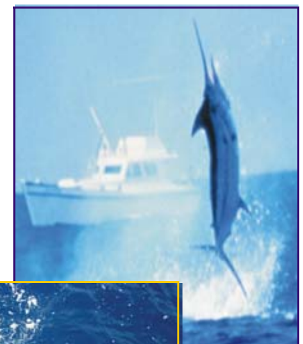
# *Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan*







Including:
A Final Environmental Impact Statement,
A Final Regulatory Impact Review,
A Final Regulatory Flexibility Analysis,
A Final Social Impact Assessment,
Framework Actions, and
the 2006 Stock Assessment and Fishery Evaluation Report

**DEPARTMENT OF COMMERCE**
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
*Office of Sustainable Fisheries*
*Highly Migratory Species Management Division*

*July 2006*

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# CONSOLIDATED
# ATLANTIC HIGHLY MIGRATORY SPECIES
# FISHERY MANAGEMENT PLAN

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Highly Migratory Species Management Division
Office of Sustainable Fisheries
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, Maryland 20910

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**The Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan**

**Actions:** Consolidate the Fishery Management Plan for Atlantic Tunas, Swordfish, and Shark and the Atlantic Billfish Fishery Management Plan; establish workshops for fishermen and dealers; consider changes to time/area closures; address rebuilding and/or overfishing of northern albacore tuna, finetooth sharks, and Atlantic billfish; modify the management process of bluefin tuna; change the fishing year; modify the authorized gears; implement minor changes and clarifications to the regulations; and begin the process to update essential fish habitat

**Type of Statement:** Final Environmental Impact Statement; Final Regulatory Impact Review; Final Regulatory Flexibility Analysis; Final Social Impact Statement; and Final Framework Actions

**Lead Agency:** National Marine Fisheries Service

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**Abstract:** In 2003, the National Marine Fisheries Service (NMFS) began the process to amend the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks and the Atlantic Billfish Fishery Management Plan. After considering comments on a scoping paper and on a predraft document, NMFS decided to consolidate these fishery management plans, modify the fishery management plan management measures as necessary, implement framework actions, and begin the process for updating essential fish habitat. The draft of this document was released on August 19, 2005. The comment period was open until March 1, 2006. During this time, 24 public hearings were held throughout the coastal states from Maine through Texas and the Caribbean. The final document describes a range of alternatives that could impact fishermen and dealers for all highly migratory species fisheries. The preferred alternatives include those to: establish mandatory workshops for fishermen and dealers; implement two small closures, consistent with regulations implemented by the Gulf of Mexico Fishery Management Council; establish criteria for modifying and/or establishing time/area closures; address rebuilding and/or overfishing of northern albacore tuna, finetooth sharks, and Atlantic billfish; modify the management process of bluefin tuna; change the fishing year for tunas, swordfish, and billfish back to a calendar year; authorize additional fishing gears; and clarify the regulations.

## EXECUTIVE SUMMARY

Atlantic Highly Migratory Species (HMS) are managed under the dual authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and the Atlantic Tunas Convention Act (ATCA). Under the Magnuson-Stevens Act, the National Marine Fisheries Service (NMFS) must manage fisheries to maintain optimum yield (OY) by rebuilding overfished fisheries and preventing overfishing. Under ATCA, NMFS is authorized to promulgate regulations, as may be necessary and appropriate, to implement the recommendations from the International Commission for the Conservation of Atlantic Tunas (ICCAT). Before this action, tunas, swordfish, and sharks were managed under the 1999 Fishery Management Plan (FMP) for Atlantic Tunas, Swordfish, and Sharks (and its 2003 amendment) and billfish were managed under the 1988 Atlantic Billfish FMP (and its 1999 amendment). This final HMS FMP combines the management of all Atlantic HMS into one FMP, and combines and simplifies the objectives of the previous FMPs.

NMFS announced its intent to prepare an Environmental Impact Statement to amend the two previous FMPs on July 9, 2003. In this notice, NMFS asked for comments on quota allocations of Atlantic bluefin tuna (BFT), swordfish, and sharks among and within domestic fishing categories; management alternatives to improve and streamline the current HMS limited access permit program; a review of HMS essential fish habitat (EFH) identifications; and exempted fishing and scientific research permitting issues. On April 30, 2004, NMFS announced the availability of an Issues and Options Paper and its intent to hold nine scoping meetings. This paper expanded the list of issues to include those issues listed above, additional issues for every species, HMS tournaments, bycatch reduction, recordkeeping and reporting, workshops, authorized fishing gears, and consolidation of the FMPs. NMFS presented the Issues and Options Paper to the New England, Mid-Atlantic, and Gulf of Mexico Fishery Management Councils and the Atlantic States Marine Fisheries Commission. A summary of the major comments received during scoping was released in December 2004 and is available on the HMS Management Division webpage at http://www.nmfs.noaa.gov/sfa/hms.

The Issues and Options paper included an exhaustive list of issues that NMFS could address regarding Atlantic HMS. During scoping, NMFS heard of more issues and options that merit additional consideration and examination. At the Predraft stage, in order to complete this action in a timely manner, NMFS decided to handle in this rulemaking only some of the issues identified in the Issues and Options paper and scoping process. NMFS prioritized the issues and chose to consider those that were required by law (*e.g.*, handling and release workshops are required under the 2004 Biological Opinion) and/or would improve the management of the fisheries (*e.g.*, amending the FMP for the BFT General Category should allow management to make changes in the fisheries on a more timely basis).

In February 2005, NMFS released the combined Predraft of the Consolidated HMS FMP and the 2005 Annual Stock Assessment and Fishery Evaluation (SAFE) Report. NMFS presented the Predraft document to all five Atlantic Fishery Management Councils, both the Gulf and Atlantic States Marine Fisheries Commissions, and to the HMS and Billfish Advisory Panels. Comments received on both the Issues and Options Paper and the Predraft were considered when drafting and analyzing the ecological, economic, and social impacts of the alternatives in both the draft and final HMS FMP. A summary of the comments received on the Predraft was released in June 2005 and is available on the HMS Management Division webpage. While some of the options changed between the Predraft and Draft stages, the overall list of issues to be addressed did not change.

On August 19, 2005, the draft HMS FMP and proposed rule were released. Originally, the comment period was set to end 60 days after publication (October 18, 2005). However, due to hurricanes Katrina and Rita, NMFS extended the comment period to March 1, 2006 (for a total comment period of 194 days), in order to ensure that those fishermen directly affected by the hurricanes would have an adequate amount of time to review the document and provide comment. Several thousand written comments were received, 24 public hearings were held, and all five Atlantic Fishery Management Councils and the Gulf and Atlantic States Marine Fisheries Commissions were given briefings. A summary of the public comments received and NMFS' response to those comments is included in an appendix of this document and will also be in the final rule implementing the regulations. In addition to the public comments, NMFS also had three independent scientists (*i.e.*, scientists not involved in the drafting of the document) review three specific sections of the draft HMS FMP. The three sections were the time/area analyses, the standardized bycatch reporting methodology, and the review of EFH. The peer review comments are also included in an appendix of this document.

The preferred alternatives in this document considered all of the comments received from the general public at all stages of the rulemaking and the peer review by the independent scientists. Table 1 provides the list of the changes from the draft document and the expected implementation date of each alternative. A summary of the issues addressed and the other alternatives considered in this rulemaking can be found below. More detail can be found in Chapters 2 and 4 of this document. The final HMS FMP also consolidates the objectives for the FMP (listed in Chapter 1) and removes the exemption to the billfish no sale provision (allowed for, but not implemented, in the 1988 Billfish FMP). NMFS believes that the suite of preferred alternatives in this document should, consistent with the Magnuson-Stevens Act and other domestic laws, allow overfished Atlantic HMS to rebuild, address overfishing of Atlantic HMS, balance the needs of the fishermen and communities with the needs of the resource, and maximize OY for the fishery and the resource.

**Table 1 The preferred alternatives at the draft and final stage of the Consolidated HMS FMP and the expected implementation date.**

| Preferred Alternative in Draft HMS FMP | Preferred Alternative in Final HMS FMP | Expected Implementation Date |
|---|---|---|
| *Bycatch Reduction: Workshops* | | |
| A2. Mandatory workshops and certification for all HMS pelagic and bottom longline vessel owners | Same | January 1, 2007: must complete certification prior to renewing HMS permit in 2007 |
| A3. Mandatory workshops and certification for vessel operators actively participating in HMS pelagic and bottom longline fisheries | Same | January 1, 2007: must complete certification prior to fishing on a vessel that has renewed its HMS permit in 2007 |
| A5. Mandatory workshops and certification for shark gillnet vessel owners and operators | Same | January 1, 2007: must complete certification prior to renewing HMS permit in 2007 |
| A6. Certification Renewal Timetable (Certification renewal every 3-years) | Same | 30 days after final rule is published |
| A9. Mandatory HMS identification workshops for all shark dealers | Same | December 31, 2007 |
| A16. Certification Renewal Timetable (Certification renewal every 3-years) | Same | 30 days after final rule is published |
| *Bycatch Reduction: Time/Area Closures* | | |
| B4. Implement complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves | Same | 30 days after final rule is published |
| B5. Establish criteria to consider when implementing new time/area closures or making modifications to existing time/area closures | Same | 30 days after final rule is published |
| *Rebuilding and Preventing Overfishing: Northern Albacore Tuna* | | |
| C3. Establish the foundation with ICCAT for developing an international rebuilding program | Same | 30 days after final rule is published |
| *Rebuilding and Preventing Overfishing: Finetooth Sharks* | | |
| D4. Identify sources of finetooth shark fishing mortality to target appropriate management actions | Same | Ongoing |
| *Rebuilding and Preventing Overfishing: Atlantic Billfish* | | |
| E3. Effective January 1, 2007, limit all Atlantic billfish tournament participants to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations | E3. Effective January 1, 2007, limit all HMS permitted vessels participating in Atlantic billfish tournaments to deploying only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations | January 1, 2007 |

| Preferred Alternative in Draft HMS FMP | Preferred Alternative in Final HMS FMP | Expected Implementation Date |
|---|---|---|
| E6. Effective January 1, 2007, implement ICCAT Recommendations on Recreational Marlin Landings Limits | Same | January 1, 2007 |
| E7. Effective January 1, 2007 - December 31, 2011, allow only catch and release fishing for Atlantic white marlin | No longer preferred | NA |
| *Management Program Structure: Bluefin Tuna Quota Management* | | |
| F3. Amend the management procedures regarding General category time-periods, subquota, as well as geographic set-asides to allow for future adjustments to take place via a regulatory framework action | Same | 30 days after final rule is published |
| F3(c). Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 50%; Sept, 26.5%; Oct-Nov, 13%; Dec, 5.2% and Jan, 5.3%) | Same | 30 days after final rule is published |
| F4. Clarify the procedures for calculating the Angling category school size-class BFT subquota allocation and remove the Angling category north/south dividing line | F4. Clarify the procedures for calculating the Angling category school size-class BFT subquota allocation and maintain the Angling category north/south dividing line | 30 days after final rule is published |
| F6. Revise the annual BFT specification process to refer back to the supporting analytical documents of the Consolidated HMS FMP and include seasonal management measures in annual framework actions | Same | 30 days after final rule is published |
| F8. Establish an individual quota category carry-over limit of 100 percent of the baseline allocation (*i.e.*, no more than the annual baseline allocation may be carried forward), except for the Reserve category, and authorize the transfer of quota exceeding the 100 percent limit to the Reserve or another domestic quota category, while maintaining status quo overharvest provisions | Same | 30 days after final rule is published |
| F10. Revise and consolidate criteria considered prior to performing inseason and some annual BFT management actions | Same | 30 days after final rule is published |
| *Management Program Structure: Timeframe for Annual Management of HMS Fisheries* | | |
| G2. Shift the fishing year to January 1 – December 31 for all HMS | Same | January 1, 2008 |
| *Management Program Structure: Authorized Fishing Gears* | | |
| H2. Authorize speargun fishing gear as a permissible gear type in the recreational Atlantic tuna fishery | H2. Authorize speargun fishing gear as a permissible gear type in the recreational Atlantic BAYS tuna fishery | 30 days after final rule is published |

| Preferred Alternative in Draft HMS FMP | Preferred Alternative in Final HMS FMP | Expected Implementation Date |
|---|---|---|
| H4. Authorize green-stick for the commercial harvest of Atlantic BAYS tunas | No longer preferred | NA |
| H5. Authorize buoy gear in the commercial swordfish handgear fishery, and limit vessels employing buoy gear to possessing and deploying no more than 35 individual buoys, with each having no more than two hooks or gangions attached | H5. Authorize buoy gear as a permissible gear type in the commercial swordfish handgear fishery; limit vessels employing buoy gear to possessing and deploying no more than 35 floatation devices, with each individual gear having no more than two hooks or gangions attached | 30 days after final rule is published |
| H7. Clarify the allowance of hand-held cockpit gears used at boat side for subduing HMS captured on authorized gears | Same | 30 days after final rule is published |
| *Management Program Structure: Regulatory Housekeeping* | | |
| I1(b). Establish additional restrictions on longline gear in HMS time/area closures by specifying a maximum and minimum allowable number of commercial fishing floats to qualify as a BLL and PLL vessel, respectively | No longer preferred | NA |
| I1(c). Differentiate between PLL and BLL gear based upon the species composition of the catch onboard or landed | Same | 30 days after final rule is published |
| I2(b). Require that the 2nd dorsal fin and the anal fin remain on all sharks through landing | Same | 30 days after final rule is published |
| I3(b). Add new prohibition at § 635.71(a)(48) making it illegal for any person to, "Purchase any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24" | Same | 30 days after final rule is published |
| I3(c). Add new prohibition at § 635.71(a)(49) making it illegal for any person to, "Sell any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24" | Same | 30 days after final rule is published |
| I4(b). Amend the second coordinate of the East Florida Coast closed area so that it corresponds with the EEZ | Same | 30 days after final rule is published |
| I5(b). Amend the definition of "handline" at § 635.2 by requiring that they be attached to, or in contact with, all vessels | Same | 30 days after final rule is published |
| I6(b). Prohibit vessels issued commercial permits and operating outside of a tournament from possessing, retaining, or taking Atlantic billfish from the management unit | Same | 30 days after final rule is published |

| Preferred Alternative in Draft HMS FMP | Preferred Alternative in Final HMS FMP | Expected Implementation Date |
|---|---|---|
| I7(b). Amend the HMS regulations to provide an option for Atlantic tunas dealers to submit required BFT reports using the Internet | Same | 30 days after final rule is published |
| I8(b). Require submission of “No Fishing” reporting forms for selected vessels if no fishing trips occurred during the preceding month, postmarked no later than seven days after the end of the month | Same | 30 days after final rule is published |
| I8(c). Require submission of the trip "Cost-Earnings” reporting form for selected vessels 30 days after a trip and the annual “Cost-Earning” report form by January 31 of each year | I8(c). Require submission of the trip “cost-earnings” reporting form for selected vessels 30 days after a trip, and the “annual expenditures” report form by the date specified on the form | 30 days after final rule is published |
| I9(b). Require vessel owners to report non-tournament recreational landings of North Atlantic swordfish and Atlantic billfish | I9(b). Require vessel owners (or their designees) to report non-tournament recreational landings of North Atlantic swordfish and Atlantic billfish | 30 days after final rule is published |
| I10(b). Modify the HMS regulations to state that “In addition, each year, 25 mt (ww) will be allocated for incidental catch by pelagic longlines” in the NED | I10(c). Conduct additional discussions at ICCAT regarding quota rollovers and adjust quotas allocated to account for bycatch related to pelagic longline fisheries in the vicinity of the management area boundary accordingly | 30 days after final rule is published |
| I11(b). Require recreational vessels with a Federal permit to abide by Federal regulations, regardless of where they are fishing, unless a state has more restrictive regulations | Same | 30 days after final rule is published |

*Bycatch Reduction: Workshops*

The June 2004 Biological Opinion (BiOp) for the Atlantic HMS pelagic longline fishery requires NMFS to conduct training workshops regarding the safe release and disentanglement of sea turtles from pelagic longline gear and to certify that fishermen have attended these workshops. The October 2003 BiOp on the Atlantic shark fishery requires a series of workshops that provide gear handling techniques and protocols that deal with entanglements and protected species, in general, and include information on smalltooth sawfish and HMS requirements. Additionally, in Amendment 1 to the Atlantic Tunas, Swordfish, and Shark FMP, NMFS stated that if shark fishermen can show that they can fish for specific species (*e.g.*, target sandbar sharks) and correctly identify the shark species caught on their gear, then the Agency might consider using species-specific shark quotas in the future. Thus, NMFS felt it was important to consider workshops, particularly workshops for handling and release of protected species and workshops for identification of Atlantic HMS, in this rulemaking.

The workshops for the safe release, disentanglement, and identification of protected resources are designed to reduce the post-hooking mortality of sea turtles and other protected resources by educating fishermen on how to apply the appropriate safe handling and release protocols, improve compliance with regulations, and enhance the utility of vessel logbook data. The preferred alternatives for the protected species workshops would require all longline and gillnet permit holders and operators to attend and be certified in handling and release techniques and gear. Mandatory workshops for vessel owners would be linked to the vessels' permit, ensuring well attended workshops. Including operators would guarantee at least one person on board the vessel during fishing activities is adept at the safe handling and release protocols. NMFS also considered a range of alternatives for the protected species workshops including voluntary workshops (no action) and mandatory workshops for the owners, operators, and the crew of all HMS longline and gillnet vessels.

The preferred alternative for the identification workshops calls for all Federally permitted shark dealers, or a designated proxy, to attend one-day workshops on species-specific identification of offloaded shark carcasses. NMFS believes that identifying shark carcasses is more difficult and uncertain than identifying other HMS carcasses as evidenced by the large proportion of "unclassified" sharks listed on shark dealer logbooks. This uncertainty compromises quota monitoring and stock assessment efforts. Dealers are a focal point for gathering shark landings information as sharks from numerous vessels are offloaded at each individual dealer. Positive identification is often less difficult for fishermen than dealers as they know exactly where (depth, type of habitat, etc) a shark has been caught and often see the sharks alive and intact. NMFS considered a range of alternatives for these identification workshops including voluntary HMS identification workshops for dealers, recreational fishermen, and all commercial vessel owners and operators (no action) and mandatory identification workshops for all HMS dealers and/or HMS permit holders.

Under the preferred alternatives, longline and gillnet permit holders and vessel operators and shark dealers would be required to be recertified every three years. NMFS also considered recertification time periods of two and five years. Requiring recertification every three years would balance the ecological benefits of maintaining familiarity with the protocols and the economic impacts of workshop attendance due to travel costs and lost fishing opportunities.

None of the preferred alternatives changed significantly between the draft and final stages of this HMS FMP, although NMFS did adjust the effective dates as a result of public comment and the lengthening of the comment period. These one-day workshops are not expected to result in excessive economic impacts as they would be scheduled at numerous locales along the Atlantic coast, minimizing travel and lost fishing time.

*Bycatch Reduction: Time/Area Closures*

Since the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks, NMFS has implemented a number of time/area closures in order to reduce bycatch, to the extent practicable, consistent with the National Standards. While the results of preliminary analyses examining the efficacy of these closures have been included in annual SAFE Reports, a comprehensive analysis of the impact of the closures on bycatch rates, the fishermen, and the communities is contained in this document. In this document, NMFS examines the current time/area closures to determine if these closures are accomplishing the original goals of the closures and whether changes are needed to accomplish other objectives. The results of that examination indicate that both bycatch and overall effort in the fleet has been reduced (see discussions of alternative B1 in Chapter 4).

In this HMS FMP, NMFS is preferring two alternatives in regard to time/area closures. The first preferred alternative would establish HMS regulations in the Madison-Swanson and Steamboat Lumps Marine Reserves that complement the Gulf of Mexico Fishery Management Council's regulations. These closures are expected to have minimal ecological, economic, or social impacts on HMS fishermen. The second preferred alternative would establish criteria that would guide future decision-making regarding implementation or modification of time/area closures. This would provide enhanced transparency, predictability, and understanding of HMS management decisions, allow for more adaptive management, and should result in minimal social and economic impacts. Any impacts for specific closures would be analyzed when those closures are considered.

As described in Chapter 4 and Appendix A, NMFS used POP and HMS logbook data to identify new areas for time/area closures and selected alternatives based on these data to further analyze 10 different closures or modifications for this rulemaking. NMFS evaluated the reduction in discards of white marlin, blue marlin, sailfish, spearfish, leatherback sea turtles, loggerhead sea turtles, other sea turtles, and BFT without redistribution of effort based on POP data and the HMS logbook data for the various time/area closure alternatives (see Chapter 4). Using HMS logbook data (see Chapter 4 and Appendix A), NMFS evaluated different scenarios of a redistribution of fishing effort model, where each scenario had different assumptions regarding how fishing effort would be redistributed into open areas. The model used in this time/area analysis was consistent with the methods used in past rulemakings (for more information on redistribution of effort model selection, please see page 4-6). Additional redistribution of effort scenarios were considered based on comments received on the Draft Consolidated HMS FMP and the OMB reviews. As described in Chapter 4, each scenario of the models had different assumptions regarding how fishermen would react to the closures (*e.g.*, will fishermen move out of the closed area but continue fishing in surrounding open areas, move their business, or sell their permits to someone near an open area). Because of the difficulty in predicting fishermen's behavior, NMFS analyzed the range of what would happen fleet-wide while recognizing that individuals within the fleet may act differently, and large closures may result in more movement in order for fishermen to find open areas to fish and stay in business.

NMFS examined a wide range of alternatives including closing additional closures or combining these additional closures for pelagic longline gear in the Gulf of Mexico and the Atlantic Ocean, modifying existing closures for pelagic longline gear, establishing a closure for bottom longline gear to protect smalltooth sawfish, and closing all areas to pelagic longline gear. These alternatives were not preferred for a variety of reasons. The ecological benefits of some of the additional closure alternatives considered were predicted to be variable with redistribution of effort, with potential negative ecological impacts to several species. For example, alternative B2(a) (May - Nov), intended primarily to reduce leatherback sea turtle interactions, and white marlin and BFT discards, could result in a 7.9 percent increase in loggerhead sea turtle interactions and a 10.3 percent increase in BFT discards (see Table 4.2). As described in Appendix A, even the modified redistribution of effort model for alternative B2(a) predicted increases in sailfish discards (4.7 percent), LCS discards (4.4 percent), BFT discards (1.6 percent), and BAYS discards (0.7 percent). When closure areas were combined, the redistribution of effort model predicted similar results with an increase in discards of several species.

Alternatives B3(a) and B3(b) were considered to refine existing closures and to provide additional opportunity to harvest legal-sized swordfish while not increasing bycatch. NMFS, however, is not preferring any modifications to the current closures. None of the modifications considered would have resulted in a large enough increase in retained catch to alleviate concerns over uncaught portions of the swordfish and BFT quotas. For instance, B3(a) was predicted to increase retained swordfish catch by only 30.72 mt, and B3(a) was predicted to increase the retained swordfish catch by 0.07 mt. However, as of April 30, 2006, 4,905.9 mt and 294.7 mt of directed and incidental quota, respectively, were still available for the 2005 fishing year. In addition, modifications to existing closures could result in increased bycatch of blue and white marlin, which is a concern given the stock status of blue and white marlin and the scheduled white marlin ESA review. Increased interactions with sea turtles and marine mammals (*e.g.*, pilot whales and Risso's dolphins) are an additional concern.

Finally, all of these analyses (those analyzing the impacts of new closures and those analyzing the impacts of modifications to existing closures) were conducted using J-hook data. New circle hook management measures were put into place in 2004, and NMFS is still assessing the effects of circle hooks on bycatch rates for HMS. Based on the Northeast Distant experiment, circle hooks likely have a significantly different catch rate than J-hooks. Therefore, NMFS needs to conduct further investigations to determine the potential impact of any new time/area closures or modifications to existing closures. NMFS anticipates that 2005 HMS logbook final data will become available in the summer of 2006. In addition, NMFS is awaiting additional information regarding the status of the pelagic longline fleet after the devastating hurricanes in the Gulf of Mexico during the fall of 2005. A majority of the pelagic longline fleet was thought to be severely damaged or destroyed during the 2005 hurricane season. The amount of pelagic longline fishing effort, especially within the Gulf of Mexico, will likely be assessed in the summer of 2006 when 2005 HMS logbook final data becomes available. Until NMFS can better estimate the current fishing effort and potential recovery of the pelagic longline fleet, it may be premature to implement any new time/area closures, particularly in the Gulf of Mexico. Furthermore, a number of stock assessments will be conducted during 2006 (blue marlin, white marlin, north and south swordfish, eastern and western BFT, and large coastal sharks). NMFS is waiting on the results of these stock assessments to help determine domestic measures with regard to management of these species.

For the bottom longline closure alternative (B6), NMFS is waiting for the Smalltooth Sawfish Recovery Team to designate critical habitat in order to compare possible closure areas with the critical habitat. Closing all areas to pelagic longline gear (alternative B7) would have severe economic and social impacts in the short term and possible negative ecological impacts in the long term if U.S. quotas are transferred to countries without the same conservation ethic.

While NMFS did not change the preferred alternatives between the draft and final stages, NMFS did conduct additional analyses as a result of public comment. These analyses include examining the redistribution of effort model and its applicability, the mobility of the fleet, and the concept of a decision matrix. NMFS also began looking at the 2004 circle hook data for the pelagic longline fishery. In the future, NMFS intends, among other things, to investigate the choices fishermen have made regarding previous closures and to pursue alternatives to reduce bycatch in the Gulf of Mexico, especially for BFT. For BFT, NMFS is currently trying to assess how protecting one age class at the potential detriment of other age classes will affect the fish stock as a whole, and is also considering developing incentives that would dissuade fishermen from keeping incidentally caught BFT, particularly spawning BFT, in the Gulf of Mexico. This may involve research on how changes in fishing practices may help reduce bycatch of non-target species as well as the tracking of discards (dead and alive) by all gear types. More information on these additional analyses, their results, and potential future actions are contained in Chapter 4 and Appendix A.

*Rebuilding and Preventing Overfishing: Northern Albacore Tuna*

Since the 1999 FMP, NMFS has determined that northern albacore tuna are overfished. While NMFS published a final rule that stated NMFS would work with ICCAT to rebuild northern albacore, a rebuilding plan was not previously incorporated in the FMP. The preferred alternative would establish a foundation with ICCAT for developing an international rebuilding plan. Under this alternative, NMFS will continue to work with ICCAT member nations to develop and adopt an appropriate international rebuilding plan for northern albacore tuna with a specified recovery period, biomass targets, fishing mortality rate limits, and explicit interim milestones. The U.S. harvest of the North Atlantic stock is proportionally so low that the socio-economic impacts to the United States would likely be minimal but would depend upon the specifics of the rebuilding plan adopted by ICCAT. The other alternatives of no action or unilateral action would not be consistent with the Magnuson-Stevens Act or ATCA, and would be unlikely to rebuild northern albacore.

*Rebuilding and Preventing Overfishing: Finetooth Sharks*

In 2002, NMFS determined that overfishing is occurring on finetooth sharks. In the 2003 Amendment to the 1999 FMP, because most finetooth landings appear to come from fishermen in non-HMS fisheries, NMFS stated that it would take action to identify sources of fishing mortality on finetooth sharks, increase outreach, improve enforcement of the recreational limits, and work with the Regional Fishery Management Councils to identify fisheries that catch finetooth sharks.

In this HMS FMP, NMFS prefers an alternative that would establish a plan to prevent overfishing. This preferred alternative would identify the sources of fishing mortality for finetooth sharks. The analyses in the HMS FMP found that the majority of finetooth sharks are landed in the South Atlantic region (primarily Florida) by vessels deploying gillnet gear and in possession of both a Spanish mackerel permit and a commercial shark permit. NMFS also found that an unmanaged fishery, the southern kingfish fishery, also catches finetooth sharks. Thus, any management measures that are solely directed at fishermen using gillnet gear and in possession of a commercial shark permit could easily be circumvented by fishermen using gillnets for Spanish mackerel or kingfish. In addition to conducting analyses, NMFS has also contacted the states and Regional Fishery Management Councils, sent a letter to the South Atlantic Fishery Management Council requesting collaboration in management between gillnet fisheries, and requested that finetooth sharks be added to observer programs such as the Gulf of Mexico shrimp trawl fishery. These actions should provide additional options to address this issue.

NMFS considered other alternatives including no action, management measures targeting commercial shark permit holders, and management measures targeting recreational HMS permit holders. Targeting commercial shark permit holders is confounded by the fact that finetooth sharks are within the SCS complex, which is not currently overfished or experiencing overfishing, and commercial fishermen have only caught, on average, 28.5 percent of the SCS quota between 1999-2003. Measures aimed at the recreational fishery would only affect a small portion of the overall finetooth shark landings. Furthermore, a conservative bag limit of one shark (including finetooth shark) and a minimum size above the age at first maturity for males and females are already in place. NMFS intends to conduct a new small coastal shark stock assessment following the Southeast Assessment, Data, and Review process starting in 2007. As more research and data become available, NMFS may reconsider these other alternatives.

NMFS did not change the preferred alternative between the draft and final stages. NMFS believes that the preferred approach constitutes a plan to prevent overfishing and is a prudent means of establishing regulations that might affect a type of gear (gillnet), rather than an individual permit. Applying the regulations to the gear is critical as regulations implemented only on shark permit holders would only affect a sub-set of the individuals responsible for finetooth shark fishing mortality, could be easily circumvented, and would likely result in additional dead discards of finetooth sharks.

*Rebuilding and Preventing Overfishing: Atlantic Billfish*

Despite the implementation of domestic and international management measures, the status of Atlantic blue and white marlin has continued to decline. Currently, the status of sailfish and spearfish is uncertain. Atlantic white marlin has been identified as one of the most severely overfished species of any stock under ICCAT's purview for the past four years, but nevertheless continues to be subjected to unsustainable levels of fishing mortality throughout the Atlantic. In 2002, the United States undertook a status review of white marlin pursuant to the Endangered Species Act (ESA). While the status review team determined that white marlin stock status did not warrant a listing at that time, it concluded that "unless fishing mortality is reduced significantly and relatively quickly, the stock could decline to a level that would warrant ESA protection" (White Marlin Status Review Team 2002). NMFS will conduct another ESA listing review in 2007. As such, in this document, NMFS reviewed the current data and examined methods of reducing billfish mortality in both the commercial (*e.g.*, time/area closures) and recreational fisheries (*e.g.*, circle hook requirements).

NMFS is preferring two alternatives to reduce the post-release mortality of billfish associated with the directed billfish fishery. The first preferred alternative would require the use of non-offset circle hooks by HMS permitted vessels in billfish tournaments when using natural baits or natural bait/artificial lure combinations. The second preferred alternative would codify the ICCAT landings recommendations for billfish. The current landings recommendation would limit the United States to landing no more than 250 blue or white marlin per year. These alternatives strike a balance between conserving living marine resources and maintaining robust recreational fisheries while achieving the objectives of the HMS FMP. The preferred alternatives are anticipated to substantially reduce the post-release mortality of Atlantic white marlin, provide positive ecological benefits for other species such as blue marlin, sailfish, and tunas, and maintain consistency with United States' international obligations. NMFS is delaying the effective date for the circle hook requirement to mitigate, to the extent practicable, adverse economic impacts and losses in angler consumer surplus by allowing: tournament operators adequate time to adjust advertising, rules, business practices, and tournament formats; existing stockpiles of J-hooks to be used; and, anglers time to become comfortable and proficient with newly required gear.

As a result of public comment, NMFS is no longer preferring the alternative that would prohibit the landing of white marlin. Additionally, NMFS clarified the intent of the first preferred alternative to ensure that only HMS permit holders, not all tournament participants, would be affected by the circle hook requirement.

*Management Program Structure: Bluefin Tuna Quota Management*

Western Atlantic BFT are overfished, and one of the main objectives of the Consolidated HMS FMP is to end overfishing and rebuild overfished stocks, while providing reasonable fishing opportunities to harvest the limited quota that is available under the BFT rebuilding plan. Since the 1999 FMP, BFT management has become increasingly complicated and difficult for the public to understand and may no longer accurately reflect the needs of the fishery and goals of the 1999 FMP. These issues are evident on a daily basis from the number of constituent inquiries addressed by NMFS and the number of inseason management actions necessary throughout the season. In addition, NMFS has received a petition from the State of North Carolina Department of Marine Fisheries (NMDMF) for rulemaking to adjust the quota allocations to provide for a General category fishery off North Carolina in the winter. NMFS considers these requests and considers ways of clarifying BFT management.

Two of the preferred alternatives would amend the time period and sub quotas for the General category and clarify the procedures for calculating the Angling category school-size fish. These alternatives are expected to enhance NMFS' flexibility to address inherent variability in the BFT fishery while still allowing for business planning. They also respond in part to the NCDMF's Petition for Rulemaking and would allow for a formal General category winter BFT fishery while still recognizing the historical BFT catch rates in the New England area fishery. These preferred alternatives would also clarify the procedures NMFS used to implement the ICCAT recommendation regarding the eight percent tolerance limit of school BFT as well as maintain the recreational North/South dividing line as a management tool.

Two other preferred alternatives would provide participants in the BFT fishery a timely and stable baseline quota allocation from one year to the next, the ability to address under/overharvest from the previous year, the ability to establish the General category effort controls as well as recreational and commercial handgear daily retention limits for the upcoming season, and streamline the annual rulemaking process. Additionally, providing NMFS the authority to implement a cap on the amount of quota that may be carried forward from one fishing year to the next would allow NMFS to manage to harvest of BFT with more finite precision and minimize the occurrence of 'stockpiling' in any one quota category.

Another preferred alternative would consolidate and refine the criteria that NMFS must consider prior to conducting any inseason, and some annual, actions. This preferred alternative would assist in meeting the Consolidated HMS FMP’s objectives in a consistent manner, providing reasonable fishing opportunities, increasing the transparency in the decision making process, and balancing the resource's needs with users’ needs.

*Management Program Structure: Timeframe for Annual Management of HMS Fisheries*

In the 1999 FMP and 1999 Billfish Amendment, NMFS established a fishing year management cycle for tunas, billfish, and swordfish that began on June 1 and went through the following May 31. This fishing year was established to allow NMFS time to implement recommendations from ICCAT before the fishing year began. The change to the fishing year, however, has been problematic given that many of the data infrastructure and reporting requirements both within NMFS and ICCAT are based on a calendar year rather than a fishing year. NMFS prefers the alternative that would establish a fishing year management cycle for all HMS of January 1 through December 31. This preferred alternative is expected to simplify the regulatory process for constituents in the long term by managing all HMS fisheries on a calendar year and improve the United States’ basis for negotiation at international forums.

*Management Program Structure: Authorized Fishing Gears*

In 1999, NMFS published a list of authorized gears for all fisheries across the nation. Occasionally, NMFS receives requests to modify the list of authorized gears. Sometimes, these requests include gear that fishermen use in other oceans or elsewhere in the Atlantic to catch the same species; other times, the requests are due to additional groups requesting to use a gear that is approved for one permit, but not another. NMFS considers some of these requests (*e.g.*, green-stick gear and speargun fishing gear) pertaining to HMS in this rulemaking.

NMFS prefers several alternatives that would add authorized gear types in HMS fisheries. The first preferred alternative would allow spearfishermen to participate in the Atlantic bigeye, albacore, yellowfin, and skipjack (BAYS) tunas fishery. This alternative is responsive to specific public comment and requests from constituents. This preferred alternative is anticipated to result in minimal negative ecological impacts and positive social and economic benefits. This preferred alternative is modified slightly from what was proposed in that, due to concerns related to the status of BFT, only BAYS tunas could be taken by spearfishermen, not BFT.

The second preferred alternative would allow the commercial swordfish handgear fishery to continue to utilize individual unattached buoyed gears (a.k.a. buoy gear), and would limit the maximum number of gears deployed by a vessel. Before this FMP, both recreational and commercial swordfish handgear fishermen could use this gear, previously called handline, and were not limited in the number of gears that could be deployed. This alternative may provide some positive ecological benefits by limiting future expansion of this gear sector and possibly by reducing the amount of lost fishing gear. This alternative could result in positive social benefits and would maintain current economic benefits to this sector. The last preferred alternative would, in response to requests from fishery participants, clarify the allowable use of secondary cockpit gears. This alternative should not result in an increase in bycatch mortality, over current levels, as secondary gears are currently utilized in HMS fisheries.

Although NMFS originally preferred an alternative that would allow for the use of greenstick in the commercial BAYS fishery in the Draft HMS FMP, it is not preferred in the Final HMS FMP. During the comment period, NMFS realized that many fishermen, both commercial and recreational, did not understand which gear configurations were currently allowed and which configurations the Agency was proposing to allow. Thus, NMFS will clarify the existing regulatory regime and the allowable configurations of green-stick gear in an effort to reduce confusion regarding the authorized use of green-stick gear.

*Management Program Structure: Regulatory Housekeeping*

This rulemaking also considers a number of corrections and additions to the Atlantic HMS regulations at 50 CFR part 635 and other relevant sections in the CFR (*e.g.*, 50 CFR part 300 contains information regarding international trade) in order to clarify their intent, remove incorrect cross-references, remove dated regulations, as appropriate, and aid enforcement. Besides the more than 40 minor corrections to the regulatory text, NMFS also considered a few changes that required alternatives. In all, NMFS is preferring 13 alternatives in this section across a wide range of eleven different issues.

The first issue in this section pertains to the definitions of bottom and pelagic longline gear. These gears catch different species and are currently differentiated by the number of weights and/or floats each gear uses. This raises enforcement concerns particularly in closed areas. As such, NMFS is preferring an alternative that would differentiate between gears based upon the species composition of the catch onboard or offloaded. This alternative is expected to accommodate the majority of commercial fishing operations, yet still provide a quantifiable method to differentiate between vessels using one gear or the other. Vessels that fish mixed trips (*i.e.*, trips that use both gear types) could still transit the closed areas provided the signals from their vessel monitoring system unit indicate the vessel is transiting and not fishing. This alternative is not expected to create significant adverse economic and social impacts and is expected to improve the monitoring of, and compliance with, HMS closed area regulations. NMFS originally preferred both the current preferred alternative and an alternative that would limit the number of floats on bottom longline vessels. NMFS is no longer preferring that alternative based upon public comment regarding impacts to vessel's operational flexibility, difficulties with terminology, and impracticalities in enforcing the alternative. Other alternatives considered, besides the no action, included requiring time and depth recorders and closing all areas to "longline" rather than trying to define the gears.

The second issue pertains to shark identification. Currently, shark fishermen may remove all fins from the shark, consistent with the five-percent shark fin ratio. NMFS prefers an alternative that would require the second dorsal and anal fins to remain on all sharks through the first port of landing. While this alternative could have some minor economic and social impacts, this alterative is expected to generate ecological benefits by enhancing and improving species identification and data collection, thereby leading to improved management and increased shark populations. NMFS also considered alternatives that would allow fishermen to remove the second dorsal and anal fins from some species (*e.g.*, lemon sharks) or require all fins to remain on the shark.

In a third issue regarding sales of illegal landings, NMFS is preferring two alternatives that would add clear prohibitions to the regulations regarding the sale and purchase of landings in excess of the commercial retention limits. These alternatives may act as an additional deterrent to discourage this illegal practice. NMFS believes that the social benefits of preventing this practice should outweigh any short-term economic benefit gained as a result of illegally selling catches in excess of the commercial retention limits.

In a fourth issue regarding the definition of the closed areas, NMFS is preferring an alternative that would amend the area of the East Florida Coast closed area by extending one of its coordinates 1.02 km (0.55 nmi) seaward so that it corresponds with the outer boundary of the exclusive economic zone (EEZ). This alternative is not expected to create significant adverse economic and social impacts. Any fishing effort that would have occurred in this area would likely relocate to nearby open areas with similar catch rates. Because the East Florida Coast closed area would be enlarged under this alternative, it could reduce the bycatch of undersized swordfish, sailfish, and other HMS as compared with the no action alternative, but this reduction is expected to be minimal.

The fifth issue pertains to the definition of handline. In the authorized fishing gear section of the HMS FMP, NMFS is preferring an alternative that would define unattached handlines as buoy gear and restrict their use to commercial swordfish fishermen. In this section, NMFS is preferring an alternative that would require that handlines remain attached to all vessels. This alternative would primarily affect recreational fishery participants and commercial permittees that do not possess a commercial swordfish handgear permit. This alternative is not expected to have significant adverse social or economic impacts on fishery participants.

The sixth issue described in this section pertains to the retention of billfish by commercial permit holders. The directed billfish fishery is a recreational fishery. The regulations before this FMP required that all pelagic longline fishermen release any billfish. The regulations were silent on the retention of billfish by other commercial fishermen. NMFS is preferring an alternative that would clarify the regulations and would allow only recreational and charter/headboat fishermen to retain Alantic billfish. General category permit holders participating in a registered HMS tournament could retain billfish during the tournament. Charter/headboat fishermen who also hold commercial permits (*e.g.*, shark limited access permit) could retain billfish on non-for hire fishing trips only if no HMS on board exceed the recreational limits.

The seventh issue pertains to BFT dealer reports. The preferred alternative would provide an option for BFT dealers to submit certain reports electronically over the Internet once such a system is developed, but would not require it. Although unquantifiable, this alternative is expected to produce positive social and economic impacts for both industry and government, as a result of timesavings incurred when such a system is developed.

The eighth and ninth issues are related to reporting. The preferred alternatives would require no fishing reports and cost-earning reports to be submitted within a certain timeframe and would require either vessel owners or their designee, rather than anglers, to report all non-tournament recreational landings of Atlantic billfish and North Atlantic swordfish. None of these alternatives are expected to have adverse social or economic impacts. Rather, they clarify the regulations and improve data collection.

The tenth issue addresses the Northeast Distant (NED) BFT set-aside for pelagic longline fishermen. NMFS is preferring the alternative that would conduct additional discussions at ICCAT regarding the long-term implications of allowing unused BFT quota from the previous year being added to the subsequent year's allocation. Depending on the results of these discussions the regulations and operation procedures may need to be further amended in the future. In the interim, NMFS would maintain the current regulatory text, but would amend the practice of allowing under/overharvest of this set-aside allocation to be rolled into, or deducted from, the subsequent fishing year's set-aside allocation. This alternative would allow the pelagic longline fishery to retain incidentally caught BFT in the NED to the amount of 25 mt (ww) before landings are counted against the overall Longline category quota. At the proposed stage, NMFS preferred the alternative that would amend the current regulatory text and allow unharvested set-aside quota to be carried forward to subsequent years. That alternative is no longer preferred due to concerns about stockpiling quota and creating potential incentives to target BFT.

The last issue addressed in this section pertains to the inconsistencies between state and Federal regulations. Under the regulations, commercial swordfish and shark fishermen, as a condition of their permit, must abide by Federal regulations when fishing in state waters unless the state has more restrictive regulations. NMFS is preferring an alternative that would expand this permit condition to recreational and charter/headboat fishermen. This alternative is expected to achieve increased consistency between state and Federal regulations for Federally-permitted HMS recreational fishermen, and result in less confusion on behalf of fishermen and improved compliance. Compared with the No Action alternative, the preferred alternative would produce greater ecological benefits with few adverse social and economic impacts.

*Essential Fish Habitat*

In addition, this Consolidated HMS FMP continues a five-year review of EFH consistent with the EFH guidelines. The Magnuson-Stevens Act requires the Secretary, through NMFS, to establish guidelines to assist in the description and identification of EFH in FMPs, among other things.  The Agency set forth a schedule for the review and update of such EFH identifications based on new scientific evidence or other relevant information.  The EFH guidelines articulate processes for determining the extent of EFH for each species and life-stage in a managed fishery. In addition, the EFH guidelines call for periodic review and revision of EFH identified areas based on available information, as well as a complete review of all EFH information at least once every five years.  NMFS originally described and identified EFH for all HMS in 1999, and recently updated the EFH for five shark species (blacktip, dusky, finetooth, nurse, and sandbar) in Amendment 1 to the FMP for Atlantic Tunas, Swordfish, and Sharks, which was finalized in 2003.  In this document, NMFS includes the information available for all HMS in order to aid in the determination of which species need updates to their EFH identifications.  Any updates or resulting changes in management will be done in a future document.

*Future Considerations*

Beyond the issues addressed in this document or raised during scoping, other new and unresolved matters have been identified by the general public, the HMS and Billfish Advisory Panels, and NMFS staff as important to rebuilding and maintaining fisheries that are economically and biologically sustainable.  NMFS may consider these issues or others in future rulemakings.  It is important to note that some of these additional issues are complicated, may require specific comments from the public for development (*e.g.*, scoping meetings and/or developmental workshops), and may take several years to complete.  These issues include: the BFT fishery (status of BFT, protection of spawning grounds, potential impact of herring fisheries, size limits, filleting at sea); the swordfish fishery (quota underharvests, reporting by recreational anglers, limited access restrictions, time/area closures); the billfish fishery (ESA status review in 2007, stock status, reduction in bycatch and post-release mortality); the shark fishery (new stock assessments, changes to trip limits, limited access restrictions, time/area closures); HMS permit reform; and recordkeeping, reporting, and monitoring of all HMS fisheries.  These issues are described in more detail in Section 1.5.

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## LIST OF COMMONLY USED ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AA | Assistant Administrator for Fisheries |
| ACCSP | Atlantic Coastal Cooperative Statistics Program |
| ACS | Angler consumer surplus |
| ALRS | Automated Landings Reporting System |
| ALWTRP | Atlantic Large Whale Take Reduction Plan |
| ALWTRT | Atlantic Large Whale Take Reduction Team |
| ANPR | Advanced Notice of Proposed Rulemaking |
| AOCTRP | Atlantic Offshore Cetacean Take Reduction Plan |
| AOCTRT | Atlantic Offshore Cetacean Take Reduction Team |
| AP | Advisory Panel |
| APA | Administrative Procedure Act |
| ASMFC | Atlantic States Marine Fisheries Commission |
| ATCA | Atlantic Tunas Convention Act |
| B | Biomass |
| BAYS | Bigeye, albacore, yellowfin, skipjack tunas |
| BET | Bigeye tuna |
| BETYP | Bigeye Tuna Year Program |
| BFT | Bluefin tuna |
| BiOp | Biological Opinion |
| BLL | Bottom Longline |
| $B_{MSY}$ | Biomass expected to yield maximum sustainable yield |
| $B_{OY}$ | Biomass expected to yield optimum yield |
| BSD | Bluefin Tuna Statistical Document |
| BTF | By the fish |
| BUM | Blue marlin |
| CAR | Caribbean Statistical Area |
| CBP | Customs and Border Protection |
| CFDBS | Commercial Fisheries Database System |
| CFMC | Caribbean Fishery Management Council |
| CFL | Curved fork length |
| CFR | Code of Federal Regulations |
| CHB | Charter/Headboat |
| CIAT | Spanish for IATTC |
| CIE | Center for Independent Experts |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| COE | Certificate of Eligibility |
| COFI | Committee on Fisheries |
| CPI | Consumer Price Index |

| | |
|---|---|
| CPUE | Catch per unit effort |
| CSFOP | Commercial Shark Fishery Observer Program (run by University of Florida) |
| CSR | Center for Shark Research |
| CSTP | Cooperative Shark Tagging Program |
| CZMA | Coastal Zone Management Act |
| DEIS | Draft Environmental Impact Statement |
| DPS | Distinct population segment |
| DRG | Dredge |
| DSGFOP | Directed Shark Gillnet Fishery Observer Program |
| dw | Dressed weight |
| EA | Environmental Assessment |
| EEZ | Exclusive Economic Zone |
| EFC | East Florida Coast closed area |
| EFH | Essential fish habitat |
| EFP | Exempted fishing permit |
| EIS | Environmental Impact Statement |
| EO | Executive Order |
| ESA | Endangered Species Act |
| F | Instantaneous fishing mortality |
| FAD | Fish aggregating device |
| FAO | Food and Agriculture Organization |
| FAS | Free Alongside Ship |
| FEC | Florida East Coast Statistical Area |
| FEIS | Final Environmental Impact Statement |
| FL | Fork length |
| FMP | Fishery management plan |
| $F_{MSY}$ | Instantaneous fishing mortality rate expected to yield maximum sustainable yield |
| FMU | Fishery management unit |
| $F_{OY}$ | Fishing mortality rate expected to yield optimum yield |
| FR | Federal Register |
| FRFA | Final regulatory flexibility analysis |
| GDP | Gross Domestic Product |
| GIS | Geographic Information System |
| GOM | Gulf of Mexico |
| GSAFDF | Gulf and South Atlantic Fishery Development Foundation |
| GMFMC | Gulf of Mexico Fishery Management Council |
| GSMFC | Gulf States Marine Fisheries Commission |
| HACCP | Hazard Analysis Critical Control Point |
| HAPC | Habitat area of particular concern |

| | |
|---|---|
| HBS | Headboat Survey |
| HMS | Highly migratory species: Atlantic sharks, tunas, swordfish, and billfish |
| HTS | Harmonized Tariff Schedule |
| IATTC | Inter-American Tropical Tuna Commission |
| ICCAT | International Commission for the Conservation of Atlantic Tunas |
| ILAP | Initial limited access permit |
| IMARPE | Instituo del Mar del Peru |
| INP | Instituto Nacional de Pesca |
| IPOA | International Plan of Action |
| IRFA | Initial regulatory flexibility analysis |
| ITP | International Trade Permit |
| ITQ | Individual transferable quota |
| ITS | Incidental take statement |
| IUU | Illegal, Unregulated, and Unreported |
| LAP | Limited access permit |
| LCS | Large coastal sharks |
| LJFL | Lower jaw fork length |
| LOA | Letter of Acknowledgment |
| LOF | List of Fisheries |
| LPS | Large Pelagic Survey |
| LWTRP | Large Whale Take Reduction Plan |
| LWTRT | Large Whale Take Reduction Team |
| M | Mortality |
| MAB | Mid-Atlantic Bight Statistical Area |
| MAFMC | Mid-Atlantic Fishery Management Council |
| Magnuson-Stevens Act | Magnuson-Stevens Fishery Conservation and Management Act |
| MFMT | Maximum fishing mortality threshold |
| MMPA | Marine Mammal Protection Act |
| MMS | Minerals Management Service |
| MPA | Marine protected area |
| MRFSS | Marine Recreational Fishing Statistics Survey |
| MSST | Minimum stock size threshold |
| MSY | Maximum sustainable yield |
| mt | Metric tons |
| NCA | North Central Atlantic |
| NEC | Northeast Coastal Statistical Area |
| NED | Northeast Distant Statistical Area |
| NEFMC | New England Fishery Management Council |
| NEFSC | Northeast Fisheries Science Center, NMFS |

| | |
|---|---|
| NEPA | National Environmental Policy Act |
| NERO | Northeast Regional Office, NMFS |
| NFRDI | National Fisheries Research and Development Institute |
| NGO | Non-governmental organization |
| NMFS | National Marine Fisheries Service |
| nmi | Nautical mile |
| NOA | Notice of Availability |
| NOAA | National Oceanographic and Atmospheric Administration |
| NOI | Notice of Intent |
| NPOA | National Plan of Action |
| NRC | Natural Resources Consultants, Inc. |
| NS | National Standards |
| NYB | New York Bight |
| OSF | Office of Sustainable Fisheries |
| OY | Optimum yield |
| PAT | Pop-up archival tag |
| PFD | Personal flotation device |
| PIFSC | Pacific Islands Fisheries Science Center |
| PLL | Pelagic longline |
| PLTRP | Pelagic Longline Take Reduction Plan |
| PLTRT | Pelagic Longline Take Reduction Team |
| POP | Pelagic observer program |
| PPI | Producer price index |
| OPR | Office of Protected Resources |
| PRA | Paperwork Reduction Act |
| PRM | Post-release mortality |
| PSAT | Pop-up satellite archival tag |
| RBS | Recreational Billfish Survey |
| Reg Flex Act | Regulatory Flexibility Act |
| RIR | Regulatory Impact Review |
| RFMC | Regional Fishery Management Council |
| RPAs | Reasonable and Prudent Alternatives |
| RPMs | Reasonable and Prudent Measures |
| RUM | Random utility model |
| SAFE Report | Stock Assessment and Fishery Evaluation Report |
| SAFMC | South Atlantic Fishery Management Council |
| SAB | South Atlantic Bight |
| SAI | Sailfish |
| SAR | Sargasso Sea |

| | |
|---|---|
| SBR | Spawning Stock Biomass Ratio |
| SCRS | Standing Committee for Research and Statistics |
| SCS | Small coastal sharks |
| SCUBA | Self contained underwater breathing apparatus |
| SD | Statistical document |
| Secretary | Secretary of Commerce |
| SEDAR | Southeast Data, Assessment, and Review |
| SEFSC | Southeast Fisheries Science Center, NMFS |
| SEIS | Supplemental Environmental Impact Statement |
| SEN | Seines |
| SERO | Southeast Regional Office, NMFS |
| SEW | Stock evaluation workshop |
| SFA | Sustainable Fisheries Act |
| SFL | Straight fork length |
| SK Program | Saltonstall-Kennedy Program |
| SRP | Scientific research permit |
| SSB | Spawning stock biomass |
| SWFSC | Southwest Fisheries Science Center |
| TAC | Total allowable catch |
| TAG | Tag-A-Giant |
| TAL | Total allowable landings |
| TCs | Terms and Conditions |
| TL | Total length |
| TRP | Traps and pots |
| TUNS | Tuna North and Tuna South |
| TWL | Trawls |
| TXPWD | Texas Parks and Wildlife Department |
| UNK | Unknown |
| USFWS | United States Fish and Wildlife Service |
| VIMS | Virginia Institute of Marine Science |
| VMS | Vessel monitoring system |
| WHM | White marlin |
| WPFMC | Western Pacific Fishery Management Council |
| WTP | Willingness to pay |
| ww | Whole weight |
| WWF | World Wildlife Fund |
| YFT | Yellowfin tuna |
| YOY | Young of the year |

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# 1.0 INTRODUCTION

Atlantic Highly Migratory Species (HMS)[1] are managed under the dual authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and the Atlantic Tunas Convention Act (ATCA). Under the Magnuson-Stevens Act, the National Marine Fisheries Service (NMFS) must, consistent with the National Standards, manage fisheries to maintain optimum yield (OY) by rebuilding overfished fisheries and preventing overfishing. Under ATCA, NMFS is authorized to promulgate regulations, as may be necessary and appropriate, to implement the recommendations from the International Commission for the Conservation of Atlantic Tunas (ICCAT). Additionally, any management measures must also be consistent with other domestic laws including, but not limited to, the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), and the Coastal Zone Management Act (CZMA).

Before this document, Atlantic tunas, swordfish, and sharks were managed under the 1999 Fishery Management Plan (FMP) for Atlantic Tunas, Swordfish, and Sharks (and its 2003 amendment) and Atlantic billfish were managed under the 1988 Atlantic Billfish FMP (and its 1999 amendment). This final document consolidates the management of all Atlantic HMS into one comprehensive FMP (described Section 1.4), and combines and simplifies the objectives of the previous FMPs (described in Section 1.3).

Chapters 2 and 4 of this document provide a description of the alternatives and the analyses of the potential impacts. All of the preferred alternatives would likely be implemented in a final rule to be published shortly after this document. Chapter 3 provides a description of the fishery and contains the 2006 stock assessment and fishery evaluation report (SAFE report). Chapter 5 discusses any mitigating measures regarding the alternatives. Chapters 6, 7, and 8 fully analyze the economic impacts of the alternatives and address the requirements of a Regulatory Impact Review (RIR) and Final Regulatory Flexibility Analysis (FRFA). Chapter 9 provides the social impact analysis. Chapter 10 describes the first step in updating the descriptions of essential fish habitat. Appendix A provides the methodologies and analyses for the time/area closure alternatives described in Sections 2.1.2 and 4.1.2. Appendix B provides the maps for EFH as described in Chapter 10. Appendix C provides additional information related to domestic Atlantic billfish mortality contributions of the recreational sector and the pelagic longline fishery. Appendix D provides a summary of the comments received on the draft HMS FMP and proposed rule and NMFS' responses. Appendix E provides the peer reviews completed under the OMB peer review bulletin and NMFS' actions based on those reviews.

[1] The Magnuson-Stevens Act, at 16 U.S.C. 1802(14), defines the term "highly migratory species" as tuna species, marlin (*Tetrapturus* spp. and *Makaira* spp.), oceanic sharks, sailfishes (*Istiophorus* spp.), and swordfish (*Xiphias gladius*). Further, the Magnuson-Stevens Act, at 16 U.S.C. 1802(27), defines the term "tuna species" as albacore tuna (*Thunnus alalunga*), bigeye tuna (*Thunnus obesus*), bluefin tuna (*Thunnus thynnus*), skipjack tuna (*Katsuwonus pelamis*), and yellowfin tuna (*Thunnus albacares*).

## 1.1 Brief Management History

This section provides a brief overview of the major influences regarding HMS management and the existing FMPs. More detail regarding the management history of HMS can be found in Section 3.1.

In the 1980s, the Regional Fishery Management Councils were responsible for the management of Atlantic HMS. Thus, in 1985 and 1988, the five Councils finalized joint FMPs for swordfish and billfish, respectively. In 1989, the Councils requested that the Secretary of Commerce (Secretary) manage Atlantic sharks. NMFS finalized a Shark FMP in 1993. Atlantic tunas did not have an FMP until 1999.

On November 28, 1990, the President of the United States signed into law the Fishery Conservation Amendments of 1990 (Pub. L. 101-627). This law amended the Magnuson Fishery Conservation and Management Act (later renamed the Magnuson-Stevens Fishery Conservation and Management Act or Magnuson-Stevens Act) and gave the Secretary the authority (effective January 1, 1992) to manage HMS in the exclusive economic zone (EEZ) of the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea under authority of the Magnuson-Stevens Act (16 U.S.C. §1811). This law also transferred from the Fishery Management Councils to the Secretary, effective November 28, 1990, the management authority for HMS in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea (16 U.S.C. §1854(f)(3)). The Secretary then delegated authority to manage Atlantic HMS to NMFS. In 1992, the HMS Management Division was created within NMFS to manage Atlantic HMS.

Under the Magnuson-Stevens Act, NMFS must maintain OY of each fishery by preventing overfishing and rebuilding overfished stocks. To do this, NMFS must, among other things, consider the National Standards, including using the best scientific information and considering impacts on residents of different States, efficiency, costs, fishing communities, bycatch, and safety at sea (16 U.S.C. §1851 (a)(1-10)). The Magnuson-Stevens Act also has a specific section that addresses preparing and implementing FMPs for Atlantic HMS (16 U.S.C. §1854 (g)(1)(A-G)). In summary, the section includes, but is not limited to, requirements to:

- Consult with and consider the views of affected Councils, Commissions, and advisory groups;
- Evaluate the likely effects of conservation and management measures on participants and minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors;
- Provide fishing vessels with a reasonable opportunity to harvest any allocation or quota authorized under an international fishery agreement;
- Diligently pursue comparable international fishery management measures; and,
- Ensure that conservation and management measures promote international conservation of the affected fishery, take into consideration traditional fishing patterns of fishing vessels, are fair and equitable in allocating fishing privileges among U.S. fishermen and do not have economic allocation as the sole purpose, and promote, to the extent practicable, implementation of scientific research programs that include the tagging and release of Atlantic HMS.

In addition to domestic management under the Magnuson-Stevens Act, Atlantic HMS are also managed internationally by ICCAT. ICCAT consists of 42 contracting parties as well as other cooperating parties that fish for tunas and tuna-like species throughout the Atlantic including Canada, the European Community, Japan, and China. Since 1966, ICCAT's stated objective has been to "cooperate in maintaining the populations of these fishes at levels which will permit the maximum sustainable catch for food and other purposes." To achieve this objective, ICCAT requires countries to collect catch data. In 1966, through a resolution, ICCAT urged all countries to begin to collect and process statistics and data on Atlantic tunas fisheries. In 1972, noting data deficiencies, ICCAT again urged countries to improve the collection and efficiency of Atlantic tunas catch-effort data and to make sure data are made available to ICCAT. These types of requests continue to be made, either as resolutions or recommendations, as the management and science needs for each fishery continue to expand.

The current conservation and management recommendations of ICCAT include total allowable catches, sharing arrangements for member countries, minimum size limits, effort controls, time/area closures, trade measures, compliance measures, and monitoring and inspection programs. If the United States accepts an ICCAT recommendation, ATCA provides the Secretary with the necessary statutory authority to issue regulations as may be necessary and appropriate to implement binding ICCAT recommendations to fisheries managed by the United States (16 U.S.C. §971 *et seq*.). However, no regulation promulgated under ATCA may have the effect of increasing or decreasing any allocation or quota of fish or fishing mortality level to which the United States agreed pursuant to a recommendation of ICCAT (16 U.S.C. §971 (c)). ICCAT recommendations can be found on the internet at http://www.ICCAT.es .

In 1999, due in part to amendments to the Magnuson-Stevens Act in 1996 and additional information regarding the status of several Atlantic HMS, NMFS combined the FMPs for Atlantic swordfish and sharks and finalized the first FMP for Atlantic tunas. The result was the FMP for Atlantic Tunas, Swordfish, and Sharks (1999 FMP). At this time, NMFS also amended the 1988 Billfish FMP. Since 1999, NMFS has changed a number of regulations either through framework actions, regulatory amendments, or FMP amendments. This includes, but is not limited to, implementation of time/area closures, implementation of gear requirements for pelagic longline fishery or gear, implementation of vessel monitoring systems for shark and pelagic longline fisheries, changes in retention limits, changes in permitting requirements for charter/headboat and recreational fishermen, handling and release gear requirements for non-target species (bycatch) in longline fisheries, and changes in reporting requirements for recreational fishermen. Additionally, the status of some Atlantic HMS has changed, the pelagic longline fishery has received several times determinations that the continuation of the fishery without additional actions could jeopardize the existence of certain sea turtles, and the swordfish and bluefin tuna fisheries are not currently catching their quotas. Thus, HMS fisheries, as described in the 1999 FMP and the 1999 Billfish Amendment, have changed.

## 1.2 Need for Action

As described above, since 1999, the regulations for HMS fisheries have changed for a variety of reasons. As such, the 1999 FMP and Amendment may no longer fully describe the current fisheries. The changes have been documented in the supporting documents for various rulemakings and in annual SAFE reports. However, this document represents the first time since

1999 that a majority of the HMS fisheries have been impacted in one rulemaking. These changes and the inclusiveness of this document have been a challenge. Both before and during scoping, the public and NOAA staff raised a number of management issues that merit additional consideration and examination. Some of these issues require an FMP amendment. Other issues would be more appropriately and efficiently addressed in conjunction with other regulatory actions. However, in order to complete action on some of the issues identified during the scoping process in a timely manner, NMFS decided to handle only a portion of them in this rulemaking. NMFS prioritized the issues and chose to consider those in this rulemaking that were required by law (*e.g.*, handling and release workshops are required under the 2004 Biological Opinion) and/or would improve the management or the fisheries (*e.g.*, amending the FMP for the bluefin tuna General Category should allow management to match changes in the fisheries on a more timely basis). Other issues will be considered, as appropriate, in future rulemakings (see Section 1.5). This section provides a succinct summary of some of the reasons for the management measures being considered in this rulemaking. More detail on the individual issues can be found in Chapters 2 and 4.

This section also describes the actions that are amending the FMP and the actions that are considered regulatory framework adjustments or actions under the FMP (Table 1.1). A framework action includes notice and comment rulemaking and amends implementing regulations but not the FMP itself. Both the 1999 FMP and the 1999 Billfish Amendment listed certain management measures that could be adjusted via framework action to meet the objectives of the FMP and the Magnuson-Stevens Act and that would not necessarily require amending the FMP (50 CFR §635.34). This list was modified with Amendment 1 to the 1999 FMP. The actions preferred in this document span a range of framework actions and amendments to the FMP. The list of the types of management actions that can be accomplished via a framework action is provided in Chapter 11 of this document. For more information regarding the differences between framework actions and FMP amendments, please see Chapter 3 of the 1999 Atlantic Tunas, Swordfish, and Shark FMP.

**Table 1.1 Table indicating whether actions in this document are amending the FMP or are being taken as framework actions.**

| Major Issue | Framework or FMP Amendment |
|---|---|
| Reducing Bycatch: Workshops | FMP Amendment |
| Reducing Bycatch: Time/area closures | FMP Amendment and framework action |
| Rebuilding: Northern albacore tuna | FMP Amendment |
| Overfishing: Finetooth sharks | FMP Amendment |
| Rebuilding: Billfish | Framework action |
| Management Program: Bluefin tuna | FMP Amendment and framework action |
| Management Program: Timeframe for Annual Management | Framework action |
| Management Program: Authorized gears | Framework action |
| Management Program: Regulatory housekeeping | Framework action |

The June 2004 Biological Opinion (BiOp) requires NMFS to conduct training workshops regarding the release of sea turtles from pelagic longline gear and to certify that fishermen have attended these workshops. The October 2003 BiOp requires a series of workshops that provide gear handling techniques and protocols that deal with entanglements and protected species, in general, and including information on smalltooth sawfish and HMS requirements. Additionally, in Amendment 1 to the 1999 FMP, NMFS stated that if shark fishermen can show that they can correctly identify shark species and fish for specific species, then the Agency might consider using species-specific shark quotas in the future. In public comments received during the scoping period and on the Predraft, some fishermen commented that the data collection problem is not with the fishermen but with the dealers who often incorrectly identify shark species. These comments were considered when analyzing alternatives for workshops. Many of the needs for workshops and certifying that people are trained to handle and release fish or protected resources and to identify certain species are beyond what was considered in the 1999 FMP and Billfish Amendment. Thus, in this document, NMFS amends the 1999 FMP and Billfish Amendment and examines different types of workshops to meet these needs.

Since 1999, NMFS has implemented a number of time/area closures in order to reduce bycatch, to the extent practicable, consistent with National Standard 9. While preliminary analyses have been done in annual SAFE reports that examine the efficacy of these closures, a comprehensive analysis of the impact of the closures on bycatch rates, the fishermen, and the communities is contained in this document. Based on the results of this comprehensive analysis, in this rulemaking, NMFS examines the current time/area closures to determine if these closures are accomplishing the original goals of the closures or if changes are needed. NMFS also examines the need for additional closures to reduce bycatch in HMS fisheries of certain species including sea turtles, white marlin, and bluefin tuna. The 1999 FMP considered and allowed for the implementation of time/area closures as framework actions. However, in this action NMFS is considering a comprehensive mechanism regarding how to analyze the need for establishing, modifying, or removing time/area closures. Because this alternative is beyond the scope of the 1999 FMP, the preferred alternatives in this document recommend both amending the 1999 FMP and implementing closures under the framework mechanism.

Since the 1999 FMP, NMFS has determined that overfishing is occurring on finetooth sharks and that northern albacore tuna are overfished. NMFS addresses rebuilding and overfishing for these species in this action. For northern albacore tuna, because its rebuilding plan is not yet outlined in the FMP, any actions being considered would be an amendment to the FMP. Finetooth sharks do not require a rebuilding plan because they are not overfished but action is required to prevent overfishing. Because the actions being considered to address overfishing are contained in the list of framework actions (see Chapter 11), the actions being considered to address overfishing of finetooth sharks would be regulatory framework actions.

Despite the implementation of domestic and international management measures, the status of Atlantic blue and white marlin has continued to decline. Currently, the status of sailfish and spearfish is uncertain. Atlantic white marlin has been identified as one of the most severely overfished species of any stock under ICCAT's purview for the past four years, but nevertheless continues to be subjected to unsustainable levels of fishing mortality throughout the Atlantic. In 2002, the United States undertook a status review of white marlin pursuant to the ESA. While the status review team determined that white marlin stock status did not warrant a listing at that time, it concluded that "unless fishing mortality is reduced significantly and relatively quickly, the stock could decline to a level that would warrant ESA protection" (White Marlin Status Review Team 2002). NMFS is will conduct another ESA listing review in 2007. Ultimately, the declines in the status of blue and white marlin have diminished the likelihood of achieving domestic rebuilding goals and objectives outlined in the 1999 Billfish Amendment.

The United States has led billfish conservation efforts internationally over the past decade. The effects of these efforts, while serving to move conservation forward in the policy arena, are as yet uncertain from a biological perspective. Additional information on this issue should be available in mid to late 2006 when the next ICCAT stock assessment for Atlantic marlin is finalized. While the United States cannot unilaterally reverse stock declines for these species given the international nature of the fishery, additional domestic management actions are possible and appropriate to augment steps that have thus far been unable to stem long-term downward population trends and/or increasing fishing mortality rates for Atlantic marlins. Failure of the United States to continue leading international efforts to rebuild marlin will likely result in this issue losing visibility and priority among international fishery managers, as marlin are generally taken incidental to directed fishing activities for more commercially valuable species. The rulemaking process and the management measures analyzed are a critical component of demonstrating such leadership. Reinforcing the need for action are new data suggesting that post-release mortality for white marlin from recreational catch-and-release fishing with traditional J-hooks may be considerably higher than previous estimates. New data and studies also indicate that in some years, the domestic recreational billfish fishery may be responsible for an equal or greater amount of billfish mortality than the domestic pelagic longline fishery, in some years. This appears to be the result of the significant size differential between the two fisheries. As such, in this document, NMFS reviews the current data and examines methods of reducing billfish mortality in both the commercial (*e.g.*, time/area closures) and recreational fisheries (*e.g.*, minimum sizes, circle hooks). Because the management measures specific to reducing billfish fishing mortality are being considered are within the scope of those allowed for framework actions, these measures would be taken as regulatory framework actions.

Over the years, BFT management has become increasingly complicated, and may no longer accurately reflect the needs of the fishery and goals of the 1999 FMP. These issues are evident on a daily basis from the number of constituent inquiries addressed by NMFS and the number of inseason management actions necessary throughout the season. In addition, NMFS has received a petition from the State of North Carolina for rulemaking to adjust the quota allocations to provide for a General category fishery off of North Carolina in the winter. NMFS is considering these requests and is also considering ways of clarifying BFT management. Some of the changes considered are within the scope of those that the 1999 FMP stated could be accomplished by framework actions. However, other alternatives are beyond the scope of a framework action and need to be accomplished by FMP amendment. Thus, this issue encompasses both framework actions and amendments to the FMP.

In the 1999 FMP and Billfish Amendment, NMFS established a fishing year for tunas, billfish, and swordfish that began on June 1 and went through the following May 31. This fishing year was established to allow NMFS time to implement recommendations from ICCAT before the fishing year began. The change to the fishing year, however, has been problematic given that many of the data infrastructures and reporting requirements both within the Agency and ICCAT are based on calendar year rather than fishing years. Thus, NMFS revisits this issue during this rulemaking. Changes to the fishing year are within the scope allowed in the 1999 FMP and the 1999 Billfish Amendment. Thus, this issue is being taken as a framework action.

In 1999, NMFS published a list of authorized gears for all fisheries across the nation. Occasionally, NMFS receives requests to modify the list of authorized gears. Sometimes, these requests include gear that fishermen use in other oceans or elsewhere in the Atlantic to catch the same species; other times, the requests are due to additional groups requesting to use a gear that is approved for one permit, but not another. NMFS considers some of these requests pertaining to HMS, such as greenstick and speargun fishing gear, in this FMP. The use and restriction of gears is within the scope of management measures that can be modified through framework actions; thus, any changes to the authorized gears would be achieved via a framework action.

This FMP also considers a number of corrections and additions to the Atlantic HMS regulations at 50 CFR part 635 and other relevant sections in the CFR (*e.g.*, 50 CFR part 300 contains information regarding international trade) in order to clarify their intent, remove incorrect cross-references, remove dated regulations, as appropriate, and aid enforcement. These actions are all being taken as framework actions.

In addition, this consolidated HMS FMP continues the five-year review of HMS EFH consistent with the EFH guidelines. The Magnuson-Stevens Act requires the Secretary, through NMFS, to establish guidelines to assist in the description and identification of EFH in FMPs, among other things. The Agency set forth a schedule for the review and update of such EFH identifications based on new scientific evidence or other relevant information. The EFH guidelines articulate processes for determining the extent of EFH that encompasses each species and life-stage in a managed fishery. In addition, the EFH guidelines call for periodic review and revision of EFH identified areas based on available information, as well as a complete review of all EFH information at least once every five years. NMFS originally described and identified EFH for all HMS, including Atlantic billfish, in 1999, and recently updated the EFH for five shark species (blacktip, dusky, finetooth, nurse, and sandbar) in Amendment 1 to the FMP for Atlantic Tunas, Swordfish, and Sharks, which was finalized in 2003. In this document, NMFS includes the information available for all HMS, including billfish, in order to aid in the determination of which species need updates to their EFH identifications. Any updates or resulting changes in management will be done in a future document.

## 1.3 Objectives

Consistent with the consolidated FMP objectives (see Section 1.4.4) and the National Standards, the specific objectives of this action are to:

- Better coordinate domestic conservation and management of the fisheries for Atlantic tunas, swordfish, sharks, and billfish, considering the multi-species nature of many HMS fisheries;
- Simplify management of Atlantic HMS, to the extent practicable;
- Update the ecological, economic, and social data regarding HMS fisheries;

- Reduce bycatch and bycatch mortality, to the extent practicable, while also minimizing the economic and social impacts on related fisheries;
- Reduce mortality, including dead discards and post-release mortality, to the extent practicable, of Atlantic HMS in directed and non-directed fisheries;
- Improve, to the extent practicable, data collections or data collection programs;
- Implement, to the extent practicable, the bycatch reduction strategy using the standardized bycatch reduction methodology; and,
- Begin the review process for updating EFH identifications for Atlantic HMS, as needed.

## 1.4 Combining Management for Atlantic HMS

As discussed above, NMFS issued two separate documents in April 1999 for the Atlantic HMS fisheries. The 1999 Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, combined, amended, and replaced previous management plans for swordfish and sharks, and was the first FMP for tunas. Amendment 1 to the Billfish Management Plan updated and amended the 1988 Billfish FMP.

In 1999, based on concerns expressed by Advisory Panel (AP) members about consolidating the FMPs for billfish and the other HMS, as well as the recreational nature of the domestic billfish fishery, NMFS chose to maintain separate FMPs and APs for these species. Nevertheless, over the past six years that these two FMPs have co-existed, there has been a growing recognition by NMFS of the interrelated nature of these fisheries and the need to consider management actions together. In addition, NMFS has identified some adverse ramifications stemming from separation of the plans, including unnecessary administrative redundancy and complexity, loss of efficiency, and public confusion over the management process. The following examples illustrate the closely intertwined nature of the fisheries and their management:

1. The Magnuson-Stevens Act defines highly migratory species as tuna species, marlin, oceanic sharks, sailfishes, and swordfish;
2. An HMS Angling or Charter/Headboat (CHB) permit is required to fish for billfish or other HMS recreationally;
3. Recreational fishermen target billfish and other HMS in the same season and often on the same trip;
4. Recreational fishermen can use rod and reel to fish for both billfish and other HMS;
5. Many of the primary management actions for addressing overfishing and bycatch issues for billfish are contained in the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks;
6. Any potential management measures for billfish or other HMS are likely to impact the same communities;
7. The reporting requirements for billfish and other HMS fishermen overlap;

8. The regulations for Atlantic billfish and the other Atlantic HMS are all contained in 50 CFR part 635; and,
9. The Billfish and HMS Advisory Panels usually meet in a combined session[2].

As such, consistent with the fifth objective of Billfish Amendment 1[3] and the ninth objective listed in the 1999 Tunas, Swordfish, and Sharks FMP[4], NMFS is consolidating these FMPs into one comprehensive FMP to improve coordination of the conservation and management of the domestic fisheries for Atlantic swordfish, tunas, sharks, and billfish. The regulatory implications of consolidating the FMPs are negligible, as the regulations governing the fisheries for all Atlantic HMS have been consolidated in 50 CFR part 635 since 1999.

During the comment periods on the Predraft and Draft, some HMS and Billfish AP members, some Council members, and many recreational billfish fishermen objected to the consolidation of the FMPs. For the most part, they were concerned that: (1) two objectives from the 1988 Billfish FMP were identified for removal, on the basis that their core intent was thought to be adequately contained in objectives that would remain (this was a concern raised only for the Predraft); (2) commercial fisheries aim to utilize the specific quota while recreational fisheries, particularly billfish fisheries, aim to have the highest abundance of fish available because they are predominantly catch-and-release fisheries; (3) in a consolidated FMP, billfish would be considered only as a bycatch species and would not be a priority; and (4) billfish would lose representation on the AP. As a result of the first comment, NMFS kept those two objectives as they were originally drafted in the consolidated HMS FMP (Section 1.3). Regarding the second comment, NMFS agrees that commercial fishermen aim to fully utilize a quota and many recreational fishermen practice catch-and-release fishing. NMFS believes that this difference can be accommodated in a consolidated FMP just as they already are in the existing tunas, swordfish, and shark fisheries that are both commercial and recreational. Further, given the interconnected nature of the billfish fishery with other HMS fisheries, both on the water and in the regulatory and policy arenas, as well as the current permitting structure, changes in any of the non-billfish fisheries are likely to have impacts on the billfish fishery. Combining the FMPs would allow those changes to be analyzed more holistically with clearer links among the impacts and issues between fisheries. Regarding the third comment, NMFS believes that combining the FMPs will not change the priorities of managing HMS, which are dictated by the Magnuson-Stevens Act and other domestic law. Regarding the fourth comment, the composition of the APs in terms of representation by states and sectors (commercial, recreational, academic, or conservation) would not change as a result of combining the plans (Section 1.4.3).

Another group of constituents, including AP and Council members, objected to combining the FMPs because they felt that too many species and too much information had

[2] The Advisory Panels have met separately five times since their creation in 1997 (out of approximately 14 AP meetings total). In 1997, the Billfish AP met twice without the HMS AP because the HMS AP had not yet been created (July 7, 1997, 62 FR 36261; September 3, 1997, 62 FR 46483). At its first meeting, the HMS AP met alone (October 9, 1997, 62 FR 52692) and again after a joint meeting to discuss shark issues (July 20, 1998, 63 FR 38808). In 2003, the HMS AP met to discuss the proposed Amendment 1 to the 1999 FMP (August 27, 2003, 68 FR 51560).

[3] To better coordinate domestic conservation and management of the fisheries for Atlantic tunas, swordfish, sharks, and billfish, considering the multispecies nature of many highly migratory species (HMS) fisheries, overlapping regional and individual participation, international management concerns, and other relevant factors.

[4] To better coordinate domestic conservation and management of the fisheries for Atlantic tuna, swordfish, sharks, and billfish, considering the multispecies nature of many HMS fisheries, overlapping regional and individual participation, international management concerns, historical fishing patterns and participation, and other relevant factors.

already been combined in the existing FMPs. If anything, these parties felt that the species and management measures in the existing FMPs should be separated and that NMFS should manage on a more species-specific basis. NMFS believes that combining the FMPs for tunas, swordfish, and sharks, and the actual regulations for all HMS has led to a more holistic view of the fishery. This view has allowed the impacts of management measures on all sectors of HMS fisheries to be fully analyzed whereas before, the links may not have been seen or analyzed as readily. By combining the FMPs, NMFS is moving toward an ecosystem-based approach to the management of HMS. Such an approach could ultimately benefit the resource and the people involved. As an example, at several of the meetings on the Predraft, fishermen have noted that using circle hooks while trolling for blue marlin is impracticable. At those same meetings, tuna fishermen asked for the use of circle hooks on rod and reel. In many cases, the same fishermen fish for tunas and billfish. While NMFS could implement different regulations for tunas and billfish, more effective and appropriate management can only be done by considering the implications on both fisheries.

NMFS also received comments that other interested parties, including some recreational fishermen and AP members, feel the plan to consolidate the FMPs makes sense and is only logical, particularly given the overlapping nature of the fisheries. Some people, who supported the consolidation, noted that the customary joint meetings of the HMS and Billfish APs have resulted in an imbalance of representation favoring the recreational fishing sector. NMFS does not believe that the current APs are imbalanced. Combining the FMPs will not change the composition of the APs; however, NMFS may change the composition over time in order to preserve the balance between different interest groups.

A summary of all the comments received on the draft HMS FMP and NMFS' responses can be found in Appendix D.

### 1.4.1 Implications for Management Measures

The 1999 Tunas, Swordfish, and Sharks FMP integrated and replaced preexisting management measures for Atlantic tuna, swordfish, and shark fisheries. Amendment 1 to the Billfish FMP (1999) was developed in coordination with the Tunas, Swordfish, and Sharks FMP, but augmented rather than replaced the preexisting Billfish FMP, which had been finalized in 1988. The consolidated HMS FMP is intended to augment and combine the 1999 Atlantic Tunas, Swordfish, and Sharks FMP, Amendment 1 to the 1999 Atlantic Tunas, Swordfish, and Sharks FMP, the 1988 Billfish FMP, and Amendment 1 to the Billfish FMP into a single fishery management plan. To reiterate, upon issuance of this final document, there will be a single management plan for Atlantic tunas, swordfish, sharks, and billfish. Under this consolidated HMS FMP, "HMS" includes billfish in all references except where noted otherwise.

The consolidation itself would not change any existing management measures for Atlantic tunas, swordfish, sharks, and billfish that have been issued previously under the authority of ATCA and the Magnuson-Stevens Act. Neither would the consolidation change any of the threshold criteria that are used to determine the status of the stock (*e.g.*, overfishing is occurring if $F_{year}>F_{MSY}$). These threshold criteria are summarized briefly in Section 3.2. Should NMFS determine that further changes are necessary to the regulations or the threshold criteria, they will be made through the FMP amendment process or through rulemaking as described in the framework provisions. Please see below (Section 1.4.4) for a discussion of the implications of combining the plans on the plan objectives.

### 1.4.2 Implications for the Exemption to the Billfish No Sale Provision

The 1988 Fishery Management Plan for Atlantic Billfish prohibited the sale or purchase of Atlantic billfish. Recognizing the existence of a traditional artisanal handline fishery in Puerto Rico that occasionally landed billfishes, primarily blue marlin, the 1988 Billfish FMP also included a limited exemption from the “no sale” provision to accommodate this fishery. The exemption to the “no sale” provision was subject to a number of conditions and restrictions, including:

- only fish caught on handlines having fewer than six hooks could be retained for sale;
- vessels retaining billfish for sale could not have a rod and reel onboard;
- fish could be sold only in Puerto Rico;
- a maximum of 100 billfish per year could be landed and sold;
- if more than 100 billfish per year were landed under the exemption, the Councils would consider removing the exemption;
- all existing fishermen wishing to sell billfish would be required to obtain a permit;
- the Caribbean Fishery Management Council, in cooperation with the Government of the Commonwealth of Puerto Rico, would develop and implement a system for tracking billfish landings under the exemption; and,
- The exemption would not be in effect until the permitting and tracking systems were operative, pending approval by the five involved Councils at that time.

The exemption from the “no sale” provision for the Puerto Rican handline artisanal fishery has never been implemented under Federal regulations, because the aforementioned conditions have never been met, either prior to or following transfer of the FMP to Secretarial authority. Given that Atlantic billfish are overfished, overfishing continues to occur, longlines (not handlines) are defined in 50 CFR part 635 as having three or more hooks, and non-fulfillment of conditions necessary to implement the exemption over nearly two decades, NMFS sought comment on the potential removal of the “no sale” exemption from the FMP during the scoping process for this document. Further, as the provision was developed and approved by the five Atlantic Fishery Management Councils prior to transfer of the FMP to Secretarial authority, NMFS specifically sought comment from the Regional Fishery Management Councils on this issue in November 2004.

Public comment on elimination of the exemption to the no sale provision as discussed in the Predraft document was mixed, with support for its elimination as well as limited support for maintaining the exemption. In response to direct outreach efforts to the Councils on this issue, NMFS received formal responses from the New England Council, the Mid-Atlantic Council, and the Caribbean Council. The New England Council responded with a formal “no comment” on the issue, as it had not been directly involved in HMS management issues since the inception of

Secretarial Authority. The Mid-Atlantic Council indicated that removal of the exemption was an appropriate action, and the Caribbean Council adopted a formal motion at its May 2005 meeting in St. Thomas, USVI, in support of removing the provision. At the draft stage, NMFS did not receive any comments in opposition to the removal of this exemption.

Based on the status of Atlantic billfish as overfished with continuing overfishing; non-fulfillment of the conditions necessary to implement the exemption to the no sale provision and resultant non-implementation of the provision over a period of 18 years; public comment at all stages of writing this document; and, support of the involved Regional Fishery Management Councils, specifically the Caribbean Council which would be most directly impacted by the potential elimination of the exemption provision, NMFS is not carrying forward the exemption to the no sale provision for the artisanal handline fishery in Puerto Rico into this final consolidated HMS FMP.

### 1.4.3 Implications for Highly Migratory Species and Billfish Advisory Panels

The HMS and Billfish Advisory Panels (AP) were established in 1997, pursuant to Magnuson-Stevens Act requirements (16 U.S.C. 1801 et. seq., as amended by the Sustainable Fisheries Act PL 104-297), to assist NMFS in the collection and evaluation of information relevant to the development of the 1999 Tunas, Swordfish, and Sharks FMP and Amendment 1 of the Billfish FMP. Nominations for initial membership on the APs were solicited in March and August of 1997 for the Billfish and HMS APs, respectively. The first meeting of the Billfish AP was in July 1997 and the first meeting of the HMS AP was in October 1997.

Membership for both panels is composed of representatives of the commercial and recreational fishing communities, as well as conservation and academic interests. When finalizing the members on each panel, NMFS attempts to achieve a balance among sectors, regions, and species. The five Regional Fishery Management Councils involved in Atlantic HMS management, the Atlantic and Gulf Coastal States, the U.S. Coast Guard, and the U.S. ICCAT Advisory Committee have *ex-officio* seats. In keeping with operating practices for appointments to Regional Fishery Management Councils, in recent years, appointments to the 24-member HMS AP have been selected on a staggered, three-year cycle with eight members appointed for a three-year term. For the Billfish AP, which consists of nine appointed members, terms are on a two-year cycle with four members appointed for each two-year term. Staggered terms were implemented to ensure that there is some institutional memory on the APs at all times. The terms of *ex-officio* seats do not expire and assignment and substitution of these AP representatives are at their discretion of the respective agencies.

With the consolidation of the APs under this FMP, NMFS expects to revise the AP standard operating procedures. With this revision, NMFS will consider, among other things, how long the terms of AP members should be. The terms of current AP members will not change as a result of this consolidation.

Composition of the existing HMS and Billfish APs, in terms of the number of seats and the percentage of seat allocation, is detailed in Table 1.2. With the completion of the FMP consolidation process, the memberships of the two panels will be combined into a single consolidated HMS AP that will advise NMFS on all HMS issues, including billfish. NMFS will continue to balance representation based on species, sector, and regions, as necessary. Thus, the numbers presented in Table 1.2 may change over time, as needed.

**Table 1.2 Current Advisory Panel Seat Allocation.**

| | Current HMS AP | | Current Billfish AP | | Combined AP | |
|---|---|---|---|---|---|---|
| | # of Seats | % Representation | # of Seats | % Representation | # of Seats | % Representation |
| Commercial | 10 | 42 | 2 | 22.2 | 12 | 36.3 |
| Recreational | 8 | 33 | 4 | 44.4 | 12 | 36.3 |
| Conservation | 4 | 17 | 1 | 11.1 | 5 | 15.1 |
| Academic | 2 | 8 | 2 | 22.2 | 4 | 12.1 |
| Totals | 24 | 100 | 9 | 100 | 33 | 100 |

### 1.4.4 Implications for the FMP Objectives

Amendment and consolidation of the 1999 Tunas, Swordfish, and Shark and the Billfish FMPs and their amendments provides an opportunity to review the suitability and relevance of the HMS and Billfish FMP objectives. Both plans contain a detailed set of objectives, of which many overlap, complement, or otherwise reinforce each other. At the same time, a small number of objectives are unique to each plan, and may not logically apply to the other plan. NMFS has identified changes to the objectives of the previous FMPs that will remove redundancy and update some objectives. The objectives are finalized as outlined in Table 1.3.

**Table 1.3 Previous and Final Objectives of the Atlantic Tunas, Swordfish, and Shark, Billfish, and Consolidated HMS FMPs. *Italicized* text indicates the differences in objectives between the two previous FMPs.**

| Obj. # | Tunas, Swordfish, and Shark FMP | Billfish FMP and Billfish Amendment | Final Consolidated FMP |
|---|---|---|---|
| 1 | To prevent or end overfishing of *Atlantic tuna, swordfish, and sharks* and adopt the precautionary approach to fishery management | Prevent and/or end overfishing of Atlantic *billfish* and adopt the precautionary approach to fishery management | Prevent or end overfishing of Atlantic tuna, swordfish, billfish, and sharks and adopt the precautionary approach to fishery management |
| 2 | To rebuild overfished fisheries *in as short a time as possible* and control all components of fishing mortality, both directed and incidental, so as to ensure the long-term sustainability of the stocks and promote stock *recovery of the management unit* to the level at which the maximum sustainable yield can be supported on a continuing basis | Rebuild overfished *Atlantic billfish stocks, and monitor* and control all components of fishing mortality, both directed and incidental, so as to ensure the long-term sustainability of the stocks and promote *Atlantic-wide stock recovery* to the level where MSY can be supported on a continuing basis | Rebuild overfished Atlantic HMS stocks, and monitor and control all components of fishing mortality, both directed and incidental, so as to ensure the long-term sustainability of the stocks and promote Atlantic-wide stock recovery to the level where MSY can be supported on a continuing basis |

| Obj. # | Tunas, Swordfish, and Shark FMP | Billfish FMP and Billfish Amendment | Final Consolidated FMP |
|---|---|---|---|
| 3 | To minimize, to the extent practicable, *bycatch of living marine resources and the mortality of such bycatch that cannot be avoided in the fisheries for Atlantic tuna, swordfish, and sharks* | Minimize, to the extent practicable, *release mortality in the directed billfish fishery, and minimize, to the extent practicable, bycatch and discard mortality of billfish on gears used in other fisheries* | Minimize, to the extent practicable, bycatch of living marine resources and the mortality of such bycatch that cannot be avoided in the fisheries for Atlantic HMS or other species, and minimize, to the extent practicable, post-release mortality in the directed billfish fishery |
| 4 | To establish a foundation for *international negotiation on* conservation and management measures to rebuild overfished fisheries and to promote achievement of optimum yield for these species throughout their range, both within and beyond the exclusive economic zone. *Optimum yield is the maximum sustainable yield from the fishery, reduced by any relevant social, economic, or ecological factors* | Establish a foundation for *the adoption of comparable international* conservation and management measures, *through international entities such as ICCAT*, to rebuild overfished fisheries and to promote achievement of optimum yield for these species throughout their range, both within and beyond the EEZ | Establish a foundation for international negotiation on conservation and management measures, through international entities such as ICCAT, to rebuild overfished fisheries and to promote achievement of optimum yield for these species throughout their range, both within and beyond the exclusive economic zone |
| 5 | To minimize, to the extent practicable, economic *displacement and other adverse impacts on fishing communities during the transition from overfished fisheries to healthy ones* | Minimize *adverse social and economic effects on recreational and commercial activities* to the extent practicable, *consistent with ensuring achievement of the other objectives of this plan, and with all applicable laws* | Minimize, to the extent practicable, adverse social and economic impacts on fishing communities and recreational and commercial activities during the transition from overfished fisheries to healthy ones, consistent with ensuring achievement of the other objectives of this plan and with all applicable laws |
| 6 | To provide the data necessary for assessing the fish stocks and managing the fisheries, including addressing inadequacies in *current* collection and ongoing collection of social, economic, and bycatch data *about HMS* fisheries | Provide the data necessary for assessing the fish stocks and managing the fisheries, including addressing inadequacies in collection and ongoing collection of social, economic, and bycatch data *on Atlantic billfish* fisheries | Provide the data necessary for assessing the fish stocks and managing the fisheries, including addressing inadequacies in current collection and ongoing collection of social, economic, and bycatch data on Atlantic HMS fisheries |

| Obj. # | Tunas, Swordfish, and Shark FMP | Billfish FMP and Billfish Amendment | Final Consolidated FMP |
|---|---|---|---|
| 7 | Consistent with other objectives of this FMP, to manage Atlantic HMS fisheries for continuing optimum yield so as to provide the greatest overall benefit to the Nation, particularly with respect to *food production, providing* recreational opportunities, *preserving traditional fisheries*, and taking into account the protection of marine ecosystems | Consistent with other objectives of this *amendment*, manage Atlantic billfish fisheries for the continuing optimum yield so as to provide the greatest overall benefit to the Nation, particularly with respect to recreational opportunities and taking into account the protection of marine ecosystems. *Optimum yield is the maximum sustainable yield from the fishery, as reduced by any relevant social, economic, or ecological factors.* | Consistent with other objectives of this FMP, manage Atlantic HMS fisheries for continuing optimum yield so as to provide the greatest overall benefit to the Nation, particularly with respect to providing food production for commercial fisheries, enhancing recreational opportunities, preserving traditional fisheries to the extent practicable, and/or taking into account the protection of marine ecosystems |
| 8 | To better coordinate domestic conservation and management of the fisheries for Atlantic tuna, swordfish, sharks, and billfish, considering the multispecies nature of many HMS fisheries, overlapping regional and individual participation, international management concerns, *historical fishing patterns and participation*, and other relevant factors | Better coordinate domestic conservation and management of the fisheries for Atlantic tunas, swordfish, sharks, and billfish, considering the multispecies nature of many highly migratory species (HMS) fisheries, overlapping regional and individual participation, international management concerns, and other relevant factors | Better coordinate domestic conservation and management of the fisheries for Atlantic tuna, swordfish, sharks, and billfish, considering the multispecies nature of many HMS fisheries, overlapping regional and individual participation, international management concerns, historical fishing patterns and participation, and other relevant factors |
| 9 | *To provide a framework, consistent with other applicable law, to take necessary action under ICCAT compliance recommendation* | *Coordinate domestic regulations and ICCAT conservation measures for controlling Atlantic-wide fishing mortality* | Provide a framework, consistent with other applicable law, to take necessary action under ICCAT compliance and/or conservation recommendations, including controlling Atlantic-wide fishing mortality |
| 10 | To *promote* protection of areas identified as essential fish habitat for *tuna, swordfish, and sharks* | *Maximize* protection of areas identified as essential fish habitat for *Atlantic billfish, particularly for critical life stages* | Promote conservation and enhancement of areas identified as essential fish habitat for Atlantic HMS, particularly for critical life stages |
| 11 | To simplify and streamline HMS management while actively seeking input from affected constituencies, the general public, and the HMS AP | | Simplify and streamline HMS management while actively seeking input from affected constituencies, the general public, and the HMS AP |

| Obj. # | Tunas, Swordfish, and Shark FMP | Billfish FMP and Billfish Amendment | Final Consolidated FMP |
|---|---|---|---|
| 12 | | Promote the live release of Atlantic *billfish* through active outreach and educational programs | Promote the live release and tagging of Atlantic HMS that are voluntarily released or cannot be legally landed through active outreach and educational programs |
| 13 | | Maintain the highest availability of billfishes to the U.S. recreational fishery by implementing conservation measures that will reduce fishing mortality | Maintain the highest availability of billfishes to the U.S. recreational fishery by implementing conservation measures that will reduce fishing mortality |
| 14 | | Optimize the social and economic benefits to the nation by reserving the billfish resource for its traditional use, which in the continental United States is almost entirely a recreational fishery | Optimize the social and economic benefits to the nation by reserving the Atlantic billfish resource for its traditional use, which in the United States is entirely a recreational fishery |
| 15 | | Increase understanding of the condition of billfish stocks and the billfish fishery | Increase understanding of the condition of HMS stocks and HMS fisheries |
| 16 | To reduce latent effort and overcapitalization in HMS commercial fisheries | | Delete. |
| 17 | To create a management system to make fleet capacity commensurate with resource status so as to achieve the dual goals of economic efficiency and biological conservation | | Consistent with the other objectives of this FMP, create a management system to make fleet capacity commensurate with resource status so as to improve both economic efficiency and biological conservation, and provide access for traditional gears and fishermen |
| 18 | To develop eligibility criteria for participation in the commercial shark and swordfish fisheries based on historical participation, including access for traditional swordfish handgear fishermen to participate fully as the stock recovers | | Combined with objective 17. |

## 1.5 Issues for Future Consideration and Outlook

Beyond the issues addressed and raised in this document, other new and unresolved matters have been identified by the general public, the HMS and Billfish Advisory Panels, and

NOAA staff as important to rebuilding and maintaining fisheries that are economically and biologically sustainable. Some of the main issues are identified below. This list is not comprehensive in nature, and NMFS may consider these issues or others in future rulemakings, possibly through framework actions. The issues are not listed in any priority. It is important to note that some of the issues are complicated, may require specific comments from the public for development (*e.g.*, scoping meetings and/or developmental workshops), and may take several years to complete.

- Bluefin Tuna Fishery Issues

During this rulemaking, NMFS heard many comments regarding the BFT fishery in general. There is growing concern regarding the status of BFT, protection of the spawning grounds in the Gulf of Mexico, the underharvests in recent years, overlap between the BFT and herring fisheries/habitat, and the current minimum size and trip limits. Purse Seine participants also continue to request changes to the current regulations that limit Purse Seine vessel landings of large medium bluefin tuna (73 inches to less than 81 inches) to no more than 15 percent, by weight, of the total amount of giant bluefin tuna landed during a fishing year. Angling category participants have concerns about the unit of measurement used by surveyors and the amount of quota available in their category. Charter/headboat fishermen continue to request the ability to fillet tunas at sea. Also, ICCAT is conducting a stock assessment in June 2006 that should provide additional information regarding the status of BFT and the current rebuilding plan. It is likely that in November 2006 ICCAT will finalize the stock assessment and recommend management actions for BFT. While NMFS cannot predict what the recommendation(s) will contain, many of the actions taken in this HMS FMP should help NMFS implement the new recommendations. For example, the time/area closure preferred alternative to implement criteria for the consideration of additional or modified closures for any gear type in order to protect BFT, if needed. NMFS may also consider closing an area of the Gulf of Mexico and opening it as an experimental fishery to test for ways of reducing bycatch of spawning bluefin tuna through such things as hook and bait combinations, environmental conditions, and/or temporal and spatial associations among different species. Also, amending the process to establish the General Category subperiod and subquotas could facilitate adjustments in a more timely manner, if necessary. Depending on ICCAT recommendation(s) and the status of BFT, it is possible that NMFS could include additional issues within an ICCAT implementation rule. However, NMFS will need to prioritize issues to ensure that international obligations are met and the rebuilding plan is progressing.

- Swordfish Fishery Issues

For the past several years, the domestic swordfish fishery has been unable to catch its full U.S. quota allocation. This is a change from the fishery in the 1990s where the quota was usually taken. In 1997, the quota was overharvested and the fishery was closed. There are a number of possible explanations and factors that may contribute to the inability of the domestic fleet to fully harvest the swordfish quota today including time/area closures to pelagic longline gear (the primary gear used to harvest swordfish), the reduction in permit holders through limited access, the restrictions on vessel upgrading, the incidental trip limits, the few number of swordfish reported landed by the recreational sector, and other economic factors (*e.g.*, fuel cost). Given the general anticipation that the North Atlantic swordfish stock will be identified as fully rebuilt, per the pending September 2006 stock assessment, a number of fishermen and others have asked NMFS to assist in revitalizing this fishery. Options that have been raised include, but are not limited to, opening the time/area closures, allowing open access to swordfish handgear permits, removing or modifying the upgrade restrictions, removing or modifying the incidental trip limits, and improving recreational reporting. Many people are concerned that without a plan to revitalize the fishery, the quota will be taken from the United States and given to other countries, many of which appear to place a lower priority on conservation than does the United States. NMFS is also concerned about the status of this fishery and the U.S. quota. While this rulemaking was not intended to revitalize the swordfish fishery, many of the preferred alternatives would facilitate future actions. For example, NMFS did not modify any existing closures at this time but the preferred criteria would allow for modifications to the closed areas and/or experiments to test gears or other fishing methods in the closed areas. Additionally, NMFS is defining a "new" swordfish commercial gear type (*i.e.*, buoy gear) and clarifying the difference between this commercial gear and the primarily recreational gear of handline. Depending on the stock assessment, the takes of sea turtles and marine mammals by the pelagic longline fleet, the recommendations of the final Pelagic Longline Take Reduction Plan, and the upcoming ICCAT recommendations, NMFS expects to do rulemaking in the near future to aid in revitalizing the swordfish fishery. Such a rulemaking could, but may not necessarily, reconsider the time/area closures using the criteria established in this FMP and using circle hook data, consider changes to the upgrading restrictions and incidental trip limits, and modifications to the permitting program (described more below). Revitalizing this fishery may also require additional assistance such as creation of a Seafood Marketing Council (January 24, 2006, 71 FR 3797). Other factors that NMFS cannot control, such as fuel prices or the cost to upgrade vessels, may impact the revitalization effort. Over time, consistent with the objectives of this FMP, the Magnuson-Stevens Act, MMPA, and the ESA, NMFS intends to aid in revitalizing the fishery so that swordfish are harvested in a sustainable and economically viable manner and bycatch is minimized to the extent practicable.

- Billfish Fishery Issues

Blue and white marlin are overfished and overfishing is occurring. However, the United States is responsible for a small portion of the mortality compared to other countries in the Atlantic. NMFS received a petition under the ESA to list white marlin and intends to conduct a status review in 2007. Additionally, while Atlantic billfish cannot be sold, Pacific billfish can be. Thus, NMFS has a number of challenges to address regarding the billfish fishery and stock, much of which will depend on the results of the May 2006 stock assessment. In recent years, NMFS has implemented a number of time/area closures that have reduced the bycatch of billfish in the pelagic longline fishery. In this rulemaking, NMFS has considered several time/area closures in part to continue to reduce bycatch of billfish in the pelagic longline fishery. NMFS did not find a time/area closure that would reduce both billfish bycatch and bycatch of other species; however, the criteria could allow NMFS to continue considering this option based on circle hook data. In this rulemaking, NMFS also considered several alternatives that could reduce the post-release mortality of billfish in the directed recreational fishery. NMFS is preferring some of those alternatives and has analyzed alternatives that may, or may not, be considered by ICCAT in November 2006. NMFS is also closing potential loopholes for billfish mortality by limiting the landings or possession of billfish to Angling and Charter/Headboat category permit holders and to General category permit holders who are participating in a tournament. Regardless of the permit combination (*e.g.*, Charter/Headboat and commercial shark limited access permit), no billfish may be possessed or retained on board vessels that have commercial quantities of other HMS on board. Depending on the recommendations by ICCAT in November 2006, the results of the 2006 stock assessment, and other priorities, NMFS may need to initiate a rulemaking regarding billfish in the near future. As part of this rulemaking, NMFS may consider standardized reporting requirements, particularly in regard to the Certificate of Eligibility (COE) for Pacific billfish. Such a step may improve compliance, facilitate enforcement, and improve the quality and quantity of information on Atlantic billfish harvest and Pacific billfish shipments.

- Shark Fishery Issues

Since initiation of the 2003 Amendment 1 to the 1999 Atlantic Tunas, Swordfish, and Shark FMP, there have been a number of new assessments and new information relating to sharks. ICCAT assessed blue and shortfin mako sharks in 2004. In 2004, Canada began considering listing porbeagle sharks as endangered under Canadian laws based on a 2001 stock assessment, and in 2005, Canada published an updated stock assessment for porbeagle sharks. Both fishermen and environmentalists have requested NMFS to lower the porbeagle shark quota and strengthen the regulations in response. In August 2005, the Atlantic States Marine Fisheries Commission agreed to develop a coast-wide shark fishery management plan for state waters. In October 2005, NMFS began the process to update the LCS stock assessment; this assessment should be done in 2006. Also in 2005, the Mid-Atlantic Fishery Management Council requested jurisdiction to manage smooth dogfish. NMFS has also conducted a species-specific stock assessment for dusky sharks that is undergoing internal review. NMFS expects to update the SCS stock assessment starting in early 2007. Based on these many stock assessments and changes, NMFS realizes there may be a need to adjust current quotas for certain species. Besides this information, public comments have continued to raise concerns over particular management measures. Thus, future rulemaking may also consider, as needed, other modifications including, but not limited to, the mid-Atlantic time/area closure, changes to the LCS trip limit, changes to the upgrading restrictions and/or incidental trip limits, changes to the prohibited species list, reporting for recreational fishermen, changes to authorized gear, and changes to the management unit. Additionally, in early 2006, a right whale calf was found dead with gillnet lacerations. Thus, the gillnet fishery in the right whale critical habitat was closed for the last part of the calving season through March 31, 2006 (February 16, 2006, 71 FR 8223). The Office of Protected Resources is currently considering this issue in light of the Marine Mammal Protection Act and the Atlantic Large Whale Take Reduction Plan. Given this and repeated requests by the State of Georgia and others, NMFS may need to conduct a rulemaking to reconsider the use of gillnet gear in Atlantic shark fisheries.

- HMS Permit Reform

In the 1990s, NMFS issued shark and swordfish permits that were essentially species-based but also allowed fishermen to catch tunas other than non-bluefin tuna. NMFS also issued bluefin tuna permits that were established by gear type. In 1999, NMFS established a limited access permit system for tuna longline, swordfish, and sharks. Since then, NMFS has also implemented two overarching permits for those fishermen fishing for any HMS: angling and charter/headboat. Thus, fishermen fishing for HMS now have a variety of required permits to choose from, some of which are species-based and some of which are gear-based. Once the fisherman chooses to use one particular required permit, the fisherman must fish for that species with the particular gear authorized by that permit (*i.e.*, they are placed in a box). This has caused concern and has raised a number of complicated questions and answers. Thus, NMFS intends to conduct a rulemaking regarding HMS permits that could include, among other things, further rationalizing some segments of the HMS fisheries, streamlining or simplifying the permitting process, restructuring the permit program (gear-based, species-based, or both), reopening some segments of the limited access system to allow for the issuance of additional permits, modifying when permits are renewed (fishing year or birth month), and considering dedicated access privileges (*e.g.*, individual transferable permits).

- Recordkeeping, Reporting, and Monitoring

Timely and reliable data is critical for fishery management. Thus, NMFS is always striving to improve its data collection. Data for HMS fisheries is collected in a number of ways including through self-reported methods, such as logbooks or call-in systems, and through observers. Observer data are generally considered to be of higher quality; however, observer programs are expensive to operate and the majority of fishing effort is conducted without observers. Recent Biological Opinions pertaining to HMS fisheries require NMFS to collect observer information specific to sea turtles and marine mammals on pelagic longline vessels and commercial vessels participating in the Atlantic shark fisheries. Observer data collection in other HMS fisheries, including the recreational and Charter/Headboat fisheries, is voluntary at this time. Commercial fishermen in some HMS fisheries are required to submit logbooks. Many fishermen have asked for electronic or real-time reporting. Similarly, HMS dealers must submit dealer reports and many of them have asked for electronic reporting.

NMFS also collects commercial fisheries data via vessel monitoring systems (VMS). In HMS, pelagic longline, bottom longline, and gillnet fishermen are all required to use VMS during certain seasons. All VMS units need to be turned on and operating two hours before the vessel leaves port until the vessel returns to port. NMFS and fishermen have had problems with VMS not operating while the vessel is away from port. Some VMS units do not have any indicator light or other method for fishermen to see if the unit is working. Fishermen have also commented that certain brands appear to be unreliable. NMFS enforcement has indicated that hourly reporting may not be frequent enough for all of their needs.

Recreational fisheries are a major component of Atlantic HMS fisheries, and because recreational landings of Atlantic HMS are not marketed through commercial channels, it is not possible to monitor anglers' catches through ex-vessel transactions as in the commercial fishery. Instead, NMFS collects data through other means including the two primary statistical sampling surveys of the recreational fisheries: the Marine Recreational Fishery Statistics Survey (MRFSS) and the Large Pelagics Survey (LPS). Both surveys consist of a telephone survey to estimate effort and a dockside intercept program to collect CPUE data or landings information. The utility and accuracy of both surveys has been questioned in recent years. NMFS also uses other programs to collect information on recreational fisheries for Atlantic HMS, including tournament registration and reporting and angler self-reporting systems. Mandatory call-in systems were implemented in 1997 for bluefin tuna, and in 2003 for Atlantic billfish and swordfish. NMFS is also working cooperatively with individual states to develop more effective monitoring of

Atlantic HMS recreational fisheries. North Carolina and Maryland both employ catch card and body tag systems that may serve as a model for future recreational data collection efforts.

Despite these data collection systems, NMFS seeks to further enhance its commercial and recreational data collection efforts. NMFS believes that better administration and coordination of reporting programs and requirements for dealers and fishermen of HMS species can ultimately streamline reporting requirements and procedures, thereby ensuring that information necessary for the management of HMS species is collected more efficiently and with less burden on fishermen. As such, NMFS would like to explore methods to improve the accuracy of data, either through rules or through administrative methods. However, stakeholders must also realize that quality data is dependent on their cooperation and efforts, including submission of accurate commercial and recreational landings on a timely basis. Some of the preferred measures in this FMP will begin to facilitate this improvement of data collected from HMS fisheries (*e.g.*, shark identification dealer workshops and the ability in the future for BFT dealers to report electronically). Additional changes are possible in the future.

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# 2.0 SUMMARY OF ALTERNATIVES

## 2.1 Bycatch Reduction

### 2.1.1 Workshops

#### *2.1.1.1 Protected Species Safe Handling, Release, and Identification Workshops for Pelagic Longline, Bottom Longline, and Gillnet Fishermen*

These workshops are intended to reduce the mortality of sea turtles, marine mammals, and other protected species captured incidentally in the HMS pelagic longline (PLL), bottom longline (BLL), and gillnet fisheries. These workshops would disseminate information and demonstrate techniques specific to sea turtle safe handling and release protocols as per the current NMFS standards. Through these workshops, participants would be trained to safely disentangle, resuscitate, and release captured sea turtles, smalltooth sawfish, other protected species and non-target species, would teach participants how to properly identify protected species, and would provide information on key morphological characteristics, distribution, and basic life history to improve positive identification of protected species. Due to the nature of the workshop subject matter, hands-on training and interaction with the workshop leader is vital for initial skill development and certification. During these workshops, participants would be given a comprehensive hands-on examination, which, upon successful completion, would result in a multi-year certification. After the initial series of workshops, the Agency would continue to provide certification opportunities for permitted HMS fishery participants. Certification would be renewed on a specified timetable (*i.e*., 2, 3, or 5-year timetable) to ensure that the latest techniques to disentangle, release, and identify protected species are used. Additional certification requirements may be warranted in the future based upon reinitiation of consultation with the NMFS Office of Protected Resources or the receipt of significant new information related to handling and release protocols. While the workshop alternatives may be mandatory for certain individuals, to the extent practicable, the workshops would be open to interested individuals who wish to receive the workshop certification on a voluntary basis.

Alternative A1 Voluntary protected species safe handling, release, and identification workshops for longline fishermen (No Action)

Under alternative A1, the No Action alternative, NMFS would continue to provide voluntary safe handling and release workshops for PLL and BLL fishermen and continue to distribute wheelhouse placards, protocols, and educational videos, as well as disseminate additional information through the activities of the NMFS PLL Point of Contact (POC). No mandatory requirements would be implemented under this alternative.

Alternative A2 *Mandatory protected species safe handling, release, and identification workshops and certification for all HMS pelagic or bottom longline vessel owners – Preferred Alternative*

Alternative A2 would require mandatory workshops and certification for all vessel owners that have pelagic or bottom longline gear on their vessel and that have been issued or are required to be issued any of the HMS limited access permits (LAPs) to participate in HMS longline fisheries. Only HMS LAP owners with PLL or BLL gear on board their vessel are required to attend the workshop and receive a workshop certificate. These workshops would provide information and ensure proficiency with the safe handling, disentanglement, resuscitation, and release techniques for sea turtles, smalltooth sawfish, and other protected species. Additionally, the workshops would teach participants how to properly identify protected species, and provide information on key morphological characteristics, distribution, and basic life history to improve positive identification of protected species.

To receive their workshop certification, HMS LAP owners that fish with PLL or BLL gear would attend a workshop and demonstrate their understanding of the safe handling, disentanglement, resuscitation, release, and identification techniques. It is a refutable presumption that vessel owners and/or operators fish with longline gear if longline is on board the vessel; logbook reports indicate that longline gear was used on at least one trip in the preceding year; or in the case of a permit transfer to new owners that occurred less than a year ago, logbook reports indicate that longline gear was used on at least one trip since the permit transfer. HMS LAP(s) owners with PLL or BLL on board the vessel would be required to obtain their initial workshop certification prior to renewing their shark and swordfish limited access permit(s) in 2007. If the vessel owner holds multiple HMS LAPs, the owner would need to be certified prior to the earliest expiring shark or swordfish LAP in 2007.

For permit holders required to attend the workshop and receive a certificate, the permit holder must show a copy of their HMS permit, as well as proof of identification. If a permit holder is a corporation, partnership, association, or any other entity, the individual attending on behalf of the permit holder must show proof that he or she is the permit holder's agent and a copy of the HMS permit. The workshop certification would not be transferable to any other person and would state the name of the permit holder on the certificate. If acquiring an HMS LAP from a previous permit holder, the new owner would need to obtain a workshop certification prior to transferring the permit into the new owner's name. A copy of the owner's workshop certificate must be kept on board the vessel at all times.

The schedule for the protected species workshops would be available in advance to allow permit holders to select the workshop closest to them and most convenient to their schedule. If a permit holder is unable to attend a scheduled workshop, NMFS would consider granting one-on-one workshop training at the expense of the permit holder.

All owners that attended and successfully completed the industry-sponsored certification workshops, as documented by workshop facilitators, held on April 8, 2005, in Orlando, Florida, and on June 27, 2005, in New Orleans, Louisiana, would automatically receive valid protected species workshop certificates.

Alternative A3 *Mandatory protected species safe handling, release, and identification workshops and certification for vessel operators actively participating in HMS pelagic and bottom longline fisheries – Preferred Alternative*

Alternative A3 would require mandatory workshops and certification for vessel operators who intend to participate in HMS longline fisheries. Alternative A3 would ensure that at least one person on board and directly involved with a vessel's fishing activities is certified in the release and disentanglement protocols and identification of protected species.

The initial operator certification would be linked to the renewal of the vessel's HMS shark and swordfish LAP(s) in 2007; therefore, an operator would need to attend a workshop and receive the certification prior to the owner renewing any of the vessel's HMS shark and swordfish LAP(s) in 2007. If the vessel owner holds multiple HMS LAPs, the operator would need to be certified prior to the earliest expiration date on the either the shark or swordfish limited access permit in 2007. After the initial certification, the operator's certification is no longer linked to the renewal of a vessel's HMS LAPs and would need to be renewed prior to the expiration date on the operator's workshop certificate. The workshop certification would not be transferable to any other person and would have the operator's name on the certificate.

If the vessel's HMS LAP(s) has not yet expired in 2007, the operator has until the expiration of the vessel's HMS LAP(s) to continue operating the vessel without a workshop certification. If the vessel's shark or swordfish LAP has already been renewed in 2007, the operator would need to be certified and have a workshop certificate on board the vessel. After renewing the vessel's shark or swordfish LAP in 2007, operating a vessel with longline gear without a certified operator and a copy of the certificate on board would be illegal.

Operators are encouraged to transfer the knowledge and skills obtained from successfully completing the workshops to the crew members, potentially increasing the proper handling and release protocols, and identification of protected species. While crew members are not required to attend the workshops, to the extent practicable, the workshops would be open to anyone who wishes to attend and receive certification.

The schedule for the protected species workshops would be available in advance to allow operators to select the workshop closest to them and most convenient to their schedule. If an operator is unable to attend a scheduled workshop, NMFS would consider granting one-on-one workshop training at the expense of the individual.

All operators that attended and successfully completed the industry certification workshops, as documented by workshop facilitators, held on April 8, 2005, in Orlando, Florida, and on June 27, 2005, in New Orleans, Louisiana, would automatically receive valid protected species workshop certificates.

Alternative A4 Mandatory protected species safe handling, release, and identification workshops and certification for all HMS longline vessel owners, operators, and crew

Alternative A4 would require mandatory protected species safe handling, release, and identification workshops and certification for all HMS longline vessel owners, operators, and crewmembers. Attendance and successful completion of a workshop would be linked to an owner's ability to renew an HMS permit. This alternative would allow the Agency to certify at least two individuals per vessel that would be associated with fishing activities on board the vessel. Unless the owners, operators, and crew attend and successfully complete the workshop, an HMS permit would not be issued to the vessel. At least one trained person must be onboard during fishing activities to provide proof of certification.

Alternative A5 *Mandatory protected species safe handling, release, and identification workshops and certification for shark gillnet vessel owners and operators – Preferred Alternative*

Alternative A5 would require mandatory protected species safe handling, release, and identification workshops and certification for all shark gillnet vessel owners that have been issued a Federal directed or indirect shark permit, as well as gillnet vessel operators. It is a rebuttable presumption that vessel owners and/or operators fish with gillnet gear if a gillnet is on board the vessel; logbook reports indicate that gillnet gear was used on at least one trip in the preceding year; or in the case of a permit transfer to new owners that occurred less than a year ago, logbook reports indicate that gillnet gear was used on at least one trip since the permit transfer. These workshops would provide information and ensure proficiency with the safe handling and release techniques for sea turtles, smalltooth sawfish, and other protected species. Additionally, the workshops would teach participants the proper identification of protected species, and would provide information on key morphological characteristics, distribution, and basic life history to improve positive identification of protected species.

Attendance and successful completion of a workshop would be linked to an owner's ability to renew an HMS fishing permit. A copy of the owner's workshop certificate would need to be submitted with the HMS LAP renewal request as proof of successful completion of the protected species workshops. Shark gillnet vessel owners would be required to attend a workshop and receive a certification prior to the expiration date on their shark LAP in 2007 to renew their permit. For their initial certification only, an operator would also need to attend a workshop and receive the certification prior to renewing the vessel's shark permit in 2007. After the initial certification, the operator's certification is no longer linked to the renewal of the vessel's permit and would need to be renewed prior to the expiration date on the operator's workshop certificate.

For shark permit holders required to attend the workshop and receive a certificate, the permit holder must show a copy of their shark LAP, as well as proof of identification. If a permit holder is a corporation, partnership, association, or any other entity, the individual attending on behalf of the permit holder must show proof that he or she is the permit holder's agent and a copy of the shark LAP. The workshop certification would not be transferable to any other person and would state the name of the permit holder on the certificate. If acquiring a shark LAP from a previous permit holder, the new owner would need to obtain a workshop certification prior to transferring the permit into the new owner's name.

If the vessel's directed or indirect shark permit has not yet expired in 2007, the owner and operator would have until the expiration of the permit to continue operating the vessel without a workshop certification. If the vessel's shark permit has already been renewed in 2007, the owner and operator would need to have a workshop certificate on board the vessel. Both the owner's and operator's workshop certificate would need to be kept on board the vessel to verify successful completion of the safe release, disentanglement, and identification workshop. This alternative would ensure that at least one person on the vessel, who is directly involved with a vessel's fishing activities, is certified in the safe handling and release protocols and identification of protected species.

The schedule for the protected species workshops would be available in advance to allow owners and operators to select the workshop closest to them and most convenient to their schedule. If an owner or operator is unable to attend a scheduled workshop, NMFS would consider granting one-on-one workshop training at the expense of the individual.

Alternative A6 *Protected species safe handling, release, and identification certification renewal every 3-years – Preferred Alternative*

Alternative A6 would require the renewal of the mandatory protected species safe handling, release, and identification workshop certifications every three years. Permit holders employing longline or gillnet gear, including those grandfathered into these requirements, would be required to attain recertification every three years before renewing their shark and swordfish LAPs or tuna longline permits. Proof of the owner's valid workshop certification would need to be submitted to renew an HMS permit. Operators, including those grandfathered into these requirements, would need to renew the workshop certification every three years prior to the expiration date on the workshop certification.

Once the first round of certifications are complete, NMFS would explore alternative means for renewing permits, including online or mail-in options. The Agency also hopes to develop an online program that would serve as a medium for providing up-to-date information regarding protected species handling techniques. In addition to considering alternative timetables for certification renewal (*i.e.*, every two or five years), NMFS considered combining this alternative with each of the mandatory workshop alternatives listed above in the DEIS.

#### *2.1.1.2 HMS Identification Workshops*

Proper identification of HMS, as well as threatened and endangered species that fishermen may interact with while pursuing HMS, is paramount to the efficacy of HMS regulations and management. Permitted fish dealers and fishermen are responsible for accurately identifying HMS on the dealer reports and logbooks submitted to NMFS. These reports form the basis of quota monitoring activities and stock assessments. Misidentification of HMS can negatively impact stock assessments, calculation of season lengths, and influence the criteria used to designate certain species as prohibited. Identification workshops would help shark dealers and/or their proxies improve their shark identification skills. These workshops would be most effective if held at venues where live and/or freshly dead specimens could be displayed. After the initial series of workshops, the Agency would continue to provide certification opportunities for permitted HMS fishery participants. The preferred alternative would require the renewal of HMS identification certifications on a three-year timetable to ensure that the latest techniques to properly identify commonly caught HMS are used. While the workshop alternatives may be mandatory for certain individuals, to the extent practicable, the workshops would be open to interested individuals who wish to receive the workshop certification on a voluntary basis (*e.g.*, fishermen, dealers, law enforcement officials, and port agents).

Alternative A7 No HMS identification workshops (No Action)

Under alternative A7, the No Action alternative, NMFS would continue to support dissemination of information through the Guide to Sharks, Tunas, & Billfishes of U.S. Atlantic & Gulf of Mexico, to enhance fishery participant's ability to accurately identify species commonly caught in HMS fisheries. No mandatory requirements would be implemented under this alternative.

Alternative A8 Voluntary HMS identification workshops for dealers, all commercial vessel owners and operators, and recreational fishermen

Under alternative A8, NMFS would hold voluntary HMS identification workshops for dealers, commercial vessel owners and operators, and recreational fishermen. These workshops would be held in addition to the items listed under the No Action alternative (A7) above. No mandatory requirements would be implemented under this alternative.

Alternative A9 *Mandatory shark identification workshops for all shark dealers – Preferred Alternative*

Alternative A9 would require mandatory shark identification workshops for all Federally permitted shark dealers. Attendance and successful completion of a workshop would be linked to a dealer's ability to renew their Federal shark dealer permit. All Federally permitted shark dealers would have to successfully complete the shark identification workshop by December 31, 2007. The permit holder would be required to submit proof of a workshop certification when renewing the shark dealer permit. Also, proof of a workshop certification would need to be available at the dealer's place of business for inspection. Without a certificate indicating successful completion of the workshop, Federal shark dealer permit would not be issued. Shark identification workshops would be mandatory for Federally permitted shark dealers, but, to the extent possible, these workshops would be open to other interested individuals (*e.g.,* individuals participating in the shark fishery, port agents, law enforcement officers, state shark dealers, and recreational fishermen) on a voluntary basis.

If the permitted dealer is unable to attend or is not directly involved in species identification, then a proxy could be sent to meet mandatory attendance and certification requirements. The proxy must be a person who is currently employed by a place of business covered by the dealer's permit; is a primary participant in the identification, weighing, or first receipt of fish as they are offloaded from a vessel; and is involved in filling out dealer reports. If a dealer opts to send a proxy, the dealer would be required to designate a proxy for each place of business covered by the dealer's permit. Only one certificate will be issued to each proxy. Under this alternative, Federally permitted shark dealers would be held accountable for ensuring that the appropriate individuals receive the proper training in shark identification. NMFS encourages shark dealers to send as many proxies as necessary to train the individuals responsible for shark species identification within the dealer's business. Multiple trained and certified proxies per shark dealer would ensure that the dealer has at least one person on staff with the workshop certification and skills to properly identify sharks.

For shark dealers required to attend the Atlantic shark identification workshop certificate, the dealer must show a copy of their HMS permit, as well as proof of identification. If a permit holder is a corporation, partnership, association, or any other entity, the individual attending on behalf of the permit holder must show proof that he or she is the permit holder's agent, as well as a copy of the HMS permit. For proxies attending on behalf of a shark dealer permit holder, the proxy must have documentation from the permit holder acknowledging that the proxy is attending the workshop on behalf of the Atlantic shark dealer permit holder and must show a copy of the Atlantic shark dealer permit. A dealer or the designated proxy would be required to bring a copy of the dealer permit to the workshop to guarantee that the dealer receives credit for the certification, as the workshop certification would be linked to the dealer's permit number.

The schedule for shark identification workshops would be available in advance to allow dealers and proxies to select the workshop closest to them and most convenient to their schedule. If a dealer and/or proxy are unable to attend a scheduled workshop, NMFS would consider granting one-on-one workshop training at the expense of the shark dealer permit holder. One-on-one training sessions could also accommodate the replacement of a proxy whose employment was terminated on short notice.

Alternative A10 Mandatory HMS identification workshops for all swordfish, shark, and or/tuna dealers

Alternative A10 would require mandatory HMS identification workshops for all swordfish, shark, and/or tuna dealers. Attendance and successful completion of a workshop would be linked to a dealer's ability to renew a Federal dealer permit. If the permitted dealer was unable to attend or is not directly involved in dealer activities, then a proxy could be sent to meet mandatory attendance requirements. If a dealer opts to send a proxy, then the dealer must designate a proxy from each place of business covered by the dealer's permit. A proxy must be a person who is employed by a place of business, covered by a dealer's permit, a primary participant in identification, weighing, or first receipt of fish as they are offloaded from a vessel, and involved in filling out dealer reports. Without a certificate indicating successful completion of the workshop, no permit would be issued.

Alternative A11 Mandatory HMS identification workshops for all commercial longline vessel owners

Alternative A11 would require mandatory HMS identification workshops for all vessel owners issued HMS LAPs and using longline gear. Attendance and successful completion of a workshop would be linked to an owner's ability to renew a HMS fishing permit. Without a certificate indicating successful completion of the workshop, a HMS permit or permit renewal would not be issued to a vessel that has logbook reports indicating longline use.

Alternative A12 Mandatory HMS identification workshops for all commercial longline vessel operators

Alternative A12 would require mandatory HMS identification workshops for all commercial longline vessel operators. The initial operator certification would be linked to the vessel's HMS permit renewal.  An operator would need to attend a workshop and receive the certification prior to the renewal of the vessel's HMS permit in 2007.

Alternative A13 Mandatory HMS identification workshops for all commercial vessel owners (longline, CHB, General category, and handgear/harpoon)

Alternative A13 would require mandatory HMS identification workshops for all commercial vessel owners with an HMS permit.  Attendance and successful completion of a workshop would be linked to an owner's ability to renew a HMS fishing permit.  Without a certificate indicating successful completion of the workshop, a HMS permit would not be issued to the vessel.

Alternative A14 Mandatory HMS identification workshops for all commercial vessel operators (longline, CHB, General category, and handgear/harpoon)

Alternative A14 would require mandatory HMS identification workshops for all commercial vessel operators.  The initial operator certification would be linked to the vessel's HMS permit renewal.  An operator would need to attend a workshop and receive the certification prior to renewing the vessel's certification in 2007.

Alternative A15 Mandatory HMS identification workshops for all HMS Angling category permit holders

Alternative A15 would require mandatory HMS identification workshops for all HMS Angling permit holders, the largest category of HMS permit holders.  Attendance and successful completion of a workshop would be linked to an owner's ability to renew a HMS Angling category fishing permit.  Without a certificate indicating successful completion of the workshop, no HMS Angling category permit would be issued.

Alternative A16 *HMS identification certification renewal every 3-years – Preferred Alternative*

Alternative A16 would require renewal of mandatory HMS identification workshop certifications every three years.  In conjunction with alternative A9, Federally permitted shark dealers would be required to recertify every three years before renewing their Federal dealer permits.  Proof of a valid workshop certification would need to be submitted to renew their Federal dealer permit.  If the dealer opts to send a proxy or proxies, a copy of a workshop certificate for every business covered by the dealer's permit must be included with the renewal application.

Due to the nature of workshop subject matter, hands-on training and interaction with the workshop leader is vital for initial skill development and certification.  Once the first round of certifications are complete, NMFS would explore alternative means for renewing permits, including online or mail-in options.  The Agency also hopes to develop an online program that would serve as a medium for providing up-to-date information regarding HMS identification.  In addition to considering alternative timetables for certification renewal (*i.e.*, every two or five years), NMFS considered combining this alternative with each of the mandatory workshop alternatives listed above.

*<u>Other workshop alternatives considered but not further analyzed at this time</u>*

Alternative A17 Compliance With, and Understanding of, HMS Regulations

Constituents have expressed concern over the complexity of HMS regulations. Workshops providing a thorough explanation of HMS regulations and management history would likely be beneficial and may result in improved public relations on behalf of the Agency, improved compliance with regulations, and understanding of the HMS regulatory process.

During the scoping process for the Issues and Options Paper and Pre-draft for this document, NMFS received comments noting that workshops held by the agency should be prioritized. Furthermore, comments received were supportive of continuing to disseminate information pertaining to HMS regulations (*e.g.*, annual HMS Compliance Guide) rather than spending Federal dollars to hold workshops on regulations at this time. Advisory Panel members were supportive of focusing on mandatory requirements (*i.e.*, workshops required under Biological Opinions and other mandates) first and then following up with additional hard copy outreach materials to meet regulatory informational needs. Since NMFS already disseminates this type of information on a regular basis and given that this information can be distributed to participants attending either the handling/release and/or identification workshops, this alternative is not being further analyzed at this time. NMFS may reconsider this alternative in the future, if appropriate.

### 2.1.2 Time/Area Closures

The first time/area closure for HMS was implemented in the 1999 FMP with the Northeastern U.S. closure off New Jersey in June 1999 to reduce bluefin tuna (BFT) discards. Since then, additional closures have been implemented in the DeSoto Canyon (2000), Florida East Coast (2001), Charleston Bump, Northeast Distant (2001), and the Mid-Atlantic shark closed area (2005) (Figure 2.1). The goals of all of the HMS time/area closures are to: (1) maximize the reduction in bycatch; (2) minimize the reduction in the target catch; and (3) consider impacts on non-target HMS (*i.e.*, BFT) to minimize or reduce non-target catch levels.

These time-area closures have proven to be effective at reducing bycatch. However, despite these closures, several non-target HMS such as blue and white marlin, sailfish, and BFT are overfished with overfishing occurring, and protected species, such as leatherback and loggerhead sea turtles, continue to interact with HMS gears. As a result, NMFS considered additional closures to further reduce these interactions. However, possibly because of these closures, landings, such as swordfish, and pelagic longline (PLL) effort have decreased over the years. Therefore, NMFS considered modifications to existing closures as a means to increase the catch of Atlantic swordfish.

NMFS considered the following alternatives, ranging from the No Action alternative of maintaining existing closures to a complete prohibition of certain HMS gear types. Some of the alternatives are grouped according to the specific objectives of the closed areas. Thus, alternatives B2(a) through B2(k), B4, and B6 consider new closure areas for HMS to primarily address white marlin, BFT, sea turtle, and smalltooth sawfish bycatch, whereas alternatives B3(a) through B3(d) consider alternatives for modifying existing closures. Alternative B5 considers criteria for implementing new closures and/or modifying existing closure whereas alternative B7 considers prohibiting the use of PLL gear in HMS fisheries. For details on the methods used to consider alternatives and select alternatives for further analysis see Section 4.1.2 and Appendix A.

Alternative B1 Maintain existing time/area closures; no new time/area closures (No Action)

This alternative would maintain the existing time/area closures. It would not implement any new time/area closures nor modify any existing closures. The current time/area closures are shown in Figure 2.1.

Alternative B2(a) Prohibit the use of PLL gear in HMS fisheries in the central portion of the Gulf of Mexico from May through November (7 months), annually

This alternative would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in the central portion of the Gulf of Mexico where blue and white marlin, sailfish, spearfish, BFT, and leatherback and loggerhead sea turtles have been observed and reported caught year-round, but with highest concentrations from May through November. This closure would encompass approximately 11,991 square nautical miles ($nm^2$) and would be defined as the area within the following coordinates, beginning with the northeastern corner and proceeding clockwise: 27º 10’ N. latitude (Lat.), 90º 29’ W. longitude (Long.); 25º 47’ N. Lat., 90º 29’ W. Long.; 25º 47’ N. Lat., 93º 10’ W. Long.; 27º 10’ N. Lat., 93º 10’ W. Long. (Figure 2.2).

Alternative B2(b) Prohibit the use of PLL gear in HMS fisheries in an area of the Northeast during the month of June (1 month), each year

This alternative would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in a portion of the Northeast where large numbers of BFT is discarded during the month of June each year. This closure would encompass approximately 2,251 $nm^2$ and would be defined as the area within the following coordinates, beginning with the northern-most corner and proceeding clockwise: 41º 15’ N. Lat., 66º 41’ W. Long.; 40º 48’ N. Lat., 66º 14’ W. Long.; 39º 50’ N. Lat., 67º 22’ W. Long.; 40º 17’ N. Lat., 67º 49’ W. Long. (Figure 2.2).

Alternative B2(c) Prohibit the use of PLL gear in HMS fisheries in the central Gulf of Mexico from April through June (3 months), annually

This alternative would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in a central portion of the Gulf of Mexico from April through June (three months), annually. This area was mainly considered to protect BFT that spawn in the Gulf of Mexico. NMFS took into account information received in a petition for rulemaking to consider a closure to reduce BFT discards in a reported spawning area in the Gulf of Mexico (Blue Ocean Institute *et al*., 2005; Block *et al*., 2005). This closure would encompass approximately 101,670 $nm^2$ and would be defined as the area within the following coordinates, beginning with the northwest corner and proceeding clockwise: 28° 00’ N. Lat., 96° 00’ W. Long.; 28° 00’ N. Lat., 92° 00’ W. Long.; 29° 00’ N. Lat., 92° 00’ W. Long.; 29° 00’ N. Lat., 86° 00’ W. Long.; 28° 00’

N. Lat., 86° 00’ W. Long.; 28° 00’ N. Lat., 85° 00’ W. Long.; 27° 00’N. Lat., 85° 00’ W. Long.; 27° 00’ N. Lat., 86° 00’ W. Long.; 26° 00’ N. Lat., 86° 00’ W. Long.; 26° 02’ N. Lat., 86° 17’ W. Long.; following the EEZ until 26° 00’ N. Lat., 96° 00’ W. Long. (Figure 2.2).

Alternative B2(d) Prohibit the use of PLL gear in HMS fisheries in the Gulf of Mexico west of 86° W. Longitude year-round

This alternative would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in the Gulf of Mexico west of 86° W. Longitude year-round. This alternative would close an area where approximately 50 percent of all effort (Atlantic, Gulf of Mexico, and Caribbean) and 90 percent of all effort in the Gulf of Mexico has been reported in recent years (2001 – 2003). Closing this area would help reduce interactions for a number of different species. This closure would encompass approximately 162,181 $nm^2$ west of 86° 00’ W. Long., 25° 00’ N. Lat. between the State Territorial Sea and the EEZ boundary (Figure 2.2).

Alternative B2(e) Prohibit the use of PLL gear in HMS fisheries in an area of the Northeast to reduce sea turtle interactions year-round

This alternative would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in an area of the Northeast year-round. This area was primarily considered to reduce loggerhead sea turtle interactions, which occur with greater frequency in this area than in nearly all other areas. This closure would encompass approximately 46,956 $nm^2$ and would be defined as the area within the following coordinates, beginning with the western-most corner and proceeding clockwise: 39° 59’ N. Lat., 71° 50’ W. Long.; 41° 18’ N. Lat., 66° 26’ W. Long.; 40° 27’ N. Lat., 66° 42’ W. Long.; 37° 53’ N. Lat., 70° 28’ W. Long. (Figure 2.2).

Alternative B3(a) Modify the existing Charleston Bump time/area closure to allow the use of PLL gear in all areas seaward of the axis of the Gulf Stream

This alternative would modify the existing Charleston Bump time/area closure by moving the eastern boundary at 76º W. Long. to the west following the axis of the Gulf Stream from the existing northeast corner of the closure southwest to 31º N. Lat., 79º 16’ Long. This alternative would reopen areas seaward of the axis of the Gulf Stream previously closed to PLL gear from February 1 through April 30. In particular, this alternative would provide additional opportunity to harvest North Atlantic swordfish, for which the quota has not been harvested in recent years (Figure 2.3).

Alternative B3(b) Modify the existing Northeastern U.S. time/area closure to allow the use of PLL gear in areas west of 72º 47’ W. Long. during the month of June each year

This alternative would modify the existing Northeastern U.S. time/area closure boundary to allow PLL gear in areas west of 72º 47’ W. Long. during the month of June each year. This alternative would reopen an area in which there were historically low numbers of BFT discards. This alternative would provide additional opportunity to harvest North Atlantic swordfish and other targeted HMS such as yellowfin tuna (Figure 2.3).

Alternative B4 *Implement complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves year-round – Preferred alternative*

This alternative would implement HMS management measures in the Madison-Swanson and Steamboat Lumps Marine Reserves to complement measures for these reserves recommended by the Gulf of Mexico Fishery Management Council (GMFMC). These reserves would prohibit all HMS fishing for all gear types year-round except for surface trolling only from May through October. The HMS management measures would expire on June 16, 2010, consistent with GMFMC recommendations. Both of these reserves are located shoreward of the Desoto Canyon Closed Area. The Madison-Swanson Marine Reserve is 115 $nm^2$ in size, rectangular-shaped, and is positioned southwest of Apalachicola, FL (29° 17' N. Lat., 85° 50' W. Long. to 29° 17' N. Lat., 85° 38' W. Long. to 29° 06' N. Lat., 85° 38' W. Long. to 29° 06' N. Lat., 85° 50' W. Long. to 29° 17' N. Lat., 85° 50' W. Long.). The Steamboat Lumps marine reserve is 104 $nm^2$ in size, rectangular-shaped, and is positioned due west of Clearwater, FL (28° 14' N. Lat., 84° 48' W. Long. to 28° 14' N. Lat., 84° 37' W. Long. to 28° 03' N. Lat., 84° 37' W. Long. to 28° 03' N. Lat., 84° 48' W. Long. to 28° 14' N. Lat., 84° 48' W. Long. (Figure 2.4)

Alternative B5 *Establish criteria to consider when implementing new time/area closures or making modifications to existing time/area closures – Preferred alternative*

This alternative would establish criteria for regulatory framework adjustments for implementing new time/area closures or making modifications to existing time/area closures. These criteria would provide greater transparency in the decision making process and allow fishermen more ability to plan for future changes. Consistent with the FMP, the Magnuson-Stevens Act and other applicable law criteria that were identified for consideration, included the following: any ESA-related issues, concerns, or requirements, including applicable Biological Opinions; bycatch rates of protected species, prohibited HMS, or non-target species both within the specified or potential closure area(s) and throughout the fishery; bycatch rates and post-release mortality rates of bycatch species associated with different gear types; new or updated landings, bycatch, and fishing effort data; evidence or research indicating that changes to fishing gear and/or fishing practices can significantly reduce bycatch; social and economic impacts; and the practicability of implementing new or modified closures compared to other bycatch reduction options. If the species is an ICCAT-managed species, NMFS would need to determine the overall effect of the United States' catch on that species before implementing time/area closures.

NMFS also considered modifying the current closed areas using these same criteria and GIS mapping techniques to better pinpoint areas of low bycatch within closed areas (based on catch data from pelagic logbooks collected before an area was closed) (see Section 4.1.2). The current time/area closures were not intended to be permanent. Rather, NMFS intended to modify existing closures, as appropriate, to allow utilization of a given fishery consistent with the FMP once the objective of the time/area closure had been met. Additionally, because fisheries, fishing gear, fishing practices, and stock status change over time, periodically NMFS must examine the continued need for existing time/area closures. One method of doing this would be for NMFS to conduct, fund, or support research, such as testing methods for reducing bycatch of protected, prohibited, and non-target species. Such research would need to be part of a scientifically justified research plan, identifying the rationale, objectives, methodology, and experimental design of the research. The scope and magnitude in terms of ecological and socio-economic impact would be considered as part of any research proposal. Research in both open and closed areas may be warranted to collect data on the spatial and temporal relationship between target and bycatch species and to provide data for use in considering the criteria listed above. Such research could be cooperative in nature to include different stakeholders in the process.

Alternative B6 Prohibit the use of bottom longline gear in an area southwest of Key West to protect endangered smalltooth sawfish year-round

This alternative would prohibit the use of bottom longline gear by all U.S. flagged-vessels permitted to fish for HMS in an area southwest of Key West where smalltooth sawfish have been observed and caught year-round. This area would encompass approximately 49 $nm^2$ and would be defined as the area on the southwest tip of Key West, bordering the state waters with the following coordinates, beginning with the northwest corner and proceeding clockwise: 24° 29' N. Lat., 82° 06' W. Long.; 24° 29' N. Lat., 82° 02' W. Long.; 24° 24' N. Lat., 81° 58'W. Long.; 24° 23' N. Lat., 81° 58' W. Long., 24° 23'N. Lat. 82° 06' W. Long. (Figure 2.5)

Alternative B7 Prohibit the use of PLL gear in HMS fisheries in all areas

This alternative would prohibit the use of PLL gear in HMS fisheries in all areas to enhance the rebuilding of overfished stocks and reduce bycatch and bycatch mortality.

***<u>Other time/area closure alternatives considered but not further analyzed at this time</u>***

Below are a number of closure alternatives that were considered and eliminated from further consideration before being fully analyzed (Figure 2.6). The descriptions below include the reasons why the alternatives were not further analyzed at this time. More detail about these alternatives can be found in Appendix A. These alternatives may be considered in the future as needed.

Alternative B2(f) Prohibit the use of PLL gear in HMS fisheries in the central portion of the Gulf of Mexico in an area similar to, but larger than the area considered in alternative B2(a), from May through November (7 months), annually

Alternative B2(g) Prohibit the use of PLL gear in an area off the Northeast Atlantic coast from the 200 meter contour to the 2000 meter contour between the eastern tip of Georges Bank (66º 10' W. Long.) to Cape Hatteras (35º N. Lat.) from June through October, annually

Alternative B2(h) Prohibit the use of PLL gear in an area off the Southeast Atlantic coast from the 200 meter contour to the 2000 meter contour between Cape Hatteras (35º N. Lat.) and Cape Canaveral (29º N. Lat.) from March through November, annually

Alternative B2(i) Prohibit the use of PLL gear in an area adjacent to the eastern boundary of the existing Florida East Coast closure from 29º N. to 28º 25' N. and seaward to the 2000 meter contour year-round

Alternative B2(j) Prohibit the use of PLL gear in HMS fisheries in the Gulf of Mexico from the 200 meter contour to the 2000 meter contour from the Straits of Florida (82º W. Long.) to the border between the United States and Mexico (26º N. Lat.) year-round

Alternative B2(k) Prohibit the use of PLL gear in HMS fisheries in the Caribbean from the 200 meter contour to the 2000 meter contour on the west coast of Puerto Rico during certain times of each year

Alternative B3(c) Modify the Florida East Coast time/area closure to allow the use of PLL gear in the northeast and southwest corners of the existing closure

Alternative B3(d) Modify the existing DeSoto Canyon time/area closure to allow the use of PLL gear in all areas seaward of the 2000 meter contour

Alternative B2(f) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in a portion of the central Gulf of Mexico from May to November, annually. This is similar to, but larger than the area described in alternative B2(a), where blue and white marlin, sailfish, spearfish, BFT, and sea turtles have been observed and caught year-round, but with highest concentrations occurring from May through November. Without redistribution of fishing effort, this closure would result in a relatively large decrease in the number of discards for blue and white marlin (Tables A.1 and A.2 in Appendix A). This closure would encompass approximately 17,219 $nm^2$ and would be defined as the area within the following coordinates, beginning with the northeastern corner and proceeding clockwise: 27º 10' N. Lat., 89º 11' W. Long.; 25º 44' N. Lat., 89º 11' W. Long.; and following the EEZ boundary to 26º 10' N. Lat., 93º 10' W. Long., 27º 10' N. Lat., 93º 10' W. Long. (Figure 2.6)

When redistribution of fishing effort was considered, a seven-month closure for alternative B2(f) was predicted to result in an increase in the number of swordfish, BFT, and bigeye tuna discards (2,081, 219, and 150 discards over three years for the seven-month closure, respectively; Table A.5 in Appendix A). NMFS compared possible reductions and increases of discards and targeted catch with the redistribution of effort for B2(f) with results from other closures. For instance, B2(f) is larger in size than B2(a). Thus, NMFS would expect a greater ecological benefit in terms of bycatch reduction from the larger B2(f) closure rather than the smaller B2(a) closure. However, the model predicted comparable results in terms of bycatch reduction between B2(a) and B2(f) (Tables A.1 and A.2 in Appendix A). In addition, B2(a) would not have resulted in as many BFT discards or potentially had as large of a negative economic impact in terms of a reduction in retained catch as B2(f). B2(f) is also smaller than B2(d). However, NMFS choose to analyze the larger closure to better assess the ecological, social and economic impacts of a large B2(d) closure in the Gulf of Mexico. Therefore, by further analyzing B2(a) and B2(d), NMFS was able to analyze a range in terms of potential ecological, social, and economic impacts with regard to the size of a closure in this area of the Gulf of Mexico.

Alternatives B2(g) – (k) were considered due to their overlap with existing EFH areas for white marlin and information indicating bycatch of non-target HMS species as well as sea turtles. NMFS specifically took into account five suggested white marlin time/area closures in the U.S. EEZ described on page 10 in a February 14, 2002, letter from the Biodiversity Legal Foundation, re: Atlantic White Marlin Critical Habitat Designation. NMFS agreed to take these five areas into account, among other things, as part of a settlement agreement in Center for Biological Diversity v. NMFS, Civ. Action No. 04-0063 (D.D.C.). Data from the Highly Migratory Species (HMS) logbook (*i.e.*, the logbook the PLL fleet uses) and pelagic observer program (POP) were analyzed for these specific areas to determine the percent reduction in discards with and without redistribution of fishing effort (described in detail in Chapter 4 and Appendix A). The analyses indicated that, while there may be some benefit from closures without the redistribution of fishing effort, in nearly all cases, bycatch increased with the redistribution of fishing effort in one or more of these areas, or other areas had higher rates of bycatch and produced larger ecological benefits with fewer social and economic impacts in the redistribution of fishing effort analyses. Additionally, because these alternatives follow contour lines, they would be difficult to enforce and difficult for fishermen to know if they were fishing inside a closed area or not. Therefore, while NMFS presents some analyses here and in Appendix A, alternatives B2(g) – (k) were not further analyzed in Chapter 4.

Alternative B2(g) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in portions of the Northeast in areas where white marlin are concentrated during certain times of the year and have been observed and reported caught from June through October (Figure 2.6). This time period also corresponds to higher catches of all other species considered (blue marlin, sailfish, spearfish, leatherback and loggerhead sea turtles and BFT; Table A.10 in Appendix A). Without considering redistribution of fishing effort, closing B2(g) could result in a reduction in the number of discards for all species considered (Tables A.1 and A.2 in Appendix A). However, when redistribution of fishing effort was considered, there was a predicted increase in the number of discards for white marlin, blue marlin, sailfish, spearfish, leatherback and other sea turtles, with the largest increase in discards expected for blue marlin, sailfish, and spearfish (20.2, 23.2, and 14.5 percent, respectively; Table A.2 in Appendix A). Loggerhead sea turtles were the only species with an expected decrease in discards under the redistribution model. This closure followed contour lines from Maine to North Carolina. The temporal and spatial aspects of B2(g) are different than any other closures in this area. B2(b) and B2(e) are also located off the Northeast. A year-round closure for B2(e) could result in less of an increase in discards of blue marlin, sailfish, and spearfish with redistribution of effort (Table A.1 in Appendix A). In addition, B2(e) could result in a larger decrease in leatherback and loggerhead sea turtles, and BFT discards (Table A.1 in Appendix A). However, B2(e) was considered year-round whereas B2(g) was only considered for June through October. NMFS determined that a one month closure (June) for B2(b) may have a greater ecological benefit by decreasing the number of discards of white marlin, blue marlin, sailfish, and spearfish. In addition, it could reduce leatherback sea turtle discards as well as loggerhead sea turtles discards and have a comparable reduction in BFT discards as B2(g) (Table A.2 in

Appendix A). Given these results, alternatives B2(b) and B2(e) were further analyzed, while B2(g) was not.

Alternative B2(h) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in portions of the Southeast where white marlin are concentrated during certain times of the year and have been observed and caught year-round (Figure 2.6). Without considering redistribution of fishing effort, the model predicted a small decrease in the percentage of discards, with the exception of sailfish (Tables A.2 in Appendix A). When redistribution of fishing effort was considered, the ecological impacts of B2(h) would likely be minor (the predicted decreases in the number of discards were small and typically less than eight percent; Table A.2 in Appendix A). There would be almost no decrease in the number of discards for blue marlin, a slight increase in the number of discards for white marlin, and a moderate increase in the number of discards of both leatherback and loggerhead sea turtles (Tables A.1 and A.2 in Appendix A). This closure did not spatially overlap any of the other closures further analyzed. However, given the minimal ecological benefits for some species and the negative ecological impact for white marlin and sea turtles, this alternative was not further analyzed.

Alternative B2(i) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in portions of the east coast of Florida where white marlin are concentrated during certain times of the year and have been observed and caught year-round (Figure 2.6). As with B2(h), this closure did not spatially overlap with any of the other closures that were further analyzed. However, even without considering redistribution of fishing effort, the reduction in bycatch associated with B2(i) was small, with the highest expected reduction for blue marlin (316 fish for 3 years or 12.9 percent; Tables A.1 and A.2 in Appendix A). When redistribution of fishing effort was considered, the model predicted only slight decreases in discards of white and blue marlin, sailfish and loggerhead sea turtles, with all decreases less than ten percent (Table A.2 in Appendix A). However, there were predicted increases in spearfish, leatherback sea turtle, and BFT discards (Tables A.1 and A.2 in Appendix A). Thus, given the potential negative ecological impacts of this closure, this alternative was not further analyzed.

Alternative B2(j) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in portions of the Gulf of Mexico where white marlin are concentrated during portions of the year and have been observed and reported caught year-round (Figure 2.6). Without considering redistribution of fishing effort, B2(j) could have decreased discards of all species considered, especially blue marlin, sailfish and spearfish (21.6, 43.1, 25.5 percent, respectively; Table A.2 in Appendix A). However, when redistribution of fishing effort was considered, the model predicted an increase in the number of discards, especially for loggerhead sea turtles (22.3 percent; Table A.2 in Appendix A). While there were predicted decreases in discards of sailfish and spearfish (Tables A.1 and A.2 in Appendix A), the net effect could be a negative ecological impact. This closure was a spatially large closure in the Gulf of Mexico that could also have a large economic impact, especially for a year-round closure. Given other closures in the Gulf of Mexico that were further analyzed (B2(a), B2(c), and B2(d)) varied in size and time period, this alternative was not further analyzed.

Alternative B2(k) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in portions of the Caribbean where white marlin are concentrated and have been observed and caught during certain times of the year (Figure 2.6). Bycatch occurs primarily from December through April. As with B2(h) and B2(j), this closure did not spatially overlap with any of the other closures that were further analyzed. However, even without considering redistribution of fishing effort, the effort and reduction in bycatch associated with B2(k) was small, with the predicted reduction in the number of hooks and discards extremely low (less than one percent; Tables A.1 and A.2 in Appendix A). When redistribution of fishing effort was considered, there was only a slight decrease in the number of discards for white and blue marlin, and a slight increase in the number of discards for leatherback sea turtles and BFT discards (less than two percent; Table A.2 in Appendix A.2). Thus, the overall ecological impact due to this time/area closure would probably be relatively minor, resulting in no net decrease in discards for any of the species considered. Therefore, this alternative was not further analyzed.

In addition to proposing new closed areas, NMFS considered modifying current or existing time/area closures (alternatives B3(a) through B3(d)). In general, closed areas considered for modification (*i.e.*, partial re-opening) were chosen based on examining the PLL and POP data from 1997 through 1999. The data were analyzed in GIS, allowing NMFS to identify areas associated with minimal bycatch within current time/area closures for re-opening. Alternatives B3(a) and B3(b) were chosen for further analysis whereas alternatives B3(c) and B3(d) were initially examined but not further analyzed based on the reasons outlined below.

Alternative B3(c) would modify the Florida East Coast time/area closure by moving the eastern boundary at 27º N Lat., 30’ W Long. west to the axis of the Gulf Stream, and then following the axis of the Gulf Stream north to 31º N Lat., 79º 20’ W. Long. B3(c) would also move the southernmost boundary of the Florida East Coast closure north from 24º 00’ N Lat. to 24º 10’ N. Lat. between 81º 47’ and 81º 00’ W. Long. (Figure 2.3). This alternative would reopen these areas to PLL gear year-round. Alternative B3(d) would modify the existing DeSoto Canyon time/area closure boundary to allow PLL gear in areas seaward of the 2000 meter contour from 26º N. Lat., 85º 00’ W. Long., to 29º N. Lat., 88º 00’ W. Long. (Figure 2.3). B3(d) would reopen this area to PLL gear year-round.

The proportion of discarded swordfish versus the number of swordfish kept varied among the modifications to existing time/area closures (Table A.25 in Appendix A). Both alternatives B3(c) and B3(d) could have resulted in a larger proportion of discarded swordfish than alternatives B3(a) or B3(b) (Table A.25 in Appendix A). Minimizing the number of swordfish caught in B3(d) is important because the average swordfish size was significantly smaller in the area to be reopened (average size was 108 cm LJFL in the portion considered for reopening; $P = 0.03$; Table A.21 in Appendix A) compared to the area to remain closed (Figure A.2 in Appendix A; average size was 116 cm LJFL in the portion to remain closed; Table A.21 in Appendix A). In addition, the average swordfish size in B3(d) in the outside area was smaller than the minimum size limit of 119 cm LJFL (Table A.21 in Appendix A). There were also a lower proportion of BFT discards in the B3(a) and B3(b) modifications compared to B3(c) and B3(d) (Table A.25 in Appendix A). Although B3(c) could have resulted in an increase in the number of landed swordfish, yellowfin tuna, and bigeye tuna than either B3(a) or B3(b), it could have also increased the number of swordfish, bluefin, yellowfin and bigeye tuna discards (Table A.25 in Appendix A).

In terms of bycatch, B3(c) or B3(d) could result in the highest bycatch levels of white and blue marlin, and sailfish; almost 2.5 times as many white marlin, at least four times as many blue marlin, and at least ten times as many sailfish could be discarded in the B3(c) and B3(d) modifications compared to the B3(a) or B3(b) modification (Table A.24 in Appendix A). Such high levels of bycatch associated with B3(c) or B3(d) may have a larger negative ecological impact compared to B3(a) or B3(b); thus, NMFS only analyzed alternatives B3(a) and B3(b) in Chapter 4.

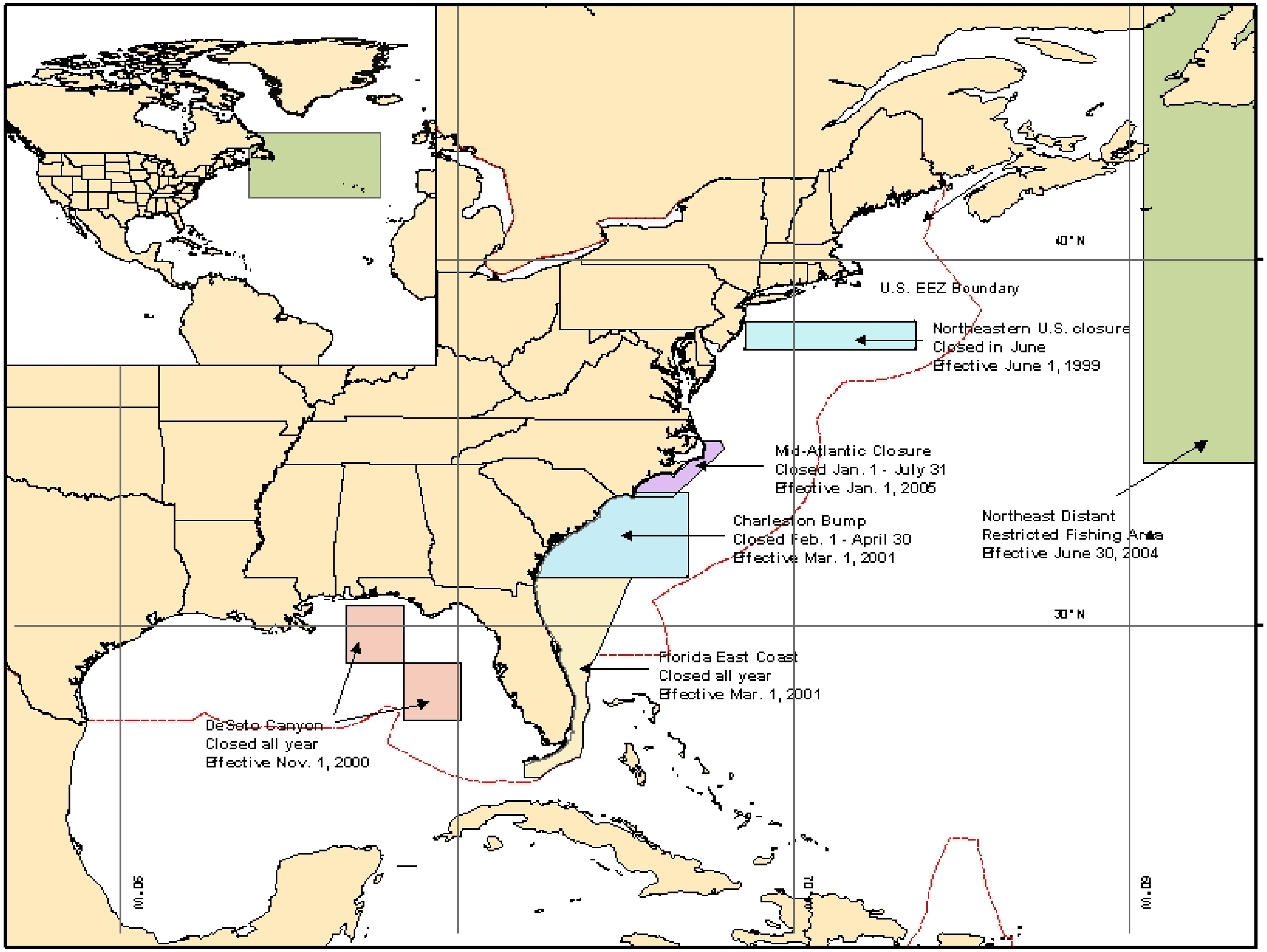


**Figure 2.1 Existing time/area closures in HMS fisheries.** Inset shows extent of the Northeast Distant restricted fishing area. All closures except the Mid-Atlantic are applicable to pelagic longline gear only. The Mid-Atlantic Closure is applicable to bottom longline gear only. Note: the Northeast Distant (NED) was a closed area to all vessels as of 2001. It became the NED Restricted Fishing Area on June 30, 2004 when it was opened to those participating in the NED experiment.

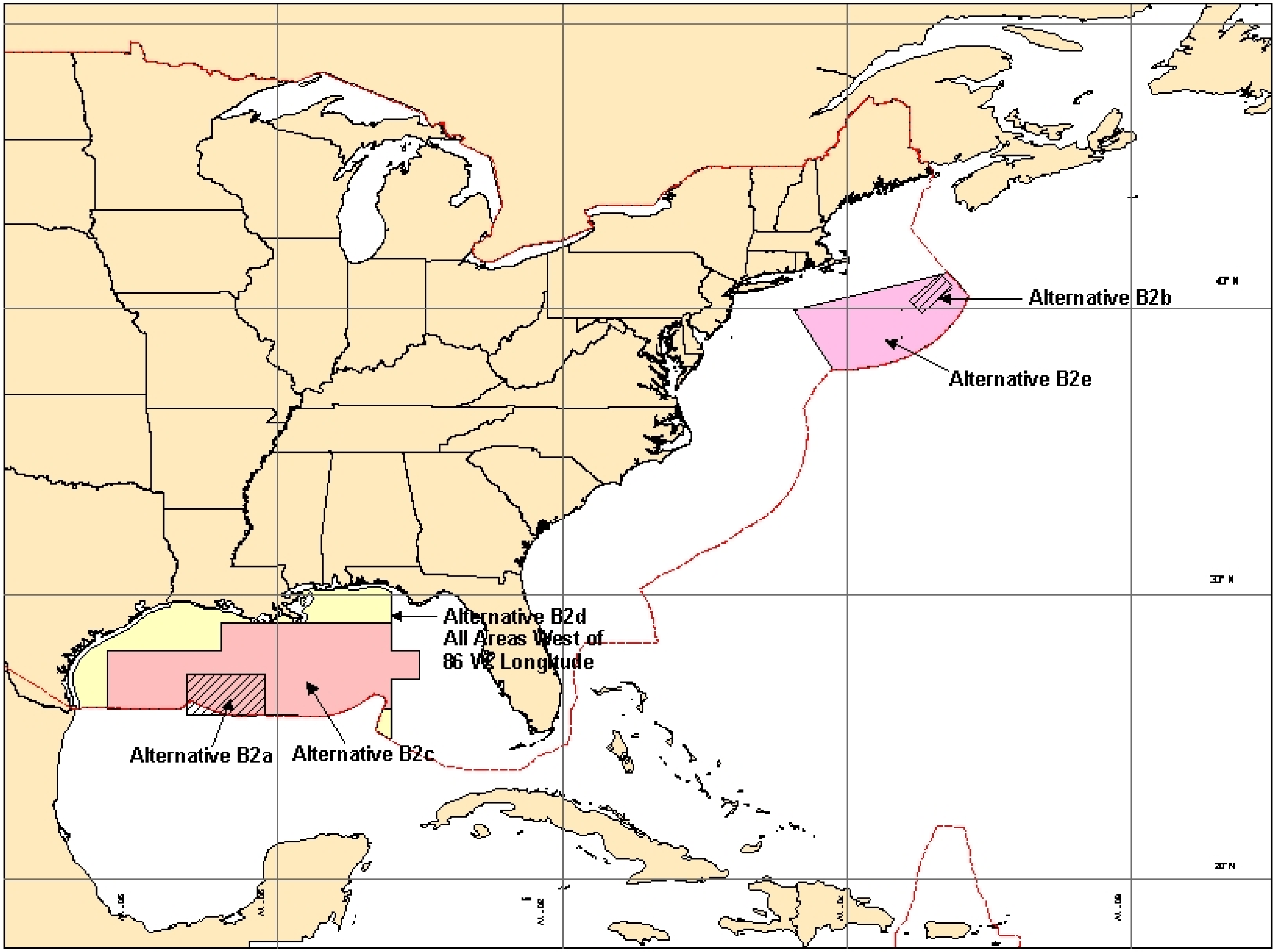


**Figure 2.2 Map showing areas being considered for new time/area closures to reduce non-target HMS and protected species interactions.**

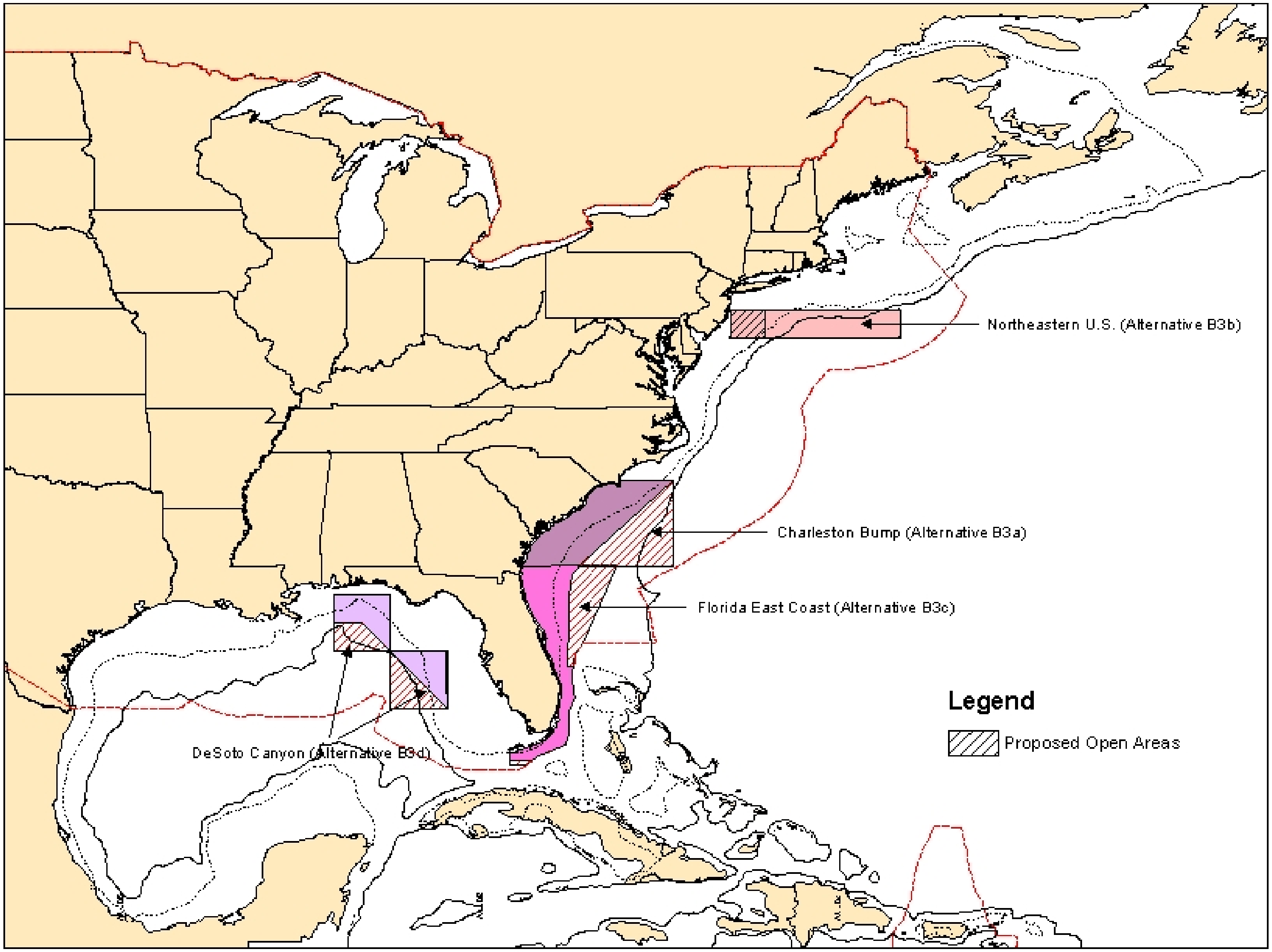


**Figure 2.3 Map showing areas considered for modifications to existing closures. Note: only alternatives B3(a) and (b) were further analyzed.**

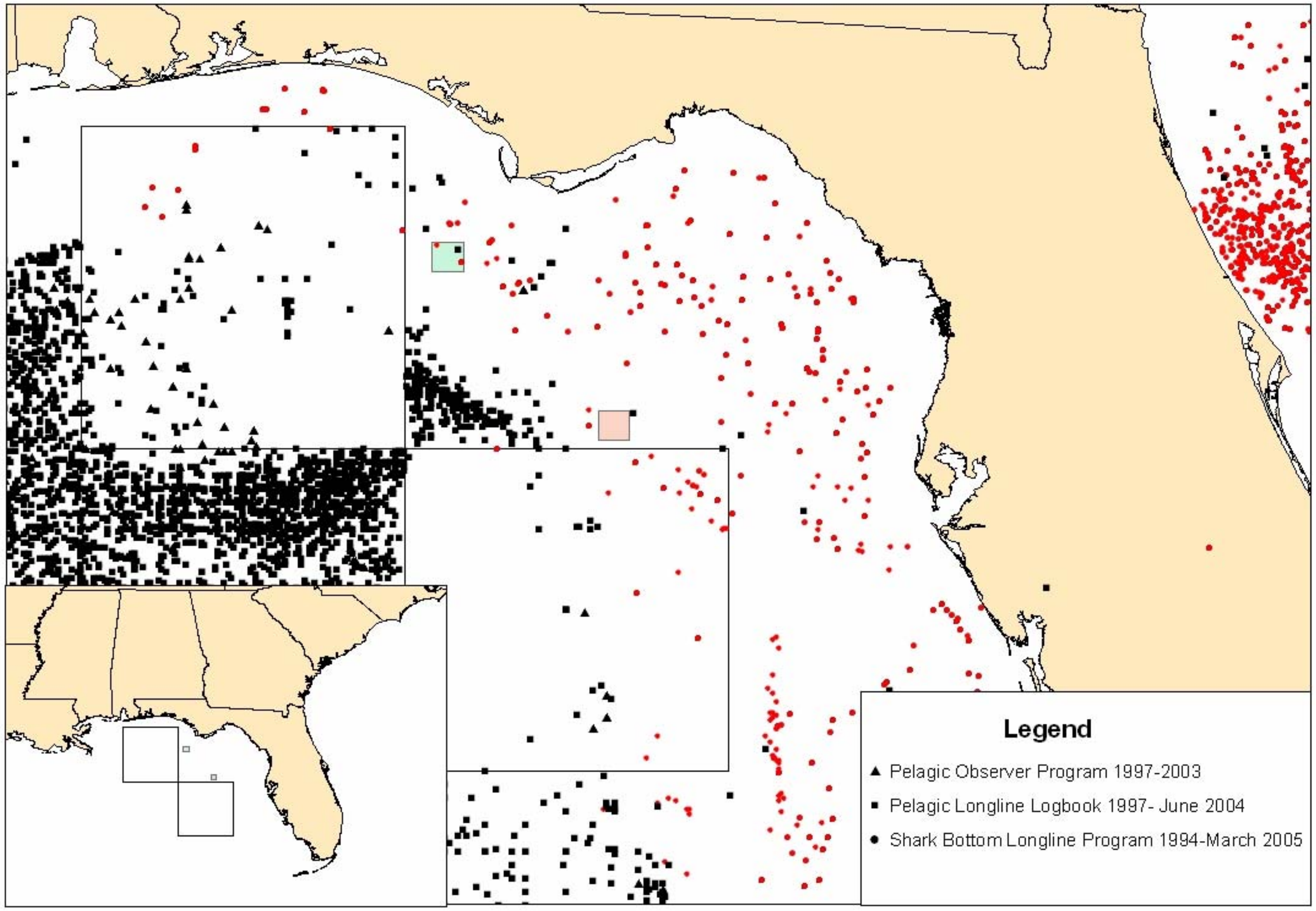


**Figure 2.4 Pelagic and Bottom Longline Sets in the Madison-Swanson (upper left) and Steamboat Lumps (lower right) Marine Reserves.** Note: one set for the Commercial Shark Fishery Observer Program (CSFOP) was in 2005. Although not indicated, no new sets were recorded for the CSFOP in 2004. Source: HMS Logbook, Pelagic Observer Program, and CSFOP. The Desoto Canyon closure is also shown for reference.

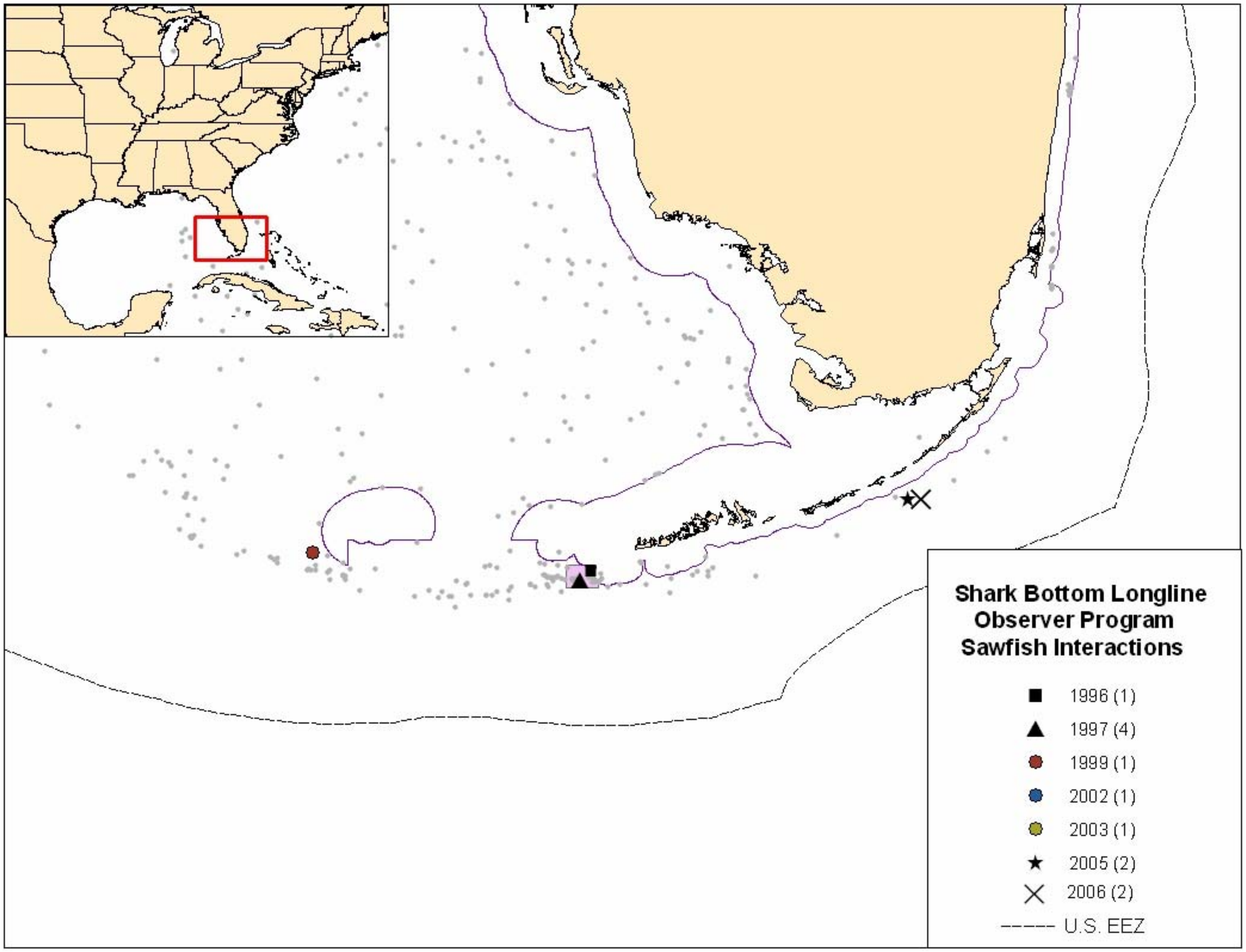


**Figure 2.5 Map showing the potential closed area to bottom longline gear to reduce bycatch of endangered smalltooth sawfish.** Grey dots are locations of observed bottom longline sets. Source: CSFOP 1994-2006.

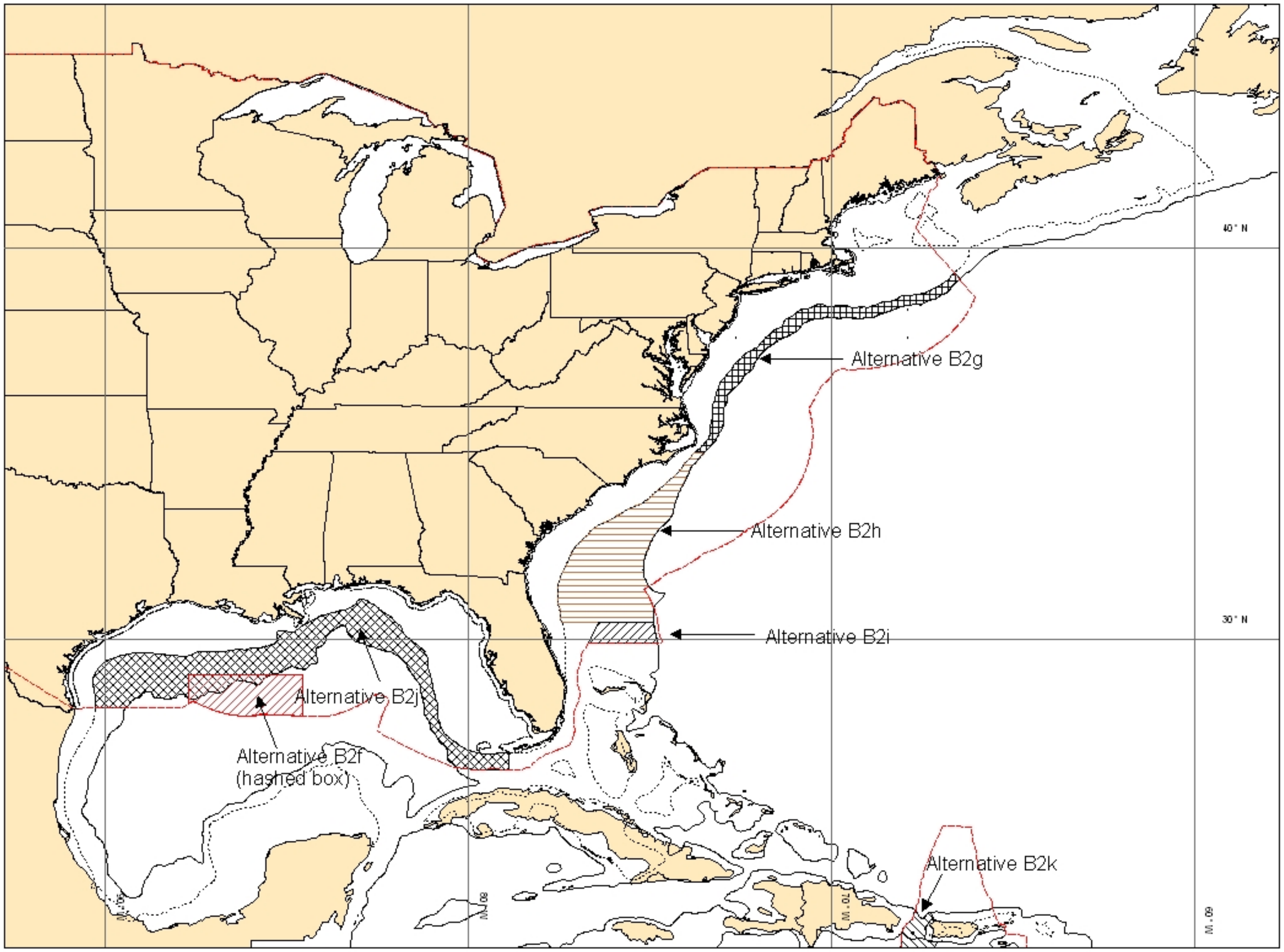


**Figure 2.6 Map showing time/area closure alternatives considered but not further analyzed at this time to reduce white marlin and other protected species interactions.**

## 2.2 Rebuilding and Preventing Overfishing

### 2.2.1 Northern Albacore Tuna

In the October 1999 Report to Congress on the Status of U.S. Fisheries, NMFS identified the northern albacore tuna stock as overfished. The Magnuson-Stevens Act requires NMFS to develop a rebuilding plan for overfished stocks. Alternatives for developing a rebuilding plan for northern albacore tuna were presented and discussed in a proposed rule issued on May 24, 2000 (65 FR 33519). The alternatives considered included; no action, a unilateral U.S. action plan, and a ten-year international rebuilding program negotiated through ICCAT. NMFS requested comment on those rebuilding alternatives and commenters noted that a rebuilding program for northern albacore tuna must reflect the magnitude of current landings and consider year-to-year variability in the U.S. commercial and recreational fisheries. In the final rule, NMFS indicated that, in establishing the foundation for an international rebuilding program, it would work through ICCAT to adopt a target stock size together with a time frame for rebuilding that included flexibility (65 FR 77523, December 12, 2000).

Since the final rule, the U.S delegation to ICCAT has advocated a total allowable catch (TAC) for northern albacore tuna set at a level less than the current estimate of replacement yield (34,500 mt ww). Other ICCAT members have not shared the U.S. position that immediate catch reductions were needed to rebuild the spawning stock biomass to levels that would support MSY. Consequently, between 2000 and 2003, ICCAT adopted recommendations each year to set a TAC at the replacement yield level of 34,500 mt ww through 2006, together with country specific allocations in order to control compliance. In addition, the 1998 recommendation on limiting vessel capacity for northern albacore has remained in force. Irrespective of the established TAC, reported catches have been significantly below the replacement yield level in recent years. Major harvesters (European Union countries) have attributed the decline in catches to gear changes (shifting from banned gillnets to trolling) and to availability (fish concentrations further offshore under prevailing oceanographic conditions) rather than further declines in abundance. If true, the low catches in recent years may have allowed some rebuilding to occur.

As noted above, NMFS previously took comment on the following northern albacore rebuilding alternatives. Comments were again received on the following alternatives ending March 1, 2006.

Alternative C1 Maintain compliance with the current ICCAT recommendation (No Action)

Under Alternative C1, NMFS would continue to monitor U.S. northern albacore tuna fisheries to stay in compliance with the ICCAT-recommended annual U.S. TAC of 607 mt ww, however; NMFS would not actively pursue the development of an international rebuilding plan, or seek to establish the foundation for such a plan at future ICCAT meetings.

Alternative C2 Unilateral proportional reduction of United States northern albacore tuna fishing mortality

Alternative C2 would establish a reduction in fishing mortality of northern albacore tuna in U.S. fisheries. This would be a unilateral action setting a proportional reduction below the current TAC in an effort to begin rebuilding the northern albacore stock. A variety of measures designed to reduce mortality would be examined, including but not limited to: seasonal closures, closed areas, quota restrictions, size limits, and retention limits. Those measures found to be appropriate would be implemented as domestic regulation through separate rulemaking.

Alternative C3 *Establish the foundation with ICCAT for developing an international rebuilding program – Preferred Alternative*

This measure would incorporate an ICCAT northern albacore rebuilding program into this consolidated HMS FMP. Depending on the results of the scheduled 2007 stock assessment, the United States would, if warranted, seek an international northern albacore tuna rebuilding program with a target stock level, a time table, and reference points for progress. In order to rebuild the stock, if the 2007 assessment indicates a similar level of stock abundance below $B_{MSY,}$ ICCAT would likely have to set the TAC at replacement level or below. The U.S. landings alone, at around two percent, would likely not provide enough harvest reduction to rebuild the stock. Under alternative C3, the United States would continue to work through ICCAT to establish a stock size and rebuilding plan time frame consistent with the Magnuson-Stevens Act. Such an international rebuilding program should ensure rebuilding to a level capable of producing MSY with a target stock level, a timetable, and reference points. Once a plan was established, the United States would comply with ICCAT recommendation(s), with domestic regulatory action as necessary. Alternative C3 would not require any immediate domestic regulatory action.

### 2.2.2 Finetooth Sharks

The following alternatives explore a range of management options available to address overfishing of finetooth sharks. The 2002 stock assessment for Small Coastal Sharks (SCS) found that overfishing was occurring on finetooth sharks. A more detailed description of the 2002 SCS assessment can be found in Section 3.2.5.

Alternative D1 Maintain current regulations (No Action)

This alternative would maintain fishing mortality at current levels. Finetooth sharks are managed for recreational and commercial fisheries within the SCS species complex. Commercial fisheries are managed under a limited access permitting system where new entrants to the fishery must obtain a previously held permit and transfer it to their vessel, subject to upgrading restrictions. There are five vessels that target sharks with drift gillnet or strikenet gear and these vessels are subject to extensive observer coverage. There is no SCS trip limit for directed permit holders; however, incidental permit holders are limited to 16 SCS and pelagic sharks combined per vessel per day. Between 1999 and 2004, commercial landings of SCS ranged from 204-330 mt dw, well below the quota established for SCS (Table 4.2). Most finetooth sharks are landed by vessels targeting species other than sharks, with gillnet gear, in the

South Atlantic region. Recreational anglers must possess an HMS Angling permit and are subject to a bag limit of one shark (including finetooth shark) greater than 54 inches FL (137 cm) per vessel per day. The Marine Recreational Fisheries Statistics Survey (MRFSS) and the Texas Parks and Wildlife Service estimated that 14,811 finetooth sharks were landed between 1999 and 2005.

Alternative D2 Implement commercial management measures to reduce fishing mortality of finetooth sharks

This alternative would implement management measures to reduce finetooth shark fishing mortality in commercial fisheries targeting sharks. These measures would affect all vessels in possession of a Federal limited access shark permit. These actions may include any combination of the following measures, including: a directed trip limit for SCS, gillnet gear restrictions, prohibiting the use of gillnet gear for landing sharks, reduced soak time for gillnets, and reducing the overall SCS quota.

Alternative D3 Implement recreational management measures to reduce fishing mortality of finetooth sharks

This alternative would implement measures aimed at reducing fishing mortality of finetooth sharks in HMS recreational fisheries. These measures would affect all vessels in possession of a Federal HMS Angling category permit, CHB permit, and/or General category permit that target finetooth sharks. This alternative may require the use of circle hooks when targeting SCS, and/or increasing the minimum size for retention of finetooth sharks. Currently, anglers may retain one shark over 54 inches (137 cm) per vessel per trip and are permitted to use circle and J-hooks. This alternative would not affect the minimum size for possession of other sharks.

Alternative D4 *Identify sources of finetooth fishing mortality to target appropriate management actions (Preferred Alternative)*

Landings data from dealer reports, compared to observer data from the Directed Shark Gillnet Fishery Observer Program (DSGFOP) indicate that the five vessels currently targeting sharks with drift or strike gillnets are not landing a significant portion of the total catch of finetooth sharks (Tables 4.1 and 4.2). Furthermore, most of these vessels also possess a Spanish mackerel permit. There are also additional vessels that are permitted to deploy gillnet gear and possess both a commercial shark limited access permit and a Spanish mackerel permit. These vessels were not previously considered to be targeting sharks and are not subject to observer coverage because they were either targeting non-HMS or not fishing gillnets in a strike or drift fashion.

This alternative would implement a plan to prevent overfishing of finetooth sharks that entails identifying sources of finetooth shark fishing mortality in commercial (gillnet and other) and recreational fisheries that may not be targeting sharks specifically, but landing them incidentally to other species. Furthermore, this alternative would also result in improved collaboration among management entities; this collaboration may be necessary to prevent overfishing of finetooth sharks because fisheries managed by other management entities may be contributing to fishing mortality. Additional data collected may also be beneficial to the upcoming stock assessment for SCS beginning in 2007. Specific activities that may be included in the Agency's plan for preventing overfishing and included in this alternative may include, but would not be limited to: contacting states, Regional Fishery Management Councils, and Interstate Marine Fisheries Commissions to determine which fisheries may be landing finetooth sharks; contacting state employees responsible for processing finetooth shark landings data to understand data management protocols and procedures between states and obtain additional landings data; including finetooth sharks as a select species for bycatch sub-sampling in the Gulf of Mexico shrimp trawl fishery; selecting vessels that deploy sink gillnet gear and/or target non-HMS for observer coverage under the DSGFOP; analyzing Federal logbook data to determine seasonality, locations, and which non-HMS are landed on trips that also harvest finetooth sharks; exploring collaborative management measures with the South Atlantic Fishery Management Council to address the overlap between shark and Spanish mackerel gillnet fisheries; and, implementing shark identification workshops (alternative A9) for dealers so that they might become more proficient at identifying finetooth sharks (Table 2.1).

**Table 2.1 Summary and status of activities, anticipated results, and associated timelines for preventing overfishing of finetooth sharks.**

| Activity | Anticipated Results | Status | Timeline |
|---|---|---|---|
| Send letters to Regional Fishery Management Councils and Interstate Marine Fisheries Commissions to determine sources of finetooth mortality | Expand information on fisheries that are landing finetooth sharks within the purview of Councils, Commissions, and state agencies; Obtain additional data for SCS assessment; attain points of contacts with the various Councils, states, and Commissions regarding identification of finetooth landings; understand how and where finetooth sharks are being reported and the availability of additional landings data | Contacts for ASMFC and GMFMC attained; additional information on fisheries landing finetooth sharks in Federal waters was obtained | 06/2005 (*letters sent to Gulf and South Atlantic Councils and Gulf and Atlantic States Marine Fisheries Commissions seeking data/information on finetooth landings)*<br>04/2006 – ongoing (*collaboration/follow-up with SAFMC initiated because of overlap between Spanish mackerel and shark fisheries; issues surrounding potential management of kingfish in Federal waters*) |
| Expand DSGFOP to include vessels targeting non-HMS and/or using sink gillnet gear | Increase landings information on finetooth sharks landed with gillnet gear in Federal waters of the South Atlantic, expand available data for SCS assessment | In 2005, 88 sets observed on 30 trips from 8 vessels not targeting HMS or fishing with sink gillnets | 2005 (*pilot program, expanded DSGFOP to include sink-gillnet fishermen, vessels not targeting HMS*)<br>2006 - ongoing (*continue inclusion of additional vessels in selection for coverage under DSGFOP*) |
| Contact individual states (TX to NC) to determine data management protocols, fisheries | Obtain additional information on finetooth shark landings, fisheries deploying gillnets in state waters, data management and reporting; Attain state | Contacted state employees in AL, TX, NC, FL, LA, MS, and GA, SC.<br>Additional landings | 2006 - ongoing (*inclusion of finetooth sharks in any state observer program for bycatch sampling*) |

| Activity | Anticipated Results | Status | Timeline |
|---|---|---|---|
| interacting with finetooth, regulations, etc. | contacts for future measures to prevent overfishing of finetooth sharks | data attained from FL, AL, LA | |
| Include finetooth sharks as a select species in the Shrimp Trawl Fishery Observer Program in the Gulf of Mexico | Increase bycatch landings information in the GOM shrimp trawl fishery, expand bycatch data for SCS assessment | Included finetooth sharks as a select spp. for bycatch sampling on shrimp trawl vessels in GOM | 2006 - ongoing |
| Implement identification workshops for shark dealers (Alternative A9) | Improve species identification skills; improve General Canvass (dealer) data reports | Implementation of Alternative A9 in 2007; include all Federal shark dealer permit holders | 2007 - ongoing |
| SCS stock assessment | Update information on the status of finetooth sharks in the Atlantic Ocean | First data review workshop in early 2007 | 2007 |
| Target appropriate management measures as necessary | Based on stock assessment and investigating other sources of mortality, implement commercial and/or recreational management measures as necessary to prevent overfishing | | 2007 - 2008 |

*Other alternatives considered but not further analyzed at this time*

Alternative D5 Prohibit landings of finetooth sharks in commercial and recreational fisheries.

This alternative would add finetooth sharks to the prohibited species list for commercial and recreational fisheries. Federally permitted commercial and recreational fishermen would not be able to land and/or possess finetooth sharks under this alternative. Finetooth sharks would need to meet at least two of the four criteria defined under 50 CFR Part 635 for inclusion of the species to the prohibited species list for Atlantic sharks. The existing criteria are: (1) there is sufficient biological information to indicate the stock warrants protection, such as indications of depletion or low reproductive potential or the species is on the ESA candidate list; (2) the species is rarely encountered or observed caught in HMS fisheries, (3) the species is not commonly encountered or observed caught as bycatch in fishing operations, or (4) the species is difficult to distinguish from other prohibited species (*i.e.*, look alike issue). Finetooth sharks do not meet any of the criteria necessary to be considered a prohibited species at this time.

During the development of Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, the Agency considered the addition of finetooth to the list of prohibited species and concluded:

"This alternative would have limited ecological impacts as finetooth sharks are common bycatch in non-HMS fisheries and prohibiting them will not prevent their capture. A reduction in finetooth shark landings in HMS fisheries may not significantly reduce mortality because they are only a small component of total landings. This alternative may help to reduce mortality of this species but could also increase waste and discards...In regard to alternative I6 [prohibited species listing criteria], finetooth sharks are not depleted and are commonly caught in HMS and non-HMS fisheries. Therefore, this species does not appear to meet the criteria selected under alternative I6, at this time".

The Agency does not have any new information at this time that would alter this conclusion. Thus, this alternative was not further analyzed at this time. As more information is collected, NMFS may re-consider if necessary.

### 2.2.3 Atlantic Billfish

Atlantic blue and white marlins have been identified as overfished with overfishing continuing. West Atlantic sailfish are considered overfished. The status of blue and white marlin is characterized by reduced or severely reduced biomass levels and high fishing mortality rates. In 2002, NMFS conducted an Endangered Species Act (ESA) status listing review for Atlantic white marlin and determined that a listing was not warranted at that time. Another ESA status listing review for Atlantic white marlin is scheduled in 2007, and additional conservation steps taken in advance of that review would be relevant to status review deliberations. Domestically, directed billfish fishing effort has been reserved for the recreational fishing sector since 1988, when possession by pelagic longline vessels and sales of Atlantic billfish species were prohibited. Based on ICCAT data, the United States' landings (landings and dead discards) of Atlantic blue and white marlin averaged 2.4 percent and 4.5 percent (respectively) of aggregate Atlantic-wide landings for these species, as reported to ICCAT for the period 1999-2004. U.S. landings of West Atlantic sailfish averaged 8.6 percent of aggregate West Atlantic-wide sailfish landings, as reported to ICCAT for the period 1999-2004.

The following alternatives represent the range of options that NMFS is considering to reduce the recreational fishery's contribution to overfishing and to improve data collection. Please see section 2.1.2 for alternatives considered to address commercial billfish bycatch issues. The alternatives include gear restrictions, landings restrictions, and data collection requirements.

Alternative E1 Retain existing regulations regarding recreational billfish fishing, including permit requirements, minimum size limits, prohibited species, landing form, allowable gear, and reporting requirements (No Action)

Alternative E1 would maintain the *status quo* in the domestic Atlantic recreational billfish fishery. As such, this alternative retains all existing regulations regarding recreational billfish fishing in the Atlantic Ocean, including permit requirements, minimum size limits, prohibited species, catch and release fishery management program, landing form, allowable gear, and reporting requirements, unless specifically modified during this rulemaking.

Alternative E2 Effective January 1, 2007, limit all participants in Atlantic HMS recreational fisheries to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations

Alternative E2 would require the use of non-offset circle hooks in all segments of HMS recreational fisheries, for all species, whenever natural baits or natural bait/artificial lure combinations are used, beginning on January 1, 2007. This includes HMS Angling category permitted vessels, Charter/Headboat permitted vessels on for-hire trips, and all General category permitted vessels participating in registered HMS tournaments. Circle hooks are defined in 50 CFR §635.2 as "a fishing hook originally designed and manufactured so that the point is turned perpendicularly back to the shank to form a generally circular, or oval, shape." Natural bait/artificial lure combinations would include, but are not limited to, rigs such as natural baits used in combination with artificial hoods, heads, and/or skirts. This alternative would allow the use of J-hooks with artificial lures.

Alternative E3 *Effective January 1, 2007, limit all HMS permitted vessels participating in Atlantic billfish tournaments to deploying only non-offset circle hooks when using natural bait or natural bait/artificial lure combinations – Preferred Alternative*

Alternative E3 would require the use of non-offset circle hooks by anglers fishing from HMS permitted vessels, or vessels required to be permitted, participating in Atlantic billfish tournaments whenever natural bait or natural bait/artificial lure combinations are used, effective January 1, 2007. Any tournament that has an award category, or awards points or prizes for Atlantic billfish is considered a billfish tournament. Circle hooks are defined in 50 CFR §635.2 as "a fishing hook originally designed and manufactured so that the point is turned perpendicularly back to the shank to form a generally circular, or oval, shape." Natural bait/artificial lure combinations would include, but are not limited to, rigs such as natural baits used in combination with artificial hoods, heads, and/or skirts. This alternative would allow the use of J-hooks with artificial lures in tournaments. This alternative includes a minor technical clarification relative to preferred alternative E3, as presented in the Draft Consolidated HMS FMP. As described more fully in Chapter 4, the changes are intended to clarify that circle hook use is only required aboard HMS permitted vessels participating in Atlantic billfish tournaments when deploying natural baits or natural bait/artificial lure combinations. The phrasing of alternative E3 in the Draft Consolidated HMS FMP was sufficiently vague to allow other interpretations of which anglers may be affected by this alternative. This technical clarification has no effect on the impacts of the alternative, as only permitted HMS vessels may fish for, catch, or retain Atlantic billfish, and alternative E3 in the Draft Consolidated HMS FMP was analyzed from the vantage point of applying only to HMS permitted vessels.

Alternative E4(a) Increase the minimum legal size for Atlantic white marlin to a specific size between 68 and 71 inches LJFL (172 - 180 cm)

Alternative E4(a) would increase the minimum legal size for Atlantic white marlin to a specific size between 68 and 71 inches LJFL (172 - 180 cm) to reduce U. S. landings and/or mortalities, as appropriate. The sizes presented represent the upper and lower bounds of the sizes analyzed and available for selection, and as such, do not represent consideration of a "slot limit."

Alternative E4(b) Increase the minimum size for blue marlin to a specific size between 103 and 106 inches LJFL (261 – 269 cm)

Alternative E4(b) would increase the minimum size for blue marlin to a specific size between 103 and 106 inches LJFL (261 – 269 cm) to reduce U.S. landings and/or mortalities, as appropriate. The sizes presented represent the upper and lower bounds of the sizes analyzed and available for selection, and as such, do not represent consideration of a "slot limit."

Alternative E5 Implement a recreational bag limit of one Atlantic billfish per vessel per trip

Alternative E5 would implement a recreational bag limit of one Atlantic billfish per vessel per trip. No more than one Atlantic billfish would be allowed to be possessed, retained, or landed on, or by, a vessel regardless of the length of the trip.

Alternative E6 *Effective January 1, 2007, Implement ICCAT Recommendations on Recreational Marlin Landings Limits – Preferred Alternative*

Alternative E6 would codify ICCAT recommendations pertaining to recreational marlin landing limits and implement domestic compliance mechanisms. Specifically, this includes an annual landings-limit of 250 recreationally caught Atlantic blue and white marlin, combined, as per ICCAT recommendations 00-13 and 04-09. To provide for maximum utilization of the U.S. recreational Atlantic marlin landing limit without exceeding it, this alternative would allow NMFS to increase the legal minimum size of blue and/or white marlin, as appropriate. The anticipated effect of an in-season minimum size increase would be to slow landings, if necessary, and thereby prevent a shift to catch and release fishing only. Under this alternative, the proposed size range that would be made available to NMFS for in-season management actions is from 117 to 138 inches for Atlantic blue marlin and 70 to 79 inches for Atlantic white marlin. The need for action and the specific minimum size temporarily implemented would be based upon a review of observed landings, time remaining until conclusion of the current fishing year, current and historical landings trends, and any other relevant factors. As a backstop to ensure that the U.S.'s actions remain consistent with the ICCAT landing limit, the fishery would become catch and release only for the remainder of a fishing year if the landing limit were achieved. If marlin minimum sizes are increased to slow landings during a given fishing year, they would revert back to the previous minimum size at the start of the next fishing season. Consistent with ICCAT recommendations, NMFS would subtract any overharvest from the subsequent fishing year's landing limit, and could carry forward any underharvest to the subsequent fishing year.

Alternative E7 Effective January 1, 2007 – December 31, 2011, allow only catch and release fishing for Atlantic white marlin

Alternative E7 would allow only catch and release fishing for Atlantic white marlin. Possession, retention, and landings of Atlantic white marlin would be prohibited at all times and under all circumstances. This provision would expire five years from the effective date unless specifically extended by NMFS. This alternative was preferred in the Draft Consolidated HMS FMP. As further described in Chapter 4, NMFS is not selecting this alternative as a preferred alternative in the final Consolidated HMS FMP, but may consider it in a future rulemaking, as necessary and appropriate.

Alternative E8 Effective January 1, 2007 – December 31, 2011, allow only catch and release fishing for Atlantic blue marlin

Alternative E8 would allow only catch and release fishing for Atlantic blue marlin. Possession, retention, and landings of Atlantic white marlin would be prohibited at all times and under all circumstances. This provision would expire five years from the effective date unless specifically extended by NMFS

*Other billfish alternatives considered but not further analyzed at this time*

Alternative E9 Implement a mandatory Atlantic HMS tournament permit

Alternative E9 would replace the current tournament registration system with a mandatory tournament permit. A separate permit would be required for each tournament on an annual basis. Tournament permit applications would be required to be received 45 days in advance of the tournament to allow NMFS time to process the permit and select tournaments for reporting, if appropriate. This alternative would not alter reporting requirements. NMFS has determined that improvements to tournament registration, data collection, and enforceability that could be achieved under this alternative can be achieved with significantly less burden to the public and government through implementation of regulatory clarifications contained elsewhere in this document. Please see the Section 2.3.4 Regulatory Housekeeping for addition details. Therefore, this alternative is not further analyzed in this rulemaking, but maybe considered, if appropriate and necessary, in a future rulemaking.

## 2.3 Management Program Structure

### 2.3.1 Atlantic Bluefin Tuna Quota Management

#### *2.3.1.1 BFT Quota Management in the General and Angling Categories*

The following alternatives explore different possibilities for amending/clarifying the annual BFT quota allocation schemes in both the General and Angling categories. Currently, ICCAT recommends an annual Total Allowable Catch (TAC) of BFT for the United States in the western Atlantic management area. NMFS implements these ICCAT recommendations, as required by ATCA, by dividing the annual U.S. BFT TAC among several domestic quota categories based on allocation percentages established in the 1999 FMP. In some categories, including the General and Angling categories, NMFS further subdivides these domestic category allocations into subquotas (*i.e.*, on a temporal, geographic, and/or BFT size class basis) to further meet the objectives of the Magnuson-Stevens Act, ATCA, and the 1999 FMP. Not all of the alternatives described below are mutually exclusive.

Alternative F1 Maintain the time-periods, subquota allocations, and geographic set-asides for the General and Angling categories as established in the 1999 FMP (No Action)

This alternative would maintain the current General category time-period subquota allocation scheme, as stated in the 1999 FMP, and would require an FMP amendment to adjust the time-period subquota allocation percentages in the future. This sub-allocation scheme divides the annual General category quota in three distinct time-periods and one geographic set-aside. The New York Bight geographic set-aside (Figure 2.7) is allocated ten metric tons (mt) whole weight on an annual basis. Once this amount is deducted from the overall General category quota, the remaining quota is divided among three time-periods and is allocated to each time-period as follows: 60 percent to June through August, 30 percent to September, and 10 percent to October through January (Figure 2.8).

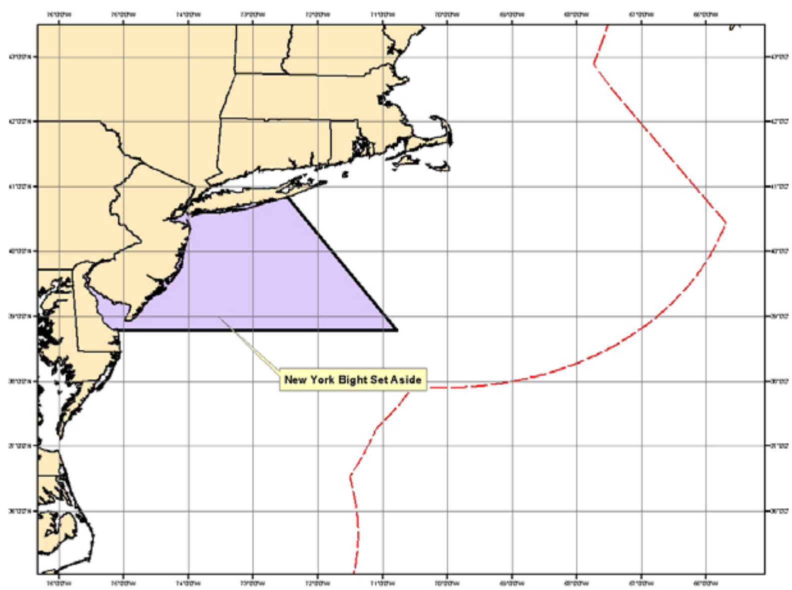


**Figure 2.7 The New York Bight set-aside is defined as an area comprising the waters South and West of a straight line originating at a point on the southern shore of Long Island, NY, at 72º 27' W. Long. (Shinnecock Inlet) and running South southeast 150º true, and north of 38º 47' N. Lat.**

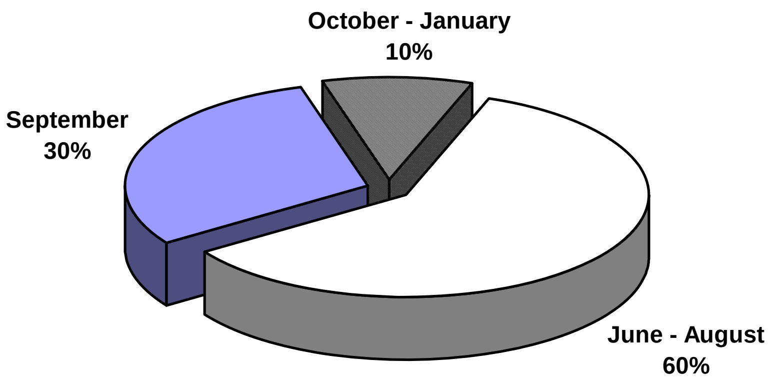


**Figure 2.8 Alternative F1: No Action. Suballocation of the BFT General Category Quota among the current three time-periods. New York Bight set-aside is subtracted from the General Category quota and then the time-period allocations are determined.**

This alternative would maintain the process NMFS currently uses to account for the ICCAT recommendations regarding the tolerance limit of school BFT and the Northeast Distant (NED) Statistical Area set-aside. The ICCAT recommendation regarding school BFT states that contracting parties, non-contracting parties, entities and fishing entities may grant tolerances to capture western Atlantic BFT either weighing less that 30 kg, or in the alternative having a fork length less than 115 cm provided they limit the take of these fish so that the average over each four-consecutive-year quota balancing period is no more than eight percent by weight of the total BFT quota on a national basis, and institute measures to deny economic gain to the fishermen from such fish. ICCAT has adopted an additional recommendation stating that the United States shall receive a quota (of catch that can be retained) of 25 mt to account for bycatch related to its directed longline fisheries in the vicinity of the management area boundary. NMFS defined “in the vicinity of the management area boundary” as the NED Statistical Area (68 FR 56783, October 2, 2003).

As the NED Statistical Area recommendation is more recent than the school BFT tolerance limit, NMFS has not accounted for this additional allocation in the calculations used to formulate the school tolerance BFT. Therefore, under this alternative, the United States would deduct the quota attributed to the NED Statistical Area before applying the eight percent school size-class BFT tolerance limit to the U.S. overall quota, rather than applying the eight percent to the total U.S. BFT quota.

This alternative would maintain the North/South Angling category dividing line (Figure 2.9). This dividing line is intended to provide a more equitable geographic and temporal distribution of recreational fishing opportunities by separating each BFT size-class subquota into two geographical regions, the northern area (allocated 47.2 percent of the size-class subquotas) and the southern area (52.8 percent of the size-class subquotas).

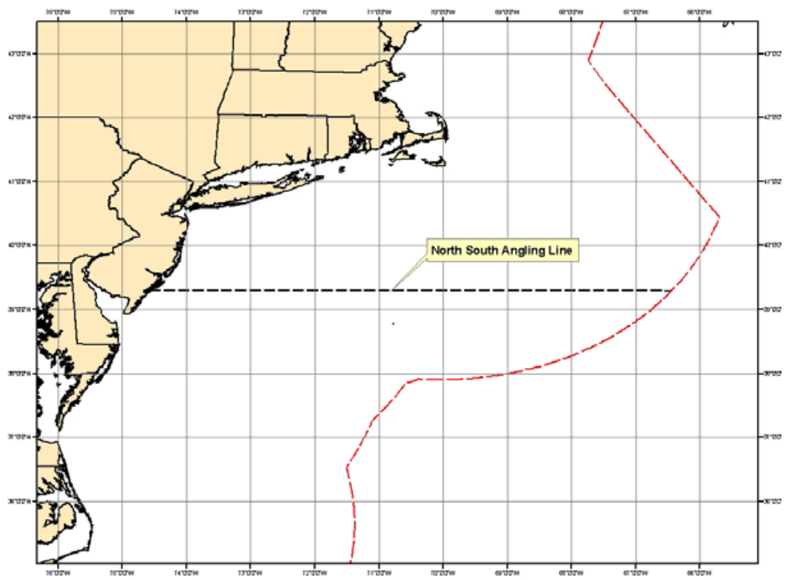


**Figure 2.9 The Angling category North/South dividing line, located at 39º 18’ N. Lat. (Great Egg Inlet, NJ).**

Alternative F2 Establish General category time-periods, subquotas, and geographic set-asides annually via framework actions

This alternative would amend the status quo process that establishes the General category time-periods and associated subquotas. Under this alternative, General category time-periods and/or the subquota allocated to each time-period, as well as any geographic set-asides, would be established annually via a regulatory framework action (versus an FMP amendment as described under Alternative F1). This alternative would revise the detailed language regarding General category time-periods, subquota allocations, and geographic set-asides contained in the 1999 FMP to be more general. The specific details pertaining to management of the General category would be established each year in the annual regulatory framework action. This alternative attempts to address the inherent variability in the General category BFT fishery from one year to the next, and would require the regulatory framework action to be finalized prior to the start of the season, thereby establishing General category time-periods and associated subquotas before the fishery commences.

Factors that would be considered prior to establishing the annual General category time-periods, associated subquotas, and/or geographic set-asides may include, but would not be limited to, protected species interactions and bycatch rates, historic landings, total landings reported at the end of the season, weather conditions, levels of effort, the amount of unharvested quota rolling over from the previous fishing year, and the projected ability of the vessels to harvest the subquotas.

Alternative F3 *Amend the management procedures regarding General category time-periods, subquotas, as well as geographic set-asides to allow for future adjustments to take place via a regulatory framework action – Preferred Alternative*

This alternative would amend the status quo management procedures which establish and adjust the General category time-periods, subquotas, as well as geographic set-asides. More specifically, this alternative would revise the detailed language regarding General category time-periods, subquota allocations, and geographic set-asides contained in the 1999 FMP to be more general, similar to Alternative F2. However, under this alternative, the specific details pertaining to management of the General category would be established in the regulatory text implementing the consolidated FMP, versus established annually (as in Alternative F2), thereby providing a level of consistency from one year to the next. By moving the specific language from the FMP to the implementing regulations, NMFS would be able to provide consistent time-periods and subquotas while also gaining the ability to amend these General category time-periods, subquota allocation percentages, and geographic set-asides, if deemed necessary, via a regulatory framework action, versus an FMP amendment.

Additionally, because the General category baseline quota, time-periods, and associated subquotas would be contained in the implementing regulations, the annual BFT specification process would not be necessary for the fishery to commence on the first day of the fishing year. Factors that may warrant future adjustments may include, but may not be limited to, ICCAT recommendations that modify BFT management measures, shifts in protected species interactions and bycatch rates, consideration of historic allocations and landings, stability and predictability of quotas, total landings reported, weather conditions, levels of effort, the amount of unharvested quota rolling from one year to the next, and the projected ability of the vessels to harvest the subquotas. If the specific management measures contained in the regulatory text need to be changed, then an appropriate analytical document (*i.e.*, EA or EIS, RIR, IRFA, etc.) may need to accompany the proposed and final rule in the regulatory amendment. However, as long as the ICCAT recommended annual U.S. BFT quota remains consistent, and the established General category time-period subquota allocation percentages are specified in whole weight, the regulatory, environmental, social, and economic analyses conducted for the consolidated HMS FMP would constitute the supporting documentation for the annual regulatory framework action.

This alternative would also amend the actual General category time-periods as well as the corresponding subquota allocation percentages for each time-period. These subalternatives would support the preferred alternative in Section 2.3.2, which would adjust management of all HMS fisheries to a calendar year basis, by providing separate time-period subquota for December and January, ensuring that the time-periods do not span two calendar years. The status quo General category time-periods and subquotas are described in Alternative F1. The range of sub-alternatives analyzed in this document are intended to further meet the objectives of the Magnuson-Stevens Act, ATCA, as well as the consolidated HMS FMP, and are drafted in accordance with the preferred CY/FY alternatives contained in Section 2.3.2. These alternatives specifically address public comments received during the scoping period of this action as well as the North Carolina Department of Marine Fisheries' (NCDMF) Petition for Rulemaking (see Notice of Receipt of Petition, 67 FR 69502, November 18, 2002). The sub-alternatives are as follows:

Alternative F3(a) Establish equal monthly General category time-periods and subquotas (June-Jan; 12.5 percent each)

This sub-alternative would remove the New York Bight set-aside allocation and divide the coast-wide General category season into eight distinct time-periods that correspond to each month from June through January. The coast-wide General category quota would be allocated in equal amounts among all eight time periods, specifically 12.5 percent to each time-period (Figure 2.10). This alternative was designed to provide an opportunity to harvest an equal amount of quota during all eight months of the General category BFT season.

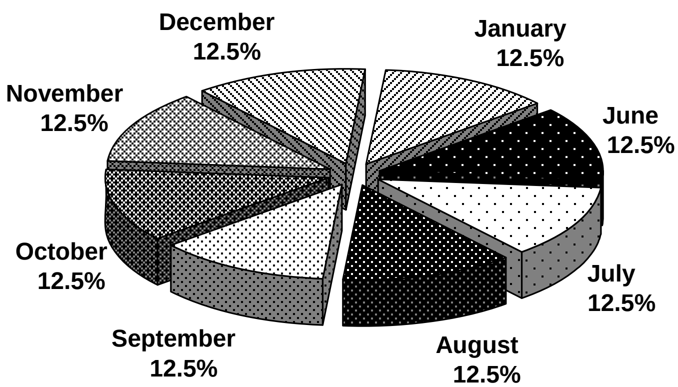


**Figure 2.10 Alternative F3a: Equal General category subquota allocation percentages for each month of the BFT fishing season.**

Alternative F3(b) Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 54 percent; Sept, 26.5 percent; Oct-Nov, 9 percent; Dec, 5.2 percent; and Jan, 5.3 percent)

This sub-alternative would remove the New York Bight set-aside allocation and divide the coast-wide General category season into five distinct time-periods that correspond with traditional fishing patterns in the New England region, yet are slightly modified to reflect recent trends in the fishery and provide for a formal winter fishery in the South Atlantic region. Historically, the coast-wide General category BFT fishery was prosecuted in the waters off New England during the summer and early fall months. However, recent trends in this coast-wide fishery reflect a shift in the availability of commercial size BFT, both geographically and temporally, to the South Atlantic area. This alternative is intended to achieve optimum yield from the General category quota while providing fair and equitable fishing opportunities to General category participants regardless of geographical location. The time-periods would consist of June through August, September, and October through November, December, and January. This alternative would also establish time-period subquota allocation percentages as follows: 54 percent (June through August), 26.5 percent (September), 9 percent (October through November), 5.2 percent (December) and 5.3 percent (January) (Figure 2.11).

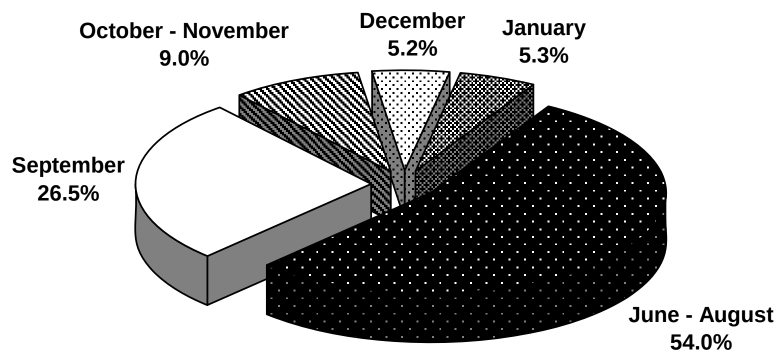


**Figure 2.11 Alternative F3b: Proposed General category time-period subquota allocation percentages.**

Alternative F3(c) *Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 50 percent; Sept, 26.5 percent; Oct-Nov, 13 percent; Dec, 5.2 percent; and Jan, 5.3 percent) – Preferred Alternative*

This sub-alternative would remove the New York Bight set-aside allocation and divide the coast-wide General category season into five distinct time-periods, June through August, September, October through November, December, and January. This alternative would shift slightly more quota from the start of the season to the October through November fishery (relative to Alternative F3(b)) where demand has been increasing in recent years, and to the December and January time-periods (relative to Alternative F1) providing for a formal winter BFT fishery in the South Atlantic region. As described in Alternative F3(b), the historical General category BFT fishery was primarily prosecuted in the waters off New England during the summer and early fall months. This resulted in a General category time-period and subquota allocation scheme heavily weighted to the New England fishery (*i.e.*, See Alternative F1 for the status quo). The time-periods, and associated subquotas, of this alternative would allocate fishing privileges to further achieve optimum yield without excluding traditional participants in the fishery. Thus, this alternative would establish time-period subquota allocation percentages as follows: 50 percent (June through August), 26.5 percent (September), 13 percent (October through November), 5.2 percent (December), and 5.3 percent (January) (Figure 2.12).

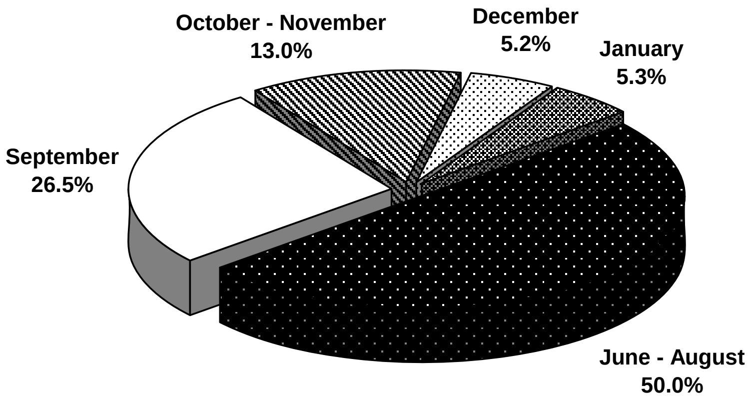


**Figure 2.12 Alternative F3c: Proposed General category time-period subquota allocation percentages.**

Alternative F3(d) Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 38.7 percent; Sept , 26.6 percent; Oct-Nov, 13 percent; Dec, 10.8 percent; and Jan, 10.9 percent)

This sub-alternative would also remove the New York Bight set-aside allocation and divide the coast-wide General category season into the same five distinct time-periods referred to in sub-alternatives F3(b) and F3(c). However, this alternative's time-period subquota allocation percentages would provide the greatest opportunity for the winter BFT fishery and specifically embody the subquota allocation requested in the NCDMF Petition for Rulemaking. This alternative would establish time-period subquota allocation percentages as follows: 38.7 percent (June through August), 26.6 percent (September), 13 percent (October), 10.8 percent (December), and 10.9 percent (January) (Figure 2.13).

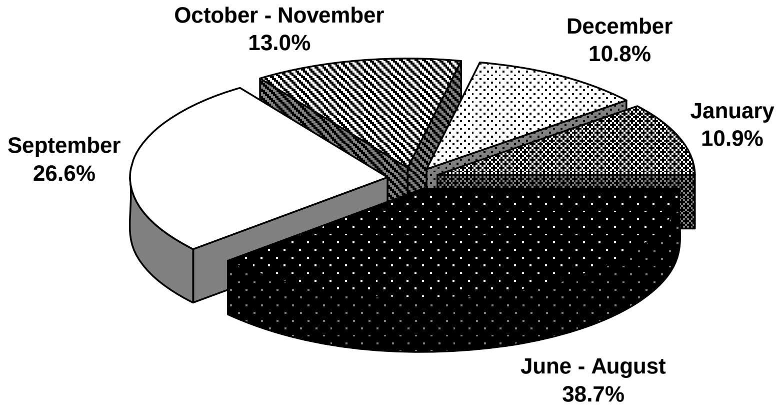


**Figure 2.13 Alternative F3d: Proposed General category time-period subquota allocation percentages embodying the NCDMF Petition for Rulemaking.**

Alternative F4 *Clarify the procedures for calculating the Angling category school size-class BFT subquota allocation – Preferred Alternative*

This alternative would clarify the procedure for calculating the ICCAT-recommended school size-class BFT tolerance for the Angling category quota. The eight percent tolerance limit would be calculated from the U.S. BFT quota to determine the school size-class allowance for the Angling category. Then, the NED Statistical set-aside allocation would be deducted from the remaining U.S. BFT quota. This clarification would implement procedures for calculating the eight percent tolerance limit to be more consistent with the actual language from the ICCAT recommendation and would result in a slight increase of the school size class BFT quota by approximately 0.02 percent.

This alternative has been slightly modified from that proposed in the draft HMS FMP. This preferred alternative modifies the proposed alternative in the draft FMP by retaining the North/South Angling category dividing line located at 39º 18 minutes N. latitude (Great Egg Inlet, NJ) (Figure 2.9). This dividing line is intended to provide a more equitable geographic and temporal distribution of recreational fishing opportunities by separating each BFT size-class subquota into two geographical regions, the northern area (allocated 47.2 percent of the size-class subquotas) and the southern area (52.8 percent of the size-class subquotas). This management tool was originally intended to ensure reasonable recreational fishing opportunities in all geographic areas without risking overharvest of the Angling category quota. While this line allows NMFS to allocate different retention limits based on the migratory pattern of BFT, the effectiveness of this management tool depends on NMFS gathering recreational BFT landings information in a timely fashion to support real-time management decisions.

#### *2.3.1.2 Annual BFT Quota Adjustments*

In 1991, ICCAT recommended that if the catch of a Contracting Party exceeds its annual or biannual scientific monitoring quota, then in the biannual period or year following reporting of that catch to ICCAT, that Contracting Party will reduce its catch to compensate in total for that overage. Such a reduction will be applied to the domestic catch category of the applicable Contracting Party of the overage (ICCAT 91-1). This recommendation was revised in 1998 to state that unused quota or overage from the previous year shall be added or subtracted, as appropriate, to the current year's catch that can be retained (ICCAT 98-7). The intent of the following alternatives is to streamline the annual BFT quota adjustment process, including the allocation of baseline quotas as well as adjusting those quotas based on the previous years under/overharvests.

The U.S. BFT quota is allocated to specific domestic quota categories via allocation percentages contained in the 1999 FMP. The annual BFT specifications quantify the baseline allocation for each domestic quota category, measured in whole weight (metric tons), by calculating the allocation percentages against the recommended U.S. BFT quota. These percentage shares were based on allocations that had been developed by NMFS over several years. Under all of the subsequent alternatives, the allocation of the U.S. BFT quota will remain consistent with those baseline percentages established in the 1999 FMP. These percentages are as follows: General - 47.1 percent; Angling - 19.7 percent; Harpoon - 3.9 percent; Purse Seine - 18.6 percent; Longline - 8.1 percent; and Trap - 0.1 percent. The remaining 2.5 percent of the

BFT landings quota will be held in the Reserve category (Figure 2.8). These domestic quota category percentages will remain unchanged as codified in the consolidated HMS FMP and would require an FMP amendment to change them in the future. However, revisions to the General category time-period subquota allocation scheme are being considered in Section 2.3.1.1.

Alternative F5 Maintain the annual BFT quota specification process and the under/overharvest procedures within individual domestic quota categories and individual vessels in the Purse seine category (No Action)

This alternative would maintain the annual BFT quota specification process established in the 1999 FMP, which allocates the ICCAT-recommended U.S. BFT quota annually to domestic user groups. This alternative would require NMFS to draft proposed annual BFT quota specifications and appropriate supporting analytical documents, collect public comment on those proposed specifications, and then, after responding to comments received, finalize the initial BFT quota specifications via a final rule published in the Federal Register. This process would establish the baseline domestic quota category allocations in weight, as well as any applicable subquota allocations, and account for any under/overharvests from the previous fishing year.

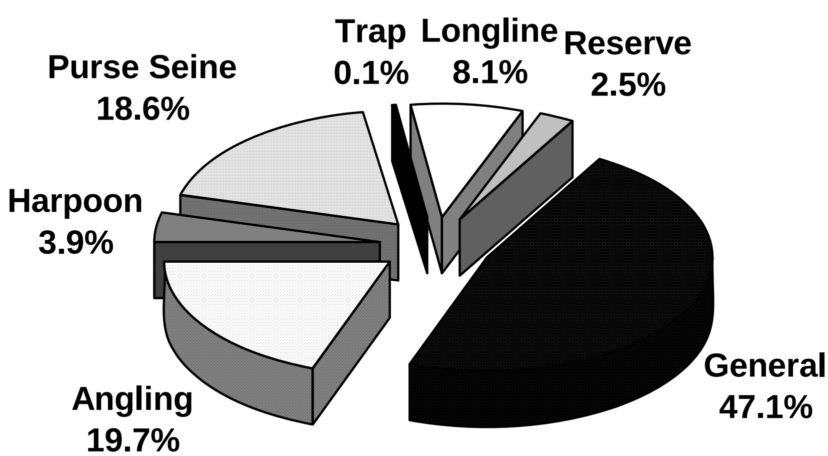


**Figure 2.14 Alternative F5: No Action. U.S. BFT Domestic Quota Category Allocation Percentages.**

This alternative would maintain and implement annual adjustment procedures, which include accounting for unused quota or an overage from the previous year, within individual domestic quota categories, via the current annual specification process. These annual adjustments would be based on landings statistics and other available information, and consideration of which BFT quota in any category or, as appropriate, subcategory has been exceeded or has not been reached, with the exception of the Purse seine category due to the IFQ nature of this category. Any overharvest would be subtracted from, or the underharvest would be added to, that same quota category for the following fishing year, provided that the total of the adjusted category quotas and the Reserve remained consistent with ICCAT recommendations, the tolerance of school BFT, and the allowance for dead discards. For the Purse seine category, annual adjustments would be based on landings statistics and other available information for that specific purse seine vessel's allocation. Adjustments would then be considered based on calculations of whether a purse seine vessel's allocation, as adjusted, has been exceeded or has not been reached, in which case the overharvest would be subtracted from, or underharvest would be added to, that vessel's allocation for the following fishing year. Under this alternative, there would be no limit on the amount of quota that could be carried forward from one year to the next in any domestic quota category.

This alternative would implement annual adjustment procedures to allocate any quota in the Reserve category at the end of a fishing year to account for overharvests in any fishing category, provided such allocation is consistent with the criteria specified in Section 2.3.1.3. This alternative would also maintain the authority to perform inseason actions within a fishing year, such as adjusting daily retention limits, quota transfers among categories or, as appropriate, subcategories, and performing interim closures. These inseason actions would be determined based on the consideration of the criteria stipulated in Section 2.3.1.3.

This alternative would maintain the default General and Angling category BFT retention limits as articulated in the regulations implementing the 1999 FMP. The default coast-wide General category BFT retention limit is one large medium or giant BFT, measuring 73 inches curved fork length (CFL) or greater, per vessel per day/per trip. The default Angling category BFT retention limit is one school, large school, or small medium BFT, measuring 27 inches to less than 73 inches CFL per vessel per day/trip. NMFS has the ability to change the default retention limits via an inseason action. For further details regarding inseason actions, please see Section 2.3.1.3.

Lastly, this alternative would maintain the procedure for establishing Restricted Fishing Days (RFDs) in the General category BFT fishery, by proposing them in the annual BFT quota specifications. An RFD means a day beginning at 0000 hours and ending 2400 hours local time, during which a person aboard a vessel for which a General category permit for Atlantic tunas has been issued may not fish for, possess, or retain BFT. RFDs are intended to extend the General category BFT season, reduce market gluts, and further achieve optimum yield. A designated RFD may be waived if it is determined that it would impede the attainment of a time-period subquota or an RFD may be introduced if it is determined that it is needed to avert a premature time-period closure. NMFS has the ability to alter the RFD schedule via an inseason action. For further details regarding inseason actions, please see Section 2.3.1.3.

Alternative F6 *Revise the annual BFT quota specification process to refer back to the supporting analytical documents of the consolidated HMS FMP and include seasonal management measures in annual framework actions – Preferred Alternative*

This alternative is similar to Alternative F5, in that BFT quota specifications would be conducted on an annual basis; however, the range of impacts associated with annual BFT specifications would be analyzed in the appropriate analytical documents of the consolidated HMS FMP, as opposed to a separate EA or EIS. The consolidated HMS FMP analyses would then be referred to and used in subsequent quota specifications as the supporting analytical documents for regulatory, environmental, social, and economic impact analyses. Analytical documents would accompany the annual BFT quota specifications only if the analyses associated with the consolidated HMS FMP no longer applied, (*i.e.*, if ICCAT were to amend its recommendation regarding the total U.S. BFT TAC). Currently, ICCAT recommendations for BFT TACs cover multiple years, and usually coincide with the most recent BFT stock assessment. The ICCAT-recommended U.S. BFT TAC would be allocated to the domestic quota categories per the allocation percentages listed in the consolidated HMS FMP (see introductory paragraph for Section 2.3.1.2). The equivalent quota tonnage associated with these percentages would be specified in the regulatory text implementing the consolidated HMS FMP, therefore formally establishing annual baseline quotas, in whole weight, for each of the domestic quota categories and therefore removing the need to analyze them on an annual basis as they would remain consistent.

The baseline quota percentages, for each domestic quota category, would remain in the consolidated HMS FMP, while the corresponding quota allocation for each quota category, denoted in metric tons, would be specified in the regulatory text implementing the consolidated HMS FMP. These baseline quota allocations may be adjusted on an annual basis to account for under/overharvests that occur in the previous year, per ICCAT recommendations. The range of these quota adjustments would also be analyzed in the supporting analytical documents of the consolidated HMS FMP and referred to in the annual BFT specifications (see Section 4.3.1.1, Alternative F8). This alternative would implement annual adjustment procedures that provide NMFS the authority to allocate any quota remaining in the Reserve category at the end of a fishing year to any fishing category, provided such allocation is consistent with the applicable determination criteria currently listed in the regulations. Section 2.3.1.3 addresses the multiple sets of determination criteria listed in the current regulations and the preferred alternative of this section which would consolidate the multiple lists for consistency purposes. As any annual quota transfers from the Reserve category are similar to an inseason quota transfer, the determination criteria discussed in Section 2.3.1.3 would also be addressed prior to conducting an annual transfer from the Reserve category.

This alternative would also include seasonal management measures in the annual framework rulemaking. Under the No Action alternative (*i.e.*, in comparison to Alternative F5), inseason management is conducted separately from the annual rulemaking. These seasonal management measures may include, but would not be limited to, establishing recreational daily BFT retention limits and their duration and General category effort controls, such as RFDs and daily BFT retention limits. Including seasonal management measures in the annual BFT specifications would provide prior notice of, and an opportunity for the public to comment on any proposed actions. Subsequent inseason actions would likely still be necessary to close fisheries, alter seasons, and/or alter retention limits as changing fishery conditions warrant them. This alternative would also maintain the inseason action authority as discussed under Section 2.3.1.3.

Alternative F7 Eliminate unharvested quota carryover provisions and return unharvested quota to the resource, while maintaining status quo overharvest provisions

This alternative would implement an annual adjustment provision that would not allow unharvested quota to be carried forward from one fishing year to the next, but would start each fishing year with the baseline domestic quota category allocations. This alternative would maintain the overharvest provision and annual adjustment procedures as described in Alternative F5.

Alternative F8 *Establish an individual quota category carryover limit of 100 percent of the baseline allocation (i.e., no more than the annual baseline allocation may be carried forward), except for the Reserve category, and authorize the transfer of quota exceeding the 100 percent limit to the Reserve or another domestic quota category, while maintaining status quo overharvest provisions – Preferred Alternative*

This alternative would implement similar carryover provisions described in Alternative F5, but may apply a limit to the amount of quota each domestic quota category could carry forward from one fishing year to the next. This limit may be applied to all domestic quota categories, except for the Reserve category. The intent of this alternative is to prevent "stockpiling" of unharvested quota in a particular domestic quota category due to multiple successive years of underharvest. This alternative would implement a carryover cap of 100 percent of the baseline allocation for each domestic quota category, except for the Reserve category, such that no more than two years worth of quota allocation may be held by a particular domestic quota category at the start of the fishing year. For example, the Harpoon category is allocated 3.9 percent of the U.S. BFT quota. Using the current ICCAT BFT quota recommendation, this equates to an annual baseline allocation of approximately 57.1 mt. Under this alternative, the Harpoon category would be allowed to carry forward 57.1 mt of unharvested quota from one year to the next. Combining the Harpoon category annual baseline allocation of 57.1 mt with the unharvested quota that may be carried forward, 57.1 mt, and the Harpoon category quota would be limited to 114.2 mt. Any quota that exceeds the 100 percent carryover limit would then be transferred to either the Reserve category or to another domestic quota category. This preferred alternative would not preclude NMFS from transferring additional quota from the Reserve back to a category that has reached the rollover limit via an inseason action. Section 2.3.1.3 addresses the multiple sets of determination criteria listed in the current regulations and the preferred alternative of this section which would consolidate multiple criteria lists for consistency purposes. As any quota transfers associated with exceeding the 100 percent rollover limit would be similar to an inseason quota transfer, the determination criteria discussed in Section 2.3.1.3 would also need to be addressed prior to transferring quota under this alternative. This alternative would maintain the overharvest provisions as stipulated in Alternative F5.

#### *2.3.1.3 Inseason Actions*

The following alternatives set forth the basis for NMFS' management of BFT inseason actions, including, but not limited to adjusting daily retention limits, inseason quota transfers, and fishery closures/reopenings.

Alternative F9 Maintain inseason action procedures (No Action)

This alternative would maintain and implement the status quo regulatory authority to provide for maximum utilization of the BFT quota by authorizing increases or decreases to the General category daily retention limit of large medium and giant BFT over a range from zero to a maximum of three per vessel via the use of inseason management actions that are published in the final rule section of the Federal Register. These actions would be based on a review of dealer reports, daily landing trends, availability of the species on the fishing grounds, and any other relevant factors. General category retention limit adjustments are not effective until at least three calendar days after a notification is filed with the Office of the Federal Register for publication. The one exception corresponds to previously designated RFDs. RFDs may be waived effective upon closure of the General category fishery so that persons aboard vessels permitted in the General category may conduct catch-and-release or tag-and-release fishing for BFT under § 635.26.

This alternative would maintain and implement the existing regulatory authority to provide for maximum utilization of the Angling category BFT quota, by authorizing adjustments that may increase or decrease the recreational retention limit for any size-class BFT or change a vessel trip limit to an angler limit and vice versa. Such adjustments would be based on a review of daily landing trends, availability of the species on the fishing grounds, and any other relevant factors. Also, such adjustments to the retention limits may apply separately for persons aboard a specific vessel type, such as private vessels, headboats, or charterboats. Recreational retention limit adjustments are not effective until at least three calendar days after a notification is filed with the Office of the Federal Register for publication.

This alternative would maintain and implement regulations that authorize quota transfers among categories or, as appropriate subcategories, within a fishing year after considering the following factors:

(A) The usefulness of information obtained from catches in the particular quota category for biological sampling and monitoring of the status of the stock;

(B) The catches of the particular category quota to date and the likelihood of closure of that segment of the fishery if no allocation is made;

(C) The projected ability of the vessels fishing under the particular category quota to harvest the additional amount of BFT before the end of the fishing year;

(D) The estimated amounts by which quotas for other gear categories of the fishery might be exceeded;

(E) Effects of the transfer on BFT rebuilding and overfishing;

(F) Effects of the transfer on accomplishing the objectives of the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks.

If it was determined, based on these criteria and the probability of exceeding the total quota, that vessels fishing under any category or subcategory quota were not likely to take that quota, NMFS could conduct an inseason transfer of any portion of the remaining quota of that fishing category to any other fishing category or to the Reserve.

This alternative would maintain and implement regulations to close a domestic quota category, other than the Purse Seine category quota due to the IFQ nature of this category, based on when that quota was reached, or was projected to be reached. The closure would be effective for the remainder of the fishing year or for a specified period as indicated in the closure notice published as an inseason action in the final rule section of the Federal Register.

This alternative would also maintain and implement the regulations to close and reopen the Angling category BFT fishery by accounting for variations in seasonal distribution, abundance, or migration patterns of BFT, or catch rates in one area, which may have precluded anglers in another area from a reasonable opportunity to harvest a portion of the Angling category quota. The Angling category BFT fishery, or a part of the fishery, may be reopened at a later date if it is determined that BFT migrated into the other area. In determining the need for any such interim closure, the following criteria would be considered:

(A) The usefulness of information obtained from catches of a particular geographic area of the fishery for biological sampling and for monitoring the status of the stock;

(B) The current year catches from the particular geographic area relative to the catches recorded for that area during the preceding four years;

(C) The catches from the particular geographic area to date relative to the entire category and the likelihood of closure of that entire category of the fishery if no interim closure or area closure is effected; and

(D) The projected ability of the entire category to harvest the remaining amount of BFT before the anticipated end of the fishing season.

Alternative F10 *Revise and consolidate criteria considered prior to performing inseason and certain annual BFT management actions – Preferred Alternative*

This alternative would revise and consolidate the sets of criteria that NMFS considers for any and all inseason management actions, as well as certain annual management actions, including, but not limited to adjustments in daily retention limits, annual quota adjustments to/from the Reserve, inseason quota transfers, fishery closures, and interim fishery closure/reopenings. This alternative would enhance the flexibility and consistency regarding the determination criteria analyzed prior to conducting inseason management actions and/or some annual management actions as discussed in the previous alternatives. The criteria listed below are in no particular order of importance and in some circumstances not all criteria would be relevant in the decision making process.

This alternative would also move the determination criteria from § 635.27(a)(7) into a stand-alone section. Thus, this alternative would implement the following consolidated criteria:

(A) The usefulness of information obtained from catches in the particular category for biological sampling and monitoring of the status of the stock;

(B) The catches of the particular category quota, and/or subquota, to date and the likelihood of closure of that segment of the fishery if no interim closure or quota allocation is made;

(C) The projected ability of the vessels fishing under the particular category quota and/or subcategory quota to harvest the remaining and/or additional amount of BFT before the end of the fishing year;

(D) The estimated amounts by which quotas for other gear categories of the fishery might be exceeded;

(E) Effects of the action on BFT rebuilding and overfishing;

(F) Effects of the action on accomplishing the objectives of the consolidated HMS FMP;

(G) Review of variations in seasonal distribution, abundance, or migration patterns of BFT;

(H) Effects of catch rates in one area, precluding participants in another area from having a reasonable opportunity to harvest a portion of the category quota; and

(I) Review of dealer reports, daily landing trends, and/or availability of the species on the fishing grounds.

This alternative would maintain and implement regulations to close a domestic quota category, other than the Purse seine category quota due to the IFQ nature of this category, based on when that quota is reached, or is projected to be reached. The closure would be effective for the remainder of the fishing year or for a specified period as indicated in the closure notice published as an inseason action in the final rule section of the Federal Register.

Alternative F11 Eliminate BFT inseason actions

This alternative would eliminate NMFS' authority to perform inseason actions such as daily retention limit adjustments, inseason quota transfers, or interim closures. Domestic BFT quotas would be established as outlined in Section 0, and would be amended annually due to carryover provisions as outlined in Section 2.3.1.2. This alternative was designed to provide BFT fishery participants certainty in the rules and regulations throughout the BFT season for the purpose of consistency and at the expense of flexibility.

### 2.3.2 Timeframe for Annual Management of HMS Fisheries

Many aspects of HMS fisheries are managed on an annual cycle, including, but not limited to, quota distribution, permit issuance, and fishery specifications. Currently, sharks are managed on a calendar year cycle (January 1 to December 31) while tunas, swordfish, and billfish are managed on a fishing year cycle (June 1 to May 31). For example, the 2005 annual quotas recommended by ICCAT for the U.S. tuna and swordfish fisheries are implemented for the fishing year from June 1, 2005 to May 31, 2006, and the annual 2005 domestic shark fishery quotas are based on a fishing year from January 1, 2005 through December 31, 2005 (ICCAT does not currently make recommendations for annual shark quotas). The following alternatives present options for shifting the management cycle timeframe in order to simplify the management program for HMS fisheries and improve the United States' basis for negotiations at international forums.

Alternative G1 Maintain the current management cycle for all HMS (No Action)

This alternative would maintain the current management timeframe for all managed HMS. Atlantic tunas, swordfish, and billfish would continue to be managed on a fishing year from June 1 to May 31, whereas Atlantic sharks would continue to be managed on a calendar year. This alternative would not require any re-allocation of the sub-quotas used to manage BFT, sharks, or swordfish.

Alternative G2 *Shift the management cycle to January 1 to December 31 for all HMS – Preferred Alternative*

Under this alternative, the preferred alternative for the Draft HMS FMP, all of the HMS management programs would be implemented on a calendar year cycle. The Atlantic shark management timeframe would maintain the status quo, whereas tunas, swordfish, and billfish would shift from a fishing year to a calendar year. The calendar year for billfish would be implemented on January 1, 2007 via this action. To transition from a fishing year to a calendar year, an abbreviated fishing year would be established via a separate action for BFT and swordfish to cover the months between the end of the fishing year (May 31, 2007) and the start of the new calendar year (January 1, 2008). This alternative has been refined relative to the Draft HMS FMP by shifting the effective date for BFT and swordfish from January 1, 2007 to January 1, 2008. The shift in the management timeframe would require some alteration to the BFT seasonal allocations because a domestic BFT subquota and time-period currently spans two calendar years. Section 2.1.1.1 discusses management alternatives for BFT, including all the subalternatives under alternative F3, which would address this issue by providing separate subquota time periods for December and January.

Alternative G3 Shift the management cycle to June 1 to May 31 for all HMS

This alternative would move all HMS to a June 1 to May 31 fishing year management cycle. The management timeframe for Atlantic tunas, swordfish, and billfish would maintain status quo, whereas shark management would shift from the calendar year to a fishing year. The shark management program's trimesters and sub-quotas would be modified to fit within a fishing year management regime, and a bridge period would be required to cover the months between the end of the calendar year (December 31, 2006) and beginning of the fishing year (June 1, 2007).

### 2.3.3 Authorized Fishing Gear

Innovative fishing gears and techniques are essential to increasing efficiency and reducing bycatch in fisheries for Atlantic HMS. As current or traditional gears are modified and new gears are developed, NMFS needs to be cognizant of these advances to gauge their potential impacts on target catch rates, bycatch rates, and protected species interactions, all of which can have important management implications. New gears and techniques need to be evaluated by NMFS for qualification as authorized gear types. In this document, NMFS is considering the definition and authorization of speargun gear, green-stick gear, and buoy gear, as well as clarifying the allowable use of handheld cockpit gears.

Alternative H1 Maintain current authorized gears in Atlantic HMS fisheries (No Action)

The revised list of authorized fisheries (LOF) and the associated fishing gears became effective December 1, 1999 (64 FR 67511). The rule applies to all U.S. marine fisheries, including Atlantic HMS. As stated in the rule, "no person or vessel may employ fishing gear or participate in a fishery in the exclusive economic zone (EEZ) not included in this LOF without giving 90 days' advance notice to the appropriate Fishery Management Council (Council) or, with respect to Atlantic HMS, the Secretary of Commerce (Secretary)." The LOF is updated periodically and can be found at 50 CFR § 600.725. Acceptable HMS fisheries and authorized gear types for Atlantic tunas, swordfish, and sharks include: <u>swordfish handgear fishery</u> - rod and reel, harpoon, handline, bandit gear; <u>pelagic longline fishery</u> - longline; <u>shark drift gillnet fishery</u> - gillnet; <u>shark bottom longline fishery</u> - longline; <u>shark recreational fishery</u> - rod and reel, handline; <u>tuna purse seine fishery</u> - purse seine; <u>tuna recreational fishery</u> - rod and reel, handline; and <u>tuna handgear fishery</u> - rod and reel, harpoon, handline, bandit gear. For Atlantic billfish, the only acceptable fishery and authorized gear type is recreational fishery - rod and reel. This alternative would maintain the status quo for authorized gears in all Atlantic HMS fisheries.

Alternative H2 *Authorize speargun fishing gear as a permissible gear type in the recreational Atlantic BAYS tuna fishery - Preferred Alternative*

Alternative H2 would define and authorize speargun fishing gear in the recreational Atlantic bigeye, albacore, yellowfin and skipjack (BAYS) tuna fishery (*i.e.*, all regulated HMS tuna species except for BFT). This is a slightly modified alternative from that proposed in the Draft Consolidated HMS FMP. This preferred alternative modifies the proposed alternative contained in the Draft Consolidated HMS FMP by not allowing BFT to be fished for, landed, or retained by fishermen using speargun gear. In addition, this revised alternative would not allow the sale of any BAYS tuna harvested with speargun gear, under any circumstances, including those landed by fishermen aboard a HMS CHB permitted vessel and regardless of whether the CHB permitted vessel is operating in a for-hire or non-for-hire manner. BFT would be excluded from the allowed list of target species by this new gear type due to the recent declining performance of the existing BFT fishery, recent quota limited situations within the recreational angling sector, and ongoing concerns over the status of the stock. All sale of tuna harvested with this gear type would be prohibited in order to clarify the intent of authorizing this gear type, which would be to allow recreational speargun fishermen an opportunity to use speargun gear to recreationally target BAYS tuna. Recreational spearfishermen would only be allowed to fish from vessels possessing valid HMS Angling or CHB category permits, and would be subject to all Federal management measures for recreational HMS fishing including retention limits for YFT, a minimum size of 27 inches for BET and YFT, and reporting requirements, as well as other measures. Speargun landings would be monitored using existing recreational monitoring methods, including LPS. Under this alternative, no HMS would be allowed to be taken by speargun gear, other than Atlantic BAYS tunas.

Fishermen using speargun gear would be allowed to freedive, use SCUBA, or other underwater breathing devices, and would be required to be physically in the water when firing or discharging a speargun. Only free-swimming fish, not those restricted by fishing lines or other means, could be taken with a speargun.

Under alternative H2, speargun fishing gear would be defined as a muscle-powered speargun equipped with a trigger mechanism, a spear with a tip designed to penetrate and retain fish, and terminal gear. Terminal gear may include but would not be limited to trailing lines, reels, and floats. Muscle-powered spearguns store potential energy provided from the operator's muscles. Muscle-powered spearguns may only release that amount of energy that the operator has provided to it from his/her own muscles. Common energy storing methods for muscle-powered spearguns include compressing air and springs, and the stretching of rubber bands (IBSRC, 2005) (Figure 2.15). Powerheads, as defined at 50 CFR § 600.10, or any other explosive devices, would not be allowed to harvest or subdue BAYS tunas with this gear type.

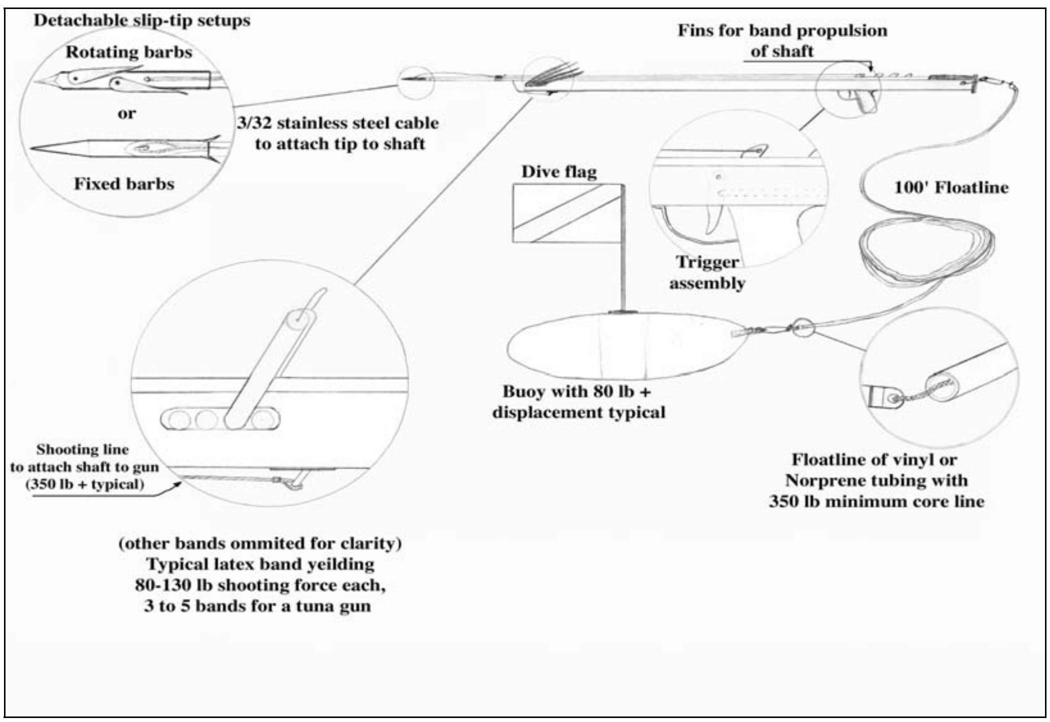


**Figure 2.15 A Diagram of a Typical Speargun Fishing Gear Configuration** (courtesy of Matthew Richards).

Alternative H3 Authorize speargun fishing gear as a permissible gear-type in the commercial tuna handgear and recreational Atlantic tuna fisheries

Alternative H3 would authorize the use of speargun fishing gear, as defined above, in the commercial tuna handgear and recreational Atlantic tunas fisheries. Recreational BFT speargun landings would be deducted from the Angling category quota and commercial BFT speargun landings would be subtracted from the General category quota. As discussed in alternative H2, fishermen using speargun fishing gear would be allowed to freedive, use SCUBA, or other underwater breathing devices, and would be required to be physically in the water when firing a speargun. Only free-swimming fish, not those restricted by fishing lines or any other devices, could be taken. The use of powerheads, as defined at 50 CFR § 600.10, or any other explosive devices, would not be allowed to harvest or subdue tunas with this gear type. Under this alternative, no HMS would be allowed to be taken by speargun gear, other than Atlantic tunas.

Alternative H4 Authorize green-stick fishing gear for the commercial harvest of Atlantic BAYS tunas

Alternative H4 would add a definition of green-stick fishing gear to the Atlantic HMS regulations and add this gear to the list of authorized fishing gears for the commercial tuna handgear fishery for certain fishing permits. This alternative was preferred in the Draft Consolidated HMS FMP, however it is not preferred in the Final Consolidated HMS FMP. Under this alternative, green-stick gear would be distinguished from current definitions of existing gear types and individually defined as a line that is elevated, or suspended, above the waters' surface from which no more than 10 hooks or gangions may be hung. Possible technical configuration and use of the gear would be similar to that described below. The intent of this alternative would be to allow commercial tuna handgear fishermen, targeting BAYS with green-stick gear, to increase the number of hooks on their gear from two hooks to no more than 10 hooks. This alternative would also prohibit commercial vessels using or possessing green-stick fishing gear from retaining or possessing BFT on board. The primary impacted commercial fishing entities would be General category and HMS CHB permit holders, who are currently restricted to the handgear limit of two hooks or less per line, but are allowed to sell their BAYS catch, in accordance with other appropriate management measures (*e.g.*, size limits). Longline permit holders are currently allowed to use three hooks or more per line although they are restricted to the use of circle hooks only, among other restrictions (*e.g.*, closed areas). This alternative would not impact HMS recreational fishermen targeting BAYS as they are already not allowed to sell their catch.

During the public comment period for the Draft Consolidated HMS FMP, commenters provided a range of opposition and support regarding this previously preferred alternative (to authorize green-stick gear for the commercial harvest of Atlantic BAYS tunas) including; considerable confusion over the current regulatory regime; concern over the need for better reporting, monitoring and overall data collection for this gear-type; and, the need for further understanding of the technical nature of the gear itself. Based on these comments, the Agency has determined it would be preferable to clarify the currently allowed use of the green-stick gear rather than proceed with authorization and definition of the gear-type in a manner that may further add to the confusion and have unintended negative consequences to the fishery and the resource.

Below is a brief discussion of the currently allowed and authorized use of green-stick gear in HMS fisheries. The gear is currently recognized to be configured in at least two different modes classified as "recreational" and "commercial." In either mode, the gear is actively trolled and configured so that the baits are fished on or above the surface of the water. The suspended line, attached gangions, and catch may be retrieved collectively by hand or mechanical means. The discussion below is solely intended to further understanding of the technical nature and possible use of this gear. Despite the terminology of these modes, it is possible for the actual use of the gear, in either mode, to exist in the commercial or the recreational HMS fisheries in accordance with existing HMS and tuna permit requirements and HMS management measures.

In the “recreational” configuration, a fiberglass pole, or “green-stick”, serves as a vertical outrigger, elevating a line above the waters’ surface, allowing multiple anglers to fish individually tended lines suspended by the green-stick’s single line (Figure 2.16). At the end of the green-stick line, a floating decoy is attached. This decoy provides drag as the vessel moves forward and puts tension on the green-stick line. The individual fishing lines are connected to the green-stick line by rubber bands, outrigger clips, or other breakaway connections, and are allowed to hang down and brush across the surface of the water while trolled. When a fish takes one of the baits, the breakaway connection releases, and the angler tending that individual line fights and lands the fish. Some recreational fishermen have further modified the gear and suspend baits from a “high-line” attached to a flying bridge or tuna tower, and do not actually use the green-stick pole (Wescott, 1996).

It is believed that this “recreational” configuration is primarily used to target YFT, although BFT, other BAYS species, and possibly billfish can be captured via this method. So long as each separate and individual fishing line that is attached to the mainline <u>only trails two hooks or fewer</u> this configuration would fall under current HMS regulatory handgear definitions for rod and reel and handline. Rod and reel and handline gears are already authorized for either recreational or commercial fishing for HMS species under existing regulations. Fishermen wishing to use green-stick gear in this manner would need to possess any of the HMS permits that authorize the use of rod and reel or handline, including HMS CHB, HMS Angling, Atlantic tunas General category permits, or Swordfish and Shark limited access permits. Again, it is important to note that although the configuration may be termed “recreational,” HMS species landed under the HMS commercial permits (authorized for handgear) and using this configuration (*e.g.,* all except the HMS Angling permit) may be sold as normal, under existing regulations.

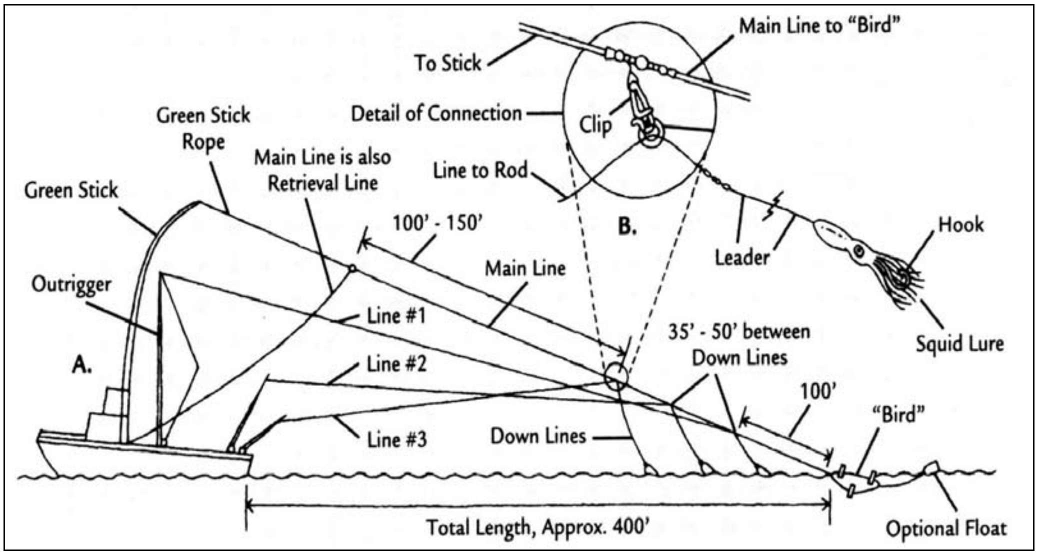


**Figure 2.16 A Diagram of the Recreational Configuration of Green-stick Fishing Gear.** Source: Wescott, 1996

The "commercial" configuration of green-stick gear generally consists of a 10.7 - 13.7 m (35 - 45 feet) fiberglass pole mounted to the vessel. A heavy mainline (800-1,000-pound test line) housed in a spool is hoisted by a tether-rope mounted to the top of the pole. The mainline is connected to the tether-rope with a cotton breakaway cord. At the end of the mainline, a floating decoy is attached. This decoy provides drag as the vessel moves forward and puts tension on the mainline. Several leaders hang down from the mainline at regularly spaced intervals and suspend baits so that they brush across the top of the water (Figure 2.17). As this gear is towed, the baits attached to the mainline skip across the water's surface and flex in the fiberglass pole produces a "jigging" action that attracts fish. This gear was designed so that the mainline breaks away from the tether rope when one or more fish are hooked. The mainline and all the fish are then retrieved together using the spool (Wescott, 1996).

It was understood that the "commercial" configuration of green-stick gear was primarily used on vessels targeting YFT. However, since publication of the Draft Consolidated HMS FMP, public comments to the Agency, particularly from the North Carolina area, have made it clear that there is interest and potential activity targeting other species, including BFT. Theoretically, it is possible to use this "commercial" mode of configuration with a main line that only trails two hooks or less. In this case, it would also fall under current HMS regulatory handgear definitions for rod and reel and handline and is thus already authorized for either commercial or recreational fishing for HMS species under existing regulations. However, when fishing in this mode, it is likely that more than two hooks would be applied to the line. In cases where <u>more than two hooks</u> are attached to the mainline, the use of this gear would fall under the current HMS regulatory definition for longline gear. Fishermen wishing to use the commercial configuration with more than two hooks could still use this configuration of green-stick gear but would need to hold an Atlantic tunas longline permit and other necessary limited access permits depending on species and amounts targeted. An important note to consider under these circumstances is the relatively recent regulatory requirement (69 FR 40734, July 6, 2004) that vessels using pelagic longline gear are limited at all times to possessing on board and using only circle hooks (50 CFR 635.21).

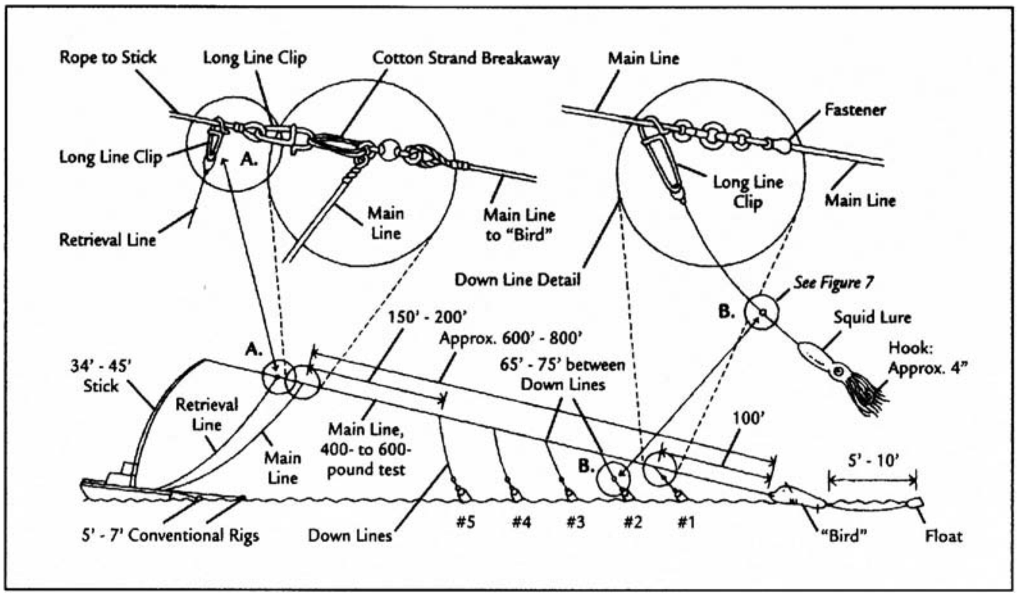


**Figure 2.17 A Diagram of the Commercial Configuration of Green-stick Fishing Gear.** Source: Wescott, 1996

Although the alternative to explicitly define and authorize green-stick gear is not preferred in the Final Consolidated HMS FMP, fishermen are still allowed to use green-stick gear as a form of currently approved handgear or longline gear. Under current HMS regulations, either configuration described above is already authorized, provided vessels are issued a valid HMS vessel permit and abide by all gear operation and deployment restrictions (*e.g.*, number and type of hooks per line, closed areas), and management measures (*e.g.*, size and catch limits, target catch restrictions) appropriate for that HMS vessel permit.

Alternative H5 *Authorize buoy gear as a permissible gear type in the commercial swordfish handgear fishery; limit vessels employing buoy gear to possessing and deploying no more than 35 floatation devices, with each individual gear having no more than two hooks or gangions attached – Preferred Alternative*

Alternative H5 would define and authorize buoy gear in the commercial swordfish handgear fishery. This alternative has been modified from the alternative proposed in the Draft Consolidated HMS FMP to allow the use of more than one floatation device per buoy gear. This modification was made in response to public comment. Additional detail regarding this change can be found in Chapter 4. The swordfish handgear fishery may currently utilize individual handlines attached to free-floating buoys; however, another preferred alternative in this document (I5(b)) would require that handlines used in HMS fisheries be attached to a vessel. Alternative H5 would change the definition of individual free-floating buoyed lines, that are currently considered to be handlines, to "buoy gear," allowing the commercial swordfish handgear fishery to continue utilizing this gear type. This fishery has been operating under the current regulations, which require that handlines be restricted to no more than two hooks and be released and retrieved by hand. The current regulations do not limit the number of individual handlines/buoy gears that may be possessed or deployed and do not require that the lines be attached to a vessel. This gear (free-floating handlines) has been utilized with no limits on the number of gears by both recreational and commercial fishermen in many areas, including areas closed to pelagic longline fishing. Under alternative H5, only commercial swordfish fishermen possessing valid swordfish handgear or swordfish directed limited access permits would be authorized to utilize buoy gear and could only retain swordfish captured on this gear. Alternative H5 would maintain current limits of no more than two hooks per buoy gear and requirements that the gear be released and retrieved by hand; however, it would limit the number of individual floatation devices possessed or deployed to no more than 35 per vessel.

There is an existing definition of buoy gear at 50 CFR § 600.10 which states that "buoy gear means fishing gear consisting of a float and one or more lines suspended therefrom. A hook or hooks are on the lines at or near the end. The float and line(s) drift freely and are retrieved periodically to remove catch and rebait hooks." The proposed HMS definition of buoy gear is consistent with this general definition; however, the Agency would provide a more specific definition for the use of buoy gear in the commercial swordfish handgear fishery. NMFS feels it is appropriate to include a refined definition of buoy gear at 50 CFR § 635 given the nature and characteristics of the swordfish fishery, as well as gear and techniques commonly utilized.

Under alternative H5, buoy gear would be defined as a fishing gear consisting of one or more floatation devices supporting a single mainline to which no more than two hooks or gangions are attached. Fishermen using buoy gear would be required to mark each floatation device with the vessel's name, registration number, or HMS permit number, as per current regulations at 50 CFR § 635.6 (c). Under alternative H5, buoy gear would be required to be constructed and deployed so that the hooks would be attached to the vertical portion of the mainline. Floatation devices could be attached to one, but not both ends of the mainline, and no hooks or gangions could be attached to any floatation device or horizontal portion of the mainline. If more than one floatation device were attached to a buoy gear, no hook or gangion may be attached to the mainline between them (Figure 2.18). Individual buoy gears could not be connected together in any way and all buoy gears would be required to be released and retrieved by hand. Under this alternative, fishermen using this gear type would be required to affix gear monitoring equipment to each individual buoy gear to aid in recovery. Gear monitoring equipment could include, but would not be limited to, radar reflectors, beeper devices, lights, or reflective tape. If only reflective tape were used, the vessel deploying the buoy gear would be required to possess an operable spotlight capable of illuminating deployed buoys. If a gear monitoring device were positively buoyant and rigged to be attached to a fishing gear, it would be included in the 35 floatation device vessel limit and would need to be marked appropriately. Additionally, a floatation device would be defined as any positively buoyant object rigged to be attached to a fishing gear.

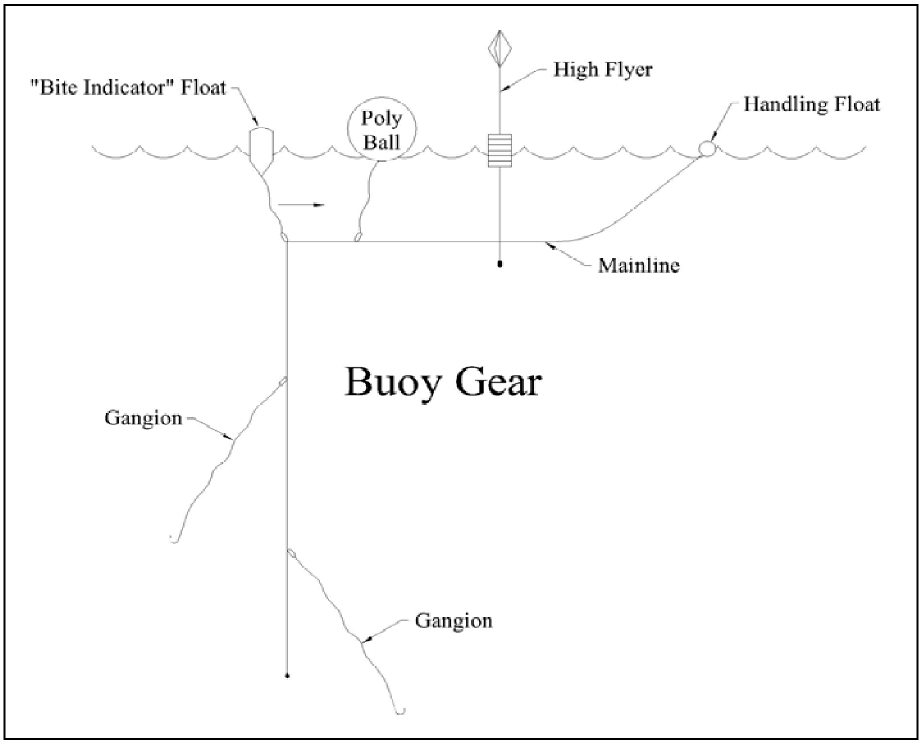


**Figure 2.18 A Diagram of a Buoy Gear with Four Floatation Devices Attached** (courtesy of Dave Meyer).

Alternative H6 Authorize buoy gear as a permissible gear type in the commercial swordfish handgear fishery; limit vessels employing buoy gear to possessing and deploying no more than 50 floatation devices, with each individual gear having no more than 15 hooks or gangions attached

Alternative H6 would authorize the use of buoy gear, as defined above, in the commercial swordfish handgear fishery. This alternative is similar to H5; however, it would limit vessels to possessing and deploying no more than 50 floatation devices, with each buoy gear having no more than 15 hooks or gangions attached. This alternative has been modified from the alternative proposed in the Draft Consolidated HMS FMP to allow the use of more than one floatation device per buoy gear. This modification was made to provide an appropriate comparison to alternative H5 which was modified in response to public comment. Additional detail regarding this change can be found in Chapter 4

Alternative H7 *Clarify the allowance of hand-held cockpit gears used at boat side for subduing HMS captured on authorized gears - Preferred Alternative*

In recent years, NMFS has become aware of some confusion regarding the allowable use of hand-held cockpit gears. Constituents have stated that they are unsure of whether they are allowed to possess cockpit gears, such as gaffs and dart harpoons, onboard their vessels if these gears are not specifically authorized in their particular fishery or permit category. This confusion stems from the Atlantic HMS regulations regarding authorized gears located at 50 CFR § 635.21(e). In this section, NMFS lists the authorized primary gear types that Atlantic HMS permit holders are allowed to use. The gear types are based on the species being targeted and the permit category of the particular vessel. It is NMFS' intent to only authorize the primary gear types used to harvest HMS, meaning the gears used to bring an HMS to the vessel. This issue is being addressed to clarify the allowable use of secondary gears to subdue HMS after they are brought to the vessel using a primary gear type.

Alternative H7 would clarify the allowance of secondary hand-held cockpit gears by amending existing text at 50 CFR § 635.21 (b). The text would state that:

> No person may fish for, catch, possess, or retain any Atlantic HMS other than with the primary authorized gears, which are the gears specifically authorized in this part. Consistent with paragraphs (a)(1) and (a)(2) of this section, secondary gears may be used to aid and assist in subduing, or bringing on board a vessel, Atlantic HMS that have first been caught or captured using primary gears. For purposes of this part, secondary gears include, but are not limited to, dart harpoons, gaffs, flying gaffs, tail ropes, etc. Secondary gears may not be used to capture, or attempt to capture, free-swimming or undersized HMS.

This alternative would acknowledge and account for the current regulations located at 50 CFR § 635.21(a), which state that an Atlantic HMS harvested from its management unit that is not retained must be released in a manner that will ensure maximum probability of survival, but without removing the fish from the water. Under this alternative, cockpit gears would not be allowed to be used in any way to capture, or attempt to capture, free-swimming or undersized HMS, but only to gain control of legal-sized HMS brought to the vessel via an authorized primary gear type, with the intent of retaining that HMS.

### 2.3.4 Regulatory Housekeeping

This section addresses several items in the HMS regulations that need to be "cleaned up," including minor corrections, clarifications, the removal or modification of obsolete cross-references, and minor changes to definitions and prohibitions that will improve the administration and enforcement of HMS regulations. Several of these items have been identified by constituents over the past few years or were raised during scoping hearings. Most of the corrections, clarifications, changes in definitions, and modifications to remove obsolete cross-references are consistent with the intent of previously analyzed and approved management measures. These changes would have no effect either individually or cumulatively upon the human environment. Under NOAA Administrative Order 216-6, actions that modify previously analyzed actions and that do not affect the human environment, minor technical additions, corrections, or changes to existing regulations are categorically excluded from the requirements of an EA or EIS. Changes that meet these criteria, and that are therefore exempt from the NEPA requirements, are described in Section 2.3.4.1 with the current regulation in the left column and the amendment in the right column. Other, more substantive, changes for which alternatives have been analyzed pursuant to NEPA, the Regulatory Flexibility Act, or other applicable laws are discussed in Section 2.3.4.2.

### 2.3.4.1 *Proposed Regulatory Changes That Do Not Need Alternatives*

Table 2.2 presents a list of the current regulations and the amendments to those regulations that will be effective in the final rule. The actual changes in the final rule may differ slightly from what is presented here due to overlap between these changes and changes due to other preferred actions in this document. However, the final rule will reflect the intent for the change, as described in the last column of the table.

**Table 2.2 List of Proposed Regulatory Changes.**

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| 1 | **§ 635.2 Definitions.**<br><br>*ILAP* means an initial limited access permit issued pursuant to §635.4. | **§ 635.2 Definitions.**<br><br>Remove the definition for ILAP. | Removes the definition of Initial Limited Access Permits (ILAPs), which are no longer issued. |
| 2 | **§ 635.2 Definitions.**<br><br>*Management unit* means in this part: * * * (5) For sharks, means all fish of these species in the western north Atlantic Ocean, including the Gulf of Mexico and the Caribbean Sea, excluding those species listed in Table 2 of Appendix A. | **§ 635.2 Definitions**<br><br>*Management unit* means in this part: * * * (5) For sharks, means all fish of the species listed in Table 1 of Appendix A to this part, in the western north Atlantic Ocean, including the Gulf of Mexico and the Caribbean Sea. | Specifies the species that are part of the management unit, rather than those that are not part of the management unit. |
| 3 | **§ 635.2 Definitions.**<br><br>*Northeast Distant closed area* *** * *** | **§ 635.2 Definitions.**<br><br>*Northeast Distant gear restricted area* *** * *** | Amends title of the Northeast Distant closed area to reflect recent amendments to the regulations governing this area. The term is also replaced throughout the regulations. |
| 4 | **§ 635.2 Definitions.**<br><br>*Shark* means one of the oceanic species, or a part thereof, listed in tables 1 and 2 in Appendix A to this part. | **§ 635.2 Definitions.**<br><br>*Shark* means one of the oceanic species, or a part thereof, listed in Table 1 in Appendix A to this part. | Links the definition of "shark" to the definition of "management unit." |
| 5 | **Table 2 in Appendix A - List of Deepwater and other sharks** | Revise **Table 2 in Appendix A by replacing it with another non-related table**.<br><br>NOTE – Table 2 is revised pursuant to measures described in Issue 1 in "Regulatory Housekeeping." | Removes the table of deepwater and other shark species that were previously removed from the management unit. NMFS will continue to collect data on these species and may add them to the management unit in the future. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| **6** | **§ 635.4(c)(2)** A vessel issued an Atlantic Tunas General category permit under paragraph (d) of this section may fish in a recreational HMS fishing tournament if the vessel has registered for, paid an entry fee to, and is fishing under the rules of a tournament that has notified NMFS as required under § 635.5(d). When a vessel issued an Atlantic Tunas General category permit is fishing in such a tournament, such vessel must comply with HMS Angling category regulations, except as provided in 635.4(c)(3). | **§ 635.4(c)(2)** A vessel issued an Atlantic Tunas General category permit under paragraph (d) of this section may fish in a recreational HMS fishing tournament if the vessel has registered for, paid an entry fee to, and is fishing under the rules of a tournament that has registered with NMFS as required under § 635.5(d). When a vessel issued an Atlantic Tunas General category permit is fishing in such a tournament, such vessel must comply with HMS Angling category regulations, except as provided in 635.4(c)(3). | Clarifies the requirement that tournaments must be registered with NMFS, consistent with proposed revisions to § 635.5(d). |
| **7** | **§ 635.4(d)(4)** A person can obtain an Atlantic Tunas Longline category permit for a vessel only if the vessel has been issued both a limited access permit for shark and a limited access permit for swordfish. NMFS will issue Atlantic Tunas Longline category permits to qualifying vessels in calendar year 1999. Thereafter, such permits may be obtained through transfer from current owners consistent with the provisions under paragraph (l)(2) of this section. | **§ 635.4(d)(4)** A person can obtain an Atlantic Tunas Longline category permit for a vessel only if the vessel has been issued both a limited access permit for shark and a limited access permit other than handgear for swordfish. Limited access Atlantic Tunas Longline category permits may only be obtained through transfer from current owners consistent with the provisions under paragraph (l)(2) of this section. | Removes a reference to a date that has passed. Also, clarifies that handgear permit holders cannot have an Atlantic Tunas Longline category permit because they cannot use longline gear to catch swordfish. |
| **8** | **§ 635.4(e)(1)** As of July 1, 1999, the only valid Federal commercial vessel permits for sharks are those that have been issued under the limited access criteria specified in §635.16. | **§ 635.4(e)(1)** The only valid Federal commercial vessel permits for sharks are those that have been issued under the limited access program consistent with the provisions under paragraphs (l) and (m) of this section. | Removes a date that has passed, and a cross-reference that has been removed. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| **9** | **§ 635.4(e)(2)** The owner of each vessel used to fish for or take Atlantic sharks or on which Atlantic sharks are retained, possessed with an intention to sell, or sold must obtain, in addition to any other required permits, only one of two types of commercial limited access shark permits: Shark directed limited access permit or shark incidental limited access permit. See §635.16 regarding the initial issuance of these two types of permits. It is a rebuttable presumption that the owner or operator of a vessel on which sharks are possessed in excess of the recreational retention limits intends to sell the sharks. | **§ 635.4(e)(2)** The owner of each vessel used to fish for or take Atlantic sharks or on which Atlantic sharks are retained, possessed with an intention to sell, or sold must obtain, in addition to any other required permits, only one of two types of commercial limited access shark permits: Shark directed limited access permit or shark incidental limited access permit. It is a rebuttable presumption that the owner or operator of a vessel on which sharks are possessed in excess of the recreational retention limits intends to sell the sharks. | Removes a cross-reference that has been removed. |
| **10** | **§ 635.4(f)(1)** The owner of each vessel used to fish for or take Atlantic swordfish or on which Atlantic swordfish are retained, possessed with an intention to sell, or sold must obtain, in addition to any other required permits, only one of three types of commercial limited access swordfish permits: swordfish directed limited access permit, swordfish incidental limited access permit, or swordfish handgear limited access permit. See §635.16 regarding the initial issuance of these three types of permits. | **§ 635.4(f)(1)** The owner of each vessel used to fish for or take Atlantic swordfish or on which Atlantic swordfish are retained, possessed with an intention to sell, or sold must obtain, in addition to any other required permits, only one of three types of commercial limited access swordfish permits: swordfish directed limited access permit, swordfish incidental limited access permit, or swordfish handgear limited access permit. It is a rebuttable presumption that the owner or operator of a vessel on which swordfish are possessed in excess of the recreational retention limits intends to sell the swordfish. | Removes a cross-reference that has been previously removed. Also, adds rebuttable presumption that swordfish possessed in excess of recreational retention limits are intended to be sold. |
| **11** | **§ 635.4(f)(2)** As of July 1, 1999, the only valid Federal vessel permits for swordfish are those that have been issued under the limited access criteria specified in §635.16. | **§ 635.4(f)(2)** The only valid Federal vessel permits for swordfish are those that have been issued under the limited access program consistent with the provisions under paragraphs (l) and (m) of this section.. | Removes a date that has passed, and a cross-reference that has been previously removed. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| 12 | **§ 635.4(h)(2)** *Limited access permits for swordfish and shark*. See §635.16 for the issuance of ILAPs for shark and swordfish. See paragraph (l) of this section for transfers of ILAPs and LAPs for shark and swordfish. See paragraph (m) of this section for renewals of LAPs for shark and swordfish. | **§ 635.4(h)(2)** *Limited access permits for swordfish and shark*. See paragraph (l) of this section for transfers of LAPs for shark and swordfish. See paragraph (m) of this section for renewals of LAPs for shark and swordfish. | Removes references to Initial Limited Access Permits (ILAPs), which are no longer issued. Also, removes a cross-reference that has been previously removed. |
| 13 | **§ 635.4(l)(2)(i)** Subject to the restrictions on upgrading the harvesting capacity of permitted vessels in paragraph (l)(2)(ii) of this section and to the limitations on ownership of permitted vessels in paragraph (l)(2)(iii) of this section, an owner may transfer a shark or swordfish ILAP or LAP or an Atlantic Tunas Longline category permit to another vessel that he or she owns or to another person. Directed handgear ILAPs and LAPs for swordfish may be transferred to another vessel but only for use with handgear and subject to the upgrading restrictions in paragraph (l)(2)(ii) of this section and the limitations on ownership of permitted vessels in paragraph (l)(2)(iii) of this section. Incidental catch ILAPs and LAPs are not subject to the requirements specified in paragraphs (l)(2)(ii) and (l)(2)(iii) of this section. | **§ 635.4(l)(2)(i)** Subject to the restrictions on upgrading the harvesting capacity of permitted vessels in paragraph (l)(2)(ii) of this section and to the limitations on ownership of permitted vessels in paragraph (l)(2)(iii) of this section, an owner may transfer a shark or swordfish LAP or an Atlantic Tunas Longline category permit to another vessel that he or she owns or to another person. Directed handgear LAPs for swordfish may be transferred to another vessel but only for use with handgear and subject to the upgrading restrictions in paragraph (l)(2)(ii) of this section and the limitations on ownership of permitted vessels in paragraph (l)(2)(iii) of this section. Incidental catch LAPs are not subject to the requirements specified in paragraphs (l)(2)(ii) and (l)(2)(iii) of this section. | Removes references to Initial Limited Access Permits (ILAPs), which are no longer issued. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| **14** | **§ 635.4(l)(2)(ii)(B)** The vessel's horsepower may be increased only once subsequent to the issuance of a limited access permit, whether through refitting, replacement, or transfer. Such an increase may not exceed 20 percent of the horsepower of the vessel's baseline specifications, as applicable. | **§ 635.4(l)(2)(ii)(B)** Subsequent to the issuance of a limited access permit, the vessel's horsepower may be increased only once, relative to the baseline specifications of the vessel originally issued the LAP, whether through refitting, replacement, or transfer. Such an increase may not exceed 20 percent of the baseline specifications of the vessel originally issued the LAP. | Clarifies that the one allowable horsepower upgrade for vessels with limited access permits is relative to the baseline specifications of the vessel originally issued the LAP. |
| **15** | **§ 635.4(l)(2)(ii)(C)** The vessel's length overall, gross registered tonnage, and net tonnage may be increased only once subsequent to the issuance of a limited access permit, whether through refitting, replacement, or transfer. Any increase in any of these three specifications of vessel size may not exceed 10 percent of the vessel's baseline specifications, as applicable. *** | **§ 635.4(l)(2)(ii)(C) )** Subsequent to the issuance of a limited access permit, the vessel's length overall, gross registered tonnage, and net tonnage may be increased only once, relative to the baseline specifications of the vessel originally issued the LAP, whether through refitting, replacement, or transfer. Any increase in any of these three specifications of vessel size may not exceed 10 percent of the baseline specifications of the vessel originally issued the LAP. * * * | Clarifies that the one allowable vessel size upgrade for vessels with limited access permits is relative to the baseline specifications of the vessel originally issued the LAP. |
| **16** | **§ 635.4(l)(2)(viii)** As specified in paragraph (f)(4) of this section, a directed or incidental ILAP or LAP for swordfish, a directed or an incidental catch ILAP or LAP for shark, and an Atlantic Tunas commercial category permit are required to retain swordfish. Accordingly, a LAP for swordfish obtained by transfer without either a directed or incidental catch shark LAP or an Atlantic tunas commercial category permit will not entitle an owner or operator to use a vessel to fish in the swordfish fishery. | **§ 635.4(l)(2)(viii)** As specified in paragraph (f)(4) of this section, a directed or incidental LAP for swordfish, a directed or an incidental catch LAP for shark, and an Atlantic Tunas longline category permit are required to retain swordfish. Accordingly, a LAP for swordfish obtained by transfer without either a directed or incidental catch shark LAP or an Atlantic Tunas longline category permit will not entitle an owner or operator to use a vessel to fish in the swordfish fishery. | Removes references to Initial Limited Access Permits (ILAPs), which are no longer issued. Changes general term "commercial" to "longline" to be consistent with the cross-reference to paragraph (f)(4). |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| 17 | **§ 635.4(l)(2)(ix)** As specified in paragraph (d)(4) of this section, a directed or incidental ILAP or LAP for swordfish, a directed or an incidental catch ILAP or LAP for shark, and an Atlantic Tunas Longline category permit are required to retain Atlantic tunas taken by pelagic longline gear. Accordingly, an Atlantic Tunas Longline category permit obtained by transfer without either a directed or incidental catch swordfish or shark LAP will not entitle an owner or operator to use the permitted vessel to fish in the Atlantic tunas fishery with pelagic longline gear. | **§ 635.4(l)(2)(ix)** As specified in paragraph (d)(4) of this section, a directed or incidental LAP for swordfish, a directed or an incidental catch LAP for shark, and an Atlantic Tunas Longline category permit are required to retain Atlantic tunas taken by pelagic longline gear. Accordingly, an Atlantic Tunas Longline category permit obtained by transfer without either a directed or incidental catch swordfish or shark LAP will not entitle an owner or operator to use the permitted vessel to fish in the Atlantic tunas fishery with pelagic longline gear. | Removes references to Initial Limited Access Permits (ILAPs), which are no longer issued. |
| 18 | **§ 635.4(m)(2***) Shark, swordfish, and tuna longline LAPs*. As of June 1, 2000, the owner of a vessel of the United States that fishes for, possesses, lands or sells shark or swordfish from the management unit, or takes or possesses such shark or swordfish as incidental catch or that fishes for Atlantic tunas with longline gear must have the applicable limited access permit(s) issued pursuant to the requirements in §635.4, paragraphs (e) and (f). However, any ILAP that expires on June 30, 2000, is valid through that date. Only valid limited access permit holders in the preceding year are eligible for renewal of a limited access permit(s). Limited access permits that have been transferred according to the procedures of paragraph (l) of this section are not eligible for renewal by the transferor. | **§ 635.4(m)(2***) Shark, swordfish, and tuna longline LAPs*. The owner of a vessel of the United States that fishes for, possesses, lands or sells shark or swordfish from the management unit, or takes or possesses such shark or swordfish as incidental catch or that fishes for Atlantic tunas with longline gear must have the applicable limited access permit(s) issued pursuant to the requirements in paragraphs (e) and (f) of this section. Only persons holding a non-expired limited access permit(s) in the preceding year are eligible for renewal of a limited access permit(s). Limited access permits that have been transferred according to the procedures of paragraph (l) of this section are not eligible for renewal by the transferor. | Removes a date that has passed, and references to Initial Limited Access Permits (ILAPs), which are no longer issued. Also, replaces the word "valid" with "non-expired" to better clarify the intent of the paragraph. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| **19** | **§ 635.5(a)(4)** *Pelagic longline sea turtle reporting*. The operators of vessels that have pelagic longline gear on board and that have been issued, or are required to have, a limited access swordfish, shark, and tuna longline category permit for use in the Atlantic Ocean including the Caribbean Sea and the Gulf of Mexico are required to report any sea turtles that are dead when they are captured or that die during capture to the NOAA Fisheries Southeast Fisheries Science Center Observer Program, at a number designated by NOAA Fisheries, within 48 hours of returning to port, in addition to submitting all other reporting forms required by this part and 50 CFR parts 223 and 224. | Remove **§ 635.5(a)(4),** and redesignate subsequent sections as needed. | Removes a duplicative reporting requirement. Captured sea turtles would still be required to be reported in PLL logbooks, so no information is lost. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| 20 | **§ 635.5(d)** *Tournament operators.* A tournament operator must notify NMFS of the purpose, dates, and location of the tournament conducted from a port in an Atlantic coastal state, including the U.S. Virgin Islands and Puerto Rico, at least 4 weeks prior to commencement of the tournament. NMFS will notify a tournament operator in writing, when his or her tournament has been selected for reporting. The tournament operator that is selected must maintain and submit to NMFS a record of catch and effort on forms available from NMFS. Tournament operators must submit completed forms to NMFS, at an address designated by NMFS, postmarked no later than the 7th day after the conclusion of the tournament and must attach a copy of the tournament rules. | **§ 635.5(d)** *Tournament operators.* A tournament operator must register with the NMFS' HMS Management Division all tournaments that are conducted from a port in an Atlantic coastal state, including the U.S. Virgin Islands and Puerto Rico, at least 4 weeks prior to commencement of the tournament by indicating the purpose, dates, and location of the tournament. Tournament registration is not considered complete unless the operator has received a confirmation number from the NMFS' HMS Management Division. NMFS will notify a tournament operator in writing when his or her tournament has been selected for reporting. Tournament operators that are selected to report must maintain and submit to NMFS a record of catch and effort on forms available from NMFS. Tournament operators must submit the completed forms to NMFS, at an address designated by NMFS, postmarked no later than the 7th day after the conclusion of the tournament, and must attach a copy of the tournament rules. | Clarifies the specific line office that HMS tournament operators must notify and register with. Indicates that a confirmation number is necessary to complete the registration process. |
| 21 | **§ 635.21(a)(2)** If a billfish is caught by a hook, the fish must be released by cutting the line near the hook or by using a dehooking device, in either case without removing the fish from the water. | **§ 635.21(a)(2)** If a billfish is caught by a hook and not retained, the fish must be released by cutting the line near the hook or by using a dehooking device, in either case without removing the fish from the water. | Clarifies that billfish caught by a hook *and not retained* must be released using specified protocols. Without clarification, the implication may be that billfish caught by hook must always be released. |
| 22 | **§ 635.21(c)(1)** From August 1, 1999, through November 30, 2000, no person may deploy a pelagic longline that is more than 24 nautical mile (44.5 km) in length in the Mid-Atlantic Bight. | **This paragraph is revised with new, non-related regulations.** | Removes a requirement that has expired. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| 23 | **§ 635.21(c)(2)(ii)** In the Charleston Bump closed area from March 1 through April 30, 2001, and from February 1 through April 30 each calendar year thereafter; | **§ 635.21(c)(2)(ii)** In the Charleston Bump closed area from February 1 through April 30 each calendar year; | Removes dates that have passed. |
| 24 | **§ 635.21(c)(2)(iii)** In the East Florida Coast closed area at any time beginning at 12:01 a.m. on March 1, 2001; | **§ 635.21(c)(2)(iii)** In the East Florida Coast closed area at any time; | Removes dates that have passed. |
| 25 | **§ 635.21(c)(2)(iv)** In the Desoto Canyon closed area at any time beginning at 12:01 a.m. on November 1, 2000; | **§ 635.21(c)(2)(iv)** In the Desoto Canyon closed area at any time; | Removes dates that have passed. |
| 26 | **§ 635.21(c)(2)(v)** In the Northeast Distant closed area at any time, unless persons onboard the vessel comply with the following: * * * | **§ 635.21(c)(2)(v)** In the Northeast Distant gear restricted area at any time, unless persons onboard the vessel comply with the following: * * * | Amends title of the Northeast Distant closed area to reflect recent amendments to the regulations governing the area. |
| 27 | Second sentence of **§ 635.21(e)(1)** currently reads, "When fishing for Atlantic tunas other than BFT, fishing gear authorized for any Atlantic Tunas permit category may be used, except that purse seine gear may only be used on board vessels permitted in the Purse Seine category and pelagic longline gear may be used only on board vessels issued an Atlantic Tunas Longline category tuna permit as well as ILAPs or LAPs for both swordfish and sharks." | Second sentence of **§ 635.21(e)(1)** proposed to be amended as, "When fishing for Atlantic tunas other than BFT, primary fishing gear authorized for any Atlantic Tunas permit category may be used, except that purse seine gear may only be used on board vessels permitted in the Purse Seine category and pelagic longline gear may be used only on board vessels issued an Atlantic Tunas Longline category tuna permit and a LAP other than handgear for swordfish, and a LAP for sharks."<br>**NOTE –** The first sentence in this paragraph is modified pursuant to regulatory changes described in the "Authorized Fishing Gear" section. | Removes references to Initial Limited Access Permits (ILAPs), which are no longer issued. Consistent with existing regulations, reiterates that vessels issued swordfish handgear permits cannot be issued an Atlantic Tunas Longline category permit because the vessel cannot use longline gear to catch swordfish. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| **28** | **§ 635.21(e)(4)(iii)** A person aboard a vessel issued a directed handgear ILAP or LAP for Atlantic swordfish may not fish for swordfish with any gear other than handgear. * * * | **§ 635.21(e)(4)(iii)** A person aboard a vessel issued or required to be issued a directed handgear LAP for Atlantic swordfish may not fish for swordfish with any gear other than handgear. * * *<br>**NOTE –** The remainder of this paragraph is modified pursuant to regulatory changes described in the "Authorized Fishing Gear" section. | Removes references to Initial Limited Access Permits (ILAPs), which are no longer issued. |
| **29** | The third sentence of **§635.22(c)** currently reads, "No prohibited sharks from the management unit, which are listed in table 1(d) of Appendix A to this part, may be retained." | The third sentence of **§635.22(c)** is amended to be, "No prohibited sharks, including parts or pieces of prohibited sharks, from the management unit, which are listed in table 1 of Appendix A to this part under prohibited sharks, may be retained." | Clarifies that parts and pieces of prohibited sharks may not be retained. |
| **30** | **§ 635.23(f)(3) –** For pelagic longline vessels fishing in the Northeast Distant closed area, as defined under §635.2, under the exemption specified at §635.21(c)(2)(v), all BFT taken incidental to fishing for other species while in the Northeast Distant closed area may be retained up to a maximum of 25 mt for all vessels so authorized, notwithstanding the retention limits and target catch requirements specified in paragraph (f)(1) of this section. | **§ 635.23(f)(3) –** For pelagic longline vessels fishing in the Northeast Distant gear restricted area under the exemption specified at §635.21(c)(2)(v), all BFT taken incidental to fishing for other species while in that area may be retained up to the available quota as specified in §635.27(a), notwithstanding the retention limits and target catch requirements specified in paragraph (f)(1) of this section. Once the available quota as specified in §635.27(a) has been attained, the target catch requirements specified in paragraph (f)(1) of this section apply.<br>**NOTE –** Much of the regulatory text in this paragraph is modified pursuant to Issue 10 in the "Regulatory Housekeeping" section. | Changes the title of the NED closed area to reflect recent amendments to the regulations governing the area. |
| **31** | **§ 635.24(a)(1)** Persons who own or operate a vessel that has been issued a directed ILAP or LAP for shark may retain, possess or land no more than 4,000 lb (1,814 kg), dw, of LCS per trip. | **§ 635.24(a)(1)** Persons who own or operate a vessel that has been issued a directed LAP for shark may retain, possess or land no more than 4,000 lb (1,814 kg), dw of LCS per trip. | Removes references to Initial Limited Access Permits (ILAPs), which are no longer issued. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| 32 | **§ 635.24(a)(2)** Persons who own or operate a vessel that has been issued an incidental catch ILAP or LAP for sharks may retain, possess or land no more than 5 LCS and 16 SCS and pelagic sharks, combined per trip. | **§ 635.24(a)(2)** Persons who own or operate a vessel that has been issued an incidental catch LAP for sharks may retain, possess or land no more than 5 LCS and 16 SCS and pelagic sharks, combined, per trip. | Removes references to Initial Limited Access Permits (ILAPs), which are no longer issued. |
| 33 | | Add a new paragraph at **§635.24(a)(3)** to read as follows, "Persons who own or operate a vessel that has been issued an incidental or directed LAP for sharks may not retain, possess, land, sell, or purchase a prohibited shark, including parts or pieces of prohibited sharks, which are listed in Table 1 of Appendix A to this part under prohibited sharks." | Clarifies existing regulations regarding the retention, possession, sale and purchase of prohibited sharks by also including parts and pieces of prohibited sharks. |
| 34 | **§ 635.24(b)(1)** Persons aboard a vessel that has been issued an incidental ILAP or LAP for swordfish may retain, possess, or land no more than two swordfish per trip in or from the Atlantic Ocean north of 5° N. lat. | **§ 635.24(b)(1)** Persons aboard a vessel that has been issued an incidental LAP for swordfish may retain, possess, or land no more than two swordfish per trip in or from the Atlantic Ocean north of 5° N. lat. | Removes reference to Initial Limited Access Permits (ILAPs), which are no longer issued. |
| 35 | **§ 635.24(b)(2)** Persons aboard a vessel in the squid trawl fishery that has been issued an incidental ILAP or LAP for swordfish may retain, possess, or land no more than five swordfish per trip in or from the Atlantic Ocean north of 5° N. lat. * * * | **§ 635.24(b)(2)** Persons aboard a vessel in the squid trawl fishery that has been issued an incidental LAP for swordfish may retain, possess, or land no more than five swordfish per trip in or from the Atlantic Ocean north of 5° N. lat. * * * | Removes reference to Initial Limited Access Permits (ILAPs), which are no longer issued. |
| 36 | **§ 635.27(a)(3)** * * * In addition, 25 mt shall be allocated for incidental catch by pelagic longline vessels fishing in the Northeast Distant closed area, as defined under §635.2, under the exemption specified at §635.21(c)(2)(v). | **§ 635.27(a)(3)** * * * In addition, 25 mt shall be allocated for incidental catch by pelagic longline vessels fishing in the Northeast Distant gear restricted area as specified at §635.23(f)(3). | Changes title of the NED closed area to reflect recent regulatory changes to the area. |
| 37 | **§ 635.71(a)(7)** Fail to allow an authorized agent of NMFS to inspect and copy reports and records, as specified in § 635.5(e) or § 635.32. | **§ 635.71(a)(7)** Fail to allow an authorized agent of NMFS to inspect and copy reports and records, as specified in § 635.5(e) and (f), or § 635.32. | Adds an additional reference in this prohibition to § 635.5(f) – *Additional data and inspection.* |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| **38** | **§ 635.71(a)(8)** Fail to make available for inspection an Atlantic HMS or its area of custody, as specified in § 635.5(g). | **§ 635.71(a)(8)** Fail to make available for inspection an Atlantic HMS or its area of custody, as specified in § 635.5(e) and (f). | Corrects an obsolete reference to § 635.5(g) and replaces with § 635.5 (e) and (f). |
| **39** | **§ 635.71(a)(37)** Fail to report to NMFS, at the number designated by NMFS, the incidental capture of listed whales with shark gillnet gear and sea turtle mortalities associated with pelagic longline gear as required by § 635.5. | **§ 635.71(a)(37)** Fail to report to NMFS, at the number designated by NMFS, the incidental capture of listed whales with shark gillnet gear as required by § 635.5. | Removes a duplicative reporting requirement. Captured sea turtles would still be required to be reported in PLL logbooks, so no information is lost. |
| **40** | **§ 635.71(b)(22)** As the owner or operator of a purse seine vessel, fail to comply with the requirements for weighing, measuring, and information collection specified in § 635.30(a)(2). | **§ 635.71(b)(22)** As the owner or operator of a purse seine vessel, fail to comply with the requirement for possession at sea and landing of BFT under § 635.30(a). | Revises language referencing a paragraph that has been removed by referencing the appropriate paragraph. |
| **41** | **§ 635.71(d)(10)** Retain, possess, sell, or purchase a prohibited shark, as specified under § 635.22(c) and § 635.27(b)(1) or fail to disengage any hooked or entangled prohibited shark with the least harm possible to the animal as specified at § 635.21(d)(3). | **§ 635.71(d)(10)** Retain, possess, sell, or purchase a prohibited shark, including parts or pieces of prohibited sharks, as specified under §§ 635.22(c), 635.24(a)(3), and 635.27(b)(1) or fail to disengage any hooked or entangled prohibited shark with the least harm possible to the animal as specified at §635.21(d)(3). | Adds a reference to a new paragraph at § 635.24(a)(3), which includes parts and pieces of prohibited sharks. |
| **42** | **§ 635.71(d)(11)** Falsify information submitted under § 635.16(d)(2) or (d)(4) in support of an application for an ILAP or an appeal of NMFS' denial of an ILAP for shark. | Revise **§ 635.71(d)(11)** with regulatory language pursuant to "HMS Identification Workshops" section. | Removes a cross-reference that has been removed. ILAPs are no longer being issued, and appeals are complete. |
| **43** | **§ 635.71(e)(11)** Falsify information submitted under §635.16(d)(2) or (d)(4) in support of an application for an ILAP or an appeal of NMFS' denial of an initial limited access permit for swordfish. | Revise **§ 635.71(e)(11)** with regulatory language pursuant to "Authorized Gears" section. | Removes a cross-reference that has been removed. ILAPs are no longer being issued, and appeals are complete. |

| Item Number | Current Regulation | Amendment | Rationale for Amendment |
|---|---|---|---|
| 44 | **§ 300.182(d)** *Duration.* Any permit issued under this section is valid until December 31 of the year for which it is issued, unless suspended or revoked. | **§ 300.182(d)** *Duration.* Any permit issued under this section is valid for the period specified on it, unless suspended or revoked. | Modifies the expiration date of the HMS International Trade Permit. |
| 45 | **§ 635.22(b)** *Billfish*. No longbill spearfish from the management unit may be possessed shoreward of the outer boundary of the EEZ. | **§ 635.22(b)** *Billfish*. No longbill spearfish from the management unit may be taken, retained, or possessed shoreward of the outer boundary of the EEZ. | Strengthens longbill spearfish regulations, and is consistent with similar language regarding other species. |

#### *2.3.4.2 Alternatives*

The issues being addressed in this section include changes in definitions, clarifications, and amendments for which alternatives have been developed and analyzed. A description of each issue is provided, followed by a description of the alternatives being considered.

<u>Issue 1: Definitions of Pelagic and Bottom Longline</u>

The HMS time/area closures that are currently in effect apply specifically to either pelagic or bottom longline gear (*i.e*., the Desoto Canyon, East Florida Coast, Charleston Bump, Mid-Atlantic Shark, and Northeastern United States Closed Areas). Therefore, to determine compliance with the closed area restrictions, it is optimal for the two gear types to be clearly differentiable. In the current regulations, the difference is articulated by general reference to the presence of weights/floats capable of anchoring/supporting the mainline on/in the seafloor/water column. Problems have arisen because bottom longline vessel operators sometimes possess and utilize floats on bottom longline gear, and pelagic longline vessel operators sometimes possess and utilize weights on pelagic longline gear. In these situations, it may be difficult to determine if the weights are capable of anchoring the mainline on the seafloor, or if the floats are capable of supporting the mainline in the water column. NMFS is considering amending the definitions for pelagic and bottom longlines at §§ 635.2, 635.21(c), and 635.21(d), or establishing additional restrictions or possession limits on these gears when fishing in any of the HMS time/area closures.

Alternative I1(a) Retain current definitions for pelagic and bottom longline gears (No Action)

This alternative would retain the current definitions for pelagic and bottom longlines at §§ 635.2, 635.21(c), and 635.21(d). A pelagic longline is defined as a longline that is suspended by floats in the water column and that is not fixed to or in contact with the ocean bottom. For purposes of § 635.21(c), a vessel is considered to have pelagic longline gear onboard when a power-operated longline hauler, a mainline, floats capable of supporting the mainline, and leaders (gangions) with hooks are onboard. A bottom longline is defined as a longline that is deployed with enough weights and/or anchors to maintain contact with the ocean bottom. For purposes of § 635.21(d), a vessel is considered to have bottom longline gear on board when a power-operated longline hauler, a mainline, weights and/or anchors capable of maintaining contact between the mainline and the ocean bottom, and leaders (gangions) with hooks are on board. There are currently no restrictions on the amount of pelagic species that may be possessed when fishing with bottom longline gear in PLL closed areas, and vice verse.

Alternative I1(b) Establish additional restrictions on longline gear in HMS time/area closures by specifying a maximum and minimum allowable number of commercial fishing floats in order to qualify as a bottom or pelagic longline vessel, respectively

This alternative would retain the current definitions for pelagic and bottom longlines at §§ 635.2; 635.21(c); and 635.21(d). However, in addition, this alternative would establish limits on the number of commercial fishing floats that longline fishing vessels must possess onboard to qualify as either a bottom or pelagic longline vessel within the closed areas. Specifically, under this alternative, to be considered a bottom longline vessel in a PLL closed area, the vessel must possess no more than 70 commercial fishing floats onboard or deployed, combined. To be considered a pelagic longline vessel in a BLL closed area, the vessel must possess at least 71 commercial fishing floats onboard or deployed, combined. Examples of commercial fishing floats include bullet floats, poly balls, high flyers, and lobster pot buoys. This alternative was a preferred alternative in the Draft Consolidated HMS FMP.

Alternative I1(c) *Differentiate between pelagic and bottom longline gear based upon the species composition of the catch onboard or landed – Preferred Alternative*

This alternative would retain the current definitions for pelagic and bottom longlines at §§ 635.2, 635.21(c), and 635.21(d). However, in addition, this alternative would establish a five-percent limit (by weight) on the allowable amount of pelagic "indicator" species that bottom longline vessels may possess or land from PLL closed areas, and establish a five-percent limit (by weight) on the allowable amount of demersal "indicator" species that pelagic longline vessels may possess or land from BLL closed areas (measured relative to the total weight of all pelagic and demersal "indicator" species). Specifically, to qualify as a bottom longline vessel when fishing in a PLL closed area, no more than five percent (by weight) of the species possessed or landed may be pelagic "indicator" species, as measured relative to the total weight of all pelagic and demersal "indicator" species. To be considered a pelagic longline vessel when fishing in a BLL closed area, no more than five percent (by weight) of the species possessed or landed may be demersal "indicator" species, as measured relative to the total weight of all pelagic and demersal "indicator" species. The indicator species are listed in Table 1 of Section 4.3.4.

Alternative I1(d) Require time/depth recorders (TDRs) on all HMS longlines

This alternative would require TDRs (data loggers) at pre-specified intervals on all HMS longline fishing gear that is deployed. Under this alternative, the TDRs would have to be operational and able to accurately record the maximum and minimum fishing depths of HMS longline gear using an onboard TDR reader. Pelagic longline gear would be required to remain within the upper two-thirds of the water column while fishing, and bottom longline gear would be required to remain within the bottom third of the water column while fishing.

Alternative I1(e) Base HMS time/area closures on all longlines (PLL and BLL)

This alternative would not differentiate between pelagic and bottom longline gear in the establishment and enforcement of HMS longline closed areas. Specifically, if this alternative were adopted, all longline gear would be prohibited from all HMS longline closed areas.

Issue 2: Shark Identification

Species identification of sharks can be enhanced by the presence of fins. NMFS is considering amending the regulations governing commercial shark landings, possibly at § 635.30(c)(2) and at § 635.71(d)(6), to facilitate shark identification for enforcement and data collection purposes.

Alternative I2(a) Retain current commercial regulations regarding shark landing requirements (No Action)

By retaining the *status quo*, this alternative would allow for the removal of all shark fins prior to landing. Other regulations governing the landing of sharks and shark fins would remain unchanged, as well. As such, Federal commercial shark limited access permit holders would be allowed to eviscerate sharks and remove their heads and fins at sea as long as the ratio between the weight of fins and the weight of carcass does not exceed five percent.

Alternative I2(b) *Require that the $2^{nd}$ dorsal fin and the anal fin remain on all sharks through landing – Preferred Alternative*

This alternative would mandate the retention of the $2^{nd}$ dorsal fin and anal fin on all shark species through landing. Specifically, Federal commercial shark limited access permit holders would be required to have these fins attached to all sharks during offloading. Removal of these fins would only be permissible after the shark is offloaded.

Alternative I2(c) Require that the $2^{nd}$ dorsal fin and the anal fin remain on all sharks through landing, except for lemon and nurse sharks

This alternative would mandate the retention of the $2^{nd}$ dorsal fin and anal fin on all shark species, except for lemon and nurse sharks, through landing. Specifically, Federal commercial shark limited access permit holders would be required to have these fins attached to all sharks, except nurse and lemon sharks, during offloading. Removal of these fins would only be permissible after the shark is offloaded. Due to ease at which nurse and lemon sharks without $2^{nd}$ dorsal and anal fins can be identified, these species would be exempt under this alternative.

Alternative I2(d) Require that all fins remain on all sharks through landing

This alternative would mandate the retention of all fins on all shark species through landing. Federal commercial shark limited access permit holders would be required to have all fins attached to all sharks during offloading. Removal of the fins would only be permissible after the shark is offloaded.

Issue 3: HMS Retention Limits

Currently, HMS retention limits apply to “persons aboard a vessel” (*i.e*., vessel owners and operators). NMFS is considering adding new prohibitions at § 635.71(a)(48) and § 635.71(a)(49) that would address the purchase and sale of HMS by dealers and fishermen in excess of the retention limits specified in § 635.23 and § 635.24. The intent of these prohibitions would be to improve compliance with HMS retention limits by extending the regulations to both of the parties involved in a transaction (*i.e*. “persons aboard a vessel” & buyers).

Alternative I3 (a) Retain current regulations regarding retention limits, with no new prohibitions (No Action)

This alternative would not implement any new prohibitions regarding the purchase and sale of HMS by dealers and fishermen in excess of the retention limits specified in §§ 635.23 and 635.24. As such, compliance with many of the HMS retention limits would remain solely incumbent upon “persons aboard a vessel” (*i.e*., vessel owners and operators). Persons who purchase HMS that were offloaded from an individual vessel in excess of the retention limits would remain unaffected.

Alternative I3(b) *Add new prohibition at § 635.71(a)(48) making it illegal for any person to, “Purchase any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24” – Preferred Alternative*

This alternative would implement a new prohibition at § 635.71(a)(48) making it illegal for any person to, “Purchase any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24.” As such, dealers or buyers would be held responsible for purchases of HMS in excess of the commercial retention limits. This prohibition is intended to improve compliance with HMS retention limits by extending the regulations to both of the parties involved in a transaction. It would reinforce and clarify other existing regulations regarding landings of HMS in excess of commercial retention limits.

Alternative I3(c) *Add new prohibition at § 635.71(a)(49) making it illegal for any person to, “Sell any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24” – Preferred Alternative*

This alternative would implement a new prohibition at § 635.71(a)(49) making it illegal for any person to, “Sell any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24.” As such, vessel owners or operators would be held responsible for sales in excess of HMS retention limits. This prohibition would reinforce and clarify other existing regulations regarding landings of HMS by vessels in excess of commercial retention limits.

Issue 4: Definition of East Florida Coast Closed Area

NMFS is considering amending the definition of the East Florida Coast closed area at § 635.2 by replacing the second coordinate (28° 17’ N. Lat., 79° 12’ W. Long.) with a new coordinate (28° 17’ 10” N. Lat., 79° 11’ 24” W. Long.), so that the outer boundary of the closed area corresponds with the outer boundary of the EEZ, as originally intended. This area was initially described in the FSEIS (NMFS June 14, 2000) and the final rule prepared pursuant to implementation of the closed area (65 FR 47214, August 1, 2000). However, one of the current outer coordinates does not correspond exactly with the EEZ boundary, thus inadvertently leaving a small area open between the closed area and the EEZ. The outer coordinate being considered is approximately 1.02 km (0.55 nm) seaward (eastward) of the current coordinate.

Alternative I4(a) Retain current coordinates for the East Florida Coast closed area (No Action)

This alternative would retain the *status quo* coordinates for the East Florida Coast closed area. One of the outer coordinates does not correspond exactly with the EEZ boundary, thus leaving a small area open between the closed area and the EEZ. Pelagic longline vessels would continue to be allowed to fish in this small region between the closed area and the EEZ.

Alternative I4(b) *Amend the second coordinate of the East Florida Coast closed area to 28° 17’ 10” N. Lat., 79° 11’ 24” W. Long., so that it corresponds with the EEZ – Preferred Alternative*

This alternative would amend the second coordinate of the East Florida Coast closed area. If this alternative were selected, pelagic longline vessels would not be able to fish in the small area that is currently open between the closed area and the EEZ. This modification would meet the intent of the closed area to extend out to the EEZ.

<u>Issue 5: Definition of Handline</u>

Currently, a “handline” is defined as fishing gear consisting of a mainline to which no more than two leaders (gangions) with hooks are attached, and that is released and retrieved by hand, rather than by mechanical means. It has been brought to the Agency’s attention that some vessel operators, both commercial and recreational, may be deploying numerous handlines that are not attached to their vessel in areas that are closed to pelagic longlines and elsewhere. While these vessel operators may be technically compliant with current regulations, this practice may circumvent the original “concept” of handline gear, and could potentially diminish the conservation benefits associated with the PLL closed areas. Therefore, NMFS is considering amending the definition of “handline,” possibly at §§ 635.2 and 635.2l.

Alternative I5(a) Retain the current definition of “handline” at § 635.2 (No Action)

The “No Action” alternative would retain the current definition of “handline,” as described above. As such, the practice of fishing with an unlimited number of unattached handlines would continue to be allowed.

Alternative I5(b) *Amend the definition of “handline” at § 635.2 by requiring that they be attached to, or in contact with, a vessel – Preferred Alternative*

Alternative I5(b) would define a handline as fishing gear that is attached to, or in direct contact with, a fishing vessel and consists of a mainline to which no more than two leaders (gangions) with hooks are attached, and that is released and retrieved by hand, rather than by mechanical means. As such, the practice of fishing with unattached handlines would be disallowed for all HMS commercial and recreational fishing activities. Please see Section 2.3.3 of this document regarding an alternative that would add "buoy gear" to the list of authorized gears for the swordfish handgear fishery.

Alternative I5(c) Require that handlines remain attached to vessels when fishing recreationally and allow unattached handlines when fishing commercially

Alternative I5(c) would require that handlines remain attached to, or in direct contact with, a fishing vessel for all vessels possessing either an HMS Angling category permit; an HMS Charter/headboat permit when fishing on a for-hire trip; or, an Atlantic Tunas General category permit when fishing in a registered HMS tournament. As such, the practice of fishing with unattached handlines would be disallowed when conducting recreational fishing activities, but the practice would be allowed when fishing commercially.

Issue 6: Possession of Billfish on Vessels Issued HMS Commercial Permits

The Atlantic billfish fishery is a recreational fishery and the sale of Atlantic billfish is prohibited. Furthermore, Atlantic billfish may only be harvested by rod and reel, and persons may not currently possess, take, or retain billfish if pelagic longline gear is onboard the vessel. NMFS is considering amendments that would reinforce the recreational nature of the Atlantic billfish fishery by eliminating a minor loophole that exists, whereby the possession or retention of billfish is not prohibited if commercial gears other than pelagic longline are onboard a vessel. As such, persons aboard HMS-permitted vessels may potentially fish for and possess Atlantic billfish for non-commercial purposes using rod and reel when other commercial gear is onboard. Also, vessel operators might incidentally capture and possess billfish caught on other commercial gears and illegally retain the fish by indicating that it was caught using rod and reel. Therefore, NMFS is considering amendments to prohibit the possession or retention of billfish on all vessels issued HMS commercial permits.

Alternative I6(a) Retain current regulations regarding the possession of Atlantic billfish (No Action)

The "No Action" alternative would allow the possession or retention of billfish when commercial gears, other than pelagic longlines, are onboard the vessel. As such, persons may potentially fish for and possess Atlantic billfish for non-commercial purposes using rod and reel, when other commercial gear is onboard. The "No Action" alternative does not specify which permit holders may possess or retain an Atlantic billfish taken from its management unit.

Alternative I6(b) *Prohibit vessels issued HMS commercial permits and operating outside of a tournament from possessing, retaining, or taking Atlantic billfish from the management unit – Preferred Alternative*

Alternative I6(b) would prohibit the possession or retention of billfish on all vessels that have been issued HMS commercial permits. Only vessel owners possessing either an HMS Angling, HMS Charter/headboat permit, or an Atlantic Tunas General category (when fishing in a registered HMS tournament) permit would be allowed to possess or retain an Atlantic billfish taken from its management unit with rod and reel. If this alternative were selected, the regulations for all HMS commercial fisheries would be consistent with current regulations in effect for the pelagic longline fishery. This alternative would further reinforce and clarify the recreational nature of the Atlantic billfish fishery.

Issue 7: Bluefin Tuna Dealer Reporting

NMFS is investigating alternative methods of BFT dealer reporting. Currently, BFT dealers are required to manually complete and submit as many as three individual BFT reports (BFT landing reports, bi-weekly BFT reports, and BFT statistical documents for international trade). These reports are then re-entered into databases by NMFS personnel. Recent advances in software technology and web-based applications provide opportunities for dealers to enter and report data with greater efficiency, and with potential reductions in administrative costs for both dealers and NMFS. For example, NMFS' Northeast Regional Office has transitioned to an electronic web-based dealer reporting system and continues to work with dealers to improve the system. Electronic capabilities could also be developed for an HMS BFT system to increase quality control and assurance capabilities, using cross-checks with other databases, data fields, and flags that would facilitate accurate data entry. However, current regulations regarding BFT dealer reporting and recordkeeping require that dealers submit written reports, either in the mail or via FAX transmittal. To provide additional electronic reporting flexibility, as described above, it is necessary to amend the HMS regulations to specify that BFT dealers may submit these reports electronically over the Internet if they choose to do so, or are required to do so.

Alternative I7(a) Retain the current regulations regarding bluefin tuna dealer reporting (No Action)

Under this alternative the regulations regarding BFT dealer reporting would remain unchanged. Potentially, dealers that have the capacity and interest to report electronically would not be able to do so because the current requirements specifically state that reports must be written and mailed or faxed (*i.e.*, fax for landing reports; fax or standard mail for bi-weekly reports; fax or standard mail for statistical documents accompanying imported BFT; standard mail for statistical documents accompanying exported BFT).

Alternative I7(b) *Amend the HMS regulations to provide an option for Atlantic tunas dealers to submit required BFT reports using the Internet – Preferred Alternative*

Under this alternative, the regulations would be slightly modified to add text under each BFT dealer reporting requirement so that dealers may also electronically submit the required report if they choose to do so, using an on-line tool or webpage. All *status quo* methods of providing hand-written reports and documentation via mail or fax would remain available and permissible. Electronic submission would be provided as an option, and would not be mandatory. Investigations are still underway regarding the feasibility and design of an electronic system and no dates for implementation have yet been set. However, when such a system has been designed, it would be useful to provide interested dealers with the opportunity to test the system and provide feedback for future enhancements. The preferred alternative would provide dealers with the flexibility not only to test the system, but continue to use it should they choose to do so.

Alternative I7(c) Amend the HMS BFT dealer reporting regulations to require that Atlantic tunas dealers submit BFT reports electronically, with specific exceptions

This alternative proposes to adjust the regulations to require all BFT dealers, with some exceptions, to submit all BFT reports electronically either using a web-based application, or using software on a private computer with the data being transmitted over the Internet. The intent of this alternative would be to standardize reporting, reduce administrative burdens, and ensure the new system is used. All options to submit written reports via mail or fax would be eliminated with certain specific exemptions, such as for dealers falling below an established economic threshold, or for dealers who only report minimal numbers of fish on an infrequent basis.

Issue 8: "No-Fishing," "Cost-Earnings," and "Annual Expenditures" Reporting Forms

Presently, if commercial HMS permit holders (*i.e.*, HMS Charter/headboat, Atlantic Tunas, and commercial shark and swordfish permit holders) are selected for reporting, they are required to submit logbooks to NMFS postmarked within seven days of offloading any Atlantic HMS. NMFS supplies logbook forms to all selected vessels. These forms consist of a fishing report (catch, discards, effort and fishing area data), a "no-fishing" reporting form if no fishing took place during the preceding month, and trip and annual "cost-earnings" reporting forms. The reported information is used to conduct stock assessments, monitor quotas, prevent overfishing, and estimate the economic impacts of different management measures. There has been some confusion as to whether the "no-fishing" reporting form and the "cost-earnings" reporting forms are a required component of the logbook, and exactly when they must be submitted. Therefore, NMFS is considering amendments to require the submission of a "no-fishing" reporting form, and to specify that the report must be postmarked no later than seven days after the end of the month. Similarly, the "cost-earnings" and "annual expenditures" reporting forms would need to be submitted consistent with the instructions on the forms. The Paperwork Reduction Act (PRA) reporting burden for these information collections is currently approved under the PRA submission for Atlantic HMS vessel logbooks (OMB Control Number 0648-0371). A requirement to submit the "no-fishing" report form, and the trip "cost-earnings" and "annual expenditures" reporting forms within a certain timeframe would be new, however it is consistent with current HMS requirements and with other NMFS' Southeast Regional regulations. These modifications would clarify HMS logbook reporting requirements.

Alternative I8(a) Maintain the existing regulations regarding submission of logbooks (No Action)

The "No Action" alternative would retain the existing regulations regarding the submission of HMS vessel logbooks at § 635.5(a)(1). There are currently no specific regulations to submit "no-fishing," "cost-earnings," and "annual expenditure" reporting forms to NMFS within a certain timeframe.

Alternative I8(b) *Require submission of "no-fishing" reporting forms for selected vessels if no fishing trips occurred during the preceding month, postmarked no later than seven days after the end of the month – Preferred Alternative*

Alternative I8(b) would amend the HMS regulations at § 635.5(a)(1) to require the submission of "no-fishing" reporting forms for selected vessels if no fishing trips occurred during the preceding month to be postmarked no later than seven days after the end of the month. This alternative would clarify HMS logbook reporting requirements and provide important information to conduct stock assessments, monitor quotas, and prevent overfishing.

Alternative I8(c) *Require submission of the trip "cost-earnings" reporting form for selected vessels 30 days after a trip, and the" annual expenditures" report form by the date specified on the form – Preferred Alternative*

Alternative I8(c) would amend the HMS regulations to require the submission of trip "cost-earnings" reporting forms for selected vessels 30 days after a trip, and the "annual expenditures" report form by the date specified on the form (presently January 31st). This alternative would better clarify HMS reporting requirement and provide important information to estimate the economic impacts of different management measures.

Issue 9: Non-Tournament Recreational Landings Reporting

HMS regulations currently specify that anglers are required to report non-tournament recreational landings of Atlantic billfish and swordfish, whereas other HMS regulations specify that vessel owners are required to report recreational landings of bluefin tuna under the Angling category. NMFS is considering clarifying that owners of vessels permitted, or required to be permitted, in the Atlantic HMS Angling or Atlantic HMS Charter/headboat category (or their designee) must report all non-tournament recreational landings of billfish and swordfish. This action is being considered to remove inconsistencies in reporting requirements and to clarify NMFS' intent that the vessel owner, rather than the angler, is responsible for reporting non-tournament recreational landings of Atlantic billfish and swordfish.

Alternative I9(a) Retain existing regulations at § 635.5(c)(2) requiring anglers to report non-tournament recreational landings of North Atlantic swordfish and Atlantic billfish (No Action)

Alternative I9(a) would retain existing HMS regulations that specify that anglers are required to report non-tournament recreational landings of Atlantic billfish and swordfish. These regulations are inconsistent with other HMS regulations specifying that vessel owners are required to report recreational landings of bluefin tuna under the Angling category.

Alternative I9(b) *Require vessel owners (or their designee) to report non-tournament recreational landings of North Atlantic swordfish and Atlantic billfish – Preferred Alternative*

Alternative I9(b) would amend the HMS regulations to specify that vessel owners (or their designee) are required to report non-tournament recreational landings of Atlantic billfish and swordfish.  The vessel owner would be responsible for reporting, but the owner's designee could fulfill the requirement.  This alternative would be consistent with other HMS regulations specifying that vessel owners are required to report recreational landings of bluefin tuna under the Angling category.

Issue 10: Pelagic Longline 25 mt (ww) NED Incidental BFT Allocation

In November 2002, ICCAT recommended an annual U. S. Total Allowable Catch (TAC) of western Atlantic BFT of 1,489.6 mt (ww).  A specific allocation of 25 mt (ww) was included in this TAC to account for the incidental catch of BFT by longline fisheries directed on other species "in the vicinity of the management boundary area" for the eastern and western BFT stocks.  This area was defined by NMFS in the 2003 BFT annual specification as the Northeast Distant (NED) statistical reporting area (approximately the Grand Banks fishing grounds) (68 FR 56783, October 2, 2003).  The regulatory text at 50 CFR 635.27(a)(3) was revised to include this additional allocation, and specifically states that "25 mt shall be allocated for incidental catch by pelagic longline vessel fishing in the NED."

As the language contained in the ICCAT recommendation is not explicit regarding application of any unharvested quota to the following year's quota, NMFS prefers to clarify the regulatory text and the procedures implementing that text, as it directly relates to this specific set-aside.  Since the implementation of the 25 mt (ww) recommendation, NMFS has allocated an additional 25 mt (ww) for this incidental catch each year.  However, because previous year's longline activity has not resulted in full incidental set-aside quota attainment, NMFS has carried forward un-utilized quota and added it to the subsequent fishing year's annual 25 mt (ww) allocation.  This has resulted in revised totals that exceed 25 mt (ww).  This accumulation of incidental quota has led to revised set-aside quotas exceeding that of the ICCAT recommended amount and therefore, may not fully reflect the intent of the recommendation.  Several alternatives are presented below to clarify the amount of available incidental BFT quota for pelagic longline activity in the vicinity of the NED statistical reporting area.

Alternative I10(a): Retain the current regulations specifically referring to 25 mt (ww) (No Action)

Under this alternative, the status quo regulatory text implementing this ICCAT recommendation would remain unchanged and would indicate that 25 mt (ww) shall be allocated for incidental catch of BFT by pelagic longline vessels fishing in the NED.  This alternative would not clarify the applicability of quota carry-over provisions to this set-aside quota, and may allow for implementing practices to not fully reflect the original intent of the recommendation.  Under this alternative, NMFS would allocate 25 mt (ww) for this incidental catch on an annual basis.  If the previous year's longline activity has not resulted in full incidental set-aside quota attainment, NMFS would carry forward un-utilized quota and add it to the subsequent fishing year's 25 mt (ww) allocation.  If the previous year's longline activity has exceeded the incidental set-aside quota, NMFS would deduct the overharvest from the subsequent fishing year's 25 mt (ww) allocation.  Thus, this alternative may result in a revised quota that differs from the 25 mt (ww).

Alternative I10(b): Modify the HMS regulations to state that "In addition, each year, 25 mt (ww) will be allocated for incidental catch by pelagic longline vessels fishing in the NED"

Under Alternative I10(b), the regulatory text would be modified to include the phrase "each year" to clarify that the annual baseline allocation equals 25 mt (ww), but the total available quota for a given year would not be limited and may be modified to account for under/overharvests from prior year's activity. This alternative would clarify that carryover provisions apply to this set-aside quota. This was a preferred alternative in the Draft HMS FMP.

Alternative I10(c): *Conduct additional discussions at ICCAT regarding quota rollovers and adjust quotas allocated to account for bycatch related to pelagic longline fisheries in the vicinity of the management area boundary accordingly Preferred Alternative*

Under this alternative, the United States would conduct additional discussions at the annual ICCAT meeting regarding the long-term implications of allowing unused BFT quota from the previous year being added to the subsequent year's allocation that can be retained. Depending on the results of any additional discussions at ICCAT, the regulations and operational procedures that account for BFT bycatch related to pelagic longline fisheries in the vicinity of the management area boundary may need to be further amended in the future. In the interim, NMFS would maintain the current regulatory text implementing the ICCAT recommendation, as described in alternative I10(a), but would amend the current practice of allowing under/overharvest of this set-aside allocation to be rolled into, or deducted from, the subsequent fishing year's set-aside allocation. Therefore, regardless of the amount of the set-aside harvested or unused in a given year, the balance would return to 25 mt (ww) at the start of each fishing year. If landings were to exceed the 25 mt (ww) allotment, they would be accounted for via Longline category quota that applies to the entire Western Atlantic management area.

<u>Issue 11: Permit Condition for Recreational Trips</u>

In the HMS regulations, as a condition of their permits, vessels that have a commercial shark or swordfish permit must currently comply with Federal regulations regardless of where vessels are fishing, unless a state has more restrictive regulations (50 CFR § 635.4(a)(10)). However, vessels fishing recreationally for sharks, swordfish, billfish, and tunas in a few states are currently able to fish under state regulations while in state waters, and under Federal regulations when in Federal waters. This has generated confusion due to the differences between state and Federal regulations and the inability to verify whether or not a particular fish onboard a vessel was caught in state waters or Federal waters. The alternatives below consider modifying the *status quo* to remove this ambiguity.

Alternative I11(a) No permit condition for recreational trips (No Action)

Under this alternative, the regulations would remain as they currently are. Thus, vessels issued an HMS Angling permit, an Atlantic Tunas General Category permit that was participating in a registered tournament, or an HMS Charter/headboat permit that was on a for-hire trip would fish under Federal requirements in Federal waters and under state requirements in state waters.

Alternative I11(b) *Require recreational vessels with a Federal permit to abide by Federal regulations, regardless of where they are fishing, unless a state has more restrictive regulations - Preferred Alternative*

Under this alternative, vessels that have been issued an HMS Angling permit, an Atlantic Tunas General category permit that was participating in a registered tournament, or an HMS Charter/headboat permit on a for-hire trip would be required to fish for, retain, or possess Atlantic HMS in accordance with Federal regulations regardless of fishing location, unless the state where the fish is caught has more restrictive regulations. For example, if the Federal bag limit is three fish per vessel, and the state bag limit is two fish per vessel, a vessel with a Federal permit fishing in state waters would be limited to two fish per vessel. However, if the Federal bag limit is three fish per vessel, and the state bag limit is four fish per vessel, a vessel with a Federal permit fishing in state waters would be limited to three fish per vessel. Vessels that have not been issued a Federal permit that allows for recreational Atlantic HMS fishing would need to abide by state regulations when fishing for HMS in state waters. A vessel without a Federal permit cannot legally fish in Federal waters for Atlantic HMS.

# CHAPTER 2 REFERENCES

## Reference for Section 2.1.2

Blue Ocean Institute, Monterrey Bay Aquarium, National Coalition for Marine Conservation, Natural Resources Defense Council, Oceana Inc., 2005. Petition for Immediate Rulemaking to Protect Spawning Atlantic Bluefin Tuna in the Gulf of Mexico. Submitted to Secretary of Commerce on June 8, 2005. 13 p.

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## References for Section 2.3.3

IBSRC. 2005. International Bluewater Spearfishing Records Committee Rules. http://freedive.net/ibsrc/index.html .

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## 3.0 DESCRIPTION OF AFFECTED ENVIRONMENT

This Chapter serves several purposes. As part of an EIS, this Chapter describes the affected environment (the fisheries, the gears used, the communities involved, etc.). The description should provide a view on the current conditions and serves as a baseline against which to compare impacts of the alternatives. This Chapter also serves as the 2006 SAFE Report required under the guidelines for National Standard 2 of the Magnuson-Stevens Act (50 CFR 600.315(e)). The SAFE Report should provide a summary of information concerning the biological status of the stocks; the marine ecosystems in the fishery management unit; the social and economic condition of the fishing interests, fishing communities, and fish processing industries; and, the best available scientific information concerning the past, present, and possible future condition of the stocks, ecosystems, and fisheries.

### 3.1 Introduction to HMS Management and HMS Fisheries

Atlantic HMS fisheries are primarily managed directly by the Secretary of Commerce, who designated that responsibility to NMFS. The HMS Management Division within NMFS is the lead in developing regulations for HMS fisheries, although some actions (*e.g.*, Large Whale Take Reduction Plan) are taken by other NMFS offices outside of the HMS Management Division if the main legislation (*e.g.*, Marine Mammal Protection Act) driving the action are not the Magnuson-Stevens Act or ACTA. Because of their migratory nature, HMS fishery management necessitates management at the international, national, and state levels. NMFS primarily coordinates the management of HMS fisheries in Federal waters (domestic) and the high seas (international) while individual States establish regulations for HMS in their own waters. There are exceptions to this generalization. For example, Federal bluefin tuna regulations apply in most state waters, and Federal shark and swordfish fishermen, as a condition of their permit, are required to follow Federal regulations in all waters unless that state has more restrictive regulations (see Sections 2.3.4 and 4.3.4 for a preferred alternative that would apply the permit condition to recreationally caught HMS). Additionally, in 2005, the Atlantic States Marine Fisheries Commission agreed to develop an interstate coastal shark FMP. Once complete, this interstate FMP would coordinate management measures among all states along the Atlantic coast (Florida to Maine). NMFS is participating in the development of this interstate FMP. A brief history of HMS management is provided in sections 3.1.1 and 3.1.2.

Generally, on the domestic level, NMFS implements international agreements, as appropriate, and management measures that are required under domestic laws such as the Magnuson-Stevens Act. While NMFS does not generally manage HMS fisheries in state waters, states are invited to send representatives to AP meetings and to participate in stock assessments, public hearings, or other fora. NMFS is working to improve its communication and coordination with state agencies. In the past year, NMFS has reviewed the shark regulations of several states and has asked for some states to consider changing their regulations to become more consistent with Federal regulations. As of May 2006, this request resulted in changes and dialogs with certain states regarding the regulations such as the Commonwealth of Virginia and the State of Florida. Additionally, as a result of ASMFC's decision to develop an interstate FMP, the State of Maine opened a dialog with the NMFS regarding shark regulations. See section 3.1.5 for more information regarding state regulations by state.

On the international level, NMFS participates in the stock assessments conducted by ICCAT's SCRS and in the annual ICCAT meetings. The stock assessments and management recommendations or resolutions are listed on ICCAT's website at http://www.iccat.es/. NMFS also actively participates in other international bodies that could affect U.S. fishermen and the fishing industry including CITES and FAO. A summary of 2005 ICCAT accomplishments is provided in section 3.1.4 below. NMFS expects ICCAT to assess a number of stocks in 2006 including marlin, bluefin tuna, and swordfish. More information on the current status of HMS and the dates of the next ICCAT stock assessments is provided in section 3.2.

### 3.1.1 History of Atlantic Tunas, Swordfish, and Shark Management

This section and section 3.1.2 give a relatively brief history of the management of HMS. This history is organized by the previous FMPs, with Atlantic tunas, swordfish, and sharks in one section and Atlantic billfish in the next section. For more detail regarding the history of management, please see the original documents. Proposed rule, final rules, and other official notices can be found in the Federal Register at http://www.gpoaccess.gov/fr/index.html. Supporting documents can be found on the HMS Management Division's webpage at http://www.nmfs.noaa.gov/sfa/hms. Documents can also be requested by calling the HMS Management Division at (301) 713-2347. Section 3.1.3 provides information on more recent actions.

#### 3.1.1.1 Pre-1999 Atlantic Tunas Management

Unless otherwise specified, the following history is a combination of a variety of sources including ICCAT recommendations, the 1999 FMP for Atlantic Tuna, Swordfish, and Sharks, and a 1996 document on the historic rationale and effectiveness of the regulations for U.S. Atlantic BFT fisheries (NMFS, 1996).

Bigeye, albacore, yellowfin, and skipjack (BAYS) tunas, as well as bluefin tuna have been exploited in the western Atlantic for many years. In the early 1900s, a sport fishery developed for small and medium tunas off New York and New Jersey, and for giant bluefin tuna in the Gulf of Maine. The rod and reel fishery expanded rapidly during the 1950s and 1960s, as hundreds of private, charter, and partyboats targeted tunas along the Mid-Atlantic coast. This recreational fishery continues today from Cape Hatteras to the Canadian border. In addition, it is locally important in the Straits of Florida. Sport catches of BAYS, particularly yellowfin tuna, are also made in the Gulf of Mexico.

Until the late 1950s, the U.S. commercial fishery for tunas employed mostly harpoons, handlines, and traps. There was no commercial market for bluefin tuna, and giant bluefin tuna (greater than 310 pounds (lb)) were regarded as a nuisance because of the damage they caused to fishing gear. Much of the bluefin tuna catch was incidental to operations targeting other species. In 1958, commercial purse seining for Atlantic tunas began with a single vessel in Cape Cod Bay and expanded rapidly into the region between Cape Hatteras and Cape Cod during the early 1960s. The purse seine fishery between Cape Hatteras and Cape Cod was directed mainly at small and medium bluefin tuna, and at skipjack tuna, all for the canning industry. North of Cape Cod, purse seining was directed at giant bluefin tuna. A pelagic longline fishery for Atlantic tunas also developed rapidly during the 1960s, comprised mainly of Japanese vessels fishing in the Gulf of Mexico. Today U.S. pelagic longline vessels target bigeye and yellowfin tuna, and catch bluefin tuna incidentally.

The U.S. handgear fishery for Atlantic tunas is mainly a summer through early winter fishery. The recreational tuna fishery takes place mainly in the Mid-Atlantic region through the Gulf of Mexico (GOM). Private vessels targeting tuna for recreational purposes only are permitted in the Angling category, while the charter/headboats targeting tunas are permitted in the Charter/Headboat category. Many fishermen who might normally consider themselves "recreational" fishermen participate in the General category in northeast waters during the summer and fall and are classified as commercial fishermen. Recently, a commercial bluefin tuna fishery has developed off of some south Atlantic states, particularly the State of North Carolina, in the early winter. General category permit holders may sell tuna, and specifically bluefin tuna greater than 73 inches. A 1998 regulation prohibiting the retention of bluefin tuna less than 73 inches by fishermen in the General category clarified the distinction between the commercial and recreational fisheries. The commercial handgear fishery for bluefin tuna occurs mainly in New England, with vessels targeting fish using handline, rod and reel, and harpoon.

*Bluefin Tuna*

Peak yields of bluefin tuna from the western Atlantic (about 8,000 to 19,000 metric tons (mt) whole weight (ww)) occurred between 1963 and 1966 when much of the catch was taken by Asian longline vessels off Brazil. During the late 1960s and 1970s, annual yields averaged about 5,000 mt ww. High catches of juvenile bluefin tuna were sustained throughout the 1960s and into the early 1970s. During the 1960s and 1970s, a North American purse seine fishery for juveniles and the longline fishery, mostly Japanese vessels, usually took 70 to 80 percent of the yield and recreational fisheries usually took 10 percent. By 1973, the United States and other nations began to express concern about the decrease in the abundance of bluefin tuna. In response to this concern, in 1974, ICCAT recommended a minimum size limit of 6.4 kg (14 lb) and recommended that all countries limit fishing mortality to recent (at that time) levels for one year. As a result, the United States limited U.S. harvest by imposing quotas and size limits. In the late 1970s, approximately 10,000 giant bluefin tuna were taken in one year alone from the Gulf of Mexico.

After conducting a series of stock assessments, the ICCAT Standing Committee on Research and Statistics (SCRS) recommended in 1981 that catches of western Atlantic bluefin tuna be reduced to as near zero as possible to stop the decline of the stock and established a 800 mt ww total allowable catch (TAC). This recommendation also prohibited fishing effort in the western Atlantic from transferring to the eastern Atlantic (the stocks were split at $45^0$ W longitude through $10^0$ N latitude before moving to $25^0$ W longitude at the equator). At the 1982 meeting, the TAC was increased to 2,660 mt ww, to be split proportionately between the relevant Contracting Parties. This level was maintained through 1991. Also at the 1982 meeting, ICCAT recommended that there be no directed fishery on bluefin tuna spawning stocks in the western Atlantic in spawning areas such as the Gulf of Mexico.

By the late 1980s, high ex-vessel prices and the increased importance of the Japanese market had blurred the distinction between the commercial and recreational fisheries for bluefin tuna and much of the traditionally recreational catch for medium and giant bluefin tuna was being sold for shipment to Japan. In 1992, NMFS responded by banning the sale of school, large school, and small medium bluefin tuna (27 inches to less than 73 inches curved fork length).

At the 1991 meeting, ICCAT recommended additional measures to prevent further declines in the western Atlantic bluefin tuna stock, including a ten percent reduction in the total allowable catch. In 1993, the western Atlantic bluefin tuna quota was reduced further from 2,394 mt ww to 1,995 mt ww in 1994 and 1,200 mt ww in 1995. At the 1991 meeting, the United States was allocated 693 mt ww per year for both 1993 and 1994. This 1991 recommendation also increased the minimum size to 30 kg (66 lb) or 115 cm (45 in) fork length with a tolerance level of eight percent. Fishermen who caught fish smaller than this size were encouraged to tag and release them.

In 1992, NMFS established base quotas for each permit category in the bluefin tuna fishery based upon the historical share of catch in each of these categories during the period 1983 to 1991. These quotas were used in 1992, 1993, and 1994, with overharvests and underharvests added and subtracted as required by ICCAT, as well as some inseason transfers. At the 1992 ICCAT meeting, ICCAT recommended that by September 1, 1993, all bluefin tuna imports into a Contracting Party be accompanied by an ICCAT Bluefin Tuna Statistical Document that included, among other things, the area that the fish was harvested in, the gear, and a validation by a government official of the flag state of the vessel that harvested the tuna.

The SCRS projections in 1994 indicated that the stock could support higher quota levels and still begin to rebuild, albeit more slowly. Based on the new stock assessment, ICCAT members adopted a recommendation to increase the annual bluefin tuna total allowable catch in the western Atlantic Ocean from 1,995 to 2,200 mt ww. The share allocated to the United States was set at 1,311 mt ww. This allocation reflected trends in fleet size, effort and landings by category, as well as the ICCAT recommendation which specifies that data should be collected for the broadest range of size-classes possible, given size restrictions. At the 1996 meeting, ICCAT recommended an annual western Atlantic bluefin tuna TAC of 2,354 mt ww for 1997 and 1998. The annual quota allocated to the United States for 1997 and 1998 was 1,344 mt ww.

In 1998, the Commission adopted a 20-year Rebuilding Program for the western Atlantic bluefin management area (ICCAT Ref. 98-07) aimed at rebuilding to the stock size that will produce Maximum Sustainable Yield (MSY) by 2018 with a 50 percent or greater probability. The Program states that the TAC for the west would only be adjusted from the 2,500 mt ww level adopted for 2003 – 2004 if SCRS advises that (a) a catch of 2,700 mt ww or more has a 50 percent or greater probability of rebuilding or (b) a catch of 2,300 t or less is necessary to have a 50 percent or greater probability of rebuilding. According to the Program, the MSY rebuilding target can be adjusted according to advice from SCRS. In 2002, the Commission set the annual TAC, inclusive of dead discards, for the western Atlantic management area to 2,700 mt ww, effective beginning in 2003 (ICCAT Ref. 02-07). The current U.S. share of this TAC equals 1,496 mt ww inclusive of 25 mt ww for pelagic longline incidental catch in the Northeast Distant Statistical Reporting area and an allowance for dead discards of an additional 68 mt ww. If there are dead discards in excess of this allowance, they must be counted against the following year's quota. If there are fewer dead discards, then half of the underharvest may be added to the following year's quota while the other half is conserved. The recommendation also allowed four years to balance the eight percent tolerance for bluefin tuna under 115 cm (young school and school bluefin tuna).

*Bigeye Tuna*

ICCAT adopted a minimum size of 3.2 kg (7 lb) with a 15 percent tolerance level for undersized bigeye tuna in 1979. In 1995, noting the large increases in longline and purse seine catches of bigeye tuna and the large number of undersized fish, ICCAT urged countries to reduce catches below MSY and reduce catches of undersized fish. ICCAT also asked countries that had equatorial fisheries catching undersized fish to place observers on the vessels and allow SCRS to study the data. In 1997, ICCAT issued two resolutions to limit the catch of larger vessels in the Atlantic and the catch of countries that caught more than an average of 200 mt ww between 1992 and 1996 and to collect information on the larger vessels in the fleet (those greater than 80 GRT).

Large numbers of undersized fish are still harvested by the surface fleets operating near the equator. SCRS estimates that approximately 70 percent by number of bigeye tuna landed are smaller than the minimum size, well in excess of the 15 percent tolerance. Total Atlantic bigeye tuna catch has increased substantially since 1990. ICCAT has not recommended Atlantic-wide quotas for bigeye tuna. However, in 1998, ICCAT adopted two new management recommendations that are designed to limit effort in commercial fisheries for bigeye tuna throughout the Atlantic. ICCAT also adopted a resolution in 1998 that tasks SCRS with developing stock rebuilding scenarios for bigeye.

Purse seine fleets in the east Atlantic have developed a fishery that targets schools of tuna near artificial floating objects, also known as fish aggregating devices (FADs). This method of fishing has increased harvesting efficiency and contributed to excessive catch of undersized bigeye tuna. Favorable oceanographic conditions as well as the extensive use of sonar and deeper nets have also contributed to increased bigeye tuna harvest in recent years. In 1998, ICCAT established a mandatory time/area closure for purse seiners using fish aggregating devices in equatorial waters.

*Albacore Tuna*

Although albacore tuna harvests in the north Atlantic have declined since 1970, catch and effort in newer surface fisheries have increased since 1987. In 1997, SCRS determined that North Atlantic albacore tuna was at or near a level of full exploitation. In 1998, ICCAT adopted a recommendation to limit fishing capacity to the number of vessels in the directed albacore tuna fishery during the years of 1993 to 1995 and for countries to submit a list of vessels fishing for northern albacore. In 2003, ICCAT recommended a TAC of 34,500 mt ww for 2004, 2005, and 2006, of which the United States is allocated 607 mt ww per year.

ICCAT began managing southern Albacore when, in 1994, the SCRS found that catches of southern Albacore exceeded MSY. At this time, ICCAT recommended that countries limit the catch to 90 percent of previous levels. In 1996, ICCAT recommended a 22,000 mt ww quota for all countries fishing below 5º N latitude with the goal of achieving MSY by 2005. In 1998, this TAC was increased to 28,200 mt ww. In 2003, SCRS determined that southern albacore is not overexploited at current fishing levels. Thus, SCRS recommended that the TAC be 29,200 mt ww.

*Yellowfin Tuna*

Since the early 1970s, ICCAT has expressed concern over the high proportion of juvenile yellowfin tuna that are landed. In 1972, ICCAT passed a recommendation that prohibited the landing of yellowfin tuna less than 3.2 kg (7 lb). This recommendation also included an allowed 15 percent tolerance level on this minimum size. In 1995, an estimated 50 percent by number of yellowfin tuna landed were less than the minimum size. As in the bigeye tuna fisheries, these high catches of juveniles are largely a result of the use of FADs.

Atlantic yellowfin tuna landings reached a record high in 1990, primarily due to increased landings in the east Atlantic. Since 1990, catches across the Atlantic have declined somewhat and then remained stable. In 1993, ICCAT recommended that there be no increase in the level of effective fishing effort over 1992 levels.

*Skipjack Tuna*

The stock structure of Atlantic skipjack tuna is uncertain; separate management units are maintained in the eastern and western Atlantic. Skipjack tuna fisheries have changed significantly since 1991, with the introduction of fishing on floating objects and the expansion of the purse seine fishery towards the western Atlantic and closer to the equator. SCRS has noted that additional research on skipjack tuna is needed. At this time, there are no ICCAT recommendations or resolutions specific to skipjack tunas.

*All Tunas*

In April 1999, NMFS published the Final Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (1999 FMP). This was the first FMP for Atlantic tunas. Some of the specific tuna management measures included:

- Prohibition of pelagic driftnets for tunas;
- Implementation of the BFT ICCAT Rebuilding Program;
- Establishment of category-specific percent BFT quota allocations;
- Implementation of a Cap on the Purse Seine category of 250 mt ww for BFT (later rescinded);
- Time/area closure in Mid-Atlantic to reduce bluefin tuna dead discards;
- Establishment of the foundation for developing an international 10-year rebuilding program for bigeye tuna;
- Establishment of a recreational retention limit of three yellowfin tuna per person per day; and
- Establishment a fishing year of June 1 to the following May 31.

### 3.1.1.2 Pre-1999 Atlantic Swordfish Fishery and Management

Unless otherwise specified, the following paragraphs regarding the early history of the swordfish fishery summarize information found in the Source Document to the 1985 Atlantic Swordfish Fishery Management Plan (SAFMC, 1985a). The summary of more recent history is a combination of information from the 1999 Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks and various ICCAT recommendations.

The recreational fishery for swordfish has existed since the 1920s when the fish were taken mainly by handline trailing a baited hook or occasionally by rod and reel or harpoon. This early fishery was located from Massachusetts to New York and, because it relied on locating the fish and enticing it to strike, occurred mainly during the day. Occasionally, an angler fishing for billfish in the Mid-Atlantic Bight would catch a swordfish.

In the 1970s, a recreational rod and reel fishery developed in Florida. This fishery borrowed techniques from longline fishermen and drifted the bait below the surface at night. Prior to the development of this fishery, fewer than 2,000 swordfish were estimated caught by all recreational fishermen over time in aggregate. In 1976, approximately 25 – 30 swordfish were taken off of Florida by rod and reel. By 1977, approximately 400 to 500 swordfish were taken. In 1978, swordfish tournaments were held in Florida, South Carolina, and New Jersey (the first ones ever for South Carolina and New Jersey) using this new technique. Due to a loss of interest by anglers and a relatively poor fishing year in 1979, there was a decrease in recreational effort in the early 1980s. In 1981 and 1982, only 86 and 53 swordfish were reported captured.

The commercial fishery began as a harpoon fishery between New York and Canada. In the 1960s, longline gear was introduced. This new gear expanded the range of the fishery down to the Gulf of Mexico and dramatically increased the amount of fish caught from approximately 2,800 mt ww in 1960 to 8,800 mt ww in 1963. Landings stabilized in the 1970s at around 5,000 mt ww.

In 1971, the U.S. Food and Drug Administration prohibited the sale of swordfish with more than 0.5 parts per million (ppm) tissue mercury content, leading to decreased landings of swordfish worldwide. In 1978, the permissible level of mercury was raised to 1.0 ppm, which rejuvenated the commercial fishery and landings increased as a result.

In the early years, there were essentially four primary components to the commercial swordfish fleet. There were approximately 25 vessels that used harpoons and spotter aircraft to catch swordfish in northern waters during the summer months. These vessels also participated in other fisheries because of the seasonal nature of the fishery. A mobile New England pelagic longline vessel component was comprised of vessels greater than 50 feet in length, and fished the Florida Straits primarily in winter and spring. Florida longline vessels, approximately 35 – 50 feet in length, fished mainly between Miami and Cape Canaveral and on the west coast of Florida. There were also Cuban-American vessels, usually between 25 to 40 feet in length, which fished between Key West and Miami. The harpoon fishery usually took female swordfish greater than 200 lb. The longline fleet usually took a mixture of male and female fish weighing between 10 and 300 lb.

By the early 1980s, the early styles of longline gear had been replaced by monofilament style gear. Additionally, the components of the fishery had changed. The larger New England vessels were still highly mobile and were now fishing from the Gulf of Mexico to the Florida Keys. The smaller Florida vessels became more mobile and began expanding into the Carolinas and the Mid-Atlantic area. Smaller vessels began to operate up and down the coast and even ventured into the edge of the Grand Banks. Many of these fishermen were either part-time swordfish fishermen who supplemented their income with charterboat fishing or full-time commercial fishermen who also fished for snappers, groupers, tilefish, and tunas.

From the late 1970s until the Atlantic swordfish FMP was approved in 1985, Federal management of swordfish was accomplished through the Preliminary Fishery Management Plan for Atlantic Billfishes and Sharks. This Preliminary FMP (43 FR 3818, January 27, 1978) was prepared by the Department of Commerce and established a number of requirements for foreign vessels fishing within the Atlantic fishery conservation zone (see section 1.1.2 for additional detail on the Preliminary FMP). Starting in June 1984, all vessels intending to catch swordfish by methods other than rod and reel were required to obtain a permit from NMFS Southeast Regional Office. By January 1985, 340 permit applications had been received (SAFMC, 1985b).

The Atlantic Swordfish FMP (February 1985) was prepared by the South Atlantic Fishery Management Council (SAFMC) in cooperation with the Caribbean Fishery Management Council (CFMC), the Gulf of Mexico Fishery Management Council (GMFMC), the Mid-Atlantic Fishery Management Council (MAFMC), and the New England Fishery Management Council (NEFMC). The final rule implementing the FMP published on August 22, 1985 (50 FR 33952; correction notice 50 FR 35563, September 3, 1985). This plan separated the swordfish fishery from the billfish fishery because, by this time, virtually all swordfish were taken commercially with longline or harpoon gear, while the majority of billfish were taken recreationally with rod and reel. However, it should be noted that there was a rapidly expanding market for marlin with increasing commercial landings from the late 1970s until the implementation of the Atlantic Billfish Fishery Management Plan in 1988. In the mid-1980s, Atlantic swordfish were considered to be in or near a state of growth overfishing.[1] The plan specified the following five management objectives (SAFMC, 1985b):

1. Maintain high landings in the form of the larger fish that are preferred in the market by controlling (reducing) the harvest of smaller swordfish.
2. Prevent or reduce growth overfishing to create a buffer against possible recruitment overfishing. This was to be done by maintaining a sufficient number of larger fish by controlling the harvest of smaller fish.
3. Obtain scientific information to continually monitor and refine the management of the swordfish fishery by an onboard technician program on a sample number of commercial boats.
4. Monitor and mitigate user group conflicts using the onboard technician program.

[1] Growth overfishing occurs when excessive numbers of small fish are harvested from a stock, thereby preventing growth to the size at which the maximum yield-per-recruit would be obtained from the stock.

5. Minimize the impacts of foreign fishing on the domestic U.S. swordfish fishery by minimizing the swordfish bycatch of foreign longliners and squid trawls consistent with the requirement to allow opportunities to harvest tuna or catch squid under a Governing International Fisheries Agreement.

Some of the management measures implemented in the Swordfish FMP were: variable season closures to control landings of small swordfish; requiring all commercially-caught swordfish to be landed whole or as carcasses; gear restrictions for closed areas; restrictions to foreign fishing for tuna longliners and squid trawlers; commercial permit requirement; observer or technician requirements; and reporting requirements for vessels in Puerto Rico or the U.S. Virgin Islands. In September 1986, NMFS published a notice stating that the variable season closures would not be implemented (51 FR 31151, September 2, 1986). In August 1990, a final rule published requiring mandatory dealer reporting (55 FR 35643, August 31, 1990).

In November 1990, ICCAT adopted its first Atlantic swordfish recommendation. This recommendation required members to reduce fishing mortality on fish weighing more than 25 kg (55 lb) by 15 percent from 1988 fishing levels and to prohibit the landing of swordfish less than 25 kg with a 15 percent tolerance level. NMFS implemented this recommendation with an emergency rule (56 FR 26934, June 12, 1991) and later a final rule (56 FR 65007; December 13, 1991).

At its 1994 meeting, ICCAT established specific TAC levels for nations fishing for both North and South Atlantic swordfish stocks (the United States was allocated 3,970 mt ww and 3,500 mt ww for 1995 and 1996, respectively). At the 1995 meeting, ICCAT adopted recommendations that allowed nations to maintain the existing minimum size for swordfish with a 15 percent tolerance of smaller fish or alternatively to abide by a smaller minimum size (119 cm or equivalent weight) with no tolerance. ICCAT also adjusted the percentages each country received of the total allowable catch levels for North Atlantic swordfish, and established measures to account for over- and underharvests. Under the 1995 recommendation, the United States receives 29 percent of the available total allowable quota. From 1995 to 1999, NMFS modified the existing U.S. quotas for Atlantic swordfish based on these recommendations and a 1996 recommendation that established the TAC at 11,300, 11,000, and 10,700 mt ww in 1997, 1998, and 1999, respectively (the United States' allocation was 3,277, 3,190, and 3,103 mt ww in 1997, 1998, and 1999, respectively).

In 1999, NMFS implemented a number of regulations that affected swordfish fishermen, including a prohibition on the use of driftnets in the swordfish fishery, and regulations to aid in tracking swordfish trade including dealer permitting and reporting for all swordfish importers, a documentation scheme that indicated the country of origin and flag of the vessel, and a prohibition on importing swordfish less than the minimum size. These regulations were codified in the first quarter of 1999. In April 1999, NMFS published the 1999 FMP. This FMP replaced the 1985 Swordfish FMP that had been drafted by the Fishery Management Councils. The 1999 FMP maintained a number of the management measures from the previous FMP including reporting requirements, annual quotas, authorized gear, and the minimum size. However, the 1999 FMP also called for the United States to negotiate an international rebuilding plan, required that recreational landings be counted against the U.S. portion of the ICCAT-established TAC, and implemented a limited access program for commercial vessel permits.

In November 1999, ICCAT established a 10-year rebuilding program for Atlantic swordfish. This rebuilding program reduced the North Atlantic TAC (10,600, 10,500, and 10,400 mt ww for the years 2000, 2001 and 2002, respectively; 2951 mt ww for the United States in all years), established a dead discard allowance (400 , 300, and 200 mt ww in 2000, 2001, and 2002, respectively; 80 percent to the United States; phased out by 2004; the TAC minus the allowance for dead discards is the amount that could be retained) , restated the need for data reporting, and maintained the existing minimum size limits. In 2002, noting the improvement on the stock, ICCAT increased the overall TAC slightly while simultaneously reemphasizing the need to protect juvenile swordfish.

#### 3.1.1.3 Pre-1999 Atlantic Shark Fisheries and Management

Unless otherwise specified, the main sources of the following history are the 1993 Atlantic Shark Fishery Management Plan and the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks.

Recreational fishing for Atlantic sharks occurs in Federal and state waters from New England to the Gulf of Mexico and Caribbean Sea. In the past, sharks were often called “the poor man’s marlin.” Recreational shark fishing with rod and reel is now a popular sport at all social and economic levels, largely because of accessibility to the resource. Sharks can be caught virtually anywhere in salt water, with even large specimens available in the nearshore area to surf anglers or small boaters. Most recreational shark fishing takes place from small to medium-size vessels. Mako, white, and large pelagic sharks are generally accessible only to those aboard ocean-going vessels. Recreational shark fisheries are exploited primarily by private vessels and charter/headboats although there are some shore-based fishermen active in the Florida Keys.

The commercial shark fishery has been sporadic in nature. In the early 1900s, a Pacific shark fishery supplied limited demands for fresh shark fillets and fish meal as well as a more substantial market for dried fins of soupfin sharks. In 1937, the price of soupfin shark liver skyrocketed when it was discovered to be the richest source of vitamin A available in commercial quantities. A shark fishery in the Caribbean Sea, off the coast of Florida, and in the Gulf of Mexico developed in response to this demand (Wagner, 1966). At this time, shark fishing gear included gillnets, hook and line, anchored bottom longlines, floating longlines, and benthic lines for deepwater fishing. These gear types are slightly different than the gears used today and are fully described in Wagner (1966). By 1950, the availability of synthetic vitamin A caused most shark fisheries to be abandoned (Wagner, 1966).

A small fishery for porbeagle existed in the early 1960s off the U.S. Atlantic coast involving Norwegian fishermen. Between the World Wars, Norwegians and Danes had pioneered fishing for porbeagles in the North Sea and in the region of the Shetland, Orkney, and the Faroe Islands. In the late 1940s, these fishermen caught from 1,360 to 2,720 mt yearly, with lesser amounts in the early 1950s (Rae, 1962). The subsequent scarcity of porbeagles in their fishing area forced the Norwegians to explore other grounds, and around 1960, they began fishing the Newfoundland Banks and the waters east of New York. Between 1961 and 1964, their catch increased from 1,800 to 9,300 mt, then declined to 200 mt (Casey *et al*., 1978).

The U.S. Atlantic shark fishery developed rapidly in the late 1970s due to increased demand for their meat, fins, and cartilage. At the time, sharks were perceived to be underutilized as a fishery resource. The high commercial value of shark fins led to the controversial practice of finning, or removing the valuable fins from sharks and discarding the carcass. Growing demand for shark products encouraged expansion of the commercial fishery throughout the late 1970s and the 1980s. Tuna and swordfish vessels began to retain a greater proportion of their shark incidental catch, and some directed fishery effort expanded as well. The Secretary of Commerce published the Preliminary Fishery Management Plan for Atlantic Billfish and Sharks in 1978, which noted, among other things, the need for international management regarding sharks. As catches accelerated through the 1980s, shark stocks suffered a precipitous decline. Peak commercial landings of large coastal and pelagic sharks were reported in 1989.

In 1989, the five Atlantic Fishery Management Councils asked the Secretary of Commerce to develop a Shark FMP. The Councils were concerned about the late maturity and low fecundity of sharks, the increase in fishing mortality, and the possibility of the resource being overfished. The Councils requested that the FMP cap commercial fishing effort, establish a recreational bag limit, prohibit "finning," and begin a data collection system.

In 1993, the Secretary of Commerce, through NMFS, implemented the FMP for Sharks of the Atlantic Ocean. The management measures in the 1993 FMP included:

- Establishing a fishery management unit (FMU) consisting of 39 frequently caught species of Atlantic sharks, separated into three groups for assessment and regulatory purposes (Large Coastal Sharks (LCS), Small Coastal Sharks (SCS), and pelagic sharks);
- Establishing calendar year commercial quotas for the LCS and pelagic sharks and dividing the annual quota into two equal half-year quotas that apply to the following two fishing periods – January 1 through June 30 and July 1 through December 31;
- Establishing a recreational trip limit of four sharks per vessel for LCS or pelagic shark species groups and a daily bag limit of five sharks per person for sharks in the SCS species group;
- Requiring that all sharks not taken as part of a commercial or recreational fishery be released uninjured;
- Establishing a framework procedure for adjusting commercial quotas, recreational bag limits, species size limits, management unit, fishing year, species groups, estimates of maximum sustainable yield, and permitting and reporting requirements;
- Prohibiting finning by requiring that the ratio between wet fins/dressed carcass weight not exceed five percent;
- Prohibiting the sale by recreational fishermen of sharks or shark products caught in the Economic Exclusive Zone (EEZ);

- Requiring annual commercial permits for fishermen who harvest and sell shark (meat products and fins);
- Establishing a permit eligibility requirement that the owner or operator (including charter vessel and headboat owners/operators who intend to sell their catch) must show proof that at least 50 percent of earned income has been derived from the sale of the fish or fish products or charter vessel and headboat operations or at least $20,000 from the sale of fish during one of three years preceding the permit request;
- Requiring trip reports by permitted fishermen and persons conducting shark tournaments and requiring fishermen to provide information to NMFS under the Trip Interview Program; and,
- Requiring NMFS observers on selected shark fishing vessels to document mortality of marine mammals and endangered species.

At that time, NMFS identified LCS as overfished and pelagic and SCS as fully fished. The quotas were 2,436 mt dressed weight (dw) for LCS and 580 mt dw for pelagic sharks. No quota was established for SCS. Under the rebuilding plan established in the 1993 FMP, the LCS quota was expected to increase every year up to the maximum sustainable yield estimated in the 1992 stock assessment, which was 3,787 mt dw.

A number of difficulties arose in the initial year of implementation of the Shark FMP that resulted in a short season and low ex-vessel prices. To address these problems, a commercial trip limit of 4,000 lb. for permitted vessels for LCS was implemented on December 28, 1993 (58 FR 68556), and a control date for the Atlantic shark fishery was established on February 22, 1994 (59 FR 8457). A final rule to implement additional measures authorized by the FMP published on October 18, 1994 (59 FR 52453), which:

- Clarified operation of vessels with a Federal commercial permit;
- Established the fishing year;
- Consolidated the regulations for drift gillnets;
- Required dealers to obtain a permit to purchase sharks;
- Required dealer reports;
- Established recreational bag limits;
- Established quotas for commercial landings; and
- Provided for commercial fishery closures when quotas were reached.

In 1994, under the rebuilding plan implemented in the 1993 Shark FMP, the LCS quota was increased to 2,570 mt dw. Additionally, a new stock assessment was completed in March 1994 that indicated rebuilding LCS could take as long as 30 years and suggested a more cautious approach for pelagic sharks and SCS. A final rule that capped quotas for LCS and pelagic sharks at the 1994 levels was published on May 2, 1995 (60 FR 21468).

In June 1996, NMFS convened another stock assessment to examine the status of LCS stocks. The 1996 stock assessment found no clear evidence that LCS stocks were rebuilding and concluded that "[a]nalyses indicate that recovery is more likely to occur with reductions in effective fishing mortality rate of 50 [percent] or more." In response to these results, in 1997, NMFS reduced the LCS commercial quota by 50 percent to 1,285 mt dw and the recreational retention limit to two LCS, SCS, and pelagic sharks combined per trip with an additional allowance of two Atlantic sharpnose sharks per person per trip (62 FR 16648, April 2, 1997). In this same rule, NMFS established an annual commercial quota for SCS of 1,760 mt dw and prohibited possession of five species. As a result of litigation, NMFS prepared additional economic analyses on the 1997 LCS quotas and was allowed to maintain those quotas during resolution of the case.

In June 1998, NMFS held another LCS stock assessment. The 1998 stock assessment found that LCS were overfished and would not rebuild under 1997 harvest levels. Based in part on the results of the 1998 stock assessment, in April 1999, NMFS published the 1999 FMP which included numerous measures to rebuild or prevent overfishing of Atlantic sharks in commercial and recreational fisheries. The 1999 FMP replaced the 1993 Atlantic Shark FMP. Management measures related to sharks that changed in the 1999 FMP included:

- Reducing commercial LCS and SCS quotas;
- Establishing ridgeback and non-ridgeback categories of LCS;
- Implementing a commercial minimum size for ridgeback LCS;
- Establishing blue shark, porbeagle shark, and other pelagic shark subgroups of the pelagic sharks and establishing a commercial quota for each subgroup;
- Reducing recreational retention limits for all sharks;
- Establishing a recreational minimum size for all sharks except Atlantic sharpnose;
- Expanding the list of prohibited shark species to 19 species;
- Implementing limited access in commercial fisheries;
- Establishing a shark public display quota;
- Establishing new procedures for counting dead discards and state landings of sharks after Federal fishing season closures against Federal quotas; and
- Establishing season-specific over- and underharvest adjustment procedures.

The implementing regulations were published on May 28, 1999 (64 FR 29090). However, in 1999, a court enjoined implementation of the 1999 regulations, as they related to the ongoing litigation on the 1997 quotas. Further history of this litigation and shark management is provided under Section 3.1.1.7 below. A year later, on June 12, 2000, the court issued an order clarifying that NMFS could proceed with implementation and enforcement of the 1999 prohibited species provisions (64 FR 29090, May 28, 1999).

#### 3.1.1.4 1999 Fishery Management Plan for Atlantic Tunas, Swordfish, & Sharks

As described, the 1999 FMP replaced the existing Atlantic Shark and Atlantic Swordfish FMPs, and established the first FMP for Atlantic tunas. Before the 1999 FMP, Atlantic tunas were managed only under the ATCA; after the 1999 FMP, Atlantic tunas were managed under both the Magnuson-Stevens Act and ATCA.

NMFS began working on the 1999 FMP shortly after the U.S. Congress reauthorized the Magnuson-Stevens Act in 1996. The 1996 Magnuson-Stevens Act amendments added new fishery management requirements including requiring NMFS to halt overfishing; rebuild overfished fisheries; minimize bycatch and bycatch mortality, to the extent practicable; and identify and protect essential fish habitat (EFH). These provisions were coupled with the recognition that the management of HMS requires international cooperation and that rebuilding programs must reflect traditional participation in the fisheries by U.S. fishermen, relative to foreign fleets.

Development of the 1999 HMS FMP began in September 1997 with the formation of the HMS Advisory Panel (AP). The HMS AP was established under a requirement of the Magnuson-Stevens Act, and is composed of representatives of the commercial and recreational fishing communities, conservation and academic organizations, the five regional fishery management councils involved in Atlantic HMS management, the Atlantic and Gulf coastal states, and the U.S. ICCAT Advisory Committee. The HMS AP met seven times during development of the 1999 FMP, including once during the public comment period on the draft FMP, and provided extensive comment and advice to NMFS.

In October 1997, NMFS prepared and distributed a scoping document to serve as the starting point for consideration of issues for the 1999 FMP. The scoping document described major issues in the fishery, legal requirements for management, and potential management measures that could be considered for adoption in the FMP and solicited public comment on these issues. The scoping document was the subject of 21 public hearings that were held in October and November 1997 throughout the management area. The scoping meetings allowed NMFS to gather information from participants in the fisheries, and provided a mechanism by which the public could provide input to NMFS early in the FMP development process.

In October 1998, NMFS announced in the Federal Register the availability of the draft FMP. The comment period on the draft FMP lasted from October 25, 1998, to March 12, 1999. The proposed rule that accompanied the draft FMP was published in the Federal Register on January 20, 1999. The supplemental part that related to the bluefin tuna rebuilding program published in the Federal Register on February 25, 1999. The comment period on the proposed rule and its supplement also went until March 12, 1999. Subsequent to the release of the proposed rule, NMFS held 27 public hearings in communities from Texas to Maine and the Caribbean. During the comment period, NMFS received several thousand comments from commercial and recreational fishermen, scientists, conservationists, and concerned individuals. An HMS AP meeting was held toward the end of the comment period to allow HMS AP members to view most of the comments NMFS had received on the draft FMP and accompanying proposed rule.

The 1999 FMP incorporated all existing management measures for Atlantic tuna and north Atlantic swordfish that have been issued previously under the authority of the ATCA. It also incorporated all existing management measures for north Atlantic swordfish and Atlantic sharks that had previously been issued under the authority of the Magnuson-Stevens Act. Southern Atlantic swordfish and southern Atlantic albacore tuna continue to be managed only under ATCA. In November 2004, ICCAT adopted its first recommendation for Atlantic sharks.

Some of the non-species specific management measures of the 1999 FMP included vessel monitoring systems for all pelagic longline vessels; gear and vessel marking requirements; moving pelagic longline gear after an interaction with a protected species; a requirement for charter/headboats to obtain an annual vessel permit; tournament registration for all HMS tournaments; time limits on completing a vessel logbook; and expanded observer coverage. The 1999 FMP also established the threshold levels to determine if a stock is overfished, if overfishing is occurring, or if the stock is rebuilt. Finally, the 1999 FMP identified essential fish habitat (EFH) for all Atlantic tunas, swordfish, and sharks. As part of the 1999 FMP, the regulations for all Atlantic HMS, including billfish, were consolidated into one part of the Code of Federal Regulations, 50 CFR part 635. Before then, each species had its own part. This often led to confusion and, in some cases, conflicting regulations.

#### 3.1.1.5 Post 1999 FMP

After issuance of the 1999 FMP, a number of constituents (environmental, commercial fishermen, and recreational fishermen) sued the NMFS (the Agency) over aspects of the plan, including the BFT rebuilding program, the use of vessel monitoring systems in the pelagic longline fleet, the time/area closure for the pelagic longline fleet, the pelagic shark quotas, the shark and yellowfin tuna recreational retention limits, the large and small coastal shark quotas, and the bluefin tuna purse seine allocation. The Agency received favorable court rulings, upholding its actions, in most of these cases, and resolved some matters via settlement agreements. All of the briefings and court orders are a matter of the public record.

#### 3.1.1.6 Regulatory Amendments Relating to the Pelagic Longline Fishery

In the 1999 FMP, NMFS committed to implement a closed area that would effectively protect small swordfish. NMFS began to work towards this goal shortly after the publication of the 1999 FMP. After the publication of the 1999 FMP, NMFS was sued by environmentalists who felt, among other things, that the Agency had not done enough to reduce bycatch in HMS fisheries. As a result, NMFS expanded the goal of the rule to reduce all bycatch and bycatch mortality, to the extent practicable, in the HMS pelagic longline fishery. The following objectives were developed to guide agency action for this goal:

- Maximize the reduction in finfish bycatch;
- Minimize the reduction in the target catch of swordfish and other species;
- Consider impacts on the incidental catch of other species to minimize or reduce incidental catch levels; and
- Optimize survival of bycatch and incidental catch species.

NMFS published the final rule implementing the first regulatory amendment to the 1999 FMP on August 1, 2000 (65 FR 47214), which closed three large areas (DeSoto Canyon, Florida East Coast, and Charleston Bump) and prohibited the use of live bait in the Gulf of Mexico

During the course of this rulemaking, the pelagic longline fleet exceeded the incidental take statement for sea turtles established during the Endangered Species Act (ESA) Section 7 Consultation for the 1999 FMP. That, combined with new information on sea turtles and the uncertainty regarding what the closures would mean for sea turtles, resulted in a new Biological Opinion (BiOp) (June 30, 2000) that concluded that the continuation of the pelagic longline fishery would jeopardize the continued existence of leatherback and loggerhead sea turtles. As a result of the jeopardy finding, NMFS needed to implement certain measures to reduce sea turtle bycatch in the pelagic longline fishery.

Shortly after this conclusion, NMFS decided that further analyses of observer data and additional population modeling of loggerhead sea turtles were needed to determine more precisely the impact of the pelagic longline fishery on turtles. Because of this, NMFS reinitiated consultation on the HMS fisheries on September 7, 2000. In the interim, NMFS implemented emergency regulations, based on historical data on sea turtle interactions, to reduce the short-term effects of the pelagic longline fishery on sea turtles. An emergency rule that closed a portion of the Northeast Distant Statistical Area (NED) and required dipnets and line clippers to be carried and used on pelagic longline vessels to aid in the release of any captured sea turtle published on October 13, 2000 (65 FR 60889).

NMFS issued a BiOp on June 8, 2001 (revised on June 14, 2001), that again concluded that the continued operation of the Atlantic pelagic longline fishery is likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. Accordingly, the BiOp provided a reasonable and prudent alternative (RPA) to avoid jeopardy. This BiOp concluded no jeopardy for other HMS fisheries, but did require additional management measures to reduce sea turtle takes in these fisheries. The RPA included the following elements: closing the NED area effective July 15, 2001, and conducting a research experiment in this area to reduce sea turtle bycatch and bycatch mortality in the PLL fishery; requiring gangions to be placed no closer than twice the average gangion length from the suspending floatlines effective August 1, 2001; requiring gangion lengths to be 110 percent of the length of the floatline in sets of 100 meters or less in depth effective August 1, 2001; and, requiring the use of corrodible hooks effective August 1, 2001. Also, the BiOp included a term and condition for the incidental take statement that required NMFS to issue a regulation requiring that all vessels permitted for HMS fisheries, commercial and recreational, post the sea turtle guidelines for safe handling and release following longline interactions inside the wheelhouse by September 15, 2001. The requirement that all vessels permitted for HMS fisheries post sea turtle handling and release guidelines was modified to specify only bottom and pelagic longline vessels by an August 31, 2001, memorandum from the Office of Protected Resources.

On July 13, 2001, NMFS published an emergency rule (66 FR 36711) to implement several of the BiOp requirements. NMFS published an amendment to the emergency rule to incorporate the change in requirement for the handling and release guidelines that was published in the Federal Register on September 24, 2001 (66 FR 48812).

On July 9, 2002, NMFS published the final rule (67 FR 45393) implementing measures required under the June 14, 2001, BiOp on Atlantic HMS to reduce the incidental catch and post-release mortality of sea turtles and other protected species in HMS Fisheries, with the exception of the gangion placement measure. The rule implemented the NED closure, required the length of any gangion to be 10 percent longer than the length of any floatline if the total length of any gangion plus the total length of any floatline is less than 100 meters, and prohibited vessels from having hooks on board other than corrodible, non-stainless steel hooks. In the HMS shark gillnet fishery, both the observer and vessel operator must look for whales, the vessel operator must contact NMFS if a listed whale is taken and shark gillnet fishermen must conduct net checks every 0.5 to 2 hours to look for and remove any sea turtles or marine mammals from their gear. The final rule also required all HMS bottom and pelagic longline vessels to post sea turtle handling and release guidelines in the wheelhouse. NMFS did not implement the gangion placement requirement because it appeared to result in an unchanged number of interactions with loggerhead sea turtles and an apparent increase in interactions with leatherback sea turtles.

In 2001, 2002, and 2003, NMFS in conjunction with the fishing industry conducted an experiment in the NED to see if certain gear restrictions or requirements could reduce sea turtle captures and mortality. The results of this experiment indicated that certain gear types could reduce sea turtle interactions and mortality and that certain methods of handling and releasing turtles could further reduce mortality. For example, using 16/0 non-offset or 18/0 offset hooks of at least 10 degrees could reduce leatherback and loggerhead sea turtle interactions by approximately 50 and 0 percent, respectively. Using 18/0 hooks flat or offset up to 10 degrees could reduce leatherback and loggerhead sea turtle interactions by approximately 50 and 65 percent, respectively. NMFS is currently, in conjunction with the fishing industry, conducting additional experiments to verify these results throughout the fishery. Additionally, NMFS is working to export these results to other countries to reduce sea turtle interactions and mortality throughout the Atlantic and Pacific Oceans.

On November 28, 2003, based on the conclusion of this experiment and based on preliminary data that indicated that the Atlantic pelagic longline fishery may have exceeded the ITS in the June 14, 2001 BiOp, NMFS published a Notice of Intent (NOI) to prepare a Supplemental Environmental Impact Statement (SEIS) to assess the potential effects on the human environment of proposed alternatives and actions under a proposed rule to reduce sea turtle bycatch (68 FR 66783).

In January 2004, NMFS reinitiated consultation after receiving data that indicated the Atlantic pelagic longline fishery exceeded the incidental take statement for leatherback sea turtles in 2001 – 2002 and for loggerhead sea turtles in 2002. In the spring of 2004, NMFS released a proposed rule that would require fishermen to use certain hook and bait types and take other measures to reduce sea turtle takes and mortality. The resulting June 1, 2004, BiOp considered these measures and concluded that the pelagic longline fishery was not likely to jeopardize the continued existence of loggerhead sea turtles, but was still likely to jeopardize the continued existence of leatherback sea turtles. NMFS published a final rule implementing many gear and bait restrictions and requiring certain handling and release tools and methods on July 6, 2004 (69 FR 40734). NMFS also published an Advance Notice of Proposed Rulemaking to receive comments on how to further reduce sea turtle mortality (69 FR 49858, August 12, 2004), held several workshops to demonstrate sea turtle release equipment and techniques (69 FR 44513), and released revised sea turtle handling and release placards, protocols, and a video. The placards, protocols, and video are available in English, Spanish, and Vietnamese. NMFS continues to monitor the sea turtle takes in the pelagic longline fishery and may need to take further action if sea turtle takes do not remain below the levels specified in the June 2004 BiOp.

#### 3.1.1.7 Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks

As noted under Section 3.1.1.3, in 1999, a court enjoined the Agency from implementing many of the shark-specific regulations in the 1999 FMP. In 2000, the injunction was lifted when a settlement agreement was entered to resolve the 1997 and 1999 lawsuits. The settlement agreement required, among other things, an independent (*i.e.*, non-NMFS) review of the 1998 LCS stock assessment. The settlement agreement did not address any regulations affecting the pelagic shark, prohibited species, or recreational shark fisheries. Once the injunction was lifted, on January 1, 2001, the pelagic shark quotas adopted in the 1999 HMS FMP were implemented (66 FR 55). Additionally, on March 6, 2001, NMFS published an emergency rule implementing the settlement agreement (66 FR 13441). This emergency rule expired on September 4, 2001, and established the LCS and SCS commercial quotas at 1997 levels.

In late 2001, the Agency received the results of the peer review of the 1998 LCS stock assessment. These peer reviews found that the 1998 LCS stock assessment was not the best available science for LCS. Taking into consideration the settlement agreement, the results of the peer reviews of the 1998 LCS stock assessment, current catch rates, and the best available scientific information (not including the 1998 stock assessment projections), NMFS implemented another emergency rule for the 2002 fishing year that suspended certain measures under the 1999 regulations pending completion of new LCS and SCS stock assessments and a peer review of the new LCS stock assessment (66 FR 67118, December 28, 2001; extended 67 FR 37354, May 29, 2002). Specifically, NMFS maintained the 1997 LCS commercial quota (1,285 mt dw), maintained the 1997 SCS commercial quota (1,760 mt dw), suspended the commercial ridgeback LCS minimum size, suspended counting dead discards and state landings after a Federal closure against the quota, and replaced season-specific quota accounting methods with subsequent-season quota accounting methods. That emergency rule expired on December 30, 2002.

On May 8, 2002, NMFS announced the availability of a SCS stock assessment (67 FR 30879). The Mote Marine Laboratory and the University of Florida provided NMFS with another SCS assessment in August 2002. Both of these stock assessments indicate that overfishing is occurring on finetooth sharks while the three other species in the SCS complex (Atlantic sharpnose, bonnethead, and blacknose) are not overfished and overfishing is not occurring. On October 17, 2002, NMFS announced the availability of the 2002 LCS stock assessment and the workshop meeting report (67 FR 64098). The results of this stock assessment indicate that the LCS complex is still overfished and overfishing is occurring. Additionally, the 2002 LCS stock assessment found that sandbar sharks are no longer overfished but that overfishing is still occurring and that blacktip sharks are rebuilt and overfishing is not occurring.

Based on the results of both the 2002 SCS and LCS stock assessments, NMFS implemented an emergency rule to ensure that the commercial management measures in place for the 2003 fishing year were based on the best available science (67 FR 78990, December 27, 2002; extended 68 FR 31987, May 29, 2003). Specifically, the emergency rule implemented the LCS ridgeback/non-ridgeback split, set the LCS and SCS quotas based on the results of stock assessments, suspended the commercial ridgeback LCS minimum size, and allowed both the season-specific quota adjustments and the counting of all mortality measures to go into place.

In December 2003, NMFS implemented the regulations in Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (68 FR 74746). These regulations were based on the 2002 small and large coastal shark stock assessments. Some of the measures taken in Amendment 1 included revising the rebuilding timeframe for LCS; re-aggregating the LCS complex; establishing a method of changing the quota based on maximum sustainable yield (MSY); updating some shark EFH identifications; modifying the quotas, seasons, and regions; adjusting the recreational bag limit; establishing criteria to add or remove species to the prohibited shark list; establishing gear restrictions to reduce bycatch and bycatch mortality; establishing a time/area closure off of North Carolina for bottom longline fishermen; and establishing VMS requirements for bottom longline and gillnet fishermen.

#### 3.1.1.8 Other Post-1999 FMP Regulations for Atlantic Tunas, Swordfish, and Sharks

Since the 1999 FMP, there have been a number of other regulatory actions in addition to the rules mentioned above. Below is a short list of some of these actions.

- <u>Removal of the bluefin tuna purse seine category cap</u>: In the 1999 FMP, NMFS finalized an alternative that would have capped the quota for vessels in the purse seine category at 250 mt ww. On November 1, 1999, NMFS published a final rule that removed the purse seine category quota cap (64 FR 58793). In that rule, the purse seine category was given 18.6 percent of the total landings quota available to the United States.

- <u>Change to bluefin tuna incidental category catch limits</u>: In May 2003 (68 FR 32414), NMFS modified the target catch requirements for vessels participating in the Atlantic Tunas Longline category such that pelagic longline vessels would have to land 2,000 lb. of other fish in order to land one bluefin tuna on a trip, 6,000 lb. of other fish in order to land two bluefin tuna on a trip, and 30,000 lb. of other fish to land three bluefin tuna. The rule was designed to reduce the discards of bluefin tuna. This change in the target catch requirements applies to all fishing areas. This rule also maintained separate quotas for the seasonal fisheries, adjusted the Longline category North/South division line to 31°00’ N. latitude and adjust the Longline category subquotas to allocate 60 percent to the southern area and 40 percent to the northern area.
- <u>Bluefin tuna amendment</u>: On December 24 , 2003 (68 FR 74504), NMFS published a final rule that changed the opening date of the Purse seine category, established closure dates of the Harpoon and General categories, and set size tolerances of large medium BFT for the Purse seine and Harpoon categories.

- Recreational permits and reporting requirements: On December 18, 2002 (67 FR 77434), NMFS published a final rule requiring all vessel owners fishing recreationally (*i.e.*, no sale) for Atlantic HMS, including billfish, to obtain an Atlantic HMS recreational angling category permit. On January 7, 2003 (68 FR 711), a final rule establishing a mandatory reporting system for all non-tournament recreational landings of Atlantic marlins, sailfish, and swordfish was published. These requirements became effective in March 2003.
- International trade permit: On November 17, 2004, NMFS published a final rule that implements the recommendations of ICCAT and the Inter-American Tropical Tuna Commission (IATTC) for bluefin tuna, swordfish, and bigeye tuna (69 FR 67268). The rule requires all importers and exporters, regardless of ocean basin, of bluefin tuna, swordfish, and bigeye tuna to obtain an HMS International Trade Permit on an annual basis, report imports and exports on species-specific statistical documents and re-export certificates, and submit biweekly activity reports to NMFS. The rule is effective on July 1, 2005.
- Import restrictions: Due to compliance concerns, ICCAT has recommended numerous import restrictions on countries that have not shown that they are complying with ICCAT recommendations. Over the years, the countries and species that have import restrictions placed on them have changed. As of July 2, 2005, bigeye tuna from Bolivia or Georgia will not be allowed to be imported into the United States (May 17, 2005, 70 FR 28218). Additionally, ICCAT established "positive" and "negative" lists. These lists outline all the vessels that have permits and do not conduct IUU fishing (positive list) and those vessels that are not permitted and have conducted IUU fishing in the past (negative list). Fish that were caught on vessels that are not on the positive list or that are on the negative list cannot be imported into the United States (December 6, 2004, 69 FR 70396).
- Quota adjustments: Based on various ICCAT recommendations, NMFS has adjusted the quotas for North and South Atlantic swordfish (69 FR 68090, November 23, 2004) and Atlantic bluefin tuna.
- 
- National Plan of Action for the Conservation and Management Of Sharks: On February 15, 2001, NMFS released the final National Plan of Action (NPOA) for the Conservation and Management of Sharks (66 FR 10484). The NPOA was developed pursuant to the endorsement of the International Plan of Action (IPOA) by the United Nations' Food and Agriculture Organization Committee on Fisheries Ministerial Meeting in February 1999. The overall objective of the IPOA is to ensure conservation and management of sharks and their long-term sustainable use. The final NPOA, consistent with the Magnuson-Stevens Act, requires NMFS and the Regional Fishery Management Councils to undertake extensive data collection, analysis, and management measures in order to ensure the long-term sustainability of U.S. shark fisheries. The NPOA also encourages Interstate Marine Fisheries Commissions and State agencies to initiate or expand current data collection, analysis, and management measures and to implement regulations consistent with federal regulations, as needed. For additional information on the U.S. NPOA and its implementation, see http://www.nmfs.noaa.gov.
- Shark Finning Prohibition Act: On December 21, 2000, President Clinton signed the Shark Finning Prohibition Act into law (Public Law 106-557). This amended the

Magnuson-Stevens Fishery Conservation and Management Act to prohibit any person under U.S. jurisdiction from (i) engaging in the finning of sharks; (ii) possessing shark fins aboard a fishing vessel without the corresponding carcass; and (iii) landing shark fins without the corresponding carcass. NMFS published final regulations on February 11, 2002 (67 FR 6194). These regulations prohibit the finning of sharks, possession of sharks without the corresponding carcasses, and landings of shark carcasses without the corresponding carcasses in U.S. fisheries in the exclusive economic zone and on the high seas.

Other regulatory actions that have been taken including opening and closing of fisheries and adjustments to quota allocations. All of these actions are not listed here but can be found by searching the Federal Register webpage at http://www.gpoaccess.gov/fr/index.html or by reviewing the annual HMS SAFE reports (http://www.nmfs.noaa.gov/sfa/hms).

### 3.1.2 History of Atlantic Billfish Fishery Management

Atlantic billfish managed by NMFS are Atlantic blue marlin (*Makaira nigricans*), white marlin (*Tetrapturus albidus*), sailfish (*Istiophorus platypterus*), and longbill spearfish *(Tetrapturus pfluegeri)*. Atlantic billfish management strategies have been guided by international and domestic considerations and mechanisms since the 1970s.

#### 3.1.2.1 Preliminary Fishery Management Plan (PMP) for Atlantic Billfish and Sharks

Domestic management of Atlantic billfish resources has been developed, modified, and implemented in three primary stages and through a series of other rulemakings. In January 1978, NMFS published the Preliminary Fishery Management Plan (PMP) for Atlantic Billfish and Sharks (43 FR 3818), which was supported by an EIS (42 FR 57716). This PMP was a Secretarial effort. The management measures contained in the plan were designed to:

1. minimize conflict between domestic and foreign users of billfish and shark resources;
2. encourage development of an international management regime; and
3. maintain availability of billfishes and sharks to the expanding U.S. fisheries.

Primary management measures in the Atlantic Billfish and Shark PMP included:

- Mandatory data reporting requirements for foreign vessels;
- A prohibition on the foreign commercial retention of all billfishes caught within the Fishery Conservation Zone (FCZ) of the United States and stipulated release in a manner that will maximize the probability of survival;
- A hard cap on the catch of sharks by foreign vessels, which when achieved would prohibit further landings of sharks by foreign vessels;
- Permit requirements for foreign vessels to fish in the FCZ of the United States;
- Radio checks by foreign vessels upon entering and leaving the FCZ;

- Boarding and inspection privileges for U.S. observers; and
- Prohibition on intentional discarding of fishing gears by foreign fishing vessels within the FCZ that may pose environmental or navigational hazards.

#### 3.1.2.2 The Fishery Management Plan for the Atlantic Billfishes

Building upon the PMP for Atlantic Billfish and Sharks was the Fishery Management Plan for the Atlantic Billfishes (53 FR 21501). This plan was jointly developed by five Atlantic regional councils (Caribbean, Gulf, South Atlantic, Mid-Atlantic, New England) and implemented in October 1988 (53 FR 37765). The 1988 FMP defined the Atlantic billfish management unit to include sailfish from the western Atlantic Ocean, white marlin and blue marlin from the North Atlantic Ocean, and longbill spearfish from the entire Atlantic Ocean; described objectives for the Atlantic billfish fishery; and established management measures to achieve those objectives. The objectives identified in the Billfish FMP were to:

1. Maintain the highest availability of billfishes to the U.S. recreational fishery by implementing conservation measures that will reduce fishing mortality;
2. Optimize the social and economic benefits to the nation by reserving the billfish resource for its traditional use, which in the continental United States is almost entirely a recreational fishery; and
3. Increase understanding of the condition of billfish stocks and the billfish fishery.

The primary management measures adopted to achieve the stated objectives of the 1988 Billfish FMP included:

- Defining OY in qualitative terms;
- A prohibition on the sale of Atlantic billfish, with an exemption for small-scale handline (artisanal) fishery in Puerto Rico;
- Establishment of minimum sizes for Atlantic billfish;
- A prohibition on possession of Atlantic billfish by commercial longline and drift net vessels; and
- Establishment of data reporting requirements.

As previously mentioned, passage of the 1996 Magnuson-Stevens Act initiated fundamental changes in U.S. fishery management policy, shifting emphasis to precautionary management strategies. In September 1997, NMFS listed fishery resources considered to be overfished, which included Atlantic blue and white marlin. This action triggered a suite of management requirements, including development of a rebuilding plan for overfished stocks, and reduction in bycatch and bycatch mortality. Further, in 1998, western Atlantic sailfish was added to the list of overfished species. In the international arena, ICCAT made its first-ever binding recommendation for Atlantic blue and white marlin in 1997. ICCAT Recommendation 97-09 required landing reductions of at least 25 percent from 1996 levels by the end of 1999. Improvements in data and monitoring were also included in this recommendation.

#### 3.1.2.3 Interim Rules

On March 24, 1998, NMFS published an interim rule (63 FR 14030) under section 305(c) of the Magnuson-Stevens Act, that increased the minimum size limits for Atlantic blue marlin and Atlantic white marlin to 96 inches lower jaw-fork length (LJFL) and 66 inches LJFL, respectively, and required tournament operators to notify NMFS of tournaments involving any Atlantic billfish at least four weeks prior to commencement. NMFS utilized the increases in size limits to immediately reduce overfishing, and to implement the 1997 ICCAT recommendation, as required by the ATCA. NMFS published an extension and amendment of the interim rule on September 29, 1998 (63 FR 51859), that:

- Further increased the minimum size for Atlantic blue marlin to 99 inches LJFL;
- Restated the minimum size for Atlantic white marlin as 66 inches LJFL;
- Established a recreational bag limit of one Atlantic marlin (blue or white marlin) per vessel per trip;
- Granted the Assistant Administrator for Fisheries (AA) the authority to adjust the bag limit, with a three-day notice, including adjustment to a zero bag limit, if necessary to meet international and domestic management objectives; and
- Continued requirements to notify NMFS of tournaments involving any Atlantic billfish at least 4 weeks prior to commencement. NMFS amended the interim rule on November 13, 1998 (63 FR 63421) by removing the adjustable bag limit provision.

Internationally, ICCAT adopted its second binding recommendation regarding billfish in November 1998. ICCAT Recommendation 98-10 built upon the previously discussed ICCAT Recommendation 97-09 by limiting landings of Atlantic blue and white marlin in the year 2000 to no more than levels required to be achieved by the end of 1999.

#### 3.1.2.4 Amendment One to the Atlantic Billfish Fishery Management Plan

In response to Magnuson-Stevens Act requirements, and concurrent with efforts on the interim rule discussed above, NMFS prepared Amendment One to the Atlantic Billfish Fishery Management Plan and published final regulations on May 28, 1999 (64 FR 29090). Amendment One maintained the objectives of the original 1988 Billfish FMP and identified the following additional objectives. As described in Chapter 1, this document consolidates these objectives with the objectives of the 1999 Atlantic Tunas, Swordfish, and Sharks FMP.

1. Prevent and/or end overfishing of Atlantic billfish and adopt the precautionary approach to fishery management;
2. Rebuild overfished Atlantic billfish stocks, and monitor and control all components of fishing mortality, both directed and incidental, so as to ensure the long term sustainability of the stocks and promote Atlantic-wide stock recovery to the level where MSY can be supported on a continuing basis;
3. Establish a foundation for the adoption of comparable international conservation and management measures, through international entities such as ICCAT, to rebuild

overfished fisheries and to promote achievement of optimum yield for these species throughout their range, both within and beyond the EEZ;

4. Minimize, to the extent practicable, release mortality in the directed billfish fishery, and minimize, to the extend practicable, bycatch and discard mortality of billfish on gears used in other fisheries;
5. Better coordinate domestic conservation and management of the fisheries for Atlantic tunas, swordfish, sharks, and billfish, considering the multispecies nature of many highly migratory species (HMS) fisheries, overlapping regional and individual participation, international management concerns, and other relevant factors;
6. Provide the data necessary for assessing the fish stocks and managing the fisheries, including addressing inadequacies in collection and ongoing collection of social, economic, and bycatch data on Atlantic billfish fisheries;
7. Coordinate domestic regulations and ICCAT conservation measures for controlling Atlantic-wide fishing mortality;
8. Consistent with other objectives of the amendment, manage Atlantic billfish fisheries for the continuing OY, so as to provide the greatest overall benefit to the Nation, particularly with respect to recreational opportunities and taking into account the protection of marine ecosystems. Optimum yield is the maximum sustainable yield from the fishery, as reduced by any relevant social, economic, or ecological factors;
9. Minimize adverse social and economic effects on recreational and commercial activities to the extent practicable, consistent with ensuring achievement of the other objectives of this plan, and with all applicable laws;
10. Maximize protection of areas identified as essential fish habitat for Atlantic billfish, particularly for critical life stages; and
11. Promote the live release of Atlantic billfish through active outreach and educational programs.

Primary management measures included:

- Adjustment of minimum size regulations for Atlantic billfish;
- A prohibition on the retention of longbill spearfish;
- Maintenance of prohibitions on commercial possession and retention;
- Allowed removal of the hook from Atlantic billfish;
- A requirement for permits and logbook reporting for charterboats targeting billfish, if selected, as part of an HMS charter/headboat system;
- Implementation of billfish tournament notification requirements;
- Implementation of a June 1 to May 31 fishing year;
- Development and implementation of outreach programs; and
- An extension of the management unit for Atlantic marlins.

#### 3.1.2.5 ICCAT 2000

ICCAT adopted additional recommendations (00-13) regarding Atlantic billfish, including an international two-phased rebuilding plan for Atlantic blue and white marlin, in November 2000. Phase I of the plan required that countries (other than the United States) capturing marlins in commercial fisheries reduce white marlin landings from pelagic longline and purse seine fisheries by 67 percent and blue marlin landings by 50 percent from 1999 levels. ICCAT adopted the marlin rebuilding strategy based on the SCRS' most recent stock assessments that indicated that marlin stocks continued to be severely overfished. ICCAT Recommendation 00-13 also recommended that the United States restrict annual landings by U.S. recreational fishermen to 250 Atlantic blue and white marlin, combined, for 2001 and 2002 (Phase I). This recommendation was subsequently extended through 2006.

#### 3.1.2.6 White Marlin Endangered Species Act (ESA) Listing Review

In September 2001, NMFS received a petition filed pursuant to ESA to list white marlin as endangered or threatened throughout its range and to designate critical habitat. After conducting a comprehensive review of the status of the species, NMFS determined in September 2002 that, while Atlantic white marlin abundance had declined from historical levels, the stock was not at a level that warranted listing under the ESA. The ESA determination specified that another stock status review would occur in 2007. Also, in 2001, the HMS and Billfish Advisory Panels (Billfish AP), a group of state representatives, regional Fishery Management Council members, commercial fishing representatives, recreational fishing representatives, academics, and environmental interest group representatives, indicated that it was necessary to improve the monitoring of recreational swordfish and Atlantic billfish landings.

#### 3.1.2.7 ICCAT 2002

In 2002, Phase 1 of the ICCAT Atlantic marlin rebuilding plan was extended through the year 2005 by adoption of ICCAT Recommendation 02-13. ICCAT amended the rebuilding program by specifying that, through 2005, the annual amount of blue marlin that can be harvested and retained by pelagic longline and purse seine vessels must be no more than 50 percent of the 1996 or 1999 landing levels, whichever is greater. For white marlin, the annual amount allowed to be harvested and retained by pelagic longline and purse seine vessels must be no more than 33 percent of the 1996 or 1999 landing levels, whichever is greater. The United States had already prohibited commercial retention of billfish since the implementation of the 1988 Atlantic Billfish FMP, so it was already compliant with this recommendation. For ICCAT members other than the United States, the plan required the release of all live marlins taken as bycatch in commercial fisheries, but provided an allowance for the landing of fish unavoidably killed, provided that they were not sold. For its part of the rebuilding program, the United States agreed to continue limiting recreational landings of Atlantic blue and white marlin to 250 fish, annually, maintain its regulations prohibiting the retention of marlins by U.S. pelagic longline vessels, and continue monitoring billfish tournaments through scientific observer coverage of at least five percent initially, with the objective of 10 percent coverage by 2002. As recorded in ICCAT compliance tables, the United States remained within its 250 marlin limit in 2001 and 2003, but exceeded the 250 fish limit in 2002. At present, the United States complies with the ICCAT observer requirements by requiring that all HMS tournaments register with NMFS, selecting all billfish tournaments for reporting their results, and assigning observers to many billfish tournaments.

#### 3.1.2.8 Recreational Permitting and Reporting Rules

A key element in complying with Phase I of the ICCAT marlin rebuilding plan and improving the monitoring of recreational billfish and swordfish landings was establishing a comprehensive monitoring program for all recreational landings of marlin, sailfish and swordfish, particularly those landed outside of fishing tournaments, which are monitored through the Recreational Billfish Survey (RBS).

In early 2002, the HMS and Billfish APs again discussed monitoring U.S. recreational billfish landings, and focused upon both a landings tag program (similar to those operating for the recreational bluefin tuna fisheries in North Carolina and Maryland) and a call-in requirement for all billfish landings.

On December 18, 2002 (67 FR 77434), NMFS published a final rule requiring all vessel owners fishing for Atlantic HMS to obtain an Atlantic HMS recreational angling category permit. On January 7, 2003 (68 FR 711), a final rule establishing a mandatory reporting system for all non-tournament recreational landings of Atlantic marlins, sailfish, and swordfish was published. These requirements became effective in March 2003. These requirements, in combination with mandatory tournament reporting, are improving the ability of the United States to accurately monitor all recreational landings of Atlantic marlins, sailfish, and swordfish, however, non-compliance by recreational anglers remains a significant issue.

#### 3.1.2.9 Proposed Rule to Codify the 250 Marlin Landing Limit

On September 17, 2003, NMFS published a proposed rule (68 FR 54410) to codify an annual landings limit of 250 Atlantic blue and white marlin combined, and to implement a provision to carry forward over- and underharvest of the Atlantic blue and white marlin landing limit into subsequent fishing years, consistent with ICCAT recommendations. To remain in compliance with the landing limit and to maximize allowable landings, NMFS proposed to increase the legal recreational minimum size of Atlantic blue and white marlin for the remainder of a fishing year when 80 percent of the landing limit was projected to be achieved. If the landing limit was attained, NMFS proposed to allow only catch-and-release fishing for these species for the remainder of the fishing year. The proposed rule was not finalized due to a need to review the methodology of calculating recreational marlin landings. The proposed rule incorporated landings as reported by the Recreational Billfish Survey (RBS), and indicated landings levels of 129 fish for 2002. Application of a new methodology (scalar expansion) resulted in the United States reporting 279 marlin to ICCAT for compliance purposes for 2002, which exceeded the annual 250 fish landings limit by 29 fish. NMFS is continuing to review various methodologies to identify the most appropriate approach for estimating recreational marlin landings. The proposed rule for this current Draft HMS FMP formally withdrew this 2003 proposed rule. Similar measures to those in the 2003 proposed rule are analyzed in Chapter 4 of this document.

#### 3.1.2.10 ICCAT 2004

At the November 2004 ICCAT meeting, the United States chose not to apply the scalar expansion methodology for compliance purposes, but rather applied a methodology (RBS + Non-Tournament Reporting System + State Landing Tags) similar, but not identical to that used in the 2001 compliance report and the September 2003 Proposed Rule. Application of this methodology resulted in the United States reporting 131 marlin to ICCAT for compliance purposes in 2004. The United States is continuing to review its methodology to quantify recreationally landed marlins. Further, a new ICCAT Recommendation (as yet unnumbered) was adopted which extended Phase I of the Marlin Rebuilding Plan and delayed the planned 2005 assessment by SCRS of blue and white marlin to 2006 on the basis of inadequate data. This action resulted in an extension of the cap of 250 blue and white marlin, combined, for U.S. recreational landings through 2006.

### 3.1.3 Summary and Update of Management Measures Taken in 2005 and Early 2006

During calendar year 2005, NMFS' HMS Management Division completed numerous actions, including the release of the Draft HMS FMP, several inseason actions and proposed and final rules, and responses to several petition for rulemakings. Each of the regulatory actions is consistent with existing HMS rebuilding plans, and is supported by a regulatory analysis, as required, of the action's socio-economic and/or ecological effects. These analyses are supplements or updates to previous environmental impact statements and regulatory impact analyses, and are found in supporting documents including but not limited to environmental assessments (EA), environmental impact statements (EIS), and/or regulatory impact reviews (RIR). As reflected in these supporting documents, which are available from NMFS upon request or on the NMFS HMS Management Division's webpage, these actions are not expected to have adverse ecological impacts on target, non-target, or protected species, but are expected overall to have positive cumulative impacts. Table 3.1 provides a list of all Federal Register notices filed during 2005 relating to specific actions taken by NMFS' HMS Management Division.

In the beginning of 2006, NMFS' HMS Management Division completed additional actions including proposing and finalizing adjustment to the U.S. swordfish annual quota, proposing and finalizing the second and third 2006 fishing seasons for the Atlantic shark fishery, proposing the annual specifications for the 2006 BFT fishery, and proposing dehooking and complementary closures for the Atlantic shark bottom longline fishery. NMFS will provide a similar table of all 2006 actions related to Atlantic HMS in the 2007 SAFE Report.

Currently, there is one active lawsuit (The Ocean Conservancy v. Evans, Civ. No. 1:04-cv-1155 (D.D.C.)) relating to an HMS management action. In the summer of 2004, environmental groups challenged the July 2004 sea turtle bycatch mitigation rule that NMFS implemented for the Atlantic pelagic longline fishery and accompanying BiOp. The judge ruled in favor of NMFS in 2005; the plaintiffs have appealed the ruling.

**Table 3.1 Summary of 2005 Federal Register Notices Related to HMS.**

| | | | Action Pub Info |
|---|---|---|---|
| Rules and Regulations<br>ID 122704C | 635 | Atlantic Highly Migratory Species; Bluefin Tuna Fisheries; Fishery reopening; quota transfer. | 1/4/2005<br>70 FR 302 |
| Notice<br>ID 020205B | | Proposed Information Collection; Comment Request; Highly Migratory Species Vessel Logbooks and Cost-Earnings Data Reports; Notice. | 2/7/2005<br>70 FR 6419 |
| Notice<br>ID 020205C | | Notice; Proposed Information Collection; Comment Request; Atlantic Highly Migratory Species Vessel and Gear Marking; Notice. | 2/7/2005<br>70 FR 6420 |
| Notice<br>ID 020105N | | Proposed Information Collection; Comment Request; Atlantic Highly Migratory Species Observer Notification Requirements; Notice. | 2/7/2005<br>70 FR 6418 |
| Notice | | Proposed Information Collection; Comment Request; Atlantic Highly Migratory Species Permit Family of Forms; Notice. | 2/17/2005<br>70 FR 8074 |
| Rules and Regulations ID 07234B<br>RIN 0648-AR86 | 635 | Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Quota Specifications, General Category Effort Controls, and Catch-and-Release Provision; Final rule. | 3/7/2005<br>70 FR 10897 |
| Proposed Rules<br>ID 021105C<br>RIN 0648-AT05 | 635 | Atlantic Highly Migratory Species; Lifting Trade Restrictive Measures; Proposed rule, request for comments, notice of public hearing. | 3/8/2005<br>70 FR 11190 |
| Proposed Rule<br>ID 020205F<br>RIN 0648-AT07 | 635 | Atlantic Highly Migratory Species; Atlantic Commercial Shark Management Measures; Proposed rule; request for comments. | 3/10/2005<br>70 FR 11922 |
| Rules and Regulations ID 030405B | 635 | Atlantic Highly Migratory Species; Bluefin Tuna Fisheries; Closure. | 3/11/2005<br>70 FR 12142 |
| Proposed Rules<br>ID 030405C<br>RIN 0648-AT01 | 635 | Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Quota Specifications and General Category Effort Controls; Proposed rule; request for comments; notice of public hearings. | 3/23/2005<br>70 FR 14630 |
| Notices<br>ID 032805A | | Highly Migratory Species; Notice of availability; request for comments. | 4/4/2005<br>70 FR 17069 |
| Rules and Regulations<br>ID020205F<br>RIN 0648-AT07 | | Atlantic Highly Migratory Species; Atlantic Commercial Shark Management Measures; Temporary rule; fishing season notification. | 4/27/2005<br>70 FR 21673 |
| Notices<br>ID 032805A | | Atlantic Highly Migratory Species; Exempted Fishing Permits, Notice. | 5/9/2005<br>70 FR 24397 |
| Proposed Rules<br>ID 020205F<br>RIN 0648-AT07 | 635 | Atlantic Highly Migratory Species; Receipt of a petition for rulemaking; request for comments. | 5/10/2005<br>70 FR 11922 |
| Final Rule<br>ID 021105C<br>RIN 0648-AT05 | 635 | Atlantic Highly Migratory Species; Lifting Trade Restrictive Measures; Final rule. | 5/17/2005<br>70 FR 28218 |
| Notices<br>ID 032805A | | Atlantic Highly Migratory Species; Notice of public workshops. | 5/20/2005<br>70 FR 29285 |

| | | | Action Pub Info |
|---|---|---|---|
| Rules and Regulations ID 030405C<br>RIN 0648-AT01 | 635 | Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Quota Specifications and General Category Effort Controls; Final rule. | 6/7/2005<br>70 FR 33033 |
| Rules and Regulations ID 052405D | 635 | Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Fisheries; Temporary rule; in season retention limit adjustment. | 6/7/2005<br>70 FR 33039 |
| Rules and Regulations ID 080405B | 635 | Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Fisheries; Temporary rule; in season retention limit adjustment. | 8/18/2005<br>70 FR 48490 |
| Proposed Rules<br>ID 051603<br>RIN 0648-AQ65 | 300<br>600<br>635 | Atlantic Highly Migratory Species; Recreational Atlantic Blue and White Marlin Landings Limit; amendments to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks and the Fishery Management Plan for Atlantic Billfish. Proposed rule; availability of the Fishery Management Plan (FMP); petition for rulemaking; proposed rule withdrawal; request for comments; public hearings. | 8/19/2005<br>70 FR 48804 |
| Notices | | Proposed Information Collection; Comment Request; Highly Migratory Species Scientific Research Permits, Exempted Fishing Permits, and Letters of Authorization; Notice. | 8/31/2005<br>70 FR 51754 |
| Proposed Rules<br>ID 051603C<br>RIN 0648-AQ65 | 635 | Atlantic Highly Migratory Species; Cancelling and changing the location and time of certain public hearings. | 9/7/2005<br>70 FR 53146 |
| Notices<br>ID 081705D | | Notice; advisory panel meetings; request for nominations. | 9/12/2005<br>70 FR 53777 |
| Notices<br>ID 090205B | | Large Coastal Shark 2005/2006 Stock Assessment Data Workshop; Notification of workshop. | 9/15/2005<br>70 FR 54537 |
| Proposed Rules<br>ID 051603C<br>RIN 0648-AQ65 | 635 | Atlantic Highly Migratory Species; Cancellation of a public hearing. | 9/23/2005<br>70 FR 55814 |
| Rules and Regulations<br>ID 091405F | 635 | Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Fisheries; Temporary rule; inseason catch limit adjustment. | 9/28/2005<br>70 FR 56595 |
| Proposed Rule<br>ID 051603C<br>RIN 0648-AQ65 | 635 | Atlantic Highly Migratory Species: Extension of comment period; rescheduling of the Joint Advisory Panel meeting. | 10/5/2005<br>70 FR 58177 |
| Proposed Rules<br>ID 090805C<br>RIN 06448-AT74 | 635 | Atlantic Highly Migratory Species; Atlantic Commercial Shark Management Measures; Proposed rule; request for comments. | 10/6/2005<br>70 FR 58366 |
| Rules and Regulations<br>ID 102505 | 635 | Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Fisheries; Temporary rule; inseason retention limit adjustment. | 11/09/2005<br>70 FR 67929 |
| Notices<br>ID 110905B | | Magnuson-Stevens Act Provisions; Atlantic Highly Migratory Species; Exempted Fishing, Scientific Research, Display, and Chartering Permits; Notice of intent to issue exempted fishing, scientific research, display, and chartering permits; request for comments. | 11/29/2005<br>70 FR 71469 |
| Rules and Regulations<br>ID 090805C<br>RIN 0648-AT74 | 635 | Atlantic Highly Migratory Species; Atlantic Commercial Shark Management Measures; Final rule; fishing season notification. | 12/1/2005<br>70 FR 72080 |

| | | | Action Pub Info |
|---|---|---|---|
| Notices | | Proposed Information Collection; Comment Request; Vessel Monitoring System for Atlantic Highly Migratory Species; Notice. | 12/6/2005<br>70 FR 72611 |
| Rules and Regulations<br>ID 112305D | 635 | Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Fisheries; Temporary rule; quota transfer. | 12/7/2005<br>70 FR 72724 |
| Proposed Rules<br>ID 040605D | 635 | Atlantic Highly Migratory Species; Commercial Shark Management Measures; Petition for rulemaking; decision. | 12/14/2005<br>70 FR 73980 |
| Rules and Regulations<br>ID 121205F | 635 | Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Fisheries; Temporary rule; inseason retention limit adjustment. | 12/16/2005<br>70 FR 74712 |
| Notices<br>ID 120505C | | Large Coastal Shark 2005/2006 Stock Assessment Workshop; Notice; Public Workshop. | 12/22/2005<br>70 FR 76031 |
| Notices<br>ID 051603C<br>RIN 0648-AQ65 | 635 | Atlantic Highly Migratory Species; Amendments to the Fishery Management Plan (FMP) for Atlantic Tunas, Swordfish, and Sharks and the FMP for Atlantic Billfish; Rescheduling and addition of public hearings. | 12/27/2005<br>70 FR 76441 |

### 3.1.4 2005 Accomplishments of the International Commission for the Conservation of Atlantic Tunas (ICCAT)

The 2005 Regular Meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT) was held November 14 – 20, 2005, in Seville, Spain. There was no new species stock assessments conducted in 2005. As such, much of the work at the 2005 Commission meeting dealt with issues such as trade and trade monitoring, compliance with existing ICCAT recommendations, bycatch, data collection, and the functioning of the Commission. For purposes of clarity, it should be understood that ICCAT recommendations are binding instruments for Contracting Parties while ICCAT resolutions are non-binding and express the will of the Commission. All ICCAT recommendations and resolutions are available on the ICCAT website at http://www.ICCAT.es.

#### 3.1.4.1 Atlantic Tunas

Despite U.S. concerns over increasing catches of juvenile yellowfin tuna, ICCAT adopted Recommendation 05-01, which repealed the longstanding 3.2 kg size limit on Atlantic yellowfin tuna, as originally established by Recommendation 72-01. The Commission also adopted Recommendation 05-02 which severely reduced the Taiwan's bigeye tuna quota in the Atlantic from 16,500 mt to 4,600 mt. This recommendation provided 3,300 mt to the directed Taiwanese bigeye tuna fleet and 1,300 mt as bycatch in the Taiwanese albacore fishery. Under this recommendation, Taiwan's directed bigeye fleet is also limited to 15 vessels and its albacore fleet is limited to 60 vessels in 2006. In addition, the measure requires Taiwan to improve monitoring and control of its fleet, to reduce overall fleet capacity in the Atlantic, and to take steps to control its business entities involved in supporting illegal, unregulated, and unreported (IUU) activities.

#### 3.1.4.2 Atlantic Sharks

ICCAT adopted Recommendation 05-05 which requires contracting parties to report on domestic implementation of *Recommendation 04-10 Concerning the Conservation of Sharks Caught in Association with Fisheries Managed by ICCAT*. For those contracting parties that had not implemented ICCAT Recommendation 04-10 at the time of the 2005 Commission meeting, Recommendation 05-05 reinforced the requirement to do so.

#### 3.1.4.3 Trade and Trade Monitoring

ICCAT adopted a number of recommendations regarding trade of HMS or tracking of trade during the 2005 Commission meeting. Recommendation 05-04 implements new requirements regarding farmed bluefin tuna including improved tracking of farmed fish for quota monitoring and trade purposes, sampling and data collection programs for assessment purposes, and other requirements to ensure the effectiveness of ICCAT conservation and management measures. To better combat IUU fishing activities, ICCAT adopted Recommendation 05-06 that establishes a program for transshipment by large-scale tuna longline fishing vessels, and procedures for transshipments that occur on the high seas and within areas of national jurisdiction. The measure establishes a record of carrier vessels authorized to receive ICCAT-managed species, and requires carrier vessels to use VMS and to have an ICCAT observer on board. It also establishes the ICCAT Regional Observer Program for placing observers on carrier vessels in the Atlantic – the first of its kind at ICCAT. The observer program will be funded by members and cooperating parties engaging in transshipment operations. The program will be operated by the ICCAT Secretariat, who is responsible for training and placement of observers.

#### 3.1.4.4 Data Compliance

ICCAT adopted Recommendation 05-09, a U.S. sponsored proposal establishing a process and procedure for reviewing compliance by ICCAT parties and cooperating parties with data submission requirements. Specifically, Recommendation 05-09 established a procedure for identifying data gaps and their causes and for developing appropriate actions to address those data problems. The measure tasks the SCRS with providing a report of data gaps and their impacts on assessments. It requires the responsible member or cooperating party to explain the reporting deficiency and provide a plan for corrective action. In addition, the measure provides that the Compliance Committee of the Commission should recommend appropriate action based on relevant information to address problematic data deficiencies.

#### 3.1.4.5 Circle Hooks

A U.S. proposal encouraging ICCAT parties to undertake research on the use of circle hooks in pelagic longline, recreational, and artisanal fisheries was adopted by the Commission as Resolution 05-08. The measure is non-binding and also includes a provision encouraging parties to share information on fishing methods and technological gear changes that improve the safe handling and release of incidentally caught species.

A number of other non-binding resolutions were adopted which can be found on the ICCAT website identified above.

### 3.1.5 Existing State Regulations

Table 3.2 outlines the existing State regulations as of May 30, 2006, with regard to HMS species. The HMS Management Division updates this table periodically throughout the year. While the HMS Management Division updates this table periodically throughout the year, persons interested in the current regulations for any state should contact that state directly.

**Table 3.2 State Rules and Regulations Pertaining to Atlantic HMS, as of May 30, 2006.**

Please note that state regulations are subject to change. Please contact the appropriate state personnel to ensure that the regulations listed below remain current. X = Regulations in Effect; n = Regulation Repealed; FL = Fork Length; CL = Carcass Length; TL = Total Length; LJFL = Lower Jaw Fork Length; CFL = Curved Fork Length; DW = Dressed Weight; and SCS = Small Coastal Sharks; LCS = Large Coastal Sharks.

| | | | | | | | Contact Information |
|---|---|---|---|---|---|---|---|
| ME | X | | | X | Tuna -ME Rev. Stat. Ann. tit. 12, " 6001, 6502, and 6551<br>Sharks - Code ME R. 13-188 ' 50.02 | **Tuna** - Retention limit - 1 tuna/year - non resident special tuna permit holder; Unlawful to fish for tuna with gear other than harpoon or hook and line or possess tuna taken in unlawful manner. No minimum size limits.<br>**Sharks** - Regulations apply to Spiny dogfish only | ME Department of Marine Resources<br>George Lapointe<br>Phone: 207/624-6553<br>Fax: 207/624-6024 |
| NH | R | | X | X | Tuna - FIS 603.10 (REPEALED)<br>Billfish - FIS 603.13<br>Sharks - FIS 603.19 | **Billfish** - Possession limit - 1 billfish/trip; Minimum size (LJFL) - Blue marlin - 99"; White marlin - 66"; Sailfish - 57"; May be taken by hook and line only; Unlawful to sell billfish<br>**Sharks** - Regulations apply to Spiny dogfish only | NH Fish and Game<br>Clare McBane<br>Phone: 603/868-1095<br>Fax: 603/868-3305 |
| MA | X | R | | X | Tuna - 322 CMR ' 6.04<br>Billfish – 322 CMR ' 6.11 (REPEALED)<br>Sharks – 322 CMR ' 6.35 & 6.37 CMRs available online at http://www.mass.gov/dfwele/dmf/commercialfishing/cmr_index.htm | **Tuna** - Reference to ATCA and Federal regulations<br>**Billfish** – repealed as of December 2005<br>**Sharks** - Regulations apply to Spiny dogfish; Prohibition on harvest, catch, take, possession, transportation, selling or offer to sell any basking, dusky, sand tiger, or white sharks. | MA Division of Marine Fisheries<br>Melanie Griffin<br>Phone: 617/626-1520<br>Fax: 617/626-1509 |
| RI | | | | X | Sharks - RIMFC Regulations ' 7.15 | **Sharks** - Regulations apply to spiny dogfish only | RI Department of Environment Management<br>Brian Murphy<br>Phone: 401/783-2304 |
| CT | | | | X | Dogfish – Regulations of Connecticut State Agencies § 26-159a-19 | **Sharks** - Regulations apply to spiny dogfish only | CT Department of Environmental Protection<br>David Simpson<br>Phone: 860/434-6043<br>Fax: 860/434-6150 |

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| NY | | | X | X | Billfish -NY Environmental Conservation ' 13-0339 (5)<br>Sharks - NY Environmental Conservation ' 13-0338; State of New York Codes, Rules and Regulations (Section 40.1) | **Billfish** - Blue marlin, White marlin, Sailfish, and Longbill spearfish shall not be bought, sold or offered for sale; Striped marlin, Black marlin, Shortbill spearfish shall not be bought, sold or offered for sale<br>**Sharks** - Shark finning prohibited; Reference to the Federal regulations 50 CFR part 635; Prohibited sharks listed | NY Department of Environmental Conservation<br>Gordon Colvin<br>Phone: 631/444-0435<br>Fax: 631/444-0449 |
| NJ | | | | X | Sharks-NJ Administrative Code, Title 7. Department of Environmental Protection, NJAC 7:25-18.1 and 7:25-18.12(d) | **Sharks** - Commercial/Recreational: min size 48" TL or 23" **f**rom the origin of the first dorsal fin to pre-caudal pit; possession limit - 2 fish/vessel or 2 fish per person if fishing from shore or a land based structure, must hold Federal permit to possess or sell more than 2 sharks; no sale during Federal closures; Finning prohibited; Prohibited Species: basking, bigeye sand tiger, sand tiger, whale and white sharks. | NJ Fish and Wildlife<br>Hugh Carberry<br>Phone: 609/748-2020<br>Fax: 609/748-2032 |
| DE | | | X | X | Billfish - DE Code Ann. tit. 7, ' 1310<br>Sharks - DE Code Regulations 3541 | **Billfish/Sharks** - Reference to Federal regulations for sharks; Prohibition on sale of Atlantic Sailfish and Blue/White/Striped marlin<br>**Sharks** – Recreational/Commercial: min size – 54" FL; bag limit – 1 shark/vessel/trip; shorebound anglers – 1 shark/person/day; 2 Atlantic sharpnose/vessel/trip with no min size; Prohibited Species: same as Federal species. Prohibition against fins without being naturally attached to the body. | DE Division of Fish and Wildlife<br>Roy Miller<br>Phone: 302/739-9914 |

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| MD | X | X | X | X | Tuna - Code of Maryland Regulations tit. 8, ' 02.12.01 and tit. 8, ' 02.05.23<br>Swordfish - Code of Maryland Regulations tit. 8, ' 02.12.01 and tit. 8, ' 02.05.27<br>Billfish - Code of Maryland Regulations tit. 8, ' 02.12.01 and tit. 8, ' 02.05.26<br>Sharks - Code of Maryland Regulations tit 8, ' 02.05.17 | **Tuna** - Reference to listing Bluefin Tuna as Ain need of conservation@; Federal regulations used to control size and seasons and recreational catch required to be tagged<br>Swordfish - Reference to listing Swordfish as Ain need of conservation@; Federal regulations used to control size and seasons and recreational catch required to be tagged<br>**Billfish** (blue and white marlin and sailfish) - Reference to listing Billfish as Ain need of conservation@; Federal regulations control size and seasons and recreational catch required to be tagged<br>**Sharks** – Recreational: min size - 54" FL or 31" carcass; 1 shark/vessel/trip; 1 Atlantic sharpnose/person/trip with no min size; Commercial: same as Federal regulations; Finning prohibition; Prohibited Species: same as Federal regulations. | MD Department of Natural Resources<br>Harley Speir<br>Phone: 410/260-8303 |
| VA | | | X | X | Billfish - 4 VA Administrative Code 20-350<br>Sharks - 4 VA Administrative Code 20-490 | **Billfish** - Prohibition on sale of billfish<br>**Sharks** – Recreational: bag limit – 1 LCS, SCS, or pelagic shark/vessel/day with a min size of less than 54” FL or 30” CL; 1 Atlantic sharpnose and bonnethead/person/day with no min size; No limits on rec harvest of smooth and spiny dogfish; Commercial: possession limit - 4000 lb dw/day, min size - 58" FL or 31" CL west of the COLREGS line and no min size limit east of the COLREGS line; Prohibitions: fillet at sea, finning, longlining, same prohibited shark species as Federal regulations; and spiny dogfish commercial regulations. | VA Marine Resources Commission<br>Jack Travelstead<br>Phone: 757/247-2247<br>Fax: 757/247-2020 |

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| NC | | | X | X<br>* Modify closed area off NC to allow fishing outside 15 fathoms during 1st trimester (Jan 1 - Feb 15) | Billfish -NC Administrative Code tit. 15A, r.3M.0507<br>Sharks -NC Administrative Code tit. 15A, r.3M.0505; Proclamation FF-24-2004 | **Billfish** - Recreational possession limit - 1 Blue or White marlin/vessel/trip; 1 Sailfish/person/day; Minimum size - Blue marlin - 99"; White marlin - 66"; Sailfish - 63"; unlawful to sell or offer for sale Blue or White marlin and Sailfish<br>**Sharks** - Director may impose restrictions for size, seasons, areas, quantity, etc. via proclamation; Commercial: open seasons and species groups same as Federal; 4000 lb trip limit for LCS; retain fins with carcass through point of landing; LL shall only be used to harvest LCS during open season, shall not exceed 500 yds or have more than 50 hooks; Recreational: LCS (54" FL min size) - no more than 1 shark/vessel/day or 1 shark/person/day, SCS (no min size) – no more than 1 finetooth or blacknose shark/vessel/day and no more than 1 Atlantic sharpnose and 1 bonnethead/person/day, pelagics (no min size) -1 shark/vessel/day; Same prohibited shark species as Federal regulations. | NC Division of Marine Fisheries<br>Preston Pate<br>Phone: 252/726-7021<br>Fax: 252/726-0254 |
| SC | X | | X | X | Tuna -SC Code Ann. ' 50-5-2730<br>Billfish - SC Code Ann. ' 50-5-1700<br>Sharks -SC Code Ann. ' 50-5-2725 | **Tuna** - Reference to ATCA and MSA regulations for Tuna<br>**Billfish** - Unlawful to sell billfish; hook and line gear only; unlawful to possess while transporting gillnets, seines, or other commercial gear<br>**Sharks** – Recreational: 2 Atlantic sharpnose/per/day and 1 Bonnethead/person/day, no min size; All others – 1 shark/boat/trip, min size – 54" FL; Reference to Federal commercial regulations and prohibited species | SC Department of Natural Resources<br>Robert Boyles<br>Phone: 843/953-9050<br>Fax: 912/262-2318 |

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| GA | | | X | X | Gear Restrictions/Prohibitions - GA Code Ann. ' 27-4-7; Billfish - GA Code Ann. ' 27-4-130.2; GA Comp. R. & Regs. ' 391-2-4-.04 Sharks - GA Code Ann. ' 27-4-130.1; OCGA ' 27-4-7(b); GA Comp. R. & Regs. ' 391-2-4-.04 | Gear Restrictions/Prohibitions - Use of gillnets is prohibited in state waters. **Billfish** - Possession prohibited in state waters, except for catch and release. **Sharks** – Commercial/Recreational: 2 sharks from the Small Shark Composite (bonnethead, sharpnose, and spiny dogfish, daily limit may consist of 2 of the same species (eg., 2 bonnetheads, 2 sharpnoses) or 2 different species, SCS min size 30" TL; All other sharks - 2 sharks/person or boat, whichever is less, min size 48" TL, may include only 1 greater than 84"; Prohibited Species: sand tiger sharks. All species must be landed head and fins intact. Sharks may not be landed in Georgia if harvested using gill nets. | GA Department of Natural Resources<br>Phone: 912/264-7218<br>Fax: 912/262-3143 |

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| FL | | X | X | X | Sharks -FL Administrative Code Ann. r.68B-44, F.A.C<br>Swordfish/ Billfish - FL Administrative Cod Ann. r. 68B-33 F.A.C | **Billfish** – Longbill/Mediterranean/roundscale spearfish – harvest/possession/landing/purchase/sale/exchange prohibited.<br>Blue/White Marlin and Sailfish – Sale prohibited; Aggregate possession of 1 fish/person; Gear restriction (hook and line only); Minimum size limit (Blue Marlin – 99" LJFL; White Marlin – 66" LJFL; Sailfish – 63" LJFL); Recreational catch reporting requirement (all non-tournament landings must be reported NOAA within 24 hours); Must land in whole condition (gutting allowed)<br>**Swordfish** - Minimum size - 47 in LJFL/29" cleithrum to keel/33 lbs. dw; Possession limit 1 fish/person/day or 3 fish/vessel/day (with 3 or more persons onboard); Commercial harvest and sale allowed only with Florida saltwater products license and a federal LAP for swordfish; Recreational catch reporting requirement (all non-tournament landings must be reported NOAA within 24 hours)<br>**Sharks** – Commercial/Recreational: min size - none; possession limit – 1 shark/person/day or 2 sharks/vessel on any vessel with 2 or more persons on board; State waters close to commercial harvest when adjacent Federal waters close; Federal permit required for commercial harvest, so Federal regulations apply unless state regulations are more restrictive; Finning & Filleting prohibited; and same prohibited species as Federal regulations, except Caribbean sharpnose is not included. | FL Fish and Wildlife Conservation Commission<br>Phone: 850/488-6058<br>Fax: 850/488-7152 |
| AL | X | X | X | X | Sharks - AL Administrative Code r. 220-2-.46, r.220-3-.30, r.220-3-.37 | **Tuna/Swordfish/Billfish/Sharks** - Reference to Federal regulations<br>**Sharks** – Recreational & Commercial: bag limit – 2 sharpnose/person/day; no min size; all other sharks – 1/person/day; min size – 54" FL or 30" dressed; state waters close when Federal season closes; Prohibition: Atlantic angel, bigeye thresher, dusky, longfin make, sand tiger, basking, whale, white, and nurse sharks. | AL Department of Conservation and Natural Resources<br>Major Jenkins<br>jjenkins@dcnr.state.al.us<br>Phone: 251 861 2882 |

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| LA | X | X | X | X | Tuna -LA Administrative Code Title 76, Pt. VII, Ch. 3, § 361<br>Swords/Billfish - LA Administrative Code Title76, Pt. VII, Ch. 3, § 355<br>Sharks - LA Administrative Code Title 76, Pt. VII, Ch. 3, § 357 | **Tuna** - Recreational bag and possession limit Yellowfin (3 fish/person); Rec/Commercial minimum size - Yellowfin, Bigeye and Bluefin (27 in CFL)<br>**Billfish/Swordfish** - Minimum size - Blue marlin (99 in LJFL), White marlin (66" LJFL), Sailfish (63 in LJFL), Swordfish (29 in carcass length or 33 lbs dw); Recreational creel limit - 5 swordfish/vessel/trip<br>**Sharks** - Recreational: min size – 54" FL, except Atlantic sharpnose and bonnethead; bag limit - 1 sharpnose/person/day; all other sharks – 1 fish/person/day; Commercial: 4,000 lb LCS trip limit, no min size; Com & Rec Harvest Prohibited: 4/1-6/30; Prohibition: same as Federal regulations, as well as smalltooth and largetooth sawfish | LA Department of Wildlife and Fisheries<br>Harry Blanchet<br>225 765-2889<br>fax (225) 765-2489<br>hblanchet@wlf.louisiana.gov |
| MS | X | | X | X | Tuna/Billfish/Sharks - MS Code Title-22 part 7 | **Tuna** – Min size - Bigeye 27" CFL; Yellowfin 27" CFL; Bag limit none in commercial; Bag limit of 3 yellowfin tuna/person in recreational; No commercial take of bluefin tuna; 1 bluefin tuna/vessel/week and landing must be reported to MDMR.<br>**Billfish** - No take provisions for commercially harvested Blue and White marlin and Sailfish; Recreational minimum size - Blue marlin 99" LJFL; White marlin 66" LJFL; Sailfish 63" LJFL; No position for longbill spear fish.<br>**Sharks** – Recreational: min size - LCS/Pelagics 37" TL; SCS 25" TL; bag limit - LCS/Pelagics 1/person up to 3/vessel; SCS 4/person; Commercial & Prohibited Species - Reference to Federal regulations. | MS Department of Marine Resources<br>Kerwin Cuevas<br>Phone: 228/374-5000 |

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| TX | | X | X | X | Billfish/Swordfish/Sharks - TX Administrative Code Title 31, Part 2, Parks and Wildlife Code Title 5, Parks and Wildlife Proclamations 65.3 and 65.72 | **Blue Marlin, White Marlin, Sailfish, Sharks, Longbill spearfish, and Broadbill swordfish** are gamefish and may only be taken with pole and line (including rod and reel);<br>**Blue Marlin, White Marlin, Sailfish, and Longbill spearfish** may not be sold for any purpose;<br>**Billfish** - Bag limit none; min size Blue Marlin – 131" TL; White Marlin – 86" TL; Sailfish – 84" TL;<br>**Sharks** - Commercial/Recreational: bag limit - 1 shark/person/day; Commercial/Recreational possession limit is twice the daily bag limit (i.e., 2 sharks/person/day); min size 24" TL. | TX Parks & Wildlife<br>Randy Blankinship<br>Phone: 956/350-4490<br>Fax: 956/350-3470 |
| Puerto Rico | X | X | X | X | Regulation #6768<br>Article 8 – General Fishing Limits<br><br>Article 13 – Limitations<br><br>Article 17 – Permits for Recreational Fishing<br>(March 2004) | Sell, offer for sale, or traffic in any billfish or marlin, either whole or processed, captured in jurisdictional waters of Puerto Rico.<br><br>Swordfish or billfish, tuna and shark are covered under the federal regulation known as Highly Migratory Species of the United States Department of Commerce (50 CFR, Part 635). Fishers who capture these species shall comply with said regulation. Billfish captured incidentally with long line must be released by cutting the line close to the fishhook, avoiding the removal of the fish from the water.<br><br>In the case of tuna and swordfish, fishers shall obtain a permit according to the requirements of the Federal government. | Puerto Rico Department of Natural and Environmental Resources<br>Craig Lilyestrom<br>Phone: 787-724-8774 x4042<br>craig@caribe.net |
| U.S. Virgin Islands | X | X | X | X | US VI Commercial and Recreational Fisher's Information Booklet Revised June 2004 | Federal regulations and federal permit requirements apply in territorial waters. | www.caribbeanfmc.com<br>http://www.caribbeanfmc.com/usvi%20booklet/fisher%20booklet%20final.pdf |

## 3.2 Status of the Stocks

The thresholds used to determine the status of Atlantic HMS are fully described in Chapter 3 of the 1999 Tunas, Swordfish, and Shark FMP and Amendment 1 to the Billfish FMP, and are presented in Figure 3.1. These thresholds are based on the thresholds described in a paper describing the technical guidance for implementing National Standard 1 of the Magnuson-Stevens Act (Restrepo *et al*., 1998). These thresholds will not change as a result this Final Consolidated HMS FMP.

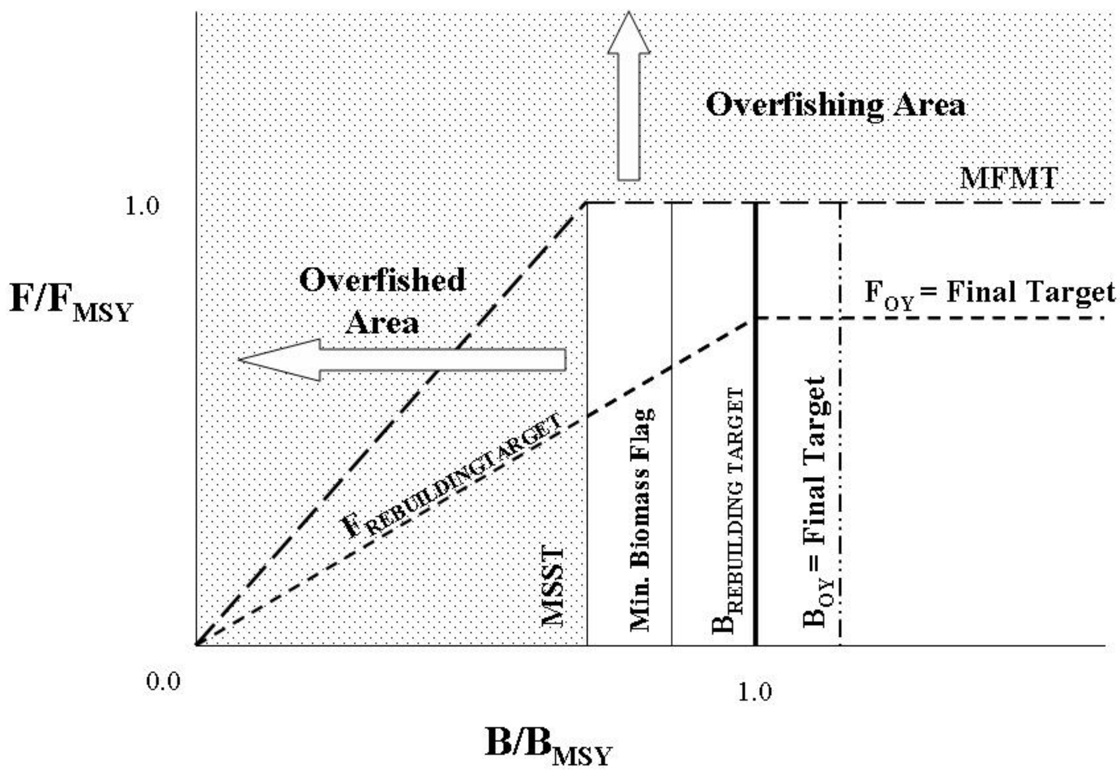



**Figure 3.1 Illustration of the status determination criteria and rebuilding terms.**

In summary, a species is considered overfished when the current biomass (B) is less than the minimum stock size threshold ($B < B_{MSST}$). The minimum stock size threshold (MSST) is determined based on the natural mortality of the stock and the biomass at maximum sustainable yield ($B_{MSY}$). Maximum sustainable yield (MSY) is the maximum long-term average yield that can be produced by a stock on a continuing basis. The biomass can be lower than $B_{MSY}$, and the stock not be declared overfished as long as the biomass is above $B_{MSST}$.

Overfishing may be occurring on a species if the current fishing mortality (F) is greater than the fishing mortality at MSY ($F_{MSY}$) ($F > F_{MSY}$). In the case of F, the maximum fishing mortality threshold is $F_{MSY}$. Thus, if F exceeds $F_{MSY}$, the stock is experiencing overfishing.

If a species is declared overfished or has overfishing occurring, action to rebuild the stock and/or prevent further overfishing is required by law. A species is considered rebuilt when B is greater than $B_{MSY}$ and F is less than $F_{MSY}$. A species is considered healthy when B is greater than or equal to the biomass at optimum yield ($B_{OY}$) and F is less than or equal to the fishing mortality at optimum yield ($F_{OY}$).

In summary, the thresholds to use to calculate the status of Atlantic HMS, as described in the 1999 FMP and Amendment, are:

- Maximum Fishing Mortality Threshold (MFMT) = $F_{limit}$ = $F_{MSY}$;
- Overfishing is occurring when $F_{year} > F_{MSY}$;
- Minimum Stock Size Threshold (MSST) = $B_{limit}$ = (1-M)$B_{MSY}$ when M < 0.5 = 0.5$B_{MSY}$ when M >= 0.5 (for billfish, the specific MSST values are: blue marlin = 0.9$B_{MSY}$; white marlin = 0.85$B_{MSY}$; west Atlantic sailfish = 0.75$B_{MSY}$);
- Overfished when $B_{year}/B_{MSY}$ < MSST;
- Biomass target during rebuilding = $B_{MSY}$;
- Fishing mortality during rebuilding < $F_{MSY}$;
- Fishing mortality for healthy stocks = 0.75$F_{MSY}$;
- Biomass for healthy stocks = $B_{OY}$ = ~1.25 to 1.30$B_{MSY}$;
- Minimum biomass flag = (1-M)$B_{OY}$; and
- Level of certainty of *at least* 50 percent but depends on species and circumstances.

This final Consolidated HMS FMP does not change these threshold levels. The current status of Atlantic HMS is provided in the table below. Numerous stock assessments are expected to occur in 2006 that could change this status. Those species expected to have new stock assessments in the near future are: LCS (the review workshop – last of three – June 5-9, 2006); marlin (May 15-19, 2006); BFT (June 12-18, 2006); swordfish (September 4-8, 2006); and SCS (first workshop of three early 2007). The results of the LCS stock assessment will not be considered complete until the review workshop document is finalized, likely in summer 2006.

**Table 3.3 Stock Assessment Summary Table.** Source: SCRS, 2004 and 2005, Cortes, 2002, and Cortes *et al.* 2002.

| | | | | | Outlook** |
|---|---|---|---|---|---|
| **West Atlantic Bluefin Tuna** | $SSB_{01}/SSB_{MSY}$ = 0.31 (low recruitment ); 0.06 (high recruitment )<br><br>$SSB_{01}/SSB_{75}$ = 0.13 (low recruitment ); 0.13 (high recruitment ) | $0.86SSB_{MSY}$ | $F_{01}/F_{MSY}$ = 2.35 (low recruitment scenario)<br><br>$F_{01}/F_{MSY}$ = 4.64 (high recruitment scenario) | $F_{year}/F_{MSY}$ = 1.00 | Overfished; overfishing is occurring. |
| **East Atlantic Bluefin Tuna** | $SSB_{00}/SSB_{70}$ = 0.86 | *Not estimated* | $F_{00}/F_{max}$ = 2.4 | *Not estimated* | Overfished; overfishing is occurring.* |
| **Atlantic Bigeye Tuna** | $B_{03}/B_{MSY}$ = 0.85-1.07 | $0.6B_{MSY}$ *(age 2+)* | $F_{02}/F_{MSY}$ = 0.73-1.01 | $F_{year}/F_{MSY}$ = 1.00 | Overfished; overfishing is occurring. |
| **Atlantic Yellowfin Tuna** | $B_{01}/B_{MSY}$ = 0.73 - 1.10 | $0.5B_{MSY}$ *(age 2+)* | $F_{01}/F_{MSY}$ = 0.87-1.46 | $F_{year}/F_{MSY}$ = 1.00 | Approaching an overfished condition. |
| **North Atlantic Albacore Tuna** | $B_{00}/B_{MSY}$ = 0.68 (0.52-0.86) | $0.7B_{MSY}$ | $F_{00}/F_{MSY}$ = 1.10 (0.99 - 1.30) | $F_{year}/F_{MSY}$ = 1.00 | Overfished; overfishing is occurring. |
| **South Atlantic Albacore Tuna** | $B_{02}/B_{MSY}$ = 1.66 (0.74-1.81) | *Not estimated* | $F_{02}/F_{MSY}$ = 0.62 (0.46-1.48) | *Not estimated* | Not overfished; overfishing not occurring.* |
| **West Atlantic Skipjack Tuna** | *Unknown* | *Unknown* | *Unknown* | $F_{year}/F_{MSY}$ = 1.00 | Unknown |
| **North Atlantic Swordfish** | $B_{02}/B_{MSY}$ = 0.94 (0.75 - 1.26) | *Unknown* | $F_{01}/F_{MSY}$ = 0.75 (0.54 - 1.06) | $F_{year}/F_{MSY}$ = 1.00 | Overfished; overfishing not occurring |
| **South Atlantic Swordfish** | *Unknown* | *Unknown* | *Unknown* | $F_{year}/F_{MSY}$ = 1.00 | Unknown |
| **Blue Marlin** | $B_{00}/B_{MSY}$ = 0.4 (0.25 – 0.6) | $0.9B_{MSY}$ | $F_{99}/F_{MSY}$ = 4.0 (2.5 – 6.0) | $F_{year}/F_{MSY}$ = 1.00 | Overfished: overfishing is occurring |
| **White Marlin** | $B_{01}/B_{MSY}$ = 0.12 (0.06 – 0.25) | $0.85B_{MSY}$ | $F_{00}/F_{MSY}$ = 8.28 (4.5 – 15.8) | $F_{year}/F_{MSY}$ = 1.00 | Overfished: overfishing is occurring |

| | | | | | Outlook** |
|---|---|---|---|---|---|
| **West Atlantic Sailfish** | *Unknown* | *0.75$B_{MSY}$* | *Unknown* | *Not estimated* | Overfished:<br>Overfishing is occurring |
| **Spearfish** | *Unknown* | *Unknown* | *Unknown* | *Not estimated* | *Unknown* |
| **LCS** | $B_{01}/B_{MSY}$ = 0.46-1.18 | *0.8$B_{MSY}$* | $F_{01}/F_{MSY}$ = 0.89 – 4.48 | $F_{year}/F_{MSY}$ = 1.00 | Overfished; Overfishing is occurring |
| **Sandbar** | $B_{01}/B_{MSY}$ = 3.25E4-2.22 | *0.85$B_{MSY}$* | $F_{01}/F_{MSY}$ = 0.0015 – 2.45 | $F_{year}/F_{MSY}$ = 1.00 | Not overfished; Overfishing is occurring |
| **Blacktip** | $B_{01}/B_{MSY}$ = 0.79-1.66 | *0.8$B_{MSY}$* | $F_{01}/F_{MSY}$ = 0.13 – 1.72 | $F_{year}/F_{MSY}$ = 1.00 | Not overfished; No overfishing occurring |
| **SCS** | $B_{01}/B_{MSY}$ = 1.38-2.39 | *0.5 $B_{MSY}$ to 0.8$B_{MSY}$* | $F_{00}/F_{MSY}$ = 0.24 - 0.78 | $F_{year}/F_{MSY}$ = 1.00 | Not overfished; No overfishing $F_{2000}$ = > $F_{OY}$ |
| **Pelagic sharks** | *Unknown* | *Unknown* | *Unknown* | *Unknown* | *Unknown**** |

* South Atlantic albacore and East Atlantic bluefin tuna are not found in the U.S. EEZ.
** Based on "Sustaining and Rebuilding", National Marine Fisheries Service, 2004, - Report to Congress - The Status of U.S. Fisheries, August 2005.
*** Section 3.2.5 provides more information on the results of the stock assessment conducted by the SCRS in 2004 for blue and shortfin mako sharks and the stock assessment conducted by COSEWIC in 2005 for porbeagle sharks.

### 3.2.1 Atlantic Swordfish

#### 3.2.1.1 Life History and Species Biology

Swordfish are members of the family *Xiphiidae*, in the suborder *Scombroidei*. Atlantic swordfish (*Xiphias gladius*) are one of the largest and fastest predators in the Atlantic Ocean, reaching a maximum size of 530 kg (1165 lb). Like other highly migratory species, they have developed a number of specialized anatomical, physiological, and behavioral adaptations (Helfman *et al.*, 1997). Swordfish are distinguished by a long bill that grows forward from the upper jaw. This bill differs from that of marlins (family *Istiophoridae*) in that it is flattened rather than round in cross section, and smooth rather than rough. Swordfish capture prey by slashing this bill back and forth in schools of smaller fish or squid, stunning or injuring their prey in the process. They may also use the bill to spear prey, or as a defense during territorial encounters. Broken swordfish bills have been found embedded in vessel hulls and other objects (Helfman *et al.*, 1997).

Atlantic swordfish are usually found in surface waters but occasionally dive as deep as 650 meters. These large pelagic fishes feed throughout the water column on a wide variety of prey including groundfish, pelagics, deep-water fish, and invertebrate. Swordfish show extensive diel migrations and are typically caught on pelagic longlines at night when they feed in surface waters (SCRS, 2004). They are capable of migrating long distances to maximize prey availability and, as noted above, can prey upon various trophic levels during their daily vertical migrations (NMFS, 1999). As adults and juveniles, swordfish feed at the highest levels of the trophic food chain, implying that their prey species occur at low densities. The foraging behavior of swordfish reflects the broad distribution and scarcity of appropriate prey; they often aggregate in places where they are likely to encounter high densities of prey, including areas near current boundaries, convergence zones, and upwellings (Helfman *et al*., 1997).

Swordfish move thousands of kilometers annually and are distributed globally in tropical and subtropical marine waters. Their broad distribution, large spawning area, and prolific nature have contributed to the resilience of the species in spite of the heavy fishing pressure being exerted on it by many nations. During their annual migration, North Atlantic swordfish follow the major currents which circle the North Atlantic Ocean (including the Gulf Stream, Canary and North Equatorial Currents) and the currents of the Caribbean Sea and Gulf of Mexico. The primary habitat in the western north Atlantic is the Gulf Stream, which flows northeasterly along the U.S. coast, then turns eastward across the Grand Banks. North-south movement along the eastern seaboard of the United States and Canada is significant (NMFS, 2003). They are found in the colder waters during summer months and all year in the subtropical and tropical area (SCRS, 2003). Additional information on life history relating to habitat can be found in Section 3.3, Essential Fish Habitat, as well as the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks.

Like most large pelagic species, swordfish have adapted body contours that enable them to swim at high speeds. Their streamlined bodies are round or slightly compressed in cross section (fusiform), and their stiff, deeply forked tails minimize drag. This streamlined physical form is enhanced by depressions or grooves on the body surface into which the fins can fit during swimming. The extremely small second dorsal and anal fins of the swordfish may function like the finlets of tuna, reducing turbulence and enhancing swimming performance. Their method of respiration, known as ram gill ventilation, requires continuous swimming with the mouth open to keep water flowing across the gill surfaces, thereby maintaining an oxygen supply. This respiratory process is believed to conserve energy compared to the more common mechanism whereby water is actively pumped across the gills (Helfman *et al*., 1997). In addition to the benefits of speed and efficiency, their search for prey is aided by coloring that provides camouflage in pelagic waters. This shading is darker along the dorsal side and lighter underneath, enhanced by silvery tones.

Swordfish exhibit other physiological characteristics that enable them to extend their hunting range. For example, swordfish can maintain elevated body temperatures, conserving the heat generated by active swimming muscles. Swordfish have developed a heat exchange system that allows them to swim into colder, deep water in pursuit of prey. Because warm muscles contract faster than cool ones, heat conservation is believed to enable these predatory fishes to channel more energy into swimming speed. The internal temperatures of these fishes remain fairly stable even as they move from surface waters to deep waters. Swordfish have also adapted specialized eye muscles for deep water hunting. Because their eye muscles do not have the ability to contract, they produce heat when stimulated by the nervous system, locally warming both the brain and eye tissues (Helfman *et al*., 1997). With this modification, swordfish are able to hunt in the frigid temperatures of deep-water ocean environments without experiencing a decrease in brain and visual function that might be expected under such harsh conditions.

Juvenile swordfish are characterized as having exceptionally fast growth during the first year (NMFS, 1999). Swordfish exhibit dimorphic growth, where females show faster growth rates and attain larger sizes than males. Young swordfish grow very rapidly, reaching about 130 cm lower jaw-fork length (LJFL) by age two. Swordfish are difficult to age, but 53 percent of females are considered mature by age 5, at a length of about 130 cm LJFL (SCRS, 2003; SCRS, 2004). Approximately 50 percent of males attain maturity by 112 cm LJFL (Arocha, 1997). All males are mature by 145 to 160 cm LJFL (37 to 50 kg ww), approximately age five, and all females are mature by 195 to 220 cm LJFL (93 to 136 kg ww), approximately age nine. In general, swordfish reach 140 cm LJFL (33 kg ww) by age three and are considered mature by age five. Individual females may spawn numerous times throughout the year (NMFS, 1999).

Swordfish stocks consist of several age classes, a condition that may serve as a buffer against adverse environmental conditions and confer some degree of stability on the stocks. Swordfish are also at a high trophic level, which may make the species less vulnerable to short-term fluctuations in environmental conditions (NMFS, 1999).

When ICCAT's Standing Committee on Research and Statistics (SCRS) scientists assess the status of Atlantic swordfish, the stock is split between the North Atlantic, South Atlantic, and Mediterranean Sea. The SCRS continues to examine existing information, including spawning data, tagging information, genetic studies, and abundance indices to better define stock structure. For the purposes of domestic management, the swordfish population is considered to consist of two discrete stocks divided at 5° N.

#### 3.2.1.2 Stock Status and Outlook

The most recent assessment of North and South Atlantic swordfish stocks was conducted in 2002. In that assessment, updated CPUE and catch data through 2001 were examined. Sex and age-specific (North Atlantic) and biomass standardized catch rates (North and South Atlantic) from the various fleets were updated. The updated North Atlantic CPUE data showed similar trends to previous years, and also showed signs of improvement in stock status since 1998. In particular, the recruitment index (1997 – 2001) and the catch-at-age used in the 2002 North Atlantic assessment showed signs of substantially improved recruitment (age one), which has manifested in several age classes and the biomass index of some fisheries, and have allowed for increases in spawning biomass and a more optimistic outlook. The strong recruitments of the late 1990s promoted improvement in spawning stock biomass and should result in further improvement, if these year classes are not heavily harvested. The CPUE patterns in the South Atlantic by fleet showed contradictory patterns. Lack of important CPUE information from some fleets fishing in the South Atlantic prevented the SCRS from reconciling these conflicts (SCRS, 2004).

*North Atlantic Swordfish (all weights are given in whole weight)*

An updated estimate of maximum sustainable yield from production model analyses is 14,340 mt (range 11,500 to 15,500 mt). Since 1997, North Atlantic swordfish catches have been estimated to have remained below 14,340 mt, but the most recent years are provisional and probably represent underestimates. Details of catches for recent years are presented below in section 3.2.1.3. The biomass at the beginning of 2002 was estimated to be 94 percent (range: 75

to 124 percent) of the biomass needed to produce MSY. This estimate is up from an estimate of 65 percent of MSY in the 1998 assessment. The 2001 fishing mortality rate was estimated to be 0.75 times the fishing mortality rate at MSY (range: 0.54 to 1.06). The replacement yield for the year 2003 and beyond was estimated to be about the MSY level. As the TAC for North Atlantic swordfish for 2002 was 10,400 mt, it was considered likely that biomass would increase further under those catch levels. The TAC set for 2003 – 2005 was 14,000 mt (ICCAT Recommendation 02 – 02). Given recent fishing mortality patterns, the spawning biomass likely will increase largely owing to the very large recruitments estimated for 1997 – 2000 (SCRS, 2005). Further, given that recent (2002 – 2003) reported catch has been below estimated replacement yield, the North Atlantic swordfish biomass may have already achieved the $B_{MSY}$ level. However, noting the uncertainties inherent in the assessment, the SCRS warned against large increases over the current TAC (SCRS, 2004). The next assessment is scheduled for 2006.

*South Atlantic Swordfish*

The SCRS noted that reported total catches have been reduced since 1995, as was recommended by the SCRS. SCRS had previously expressed serious concern about the trends in stock biomass of South Atlantic swordfish based on the pattern of rapid increases in catch before 1995 that could result in rapid stock depletion, and in declining CPUE trends of some bycatch fisheries. For the 2002 stock assessment, standardized CPUE series were available for three fleets, the targeted fishery of European Community (EC) - Spain, and the bycatch fisheries of Chinese Taipei and Japan. There was considerable conflict in trends among the three CPUE series and it is unclear which, if any, of the series tracks total biomass. It was noted that there was little overlap in fishing area among the three fleets, and that the three CPUE trends could track different components (or cohorts) of the population. To address this possibility, an age-structured production model was run as a sensitivity test. For the base case production model, the Committee selected the bycatch CPUE series combined using a simple unweighted mean and the targeted CPUE series. Due to some inconsistencies in the available CPUE trends reliable stock assessment results could not be obtained (SCRS, 2004). As stated above, the next assessment is scheduled for 2006.

Reported catches of Atlantic swordfish, including discards for the period 1950 – 2004 can be found in Figure 3.2. Estimated fishing mortality rate relative to the $F_{MSY}$ for the period 1959 – 2001 can be found in Figure 3.3. Annual yield for North Atlantic swordfish relative to the estimated MSY can be found in Figure 3.4. A summary of Atlantic swordfish stock status can be found in Table 3.4

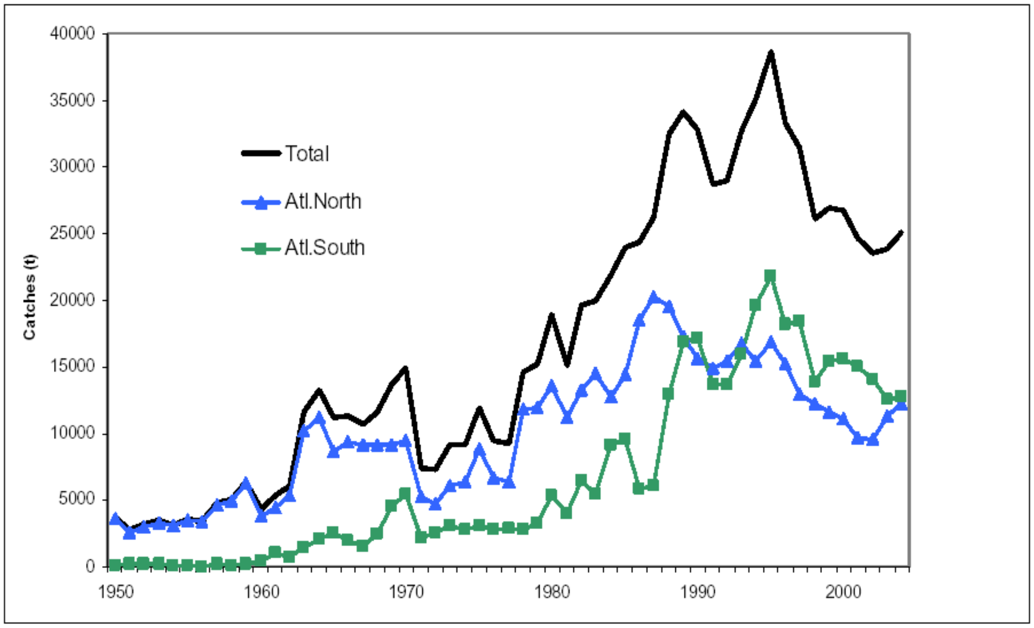



**Figure 3.2 Reported catches (mt whole weight) of Atlantic Swordfish, including discards for 1950-2004.** Source: SCRS, 2005.

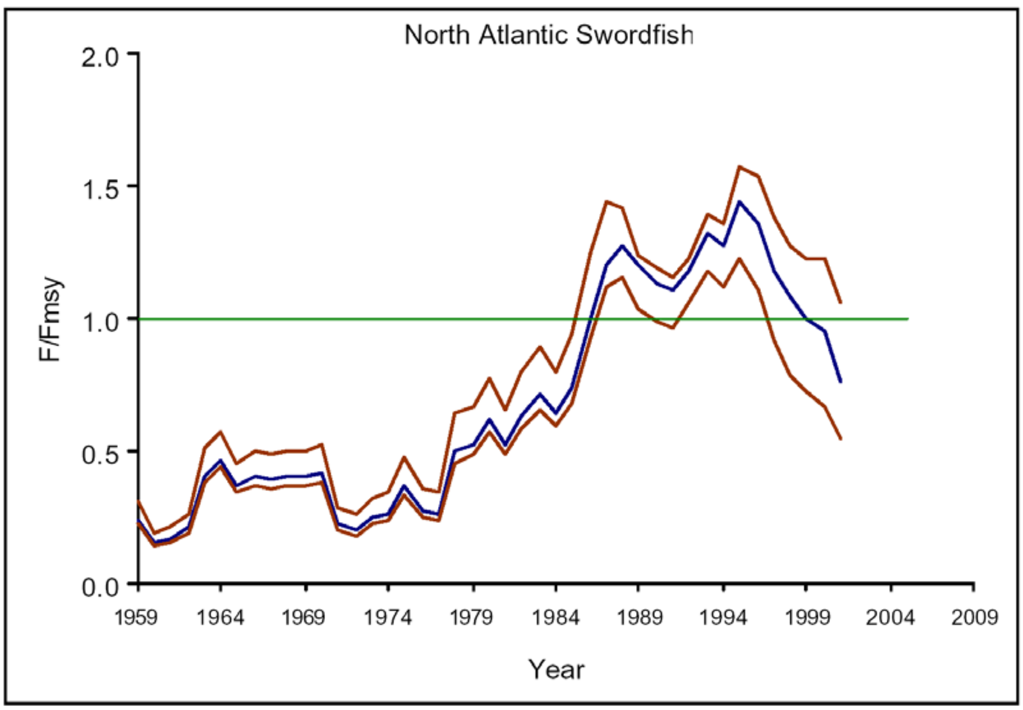



**Figure 3.3 Estimated fishing mortality rate relative to FMSY (F/FMSY) for the period 1959-2001 (median with 80 percent confidence bounds based on bootstrapping are shown).** Source: SCRS 2004.

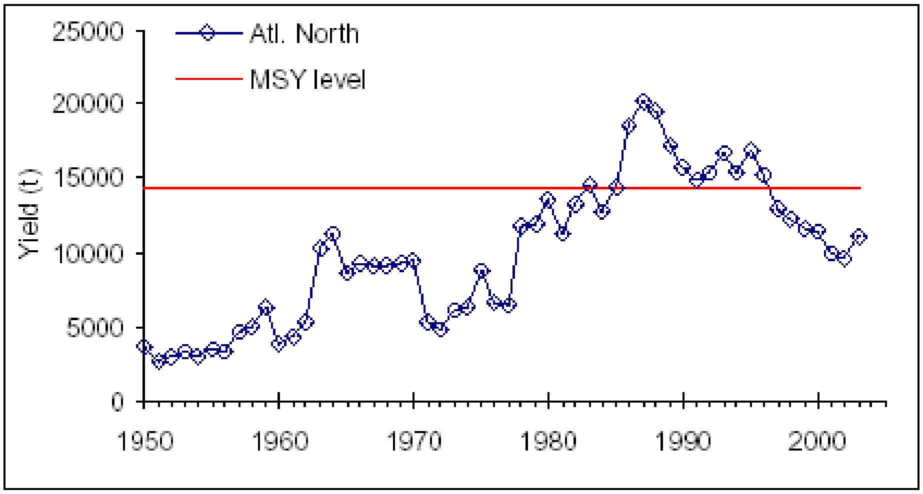



**Figure 3.4 Annual yield (mt) (whole weight) for North Atlantic swordfish relative to the estimated MSY level.** Source: SCRS 2004

**Table 3.4 Atlantic Swordfish Stock Summary (weights given in mt ww).** Source: SCRS, 2005.

| ATLANTIC SWORDFISH SUMMARY | | |
|---|---|---|
| | **North Atlantic** | **South Atlantic** |
| Maximum Sustainable Yield[1] | 14,340 t (11,580-15,530)[4] | Not estimated |
| Current (2004) Yield[2] | 12,283 t | 12,779 t |
| Current (2002) Replacement Yield[3] | about MSY | Not estimated |
| Relative Biomass ($B_{2002}/B_{MSY}$) | 0.94 (0.75 - 1.24) | Not estimated |
| Relative Fishing Mortality | | |
| $F_{2001}/F_{MSY}$[1] | 0.75 (0.54 - 1.06) | Not estimated |
| $F_{2000}/F_{max}$ | 1.08 | Not estimated |
| $F_{2000}/F_{0.1}$ | 2.05 | Not estimated |
| $F_{2000}/F_{30\%SPR}$ | 2.01 | Not estimated |
| Management Measures in Effect | Country-specific TACs [Rec. 02-02]; 125/119 cm LJFL minimum size. | TAC target [Ref. 02-03]; 125/119 cm LJFL minimum size [Rec. 02-02]. |

[1] Base Case production model results based on catch data 1950-2001.
[2] Provisional and subject to revision.
[3] For next fishing year.
[4] 80% confidence intervals are shown.

### 3.2.1.3 Effect of Regulations

*ICCAT Catch limits (all weights in this section are given in whole weight)*

The total allowable catch in the North Atlantic in 2002 was 10,400 mt (10,200 mt retained and 200 mt discarded). The reported landings were about 9,000 mt and the estimated discards were about 535 mt. The total allowable catch in the North Atlantic in 2003 was 14,000 mt (13,900 mt retained and 100 mt discarded). The reported landings in 2003 were about 10,800 mt and the estimated discards were about 460 mt. The total allowable catch in the North Atlantic in 2004 was 14,000 mt. The reported landings in 2004 were 11,867 mt with discards totaling an estimated 417 mt. Reports for year 2004 are considered provisional and subject to change (SCRS, 2005).

The total allowable catch in the South Atlantic in 2002 was 14,620 mt. The reported landings for 2002 were about 13,660 mt and reported discards were 1 mt. The total allowable catch in the South Atlantic in 2003 was 15,631 mt. The reported landings for 2003 were about 10,900 mt and reported discards were estimated to be less than 1 mt. The total allowable catch in the South Atlantic in 2004 was 15,776. The reported landings in 2004 were 12,778 mt with discards totaling an estimated 1 mt. Reports for year 2004 are considered provisional and subject to change (SCRS, 2005).

*ICCAT Minimum size limits (all weights in this section are given in whole weight)*

There are two minimum size options that are applied to the entire Atlantic: 125 cm LJFL with a 15 percent tolerance for undersized fish, or 119 cm LJFL with zero tolerance and evaluation of the discards. In the absence of size data, these calculations could not be updated or examined for 2004. In 2000, the percentage of swordfish reported landed (throughout the Atlantic) less than 125 cm LJFL was about 21 percent (in number) overall for all nations fishing in the Atlantic. If this calculation is made using reported landings plus estimated discards, then the percentage less than 125 cm LJFL would be about 25 percent. The SCRS noted that this proportion of small fish did not increase very much even though recruitment in the North has been at a high level in recent years (SCRS, 2005). Literature Cited.

*Domestic Regulations*

The domestic commercial swordfish fishery is governed by a limited access permit system with three types of permits: directed swordfish, incidental swordfish, and swordfish handgear. Anglers must also possess either a HMS Angling category permit or a CHB permit to for fish for, retain, or possess a North Atlantic swordfish. Only commercial permit holders may sell swordfish. Details of the permitting programs, including the number of permit holders can be found in section 3.9. Data on commercial catches and landings of North Atlantic swordfish are captured through observer programs, logbook reports, and dealer reports. Additional information on commercial catches, landings, and discards can be found in Chapter 0 of this document. Approximately 154,000 square miles of the Atlantic, Gulf and Caribbean have been closed to pelagic longline fishing in an effort to reduce bycatch and discards of Atlantic HMS including juvenile swordfish. Effects of the area closures on bycatch and discards can be found in Chapter 4. Recreational landings of North Atlantic swordfish are captured through mandatory tournament reports (if a tournament is selected for reporting), mandatory self-reporting of non-tournament landings, and various surveys, including the Marine Recreational Fisheries Statistics Survey and the Large Pelagics Survey. .

The United States has implemented minimum legal size regulations for Atlantic swordfish that correspond to the ICCAT 119 cm minimum size limit. Domestic minimum sizes include: the 47” lower jaw fork length, 29” cleithrum to keel length, or 33 lbs. Vessels with commercial directed and handgear swordfish permits are not constrained by trip limits when the fishery is open. Directed swordfish permit holders are limited to 15 swordfish per vessel per trip when the directed swordfish fishery is closed. Incidental commercial permit holders are limited to two swordfish per trip, except for vessels deploying squid trawl gear, which may retain five. There is a recreational bag limit of one North Atlantic swordfish per person per trip, up to a maximum of three per vessel, regardless of the length of the trip.

#### 3.2.1.4 Recent and Ongoing Research

*(The following information was taken directly from the 2005 U.S. National Report to ICCAT)*

In 2005, data from observer samples were compared against self-reported information from the U.S. large pelagic mandatory logbook reporting system, and estimates of discard mortality of swordfish, billfish, sharks and other species from the U.S. fleet were developed from that analysis for the 2005 SCRS. Estimates of small swordfish bycatch for 2002 – 2004 were compared to the average levels estimated for the late 1990's and were found to be substantially lower. Reported and observed swordfish catches, and size and catch rate patterns through 2004 were examined in support of monitoring the recovery of north Atlantic swordfish. Standardized indices of abundance were updated for the Western North Atlantic using data from the U.S. pelagic longline fleet (SCRS/2005/085). Collaborative research between various ICCAT nations and Venezuelan scientists continues on estimating the age-structure of the catch of swordfish. Results of this research will be available for the next assessment of north Atlantic swordfish. Scientists from the United States collaborated with Brazilian scientists to improve catch rate standardization procedures by offering a course on the topic in Brazil in mid-2005. Central to this collaboration is development of fisheries research capacity in Brazil through graduate student training and of stronger scientific cooperation between Brazil and the United States.

Research on measures to mitigate the interactions between pelagic longline and bycatch of marine turtles continued under a cooperative research program involving the US Atlantic pelagic longline fishery. The Northeast Distant Fishery Experiment was conducted from 2001 through 2003 on the high seas of the Western Atlantic Ocean, in an area off New Foundland known as the Grand Banks. Results of this research which was focused on reducing mortality of marine turtles interacting with pelagic longlines was recently published (Watson, *et.al.* 2005. Fishing methods to reduce sea turtle mortality associated with pelagic longlines. (Can. J. Fish. Aquat. Sci.. 62(5): 965-981). Additional cooperative research in the Gulf of Mexico was carried out in 2004 and in additional regions in 2005.

### 3.2.2 Atlantic Bluefin Tuna

All text, figures and tables for this section are from the SCRS 2004 and 2005 Reports and the U.S. National Report to ICCAT, 2005. All weights are reported as whole weights unless indicated as otherwise.

### 3.2.2.1 Life History and Species Biology

Atlantic bluefin tuna are distributed from the Gulf of Mexico to Newfoundland in the West Atlantic, from roughly the Canary Islands to south of Iceland in the East Atlantic, and throughout the Mediterranean Sea. Historically, catches of bluefin were made from a broad geographic range in the Atlantic and Mediterranean.

Atlantic bluefin tuna can grow to over 300 cm and reach more than 650 kg. The oldest age considered reliable is 20 years, based on an estimated age at tagging of two years and about 18 years at liberty, although it is believed that bluefin tuna may live to older ages. Bluefin tuna are, thus, characterized by a late age at maturity (thus, a large number of juvenile classes) and a long life span. These factors contribute to make bluefin tuna well adapted to variations in recruitment success, but more vulnerable to fishing pressure than rapid growth species such as tropical tuna species. Bluefin tuna in the West Atlantic generally reach a larger maximum size compared to bluefin caught in the East Atlantic.

Bluefin tuna in the West Atlantic are assumed to first spawn at age eight compared to ages four to five in the east Atlantic. Distribution expands with age; large bluefin are adapted for migration to colder waters. Bluefin tuna are opportunistic feeders, with fish, squid, and crustaceans common in their diet. In the West Atlantic, bluefin tuna are thought to spawn from mid-April into June in the Gulf of Mexico and in the Florida Straits. Juveniles are thought to occur in the summer over the continental shelf, primarily from about 35°N to 41°N and offshore of that area in the winter. In the East Atlantic, bluefin tuna generally spawn from late May to July depending on the spawning area, primarily in the Mediterranean, with highest concentrations of larvae around the Balearic Islands, Tyrrhenian Sea, and central and eastern Mediterranean where the sea-surface temperature of the water is about 24°C. Sexually mature fishes have also been recently observed in May and June in the eastern Mediterranean (between Cyprus and Turkey). Bluefin tuna are known to be highly migratory and the nature and extent of their ability to conduct transoceanic migrations are the subject of significant research (see section on Research below).

### 3.2.2.2 Stock Status and Outlook

The last full stock assessments for western Atlantic bluefin tuna were conducted in 2002 by the SCRS with the next scheduled for 2006. Although the next stock assessment will not be conducted until mid-2006, the 2005 SCRS reported a significant number of new research reports and studies (see Research Section below). The assessment results are similar to those from previous assessments (see

Table 3.5). They indicate that the spawning stock biomass (SSB) declined steadily from 1970 (the first year in the assessment time series) through the late 1980s, before leveling off at about 20 percent of the level in 1975 (which has been a reference year used in previous assessments). A steady decline in SSB since 1997 is estimated and leaves SSB in 2001 at 13 percent of the 1975 level. The assessment also indicates that the fishing mortality rate during 2001 on the SSB is the highest level in the series.

A noteworthy pattern of change in the fisheries since 1998 has been the trend of increase followed by a trend of decrease in catches to below TAC level. The reported total catches of western Atlantic bluefin tuna increased from about 2600 mt in 1998 to about 3,200 mt in 2002 and has subsequently fallen below 2,000 mt in 2004. The 2002 catches were the highest since 1981; however the 2004 catches were the lowest since 1982, when ICCAT catch restrictions were first established.

The Japanese longline fishery catch in the West Atlantic in 2003 was a substantial decrease from its 2002 catch level, but increased in 2004 to a level somewhat below its average catch from 1993 – 2002. This variation resulted from the adjustments made by Japan for previous quota overages. The Canadian reported landings remained at relatively stable levels over the past decade. Recent declines in U.S. landings have been attributed to a general lack of availability of large fish in the fisheries off the northeastern U.S. coast for the past several years.

Estimates of recruitment of age one fish have been generally lower since 1976. However, recruitment of age one fish in 1995 and 1998 is estimated to be comparable in size to some of the year classes produced in the first half of the 1970s. While the large decline in SSB since the early 1970s is clear from the assessment, the potential for rebuilding is less clear. Key issues are the reasons for relatively poor recruitment since 1976, and the outlook for recruitment in the future. One school of thought is that recruitment has been poor because the SSB has been low. If so, recruitment should improve to historical levels if SSB is rebuilt. Another school of thought is that the ecosystem changed such that it is less favorable for recruitment and thus recruitment may not improve even if SSB increases. To address both schools of thought, the SCRS considered two recruitment scenarios as described below and summarized in Table 3.5. (East Atlantic Bluefin tuna summary data are also provided for comparison purposes). For both scenarios, the assessment indicates that the fishing mortality on the western Atlantic bluefin resource exceeds $F_{MSY}$ and the SSB is below $B_{MSY}$ (thus overfished according to ICCAT's objective of maintaining stocks at the MSY-biomass level and as indicated in NMFS, Report to Congress, Status of Fisheries, 2005).

**Table 3.5 Summary Table for the Status of West Atlantic Bluefin Tuna.** Source: ICCAT, 2005.

| | |
|---|---|
| **Age/size at Maturity** | Age 8/~ 200 cm fork length |
| **Spawning Sites** | Primarily Gulf of Mexico and Florida Straits |
| **Current Relative Biomass Level**<br><br><br><br>*Minimum Stock Size Threshold* | $SSB_{01}/SSB_{75}$ (low recruitment) = .13 (.07-.20)<br>$SSB_{01}/SSB_{75}$ (high recruitment) = .13 (.07-.20)<br>$SSB_{01}/SSB_{msy}$ (low recruitment) = .31 (.20-.47)<br>$SSB_{01}/SSB_{msy}$ (high recruitment) = .06 (.03-.10)<br>$0.86B_{MSY}$ |
| **Current Relative Fishing Mortality Rate**<br><br>*Maximum Fishing Mortality Threshold* | $F_{01}/F_{MSY}$ (low recruitment) = 2.35 (1.72-3.24)<br>$F_{01}/F_{MSY}$ (high recruitment) = 4.64 (3.63-6.00)<br>$F/F_{MSY} = 1.00$ |
| **Maximum Sustainable Yield** | Low recruitment scenario: 3,500 mt (3,300-3,700)<br>High recruitment scenario: 7,200 mt (5,900-9,500) |
| **Catch (2004) including discards** | ~2,000 mt |
| **Short Term Sustainable Yield** | Probably > 3,000 mt |
| **Outlook** | Overfished; overfishing continues to occur |

**Table 3.6 Summary Table for the Status of East Atlantic Bluefin Tuna.** Source: ICCAT, 2005.

| | |
|---|---|
| **Age/size at Maturity** | Age 4-5 |
| **Spawning Sites** | Mediterranean Sea |
| **Current Relative Biomass Level** | $SSB_{00}/SSB_{1970} = .86$ |
| **Current Relative Fishing Mortality Rate** | $F_{00}/F_{MAX} = 2.4$ |
| **Maximum Sustainable Yield** | Not estimated |
| **Current (2004) Yield** | 26,961 mt |
| **Replacement Yield** | Not estimated |
| **Outlook** | Overfished; overfishing continues to occur. |

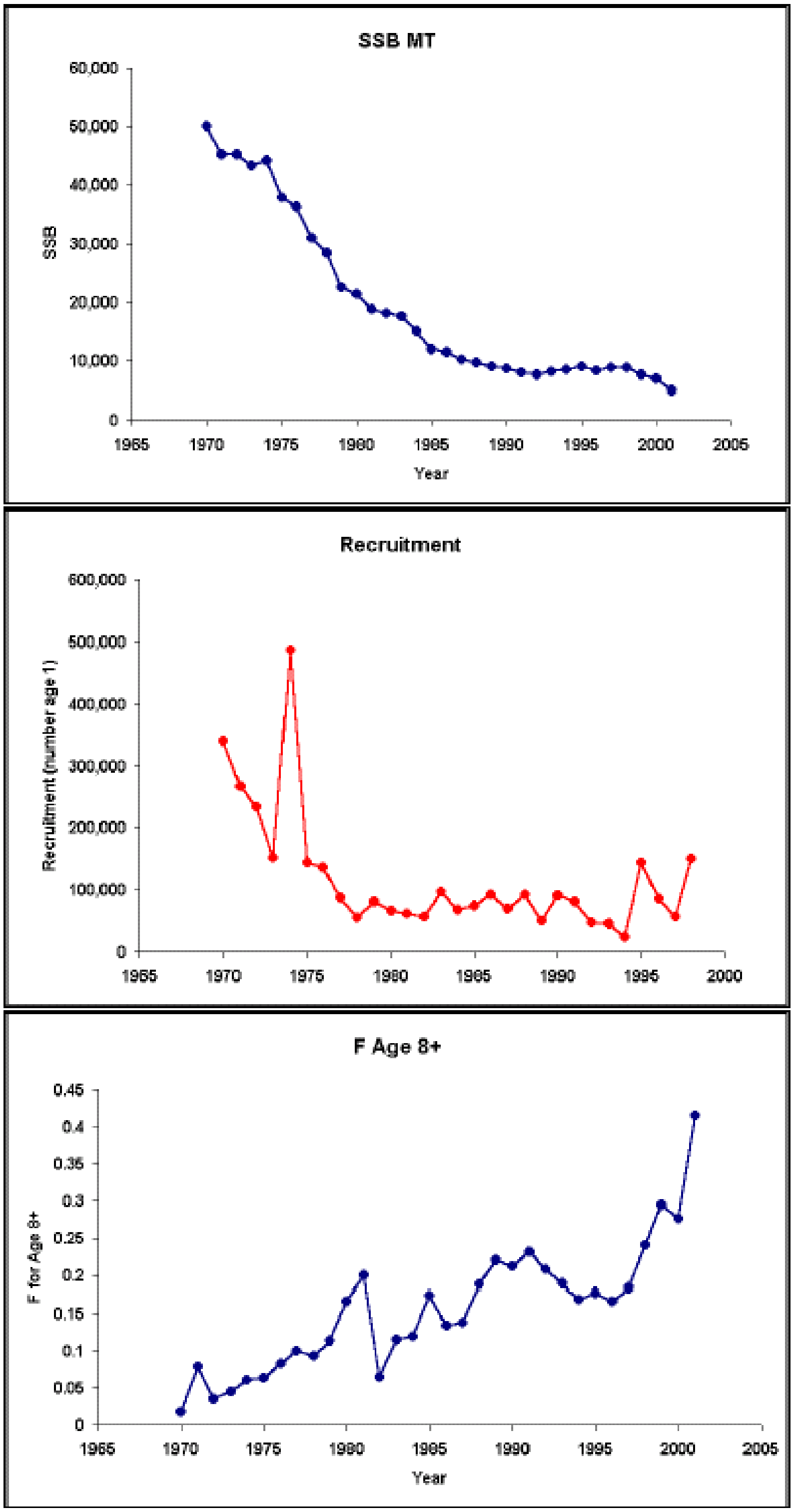



**Figure 3.5** **Western Atlantic bluefin tuna spawning biomass (t), recruitment (numbers) and fishing mortality rates for fish of age 8+, estimated by the Base Case VPA run.** Source: ICCAT, 2004.

In general, the outlook for bluefin tuna in the West Atlantic is similar to the outlook reported based on the 2000 western Atlantic bluefin tuna assessment session. The assessment and projection results for the present assessment are somewhat less optimistic than in 2000 but the confidence in the strength of the 1994 year class has increased. Therefore, the increases associated with different levels of future catch projected for the short-term are smaller but are estimated more confidently. It should be noted that the 1995 year class was estimated to be strong in 2000, but it is now estimated to be only of average strength.

As noted by the previous assessment session, western Atlantic bluefin tuna catches have not varied very much since 1983 (the range over this period is 2,106 to 3,011 mt), and the estimated spawning stock size (Spawning Stock Biomass (SSB) measured as the biomass of fish age 8+) has been relatively stable, notwithstanding the indication of a decline in the most recent years. Thus, over an extended period of time, catches around recent levels have maintained stock size at about the same level, in spite of several past assessments that predicted the stock would either decline or grow if the current catch was maintained. This observation highlights the challenge of predicting the outlook for this stock.

In order to provide advice relative to rebuilding the western Atlantic bluefin resource, the SCRS conducted projections for two scenarios about future recruitment. One scenario assumed that future average recruitment will approximate the average estimated recruitment (at age one) since 1976, unless spawning stock size declines to low levels (such as the current level estimated in the assessment, but generally lower than estimates during most of the assessment history). The second scenario allowed average recruitment to increase with spawning stock size up to a maximum level no greater than the average estimated recruitment for 1970 to 1974. These scenarios are referred to as the low recruitment and high recruitment scenarios, respectively. The low and high recruitment scenarios implied that the $B_{MSY}$ (expressed in SSB) is 42 percent and 183 percent of the biomass in 1975, respectively. With the current information, the SCRS could not determine which recruitment scenario is more likely, but both are plausible, and recommended that management strategies should be chosen to be reasonably robust to this uncertainty.

Table 3.7 below summarizes the results of projections of both scenarios at different catch levels. The projections for the low recruitment scenario estimated that a constant catch of 3,000 mt per year has an 83 percent probability of allowing rebuilding to the associated $SSB_{MSY}$ by 2018. A constant catch of 2,500 mt per year has a 35 percent probability of allowing rebuilding to the 1975 SSB by 2018.

The results of projections based on the high recruitment scenario estimated that a constant catch of 2,500 mt per year has a 60 percent probability of allowing rebuilding to the 1975 level of SSB, and there is a 20 percent chance of rebuilding SSB to $SSB_{MSY}$ by 2018. If the low recruitment scenario is valid, the TAC could be increased to at least 3,000 mt without violating ICCAT's rebuilding plan. If the high recruitment scenario is valid, the TAC should be decreased to less than 1,500 mt to comply with the plan.

The estimate of $SSB_{MSY}$ for the high recruitment scenario is critical to inferences regarding the probability of achieving rebuilding under different future levels of catch, and also less well determined by the data than $SSB_{MSY}$ for the low recruitment scenario. In particular, the estimates of $SSB_{MSY}$ based on the high recruitment scenario are substantially larger than the largest spawning stock size included in the assessment. This extrapolation considerably increases the uncertainty associated with these estimates of $SSB_{MSY}$. Previous meetings have used $SSB_{1975}$ as a rebuilding target in the context of interpreting projections. Arguably $SSB_{1975}$ is appropriate as a target level for interpreting the implications of projections based on the high recruitment scenario. Under such a target level for the high recruitment scenario, a TAC of 2,700 mt has an estimated probability of reaching the rebuilding level of about 50 percent.

The SCRS cautioned that these conclusions do not capture the full degree of uncertainty in the assessments and projections. An important factor contributing to uncertainty is mixing between fish of eastern and western origin. Furthermore, the projected increases in stock size are strongly dependent on estimates of recent recruitment, which are a particularly uncertain part of the assessment. A sensitivity test in which the estimates of the below average 1996 and the strong 1997 year classes were excluded from the analysis gave somewhat less optimistic results in terms of the estimated probabilities of recovery by 2018. However, these projections still predicted increases in spawning biomass for both recruitment scenarios, except for extreme increases in catch.

**Table 3.7 Probability of western Atlantic bluefin tuna achieving rebuilding target by 2018.** Source: ICCAT, 2004.

| | | | **High Recruitment Scenario** | |
|---|---|---|---|---|
| | | | | **$SSB_{MSY}$** |
| 500 | 95 % | 100 % | 98 % | 73 % |
| 1,000 | 89 % | 100 % | 96 % | 62 % |
| 1,500 | 77 % | 100 % | 87 % | 47 % |
| 2,000 | 60 % | 99 % | 75 % | 30 % |
| 2,300 | 45 % | 98 % | 66 % | 24 % |
| 2,500 | 35 % | 97 % | 60 % | 20 % |
| 2,700 | 26 % | 95 % | 52 % | 17 % |
| 3,000 | 14 % | 83 % | 38 % | 11 % |
| 5,000 | 0 % | 1 % | 2 % | 0 % |

#### 3.2.2.3 Effects of Regulations

The SCRS' management recommendation for the western Atlantic bluefin tuna management area is directed at the Rebuilding Program adopted by ICCAT in 1998. According to the Program, the MSY rebuilding target can be adjusted according to advice from SCRS. In 2002, ICCAT set the annual Total Allowable Catch (TAC), inclusive of dead discards, for the western Atlantic management area at 2,700 mt, effective beginning in 2003. The Program states that the TAC for the west would only be adjusted from the 2,500 mt level adopted for 2003 – 2004 if SCRS advises that (a) a catch of 2,700 mt or more has a 50 percent or greater probability of rebuilding or (b) a catch of 2,300 mt or less is necessary to have a 50 percent or greater probability of rebuilding.

The Program is designed with the intent to rebuild with 50 percent probability by 2018 to the spawning biomass level associated with MSY. In light of the uncertainty in the assessment, the choice between recruitment scenarios and rebuilding targets, and assumptions about mixing, the weight of scientific opinion within the SCRS favored no change from the current TAC of 2,500 mt per year. Projections based on the low recruitment scenario indicate that the TAC could be increased without violating the Rebuilding Program, assuming that relatively large recruitment estimates for some recent year classes are realistic. The high levels of recruitment estimated for some recent year classes are consistent with a higher biomass level as a rebuilding target. In previous assessment sessions, the spawning biomass level in 1975 was considered a useful rebuilding target. The 1975 biomass is more than twice the MSY spawning biomass level associated with the low recruitment scenario. The projections indicate a 35 – 60 percent probability of rebuilding to the 1975 spawning biomass level for a catch of 2,500 mt per year, depending on the recruitment scenario assumed. It seems likely that a recruitment scenario corresponding to a $SSB_{MSY}$ equal to the level in 1975 would indicate a probability of rebuilding by 2018 for a catch of 2,500 mt per year within the range of 35 – 60 percent.

The MSY spawning biomass associated with the high recruitment scenario, which is nearly twice the 1975 level, is unlikely to be reached by 2018 if the recent level of catch (and TAC) is maintained. However, the SCRS does not recommend the sharp reduction in TAC that would be necessary to comply with the rebuilding Program based on the high recruitment scenario because of:

- Uncertainty about the most appropriate recruitment scenario;
- Recognition that for the high recruitment scenario, the spawning biomass associated with MSY is not well determined (because estimation leads to extrapolation beyond biomass levels included within the current assessment); and
- The generally positive outlook for the resource according to the current assessment regardless of the recruitment scenario assumed.

As emphasized in previous assessments, mixing across management unit boundaries of fish of western and eastern origin could be important for management of the resource in both areas. In particular, the condition of the eastern Atlantic stock and fishery could adversely affect recovery in the West Atlantic, which was also noted in the SCRS's 1998, 2000, and 2001 reports. Therefore, the SCRS stressed the importance of continuing efforts to manage the fisheries in both the east and West Atlantic according to ICCAT's objectives.

The first regulatory measure for a scientific monitoring level was adopted for western Atlantic bluefin catches in 1981. Since then, monitoring levels have been changed in various years. Until 1987, both estimated catches and landings were below or equal to the level of the catch limits. However, from 1988 to 1997, estimated landings were very close to the level of the limits and, for some years, exceeded the limit by a maximum of 100 mt. Estimated catches (including discards) were higher than the limits every year during this period (by about 200 to 300 mt) with the exceptions of 1992 and 1997. The estimated catches exceeded the 2,500 mt limit in 2000 by 165 mt, by 218 mt in 2001, and by 715 mt in 2002. It should be pointed out that for compliance purposes, some countries (including the United States) are using fishing years that do not correspond to calendar years. Also, according to the ICCAT regulatory measure, the amount of catch that exceeded quota or was left over from the quota can be carried over to succeeding years. Hence, the catch limit set for each year could have been adjusted accordingly. The SCRS notes that the excess of the catch limits in most recent years is due to some new fisheries that operated without a quota.

For the West Atlantic, a size limit of 6.4 kg with 15 percent allowance, in number of fish, has been in effect since 1975. In addition, a prohibition on the taking and landing bluefin tuna less than 30 kg (or 115 cm) with an eight percent tolerance, by weight on a national basis, became effective in 1992. The SCRS notes that, since 1992, the proportion of undersized fish for all catches combined has been below the allowance level (*e.g.*, one percent and three percent <115cm in 2000 and 2001, respectively). Updated estimates will be available at the upcoming 2006 SCRS stock assessment.

The U.S. bluefin fishery continues to be regulated by quotas, seasons, gear restrictions, limits on catches per trip, and size limits. To varying degrees, these regulations are designed to restrict total U.S. landings and to conform to ICCAT recommendations. U.S. 2004 provisional estimated landings and discards from the northwest Atlantic (including the Gulf of Mexico), as reported by the United States to ICCAT in its annual National Report (NMFS 2005), were 899 mt and 71 mt, respectively. Those estimated landings and discards represent a decrease of 509 mt from the 2003 estimates. (Out of a total western Atlantic management area TAC of 2,700 mt, total reported catches were 2,191 mt in 2003 and about 2,000 mt in 2004). The 2004 United States landings by gear were: 32 mt by purse seine, 41 mt by harpoon, 1 mt by handline, 180 mt by longline (including discards) of which 103 mt were from the Gulf of Mexico, and 716 mt by rod and reel.

In response to 1992 regulations limiting the allowable catch of small fish by U.S. fishermen, in conformity with ICCAT agreements, enhanced monitoring of the rod and reel fishery was implemented in 1993 for the purpose of providing near real-time advice on catch levels by this fishery. This monitoring activity has continued and has included estimation of catches by finer scale size categories than reported above. The preliminary estimates for the 2004 rod and reel fishery off the northeastern United States (including the North Carolina winter fishery) for landings in several size categories were 264 fish < 66 cm, 10,193 fish 66-114 cm, 3,414 fish 115-144 cm, and 634 fish 145-177 cm (an estimated 1.5, 198, 142, and 49 mt, respectively), (NMFS 2005).

#### 3.2.2.4 Recent and Ongoing Research

As part of its commitment to the Bluefin Program, research supported by the United States has concentrated on ichthyoplankton sampling, reproductive biology, and methods to evaluate hypotheses about movement patterns, spawning area fidelity, stock structure investigations and population modeling analyses.

Ichthyoplankton surveys in the Gulf of Mexico during the bluefin spawning season were continued in 2004 and 2005. Data resulting from these surveys, which began in 1977, are used to develop a fishery-independent abundance index of spawning West Atlantic bluefin tuna. This index has continued to provide one measure of bluefin abundance that is used in SCRS assessments of the status of the resource. During the 2004 U.S. ichthyoplankton survey, a plankton net of a type used in the Spanish surveys was fished in addition to the nets normally used to determine the impact of using a wider net mouth and larger mesh on the size and catch rates of bluefin in the Gulf of Mexico. The results of this work will be reported as they become available. U.S. scientists also collaborated in development of the larval working group agenda for the Climate Impacts on Oceanic Top Predators (CLIOTOP) program managed by GLOBEC (Global Ocean Ecosystem Dynamics) initiated by SCOR and the IOC of UNESCO in 1991.

Since 1998, researchers from Texas A & M University and the University of Maryland with assistance of researchers from Canada, Europe, and Japan have studied the feasibility of using otolith chemical composition (microconstituents and isotopes) to distinguish bluefin stocks. Recent research has investigated the value of using additional microconstituent elements (transitional metals) to enhance classification success. By themselves the transitional metals provided little discriminatory power, but when combined with the other trace elements (for 13 elements in all), the classification success for several year-classes has been moderate ranging from 60 – 90 percent, and classification functions show strong year-to-year variability. In SCRS/2005/083 the utility of an alternative chemical marker in otoliths, carbon and oxygen stable isotopes, to discriminate bluefin tuna from natal regions were reported upon. The discriminatory power of stable isotopes ($\delta_{13}C$, $\delta_{18}O$) in otoliths of yearlings (age-1) was high, with 91 percent of individuals classified correctly to eastern and western nurseries. These stable isotopes and in particular $\delta_{18}O$ can be used to reliably predict nursery origin of Atlantic bluefin tuna. An initial application compared otolith core material (corresponding to the first year of life) of large school, medium, and giant category bluefin tuna to reference samples of yearling signatures to determine their origin. A large fraction (~43 – 64 percent) of the Atlantic bluefin tuna collected in the western Atlantic fishery (comprised primarily of large school and medium category fish) originated from nurseries in the east. Alternatively, medium and giant category bluefin tuna from the Mediterranean were largely (~82 – 86 percent) of eastern origin. Thus, initial evidence suggests that the western fishery received high input from the Mediterranean population. (See generally SCRS/2003/105, and Rooker et al 2001a, 2001b and 2003).

Scientists from the University of Maryland, Virginia Institute of Marine Science, and Texas A&M University have continued to sample specimens for genetic and otolith chemistry studies of stock structure. Roughly 10 – 20 young of the year were collected in 2004. In addition, limited sampling of ages 1 and older continues. Efforts are also continuing to obtain samples from juveniles and mature bluefin from the Mediterranean Sea and adjacent waters.

In response to the ICCAT Commission's request for options for alternative approaches for managing mixed populations of Atlantic bluefin tuna, SCRS/2005/108 further examined some implications of incorporating electronic tagging information on transfer rates into virtual population analyses. SCRS/2005/084 examined yield and spawner per recruit consequences of different assumed levels of mixing between eastern and western bluefin stocks to provide guidance to the Commission as requested at the 3rd Meeting of Working Group to Develop Coordinated and Integrated Bluefin Tuna Management Strategies. Researchers at the Imperial College, London, continue work with the University of Miami, the University of New Hampshire and the National Marine Fisheries Service to develop methods to estimate bluefin movement and fishing mortality rate patterns (SCRS/2005/048). Operating models are being developed which will use conventional and electronic tagging data and fishing effort by management area. These models will be used to examine possible harvest control rules and the evaluation of possible management procedures.

U.S. scientists from Stanford and Duke University along with the Monterey Bay Aquarium and NMFS have placed over 700 electronic tags in bluefin tuna in the region along the U.S. coast of North Carolina. The data from implantable archival tags has been critical for establishing the basic biology of Atlantic bluefin and the patterns of movements to feeding and breeding grounds. Results from a large number of these tags were interpreted in a paper in the journal Nature in 2005 (Block *et al.* 2005). Tagging off the Carolinas, in the Gulf of Maine, and elsewhere continued in 2004 and 2005 and more than 90 tags were placed in fish off the Carolinas in 2005. The tags are due to report 7 – 9 months from the deployment dates and will be further reported upon as results become available.

U.S. scientists from the University of New Hampshire have placed over 200 pop-up satellite archival tags on New England bluefin tuna. Ongoing efforts include examining short and long-term dispersals of bluefin in the Gulf of Maine, the identification of spawning grounds, the spatial correlation between bluefin locations and oceanographic features and continuing to determine Atlantic-wide migratory paths. Results from much of this tagging effort were recently published in the journal Marine Biology (Wilson, *et.al.* 2005).

A new research initiative in 2005 involving scientists from the University of New Hampshire, the Virginia Institute of Marine Science, and Virginia SeaGrant will place electronic tags on juvenile bluefin from off the U.S. coast of Virginia. As results become available, they will be reported upon.

A recent publication by Fromentin and Powers (2005), titled "Atlantic bluefin tuna: population dynamics, ecology, fisheries and management" provides an extensive summary of old and new information on the biology and ecology of Atlantic bluefin tuna and associated fishery management implications. The abstract reads as follows:

> "Both old and new information on the biology and ecology of Atlantic bluefin tuna have confronted scientists with research challenges: research needs to be connected to current stock-assessment and management issues. We review recent studies on habitat, migrations and population structure, stressing the importance of electronic tagging results in the modification of our perception of bluefin tuna population dynamics and behavior. Additionally, we question, from both scientific and management perspectives, the usefulness of the classical stock concept and suggest other approaches, such as Clark's contingent and metapopulation theories. Current biological information confirms that a substantial amount of uncertainty still exists in the understanding of reproduction and growth. In particular, we focus on intriguing issues such as the difference in age-at-maturity between West Atlantic and Mediterranean bluefin tuna. Our description of Atlantic bluefin tuna fisheries places today's fishing patterns within the two millennium history of exploitation of this species: we discuss trap fisheries that existed between the 17th and the early 20th centuries; Atlantic fisheries during the 1950s and 1960s; and the consequences of the recent development of the sushi–sashimi market. Finally, we evaluate stock status and management issues since the early 1970s. While important

uncertainties remain, when the fisheries history is confronted with evidence from biological and stock-assessment studies, results indicate that Atlantic bluefin tuna has been undergoing heavy overfishing for a decade. We conclude that the current exploitation of bluefin tuna has many biological and economic traits that have led several fish stocks to extreme depletion in the past."

In 1982, ICCAT established a line separating the eastern and western Atlantic management units based on discontinuities in the distribution of catches at that time in the Atlantic and supported by limited biological knowledge. The United States is allocated quota from the western Atlantic management unit where the U.S. fisheries primarily occur. However, the overall distribution of the catch in the 1990s is much more continuous across the North Atlantic than was seen in previous decades. Tagging evidence indicates that movement of bluefin across the current east/west management boundary in the Atlantic does occur, that movements can be extensive (including trans-atlantic) and complex, that there are areas of concentration of electronically tagged fish (released in the west) in the central North Atlantic just east of the management boundary, and that fisheries for bluefin tuna have developed in this area in the last decade. At least some of these fish have moved from west of the current boundary.

Complementary studies, which might show east to west movement, are less advanced. The composition and natal origin of these fish in the central North Atlantic area are not known. The SCRS emphasizes that "it is clear that the current boundary does not depict our present understanding of the biological distribution and biological stock structure of Atlantic bluefin tuna." The SCRS also notes that "the current boundary is a *management* boundary and its effectiveness for management is a different issue."

There has been an accumulation of evidence on bluefin tuna mixing in the last few years through the collection of tagging data and its examination through the modeling of mixing scenarios for evaluating their effect on management. However, the origin of fish older than one year still remains unknown. Mixing results were reviewed in 2001 by the Workshop on Bluefin Tuna Mixing. This research led to a long-term plan for modeling finer scale spatial mixing and to short-term strategies for assessment to assist the advice for management. The data and research were reviewed again in 2002.

ICCAT, at its 2002 Meeting in Bilbao, called for a *Working Group to Develop Integrated and Coordinated Atlantic Bluefin Tuna Management Strategies,* which met in 2003 and again in 2004. In response to the recommendations from these meetings, the SCRS is developing a revised proposal for initiating a coordinated Bluefin Tuna Research Program to address priority research and data needs for providing scientific advice to ICCAT related to revised management procedures for bluefin tuna. Uncertainty exists regarding the importance and impacts of mixing on western stocks. The most important uncertainty regarding management advice by the SCRS for the eastern stock is the uncertainty in the catch data that are being taken.

More than 20 scientific documents related to bluefin tuna biology were presented to the 2005 SCRS. Many of the contributions dealt with the important issue of stock structure and mixing, and new information is available for both stocks. In particular, studies of otolith microchemistry and genetics have resulted in advances in our understanding of this component of the biology of bluefin tuna. These results continue to advance our knowledge about the overlapping distribution of fish originating from the east and the west. Therefore, the SCRS continues to question present hypotheses on stock identification. While these results are promising, more complete sampling and development of appropriate analytical approaches are required. The SCRS also received contributions relating to age and growth, sampling, parasitology and condition of bluefin tuna.

### 3.2.3 Atlantic BAYS Tuna

All text, figures and tables for this Section are from the SCRS 2004 and 2005 Reports and the U.S. National Report to ICCAT, 2005. All weights are reported as whole weights unless indicated as otherwise.

#### 3.2.3.1 Atlantic Bigeye Tuna

*Life History and Species Biology*

The geographical distribution of bigeye tuna is very wide and covers almost the entire Atlantic Ocean between 50°N and 45°S. This species is able to dive deeper than other tuna species and exhibits extensive vertical movements. Similar to the results obtained in other oceans, pop-up tagging and sonic tracking studies conducted on adult fish in the Atlantic has revealed that they exhibit clear diurnal patterns being much deeper in the daytime than at night. Spawning takes place in tropical waters when the environment is favorable. From the nursery areas in tropical waters, juvenile fish tend to diffuse into temperate waters as they grow larger. Catch information from the surface gears indicate that the Gulf of Guinea is a major nursery ground for this species.

Dietary habits of bigeye tuna are varied such that prey organisms like fish, mollusks, and crustaceans are found in stomach contents. A growth study based on otolith and tagging data resulted in the adoption by the SCRS of a new growth curve (Report of the SCRS, 2004). The curve shows bigeye tuna exhibit relatively fast growth: about 105 cm in fork length at age three, 140 cm at age five, and 163 cm at age seven. Bigeye tuna become mature at about age three and a half. Young fish form schools mostly mixed with other tunas such as yellowfin and skipjack. These schools are often associated with drifting objects, whale sharks, and sea mounts. This association appears to weaken as bigeye tuna grow larger. An estimate of natural mortality (M) for juvenile fish was provided based on the results of a tagging program. According to this study, mortality for juvenile fish only is at a similar level of M as that currently used for the entire Atlantic stock as well as the level of M used for all other oceans. Various evidence including a genetic study, the time-area distribution of fish, and movements of tagged fish suggest an Atlantic-wide single stock for this species, which is currently accepted by the SCRS. However, the possibility of other scenarios, such as north and south stocks, should not be disregarded.

*Stock Status and Outlook*

ICCAT's SCRS conducted a new stock assessment for bigeye tuna in July 2004 using various types of models. However, there were considerable sources of uncertainty arising from the lack of information regarding (a) reliable indices of abundance for small bigeye from surface fisheries, (b) the species composition of Ghanaian fisheries that target tropical tunas, and (c) details on the historical catch and fishing activities of Illegal, Unregulated, Unreported (IUU) fleets (*e.g*., size, location and total catch).

Three indices of relative abundance were available to assess the status of the stock (Figure 3.6). All were from longline fisheries conducted by Japan, Chinese Taipei, and United States. While the Japanese indices have the longest duration since 1961 and represent roughly 20 – 40 percent of the total catch, the other two indices are shorter and generally account for a smaller fraction of the catch than the Japanese fishery. These three indices primarily relate to medium and large-size fish.

Various types of production models were applied to the available data and the SCRS notes that the current year's model fits to the data were better than in past assessments, although they required similar assumptions regarding stock productivity. The point estimates of MSY obtained from different production models ranged from 93,000 mt to 113,000 mt. The lower limit of this range is higher than the one estimated in the 2002 assessment, probably due to the revised indices and the addition of a new index. An estimate obtained from another age-aggregated model was 114,000 mt. The inclusion of estimation uncertainty would broaden this range considerably.

These analyses estimate that the total catch was larger than the upper limit of MSY estimates for most years between 1993 and 1999, causing the stock to decline considerably, and leveling off thereafter as total catches decreased. These results also indicate that the current biomass is slightly below or above (85 – 107 percent) the biomass at MSY (Figure 3.7), and that current fishing mortality is also in the range of 73 percent to 101 percent of the level that would allow production of MSY (Table 3.8). However, indications from the most targeted and wide-ranging fishery are of a more pessimistic status than implied by these model results. Several types of age-structured analyses were conducted using the above-mentioned longline indices from the central fishing grounds and catch-at-age data converted from the available catch-at-size data. In general, the trajectories of biomass and fishing mortality rates are in accordance with the production model analyses. Model fits appeared improved over those of past assessments, apparently as a result of using a new growth curve for the calculation of catch at age.

The most noteworthy trend in fisheries observed is the general declining trend in catches for all gears after a high peak (121,000 mt) in 1999. After that, the total annual catch has steadily declined to a current low of 72,000 mt for 2004. The decline of longline catch is mostly attributable to the decrease of Japanese and estimated IUU catches while the other country/entity's catches are generally maintained. Other gears (purse seine and baitboat) also indicated a similar but more variable decline. The decline of the Japanese catch is related to the reduced fishing effort as well as the declined CPUE in the major fishing grounds in tropical waters.

Among the fisheries catching bigeye, two changes are noted. One is an increase in catch from the northern Islands (Azores and Madeira) area due to baitboat fisheries after four years of low catch for 2000 – 2003. Another change is also observed for the fishing area of Japanese longline fishery. Since around 2001, some of the fleet had operated in central north Atlantic between 25°N – 35°N and 40°W – 75°W. In addition to the above changes in fisheries, several countries increased their individual catch levels in 2004, although the overall catch total did not significantly increase. Such increases are reported for Philippines (1,850 mt), Venezuela (1,060 mt) and Korea (630 mt). The current reported catch of Chinese Taipei for 2003 is considered under-estimated. Chinese Taipei will re-estimate the bigeye catch for 2003 in near future. The new estimate is expected to be higher than the current reported catch.

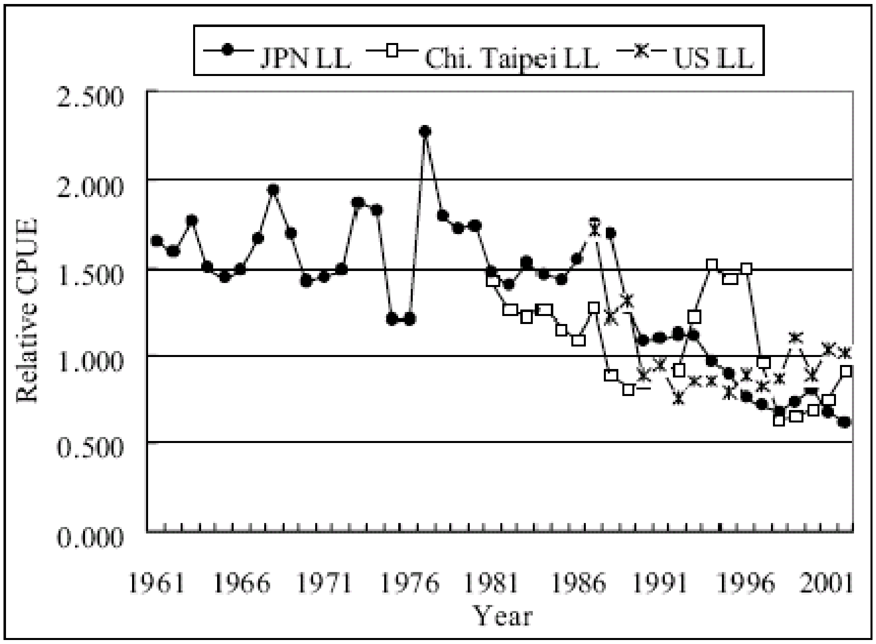



**Figure 3.6 Abundance indices in numbers of BET. All ages are aggregated.** Source: ICCAT, 2004.

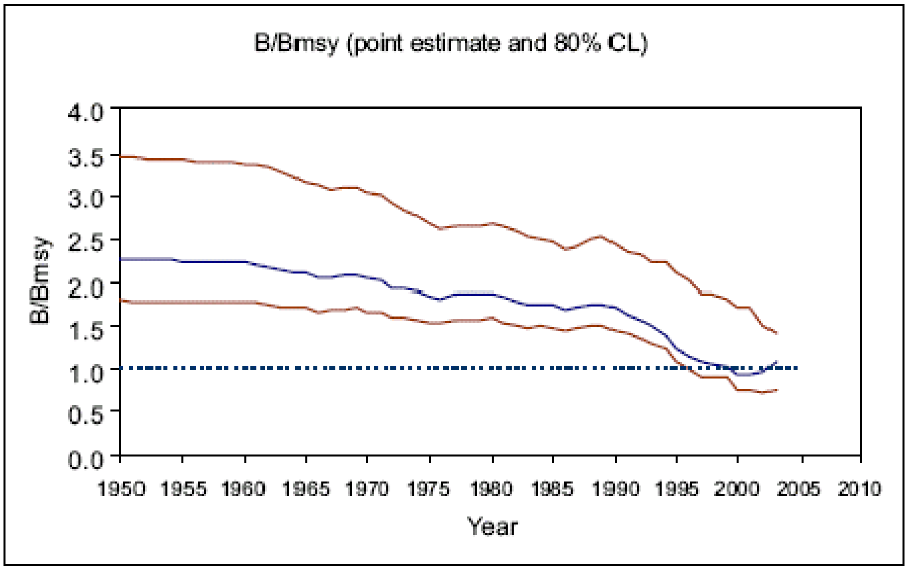



**Figure 3.7** **Trajectory of the BET biomass modeled in production model analysis (middle line) bounded by upper and lower lines denoting 80 percent confidence intervals.** Source: ICCAT, 2004.

**Table 3.8** **Summary Table for the Status of Atlantic Bigeye Tuna.** Source: ICCAT, 2005.

| | |
|---|---|
| **Age/size at Maturity** | Age 3/~100 cm curved fork length |
| **Spawning Sites** | Tropical waters |
| **Current Relative Biomass Level**<br><br>*Minimum Stock Size Threshold* | $B_{03}/B_{MSY}$ = 0.85 - 1.07<br><br>$0.6B_{MSY}$ (age 2+) |
| **Current Relative Fishing Mortality Rate**<br><br>*Maximum Fishing Mortality Threshold* | $F_{02}/F_{MSY}$ = 0.73-1.01<br><br>$F_{year}/F_{MSY}$ = 1.00 |
| **Maximum Sustainable Yield** | 93,000 - 114,000 mt |
| **Current (2004) Yield** | 72,000 mt |
| **Current (2003) Replacement Yield** | 89,000 - 103,000 mt |
| **Outlook** | Overfished; overfishing is occurring |

This assessment indicated that the stock has declined due to the large catches made since the mid-1990s to around or below the level that produces the MSY, and that fishing mortality exceeded $F_{MSY}$ for several years during that time period. Projections indicate that catches of more than 100,000 mt will result in continued stock decline. ICCAT should be aware that if major countries were to take the entire catch limit set under the ICCAT Recommendations and other countries were to maintain recent catch levels, then the total catch could exceed 100,000 mt. The SCRS highly recommended that catch levels of around 90,000 mt or lower be maintained at least for the near future for ICCAT to rebuild the stock.

*Effects of Regulations*

The bigeye minimum size regulation of 3.2 kg (Recommendation 79-01) was adopted in 1980 to reinforce the same regulation for yellowfin, and was in effect until 2004. The Committee did not evaluate this regulation at this time. However, the recommendation regarding the minimum size regulation was dropped as it was not feasible to sort the undersized bigeye and yellowfin tuna from purse seine and bait-boat catch mixed with regulation sized small skipjack without large quantities of dead discards of small bigeye and yellowfin tuna. Conversely strict enforcement of the regulation would have likely meant the closure of one of the largest tuna fisheries in the Atlantic. While the measure was in effect, it is believed that a large quantity (around 50 percent in total number of fish) of juvenile bigeye tuna smaller than 3.2 kg was caught in 2004 as well, because there are no substantial changes in the fisheries (the equatorial surface fleets) that account for most of the juvenile catch.

ICCAT asked the SCRS to examine the impact on stocks of the current minimum size regulation (bigeye tuna Recommendation 04-01). At the same time, ICCAT also asked the SCRS to recommend the necessary modifications that would improve its effectiveness as well as to review possible modifications to be applied to the closure. Although the new regulation has not been implemented yet, the SCRS met to provide a response to the Commission.

Previous yield-per-recruit and spawner-per-recruit analyses highlighted the potential importance of reducing fishing mortality on small fish. However, the percentage of fish caught less than this minimum size (3.2 kg) is very high (46 – 62 percent of the total fish caught) since 1989. The SCRS, therefore, recommends the full implementation of the moratorium on Fish Aggregation Device (FAD) fishing by all surface fisheries in the Gulf of Guinea. The moratorium on FAD fishing by surface gears in the Gulf of Guinea were observed by all fishing sectors, including Ghanaian surface fleet during 2004/2005 season. However, available purse seine catch and effort data indicated significant fishing on FADs in the moratorium area.

Limiting the annual catch to the average catch in two years of 1991 and 1992 entered into force for the major fishing countries whose 1999 catch reported to the 2000 SCRS was larger than 2,100 mt (Recommendation 01-01). The 2003 and 2004 total reported catch for the major countries and fishing entities to which the catch limit applies (EC-Spain, EC-France, EC-Portugal, Japan, Ghana, China and Chinese Taipei) were 67,000 mt and 59,500 mt, respectively. These were much lower than the total catch limit (84,200 mt) for these counties/entities. As a whole, the total catch in 2003 and 2004 for all countries is about 12,000 mt and 24,000 mt lower than the average total catch of 1991 and 1992 (96,000 mt).

Total reported U.S. bigeye tuna catches and landings (preliminary) for 2004 decreased by 69 mt from 483 mt in 2003 to 414 mt. Note that like yellowfin tuna, the estimates of rod and reel catch are considered provisional and may be revised based on results of a future review of recreational harvest estimates.

The SCRS noted its appreciation for the effort made by ICCAT in establishing the Statistical Document Program for bigeye tuna and expressed hope that the data to be submitted to the Secretariat will be useful to improve estimates of unreported catches. The SCRS also stated its appreciation regarding the initiatives to reduce the IUU activities taken by several fishing authorities. These efforts are helpful in identifying and reducing the unreported catches in the Atlantic and will make the catch limit regulation more effective, and thus will contribute to reduce uncertainties in the bigeye stock assessment. As far as the IUU catches of bigeye tuna are concerned, they are almost disappearing according to the available estimates. Nevertheless, the SCRS expressed concern that unreported catches may have been underestimated.

*Recent and Ongoing Research*

In addition to monitoring catch and effort statistics for tropical tunas that include bigeye tuna, United States scientists participated in the 2005 ICCAT Workshop on Methods to Reduce Mortality of Juvenile Tropical Tunas, held in Madrid from 4 – 8 July, 2005. Document SCRS/2005/063 used the ICCAT Task 2 catch and effort data to estimate expected changes in the catches of tropical tunas attributable to replacing the current moratorium with a time-area closure (Recommendation 04-01). The results indicate that catches of tropical tunas are expected to increase substantially if the time-area closure replaces the current moratorium. Considering that the current ICCAT hypothesis is that purse-seine fleet efficiency gains three percent per year, the net change could in fact be a large overall increase to levels above the pre-moratoria fishing mortality rate levels. SCRS/2005/079 explored the expectations for catches of undersized bigeye tuna considering the agreement reached in Recommendation 04-01. In all cases examined, total catches can be expected to increase from 5.5 to 6.7 percent as a result of Recommendation 04-01, and catches of bigeye tuna can be expected to increase from 16 to 22.1 percent. In all cases, catch of juvenile bigeye tuna increases.

U.S. scientists from the University of Miami's Rosenstiel School of Marine and Atmospheric Science continue to collaborate with EC scientists on the EU-funded assessment and management modeling project titled Framework for the Evaluation of Management Strategies (FEMS) project, on management strategy evaluations related to tropical tuna fisheries.

#### 3.2.3.2 Atlantic Yellowfin Tuna

*Life History and Species Biology*

Yellowfin tuna is a cosmopolitan species distributed mainly in the tropical and subtropical oceanic waters of the three oceans, where they form large schools. The sizes exploited range from 30 cm to 170 cm fork length (FL). Smaller fish (juveniles) form mixed schools with skipjack and juvenile bigeye tuna, and are mainly limited to surface waters, while larger fish are found in surface and sub-surface waters. The majority of the long-term recoveries of tagged fish have been tagged in the western Atlantic and recovered in the eastern Atlantic, where several recaptures are recorded each year.

Sexual maturity occurs at about 100 cm FL. Reproductive output among females has been shown to be highly variable, although the extent of this is unknown. The main spawning ground is the equatorial zone of the Gulf of Guinea, with spawning occurring from January to April. Juveniles are generally found in coastal waters off Africa. In addition, spawning occurs in the Gulf of Mexico, in the southeastern Caribbean Sea, and off Cape Verde, although the relative importance of these spawning grounds is unknown.

Although such separate spawning areas might imply separate stocks or substantial heterogeneity in the distribution of yellowfin tuna, a single stock for the entire Atlantic is assumed as a working hypothesis (Atlantic Yellowfin Working Group, Tenerife, 1993). This hypothesis indicates yellowfin are distributed continuously throughout the entire tropical Atlantic Ocean by taking into account tagging data showing transatlantic migration (from west to east), a 40-year time series of longline catch data, and other information such as time-area size frequency distributions and locations of fishing grounds).

Growth patterns are variable with size, being relatively slow initially, and increasing by the time the fish leave the nursery grounds. Males are predominant in the catches of larger sized fish. Natural mortality is assumed to be higher for juveniles than for adults. Tagging studies for Pacific yellowfin supports this assumption.

*Stock Status and Outlook*

A full assessment was conducted by the SCRS/ICCAT for yellowfin tuna in 2003 applying various age-structured and production models to the available catch data through 2001.

The variability in overall catch-at-age is primarily due to variability in catches of ages zero and one (note that the catches in numbers of age zero and especially age one were particularly high during the period 1998 – 2001). Both equilibrium and non-equilibrium production models were examined in 2003 and the results are summarized in Table 3.9. The estimate of MSY based upon the equilibrium models ranged from 151,300 to 161,300 mt; the estimates of $F_{2001}/F_{MSY}$ ranged from 0.87 to 1.29. The point estimates of MSY, based upon the non-equilibrium models, ranged from 147,200 – 148,300 mt. The point estimates for $F_{2001}/F_{MSY}$ ranged from 1.02 to 1.46. The main differences in the results were related to the assumptions of each model. The SCRS was unable to estimate the level of uncertainty associated with these point estimates. An age-structured virtual population analysis (VPA) was made using eight indices of abundance. The results from this model were more comparable to production model results than in previous assessments, owing in part to a greater consistency between several of the indices used. The VPA results compare well to the trends in fishing mortality and biomass estimated from production models. The VPA estimates that the spawning biomass (Table 3.7) and the levels of fishing mortality (Table 3.8) in recent years have been very close to MSY levels. The estimate of MSY derived from these analyses was 148,200 mt.

In summary, the age-structured and production model analyses implied that although the 2001 catches of 159,000 mt were slightly higher than MSY levels, effective effort may have been either slightly below or above (up to 46 percent) the MSY level, depending on the assumptions. Consistent with these model results, yield-per-recruit analyses also indicated that 2001 fishing mortality rates could have been either above or about the level which could produce MSY. Yield-per-recruit analyses further indicated that an increase in effort is likely to decrease the yield-per-recruit, while reductions in fishing mortality on fish less than 3.2 kg could result in substantial gains in yield-per-recruit and modest gains in spawning biomass-per-recruit.

**Table 3.9 Summary Table for the Status of Atlantic Yellowfin Tuna.** Source: ICCAT, 2005.

| | |
|---|---|
| **Age/size at Maturity** | Age 3/~110 cm curved fork length |
| **Spawning Sites** | Tropical waters |
| **Relative Biomass Level**<br><br>*Minimum Stock Size Threshold* | $B_{01}/B_{MSY}$ = 0.73 - 1.10<br><br>$0.5B_{MSY}$ (age 2+) |
| **Relative Fishing Mortality Rate**<br><br>*Maximum Fishing Mortality Threshold* | $F_{01}/F_{MSY}$ = 0.87 - 1.46<br><br>$F_{year}/F_{MSY}$ = 1.00 |
| **Maximum Sustainable Yield** | ~ 148,000 mt |
| **Current (2004) Yield** | 116,000 mt |
| **Replacement Yield (2001)** | May be somewhat below the 2001 yield (159,000 mt) |
| **Outlook** | Approaching an overfished condition |

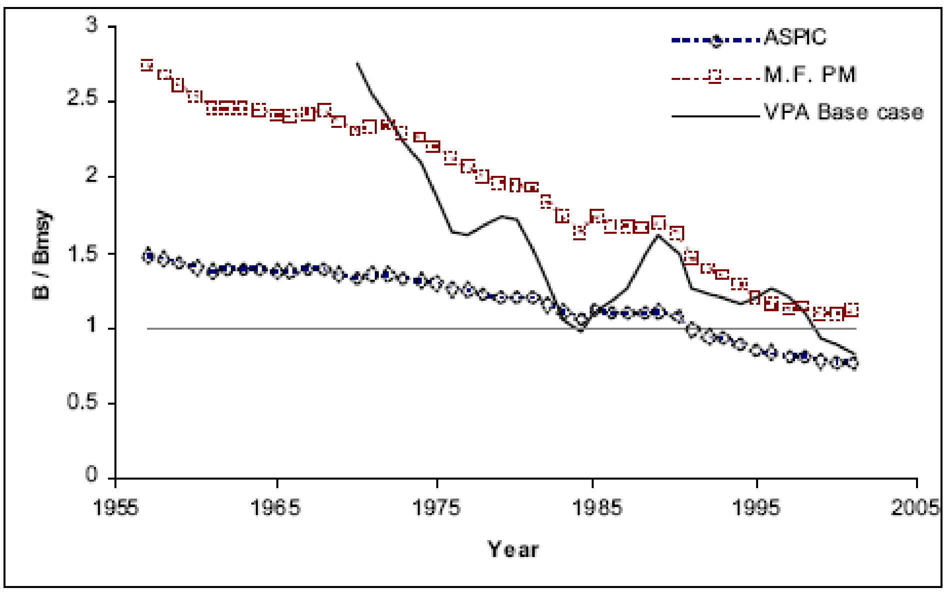



**Figure 3.8 Comparison of relative biomass trends calculated using VPA and non-equilibrium production models.** Source: ICCAT, 2004.

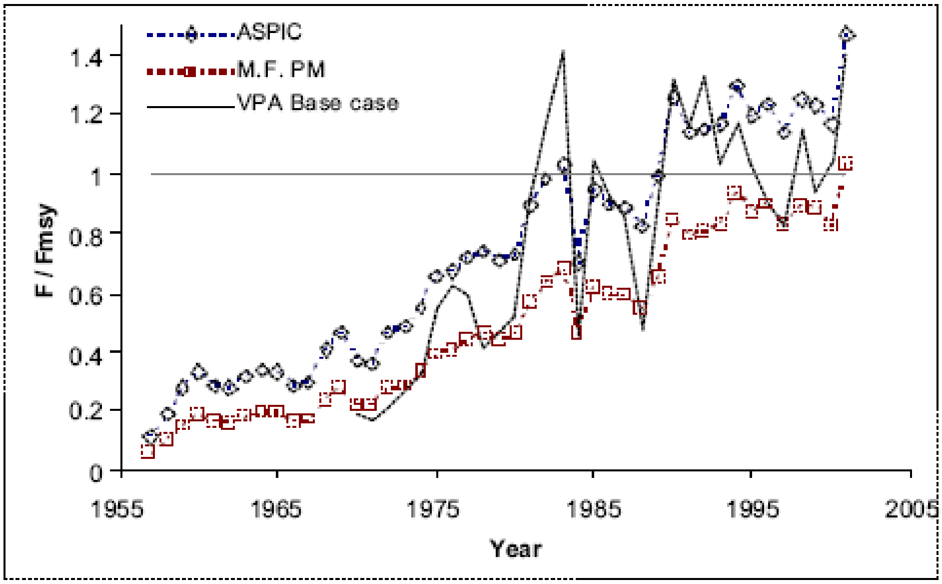



**Figure 3.9 Comparison of relative fishing mortality trends calculated using VPA and non-equilibrium production models.** Source: ICCAT, 2004.

In contrast to the increasing catches of yellowfin tuna in other oceans worldwide, there has been a steady decline in overall Atlantic catches since 2001. Atlantic surface fishery catches have shown a declining trend from 2001 to 2004, whereas longline catches have increased. In the eastern Atlantic, purse seine catches declined from 89,569 mt in 2001 to 58,632 mt in 2004, a 35 percent reduction. Baitboat catches declined by 23 percent, from 19,886 mt to 15,277 mt. This decrease is almost entirely due to reduced catches by Ghana baitboats, which resulted from a combination of reduced days fishing, a lower number of operational vessels, and the observance of the moratorium on fishing using floating objects. Catches by other baitboat fleets were generally increasing. In the western Atlantic, with the majority of the landings reported by the United States, Mexico, Venezuela, Brazil and St. Vincent and Grenadines, purse seine catches declined from 13,072 mt to 3,217 mt, a 75 percent reduction. In addition, baitboat catches also declined by eight percent from 7,027 mt to 6,735 mt. However, for the same time period, longline catches were increasing. In the eastern Atlantic, longline catches increased from 5,311 mt to 10,851 mt, a 104 percent increase. In the western Atlantic, longline catches increased from 12,740 mt to 15,008 mt, an 18 percent increase.

At the same time, the nominal effort in the purse seine fishery was declining. As an indicator, the number of purse seiners from the European and associated fleet operating in the Atlantic declined from 46 vessels in 2001 to 34 vessels in 2004. On the other hand, the European and associated baitboat fleet increased from 16 to 22 vessels during the same period. Of the relevant scientific documents presented to the 2005 SCRS, most were descriptive of the catches by country fleets. Three papers discussed observer programs in Ghana, Uruguay, and Spain, and three papers analyzed catches in the context of the moratorium. No new standardized catch rate information has been presented since the last assessment. However, examination of nominal catch rate trends from purse seine data suggest that catch-per-unit effort was stable or possibly declining since 2001 in the East Atlantic, and was clearly declining in the West Atlantic.

Since effort efficiency was estimated to have continued to increase, adjustments for such efficiency change would be expected to result in a steeper decline. Also, the average weights in European purse seine catches have been declining since 1994, which is at least in part due to changes in selectivity associated with fishing on floating objects.

Recent signals in the fishery data could result in a substantially different evaluation of stock status than that which is summarized above. It is important that the next assessment take these and other indicators (such as age of vessels and any loss of regional yellowfin fisheries) into account.

*Effects of Regulations*

Estimated catches of yellowfin tuna have averaged 141,000 mt over the past three years. This average falls near the lower estimate of the range of MSY from the age-structured and production model analyses conducted during the 2003 assessment. The SCRS considers that the yield of 159,000 mt in 2001 is likely somewhat above the replacement yield and those levels of fishing effort and fishing mortality may have been near MSY. Total catches since 2001 have been declining, but without a new assessment the SCRS in 2005 reaffirms its support for ICCAT's 1993 recommendation "that there be no increase in the level of effective fishing effort exerted on Atlantic yellowfin tuna, over the level observed in 1992." (During the 2003 assessment, the SCRS' estimates of effective fishing effort for recent years fell near the estimate for 1992).

In 1973, ICCAT adopted a regulation that imposed a minimum size of 3.2 kg for yellowfin tuna, with a 15 percent tolerance in the number of undersized fish per landing. This regulation has not been adhered to internationally, as the proportion of landings of yellowfin tuna less than 3.2 kg has been far in excess of 15 percent per year for the purse seine and baitboat fisheries. Based on the catch species composition and catch-at-size data available during the 2003 assessment, yearly catches in number ranged between 54 percent and 72 percent undersized yellowfin tuna by purse seiners and from 63 percent to 82 percent undersized fish for baitboats over the period 1997 – 2001. Landings of undersized fish occur primarily in the equatorial fisheries. Unfortunately, it is difficult to realize substantial reductions in catches of undersized fish in these fisheries because small yellowfin tuna are mostly associated with skipjack tuna, especially when fishing occurs on floating objects; thus it is difficult to avoid catching small yellowfin when catching skipjack, the latter being an important component of eastern Atlantic (equatorial) purse seine fleet catches.

Unfortunately, the use of minimum size limits as a means of reducing the mortality of juvenile tuna remains extremely problematic in this fishery for several reasons which are described in detail in "Report of the 2005 ICCAT Workshop on Methods to Reduce Mortality of Juvenile Tropical Tunas (Madrid, July 4 – 8, 2005)." In accordance with the Committee's current recommendation, any minimum size limit (or lack thereof) should be consistent for all species in a multi-species fishery. It follows that, since the minimum size limit for bigeye tuna has been eliminated, the minimum size limit for yellowfin tuna should likewise be eliminated. Notwithstanding this, the protection of juvenile tunas may be important and alternative approaches to accomplish this should be studied.

In 1993, ICCAT recommended "that there be no increase in the level of effective fishing effort exerted on Atlantic yellowfin tuna, over the level observed in 1992." As measured by fishing mortality estimates from the 2003 assessment, effective effort in 2001 appeared to be approaching or exceeding the 1992 levels. Since the relatively high catch levels of 2001 (159,000 t), catches have declined each year to a current level of 116,000 mt, a reduction of 27 percent. (Estimates of total yellowfin landings in 2002 and 2003, which were not available at the time of the assessment, are 139,000 mt and 124,000 mt, respectively). A potential explanation for this decline is the reduction in purse seine effort, but until a full assessment is conducted it is not possible to confirm this, since declines in nominal catch rates could suggest decreases in abundance or availability. Although the catches have been declining since 2001, as has the nominal effort of the purse seiners, the trend in effective effort is not clear.

Yellowfin tuna is listed as approaching an overfished condition by the United States. Several management measures have been implemented in the United States, consistent with ICCAT advice to limit fishing effort and to prevent overfishing. In 1999, NMFS implemented limited access in the pelagic longline fishery for Atlantic tunas, as well as a recreational retention limit for yellowfin tuna. The United States has also maintained its minimum size limit for YFT of 27" which was greater than that recommended by ICCAT before the organization repealed the recommendation.

Yellowfin tuna is the principal species of tropical tuna landed by U.S. fisheries in the western North Atlantic. Total estimated landings decreased to 6,500 mt in 2004, from the 2003 landings estimate of 7,702 mt. The 2004 estimate is considered provisional and may change owing to incorporation of late reports of commercial catches as they become available and to possible revisions in estimates of rod and reel catches made by recreational anglers. A high proportion of the estimated landings were due to rod and reel catches of recreational anglers in the NW Atlantic (3,434 mt). Estimates of U.S. recreational harvests for tuna and tuna-like species continue to be reviewed and this may result in the need to report additional revisions to the available estimates in the future.

*Recent and Ongoing Research*

In addition to the United States research findings for tropical tunas discussed above under bigeye tuna, one document was presented to the SCRS in 2005 that gave an overview of fishery trends and stock status for yellowfin tuna worldwide. It was noted that the natural mortality vector used by ICCAT in the Atlantic, while the same as that used by the IOTC for the Indian Ocean, is lower than is used by other scientific bodies for other oceans, particularly for the youngest ages. It was further noted that more recent information and methodologies may be available to potentially improve the estimates of natural mortality. Another document considered the estimation of natural mortality from multi-species tagging data. Due to limitations in the data (such as unbalanced design and different size distributions of released fish) and potential fishing differences between fleets, conclusions were limited to ratios of total mortality between fishing periods rather than any direct statement about natural mortality. Considering the importance of natural mortality estimates in the assessment of the stock, the improvement of natural mortality estimates remains a high research priority. It was noted that future stock assessments should include an evaluation of the sensitivity of results to the uncertainty in natural mortality estimates. Differences were also noted for other biological parameters used by the various scientific bodies, such as growth and maturity vectors, the extent to which these differences reflect estimation methodology, data quality, or real differences between stocks warrants investigation.

#### 3.2.3.3 Atlantic Albacore Tuna

*Life History and Species Biology*

Albacore is a temperate tuna widely distributed throughout the Atlantic Ocean and Mediterranean Sea. For assessment purposes, the existence of three stocks is assumed based on available biological information: northern and southern Atlantic stocks (separated at 5ºN), and a Mediterranean stock. Albacore spawning areas in the Atlantic are found in subtropical western areas of both hemispheres and throughout the Mediterranean Sea. Spawning takes place during austral and boreal spring-summer. Sexual maturity is considered to occur at about 90 cm FL (age five) in the Atlantic, and at smaller size (62 cm, age two) in the Mediterranean. Until this age, they are mainly found in surface waters, where they are targeted by surface gears. Some adult albacore are also caught using surface gears but, as a result of their deeper distribution, they are mainly caught using longlines. Young albacore tuna are also caught by longlines in temperate waters.

*Stock Status and Outlook*

The last assessment of the northern stock by ICCAT/SCRS was conducted in 2000, using data from 1975 to 1999, and that of the southern stock in 2003; no assessment of the Mediterranean stock has ever been carried out. To coordinate the timing of the assessments of northern and southern albacore tuna, the stock assessment for northern albacore was postponed at the 2004 ICCAT meeting from 2006 to 2007 (note the management measures for northern albacore expire at the end of 2006). The SCRS noted the considerable uncertainty that continues to remain in the catch-at-size data for the northern and southern stocks, and the profound impact this has had on attempts to complete a satisfactory assessment of northern albacore tuna.

<u>North Atlantic</u>

In 2003, the SCRS concluded that it was inappropriate to proceed with a VPA assessment based on the catch-at-age until the catch-at-size to catch-at-age transformation is reviewed and validated. In 2005, a document was presented on the analyses of catch-at-size and identifying the source of bias in the catch-at-age of the North Atlantic albacore stock. The SCRS recommends holding a data preparatory working group meeting to allow for a thorough revision of the North Atlantic stock prior to the next assessment in 2007. Consequently, the current state of the northern albacore stock is based primarily on the last assessment conducted in 2000 together with observations of CPUE and catch data provided to the SCRS in 2003. The results, obtained in 2000, showed consistency with those from previous assessments (Table 3.10).

The SCRS noted that CPUE trends have varied since the last assessment in 2000, and in particular differed between those representatives of the surface fleets (Spain Troll age two and Spain Troll age three) and those of the longline fleets of Japan, Chinese Taipei, and the United States. The Spanish age two troll series, while displaying an upward trend since the last assessment, nonetheless declined over the last ten years. For the Spanish age three troll series, the trend in the years since the last assessment is down; however, the trend for the remainder of the last decade is generally unchanged. For the longline fleets, the trend in CPUE indices is either upwards (Chinese Taipei and United States) or unchanged (Japan) in the period since the last assessment. However, variability associated with all of these catch rate estimates prevented definitive conclusions about recent trends of albacore catch rates.

Equilibrium yield analyses, carried out in 2000 and made on the basis of an estimated relationship between stock size and recruitment, indicate that spawning stock biomass was about 30 percent below that associated with MSY. However, the SCRS noted considerable uncertainties in these estimates of current biomass relative to the biomass associated with MSY ($B_{MSY}$), owing to the difficulty of estimating how recruitment might decline below historical levels of stock biomass. Thus, the SCRS concluded that the northern stock is probably below $B_{MSY}$, but the possibility that it is above it should not be dismissed (Figure 3.10). However, equilibrium yield-per-recruit analyses made by the SCRS in 2000 indicate that the northern stock is not being growth overfished ($F < Fmax$).

In terms of yield per recruit, the assessment carried out in 2000 indicates that the fishing intensity is at, or below, the fully exploited level. Concerning MSY-related quantities, the SCRS recalls that they are highly dependent on the specific choice of stock-recruitment relationship. The SCRS believed that using a particular form of stock-recruitment relationship that allows recruitment to increase with spawning stock size provided a reasonable view of reality. This hypothesis together with the results of the assessment conducted in 2000 indicate that the spawning stock biomass ($B_{1999}$) for the northern stock (29,000 mt) was about 30 percent below the biomass associated with MSY (42,300 mt) and that current F (2000) was about 10 percent above $F_{MSY}$. However, an alternative model allowing for more stable recruitment values in the range of observed SSB values would provide a lower estimate of SSB at MSY, below the current value.

South Atlantic

In 2003, an age-structured production model, using the same specifications as in 2000, was used to provide a base case assessment for southern Atlantic albacore. Results were similar to those obtained in 2000, but the confidence intervals were substantially narrower in 2003 than in 2000 (Table 3.11). In part, this may be a consequence of additional data now available, but the underlying causes need to be investigated further. The estimated MSY and replacement yield from the 2003 base case (30,915 mt and 29,256 mt, respectively) were similar to those estimated in 2000 (30,274 mt and 29,165 mt). In both 2000 and 2003, the fishing mortality rate was estimated to be about 60 percent of $F_{MSY}$. Spawning stock biomass has declined substantially relative to the late 1980s, but the decline appears to have leveled off in recent years and the estimate for 2002 remains well above the spawning stock biomass corresponding to MSY.

Catches of albacore in the South Atlantic in 2001 and 2002 were above replacement yield, and were below estimates of MSY in 2003. Nevertheless, both the 2000 and 2003 albacore assessments estimated that the stock is above $B_{MSY}$. There is now greater confidence in these estimates of MSY and therefore there is justification to base a TAC recommendation on MSY instead of replacement yield estimates from the model as in 2000. This results from the SCRS' view that current stock status is somewhat above $B_{MSY}$ and catch of this level, on average, would be expected to reduce the stock further towards $B_{MSY}$. Recent estimates of high recruitment could allow for some temporary increase in adult stock abundance under a 31,000 mt catch, but this result is uncertain.

Mediterranean

Given the lack of an assessment, the implications of the rapid increase in landings are unknown.

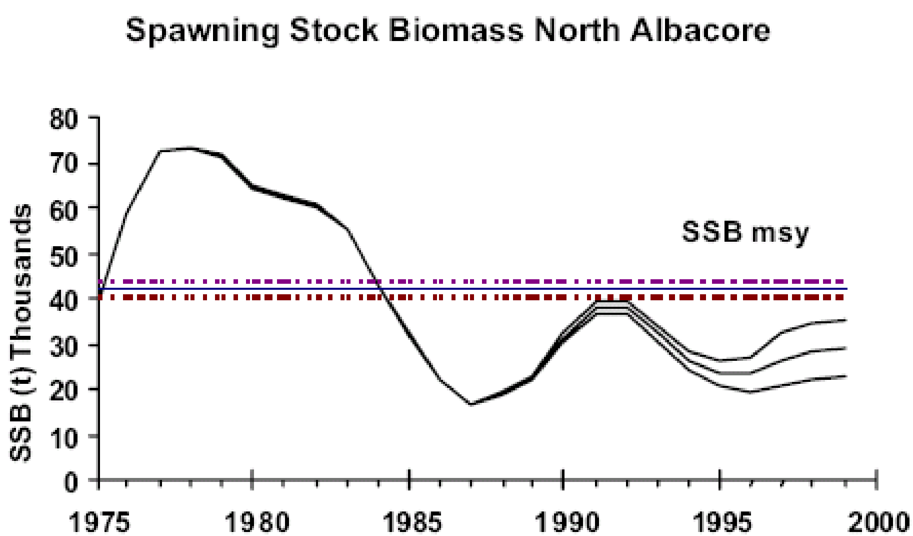



**Figure 3.10 North Atlantic albacore spawning stock biomass and recruits with 80 percent confidence limits.** Source: ICCAT, 2004.

**Table 3.10 Summary Table for the Status of North Atlantic Albacore Tuna.** Source: ICCAT, 2005.

| | |
|---|---|
| **Age/size at Maturity** | Age 5/~90 cm curved fork length |
| **Spawning Sites** | Subtropical western waters of the northern Hemisphere |
| **Current Relative Biomass Level**<br>*Minimum Stock Size Threshold* | $B_{99}/B_{MSY}$ = 0.68 (0.52 - 0.86)<br>$0.7B_{MSY}$ |
| **Current Relative Fishing Mortality Rate**<br>*Maximum Fishing Mortality Threshold* | $F_{99}/F_{MSY}$ = 1.10 (0.99 - 1.30)<br>$F_{year}/F_{MSY}$ = 1.00 |
| **Maximum Sustainable Yield** | 32,600 mt [32,400 - 33,100 mt] |
| **Current (2004) Yield** | 25,460 mt |
| **Current (2004) Replacement Yield** | not estimated |
| **Outlook** | Overfished; overfishing is occurring |

**Table 3.11 Summary Table for the Status of South Atlantic Albacore Tuna.** Source: ICCAT, 2005.

| | |
|---|---|
| **Age/size at Maturity** | Age 5/~90 cm curved fork length |
| **Spawning Sites** | Subtropical western waters of the southern Hemisphere |
| **Current Relative Biomass Level** | $B_{02}/B_{MSY}$ = 1.66 (0.74 - 1.81) |
| **Current Relative Fishing Mortality Rate** | $F_{02}/F_{MSY}$ = 0.62 (0.46 - 1.48) |
| **Maximum Sustainable Yield** | 30,915 mt (26,333 - 30,915) |
| **Current (2004) Yield** | 22,468 mt |
| **Current (2004) Replacement Yield** | 29,256 mt (24,530 - 32,277) |
| **Outlook** | Not overfished; overfishing is not occurring |

### *Effects of Regulations*

North Atlantic

In 2000, the SCRS recommended that in order to maintain a stable Spawning Stock Biomass in the near future the catch should not exceed 34,500 mt (the 1999 catch level) in the period 2001 – 2002. The SCRS further noted that should ICCAT wish the spawning stock biomass to begin increasing towards the level estimated to support MSY, and then catches in 2001 and 2002 should not exceed 31,000 mt. In 2004, the SCRS reiterated its previous advice and extended it until the next assessment in 2007. There is no ICCAT rebuilding plan for this species.

Since 2001, ICCAT established a TAC of 34,500 mt for this stock. In 2003, ICCAT extended this TAC through 2006. The SCRS noted that reported catches for 2001, 2002, 2003, and 2004 have been below the TAC. A 1998 recommendation that limits fishing capacity to the average of 1993 – 1995 also remains in force. The SCRS is unable to assess whether or not these recommendations have had a direct effect on the stock.

U.S. harvest of albacore tuna, based on 1997 through 2004 data, is landed primarily by rod and reel and pelagic longline fisheries in the Northwest Atlantic. Approximately 98 percent of total U.S. landings are harvested in the Northwest Atlantic. U.S. landings from the Caribbean increased in 1995 to make up over 14 percent of the total U.S. harvest of Albacore, but have since remained below four percent of the total.

Historically, albacore has not been a main focus of the U.S. commercial tuna fisheries operating in the North Atlantic. The commercial pelagic longline fishery harvests northern albacore tuna as incidental catch in the swordfish and other tuna pelagic fisheries. Reported commercial catches were relatively low prior to 1986; however, these catches increased substantially and have remained at higher levels throughout the 1990s. Commercial longline landings from the Northwest Atlantic over the past five years have ranged from a high of 172 mt in 2001 to a low of approximately 96 mt in 2003. In contrast, recreational estimates show a growing targeted albacore fishery off the United States Atlantic coast with landings increasing from approximately 122 mt in 2001 to over 500 mt in 2004. Calendar year landings vary between years by up to 30 percent for the longline fleet and by as high as a factor of four for the rod and reel fishery.

Since the ICCAT recommendation of a 607 mt TAC was implemented, total U.S. landings have been 453 mt (74 percent), 488 mt (80 percent), and 446 mt (73 percent) in 2001, 2002, and 2003 respectively. Calendar year landings for 2004 were 646 mt. These landings have been well below the annual TAC of 607 mt until 2004. The United States has annually taken less than two percent of the recorded total annual international landings (Table 3.6). In 2004, U.S. calendar year landings remained below the adjusted annual quotas. ICCAT recommendation provides for an adjusted TAC by adding the remaining balance from the previous year as carryover. The U.S. caught only 84 percent of the adjusted quota in 2004 and has a domestic adjusted quota in 2005 of 729 metric tons.

South Atlantic

Recent catches of albacore tuna in the South Atlantic are in the vicinity of the current and recent estimates of MSY (30,915 mt). Both the 2000 and the 2003 albacore assessments estimated that the stock is above $B_{MSY}$ (2003 estimates $B_{current}/B_{MSY} = 1.66$, $F_{current}/F_{MSY} = 0.62$). The SCRS recommends that in order to maintain SSB in the near future the catch should not exceed 31,000 mt until the next assessment in 2007.

Since 1999, ICCAT established the TAC for this stock (in 2001 – 2003, the TAC had been set at 29,200 mt). In 2003, ICCAT extended this TAC through 2004. The SCRS noted that reported catches have not exceeded the TAC in 2004. Also, the total catch by Chinese Taipei, South Africa, Brazil, and Namibia (26,620 mt) did not exceed the 27,500 mt catch limit of parties actively fishing for southern albacore, as stipulated by resolution 02-06. It should be noted that sufficient capacity exists within the fisheries to exceed the TAC as was done in 2000, 2001, and 2002. U.S. landings of South Atlantic Albacore over the past five years have been minimal (two or less mt / year). Japan adhered to its bycatch limit of four percent of the total catch of bigeye tuna in the Atlantic Ocean. However, the SCRS is unable to assess whether or not these catch limits have had a direct effect on the stock.

Mediterranean

There are no ICCAT management recommendations for the Mediterranean stock. However, the SCRS recommended to ICCAT that reliable data be provided on catch, effort and size for Mediterranean albacore tuna. The SCRS also recommended that an effort be made to recover historical data. Improvements to these basic inputs are essential before a stock assessment of Mediterranean albacore tuna can be attempted.

*Recent and Ongoing Research*

U.S. scientists prepared document SCRS/2005/081 which described population models for North Pacific albacore (*Thunnus alalunga*) that have been developed and reviewed within the North Pacific Albacore Workshop (NPALBW) forum since 2000. Currently, the NPALBW relies on a Virtual Population Analysis (VPA) model for the purposes of formulating an international-based consensus regarding the "status" of this fish stock. Recently, an equally important research directive from the NPALBW has been to develop alternative, more detailed statistical-based models, in efforts to evaluate more fully the relationship between this species' population dynamics and associated fishery operations (*i.e.*, areas of uncertainty in an overall stock assessment). Participants on the NPALBW developed one candidate model based on the Age-structured Assessment Program (ASAP), which generally represents a maximum likelihood-based numerical approach for conducting relatively straightforward, forward-simulation catch-at-age analyses. In addition, the document presents a brief discussion concerning development of other alternative stock assessment models, particularly length-based/age-structured platforms (*e.g.*, MULTIFAN-CL and Stock Synthesis 2).

#### 3.2.3.4 Atlantic Skipjack Tuna

*Life History and Species Biology*

Skipjack tuna is a gregarious species forming schools in the tropical and subtropical waters of the three oceans. Skipjack spawn opportunistically throughout the year in vast areas of the Atlantic Ocean. The size at first maturity is about 45 cm for males and about 42 cm for females in the East Atlantic, while in the West Atlantic sexual maturity is reached at around 51 cm for females and 52 cm for males. Skipjack growth is seasonal, with substantial differences according to the latitude. There remains considerable uncertainty about the variability of the growth parameters between areas. It is, therefore, a priority to gain more knowledge on the growth schemes of this species.

Skipjack is a species that is often associated with floating objects, both natural objects or fish aggregating devices (FADs) that have been used extensively since the early 1990s by purse seiners and baitboats (during the 1991 to 2003 period, about 55 percent of skipjack were caught with FADs). The concept of viscosity (low interchange between areas) could be appropriate for the skipjack stocks. A stock qualified as "viscous" can have the following characteristics:

- It may be possible to observe a decline in abundance for a local segment of the stock;
- Overfishing of that component may have little, if any, repercussion on the abundance of the stock in other areas; and,
- Only a minor proportion of fish may make large-scale migrations.

The increasing use of FADs could have changed the behavior of the schools and the migrations of this species. It is noted that, in effect, the free schools of mixed species were much more common prior to the introduction of FADs than now. These possible behavioral changes ("ecological trap" concept) may lead to changes in the biological parameters of this species as a result of the changes in the availability of food, predation, and fishing mortality. Skipjack caught with FADs are usually found associated with other species. The typical catch with floating objects is comprised of about 63 percent skipjack, 20 percent small yellowfin, and 17 percent juvenile bigeye and other small tunas. A comparison of size distributions of skipjack between periods prior to and after the introduction of FADs show that, in the eastern Atlantic, there has been an increase in the proportion of small fish in the catches, as well as a decline in the total catch in recent years in some areas.

The SCRS reviewed the current stock structure hypothesis that consists of two separate management units, one in the east Atlantic and another in the West Atlantic, separated at 30°W. The boundary of 30°W was established when the fisheries were coastal, whereas in recent years the East Atlantic fisheries have extended towards the west, surpassing this longitude, and showing the presence of juvenile skipjack tuna along the Equator, west of 30°W, following the drift of the FADs. This implies the potential existence of a certain degree of mixing. Nevertheless, taking into account the large distances between the east and west areas of the ocean, various environmental constraints, the existence of a spawning area in the east Atlantic as well as in the northern zone of the Brazilian fishery, and the lack of additional evidence (*e.g.,* transatlantic migrations in the tagging data), the hypothesis of separate east and west Atlantic stock is maintained as the most plausible alternative. On the other hand, in taking into account the biological characteristics of the species and the different fishing areas, smaller management units could be considered.

*Stock Status and Outlook*

The last ICCAT/SCRS assessment on Atlantic skipjack tuna was carried out in 1999 (Table 3.12). The state of the Atlantic skipjack stock(s), as well as the stocks of this species in other oceans, show a series of characteristics that make it extremely difficult to conduct an assessment using current models. Among these characteristics, the most noteworthy are:

- The continuous recruitment throughout the year, but heterogeneous in time and area, making it impossible to identify and monitor the individual cohorts;
- Apparent variable growth between areas, which makes it difficult to interpret the size distributions and their conversion to ages; and,
- Exploitation by many and diverse fishing fleets (baitboat and purse seine), having distinct and changing catchabilities, which makes it difficult to estimate the effective effort exerted on the stock in the East Atlantic.

For these reasons, no standardized assessments have been able to be carried out on the Atlantic skipjack stocks. Notwithstanding, some estimates were made by means of different indices of the fishery and some exploratory runs were conducted using a new development of the generalized production model.

<u>Western stock</u>

Standardized abundance indices up to 1998 were available from the Brazilian baitboat fishery and the Venezuelan purse seine fishery, and in both cases the indices seem to show a stable stock status. Uncertainties in the underlying assumptions for the analyses prevent the extracting of definitive conclusions regarding the state of the stock. However, the results suggest that there may be over-exploitation within the FAD fisheries, although it was not clear to what extent this applies to the entire stock. The SCRS could not determine if the effect of the FADs on the resource is only at the local level or if it had a broader impact, affecting the biology and behavior of the species. Under this supposition, maintaining high concentrations of FADs would reduce the productivity of the overall stock. However, since 1997, and due to the implementation of a voluntary Protection Plan for Atlantic tunas, agreed upon by the Spanish and French boat owners in the usual areas of fishing with objects, which later resulted in an ICCAT regulation on the surface fleets that practice this type of fishing, there has been a reduction in the skipjack tuna catches associated with FADs. Maintaining this closure would continue to have a positive effect on the resource. The development of nominal abundance indices of Brazilian baitboat fisheries and Venezuelan purse seiners, obtained up to 2004, seemed to show a stable stock status.

Eastern stock

Standardized catch rates are not available. However, an analysis was made, for the 1969 – 2002 period, of the different indices of the purse seine fishery that could provide valuable information on the state of the stock. For the majority of the indices, the trends were divergent, depending on the area, which may indicate the viscosity of the skipjack stock, with limited mixing rates between areas. Because of the difficulties in assigning ages to the skipjack catches, the estimates of the values of natural mortality by age and obtaining indices of abundance (especially for the eastern stock), no catch-by-age matrices were developed and, consequently, no analytical assessment methods were applied.

There is no quantified information available on the effective fishing effort exerted on skipjack tuna in the East Atlantic. It is supposed, however, that the increase in fishing power linked to the introduction to improved technologies on board the vessels as well as to the development of fishing under floating objects have resulted in an increase in the efficiency of the various fleets. An estimate of the increase in the coefficient of total mortality (Z) between the early 1980s and the end of the 1990s was carried out with a model using tagging data (Workshop on the mortality of juveniles in July 2005). For the range of sizes considered (about 40 – 60 cm FL), the increase in Z on the order of a factor 3 would reflect this increase in efficiency. This interpretation is supported by a comparison of skipjack size distributions in the East Atlantic between the periods prior to, and following, the use of FADs as an increase is observed in the proportion of small fish in the catches.

A document on the Spanish observer program on board purse seiners, presented during the 2005 SCRS, shows that for the 2001-2005 period the average rate of discards of skipjack tunas under FADs in the East Atlantic is estimated at 42 kg per ton of skipjack landed. In the West Atlantic, fishing effort of the Brazilian baitboats (which comprises the major skipjack fishery) decreased by half between 1985 and 1996, but seems to be stabilized since, after a slight increase.

**Table 3.12 Summary Table for the Status of West Atlantic Skipjack Tuna.** Source: ICCAT, 2005.

| | |
|---|---|
| **Age/size at Maturity** | Age 1 to 2/~50 cm curved fork length |
| **Spawning Sites** | Opportunistically in tropical and subtropical waters |
| **Current Relative Biomass Level**<br>*Minimum Stock Size Threshold* | *Unknown*<br>*Unknown* |
| **Current Relative Fishing Mortality Rate**<br>$F_{2003}/F_{MSY}$<br>*Maximum Fishing Mortality Threshold* | *Unknown*<br><br>$F_{year}/F_{MSY} = 1.00$ |
| **Maximum Sustainable Yield** | *Not Estimated* |
| **Current (2004) Yield** | 26,910 mt |
| **Current Replacement Yield** | *Not Estimated* |
| **Outlook** | *Unknown* |

### *Effects of Regulations*

There is currently no specific ICCAT regulation in effect for skipjack tuna. However, the French and Spanish boat owners voluntarily applied a moratorium on fishing under FADs for the period of November 1997 through January 1998, and November 1998 through January 1999. The moratorium, which was implemented in order to protect juvenile bigeye tuna, has had an influence on the skipjack catches made with FADs. Since 1999, a similar moratorium was applied, recommended by ICCAT, and is still in force. The average purse seine skipjack catches during the months from November to January by the fleets that applied the moratoria were reduced by 64 percent compared to the average catches between the 1993 – 1996 period (before the moratoria) and those corresponding to the 1998 – 2002 period. For the entire period in which the moratoria have been in effect (1998 – 2002), the average annual skipjack catches by the purse seine fleets that applied the moratoria decreased by 41 percent, which is equivalent to 42,000 mt per year. However, this decrease is likely a combined result of the decrease in effort and the moratorium impact; this is supported by the observation that the mean annual catch by boats has decreased only 18 percent between the two periods.

Total catches in 2004 in the Atlantic Ocean amounted to almost 161,000 mt which represents an increase of approximately 12.9 percent compared to the average of the last five years. Since the early 1990s, numerous changes in the fishery (such as the use the FADs and the expansion of the fishing area to the west) have increased skipjack catchability as well as the proportion of the skipjack stock which is exploited. At present, the major fisheries are the purse seine fisheries, particularly those of EC-Spain, EC-France, NEI, Ghana and Netherlands Antilles, followed by the baitboat fisheries of Ghana, EC-Spain and EC-France. The catches made in 2004 in the East Atlantic reached 134,000 mt, representing a 15.8 percent increase as compared to the average of 1999 – 2003. In the West Atlantic, the major fishery is the Brazilian baitboat fishery, followed by the Venezuelan purse seine fleet. The 2004 caches in the West Atlantic amounted to 26,900 mt, which is a level close to the average of the historical period in recent years.

Skipjack tuna are caught by U.S. vessels in the western North Atlantic. Total reported skipjack landings (preliminary) increased from 78 mt in 2003 to 102 mt in 2004. Almost 70 percent of U.S. landings are from recreational rod and reel catches and landings from the NW Atlantic and Caribbean areas, based on LPS statistical surveys of the U.S. recreational harvesting sector. Estimates of recreational harvests of skipjack continue to be reviewed and could be revised again in the future.

*Recent and Ongoing Research*

U.S. small tuna research is directed mainly on king and Spanish mackerel stocks, as the amount landed of other small tunas such by U.S. fishermen is generally low. The focus of research on skipjack research by the international scientific community is on basic stock structure and abundance and the influence of FADs on increase in efficiency of the various fleets. During the ICCAT Workshop on Methods to Reduce Mortality of Juvenile Tropical Tunas in July 2005 (Document SCI-032), a re-analysis on the tagging data in the Senegalese area showed however that the parameters of the skipjack growth curve obtained in this region were in fact closer to the growth estimates made in the Gulf of Guinea or in other oceans than those done previously in Senegal. In 2004 and 2005, U.S. scientists collaborated with Caribbean nations under the banner of the Caribbean Regional Fisheries Mechanism in initiating stock assessment analyses for small tuna (and other) stocks of mutual concern.

### 3.2.4 Atlantic Billfish

#### 3.2.4.1 Blue Marlin

*Life History/Species Biology*

Blue marlin (*Makaira nigricans*) range from Canada to Argentina in the western Atlantic, and from the Azores to South Africa in the eastern Atlantic. Blue marlin are large apex predators with an average weight of 100 – 175 kg (220 – 385 lb). Female blue marlin grow faster and reach a larger maximum size than males. Young blue marlin are one of the fastest growing teleosts, reaching 30 – 45 kg (66 – 99 lb) after the first year. The maximum growth rate of these fish is 1.66 cm/day (0.65 inches/day) which occurs at 39 cm LJFL (15.3 inches) (NMFS, 1999). Life expectancy for blue marlin is between 20 – 30 years based on age and growth analyses of dorsal spines.

Estimates of natural mortality rates for juvenile and adult billfish would be expected to be relatively low, generally in the range of 0.15 to 0.30, based on body size, behavior and physiology (NMFS, 1999). Sagitta otolith weight is suggested to be proportional to age, indicating that both sexes are equally long-lived, based on the maximum otolith weight observed for each sex. Predicting age from length or weight is imprecise due to many age classes in the fishery, and otoliths may provide a more accurate measure of age.

Blue marlin have an extensive geographical range, migratory patterns that include trans-Atlantic as well as trans-equatorial movements, and are generally considered to be a rare and solitary species relative to the schooling Scombrids (tunas). Graves et al. (2002) captured eight blue marlin with recreational fishing gear and then implanted fish with satellite pop-up tags. These fish moved 74 – 248 km (40–134 nautical miles (nm)) over five days, with a mean displacement of 166 km (90 nm). Fish spent the vast majority of their time in waters with temperatures between 22 and 26°C (71–78°F) and at depths less than 10 m. Prince et al. (2005) tagged one blue marlin with a PSAT tag off the coast of Punta Cana, Dominican Republic and found that this fish moved 406.2 km (219.3 nm) during a 40-d deployment (10.15 km/day (5.48 nm/day)). The maximum time at liberty recorded of a tagged individual was 4,024 days (about 11 years) for a blue marlin that was estimated to weigh 29.5 kg (65 lb) at the time of release. Junior et al. (2004) found the depth of capture for blue marlin with pelagic longline gear ranged from 50 – 190 m (164 – 623 feet), with most individuals captured at 90 m (295 feet).

The Cooperative Tagging Center (CTC) program has tagged 24,108 and recaptured over 220 blue marlin and found that these fish moved an average of 903 km (488 nm) (Ortiz et al., 2003). Some individuals have exhibited extended movement patterns, and strong seasonal patterns of movement of individuals between the United States and Venezuela are evident. A blue marlin released off Delaware and recovered off the island of Mauritius in the Indian Ocean represents the only documented inter-ocean movement of a highly migratory species in the history of the CTC. The minimum straight-line distance traveled for a blue marlin was 14,893 km (8,041 nm) and the maximum number of days at large was 4,024 d.

Adults are found primarily in the tropics within the 24°C (75°F) isotherm, and make seasonal movements related to changes in sea surface temperatures. In the northern Gulf of Mexico they are associated with the Loop Current, and are found in blue waters of low productivity rather than in more productive green waters. Off of Puerto Rico, the largest numbers of blue marlin are caught during August, September, and October. Equal numbers of both sexes occur off northwest Puerto Rico in July and August, with larger males found there in May and smaller males in September. Very large individuals, probably females, are found off the southern coast of Jamaica in the summer and off the northern coast in winter, where males are caught in December and January.

There has not been an Atlantic wide survey of spawning activity for blue marlin, however, these fish generally reproduce between the ages of two and four, at 220 – 230 cm (86 – 90 inches) in length, and weigh approximately 120 kg (264 lb). Female blue marlin begin to mature at approximately 47 – 60 kg (104 – 134 lb), while males mature at smaller weights, generally from 35 – 44 kg (77 – 97 lb). There are likely two separate spawning events that occur at different times in the North and South Atlantic. South Atlantic spawning takes place between February and March (NMFS, 1999). Peak spawning activity in the North Atlantic Ocean occurs between July and October, with females capable of spawning up to four times per reproductive season (de Sylva and Breder, 1997). Prince et al. (2005) conducted 23 neuston tows in the vicinity of Punta Cana, Dominican Republic between 23 April and 17 May and successfully identified four larval blue marlin; the size of the larvae indicated that spawning activity was taking place in the same general area where these samples were conducted. Serafy et al. (2003) identified 90 blue marlin larvae in the vicinity of Exuma Sound, Bahamas in the month of July, indicating that spawning activity had taken place 18 days prior to sampling.

During the spawning season, blue marlin release between one and eleven million small (1 – 2 mm), transparent pelagic planktonic eggs. The number of eggs has been correlated to interspecific sizes among billfish and the size of individuals within the same species. Ovaries from a 147 kg (324 lb) female blue marlin from the northwest Atlantic Ocean were estimated to contain 10.9 million eggs, while ovaries of a 125 kg (275 lb) female were estimated to contain seven million eggs. Males are capable of spawning at any time.

Blue marlin are generalist predators feeding primarily on epipelagic fish and cephalopods in coastal and oceanic waters, however, mesopelagic fish and crustaceans associated with rocky, sandy, and reef bottoms are also important components of the diet. Feeding in mesopelagic areas probably takes place at night (Rosas-Alayola et al., 2002). Diet studies of blue marlin off the northeastern coast of Brazil indicate that oceanic pomfret (*Brama brama*) and squid (*Ornithoteuthis antillarum*) were the main prey items and present in at least 50 percent of stomachs. Other important prey species vary by location and include dolphin fishes, bullet tuna (*Auxis. spp*) around the Bahamas, Puerto Rico, and Jamaica, and dolphin fishes and scombrids in the Gulf of Mexico. Stomach contents have also included deep-sea fishes such as chiasmodontids.

Constant ingestion of small quantities of food is necessary. Blue marlin have relatively small stomachs, reducing the proportion of the body allocated for visceral mass, and allocating more volume to musculature for swimming speed and endurance (Junior *et al*., 2004). In the Pacific Ocean, changes in the diet observed are related more with abundance and distribution of prey than preferences in food items, with *Auxis* spp. (bullet and frigate tunas) well represented in all locations. Predators of blue marlin are relatively unknown. Sharks will attack hooked blue marlin, but it is not known if they attack free-swimming, healthy individuals.

*Stock Status and Outlook*

Since 1995, blue marlin have been managed under a single stock hypothesis because of tagging data and mitochondrial DNA evidence that are consistent with one Atlantic-wide stock. The last stock assessment for blue marlin was in 2000 using similar methods to the previous assessment (1996), however, data was revised in response to concerns raised since the 1996 assessment. The assessment reflects a retrospective pattern wherein improvement in estimated biomass ratios result in estimated lower productivity. The 2000 assessment was slightly more optimistic than the 1996 assessment. Atlantic blue marlin are at approximately 40 percent of $B_{MSY}$ and overfishing has taken place for the last 10 – 15 years. $B_{MSY}$ is estimated at 2,000 mt (4,409,245 lb) and current fishing mortality is approximately four times higher than $F_{MSY}$ (Table 3.13) (SCRS, 2005). There is uncertainty in the assessment because the historical data is not well quantified. The 2000 assessment estimated that overfishing was still occurring and that productivity (MSY and a stock's capacity to replenish) was lower than previously estimated. Therefore, it is expected that landings in excess of estimated replacement yield would result in further stock decline (SCRS, 2005).

No additional assessment information became available in 2005 to modify recommendations currently in force. The current assessment indicates that the stock is unlikely to recover if the landings contemplated by the 1996 ICCAT recommendation continue into the future. While there is additional uncertainty in stock status and replacement yield, estimates are not reflected in bootstrap results, these uncertainties can only be addressed through substantial investment in research into habitat requirements of blue marlin and further verification of historical data. The SCRS recommended that the ICCAT take steps to reduce the catch of blue marlin as much as possible, including: reductions in fleet-wide effort, a better estimation of dead discards, establishment of time area closures, and scientific observer sampling for verification of logbook data. The SCRS noted that future evaluation of management measures relative to the recovery of the blue marlin stock are unlikely to be productive unless new quantitative information on the biology and catch statistics of blue marlin, and additional years of data are available (SCRS, 2004 and 2005).

A summary of Atlantic blue marlin stock assessment data can be found in Table 3.13. Estimated catches of Atlantic blue marlin by region for the period 1956 – 2001 can be found in Figure 3.11. A composite CPUE series for blue marlin for the period 1955 – 2000 can be found in Figure 3.12. The estimated median relative fishing mortality trajectory for Atlantic blue marlin can be found in Figure 3.13. A stock assessment for blue marlin is scheduled for 2006.

**Table 3.13 Summary of Atlantic Blue Marlin Stock Assessment data. Weights are in metric tons, whole weight.** Source: SCRS, 2005.

| ATLANTIC BLUE MARLIN SUMMARY[1] | |
|---|---|
| | **Total Atlantic** |
| Maximum Sustainable Yield (MSY) | ~ 2,000 t (~ 1,000 ~ 2,400 t)[2] |
| 2002 Yield | 2,626 t |
| 2003 Yield | 2,713 t |
| 2004 Yield[4] | 2,076 t |
| 1999 Replacement Yield | ~ 1,200 t (~ 840 - 1,600 t)[2] |
| Relative Biomass ($B_{2000}/B_{MSY}$) | ~ 0.4 (~ 0.25 - 0.6)[2] |
| Relative Fishing Mortality ($F_{1999}/F_{MSY}$) | 4.0 (~ 2.5 - 6.0)[2] |
| Management Measures in Effect | - Reduced pelagic longline and purse seine landings to 50% of 1996 or 1999 levels, whichever is greater [Recs. 00-13[3], 01-10[3] and 02-13]. |

[1] Assessment results are uncertain. Uncertainty in these estimates is not fully quantified by bootstrapping.
[2] Approximate 80% CI from bootstrap for ASPIC model.
[3] These measures did not take effect until mid-2001.
[4] Reported Task I value, which is likely to be a substantial underestimate of the total catch.

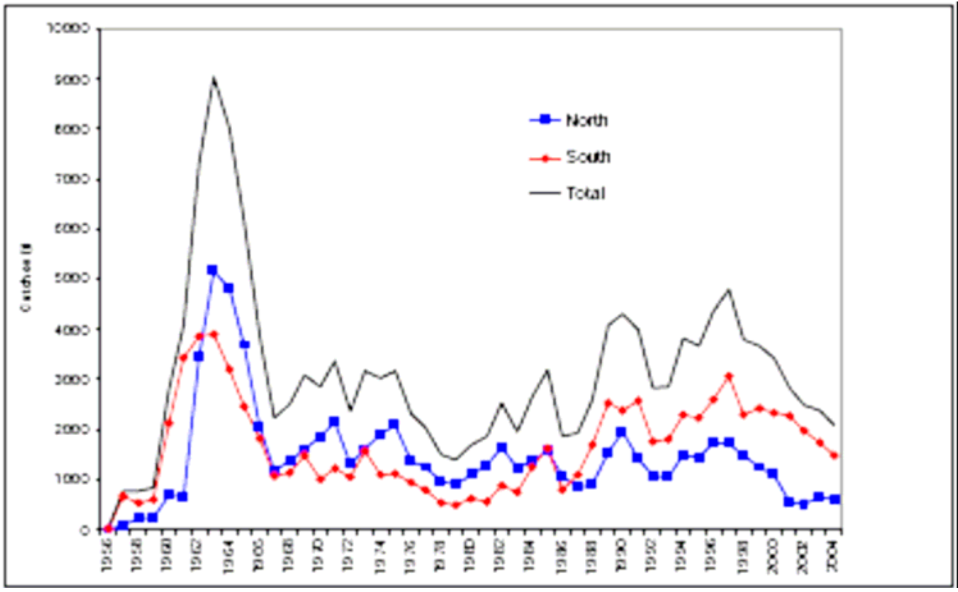



**Figure 3.11 Estimated catches (including landings and dead discards in mt) of blue marlin in the Atlantic by region. The 2003 catch reported to ICCAT is preliminary and is not included in this figure. Weights are in metric tones, whole weight.** Source: SCRS, 2005.

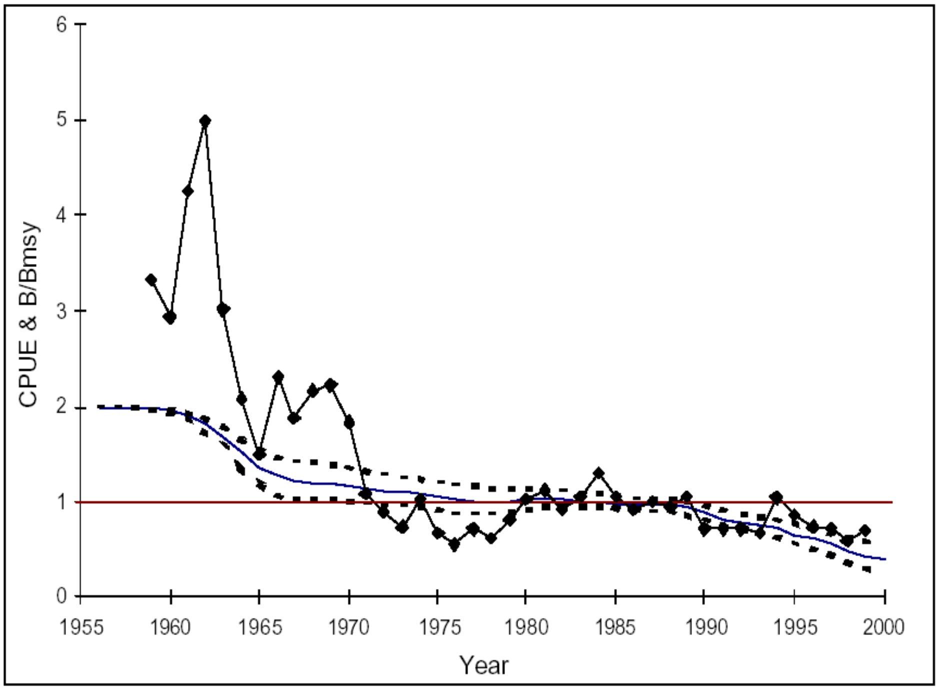



**Figure 3.12 Composite CPUE series (symbols) used in the blue marlin assessment compared to model estimated median relative biomass (solid lines) from bootstrap results (80 percent confidence bounds shown by dotted lines).** Source: SCRS, 2005.

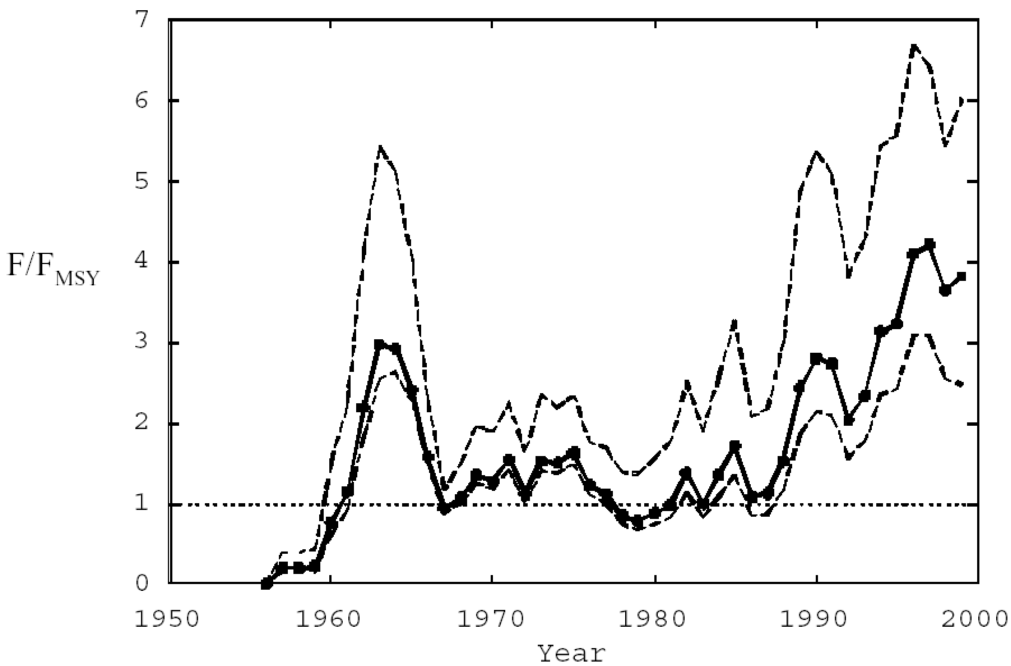



**Figure 3.13 Estimated median relative fishing mortality trajectory for Atlantic blue marlin (center, dark line) with approximate 80 percent confidence range (light lines) obtained from bootstrapping.** Source: SCRS, 2005.

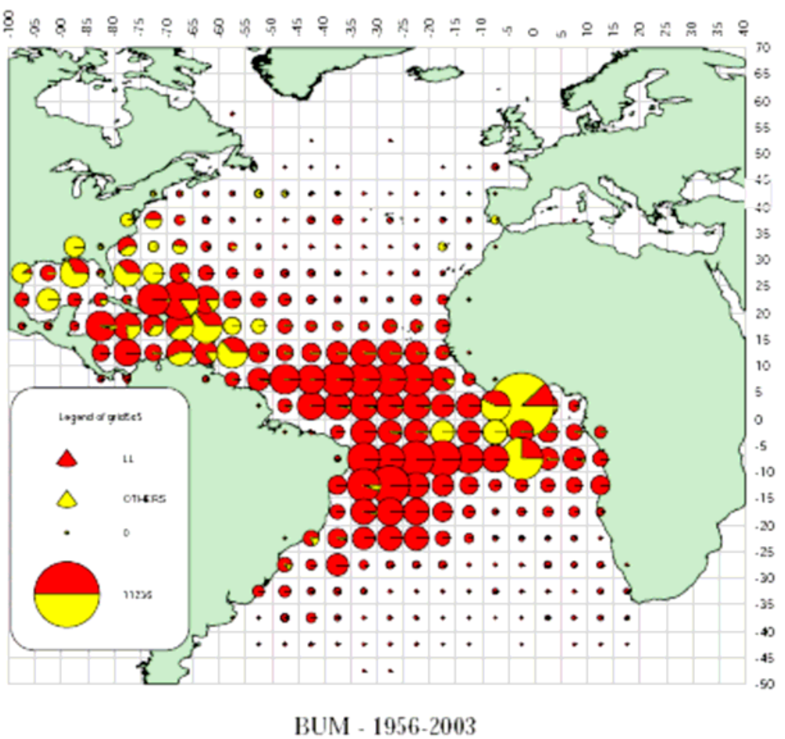



**Figure 3.14 Geographical distribution of reported catches of blue marlin for the period 1956-2003.** Source: SCRS, 2005.

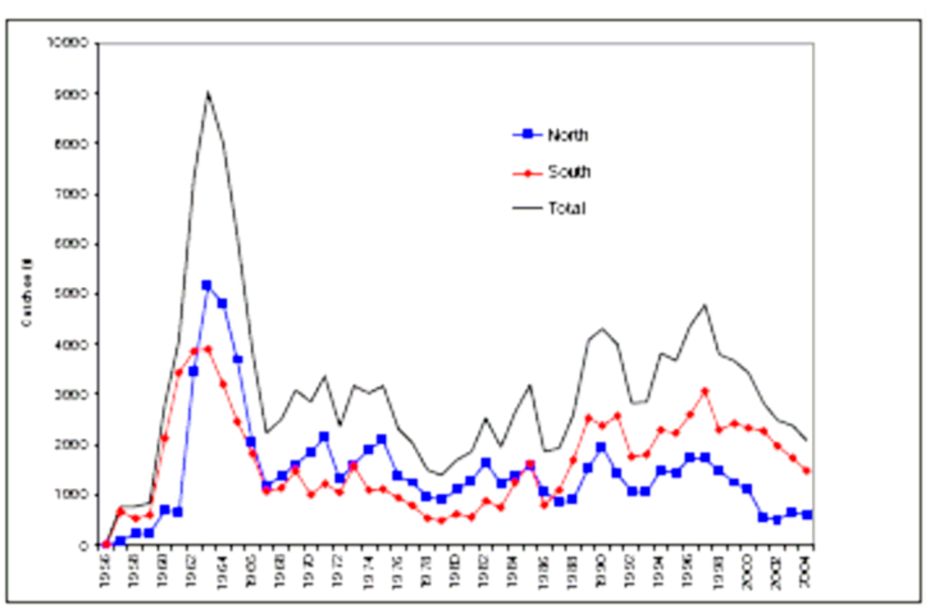



**Figure 3.15 Estimated catches (including landings and dead discards in t) of blue marlin in the Atlantic by region (1950-2004).** Source: SCRS, 2005.

*Effect of Regulations*

ICCAT Management Recommendations

ICCAT Recommendation 97-09 required Contracting Parties to reduce, starting in 1998, blue marlin and white marlin landings by at least 25 percent for each species from 1996 landings, by the end of 1999. Recommendations 00-13, 01-10, 02-13, and 04-09 imposed or extended additional catch restrictions for blue marlin. These included limiting the annual amount of blue marlin that can be harvested by pelagic longline and purse seine vessels and retained for landing to no more than 50 percent of the 1996 or 1999 landing levels, whichever is greater, as well as requiring that all blue marlin and white marlin brought to pelagic longline and purse seine vessels alive be released in a manner that maximizes their survival. The live release provision does not apply to marlins that are dead when brought along the side of the vessel or that are not sold or entered into commerce (SCRS, 2004). Globally, catches of blue marlin appear to have been reduced as a result of ICCAT recommendations, which tied reductions in blue marlin landings to 1996 or 1999 levels, whichever was greater. Total Atlantic-wide catches of blue marlin, as reported to ICCAT, decreased by approximately 46 percent from 3,836 mt in 1999 to 2,076 mt in 2004. Total Atlantic-wide longline landings of blue marlin, as reported to ICCAT, decreased by approximately 41 percent from 2,276 mt in 1999 to 1,343 in 2004.

In addition, these recommendations limited recreational landings in the United States to 250 blue and white marlin combined, on an annual basis. Also in 2000, ICCAT recommended that a blue marlin minimum size be established for recreational fisheries (251 cm (98.8 inches) LJFL). Most recently, ICCAT recommendation 04-09, extended phase one of the ICCAT mortality reduction plan, as established and modified by recommendations 00-13, 01-10, 02-13, through 2006 and postponed the next scheduled assessment of Atlantic blue marlin until 2006. The SCRS noted that it does not expect to have enough new information to provide an assessment of these recent regulations until 2006.

Domestic Regulations

The U.S. Atlantic billfish fishery, including blue marlin, white marlin, sailfish, and spearfish, has been reserved as a recreational fishery through domestic regulation since 1988. Possession of Atlantic billfish is prohibited by U.S. pelagic longline vessels and no sales of Atlantic billfish are allowed. Data on bycatch of Atlantic billfish in the domestic Atlantic pelagic longline fishery can be found in Section 3.4.1 and Appendix C. The recreational fishery is an open access fishery. Anglers must possess either a HMS Angling category permit or a CHB category permit to possess a billfish. General category tuna permit holders may possess Atlantic billfish only when participating in a registered HMS tournament. Details of the permitting program, including the number of permit holders can be found in Section 3.9. Data on domestic recreational catches of Atlantic billfish are obtained from a combination of sources, including: the Recreational Billfish Survey; the HMS swordfish and billfish non-tournament reporting line; MRFSS, and LPS. U.S. recreational billfish landings can be seen in section 4.2.3 of this document. The U.S. implemented a minimum legal size of 251 cm (99 inches), 167 cm (66 inches), 160 cm (63 inches) for blue marlin, white marlin, and sailfish respectively, in 1999.

Possession of Atlantic longbill spearfish have been prohibited since 1988. Rod and reel is the only type of gear authorized in the domestic billfish fishery.

*Recent and Ongoing Research*

The NMFS SEFSC played a substantial role in the ICCAT Enhanced Research Program for Billfish in 2004, with SEFSC scientists acting as the coordinator for the western Atlantic Ocean. Major accomplishments in the western Atlantic in 2004 were documented in SCRS/04/028. Highlights include 11 at-sea sampling trips with observers on Venezuelan industrial longline vessels in September 2004. Of the trips accomplished to date, 4 observer trips were on Korean type vessels fishing under the Venezuelan flag. Most of these vessels are based out of Cumana targeting tuna, swordfish, or both at the same time. Biological sampling of swordfish, Istiophorids, and yellowfin tuna for reproductive and age determination studies, as well as genetics research were continued during the 2004 sampling season. Shore-based sampling of billfish landings for size frequency data, as well as tournament sampling was obtained from Venezuela, Grenada, U.S. Virgin Islands, Bermuda, Barbados, and Turks and Caicos Islands. Program participants in Venezuela, Grenada, and Barbados continued to assist in obtaining information on tag-recaptured billfish, as well as numerous sharks, in the western Atlantic Ocean during 2004; a total of 44 tag recovered billfish and sharks were submitted to the Program Coordinator in 2004. Age, growth, and reproductive samples from several very large billfish were also obtained during 2004.

A study conducted by the Virginia Institute of Marine Science (VIMS) to evaluate post release survival and habitat use from the recreational fishery for Atlantic white marlin using pop-up satellite archival tags (PSATs) was finalized in 2004 and published in the peer review literature. A separate study conducted by VIMS on U.S. longline vessels to evaluate post release survival of marlin, as well as evaluating hook performance and related mortality was also finalized in 2004. These data have been submitted to a peer reviewed journal and are currently under review. The SEFSC has conducted several studies in the Northwest Atlantic and the Pacific coast of Central America to evaluate habitat use and reproductive biology of billfish using PSAT technology. About 200 PSATs have been deployed in this effort over the last 4 years with deployments ranging from a month to 5.5 months. Several peer reviewed papers summarizing these results are in press at this time, while other papers are currently in preparation. In addition, SEFSC is also currently conducting pelagic longline research to evaluate gear behavior, and the effects of gear modification on catch rate and survival of target and non-target species. Three cruises have been completed to date. This work in ongoing and should be finished sometime in 2006. Cooperative billfish research between US and Brazilian scientists was initiated in 2005.

The Fishery Management Group of the University of Miami is carrying out research on Atlantic billfish on three areas, population parameter estimation, population modeling and development of socio-economic indicators. Others at the University of Miami's Rosenstiel School and elsewhere are conducting research on early life history, reproductive biology and ecology of billfishes, as well as age and growth estimation.

Updates of standardized CPUE for blue and white marlin from the United States pelagic longline fishery in the NW Atlantic and Gulf of Mexico and the U.S. recreational tournament fishery in the NW Atlantic and Gulf of Mexico were developed and presented to ICCAT in 2005 (Document SCRS/2005/30 and SCRS/2005/31). Numerous additional papers were presented regarding standardization of CPUEs. Please see http//:www.iccat.es for additional information.

Multiple papers on habitat use were submitted to the ICCAT SCRS in 2005. These included papers on: vertical habitat use of white marlin in numerous locations of the western North Atlantic using PSAT tags (SCRS/2005/034); the depth distributions of 52 blue marlin in relation to exposure to longline gear using PSAT tags (SCRS/2005/035); and, a quantitative framework and numerical method for characterizing vertical habitat use by large pelagic animals using pop-up satellite tag data (SCRS/2005/). Additional information on spawning area research and other topics can be found at http//:www.iccat.es.

#### 3.2.4.2 White Marlin

*Life History/Species Biology*

White marlin (*Tetrapturus albidus*) are found exclusively in tropical and temperate waters of the Atlantic Ocean and adjacent seas, unlike sailfish and blue marlin, which are also found in the Pacific Ocean. White marlin are found at the higher latitudes of their range only in the warmer months. Junior et al. (2004) captured white marlin with pelagic longline gear off northeastern Brazil in depths ranging from 50 – 230 m (164 – 754 feet), with no obvious depth layer preference. White marlin generally prefer water temperatures above 22°C (71° F) with salinities between 35 – 37 ppt (NMFS, 1999). They may occur in small, same-age schools, however, are generally solitary compared to the Scombrids (tunas). Catches in some areas may include a rare species (*Tetrapturus georgei*) which is superficially similar to white marlin. The so-called "hatchet marlin" may also represent (*T. georgei)*, and has been caught occasionally in the Gulf of Mexico and South Atlantic (NMFS, 1999).

White marlin are generally 20 – 30 kg (44 – 66 lb) at harvest. These fish grow quickly, with females attaining a larger maximum size than males, and have a life span of 18 years (SCRS 2004). Adult white marlin grow to over 280 cm (110 inches) TL and 82 kg (184 lb). White marlin exhibit sexually dimorphic growth patterns; females grow larger than males, but the dimorphic growth differences are not as extreme as noted for blue marlin. This species undergoes extensive movements, although not as extreme as those of the bluefin tuna and albacore. Trans-equatorial movements have not been documented for the species. There have been 31,483 white marlin tagged and released by the CTC program, with 577 reported recaptures (1.83 percent of all releases) (Ortiz et al., 2003). The majority of releases took place in the months of July through September, in the western Atlantic off the east coast of the United States. Releases of tagged white marlin also occurred off Venezuela, in the Gulf of Mexico, and in the central west Atlantic. The longest distance traveled is 6,517 km (4,049 miles) and the maximum days at large is 5,488 days (approx. 15 years). A substantial number of individuals moved between the Mid-Atlantic coast of the United States and the northeast coast of South America. Overall, 1.1 percent of documented white marlin recaptures have made trans-Atlantic movements. The longest movement was for a white marlin tagged during July 1995 off the east coast near Cape May, NJ and recaptured off Sierra Leone, West Africa, in November, 1996. The fish traveled a distance of at least 6,517 km (3,519 nm) over 476 days (NMFS, 1999). Prince et al. (2005) tagged six white marlin off the coast of Punta Cana, Dominican Republic and found their displacement to be between 58.7 and 495.8 km (31.7 – 267.7 nm), ranging from 2.1 – 13.3 km/day (mean = 6.3 km/day).

White marlin spawn in the spring (March through June) in the northwestern Atlantic Ocean and females are generally 20 kg (44 lb) in mass and 130 cm (51.2 inches) in length at sexual maturity. White marlin spawn in tropical and sub-tropical waters with relatively high surface temperatures and salinities (20 – 29°C (68 – 84°F) and over 35 ppt) and move to higher latitudes during the summer. There has not been an Atlantic-wide study of the spawning behavior of white marlin. Spawning seems to take place in more offshore areas than for sailfish, although larvae are not found as far offshore as blue marlin. Females may spawn up to four times per spawning season (de Sylva and Breder, 1997). It is believed there are at least three spawning areas in the western north Atlantic: northeast of Little Bahama Bank off the Abaco Islands; northwest of Grand Bahama Island; and southwest of Bermuda. Prince et al. (2005) found eight white marlin larvae in neuston tows in April/May off the coast of Punta Cana, Dominican Republic indicating that there had been recent spawning activity in this general area. Larvae have also been collected from November to April, but these may have been sailfish larvae (*Istiophorus platypterus*), as the two can not readily be distinguished (NMFS, 1999). Spawning concentrations occur off the Bahamas, Cuba, and the Greater Antilles, probably beyond the U.S. EEZ, although the locations are unconfirmed. Concentrations of white marlin in the northern Gulf of Mexico and from Cape Hatteras, NC to Cape Cod, MA are probably related to feeding rather than spawning (NMFS, 1999).

White marlin are primarily piscivorous. Oceanic pomfret and squid were the most important food items in a study that sampled stomachs collected off the coast of Brazil in the southwestern Atlantic Ocean (Junior et al., 2004). The number of food items per stomach ranged from 1 – 12 individuals. The largest prey observed in white marlin stomachs were snake mackerel (*Gempylus serpens*), that were 40 – 73 cm (15.7 – 28.7 inches) in length (Junior et al., 2004). Squid, dolphin, hardtail jack, flying fish, bonitos, mackerels, barracuda, and puffer fish are the most important prey items in the Gulf of Mexico.

Data from a large sport fishery for white marlin that occurs during the summer between Cape Hatteras, NC and Cape Cod, MA indicates that white marlin inhabit offshore (148 km (80 nm)) submarine canyons, extending from Norfolk Canyon in the Mid-Atlantic to Block Canyon off eastern Long Island. Concentrations of white marlin are associated with rip currents and weed lines (fronts), and with bottom features such as steep drop-offs, submarine canyons, and shoals. Sport fishing for white marlin also occurs in the Straits of Florida, southeast Florida, the Bahamas, and off the north coasts of Puerto Rico and the Virgin Islands. Summer concentrations in the Gulf of Mexico are found off the Mississippi River Delta and at DeSoto Canyon, with a peak off the delta in July, and in the vicinity of DeSoto Canyon in August. In the Gulf of Mexico, adults appear to be associated with blue waters of low productivity, being found with less frequency in more productive green waters. While this is also true of the blue marlin, there appears to be a contrast between the factors controlling blue and white marlin abundance, as higher numbers of blue marlin are generally caught when catches of white marlin are low, and vice versa. It is believed that white marlin prefer slightly cooler temperatures than blue marlin.

*Stock Status and Outlook*

White marlin have been managed under a single stock hypothesis by ICCAT since 2000. The most recent stock assessments for white marlin (1996, 2000, and 2002) all indicated that biomass of white marlin has been below $B_{MSY}$ for more than two decades and the stock is overfished. In 2004, the SCRS indicated that in spite of significant improvements in the relative abundance estimates made available during the last three assessments, they are still not informative enough to provide an accurate estimate of stock status (SCRS, 2004). The 2002 assessment indicated that the relative fishing mortality is 8.28 times that permissible at $F_{MSY}$ (Table 3.14). Given that the stock is severely depressed, the SCRS concluded that ICCAT should take steps to reduce the catch of white marlin as much as possible, first by increasing observer coverage to improve estimates of catch and dead discards of white marlin. Furthermore, SCRS recommended that Contracting Parties conduct research into habitat requirements and post-release survival of white marlin and take steps to verify historical fishery data.

The SCRS suggested that ICCAT take steps to make sure that the intended reductions in catch are complied with, and monitored, so that proper evaluation can be carried out in the future. The SCRS recommended improving observer programs so that better estimates of catch and dead discards of white marlin are obtained. The SCRS further recommended that, in the absence of observing a change in population status resulting from the most recent management measures, the potential for increasing stock size of white marlin may require future catches to be reduced beyond the level apparently intended by its most recent recommendations. However, the SCRS also stated that more definitive advice should be available after several years of data become available. The SCRS also noted that future evaluation of management measures relative to the recovery of the white marlin stock is unlikely to be productive unless new quantitative information on the biology and catch statistics of white marlin, and additional years of data, are available (SCRS, 2004). As such, ICCAT postponed the next white marlin assessment until 2006. A summary of Atlantic white marlin stock assessment data can be found in Table 3.14.

New standardized catch rate information was presented in 2005, updating catch rates from U.S. recreational fisheries in the northwest Atlantic and Gulf of Mexico and the Venezuelan longline and artesinal fisheries. In spite of the progress made, the SCRS can not interpret the historic CPUE trends for white marlin (SCRS, 2005). In 2002, an ESA listing review was completed by NMFS. NMFS determined that listing Atlantic white marlin under the Endangered Species Act was not warranted at that time. NMFS has committed to conducting another ESA listing review in 2007.

**Table 3.14** **Summary of Atlantic White Marlin Stock Assessment data. Weights are in metric tons, whole weight.** Source: SCRS, 2005.

| ATLANTIC WHITE MARLIN SUMMARY[1] | | | | |
|---|---|---|---|---|
| | *Likely value* | *Continuity case[2] estimate (80% conf. limit)* | *Retrospective adjusted estimate[3]* | *Range of sensitivity[4] estimates* |
| Maximum Sustainable Yield | Below 2000 Yield | 964 t (849-1070) | | 323-1,320 t |
| 2002 Yield | 822 t | -- | | -- |
| 2003 Yield | 615 t | -- | | -- |
| 2004 Yield[5] | 532 t | | | |
| 2001 Replacement Yield | Below 2000 Yield | 222 t (101-416) | 371 t | 102-602 t |
| Relative Biomass ($B_{2001}/B_{MSY}$) | <1 (Over-fished) | 0.12 (0.06-0.25) | 0.22 | 0.12-1.76 |
| Relative Fishing Mortality ($F_{2000}/F_{MSY}$) | >1 (Over-fishing) | 8.28 (4.5-15.8) | 5.05 | 0.80-10.30 |
| Management Measures in Effect: | - In 2001 and 2002, PS and LL fisheries limit landings to 33% of max (1996, 1999) level. [Rec. 00-13], [Rec. 01-10] and [Rec. 02-13]. | | | |

1 Assessment results are highly uncertain.
2 The data used are not sufficiently informative to choose a "best case". For consistency, the continuity case presented here is based on data and assumptions that closely resemble the analyses made in 2000. Confidence limits from bootstrapping are conditional on this model-data set and thus may underestimate the real uncertainty.
3 These results are for the continuity case except that they were adjusted for retrospective biases.
4 The sensitivity analyses made were not chosen in a systematic way; the range is presented only for qualitative guidance.
5 Reported Task I value for 2004, which is likely an underestimate of total catch.

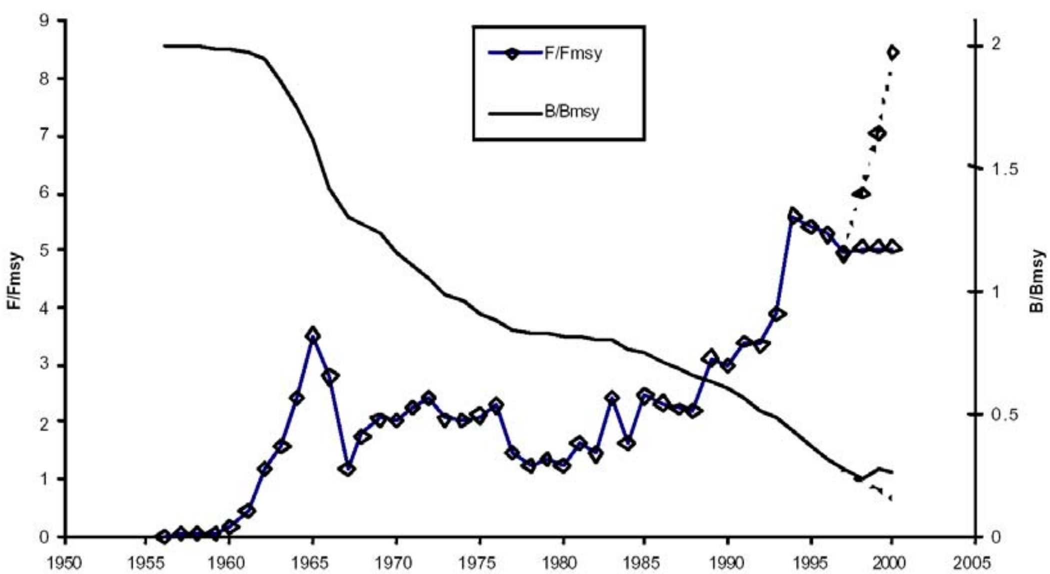



**Figure 3.16** **Estimated biomass ratio $B_{2000}$/ $B_{MSY}$ (solid line, no symbols) and fishing mortality ratio F2000/FMSY (solid line with symbols) from the production model fitted to the continuity case for white marlin. Ratios of last three years have been adjusted for retrospective pattern. Broken lines show unadjusted ratios. Note that scales are different for each ratio.** Source: SCRS, 2004.

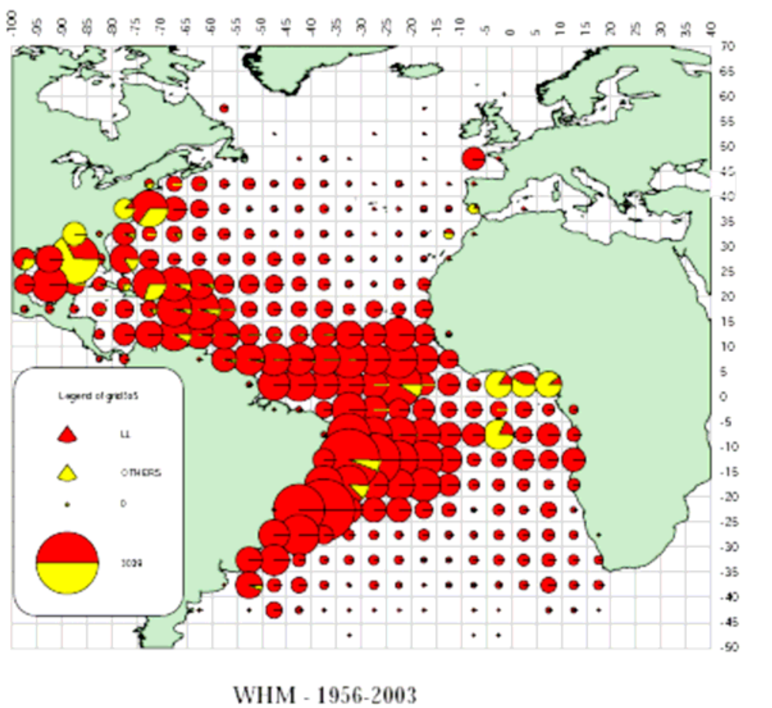



**Figure 3.17 Geographical distribution of white marlin catches for the period 1956-2003.** Source: SCRS, 2005.

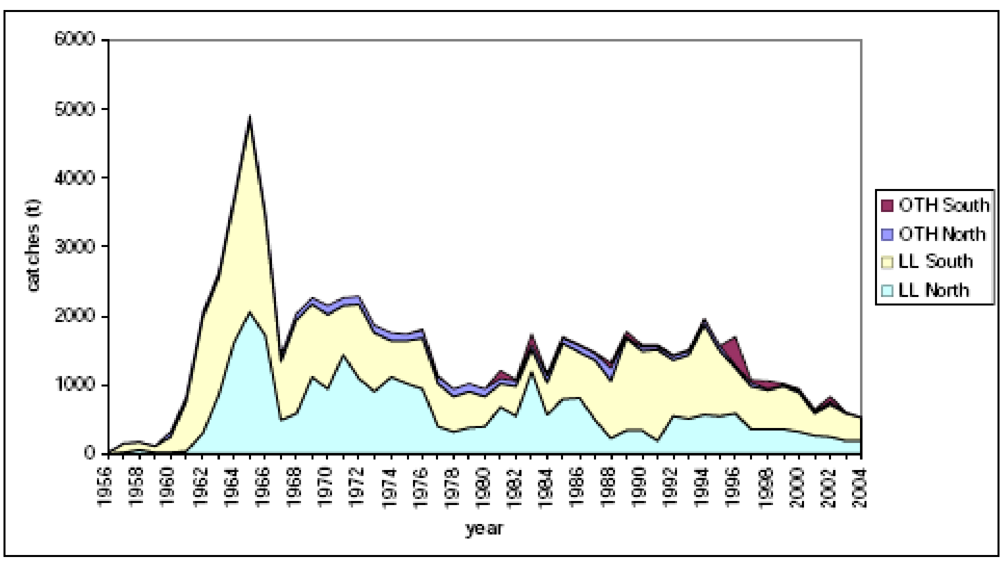



**Figure 3.18 Reported catch of white marlin (Task I) in the North and South Atlantic for longline (LL) gear and other (OTH) gears.** Source: SCRS, 2005.

*Effect of Regulations*

ICCAT Management Recommendations

Recommendation 97-09 required ICCAT Contracting Parties to reduce, starting in 1998, blue marlin and white marlin landings by at least 25 percent for each species from 1996 landings, such reduction to be accomplished by the end of 1999. ICCAT Recommendations 00-13, 01-10, and 02-13 imposed or extended additional catch restrictions for white marlin. These included reductions to no more than 33 percent of the 1996 or 1999 landing levels, whichever is greater, in the annual amount of white marlin that can be harvested and retained for landing by pelagic longline and purse seine vessels. Further, all blue marlin and white marlin brought to pelagic longline and purse seine vessels alive are required to be released in a manner that maximizes their survival (SCRS, 2004). Post-release survival studies concluded that white marlin can generally survive the trauma of being captured on pelagic longline gear (SCRS, 2005) and suggest that current management practices requiring the release of live white marlin (Rec. 00-13) will reduce fishing mortality on the stock. The live release provision does not apply to marlins that are dead when brought along the side of the vessel or that are not sold or entered into commerce. While the stock status evaluations are uncertain, projections indicated that the apparent intent of the ICCAT Billfish recommendations has, in the short term, some potential for stabilizing the stock biomass near current levels. Since 2000 is the last year of data used for the last stock assessment, it is too early to evaluate the effect of these recommendations on the stock. A stock assessment for white marlin is scheduled for 2006.

Globally, catches of white marlin appear to have been reduced as a result of ICCAT recommendations to less than 1,000 mt since 2000. Preliminary catches for 2004 were 532 mt, a slight decrease from 2003. Reported catches in 2004 by Brazil are lower than in previous years as a result of the implementation of the ICCAT recommendation to release live marlins, increased observer coverage, and a reduction in longline fishing effort (SCRS, 2005). Total Atlantic-wide catches of white marlin, as reported to ICCAT, decreased by approximately 48 percent from 1,028 mt in 1999 to 532 mt in 2004. Total Atlantic-wide longline landings of white marlin, as reported to ICCAT, decreased by approximately 46 percent from 924 mt in 1999 to 501 mt in 2004. Purse seine fisheries have incidental catches of white marlin, especially those that set on FADs. A temporary ban on FADs implemented by the EU resulted in a 300 – 400 mt (661,386 – 881,849 lb) decrease in incidental purse seine catches of all marlins (Gaertner et al., 2002). In the United States, white marlin are managed exclusively for recreational fisheries. This fishery is subject to an ICCAT imposed, 250-fish limit, annually for both blue and white marlin combined. In 2005, 31 recreationally landed white marlin were reported to ICCAT by the United States. In 2001, time area closures were established in the United States to reduce interactions between longline fisheries and white marlin and other billfish.

Domestic Regulations

Please see the discussion of domestic regulations contained in section 3.2.4.1, above.

*Recent and Ongoing Research*

Please see the discussion of recent and ongoing research contained in section 3.2.4.1, above.

### 3.2.4.3 Sailfish

*Life History/Species Biology*

Sailfish have a pan-tropical distribution and prefer water temperatures between 21 and 28°C (69 – 82°F). Although sailfish are the least oceanic of the Atlantic billfish and have higher concentrations in coastal waters (more than any other Istiophorid), they are also found in offshore waters. They range from 40°N to 40°S in the western Atlantic and 50°N to 32°S in the eastern Atlantic. No trans-Atlantic movements have been recorded, suggesting a lack of mixing between east and west. Although sailfish are generally considered to be rare and solitary species relative to the schooling Scombrids, sailfish are known to occur along tropical coastal waters in small groups consisting of at least a dozen individuals. Junior et al. (2004) captured sailfish in the southwestern Atlantic Ocean with pelagic longline gear at depths between 50 – 210 m (164 – 688 feet), with most individuals captured at 50 m. Sailfish are the most common representative of the Atlantic Istiophorids in U.S. waters (SCRS, 2005). Female sailfish grow faster, and attain a larger maximum size, than males while both sexes have a life expectancy of 15 years (NMFS, 1999).

In the winter, sailfish are found in schools around the Florida Keys and eastern Florida, in the Caribbean, and in offshore waters throughout the Gulf of Mexico. In the summer, they appear to migrate northward along the U.S. coast as far north as the coast of Maine, although there is a population off the east coast of Florida year-round. During the summer, some of these fish move north along the inside edge of the Gulf Stream. In the winter, they regroup off the east coast of Florida. Sailfish appear to spend most of their time above the thermocline, which occurs at depths of 10 – 20 m (32.8 – 65.6 feet) and 200 – 250 m (656 – 820 feet), depending on location. The 28°C (82°F) isotherm appears to be the optimal temperature for this species. Sailfish are mainly oceanic but migrate into shallow coastal waters. Larvae are associated with the warm waters of the Gulf Stream (NMFS, 1999).

A total of 65,868 sailfish have been tagged and released through the efforts of the CTC program, with reported recapture of 1,204 sailfish (1.83 percent of all releases). Most releases occurred off southeast Florida, from north Florida to the Carolinas, the Gulf of Mexico, Venezuela, Mexico, the northern Bahamas and the U.S. Virgin Islands. One tagged and recaptured specimen traveled from Juno, FL to the Mid-Atlantic, a distance of 2,972 km (1,745 miles). The longest movement tracked by tagging was 3,861 km (2,084 miles) and the longest time at large was 6,658 days (18.2 years) (Ortiz et al., 2003). During the winter, sailfish are restricted to the warmer parts of their range and move farther from the tropics during the summer. The summer distribution of sailfish does not extend as far north as for marlins, especially white marlin. Tag-and-recapture efforts have recovered specimens only as far north as Cape Hatteras, NC. Few trans-Atlantic or trans-equatorial movements have been documented using tag-recapture methods (NMFS, 1999).

Most sailfish examined that have been caught off Florida are under three years of age. Mortality is estimated to be high in this area, as most of the population consists of only two year classes. The longest period a recaptured-tagged animal was found to be at-large was 16.1 years. Unfortunately, the size at release is not available for this fish. Growth rate in older individuals is very slow (0.59 kg/yr (1.3 lb/year). Sailfish are probably the slowest growing of the Atlantic istiophorids. Sexual dimorphic growth is found in sailfish, but it is not as extreme as with blue marlin (NMFS, 1999).

Female sailfish spawn at age three and are generally 13 – 18 kg and 157 cm (28.6 – 39.6 lb and 61.8 inches), whereas males generally mature earlier at 10 kg and 140 cm (22 lb and 55.1 inches). Spawning takes place between April and October (de Sylva and Breder, 1997). Spawning has been reported to occur in shallow waters 9 – 12 m (30 – 40 ft) around Florida, from the Florida Keys to the region off Palm Beach on the east coast. Spawning is also assumed to occur, based on presence of larvae, offshore beyond the 100 m (328 feet) isobath from Cuba to the Carolinas, from April to September. However, these spawning activities have not been observed. Sailfish can spawn multiple times in one year, with spawning activity-moving northward in the western Atlantic as the summer progresses. Larvae are found in Gulf Stream waters in the western Atlantic, and in offshore waters throughout the Gulf of Mexico from March to October (NMFS, 1999). Serafy et al. (2003) found three larval sailfish in Exuma Sound, Bahamas, in the month of July indicating that there had been recent spawning activity in this vicinity. In the Pacific Ocean, sailfish spawn in waters between 27 – 30°C (Hernandez-H and Ramirez-H, 1998).

Sailfish are generally piscivorous, but also consume squid. Larvae eat copepods early in life then switch to fish at 6.0 mm (0.2 inches) in length (NMFS, 1999). The diet of adult sailfish caught around Florida consists mainly of pelagic fishes such as little tunny (*Euthynnus alletteratus*), halfbeaks (*Hemiramphus* spp.), cutlassfish (*Trichiurus lepturus*), rudderfish (*Strongylura notatus*), jacks (*Caranx* spp.), pinfish (*Lagodon rhomboides*), and squids (*Argonauta argo* and *Ommastrephes bartrami)*. Sailfish are opportunistic feeders and there is evidence that they may feed on demersal species such as sea robin (*Triglidae*), cephalopods and gastropods found in deep water.

Sailfish collected in the western Gulf of Mexico contained a large proportion of shrimp in their stomachs in addition to little tunny, bullet tuna (*Auxis* spp.), squid, and Atlantic moonfish (*Vomer setapinnis*). Junior et al. (2004) determined that squid were actually the second most important food item in the southwestern Atlantic off the coast of Brazil. Number of food items per stomach ranged from 1-14, and 6 percent of the stomachs were empty upon collection (Junior *et al*., 2004). Adult sailfish are probably not preyed upon often, but predators include killer whales (*Orcinus orca*), bottlenose dolphin (*Tursiops turncatus*), and sharks.

Participants from many nations target sailfish in both the western and eastern Atlantic Ocean.  Sailfish are found predominantly in the upper reaches of the water column and are caught in directed sport fisheries (recreational) and as bycatch in the offshore longline fisheries for swordfish and tunas and as a directed catch in coastal fisheries.  In coastal waters, artisanal fisheries use many types of shallow water gear to target sailfish (NMFS, 2003).

*Stock Status and Outlook*

Sailfish and longbill spearfish landings have historically been reported together in annual ICCAT landing statistics.  An assessment was conducted in 2001 for the western Atlantic sailfish stock based on sailfish/spearfish composite catches and sailfish "only" catches.  The assessment tried to address shortcomings of previous assessments by improving abundance indices and separating the catch of sailfish from that of spearfish in the offshore longline fleets.  The 2001 assessment looked at catches reported between 1956 and 2000 and all the quantitative assessment models used produced unsatisfactory fits, therefore the SCRS recommended applying population models that better accounted for these dynamics in order to provide improved assessment advice.  For the western Atlantic stock, annual sailfish catches have averaged about 700 mt (1,543,235 lb) over the past two decades and the abundance indices have remained relatively stable.  The 2000 yield was 506 mt (1,115,539 lb) (Table 3.15).  The reported catches of sailfish/spearfish (Task I) for 2004 were 1,017 and 1,088 mt for the west and east Atlantic, respectively.  Recent analyses did not provide any information on the MSY or other stock benchmarks for the 'sailfish only' stock.  In the eastern Atlantic, abundance indices based on coastal/inshore fisheries for sailfish have decreased in recent years, while those attained from the Japanese longline fishery indicate constant estimates of abundance since the mid-1970s (SCRS, 2004).

Based on the 2001 assessment, it is unknown if the western or eastern sailfish stocks are undergoing overfishing or if the stocks are currently overfished.  Therefore, SCRS recommended that Contracting Parties consider methods to reduce fishing mortality rates, overall, and that western Atlantic catches should not be increased above current levels.  Furthermore, the SCRS expressed concern about the incomplete reporting of catches, particularly in recent years.

A summary of Atlantic sailfish stock assessment data is given in Table 3.15.  The evolution of estimated sailfish/spearfish catches in the Atlantic during the period 1956 – 2002 for both east and west stocks is given in Figure 3.19.  Available CPUE for western Atlantic sailfish/spearfish for the period 1967 – 2000 is shown in Figure 3.20.  Estimated sailfish only catches from 1956 – 2000 are shown in Figure 3.21.

**Table 3.15 Summary of Atlantic Sailfish Stock Assessment data. Weights are in metric tons, whole weight.** Source: SCRS, 2004.

| ATLANTIC SAILFISH "ONLY" SUMMARY | | |
|---|---|---|
| | **West Atlantic** | **East Atlantic** |
| Maximum Sustainable Yield (MSY) | Not estimated | Not estimated |
| Recent Yield (2000)[1] | 506 t[2] | 969 t[2] |
| 2000 Replacement Yield | ~ 600 t | Not estimated |
| Management Measures in Effect | None | None |

[1] Estimated yield includes that carried over from previous years.
[2] Recent yield (2000) was estimated during the 2001 sailfish assessment. To estimate the 2001, 2002 and 2003 yield, catches of sailfish and spearfish would have to be separated. A separation similar to the one conducted in the 2001 assessment has not yet been conducted.

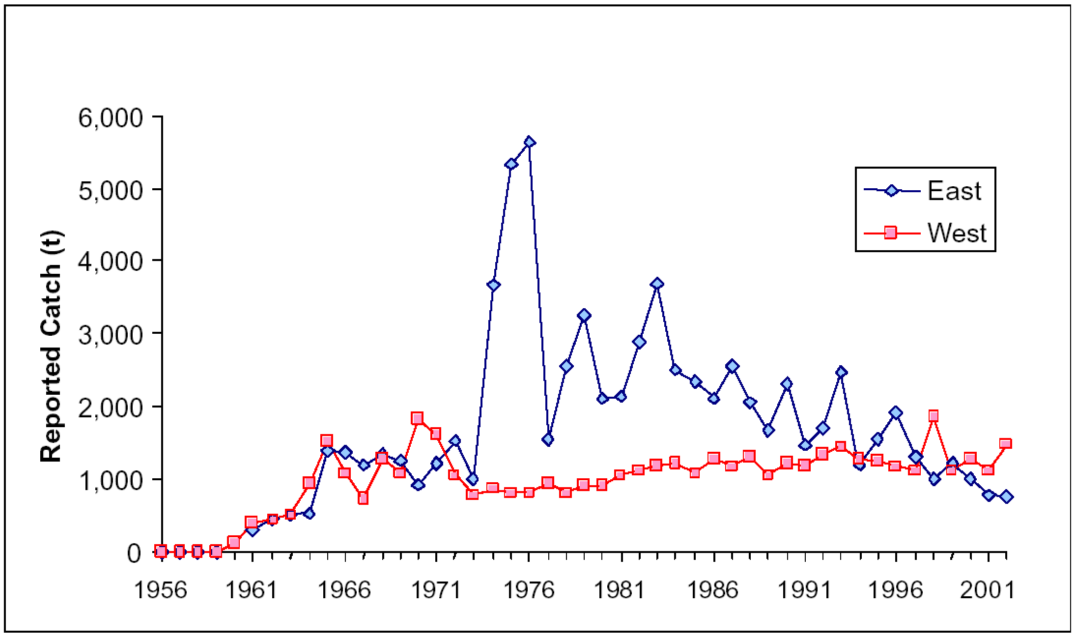



**Figure 3.19 Evolution of estimated sailfish/spearfish catches in the Atlantic (landings and dead discards, reported and carried over) in the ICCAT Task I database during 1956-2002 for the east and west stocks. The 2003 catch reported to ICCAT is preliminary and is not included in this figure. Weights are in metric tons, whole weight.** Source: SCRS, 2005.

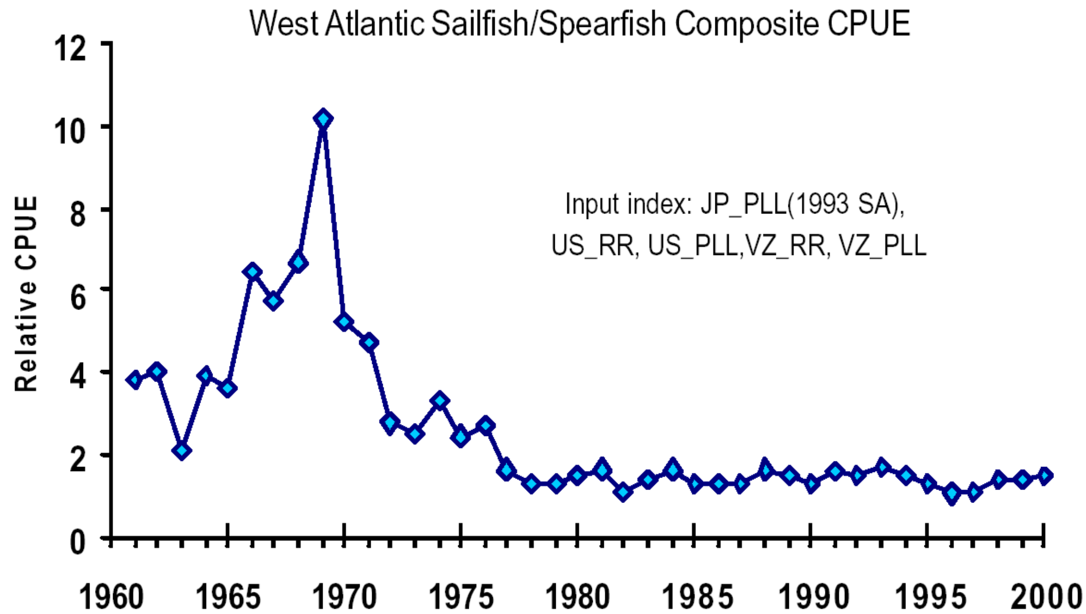



**Figure 3.20 Available standardized CPUE for western Atlantic sailfish/spearfish for the period 1967-2000, including Japanese, U.S., and Venezuelan time series data.** Source: SCRS, 2005**.**

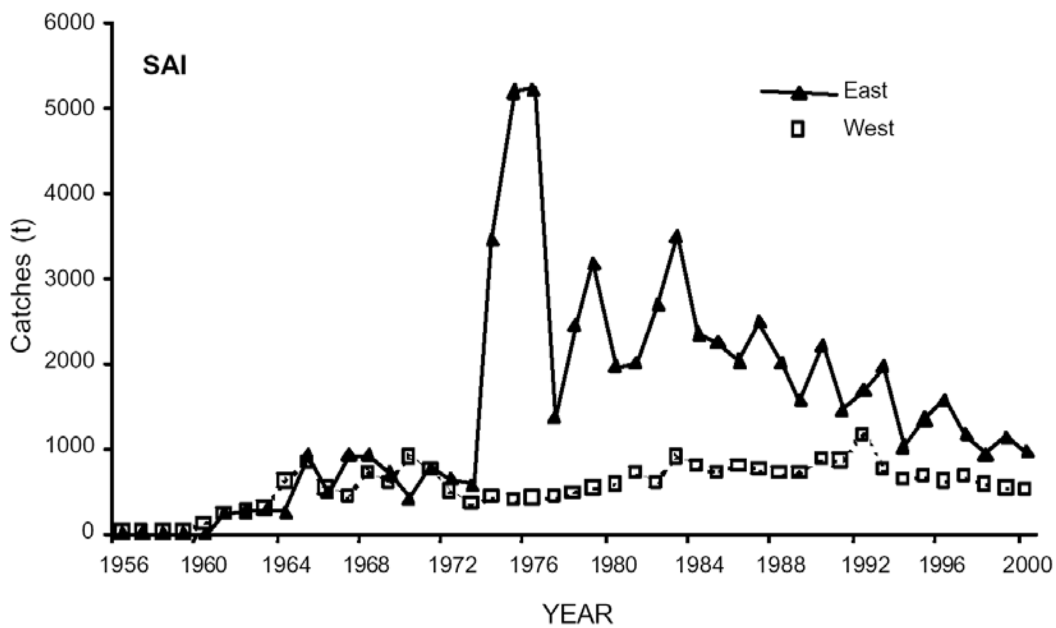



**Figure 3.21 Estimated sailfish "only" catches based on the new procedure for splitting combined sailfish and longbill spearfish catches from 1956-2000. Weights are in metric tons, whole weight.** Source: SCRS, 2005.

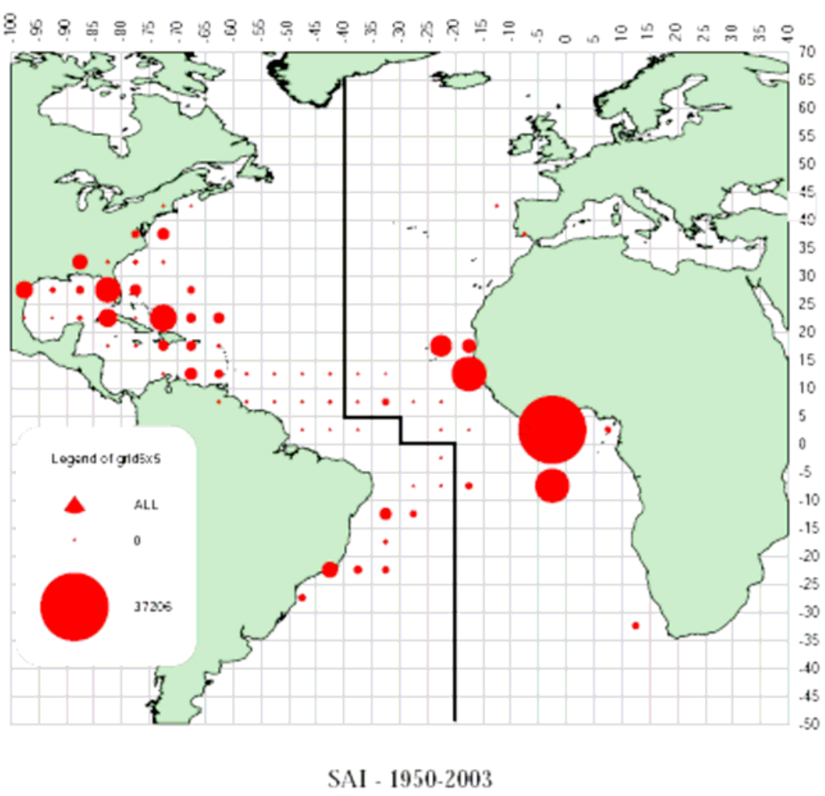



**Figure 3.22 Geographical distribution of sailfish/spearfish catches between 1950-2003.** Source: SCRS, 2005.

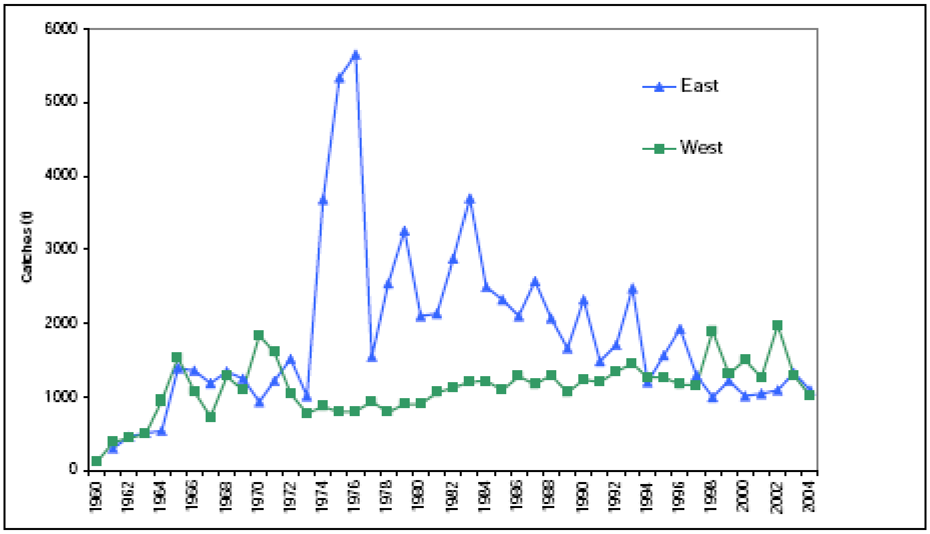



**Figure 3.23 Evolution of estimated sailfish/spearfish catches in the Atlantic (landings and dead discards, reported and carried over) in the ICCAT Task I database during 1956-2004 for the east and west stocks.** Source: SCRS, 2005.

*Effect of Regulations*

ICCAT Management Recommendations

No ICCAT management regulations are currently in effect for Atlantic sailfish. Sailfish are managed as distinct eastern and western Atlantic stocks. This separation into two management units is based on life history information. General management recommendations made by the SCRS to ICCAT have remained consistent in recent years. These management recommendations indicated that ICCAT should consider methods for reducing fishing mortality rates. The current western Atlantic assessment led the SCRS to recommend that the West Atlantic sailfish "only" catches should not exceed current levels. For the East Atlantic, the SCRS recommended that sailfish "only" catches should not exceed current levels and that ICCAT should consider practical and alternative methods to reduce fishing mortality and assure data collection systems. SCRS expressed concern about the incomplete reporting of catches, particularly for the most recent years, the lack of sufficient reports by species, and evaluations of the new methods used to split the sailfish and spearfish catch and to index abundance. The SCRS recommended all countries landing sailfish/spearfish or having dead discards, report these data to the ICCAT Secretariat and that the SCRS should consider the possibility of a spearfish "only" assessment in the future (SCRS, 2004).

Domestic Regulations

Please see the discussion of domestic regulations contained in section 3.2.4.1, above.

*Recent and Ongoing Research*

Please see the discussion of recent and ongoing research contained in section 3.2.4.1, above.

#### 3.2.4.4 Longbill Spearfish

The longbill spearfish (*Tetrapturus pfluegeri*) are the most rare of the Atlantic istiophorids, and were identified as a distinct species in 1963. There is relatively little information available on spearfish life history. A related istiophorid, the Mediterranean spearfish (*Tetrapturus belone*), is the most common representative of this family in the Mediterranean Sea. Longbill spearfish are known to occur in epipelagic waters above the thermocline, off the east-coast of Florida, the Bahamas, the Gulf of Mexico, and from Georges Bank to Puerto Rico. Junior et al. (2004) captured spearfish off the coast of Brazil at depths ranging from 50 – 190 m (164 – 623 feet). The geographic range for this species is from 40°N to 35°S.

Spearfish spawn from November to May and females are generally 17 – 19 kg (37.4 – 41.8 lb) and 160 – 170 cm (63 – 66 inches) at first maturity. These fish are unique among istiophorids in that they are winter spawners. Larval spearfish have been identified from the vicinity of the Mid-Atlantic ridge from December to February, indicating that this species spawns in offshore waters (de Sylva and Breder, 1997).

Common prey items include fish and squid. Specifically, Junior et al. (2004) observed 37 stomachs and found that oceanic pomfret and squid comprised 63 percent of the items identified in stomachs. Most prey items were between 1 – 10 cm (0.39 – 3.9 inches) in length, with a mean length of 6.7 cm (2.63 inches). The maximum number of prey items found in any individual stomach was 33.

Similar to sailfish, spearfish are caught incidentally or as bycatch in offshore longline fisheries by many nations. There are also artisinal fisheries that take place in the Caribbean Sea and in the Gulf of Guinea. Directed recreational fisheries for spearfish are limited due to the fact that the fish are generally located further offshore than other istiophorids. The reported catches of sailfish/spearfish (Task I) for 2003 are 1,310 and 416 mt (2,888,055 and 917,123 lb) for the west and east Atlantic, respectively. The 2001 – 2003 reported catch of unclassified billfish was 12 percent of the reported catch for all billfish and, for some fisheries, this proportion is much greater. This is a problem for species like spearfish for which there is already a paucity of data (SCRS, 2004).

*Stock Status and Outlook*

Initial stock assessments conducted on spearfish aggregated these landings with sailfish. As mentioned in the Sailfish section, the 2001 assessment included a ‘sailfish only’ in addition to an aggregate sailfish/spearfish assessment. West Atlantic catch levels for sailfish/spearfish combined seem sustainable because, over the past two decades, CPUE and catch levels have remained constant, however, MSY is unknown. As a result, it is unknown whether or not spearfish are experiencing overfishing or are overfished. Spearfish catch levels are shown in Figure 3.24. The SCRS recommends implementing measures to reduce or keep fishing mortality levels constant and evaluating new methods to split sailfish and spearfish indices of abundance (SCRS, 2004).

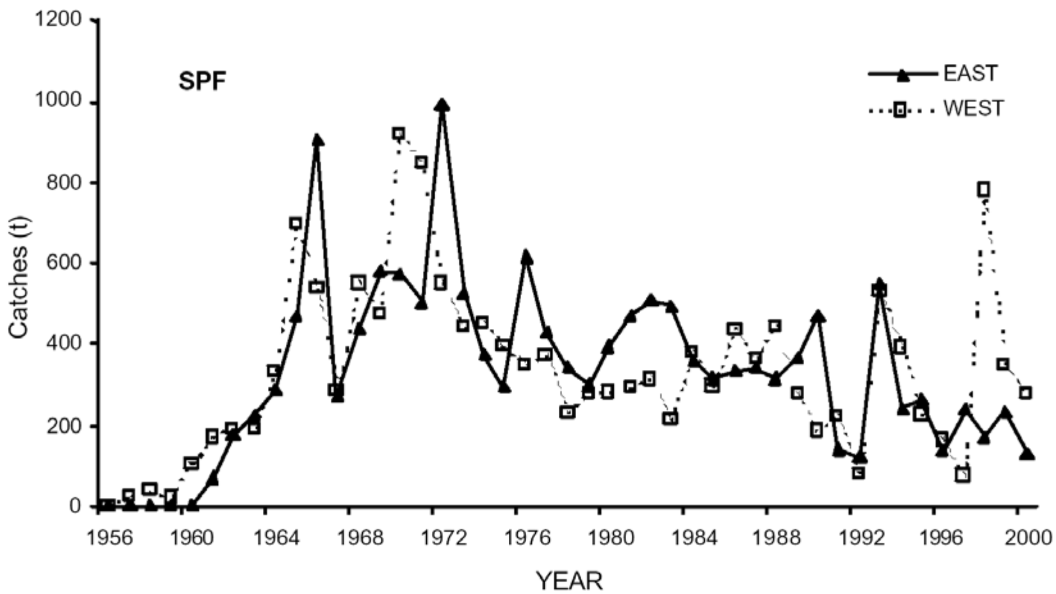



**Figure 3.24 Estimated spearfish "only" catches in the Atlantic based on the new procedure for splitting combined sailfish and spearfish catches from 1956-2000. Weights are in metric tons, whole weight.** Source: SCRS, 2005.

*Effect of Regulations*

ICCAT Management Recommendations

No ICCAT management regulations are currently in effect for Atlantic longbill spearfish. Management recommendations are similar to those listed for sailfish, including: consider methods for Contracting Parties to reduce mortality rates, encourage Contracting Parties to provide complete reporting of spearfish catches, evaluate new methods to split the sailfish and spearfish catch/index abundance, and assess sailfish independently of spearfish.

Domestic Regulations

Please see the discussion of domestic regulations contained in section 3.2.4.1, above.

*Recent and Ongoing Research*

Please see the discussion of recent and ongoing research contained in section 3.2.4.1, above.

### 3.2.5 Atlantic Sharks

#### 3.2.5.1 Life History/Species Biology

Sharks belong to the class Chondrichthyes (cartilaginous fishes) that also includes rays, skates, and deepwater chimaeras (ratfishes). From an evolutionary perspective, sharks are an old group of fishes characterized by skeletons lacking true bones. The earliest known sharks have been identified from fossils from the Devonian period, over 400 million years ago. These primitive sharks were small creatures, about 60 to 100 cm long, that were preyed upon by larger armored fishes that dominated the seas. The life span of all shark species in the wild is not known, but it is believed that many species may live 30 to 40 years or longer.

Relative to other marine fish, sharks have a very low reproductive potential. Several important commercial species, including large coastal carcharhinids, such as sandbar (*Carcharhinus plumbeus)* (Casey and Hoey, 1985; Sminkey and Musick, 1995; Heist *et al*., 1995), lemon (*Negaprion brevirostris)* (Brown and Gruber, 1988), and bull sharks (Branstetter and Stiles, 1987), do not reach maturity until 12 to 18 years of age. Various factors determine this low reproductive rate: slow growth, late sexual maturity, one to two-year reproductive cycles, a small number of young per brood, and specific requirements for nursery areas. These biological factors leave many species of sharks vulnerable to overfishing.

There is extreme diversity among the approximately 350 species of sharks, ranging from tiny pygmy sharks of only 20 cm (7.8 in) in length to the giant whale sharks, over 12 meters (39 feet) in length. There are fast-moving, streamlined species such as mako (*Isurus* spp.*)* and thresher sharks (*Alopias* spp.), and sharks with flattened, ray-like bodies, such as angel sharks (*Squatina dumerili)*. The most commonly known sharks are large apex predators including the white (*Carcharadon carcharias*), mako, tiger (*Galeocerdo cuvier*), bull (*Carcharhinus leucas)*, and great hammerhead (*Sphyrna mokarran*). Some shark species reproduce by laying eggs, others nourish their embryos through a placenta. Despite their diversity in size, feeding habits, behavior and reproduction, many of these adaptations have contributed greatly to the evolutionary success of sharks.

The most significant reproductive adaptations of sharks are internal fertilization and the production of fully developed young or "pups." These pups are large at birth, effectively reducing the number of potential predators and enhancing their chances of survival. During mating, the male shark inseminates the female with copulatory organs, known as claspers that develop on the pelvic fins. In most species, the embryos spend their entire developmental period protected within their mother's body, although some species lay eggs. The number of young produced by most shark species in each litter is small, usually ranging from two to 25, although large females of some species can produce litters of 100 or more pups. The production of fully-developed pups requires great amounts of nutrients to nourish the developing embryo.

Traditionally, these adaptations have been grouped into three modes of reproduction: oviparity (eggs hatch outside body), ovoviviparity (eggs hatch inside body), and viviparity (live birth).

Adults usually congregate in specific areas to mate and females travel to specific nursery areas to pup. These nurseries are discrete geographic areas, usually in waters shallower than those inhabited by the adults. Frequently, the nursery areas are in highly productive coastal or estuarine waters where abundant small fishes and crustaceans provide food for the growing pups. These areas also may have fewer large predators, thus enhancing the chances of survival of the young sharks. In temperate zones, the young leave the nursery with the onset of winter; in tropical areas, young sharks may stay in the nursery area for a few years.

Shark habitat can be described in four broad categories: (1) coastal, (2) pelagic, (3) coastal-pelagic, and (4) deep-dwelling. Coastal species inhabit estuaries, the nearshore and waters of the continental shelves, *e.g.*, blacktip (*Carcharhinus limbatus*), finetooth, bull, lemon, and sharpnose sharks (*Rhizoprionondon terraenovae*). Pelagic species, on the other hand, range widely in the upper zones of the oceans, often traveling over entire ocean basins. Examples include shortfin mako (*Isurus oxyrinchus*), blue (*Prionace glauca*), and oceanic whitetip (*Carcharhinus longimanus*) sharks. Coastal-pelagic species are intermediate in that they occur both inshore and beyond the continental shelves, but have not demonstrated mid-ocean or transoceanic movements. Sandbar sharks are examples of a coastal-pelagic species. Deep-dwelling species, *e.g.*, most cat sharks (*Apristurus* spp.) and gulper sharks (*Centrophorus* spp.) inhabit the dark, cold waters of the continental slopes and deeper waters of the ocean basins.

Seventy-three species of sharks are known to inhabit the waters along the U.S. Atlantic coast, including the Gulf of Mexico and the waters around Puerto Rico and the U.S. Virgin Islands. Thirty-nine species are managed by HMS; spiny dogfish also occur along the U.S. coast, however management for this species is under the authority of the Atlantic States Marine Fisheries Commission as well as the New England and Mid-Atlantic Fishery Management Councils. Deep-water sharks were removed from the management unit in 2003. Based on the ecology and fishery dynamics, the sharks have been divided into four species groups for management: (1) large coastal sharks, (2) small coastal sharks, (3) pelagic sharks, and (4) prohibited species (Table 3.16).

**Table 3.16 Common names of shark species included within the four species management units under the purview of the HMS management division.**

| | Shark Species Included |
|---|---|
| Large Coastal Sharks (11) | Sandbar, silky, tiger, blacktip, bull, spinner, lemon, nurse, smooth hammerhead, scalloped hammerhead, and great hammerhead sharks |
| Small Coastal Sharks (4) | Atlantic sharpnose, blacknose, finetooth, and bonnethead sharks |
| Pelagic Sharks (5) | Shortfin mako, thresher, oceanic whitetip, porbeagle, and blue sharks |
| Prohibited Species (19) | Whale, basking, sandtiger, bigeye sandtiger, white, dusky, night, bignose, Galapagos, Caribbean reef, narrowtooth, longfin mako, bigeye thresher, sevengill, sixgill, bigeye sixgill, Caribbean sharpnose, smalltail, and Atlantic angel sharks |

### 3.2.5.2 Stock Status and Outlook

NMFS is responsible for conducting stock assessments for the Large and Small Coastal Shark complexes (LCS and SCS) (Cortes, 2002; Cortes *et al*., 2002). ICCAT and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) have recently conducted assessments of three pelagic shark species. Stock assessments were conducted for the LCS and SCS in 2002. NMFS is conducting stock assessments for LCS and SCS in 2006 and 2007, respectively. NMFS also recently released a stock assessment for dusky sharks (May 25, 2006, 71 FR 30123). Species-specific assessments for blacktip and sandbar sharks within the LCS complex and finetooth sharks, Atlantic sharpnose sharks, blacknose sharks (*Carcharhinus acronotus*), and bonnethead sharks (*Sphyrna tiburo*) within the SCS complex, were also conducted in 2002. The conclusions of these assessments are summarized in Table 3.18 and Table 3.17 and are fully described in Amendment 1 to the 1999 Atlantic Tunas, Swordfish, and Sharks FMP. Summaries of recent stock assessments and reports on several species of pelagic sharks (blue sharks, shortfin mako sharks, and porbeagle sharks (*Lamna nasus*) by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and ICCAT are also included in this section. More detailed information on life history and distribution of sharks can be found in Appendix B (EFH).

### 3.2.5.3 Large Coastal Sharks

The last LCS stock assessment was held in June 2002, however, results from a new stock assessment should be released in 2006. Discussions of the 2002 stock assessment focused on the availability of four additional years worth of catch estimates, biological data, catch rate series, and the types of models that should be used. The modeling itself was performed after the Shark Evaluation Workshop and incorporated new catch and effort estimates for the years 1998 – 2001 as well as over 20 catch-per-unit-effort (CPUE) series for the LCS complex, sandbar, and blacktip sharks (

Table 3.17).

A variety of stock assessment models were used to investigate the population dynamics of LCS including: (1) a non-equilibrium Schaefer biomass dynamic model using the sampling/importance re-sampling (SIR) algorithm (Bayesian SPM) and several weighting schemes; (2) a non-equilibrium Schaefer state-space surplus production model (SSSPM) using a Markov Chain Monte Carlo (MCMC) method for numerical integration; (3) a lagged recruitment, survival, and growth (SSLRSG) state-space model; (4) the maximum likelihood estimation model (MLE); and (5) a fully age-structured, state-space population dynamic model (ASPM). General descriptions of these models can be found in the stock assessment. The use of multiple approaches in evaluating stock status can reduce uncertainty in the best available data and can balance individual model strengths and weaknesses.

Due to concerns that catch series may underestimate mortality from the commercial fishery, four separate catch scenarios were considered to evaluate catch histories: updated, baseline, and the alternative scenarios. The updated catch scenario was comprised of catches used in the 1998 SEW, including data through 1997, and additional catches for 1998 – 2001. The baseline catch scenario included similar information and discards from the menhaden fishery, and Mexican catches, bottom longline discards back to 1981, and commercial and recreational catches back to 1981. The alternative scenario reconstructed historical catches back in time (calendar years 1960 – 2001) and applied to the LCS complex only. The age-structured models for sandbar and blacktip shark included both updated and baseline scenarios in which specific catch series were linked to specific catchability and selectivity parameters. The alternative scenarios were used for sandbar and blacktip shark catch history evaluation.

Catch rates were also analyzed for other species included in the LCS complex such as tiger, hammerhead, dusky, and silky shark. Generally, commercial data indicate increasing catch rates for tiger shark (Brown and Cramer, 2002; Cortes *et al.*, 2002) as well as decreasing trends for dusky shark, sand tiger shark, and hammerhead shark (Brown, 2002; Cortes *et al.*, 2002; Brown and Cramer, 2002). Recreational catch data for hammerhead and bull shark point towards declining trends for both species (Cortes *et al.*, 2002).

Considering the outputs of all model analyses combined, the assessment results were considerably more pessimistic for the LCS aggregate as compared to those for individual species within the complex (*i.e.*, sandbar and blacktip sharks). While results illustrate improvements in the LCS complex since 1998, all of the models and catch scenarios described above, with the exception of the Bayesian SPM scenario which used only fishery-independent CPUE series, indicate that overfishing may be occurring and that the LCS complex may be overfished. Tables 3.4 and 3.5 provide biomass and fishing mortality estimates used to make these determinations. As such, the stock assessment finds that at least a 50-percent reduction in 2000 catch levels for the complex could be required for the biomass to reach maximum sustainable yield (MSY) in 10, 20 or 30 years. Furthermore, a 20-percent reduction in 2000 catch levels for the complex would result in less than a 50-percent probability of achieving MSY even after 30 years of implementation under those catch levels. Overall, the stock assessment found that the LCS complex as a whole is overfished and overfishing is occurring (Cortes *et al.*, 2002).

The assessment acknowledges that the results between the complex and sandbar and blacktip sharks may be considered conflicting, given that sandbar and blacktip sharks comprise the majority of LCS commercial harvests. Specifically, sandbar and blacktip sharks make up approximately 44 percent of the total commercial catch (Burgess and Morgan, 2003) and over 70 percent of the landings (Cortes and Neer, 2002). The remainder of the catch is comprised mostly of tiger, scalloped hammerhead, silky, and sand tiger, with catch composition varying by region (Burgess and Morgan, 2003). These species are less marketable and are often released, so they are reflected in the overall catch but not the landings. Nonetheless, the complex represents a variety of species beyond sandbar and blacktip shark, some of which are in apparent decline.

In December 2002, the peer review process of the 2002 LCS stock assessment was completed as required by a court settlement agreement. The peer reviews were conducted by three separate non-NMFS reviewers who were asked to respond to five questions regarding the appropriateness of specific modeling approaches and the selection there of, consideration of available data and the quality of data sets, application of available data in selected models, reliability of projections, and the effects of various catch scenarios on stock trajectories. Peer review findings were generally positive in that reviewers agreed that a state-of-the-art assessment was performed and that the best available science was employed. Reviewers noted assessment strengths including (1) compilation of several indices of abundance, (2) consideration of multiple stock assessment models, including Bayesian analyses, (3) discussion of myriad alternative harvest policies, and (4) analytical changes to address concerns raised by previous reviewers. Further investigation of catch series indices, assessment of individual species within the LCS complex, investigation of age and age-sex-area assessment models, consideration of alternative harvest policies in contrast to the current constant-catch policy, and NMFS support for observer programs to obtain fishery independent estimates of abundance were among the recommendations offered for improvements to future stock assessment for LCS.

The 2005/2006 stock assessment for LCS follows the Southeast Data, Assessment, and Review (SEDAR) process. This process is a cooperative program designed to improve the quality and reliability of the stock assessments. The SEDAR process emphasizes constituent and stakeholder participation in the assessment development, transparency in the assessment process, and a rigorous and independent scientific review of the completed stock assessment. The Data Workshop for the stock assessment, which documented, analyzed, reviewed, and compiled the data for conducting the assessment, was held from October 31 to November 4, 2005, in Panama City, FL (September 15, 2005, 70 FR 54537; correction October 5, 2005, 70 FR 58190). The Assessment Workshop, which developed and refined the population analyses and parameter estimates, was held from February 6 to February 10, 2006, in Miami, FL (December 22, 2005, 70 FR 76031). At the time of writing this Final HMS FMP, the last workshop, the Review Workshop, had not yet occurred. At the Review Workshop, independent scientists should review the assessment and data. This Workshop should be held on June 5 to June 9, 2006, in Panama City, FL (March 9, 2006, 71 FR 12185). The final results should be released after the review workshop. All reports are posted on SEDAR webpage when complete (http://www.sefsc.noaa.gov/sedar/).

Recently, the SEFSC released the first dusky shark stock assessment (May 25, 2006, 71 FR 30123). Results from all of the models used were similar with all models indicating that the stock is heavily exploited. The stock assessment summarizes relevant biological data, discusses the fisheries affecting the species, and details the data and methods used to assess the stock. At the time of writing this Final HMS FMP, NMFS is reviewing the stock assessment and considering implications for management.

#### 3.2.5.4 Small Coastal Sharks

A stock assessment for small coastal sharks (SCS) was also conducted in 2002. This was the first assessment since 1992 and as such the assessment included new information regarding SCS age and growth, reproduction, and population dynamics. Additional information relative to commercial and recreational catches as well as extended bycatch estimates for the shrimp trawl fishery were also considered.

Trends in catch were analyzed for the SCS complex as well as the four species comprising this aggregate grouping (Table 3.18). Overall, SCS commercial landings exceeded recreational harvest in all years since 1996, with the exception of 2000. Of the four species of SCS analyzed, bonnetheads contributed to over 50 percent of all SCS commercial landings in 1995, but Atlantic sharpnose and finetooth sharks each accounted for over 30 percent of the commercial landings in years 1996 – 1999 and 1998 – 2000 respectively. Atlantic sharpnose dominated recreational catch in all years between 1995 and 2000.

Also, in 2002, researchers at the Mote Marine Laboratory and the University of Florida, conducted a stock assessment for SCS using similar data but different models. The results were similar to the NMFS assessment in that current biomass levels for Atlantic sharpnose, bonnethead, and blacknose were at least 69 percent of the biomass in 1972 while the current biomass level for finetooth sharks was only nine percent the level in 1972 (Simpfendorfer and Burgess, 2002). Both stock assessments note that the data used for finetooth sharks is not as high a quality as the data used for Atlantic sharpnose due to shorter catch-per-unit-effort (CPUE) and catch series, lack of bycatch estimates, and no catches reported in some years.

NMFS intends to conduct a new stock assessment for SCS starting in 2007. The new stock assessment would follow the SEDAR process.

*Finetooth Sharks*

Additional information on finetooth sharks and the results specific to this species from the 2002 SCS stock assessment are provided in this section because finetooth sharks were the only exception to the results of the assessment, in that fishing mortality in the final five years of data considered was above the mortality level associated with producing MSY. As such, finetooth sharks are not overfished, however, overfishing is occurring (Table 3.17 and Table 3.20). Sections 2.2.2 and 4.2.2 provide more detail on the alternatives that were considered to prevent overfishing of finetooth sharks.

Finetooth sharks inhabit shallow coastal waters to depths of 10 m (32.8 feet) near river mouths in the Gulf of Mexico and South Atlantic Ocean between Texas and North Carolina. These fish often form large schools and migrate to warmer waters when water temperatures drop below 20°C (68°F). Finetooth sharks are relatively productive compared to other sharks as fish are sexually mature at 3.9 (TL = 118 cm (46 inches)) and 4.3 (TL = 123 cm (48 inches)) years for males and females, respectively (Carlson *et al*., 2003). Reproduction in finetooth sharks is viviparous with yolk sac placenta and embryos nourished through a placental connection. Females move into the nursery areas in late May and gestation is approximately 12 months. Each litter can have 1 – 6 pups with individuals measuring 51 – 64 cm (20 – 25 inches) in length. The finetooth shark feeds primarily on mullet, Spanish mackerel, spot, Atlantic menhaden, cephalopods, and crustacean (Bester and Burgess, 2004).

In 2002, NMFS conducted a stock assessment for all SCS, including finetooth sharks. Five catch rate series were used, including fishery-independent and -dependent data. The fishery-independent data sources included the NMFS Pascagoula and Panama City Laboratory longline surveys (NMFS SE LL and NMFS LL PC), and the NMFS Panama City Laboratory Gillnet Survey (NMFS GN). Fishery-dependent catch series data were included from the combined recreational series and the Directed Shark Gillnet Fishery Observer Program (DSGFOP). This catch rate series data were combined with life history information for finetooth sharks and evaluated with several stock assessment models. There were four models utilized for the assessment and numerous scenarios within each model, producing a range of point estimates for fishing mortality, relative fishing mortality, biomass, relative stock biomass, maximum fishing mortality threshold, minimum stock size threshold, and other parameters.

Of the catch series data used in the analysis, three of the five showed a positive trend (*i.e.*, had positive slopes) in catch over time, suggesting an increase in finetooth shark abundance. The catch series data showing positive trends were DSGFOP (0.03), NMFS SE LL (0.34), and NMFS LL PC (0.04); however only the slope for the DSGFOP catch series data was statistically significant different from zero (*P* = 0.03). However, it should be noted that data were missing from some years in the NMFS SE LL and the DSGFOP catch series data; therefore, one cannot necessarily assume that finetooth sharks are increasing in abundance. The other two datasets, NMFS LL PC and NMFS GN PC, had negative trends in catch over time as indicated by their negative slopes (-0.24 and -0.11, respectively) but neither trend was statistically significant from zero. Overall, the slopes for the small coastal shark (SCS) complex as a whole and other individual species were relatively flat, indicating that the relative abundance of the stocks remained fairly stable during the exploitation phase (Cortés, 2002).

Four different stock assessment models were used to evaluate the status of SCS using Bayesian statistical techniques. Results of both surplus production models and the Lagged Recruitment Survival and Growth State Space model (LRSG) (using several different scenarios) indicate that the current level of removals is sustainable for the SCS aggregate and the individual species within the complex. Relative stock biomass and fishing mortality trajectories obtained with the Bayesian state-space Schaefer surplus production model (SPM) for the small coastal aggregate and the Atlantic sharpnose sharks followed similar trends, since the catches were dominated by these species. The model predicted that the stock biomass for the small coastal shark complex in any given year from 1972 – 2000 exceeded the biomass producing MSY. Relative fishing mortality ($F/F_{MSY}$) was generally below one for the SCS complex, but for finetooth sharks, the final five values of F in the series (1996 – 2002) estimated by the model were above the level of F corresponding to MSY.

Results for finetooth sharks were directly influenced by the catch series used, which did not include any bycatch estimates, and this, in turn, influenced certain parameters of the Bayesian models (specifically, the priors chosen for K, which describes uncertainty in assessment models) (Cortés, 2002). The lack of bycatch data in the catch series data lead to low values of MSY predicted for finetooth sharks in the SCS stock assessment (especially those obtained through the SPM models). This lack of bycatch data and shorter catch and catch per unit effort (CPUE) series, coupled with no catches reported in some years, led to some uncertainty in the stock assessment for finetooth sharks. In the case of finetooth sharks, model estimates of recent F levels are above $F_{MSY}$, indicating that recent levels of effort directed at this species, if continued, could result in an overfished status in the relatively near future. The various stock assessments models used and sensitivity analyses run support these general conclusions (Cortés, 2002). Future work should continue to monitor the status of this individual species (Cortés, 2002).

Landings of finetooth sharks in other fisheries are extensive; however, catch series data from these fisheries are currently unavailable. The inclusion of such data in future stock assessments will provide better information on both fishing effort and estimates of MSY. Thus, it may be prudent to develop a plan to prevent overfishing that first investigates other sources of fishing mortality before initiating a particular set of management actions. In order to capture additional catch series data on fisheries contributing to finetooth fishing mortality, NMFS is expanding observer programs to include DSGFOP observers on all boats that have directed or incidental shark permits to determine if these gillnet vessels in the South Atlantic are contributing to the majority of fishing mortality. A continuation of a pilot program initiated in the spring of 2005 that placed observers on board additional gillnet vessels targeting other fish species will improve data collection efforts. Furthermore, contacting Regional Fishery Management Councils and Interstate Marine Fisheries Commissions to determine sources of mortality occurring under other fishery management plans, and having finetooth sharks included as a select species for sub-sampling of bycatch in the Gulf of Mexico Shrimp Trawl Observer Program will provide additional landings data necessary for appropriate management and conservation actions in the future.

**Table 3.17 Summary Table of Biomass and Fishing Mortality for Large Coastal Sharks (LCS).** Source: Cortes *et al*., 2002.

| | | | | | Outlook |
|---|---|---|---|---|---|
| Large Coastal Complex | 2,940-10,156 | 0.46-1.18 | 0.07-0.21 | 0.05-0.10 | Overfished; Overfishing is occurring |
| Sandbar Sharks | 1,027-4.86 E-8 | 3.25E4-2.22 | 0.0001-0.70 | 0.05-0.46 | Not overfished; Overfishing is occurring |
| Blacktip Sharks | 5,587-3.16 E7 | 0.79-1.66 | 0.01-0.21 | 0.06-0.18 | Not overfished; No overfishing occurring |

**Table 3.18 Summary Table of Biomass and Fishing Mortality for Small Coastal Sharks (SCS)** Source: Cortes, 2002.

| | | | = = | | | **Outlook** |
|---|---|---|---|---|---|---|
| Small Coastal Sharks (SCS) | 7.0-2.2 | 1.38-2.39 | 16.2-50.2 | 0.03-0.24 | 0.04-0.28 | Not overfished; No overfishing occuring |
| Bonnethead Sharks | 1.8-0.5 | 1.46-2.78 | 2.3-7.3 | 0.03-0.18 | 0.05-0.53 | Not overfished; No overfishing occuring |
| Atlantic Sharpnose Sharks | 7.8-1.9 | 1.69-3.16 | 11.5-33.4 | 0.02-0.06 | 0.04-0.42 | Not overfished; No overfishing Occurring |
| Blacknose Sharks | 0.8-0.2 | 1.92-3.15 | 1.6-4.5 | 0.02-0.19 | 0.03-0.32 | Not overfished; No overfishing Occurring |

**Table 3.19 Summary table of the status of the biomass of finetooth sharks.** Sources: 2002 SCS stock assessment; E. Cortes, personal communication. **LRSG=lagged recruitment, survival, and growth model; SPM=surplus production model**

| | | | | | - | = | | = | | **Outlook** |
|---|---|---|---|---|---|---|---|---|---|---|
| Finetooth Sharks | Bayesian LRSG using Gibbs sampler | 1.9 | 0.8 | 2.37 | No | 0.4 to 0.7 | 0.5 to 0.8 | 1.00 | 0.26 (118) | Stock not overfished $B_{2001} > B_{OY}$ |
| | Bayesian SPM using Gibbs sampler | 2.3 | 1.65 | 1.39 | No | 0.8 to 1.4 | 1.0 to 1.7 | 2.06 | 0.05 (23) | |

**Table 3.20 Summary table of the status of the biomass of finetooth sharks.** Sources: 2002 SCS stock assessment; E. Cortes, personal communication. **LRSG=lagged recruitment, survival, and growth; SPM=surplus production model.**

| | | | | | - | | | **Outlook** |
|---|---|---|---|---|---|---|---|---|
| Finetooth Sharks | Bayesian LRSG using Gibbs sampler | 1.50 | 0.44 | 3.42 | YES | 0.33 | YES | OVERFISHING |
| | Bayesian SPM using Gibbs sampler | 0.13 | 0.03 | 4.13 | YES | 0.02 | YES | |

### 3.2.5.5 Pelagic Sharks

Pelagic sharks are subject to exploitation by many different nations and exhibit trans-oceanic migration patterns. As a result, ICCAT's Standing Committee on Research and Statistics (SCRS) Subcommittee on Bycatch has recommended that ICCAT take the lead in conducting stock assessments for pelagic sharks.

An ICCAT meeting was held in September 2001 to review available statistics for Atlantic and Mediterranean pelagic sharks. Newly available biological and fishery information presented for review included age and growth, length/weight relationships, species identification, species composition of catch, catch per unit effort, mortality (both natural and fishing estimates for blue sharks), bycatch, and tagging and migration studies. Landings estimates, which incorporated data for both the Atlantic and Mediterranean populations of blue shark, suggested that landings declined in 2000 (3,652 mt) following a peak of 32,654 mt in 1999. Landings of porbeagles peaked in 1997, with an estimated total of 1,450 mt, and have slowly declined each year since that time period (1998 – 2000). Similarly, landing estimates for Shortfin mako also peaked in 1997 (5,057 mt) and have declined by 83 percent (863 mt in 2000) since that time. Meeting participants expressed concern regarding the lack of information pertaining to the number of fleets catching sharks, landing statistics, and dead discards for sharks.

The SCRS decided to conduct an assessment of Atlantic pelagic sharks beginning in 2004. Emphasis was placed on blue sharks and shortfin mako sharks. Several models such as non-equilibrium production and statistical age/length-structured models will be considered to analyze the population dynamics of pelagic shark species.

*ICCAT Stock Assessment on Blue and Shortfin Mako Sharks*

At the 2004 Inter-Sessional Meeting of the ICCAT Subcommittee on bycatch, stock assessments for Atlantic blue shark (*Prionace glauca*) and shortfin mako (*Isurus oxyrinchus*) were conducted. This work included a review of their biology, a description of the fisheries, analyses of the state of the stocks and outlook, analyses of the effects of current regulations, and recommendations for statistics and research. The assessment indicated that the current biomass of North and South Atlantic blue shark seems to be above MSY ($B>B_{MSY}$), however, these results are conditional and based on assumptions that were made by the committee. These assumptions indicate that blue sharks are not currently overfished, again, this conclusion is conditional and based on limited landings data. The committee estimates that between 82,000 and 114,000 mt ww (180,779,054 – 251,326,978 lb) of blue shark are harvested from the Atlantic Ocean each year.

The North Atlantic shortfin mako population has experienced some level of stock depletion as suggested by the historical CPUE trend and model outputs. The current stock may be below MSY ($B<B_{MSY}$), suggesting that the species may be overfished. Overfishing may also be occurring as between 13,000 and 18,000 mt ww (28,660,094 – 39,683,207 lb) of shortfin mako are harvested in the Atlantic Ocean annually. South Atlantic stocks of shortfin mako shark are likely fully exploited as well, but depletion rates are less severe than in the North Atlantic.

The results of both of these assessments should be considered preliminary in nature due to limitations on quality and quantity of catch data available (SCRS, 2004). The subcommittee stated that catch data currently being reported to ICCAT does not represent the total catch actually landed, and are very limited with regard to size, age, and sex of shark harvested or caught incidentally. In order to attain a more accurate estimate of total landings, and improve future stock assessments, the committee made several recommendations, including: increase the infrastructure investment for monitoring the overall catch composition of sharks, standardize catch per unit effort (CPUE) from major fishing fleets, expand use of trade statitistics (fins) to extend historical time series, and include scientists from all Contracting Parties with significant blue and shortfin mako catches in future assessments (SCRS, 2004).

*COSEWIC Stock Assessment on Porbeagle*

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) conducted a species report and assessment for porbeagle in 2004. They suggest that significant declines in porbeagle abundance have occurred as a result of overexploitation in fisheries. In 2001, porbeagle biomass was estimated at 4,409 mt ww (9,720,181 lb), a decline of 89 percent from the pre-fishing biomass in 1961 (COSEWIC, 2004). The model employed predicts that populations declined precipitously after the fishery was developed in 1961, recovered slightly in the 1980s, and then declined again to the current level. Porbeagle quotas have been reduced significantly for Canadian fisheries. NMFS is interested in working with the Canadian government to address concerns raised by the COSEWIC report. Currently, NMFS has a species-specific quota of 92 mt dw (202,823 lb) for porbeagle. These fish are generally harvested incidentally in the pelagic longline fisheries. Between 2000 and 2003, landings of porbeagle were approximately 3.4 mt dw for the four fishing years, combined (0.85 mt dw/year). NMFS is currently reviewing the latest Canadian stock assessment in terms of the overfishing and overfished thresholds defined in the FMP. At this time, the status of porbeagle sharks is unknown; however, if the stock is found to meet the thresholds, the status would be redefined.

#### 3.2.5.6 Effects of Regulations

Atlantic sharks have been managed by NMFS since the 1993 FMP for Atlantic Sharks. The 1999 FMP for Atlantic Tunas, Swordfish, and Sharks addressed numerous shark management measures, including: reducing commercial LCS and SCS quotas; establishing a commercial quota for blue sharks and a species-specific quota for porbeagle sharks; expanding the list of prohibited shark species; implementing a limited access permitting system in commercial fisheries; and establishing season-specific over- and under-harvest adjustment procedures. The 1999 FMP also partitioned the LCS complex into ridgeback and non-ridgeback categories but did not include regional quota measures. Due to litigation, many management measures in the 1999 FMP were not implemented.

The final rule implementing Amendment 1 to the 1999 FMP was published in the Federal Register on December 23, 2003. This final rule revised the shark regulations based on the results of the 2002 stock assessments for SCS and LCS. Results of these stock assessments indicate the SCS complex is not overfished (e.g. depleted in abundance) and overfishing is not occurring; the LCS complex continues to be overfished, and overfishing is occurring; sandbar sharks are not overfished, but overfishing is occurring; blacktip shark stocks are rebuilt and healthy; and finetooth sharks are not overfished, but overfishing is occurring. In Amendment 1 to the 1999 FMP, NMFS revised the rebuilding timeframe for LCS to 26 years from 2004, and implemented several new regulatory changes. Management measures enacted in the amendment included: re-aggregating the large coastal shark complex; using maximum sustainable yield (MSY) as a basis for setting commercial quotas; eliminating the commercial minimum size restrictions; implementing a commercial trip limit for LCS and SCS; implementing trimester commercial fishing seasons effective January 1, 2005; imposing gear restrictions to reduce bycatch; implementing a time/area closure off the coast of North Carolina effective January 1, 2005; and establishing three regional commercial quotas (Gulf of Mexico, South Atlantic, and North Atlantic) for LCS and SCS management units. For more detail on the management history surrounding shark regulations see Section 3.1.

As a result of using the MSY as a basis for setting quotas and implementing a new rebuilding plan, the overall quota for LCS in 2004 of 1,017 metric tons (mt) dressed weight (dw) (2.24 million lbs dw) was lower than both the 2002 LCS quota of 1,285 mt dw (2.83 million lbs dw) and the 2003 LCS quota of 1,714 mt dw (3.78 million lbs dw). The annual SCS quota is 454 mt dw per year. The annual quotas for pelagic sharks are 273 mt dw for blue sharks, 92 mt dw for porbeagle sharks, and 488 mt dw for pelagic sharks other than porbeagle and blue sharks.

The regulations governing the recreational and commercial shark fisheries allow opportunities for participants to pursue sharks for leisure, subsistence, and/or commercial gain while maintaining compliance with statutes that include, but are not limited to, the Magnuson Stevens Act, Endangered Species Act, Marine Mammal Protection Act, and the National Environmental Policy Act. These regulations seek to minimize bycatch of non-target, prohibited shark species, and protected resources by a variety of measures, including, but not limited to: mandating the use of corrodible, non-stainless steel hooks; requiring possession of handling and release equipment for protected resources (long handled line cutters and dipnets); conducting gillnet checks every two hours; mandatory observer coverage for commercial fisheries (if selected); limits on the deployment and operation of authorized gears; and, maintaining 19 species of shark on the prohibited species list (possession not authorized). Rebuilding overfished stocks is another objective of shark fishery regulations, and is accomplished through numerous measures, including, but not limited to: regional and trimester fishing quotas based on MSY; regional and trimester fishing seasons; commercial trip limits (4,000 lbs dw for LCS); recreational bag limits (1 shark/vessel/day for all authorized species except Atlantic sharpnose and bonnethead sharks (1 shark/person/day); and, recreational minimum size limits (>54” FL for all authorized species except Atlantic sharpnose and bonnethead sharks). Controlling fishing effort is accomplished by the requirement to possess a limited access permits for commercial shark fisheries and upgrading restrictions for transferred permits. Reducing fishing mortality of prohibited dusky sharks and juvenile sandbar sharks is achieved by the Mid-Atlantic time area closure (January 1 – July 31) and the requirement to use VMS when bottom longline gear is onboard during this time period.

Shark landings are monitored for adherence to regional and trimester quotas by requiring the submission of shark dealer landings reports every two weeks. Fishermen must also submit trip reports describing target and incidental landings within seven days of offloading. These data are used for stock assessments. Regulations are subject to change based on stock assessments, international obligations, litigation, and public sentiment. An updated LCS stock assessment should be available in 2006 and data workshops for an updated SCS stock assessment are scheduled to begin in early 2007. Domestic management measures affecting the U.S. shark fishery are constantly being evaluated for their effectiveness; furthermore, the United States is taking steps to improve the conservation and management of pelagic sharks within international fora, including ICCAT.

At the 2004 ICCAT annual meeting in New Orleans, ICCAT adopted a recommendation concerning the conservation of sharks caught in association with fisheries managed by ICCAT. This was the first binding measure passed by ICCAT dealing specifically with sharks. This recommendation includes, among other measures: reporting of shark catch data by Contracting Parties, a ban on shark finning, a request for Contracting Parties to live-release sharks that are caught incidentally, a review of management alternatives from the 2004 assessment on blue and shortfin mako sharks, and a commitment to conduct another stock assessment of selected pelagic shark species no later than 2007. In 2005, additional measures pertaining to pelagic sharks were added to the 2004 ICCAT recommendation. Measures included a requirement for contracting parties that have not yet implemented the 2004 recommendation, to reduce shortfin mako mortality, and annually report on their efforts to the commission.

#### 3.2.5.7 Recent and Ongoing Research

*Northeast Fisheries Science Center*

Fishery Independent Survey for Coastal Sharks

The biannual fishery independent survey of Atlantic large and small coastal sharks in US waters from Florida to Delaware was conducted from April 19 to June 1, 2004. The goals of this survey are to: (1) monitor the species composition, distribution, and abundance of sharks in the coastal Atlantic; (2) tag sharks for migration and age validation studies; (3) collect biological samples for age and growth, feeding ecology, and reproductive studies; and (4) collect morphometric data for other studies. Results from this 2004 survey included 557 sharks representing eight species caught on 69 longline sets. The time series of abundance indices from this survey are critical to the evaluation of coastal Atlantic shark species.

Age and Growth of Coastal and Pelagic Sharks

A comprehensive aging and validation study for the shortfin mako (*Isurus oxyrinchus)*, continued in conjunction with scientists at Moss Landing Marine Laboratories, California using bomb carbon techniques. Additional validation studies have begun on the sandbar shark, (*Carcharhinus plumbeus),* dusky shark, (*Carcharhinus obscurus),* tiger shark, (*Galeocerdo cuvieri)*, and white shark, (*Carcharodon carcharias)*. Age and growth studies on the tiger shark (with scientists at the University of New Hampshire), thresher shark, (*Alopias vulpinus)* (with scientists at the University of Rhode Island), night shark, (*Carcharhinus signatus)* (with NMFS scientists at the SEFSC Panama City Laboratory), and the bull shark, (*Carcharhinus leucas)* (with scientists with the Florida Division of Natural Resources) are underway. Collection, processing, photographing, and reading of samples are in various stages for these species including intercalibration of techniques, criteria, and band readings. This intercalibration process involves sharing samples and comparing counts between researchers including a researcher from the Natal Sharks Board, South Africa for joint work on shortfin mako, blue, and basking shark band periodicity. Collections of vertebra took place at tournaments and on the biannual research cruise with 285 sharks injected with OTC for validation. Night and dusky sharks were prepared with gross sectioning to determine the best method for reading and all processing was initiated using histology. Readings were completed on the thresher and tiger sharks towards intercalibration to generate bias graphs. Vertebrae, length-frequency data, and tag/recapture data collected from 1962 to present are being analyzed on each of these species to obtain growth parameters.

Biology of the Thresher Shark

Life history studies of the thresher shark continued. Data collection was augmented to include reproductive and food habits, in addition to age and growth information.

Biology of the Porbeagle Shark

A cooperative U.S./Canada research program continued on the life history of the porbeagle shark, (*Lamna nasus)* with preliminary analysis of porbeagle tagging and recaptures data using information from U.S., Canadian, and Norwegian sources.

Collection of Recreational Shark Fishing Data and Samples

Biological samples for age and growth, feeding ecology, and reproductive studies and catch data for pelagic sharks were collected at recreational fishing tournaments in the Northeast. Analysis of these tournament landings data was initiated by creating a database of historic information (1961 – 2004) and producing preliminary summaries of one long term tournament. The collection and analysis of these data are critical for input into species and age specific population and demographic models for shark management.

Cooperative Shark Tagging Program (CSTP)

The Cooperative Shark Tagging Program, operated by the Northeast Fisheries Science Center, has involved over 6,500 volunteer recreational and commercial fishermen, scientists, and fisheries observers conducted since 1962, continued to tag large coastal and pelagic sharks and provide information to define essential fish habitat for shark species in U.S. Atlantic and Gulf of Mexico waters. Since its inception, the CSTP has tagged over 128,000 sharks representing 40 species.

Atlantic Blue Shark Life History and Assessment Studies

A collaborative program to examine the biology and population dynamics of the blue shark, *Prionace glauca,* in the North Atlantic is ongoing. Research on the food and feeding ecology of the blue shark is being conducted cooperatively with University of Rhode Island staff with additional samples collected and a manuscript under revision. A detailed reexamination of the reproductive parameters of the blue shark continued with collection of additional biological samples to determine if any changes have occurred since the 1970s. A manuscript on blue shark stock structure based on tagging data was completed detailing size composition and movements between Atlantic regions. Additionally, a research focus on the population dynamics in the North Atlantic with the objectives of constructing a time series of blue shark catch rates (CPUE) from research surveys, estimation of blue shark migration and survival rates, and the development of an integrated tagging and population dynamics model for the North Atlantic for use in stock assessment continued in collaboration between NEFSC scientists and scientists at the School of Aquatic and Fishery Sciences, University of Washington. Progress to date includes the preliminary recovery of historical research survey catch data, size composition, and biological sampling data on pelagic sharks and preliminary analysis of survival and movement rates for blue sharks based on tag and release data from the NMFS CSTP. Preparation of standardized catch rate and size composition data compatible with pelagic longline observer data continued with a resulting ICCAT submission. As part of this comprehensive program, cooperative research continued with the Irish Marine Institute and Central Fisheries Board on mark-recapture databases including coordination of formats and programs with the NMFS CSTP for joint data analyses.

<u>Atlantic Shortfin Mako Life History and Assessment Studies</u>

A collaborative program with students and scientists at the University of Rhode Island to examine the biology and population dynamics of the shortfin mako in the North Atlantic was continued. Ongoing research included an update on age and growth and reproductive parameters and an examination of the predator-prey relationships between the shortfin mako and its primary prey, bluefish (*Pomatomus saltatrix)*. A manuscript was completed comparing contemporary and historic levels of bluefish predation. Future research includes the estimation of shortfin mako migration rates and patterns and survival rates using CSTP mark/recapture data and satellite tags with movements correlated with Advanced Very High Resolution Radiometer (AVHRR) sea surface temperature data. Toward these goals, two shortfin mako sharks were tagged with pop-up archival transmitting tags.

<u>Blacktip Shark Migrations</u>

Analysis of movements of the blacktip shark (*Carcharhinus limbatus)* in the western North Atlantic and Gulf of Mexico based on release and recapture data is ongoing with the examination of general migration patterns and exchange between and within regions of U.S. and Mexican waters. Release and recapture data were analyzed for evidence of Atlantic and Gulf primary and secondary blacktip nursery grounds.

<u>Cooperative Atlantic States Shark Pupping and Nursery Survey (COASTSPAN)</u>

NEFSC Apex Predators Program staff manages and coordinates this project that uses researchers in major coastal Atlantic states from Florida to Delaware to conduct a cooperative, comprehensive, and standardized investigation of valuable shark nursery areas. This research identifies which shark species utilize coastal zones as pupping and nursery grounds, gauges the relative importance of these areas, and determines migration and distribution patterns of neonate and juvenile sharks. This program is described in further detail in Section 3.3 of this document.

Juvenile Shark Survey for Monitoring and Assessing Delaware Bay Sandbar Sharks

NEFSC staff conduct this part of the COASTSPAN monitoring and assessment project for the juvenile sandbar shark population in the Delaware Bay nursery grounds using monthly longline surveys from June to September each year. A random stratified sampling plan based on depth and geographic location is ongoing to assess and monitor the juvenile sandbar shark population during the nursery season. In addition, the tagging and recapture data from this project are being used to examine the temporal and spatial relative abundance and distribution of sandbar sharks in Delaware Bay.

Habitat Utilization, Food Habits, and Essential Fish Habitat of Delaware Bay Sandbar and Smooth Dogfish Sharks

The food habits portion of the study characterizes the diet, feeding periodicity, and foraging habits of the sandbar shark as well as examines the overlap in diet and distribution with the smooth dogfish shark (*Mustelus canis)*. Stomach contents from over 800 sandbar sharks and over 200 smooth dogfish sharks have been sampled through a non-lethal lavage method. Acquired data will be coupled with environmental data, providing information on preferred habitat. This information is an important contribution towards understanding essential fish habitat and provides information necessary for nursery ground management and rebuilding of depleted shark populations.

Ecosystems Modeling

Ecosystem modeling, focusing on the role of sharks as top predators, will be conducted using ECOPATH - ECOSIM models, using the sandbar shark as a model species and examining the ecological interactions between sandbar and smooth dogfish sharks in Delaware Bay.

Overview of Gulf and Atlantic Shark Nurseries

Due to the requirement for a better understanding of shark nursery habitat in U.S. coastal waters, NEFSC staff serves as editors for an American Fisheries Society symposium proceedings volume on U.S. Atlantic and Gulf of Mexico coastal shark nursery ground and habitat studies.

Post-Release Recovery and Survivorship Studies in Sharks – Physiological Effects of Capture Stress

This ongoing research is directed towards the sandbar shark (*Carcharhinus plumbeus)*, and is being conducted cooperatively with Massachusetts Division of Marine Fisheries biologists. The study utilizes blood and muscle sampling methods in addition to acoustic tracking to obtain physiological profiles of individual sharks to characterize stamina and to determine ultimate post release survival. These analyses are requisite in view of the extensive current and proposed catch-and-release management strategies for coastal and pelagic shark species.

*Southeast Fisheries Science Center*

Stock Assessments of Pelagic, Large Coastal, and Prohibited Sharks

The ICCAT Subcommittee on Bycatch conducted a stock assessment of blue sharks and shortfin makos in Tokyo, Japan, in June 2004. All information available on biology, fisheries, stock identity, catch, CPUE, and size of these species was reviewed and an evaluation of the status of stocks conducted using surplus production, age-structured, and catch-free stock assessment models. U.S. scientists contributed eight working documents for this meeting on various aspects of shark biology and methods to assess stock status; SEFSC scientists participated in the assessment process and authored or co-authored six of those documents. A stock assessment of dusky shark, a prohibited species under the shark FMP and candidate for listing under the ESA, is under way with expected completion in summer of 2006. Biological and fishery information available for this species is being synthesized and stock status will be evaluated using multiple stock assessment methodologies. The next assessment of large coastal sharks is planned for FY06, but data collection, synthesis, analysis, and preliminary stock evaluations will begin in late FY05.

Update on Catches of Atlantic Sharks

An update on catches of large and small coastal and pelagic sharks in U.S. Atlantic, Gulf of Mexico, and Caribbean waters was generated in FY 05 for inclusion in the 2005 SAFE Annual Report and future shark stock assessments. Time series of commercial and recreational landings and discard estimates from several sources were compiled for the large coastal shark complex and sandbar and blacktip sharks. In addition, recent species-specific commercial and recreational landings were provided for sharks in the large coastal, small coastal, and pelagic groups. Species-specific information on the geographical distribution of commercial landings by gear type and geographical distribution of the recreational catches was also provided. Trends in length-frequency distributions and average weights and lengths of selected species reported from three separate recreational surveys and in the directed shark bottom-longline observer program were also included. Another update on catches of Atlantic sharks will be generated in FY 06.

Ecosystem Modeling

A dynamic mass-balance ecosystem model was used to investigate how relative changes in fishing mortality on sharks can affect the structure and function of Apalachicola Bay, Florida, a coastal marine ecosystem. Simulations were run for 25 years wherein fishing mortality rates from recreational and trawl fisheries were doubled for ten years and then decreased to initial levels. Effect of time/area closures on ecosystem components were also tested by eliminating recreational fishing mortality on juvenile blacktip sharks. Simulations indicated biomass of sharks declined up to 57 percent when recreational fishing mortality was doubled. Simulating a time/area closure for juvenile blacktip sharks caused increases in their biomass but decreases in juvenile coastal shark biomass, a competing multispecies assemblage that is the apparent competitor. In general, reduction of targeted sharks did not cause strong top-down cascades. Another update on catches of Atlantic sharks was generated in FY05

Elasmobranch Feeding Ecology and Shark Diet Database

The current Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks gives little consideration to ecosystem function because there is little quantitative species-specific data on diet, competition, predator-prey interactions, and habitat requirements of sharks. Given this, several studies are currently underway describing the diet and foraging ecology, habitat use, and predator-prey interactions of elasmobranchs in various communities. In 2005, a study on latitudinal variation in diet and daily ration of the bonnethead shark from the eastern Gulf of Mexico was completed and a manuscript is being prepared for publication. A database containing information on quantitative food and feeding studies of sharks conducted around the world has been in development for several years and presently includes over 200 studies. This fully searchable database will continue to be updated and fine-tuned in FY 06. The goal is to make this tool available to researchers in the relatively near future.

Cooperative Gulf of Mexico States Shark Pupping and Nursery Survey (GULFSPAN)

The SEFSC Panama City Shark Population Assessment Group manages and coordinates a survey of coastal bays and estuaries between the Panhandle of Florida and Texas. Surveys identify the presence/absence of neonate and juvenile sharks and attempt to quantify the relative importance of each area as it pertains to essential fish habitat requirements for sharks. The SEFSC Panama City Shark Population Assessment Group also initiated a juvenile shark abundance index survey in 1996. The index is based on random, depth-stratified gillnet sets conducted throughout coastal bays and estuaries in northwest Florida monthly from April to October. The species targeted for the index of abundance are juvenile sharks in the large and small coastal management groups. More information on this program can be found in Section 3.3 of this document.

Angel Shark Life History

The Atlantic Angel Shark is a benthic species inhabiting deep waters of the Gulf of Mexico and the Atlantic Ocean. This species is listed as prohibited by the 1999 Fisheries Management Plan for Atlantic Tunas, Swordfish, and Sharks due to the lack of biological data and a precautionary approach for species thought to be highly susceptible to exploitation. Life history studies began in 2003. Samples are obtained from commercial fishers and fishery-independent surveys. Preliminary reproductive parameters were determined in 2004 and results presented at the annual American Elasmobranch Society meeting held in Norman, Oklahoma, in May 2004.

Life History Studies of Elasmobranchs

Biological samples are obtained through research surveys and cruises, recreational fishers, and through collection by onboard observers on commercial fishing vessels. Age and growth rates and other life history aspects of selected species are processed and data analyzed following standard methodology. This information is vital as input to population models incorporating variation and uncertainty in estimates of life-history traits to predict the productivity of the stocks and ensure that they are harvested at sustainable levels. The age and growth parameters of bull shark (*Carcharhinus leucas*) and spinner shark (*C. brevipinna*) were completed and submitted for publication in 2004.

Cooperative Research – Definition of Winter Habitats for Blacktip Sharks in the Eastern Gulf of Mexico

A collaborative effort between SEFSC Panama City Shark Population Assessment Group and Mote Marine Laboratory is underway to define essential winter habitats for blacktip sharks (*Carcharhinus limbatus*). Deployment of archival Pop-Up Archival Transmitting (PAT) tags on sharks during January and February of FY05 in the Florida Keys and north Florida will be executed with the cooperation of the charterboat industry. PAT tags will be programmed to detach from individuals during late spring and early summer when sharks have recruited to coastal areas.

Cooperative Research – Habitat Utilization among Coastal Sharks

Through a collaborative effort between SEFSC Panama City Shark Population Assessment Group and Mote Marine Laboratory, the utilization of coastal habitats by neonate and young-of-the-year blacktip and Atlantic sharpnose sharks will be monitored through an array of underwater acoustic receivers (VR2, Vemco Ltd.) placed throughout each study site. Movement patterns, home ranges, activity space, survival, and length of residence of individuals will be compared by species and area to provide information to better manage critical species and essential fish habitats.

Cooperative Research – Characterization of Bycatch in the Gulf Butterfish, (*Peprilus burti*), Trawl Fishery, with an Emphasis on Identification of Life History Parameters for several Potentially High-Risk Species

A proposal with the SEFSC Panama City Shark Population Assessment Group and the University of Florida was submitted to MARFIN to quantify and qualify the elasmobranch bycatch in the butterfish, (*Peprilus triacanthus)*, trawl fishery in the Gulf of Mexico. Determination of life history parameters for the roundel skate, (*R. texana)*, the clearnose skate, (*R. eglanteria)*, the spreadfin skate (*Dipturus olseni)*, and the Atlantic angel shark, (*Squatina dumerili)* will be developed ultimately for the estimation of vital rates. Vital rate information will be used to determine the productivity of the stocks and ensure that they are harvested at sustainable levels.

Using elemental chemistry of shark vertebrae to reconstruct large-scale movement patterns of sharks

A project examining ontogenetic shifts in habitat utilization of bull sharks using Sr:Ca ratios of vertebrae will begin in FY06, funds permitting. Laser ablation ICPMS will be used to assay transects across the entire vertebral section along the corpus calcareum. Given the relationship of Sr:Ca to habitat developed from the reference samples, habitat type (freshwater, estuarine, or marine) will be assigned to each growth band, thereby reconstructing the migration history of the shark on a year-by-year basis over its lifetime.

Coastal Shark Assessment Research Surveys

The SEFSC Mississippi Laboratories in Pascagoula have been operating annual research cruises aboard NOAA vessels since 1995. The objectives of this program are to conduct bottom longline surveys to assess the distribution and relative abundance of coastal sharks along U.S. and Mexican waters of the Gulf of Mexico and the U.S. eastern seaboard. This is the only long-term, nearly stock-wide, fishery-independent survey of Atlantic sharks conducted in U.S. and neighboring waters. Ancillary objectives are to collect biological and environmental data, and to tag-and-release sharks. Starting in 2001 and under the auspices of the Mex-US-Gulf Program, the Pascagoula Laboratories have provided logistical and technical support to Mexico's Instituto Nacional de la Pesca to conduct a cooperative research cruise aboard the Mexican research vessel Onjuku in Mexican waters of the Gulf of Mexico. The cruise also took place in 2002, but was suspended in 2003 and 2004 because of mechanical problems with the research vessel and other issues.

A proposal was submitted in 2005 to gather data to help clarify the uncertainty on the current status of oceanic whitetip sharks in the western North Atlantic Ocean. Data on behavior and movement patterns will be collected using on-board observers on pelagic longline vessels. Archival satellite pop-up tags will be utilized to monitor the movement patterns, depth, and temperature preferences of this species. In addition, time-depth recorders, and hook-timers will be used to determine the depth and times at which sharks take baits. These data will be incorporated with sea surface temperature data from satellites and incorporated into new habitat-based analyses of the data to provide a better understanding of the status of oceanic whitetip sharks.

Cooperative Research – The capture depth, time, and hooked survival rate for bottom longline-caught large coastal sharks

A collaborative effort between SEFSC Panama City Shark Population Assessment Group and the University of Florida to examine alternative measures in the shark bottom longline fishery to reduce mortality on prohibited sharks such as reduced soak time, restrictions on the length of gear, and fishing depth restrictions will be tested using hook timers. Funding is being sought through the NMFS Cooperative Research Program.

Utilizing Bioenergetics and Matrix Projection Modeling to Quantify Population Fluctuations in Long-lived Elasmobranchs: Tools for Fisheries Conservation and Management

Under the supervision of SEFSC scientists at the Panama City Laboratory, the NMFS-Sea Grant Fellow in Population Dynamics and Resource Economics conducted research that sought to use a bioenergetics and matrix approach to examine the population dynamics of the cownose ray (*Rhinoptera bonasus*). Laboratory experiments and field data were used to obtain basic life history information, and that information configured the individual-based bioenergetics model. The bioenergetics model was coupled to a matrix projection model, and the coupled models were used to predict how warmer and cooler water temperatures would affect the growth and population dynamics of the cownose rays. Changes in growth rates under the warmer and cooler conditions lead to changes in age-specific survivorship, maturity, and pup production, which were used as inputs to a matrix projection model. Faster growth of individuals under the cooler scenarios translated into an increased population growth rate (4.4 – 4.7 percent/year versus 2.7 percent/year under baseline), shorter generation time, and higher net reproductive rates, while slower growth under the warmer scenarios translated into slower population growth rate (0.05 – 1.2 percent/year), longer generation times, and lower net reproductive rates. Elasticity analysis indicated that population growth rate was most sensitive to adult survival. Reproductive values by age were highest for intermediate ages.

Cooperative Research – Definition of Winter Habitats for Blacktip Sharks in the Eastern Gulf of Mexico

A collaborative effort between SEFSC Panama City Shark Population Assessment Group and Mote Marine Laboratory is underway to define essential winter habitats for blacktip sharks (*Carcharhinus limbatus*). Deployment of two pop-off satellite archival tags (PAT) on sharks during January and February of 2005 in the Florida Keys was accomplished with the cooperation of the charter boat industry. Preliminary results from these two sharks indicate one shark remained in the Keys while the other moved to an area southwest of the coast of Cuba. Additional PAT tags will be placed on sharks during the summer of 2005.

Cooperative Research – Definition of Summer Habitats and Migration Patterns for Bull Sharks in the Eastern Gulf of Mexico

A collaborative effort between SEFSC Panama City Shark Population Assessment Group, University of Florida, and Mote Marine Laboratory is underway to determine summer habitat use and short-term migration patterns of bull sharks (*Carcharhinus leucas*). Sharks are being outfitted with Pop-Up Satellite Archival Tags (PSAT) during July and August of 2005 and scheduled to deploy in autumn. This project is driven by the lack of data for this species and its current prominence within the Florida coastal community. A better understanding of this species is required to effectively manage this species for both commercial and recreational fishers as well as the general public. Concerns regarding this species will continue to be an issue as fishers and the public demand that state and federal governments provide better information concerning the presence and movements of these sharks.

## 3.3 Habitat

### 3.3.1 Regulatory Requirements

Section 303(a)(7) of the Magnuson-Stevens Act, 16 U.S.C. §§ 1801 *et seq*., as amended by the Sustainable Fisheries Act in 1996, requires FMPs to describe and identify essential fish habitat (EFH), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat. The Magnuson-Stevens Act defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.” (16 U.S.C. § 1802 (10)). The EFH regulations (at 50 C.F.R. 600 Subpart J) provide additional interpretation of the definition of essential fish habitat:

> “Waters’ include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic

> areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species' full life cycle."

The EFH regulations require that EFH be described and identified within the U.S. Exclusive Economic Zone (EEZ) for all life stages of each species in a fishery management unit. FMPs must describe EFH in text, tables, and figures that provide information on the biological requirements for each life history stage of the species. According to the EFH regulations, an initial inventory of available environmental and fisheries data sources should be undertaken to compile information necessary to describe and identify EFH and to identify major species-specific habitat data gaps. Habitats that satisfy the criteria in the Magnuson-Stevens Act have been identified and described as EFH in the 1999 FMPs and in Amendment 1 to the 1999 Tunas, Swordfish, and Shark FMP.

NMFS originally described and identified EFH and related EFH regulatory elements for all HMS in the management unit in the 1999 FMPs, and more recently updated EFH for five shark species (blacktip, sandbar, dusky, nurse, and finetooth sharks) in Amendment 1 to the 1999 Tunas, Swordfish, and Shark FMP, which was implemented in 2003. The EFH regulations further require NMFS to conduct a comprehensive review of all EFH related information at least once every five years and revise or amend the EFH boundaries if warranted. To that effect, NMFS is currently undertaking the comprehensive five-year review of information pertaining to EFH for all HMS in the management unit in this draft FMP. Based on the findings of this review, NMFS may recommend that certain EFH boundaries may need to be modified in a subsequent rulemaking. At that time, alternatives for boundary modifications would be proposed. For a complete description of the comprehensive five-year review of all new EFH information see Chapter 10 and Appendix B.

#### 3.3.1.1 Habitat Areas of Particular Concern

To further the conservation and enhancement of EFH, the EFH guidelines encourage FMPs to identify Habitat Areas of Particular Concern (HAPCs). HAPCs are areas within EFH that meet one or more of the following criteria: they are ecologically important, particularly vulnerable to degradation, undergoing stress from development, or are a rare habitat type. HAPCs can be used to focus conservation efforts on specific habitat types that are particularly important to managed species. Currently, only one area, for sandbar sharks off of North Carolina, Chesapeake Bay, MD, and Great Bay, NJ, has been identified as a HAPC for HMS (1999 FMP). Although no new HAPCs have been identified since the 1999 FMP, and no new HAPCs are proposed in this draft FMP, the information being compiled during this review may be used to identify HAPC areas in a future rulemaking.

### 3.3.2 Habitat Types and Distributions

HMS may be found in large expanses of the world's oceans, straddling jurisdictional boundaries. Although many of the species frequent other oceans of the world, the Magnuson-

Stevens Act only authorizes the description and identification of EFH in Federal, state or territorial waters, including areas of the U.S. Caribbean, the Gulf of Mexico and the Atlantic coast of the United States to the seaward limit of the U.S. EEZ. These areas are connected by currents and water patterns that influence the occurrence of HMS at particular times of the year. On the largest scale, the North and South Equatorial currents occur in the U.S. Caribbean islands. The North Equatorial Current continues through the Caribbean Basin to enter the Gulf of Mexico through the Yucatan Straits. The current continues through the Florida Straits to join the other water masses (including the Antilles Current) to form the Gulf Stream along the eastern coast of the United States. Variations in flow capacities of the Florida Straits and the Yucatan Straits produce the Loop Current, the major hydrographic feature of the Gulf of Mexico. These water movements in large part influence the distributions of the pelagic life stages of HMS.

Tuna, swordfish, and billfish distributions are most frequently associated with hydrographic features such as density fronts between different water masses. The scales of these features may vary. For example, the river plume of the Mississippi River extends for miles into the Gulf of Mexico and is a fairly predictable feature, depending on the season. Fronts that set up over the De Soto Canyon in the Gulf of Mexico, or over the Charleston Bump or the Baltimore Canyon in the Mid-Atlantic, may be of a much smaller scale. The locations of many fronts or frontal features are statistically consistent within broad geographic boundaries. These locations are influenced by riverine inputs, movement of water masses, and the presence of topographic structures underlying the water column, thereby influencing the habitat of HMS. Those areas that are known spawning grounds, or areas of aggregation for feeding or other reasons, are considered to be EFH for those species.

Sharks are found in a wide variety of coastal and ocean habitats including estuaries, nearshore areas, the continental shelf, continental slope, and open ocean. Many species are migratory and, like other marine species, are affected by the condition of the habitat. Atlantic sharks are broadly distributed as adults but have been found to utilize specific estuaries as pupping and nursery areas during pupping season and throughout their neonate (newborn) life stages which may vary from a few to many months. Since coastal and coastal pelagic species frequently appear near shore and have pupping and nursery areas near shore, much more is known about their habitat requirements, particularly for early life history stages. Much less is known about the habitat requirements, pupping areas, and other details of pelagic and deep dwelling species.

The following sections are intended to provide a general overview of the various habitats with which HMS are most frequently associated. A more detailed description is contained in the 1999 Tunas, Swordfish, and Shark FMP.

#### 3.3.2.1 Atlantic Ocean

(Material in this section is largely a summary of information in MMS, 1992; 1996. Original sources of information are referenced in those documents)

The region of the Atlantic Ocean within which EFH for Federally managed HMS is identified spans the area between the Canadian border in the north and the Dry Tortugas in the south. It includes a diverse spectrum of aquatic species of commercial, recreational, and ecological importance. The distribution of marine species along the Atlantic seaboard is strongly affected by the cold Labrador Current in the northern part, the warm Gulf Stream in the middle and southern portions of the region, and generally by the combination of high summer and low winter temperatures. For many species Cape Hatteras forms a strong zoogeographic boundary between the Mid- and South Atlantic areas, while the Cape Cod/Nantucket Island area is a somewhat weaker zoogeographic boundary in the north.

*Coastal and Estuarine Habitat*

Although HMS move primarily through open ocean waters, they do periodically utilize coastal or inshore habitats. This is especially true for several species of sharks that move inshore, often into shallow coastal waters and estuaries, to give birth; these areas then become nursery areas as the young develop. Examples include Great Bay, New Jersey, Chesapeake Bay, Maryland and Delaware Bay, Delaware which provide important nursery habitat for sandbar sharks, and Bull's Bay, South Carolina, and Terrebone Bay, Louisiana which are important blacktip shark nursery areas. Typically, the pups (neonates) remain in these same areas throughout their early life stages, which may vary from a few to many months. Recent tagging studies have shown that some sharks return to summer nursery areas in subsequent years. Although billfish move primarily throughout open-ocean waters, two species, the white marlin and the sailfish can be found inshore. Sailfish are also known to move inshore to spawn off the east coast of Florida and in the Florida Keys.

Coastal habitats that may be encountered by HMS are described in this section. Those areas that are known nursery or spawning grounds, or areas of HMS aggregation for feeding or other reasons, are considered to be EFH for those species. It should be noted that characteristics of coastal and offshore habitats may be affected by activities and conditions occurring outside of those areas (farther up-current) due to water flow or current patterns that may transport materials that could cause negative impacts.

Estuaries are highly productive, yet fragile, environments that support a great diversity of fish and wildlife species, including sharks. Many commercially valuable fish and shellfish stocks are dependent on these areas during some stage of their development. In the vicinity of North Carolina, Virginia, and Maryland, approximately 90 percent of the commercially valuable fish species are dependent on estuaries for at least part of their life cycle.

Along the Atlantic seaboard coastal wetlands are located predominantly south of New York because these coastal areas have not been glaciated. Nearly 75 percent of the Atlantic coast salt marshes are found in the states of North Carolina, South Carolina, and Georgia. These three states contain approximately nine million acres of salt marsh. Wetland vegetation plays an important role in nutrient cycling, and provides stability to coastal habitats by preventing the erosion of sediments and by absorbing the energy of storms.

There are 13,900 square miles (sq mi) (36,000 square kilometers (sq km)) of estuarine habitat along the Atlantic coast, of which approximately 68 percent (9,400 sq mi) occurs north of the Virginia/ North Carolina border, with Chesapeake Bay contributing significantly to the total. South of the Gulf of Maine, where there is a wider coastal plain and greater agricultural activity, estuaries carry higher sediment and nutrient loads. The increased fertility and generally higher water temperatures resulting from these nutrient loads allow these estuaries to support greater numbers of fish and other aquatic organisms.

South of the Virginia/North Carolina border, there are approximately 4,500 sq mi (11,655 sq km) of estuarine habitat. The Currituck, Albemarle, and Pamlico Sounds, which together constitute the largest estuarine system along the entire Atlantic coast, make up a large portion of these southern estuaries. A unique feature of these sounds is that they are partially enclosed and protected by a chain of fringing islands, the Outer Banks, located 32 to 48 km (20 to 30 mi) from the mainland.

Because of their low tidal flushing rates, estuaries are generally more susceptible to pollution than other coastal water bodies. The severity of the problem varies depending on the extent of tidal flushing. In Maryland and Virginia, the primary problems reported are excessive nutrients (nitrates and phosphates), particularly in the Chesapeake Bay and adjoining estuarine areas. Other problems included elevated bacterial and suspended sediment levels. Non-point sources of pollution are considered one of the main causes of pollution. Elevated bacterial levels were also listed as a local coastal pollution problem in Maryland.

In North Carolina, the primary problems occurring in estuarine areas are enrichment in organics and nutrients, fecal coliform bacteria, and low dissolved oxygen. Insufficient sewage treatment, wide-spread use of septic systems in coastal areas, and agricultural runoff are considered to be major causes of these pollution problems. Oil spills from vessel collisions and groundings, as well as illegal dumping of waste oil, are a common cause of local, short-term water quality problems, especially in estuaries along the North and Mid-Atlantic coasts. These sources of pollution and habitat degradation may have a negative impact on coastal shark populations, particularly during vulnerable early life stages.

Many of the coastal bays and estuaries along the Atlantic East Coast and Gulf of Mexico are described in greater detail in the 1999 Tunas, Swordfish, and Shark FMP, including the distribution, size, depth, freshwater inflow, habitat types, tidal range and salinity for each of the major estuaries and bays on the East coast and Gulf coast, and are not repeated here.

*Continental Shelf and Slope Areas*

Moving seaward away from the coast, the next major geologic features encountered are the continental shelf and slope areas. The continental shelf is characterized by depths ranging from a few meters to approximately 60 m (198 ft), with a variety of bottom habitat types. Far less research has been done in this area than on the coasts and estuaries, and consequently much less is known about the specific habitat requirements of HMS within these regions.

The shelf area of the Mid-Atlantic Bight averages about 100 km (60 mi) in width, reaching a maximum of 150 km (90 mi) near Georges Bank, off New England, and a minimum of 50 km (30 mi) offshore Cape Hatteras, NC. Current speeds are strongest at the narrowest part of the shelf where wind-driven current variability is highest. The distribution of marine species, including HMS, along the Atlantic seaboard may be strongly influenced by currents, the warm Gulf Stream in the middle and south portions of the region, and generally by the combination of high summer and low winter temperatures.

The continental shelf in the South Atlantic Bight varies in width from 50 km (32 mi) off Cape Canaveral, FL to a maximum of 120 km (75 mi) off Savannah, GA, and a minimum of 30 km (19 mi) off Cape Hatteras. The shelf is divided into three cross-shelf zones. Waters on the inner shelf (0 to 20 m (0 to 66 ft)) interact extensively with rivers, coastal sounds, and estuaries. This interaction tends to form a band of low-salinity, stratified water near the coast that responds quickly to local wind-forcing and seasonal atmospheric changes. Mid-shelf (20 – 40 m (66 – 132 ft)) current flow is strongly influenced by local wind events with frequencies of two days to two weeks. In this region, vertically well mixed conditions in fall and winter contrast with vertically stratified conditions in the spring and summer. Gulf Stream frontal disturbances (*e.g.*, meanders and cyclonic cold core rings) that occur on time scales of two days to two weeks dominate currents on the outer shelf (40 to 60 m (132 to 197 ft)).

The Mid-Atlantic area from Cape Cod, MA to Cape Hatteras, NC represents a transition zone between northern cold-temperate waters of the north and the warm-temperate waters to the south. Water temperatures in the Mid-Atlantic vary greatly by season. Consequently, many of the fish species of importance in the Mid-Atlantic area migrate seasonally, whereas the major species in the other three areas are typically resident throughout the year (MMS, 1992; 1996). The shelf-edge habitat may range in water depth between 40 and 100 m (131 and 328 ft). The bottom topography varies from smooth sand to mud to areas of high relief with associated corals and sponges. The fish species found in this area include parrotfish (*Scaridae*) and the deep-water species of the snapper-grouper assemblage.

The continental slope generally has smooth mud bottoms in water depths of 100 to 200 m (328 to 656 ft). Many of the species in this zone are representatives of cold-water northern species exhibiting tropical submergence (*i.e.*, being located in deeper, cooler water as latitude decreases).

A topographic irregularity southeast of Charleston, SC, known as the Charleston Bump, is an area of productive sea floor, which rises abruptly from 700 – 300 m (2,300 – 980 ft) within a distance of about 20 km (12 mi), and at an angle which is approximately transverse to both the general isobath pattern and the Gulf Stream currents. The Charleston Gyre is a persistent oceanographic feature that forms in the lee of the Charleston Bump. It is a location in which larval swordfish have been commonly found and may serve as nursery habitat.

*Pelagic Environment*

Many HMS spend their entire lives in the pelagic, or open ocean environment. These species are highly mobile and physiologically adapted to traveling great distances with minimal effort. Much of what is known about the association between HMS and their migrations across vast open ocean habitat comes from tagging studies.

While the open ocean may appear featureless, there are major oceanographic features such as currents, temperature gradients, eddies, and fronts that occur on a large scale and may influence the distribution patterns of many oceanic species, including HMS. For instance, the Gulf Stream produces meanders, filaments, and warm and cold core rings that significantly affect the physical oceanography of the continental shelf and slope. These features tend to aggregate both predators and prey, and are frequently targeted by commercial fishing vessels. This western boundary current has its origins in the tropical Atlantic Ocean (*i.e.*, the Caribbean Sea). The Gulf Stream system is made up of the Yucatan Current that enters the Gulf of Mexico through the Yucatan Straits; the Loop Current which is the Yucatan Current after it separates from Campeche Bank and penetrates the Gulf of Mexico in a clockwise flowing loop; the Florida Current, as it travels through the Straits of Florida and along the continental slope into the South Atlantic Bight; and the Antilles Current as it follows the continental slope (Bahamian Bank) northeast to Cape Hatteras. From Cape Hatteras it leaves the slope environment and flows into the deeper waters of the Atlantic Ocean.

The flow of the Gulf Stream as it leaves the Straits of Florida reaches maximum speeds of about 200 cm/s. During strong events, maximum current speeds greater than 250 cm/s have been recorded offshore of Cape Hatteras. The width of the Gulf Stream at the ocean surface ranges from 80 – 100 km (50 – 63 mi) and extends to depths of between 800 and 1,200 m (2,624 – 3,937 ft).

As a meander passes, the Gulf Stream boundary oscillates sequentially onshore (crest) and offshore (trough). A meander can cause the Gulf Stream to shift slightly shoreward or well offshore into deeper waters. The Gulf Stream behaves in two distinct meander modes (small and large), with the size of the meanders decreasing as they move northward along the coast. During the large meander mode the Gulf Stream front is seaward of the shelf break, with its meanders having large amplitudes. Additionally, frontal eddies and accompanying warm-water filaments are larger and closer to shore. During the small meander mode the Gulf Stream front is at the shelf break. Frontal eddies and warm-water filaments associated with small amplitude meanders are smaller and farther from shore. Since HMS tend to follow the edge of the Gulf Stream, their distance from shore can be greatly influenced by the patterns of meanders and eddies.

Meanders have definite circulation patterns and conditions superimposed on the statistical mean (average) condition. As a meander trough migrates in the direction of the Gulf Stream's flow, it upwells cool nutrient-rich water, which at times may move onto the shelf and may evolve into an eddy. These boundary features move south-southwest. As warm-water filaments, they transfer momentum, mass, heat, and nutrients to the waters of the shelf break.

Gulf Stream filaments are mesoscale events, which occur regularly offshore the southeast United States. The filament is a tongue of water extending from the Gulf Stream pointing to the south. These form when meanders cause the extrusion of a warm surface filament of Gulf Stream water onto the outer shelf. The cul-de-sac formed by this extrusion contains a cold core that consists of a mix of outer-shelf water and nutrient-rich water. This water mix is a result of upwelling as the filament/meander passes along the slope. The period from genesis to decay typically is about two to three weeks.

The Charleston Gyre is a permanent oceanographic feature of the South Atlantic Bight, caused by the interaction of the Gulf Stream waters with the topographically irregular Charleston Bump. The gyre produces an upwelling of nutrients, which contributes significantly to primary and secondary productivity of the Bight. The degree of upwelling varies with the seasonal position and velocity of the Gulf Stream currents.

In the warm waters between the west edge of the Florida Current/Gulf Stream and 20° N and 40° N, pelagic brown algae, *Sargassum natans* and *S. fluitans*, form a dynamic structural habitat. The greatest concentrations are found within the North Atlantic Central Gyre in the Sargasso Sea. Large quantities of *Sargassum* frequently occur on the continental shelf off the southeastern United States. Depending on prevailing surface currents, this material may remain on the shelf for extended periods, be entrained into the Gulf Stream, or be cast ashore. During calm conditions *Sargassum* may form irregular mats or simply be scattered in small clumps. Oceanographic features such as internal waves and convergence zones along fronts aggregate the algae along with other flotsam into long linear or meandering rows collectively termed "windrows."

Pelagic *Sargassum* supports a diverse assemblage of marine organisms including fungi, micro- and macro-epiphytes, sea turtles, numerous marine birds, at least 145 species of invertebrates, and over 100 species of fishes. The fishes associated with pelagic *Sargassum* include juveniles as well as adults, including large pelagic adult fishes. Swordfish and billfish are among the fishes that can be found associated with *Sargassum*. The *Sargassum* community, consisting of the floating *Sargassum* (associated with other algae, sessile and free-moving invertebrates, and finfish) is important to some epipelagic predators such as wahoo and dolphin. The *Sargassum* community provides food and shelter from predation for juvenile and adult fish, including HMS, and may have other functions such as habitat for fish eggs and larvae.

Offshore water quality in the Atlantic is controlled by oceanic circulation, which, in the Mid-Atlantic is dominated by the Gulf Stream and by oceanic gyres. A shoreward, tidal and wind-driven circulation dominates as the primary means of pollutant transport between estuaries and the nearshore. Water quality in nearshore water masses adjacent to estuarine plumes and in water masses within estuaries is also influenced by density-driven circulation. Suspended sediment concentration can also be used as an indication of water quality. For the Atlantic coastal areas, suspended sediment concentration varies with respect to depth and distance from shore, the variability being greatest in the Mid-Atlantic and South Atlantic. Re-suspended bottom sediment is the principal source of suspended sediments in offshore waters.

#### 3.3.2.2 Gulf of Mexico

(Material in this section is largely a summary of information in MMS, 1996; Field *et al.*, 1991; and NOAA 1997. Original sources of information are referenced in those documents.)

The Gulf of Mexico supports a great diversity of fish resources that are related to a variety of ecological factors, such as salinity, primary productivity, and bottom type. These factors differ widely across the Gulf of Mexico and between inshore and offshore waters. Characteristic fish resources are not randomly distributed; high densities of fish resources are associated with particular habitat types (*e.g.*, east Mississippi Delta area, Florida Big Bend sea grass beds, Florida Middle Grounds, mid-outer shelf, and the De Soto Canyon area). The highest values of surface primary production are found in the upwelling area north of the Yucatan Channel and in the De Soto Canyon region. In terms of general biological productivity, the western Gulf is considered to be more productive in the oceanic region than is the eastern Gulf. Productivity of areas where HMS are known to occur varies between the eastern and western Gulf, depending on the influence of the Loop Current.

*Coastal and Estuarine Habitats*

There are 5.62 million hectares (ha) (13.88 million acres) of estuarine habitat among the five states bordering the Gulf. This includes 3.2 million ha (8 million acres) of open water, 2.43 million ha (6 million acres) of emergent tidal vegetation (including about 162,000 ha (400,318 acres) of mangroves), and 324,000 ha (800, 636 acres) of submerged vegetation. Estuaries are found from east Texas through Louisiana, Mississippi, Alabama, and northwest Florida and encompass more than 62,000 sq km (23,938 sq mi) of water surface area. Estuaries of the Gulf of Mexico export considerable quantities of organic material, thereby enriching the adjacent continental shelf areas, and many of these estuaries provide important habitat as pupping and nursery grounds for juvenile stages of many important invertebrate and fish species including many species of Atlantic sharks.

Coastal wetland habitat types that occur along the Gulf Coast include mangroves, non-forested wetlands (fresh, brackish, and saline marshes), and forested wetlands. Marshes and mangroves form an interface between marine and terrestrial habitats, while forested wetlands occur inland from marsh areas. Wetland habitats may occupy narrow bands or vast expanses, and can consist of sharply delineated zones of different species, monospecific stands of a single species, or mixed plant species communities.

*Continental Shelf and Slope Areas*

The Gulf of Mexico is a semi-enclosed, subtropical sea with a surface area of approximately 1.6 million sq km (0.6 million sq mi). The main physiographic regions of the Gulf basin are the continental shelf, continental slope and associated canyons, the Yucatan and Florida Straits, and the abyssal plains. The U.S. continental shelf is narrowest, only 16 km (9.9 mi) wide, off the Mississippi River. The continental shelf width varies significantly from about 350 km (217 mi) offshore western Florida, 156 km (97 mi) off Galveston, TX, and decreasing to 88 km (55 mi) off Port Isabel near the Mexican border. The depth of the central abyss ranges to 4,000 m (13,000 ft). The Gulf is unique because it has two entrances: the Yucatan Strait and the Straits of Florida. The Loop Current dominates the Gulf's general circulation and its associated eddies. The Loop current is caused by differences between the sill depths of the two straits. Coastal and shelf circulation, on the other hand, is driven by several forcing mechanisms: wind stress, freshwater input, buoyancy and mass fluxes, and transfer of momentum and energy through the seaward boundary.

In the Gulf, the continental shelf extends seaward from the shoreline to about the 200-m water depth (660 ft), and is characterized by a gentle slope of less than one degree. The continental slope extends from the shelf edge to the continental rise, usually at about the 2,000-m (6,500 ft) water depth. The topography of the slope in the Gulf is uneven and is broken by canyons, troughs, and escarpments. The gradient on the slope is characteristically one to six degrees, but may exceed 20 degrees in some places, particularly along escarpments. The continental rise is the apron of sediment accumulated at the base of the slope. The incline is gentle with slopes of less than one degree. The abyssal plain is the basin floor at the base of the continental rise.

*Physical Oceanography*

The Gulf receives large amounts of freshwater runoff from the Mississippi River as well as from a host of other drainage systems. In recent years, large amount of nutrient laden runoff from the Mississippi River have resulted in large hypoxic or low oxygen areas in the Gulf. This "dead zone" may affect up to 16,500 sq km (6,371 sq mi) during the summer, resulting in unfavorable habitat conditions for a wide variety of species.

Sea-surface temperatures in the Gulf range from nearly constant throughout (isothermal) (29° to 30°C (84° to 86°F)) in August to a sharp horizontal gradient in January, (25°C (77°F) in the Loop Current core to 14° to 15°C (57° to 59°F) along the northern shelf). The vertical distribution of temperature reveals that in January, the thermocline depth is about 30 to 61 m (98 to 200 ft) in the northeast Gulf and 91 to 107 m (298 to 350 ft) in the northwest Gulf. In May, the thermocline depth is about 46 m (150 ft) throughout the entire Gulf.

Sea surface salinities along the north Gulf vary seasonally. During months of low freshwater input, salinities near the coastline range between 29 to 32 ppt. High freshwater input conditions during the spring and summer months result in strong horizontal gradients and inner shelf salinities less than 20 ppt. The mixed layer in the open Gulf, from the surface to a depth of approximately 100 to 150 m (330 to 495 ft), is characterized by salinities between 36.0 and 36.5 ppt.

Sharp discontinuities of temperature and/or salinity at the sea surface, such as the Loop Current front or fronts associated with eddies or river plumes, are dynamic features that may act to concentrate buoyant material such as detritus, plankton, or eggs and larvae. These materials are transported, not by the front's movements or motion across the front, but mainly by lateral movement along the front. In addition to open ocean fronts, a coastal front, which separates turbid, lower salinity water from the open-shelf regime, is probably a permanent feature of the north Gulf shelf. This front lies about 30 – 50 km (19 – 31 mi) offshore. In the Gulf, these fronts are the most commonly utilized habitat of the pelagic HMS species.

The Loop Current is a highly variable current entering the Gulf through the Yucatan Straits and exiting through the Straits of Florida (as a component of the Gulf Stream) after tracing an arc that may intrude as far north as the Mississippi-Alabama shelf. This current has been detected down to about 1,000 m (3,300 ft) below the surface. Below that level there is evidence of a countercurrent. When the Loop Current extends into or near shelf areas, instabilities, such as eddies, may develop that can push warm water onto the shelf or entrain cold water from the shelf. These eddies consist of warm water rotating in a clockwise fashion. Major Loop Current eddies have diameters on the order of 300 – 400 km (186 – 249 miles), and may extend to a depth of about 1,000 m. Once these eddies are free from the Loop Current, they travel into the western Gulf along various paths to a region between 25° N to 28° N and 93° W to 96° W. As eddies travel westward a decrease in size occurs due to mixing with resident waters and friction with the slope and shelf bottoms. The life of an individual eddy, until its eventual assimilation by regional circulation in the western Gulf, is about one year. Along the Louisiana/Texas slope, eddies are frequently observed to affect local current patterns, hydrographic properties, and possibly the biota of fixed oil and gas platforms or hard bottoms.

Once an eddy is shed, the Loop Current undergoes major dimensional adjustments and reorganization.

#### 3.3.2.3 U.S. Caribbean

(Material in this section is largely a summary of information in Appeldoorn and Meyers, 1993. Original sources of information are referenced in that document.)

The waters of the Caribbean region include the coastal waters surrounding the U.S. Virgin Islands and Puerto Rico. All of these Caribbean islands, with the exception of St. Croix, are part of a volcanic chain of islands formed by the subduction of one tectonic plate beneath another. Tremendously diverse habitats (rocky shores, sandy beaches, mangroves, seagrasses, algal plains, and coral reefs) and the consistent light and temperature regimes characteristic of the tropics are conducive to high species diversity.

The waters of the Florida Keys and southeast Florida are intrinsically linked with the waters of the Gulf of Mexico and the waters of the Caribbean to the west, south, and east, and to the waters of the South Atlantic Bight to the north. These waters represent a transition from insular to continental regimes and from tropical to temperate regimes. This zone, therefore, contains one of the richest floral and faunal complexes.

*Coastal and Estuarine Habitats*

Although the U.S. waters of the Caribbean are relatively nutrient poor, and therefore have low rates of primary and secondary productivity, they display some of the greatest diversity of any part of the South Atlantic region. High and diverse concentrations of biota are found where habitat is abundant. Coral reefs, sea grass beds, and mangrove ecosystems are the most productive of the habitat types found in the Caribbean, but other areas such as soft-bottom lagoons, algal hard grounds, mud flats, salt ponds, sandy beaches, and rocky shores are also important in overall productivity. These diverse habitats allow for a variety of floral and faunal populations.

Offshore, between the sea grass beds and the coral reefs and in deeper waters, sandy bottoms and algal plains dominate. These areas may be sparsely or densely vegetated with a canopy of up to one meter of red and brown algae. Algal plains are not areas of active sand transport. These are algae-dominated sandy bottoms, often covered with carbonate nodules. They occur primarily in deep water (> 15 m, or 50 ft), and account for roughly 70 percent of the area of the insular shelf of the U.S. Virgin Islands. Algal plains support a variety of organisms including algae, sponges, gorgonians, solitary corals, mollusks, fish, and worms, and may serve as critical juvenile habitat for commercially important (and diminishing) species such as queen triggerfish and spiny lobsters.

Coral reefs and other coral communities are some of the most important ecological (and economic) coastal resources in the Caribbean. They act as barriers to storm waves and provide habitat for a wide variety of marine organisms, including most of the economically important species of fish and shellfish. They are the primary source for carbonate sand, and serve as the basis for much of the tourism. Coral communities are made by the build up of calcium carbonate produced by living animals, coral polyps, in symbiosis with a dinoflagellate, known as zooxanthellae. During summer and early fall, most of the coral building organisms are at or near the upper temperature limit for survival and so are living under natural conditions of stress. Further increase in local or global temperature could prove devastating.

Sea grass beds are highly productive ecosystems that are quite extensive in the Caribbean; some of the largest sea grass beds in the world lie beyond the shore on both sides of the Keys. Sea grass beds often occur in close association with shallow-water coral reefs. Seagrasses are flowering plants that spread through the growth of roots and rhizomes. These act to trap and stabilize sediments, reduce shoreline erosion, and buffer coral reefs; they provide food for fish, sea turtles (heavy grazers), conch, and urchins; they provide shelter and habitat for many adult species and numerous juvenile species that rely on the sea grass beds as nursery areas; and they provide attachment surfaces for calcareous algae.

Mangrove habitats are very productive coastal systems that support a wide variety of organisms. The mangrove food web is based largely on the release of nutrients from the decomposition of mangrove leaves, and in part on the trapping of terrestrial material. Red mangroves (*Rhizophora mangle*), with their distinctive aerial prop roots; grow along the shoreline, often in mono-specific stands. The roots of the red mangroves help to trap sediments and pollutants associated with terrestrial runoff and help to buffer the shore from storm waves. Red mangrove forests support a diverse community of sponges, tunicates, algae, larvae, and corals, as well as juvenile and adult fish and shellfish. Black mangroves (*Aveicennia germinans*) and white mangroves (*Laguncularia racemosa*) grow landward of the red mangroves. They also act as important sediment traps. Exposed and sheltered mangrove shorelines are common throughout the U.S. Caribbean.

Throughout the U.S. Caribbean, both rocky shores and sandy beaches are common. While many of these beaches are high-energy and extremely dynamic, buffering by reefs and seagrasses allows some salt-tolerant plants to colonize the beach periphery. Birds, sea turtles, crabs, clams, worms, and urchins use the intertidal areas.

Salt ponds, common in the U.S. Virgin Islands, are formed when mangroves or fringing coral reefs grow or storm debris is deposited, effectively isolating a portion of a bay. The resulting "pond" undergoes significant fluctuations of salinity with changes in relative evaporation and runoff. The biota associated with salt ponds are, therefore, very specialized, and usually somewhat limited. Salt ponds are extremely important in trapping terrestrial sediments before they reach the coastal waters.

*Insular Shelf and Slope Areas*

Puerto Rico and the U.S. Virgin Islands contain a wide variety of coastal marine habitats, including coral and rock reefs, sea grass beds, mangrove lagoons, sand and algal plains, soft bottom areas, and sandy beaches. These habitats are, however, very patchily distributed. Nearshore waters range from zero to 20 m (66 ft) in depth, and outer shelf waters range from 20 to 30 m (66 to 99 ft) in depth, the depth of the shelf break. Along the north coast the insular shelf is very narrow (two to three km wide), seas are generally rough, and few good harbors are present. The coast is a mixture of coral and rock reefs, and sandy beaches. The east coast has an extensive shelf that extends to the British Virgin Islands. Depth ranges from 18 to 30 m (59 to 99 ft). Much of the bottom is sandy, commonly with algal and sponge communities. The southeast coast has a narrow shelf (eight km wide). About 25 km (15.5 mi) to the southeast is Grappler Bank, a small seamount with its summit at a depth of 70 m (231 ft). The central south coast broadens slightly to 15 km (99 mi) and an extensive sea grass bed extends nine kilometers offshore to Caja de Muertos Island. Further westward, the shelf narrows again to just two km (1.2 mi) before widening at the southwest corner to over 10 km (6 mi). The entirety of the southern shelf is characterized by hard or sand-algal bottoms with emergent coral reefs, grass beds, and shelf edge. Along the southern portion of the west coast the expanse of shelf continues to widen, reaching 25 km (15.5 mi) at its maximum. A broad expanse of the shelf is found between 14 and 27 m (46 and 99 ft), where habitats are similar to those of the south coast. To the north, along the west coast, the shelf rapidly narrows to two to three kilometers.

*Physical Oceanography*

U.S. Caribbean waters are primarily influenced by the westward flowing North Equatorial Current, the predominant hydrological driving force in the Caribbean region. It flows from east to west along the northern boundary of the Caribbean plateau and splits at the Lesser Antilles, flowing westward along the north coasts of the islands.

The north branch of the Caribbean Current flows west into the Caribbean Basin at roughly 0.5 m (1.7 ft) per second. It is located about 100 km (62 mi) south of the islands, but its position varies seasonally. During the winter it is found further to the south than in summer. Flow along the south coast of Puerto Rico is generally westerly, but this is offset by gyres formed between the Caribbean Current and the island. The Antilles Current flows to the west along the northern edge of the Bahamas Bank and links the waters of the Caribbean to those of southeast Florida.

Coastal surface water temperatures remain fairly constant throughout the year and average between 26° and 30°C (79° and 86°F). Salinity of coastal waters is purely oceanic and therefore is usually around 36 ppt. However, in the enclosed or semi-enclosed embayments salinity may vary widely depending on fluvial and evaporational influences.

It is believed that no upwelling occurs in the waters of the U.S. Caribbean (except perhaps during storm events) and, since the waters are relatively stratified, they are severely nutrient-limited. In tropical waters nitrogen is the principal limiting nutrient.

## 3.4 Fishery Data Update

In this section, HMS fishery data, with the exception of some data on Atlantic sharks, are analyzed by gear type; Section 3.4.6 provides a summary of landings by species. While HMS fishermen generally target particular species, the non-selective nature of most fishing gears promotes effective analysis and management on a gear-by-gear basis. In addition, issues such as bycatch, and safety are generally better addressed by gear type. A summary of catch statistics can be found in Section 3.4.6 of this document.

The revised list of authorized fisheries (LOF) and fishing gear used in those fisheries became effective December 1, 1999 (64 FR 67511). The rule applies to all U.S. marine fisheries, including Atlantic HMS. As stated in the rule, "no person or vessel may employ fishing gear or participate in a fishery in the exclusive economic zone (EEZ) not included in this LOF without giving 90 days' advance notice to the appropriate Fishery Management Council (Council) or, with respect to Atlantic HMS, the Secretary of Commerce (Secretary)." Acceptable HMS fisheries and authorized gear types for Atlantic tunas, swordfish, and sharks include: swordfish handgear fishery – rod and reel, harpoon, handline, bandit gear; pelagic longline fishery – longline; shark drift gillnet fishery – gillnet; shark bottom longline fishery – longline; shark recreational fishery – rod and reel, handline; tuna purse seine fishery – purse seine; tuna recreational fishery– rod and reel, handline; and tuna handgear fishery – rod and reel, harpoon, handline, bandit gear. For Atlantic billfish, the only acceptable fishery and authorized gear type is recreational fishery – rod and reel. Species whose life history characteristics may lead to their eventual categorization as highly migratory, but which are not currently under the Secretary or Regional Council management authority, are covered in two broad categories: Recreational Fisheries (Non-FMP) and Commercial Fisheries (Non-FMP). Species that fit this description may be harvested with the gears listed for these catchall categories.

Due to the nature of SCRS data collection,

Table 3.21 depicts a summary of U.S. and international HMS catches by species rather than gear type. International catch levels and U.S. reported catches for HMS, other than sharks, are taken from the 2005 Standing Report of the SCRS (SCRS, 2005). The U.S. percentage of regional and total catches for HMS species is presented (

Table 3.21) to provide a basis for comparison of the U.S.' catches relative to other nations/entities. Catch of billfish includes both recreational landings and dead discards from commercial fisheries; catch for bluefin tuna includes commercial landings and discards and recreational landings; and swordfish include commercial landings and discards. International catch and landings tables are included for the pelagic longline and purse seine fisheries in Sections 3.4.1 and 3.4.2 of this document. At this point, data necessary to assess the U.S. regional and total percentage of international catch levels for Atlantic shark species are unavailable.

**Table 3.21 Calendar Year 2004 U.S. vs International Catch of HMS (mt ww) other than sharks.** Source: SCRS, 2005.

| | | | | | | **U.S. Percentage of Total Atlantic Catch** |
|---|---|---|---|---|---|---|
| Atlantic Swordfish | 25,173* (includes N. & S. Atlantic) | North Atlantic | 12,283* | 2,600 | 21.17% | 10.39% |
| | | South Atlantic | 12,779* | 16 | 0.13% | |
| Atlantic Bluefin Tuna | 28,889** | West Atlantic | 1,928 | 971 | 50.36% | 3.36% |
| Atlantic Bigeye Tuna | 72,349 | Total Atlantic | 72,349 | 414 | 0.57% | 0.57% |
| Atlantic Yellowfin Tuna | 116,275 | West Atlantic | 29,829 | 6,500 | 21.79% | 5.59% |
| Atlantic Albacore Tuna | 52,775 (includes N. & S. Atlantic and Mediterranean) | North Atlantic | 25,460 | 646 | 2.54% | 1.23% |
| | | South Atlantic | 22,468 | 1 | 0.004% | |
| Atlantic Skipjack Tuna | 161,089 | West Atlantic | 26,910 | 102 | 0.38% | 0.06% |
| Atlantic Blue Marlin | 2,076 | North Atlantic | 596 | 59*** | 9.90% | 2.84% |
| Atlantic White Marlin | 532 | North Atlantic | 190 | 28*** | 14.74% | 5.26% |
| Atlantic Sailfish | 2,167 | West Atlantic | 1,017 | 40 | 3.93% | 1.85% |

* Actual catches are likely higher given significant non-compliance with ICCAT reporting requirements.
** Significant non-compliance with ICCAT reporting requirements affects SCRS from estimating aggregate 2004 eastern Atlantic bluefin tuna catches accurately.
***The U.S. catch of marlins reported in the DEIS was lower as discards were inadvertently omitted.

### 3.4.1 Pelagic Longline Fishery

#### 3.4.1.1 Domestic History and Current Management

The U.S. pelagic longline fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna, and bigeye tuna in various areas and seasons. Secondary target species include dolphin, albacore tuna, pelagic sharks (including mako, thresher, and porbeagle sharks), as well as several species of large coastal sharks. Although this gear can be modified (*e.g.*, depth of set, hook type, etc.) to target swordfish, tunas, or sharks, it is generally a multi-species fishery. These vessel operators are opportunistic, switching gear style and making subtle changes to target the best available economic opportunity of each individual trip. Pelagic longline gear sometimes attracts and hooks non-target finfish with little or no commercial value, as well as species that cannot be retained by commercial fishermen due to regulations, such as billfish. Pelagic longlines may also interact with protected species such as marine mammals, sea turtles, and seabirds. Thus, this gear has been classified as a Category I fishery with respect to the Marine Mammal Protection Act. Any species (or undersized catch of permitted species) that cannot be landed due to fishery regulations is required to be released, whether dead or alive. Pelagic longline gear is composed of several parts (see Figure 3.25[2]) (NMFS, 1999).

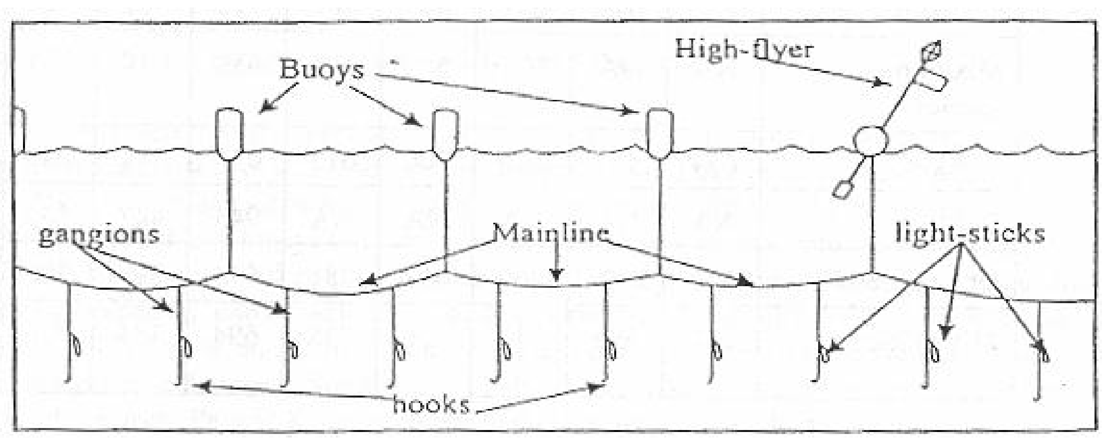



**Figure 3.25 Typical U.S. Pelagic Longline Gear.** Source: Arocha, 1996

The primary fishing line, or mainline of the longline system, can vary from five to 40 miles in length, with approximately 20 to 30 hooks per mile. The depth of the mainline is determined by ocean currents and the length of the floatline, which connects the mainline to several buoys, and periodic markers which can have radar reflectors or radio beacons attached. Each individual hook is connected by a leader, or gangion, to the mainline. Lightsticks, which contain chemicals that emit a glowing light, are often used, particularly when targeting swordfish. When attached to the hook and suspended at a certain depth, lightsticks attract baitfish, which may, in turn, attract pelagic predators (NMFS, 1999).

[2] As of April 1, 2001, (66 FR 17370) a vessel is considered to have pelagic longline gear on board when a power-operated longline hauler, a mainline, floats capable of supporting the mainline, and leaders (gangions) with hooks are on board.

When targeting swordfish, pelagic longline gear is generally deployed at sunset and hauled at sunrise to take advantage of swordfish nocturnal near-surface feeding habits (NMFS, 1999). In general, longlines targeting tunas are set in the morning, deeper in the water column, and hauled in the evening. Except for vessels of the distant water fleet, which undertake extended trips, fishing vessels preferentially target swordfish during periods when the moon is full to take advantage of increased densities of pelagic species near the surface. The number of hooks per set varies with line configuration and target species (Table 3.22) (NMFS, 1999). The pelagic longline gear components may also be deployed as a trolling gear to target surface feeding tunas. Under this configuration, the mainline and gangions are elevated and actively trolled so that the baits fish on or above the water's surface. This style of fishing is often referred to as "green-stick fishing," and reports indicate that it can be extremely efficient compared to conventional fishing techniques. For more information on green-stick fishing gear and the configurations allowed under current regulations, please refer to the discussions of alternative H4 in Chapters 2 and 4 of this document.

**Table 3.22 Average Number of Hooks per Pelagic Longline Set, 1999-2004.** Source: Data reported in pelagic longline logbook.

| | | | | | | **2004** |
|---|---|---|---|---|---|---|
| Swordfish | 521 | 550 | 625 | 695 | 712 | 701 |
| Bigeye Tuna | 768 | 454 | 671 | 755 | 967 | 400 |
| Yellowfin Tuna | 741 | 772 | 731 | 715 | 723 | 696 |
| Mix of tuna species | NA | 638 | 719 | 767 | 764 | 779 |
| Shark | 613 | 621 | 571 | 640 | 970 | 1,046 |
| Dolphin | NA | 943 | 447 | 542 | 692 | 1,033 |
| Other species | 781 | 504 | 318 | 300 | 865 | 270 |
| Mix of species | 738 | 694 | 754 | 756 | 750 | 777 |

Figure 3.26 illustrates basic differences between swordfish (shallow) sets and tuna (deep) longline sets. Swordfish sets are buoyed to the surface, have few hooks between floats, and are relatively shallow. This same type of gear arrangement is used for mixed target sets. Tuna sets use a different type of float placed much further apart. Compared with swordfish sets, tuna sets have more hooks between the floats and the hooks are set much deeper in the water column. It is believed that because of the difference in fishing depth, tuna sets hook fewer turtles than the swordfish sets. In addition, tuna sets use bait only, while swordfish fishing uses a combination of bait and lightsticks. Compared with vessels targeting swordfish or mixed species, vessels specifically targeting tuna are typically smaller and fish different grounds.

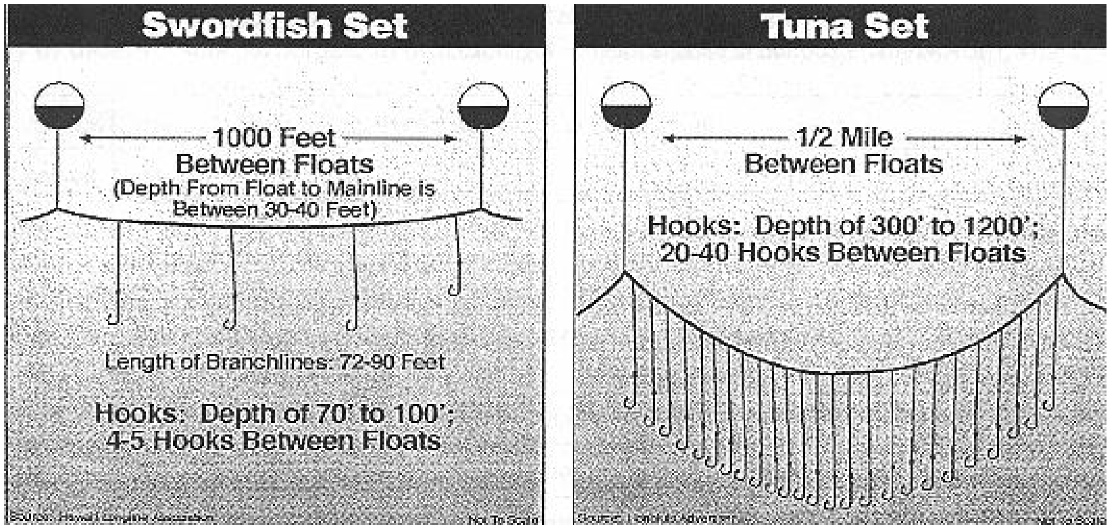



**Figure 3.26 Different Pelagic Longline Gear Deployment Techniques.** Source: Hawaii Longline Association and Honolulu Advertiser.

NOTE: This figure is only included to show basic differences in pelagic longline gear configuration and to illustrate that this gear may be altered to target different species.

*Regional U.S. Pelagic Longline Fisheries Description*

The U.S. pelagic longline fishery sector has historically been comprised of five relatively distinct segments with different fishing practices and strategies, including the Gulf of Mexico yellowfin tuna fishery, the South Atlantic-Florida east coast to Cape Hatteras swordfish fishery, the Mid-Atlantic and New England swordfish and bigeye tuna fishery, the U.S. distant water swordfish fishery, and the Caribbean Islands tuna and swordfish fishery. Each vessel type has different range capabilities due to fuel capacity, hold capacity, size, and construction. In addition to geographical area, these segments have historically differed by percentage of various target and non-target species, gear characteristics, and deployment techniques. Some vessels fish in more than one fishery segment during the course of the year (NMFS, 1999). Due to the many changes in the regulations since 1999 (*e.g.*, time/area closures and gear restrictions), the fishing practices and strategies of these different segments may have changed.

The Gulf of Mexico Yellowfin Tuna Fishery

Gulf of Mexico vessels primarily target yellowfin tuna year-round; however, each port has one to three vessels that directly target swordfish, either seasonally or year-round. Longline fishing vessels that target yellowfin tuna in the Gulf of Mexico also catch and sell dolphin, swordfish, other tunas, and sharks. During yellowfin tuna fishing, few swordfish are captured incidentally. Many of these vessels participate in other Gulf of Mexico fisheries (targeting shrimp, shark, and snapper/grouper) during allowed seasons. Home ports for this fishery include Madiera Beach, Florida; Panama City, Florida; Dulac, Louisiana; and Venice, Louisiana (NMFS, 1999).

For catching tuna, the longline gear is configured similar to swordfish longline gear but is deployed differently. The gear is typically set out at dawn (between two a.m. and noon) and retrieved at sunset (4 p.m. to midnight). The water temperature varies based on the location of fishing. However, yellowfin tuna are targeted in the western Gulf of Mexico during the summer when water temperatures are high. In the past, fishermen have used live bait, however, NMFS prohibited the use of live bait in an effort to decrease bycatch and bycatch mortality of billfish (65 FR 47214, August 1, 2000). This rule also closed the Desoto Canyon area (year-round closure) to pelagic longline gear. In the Gulf of Mexico, and all other areas, except the NED, specific circle hooks (16/0 or larger non-offset and 18/0 or larger with an offset not to exceed 10 degrees) are currently required, as are whole finfish and squid baits.

<u>The South Atlantic – Florida East Coast to Cape Hatteras Swordfish Fishery</u>

Historically, South Atlantic pelagic longline vessels targeted swordfish year-round, although yellowfin tuna and dolphin fish were other important marketable components of the catch. In 2001 (65 FR 47214, August 1, 2000), the Florida East Coast closed area (year-round closure) and the Charleston Bump closed area (February through April closure) became effective. NMFS analyzed logbook data to determine the effectiveness of these closed areas (Sections 2.1.2 and 4.1.2).

Prior to these closures, smaller vessels used to fish short trips from the Florida Straits north to the bend in the Gulf Stream off Charleston, South Carolina (Charleston Bump). Mid-sized and larger vessels migrate seasonally on longer trips from the Yucatan Peninsula throughout the West Indies and Caribbean Sea, and some trips range as far north as the Mid-Atlantic coast of the United States to target bigeye tuna and swordfish during the late summer and fall. Fishing trips in this fishery average nine sets over 12 days. Home ports (including seasonal ports) for this fishery include Georgetown, South Carolina; Charleston, South Carolina; Fort Pierce, Florida; Pompano Beach, Florida; and Key West, Florida. This sector of the fishery consists of small to mid-size vessels, which typically sell fresh swordfish to local high-quality markets (NMFS, 1999).

<u>The Mid-Atlantic and New England Swordfish and Bigeye Tuna Fishery</u>

Fishing in this area has evolved during recent years to focus almost year-round on directed tuna trips, with substantial numbers of swordfish trips as well. Some vessels participate in directed bigeye/yellowfin tuna fishing during the summer and fall months and then switch to bottom longline and/or shark fishing during the winter when the large coastal shark season is open. In 1999, NMFS closed the Northeastern U.S. area in June to pelagic longline gear to reduce bluefin tuna discards (64 FR 29090, May 28, 1999). Fishing trips in this fishery sector average 12 sets over 18 days. During the season, vessels primarily offload in the ports of New Bedford, Massachusetts; Barnegat Light, New Jersey; Ocean City, Maryland; and Wanchese, North Carolina (NMFS, 1999).

<u>The U.S. Atlantic Distant Water Swordfish Fishery</u>

This fishing ground covers virtually the entire span of the western north Atlantic to as far east as the Azores and the Mid-Atlantic Ridge. Approximately 12 large fishing vessels that fish in the distant water operate out of Mid-Atlantic and New England ports during the summer and fall months targeting swordfish and tunas, and then move to Caribbean ports during the winter and spring months. Many of the current distant water operations were among the early participants in the U.S. directed Atlantic commercial swordfish fishery. These larger vessels, with greater ranges and capacities than the coastal fishing vessels, enabled the United States to become a significant participant in the north Atlantic fishery. They also fish for swordfish in the south Atlantic. The distant water vessels traditionally have been larger than their southeast counterparts because of the distances required traveling to the fishing grounds. Fishing trips in this fishery tend to be longer than in other fisheries, averaging 30 days and 16 sets. Ports for this fishery range from San Juan, Puerto Rico through Portland, Maine, and include New Bedford, Massachusetts, and Barnegat Light, New Jersey (NMFS, 1999). This segment of the fleet was directly affected by the L-shaped closure in 2000 and the NED closure implemented in 2001. A number of vessels have recently returned to this fishery with the issuance of the July 6, 2004, rule (69 FR 40734) to reduce sea turtle bycatch and bycatch mortality. Unlike in other areas, vessels fishing in the NED are required to use 18/0 or larger circle hooks with an offset not to exceed 10 degrees and whole mackerel or squid baits.

The Caribbean Tuna and Swordfish Fishery

This fleet is similar to the southeast coastal fishing fleet in that both are comprised primarily of smaller vessels that make short trips relatively near-shore, producing high quality fresh product. Both fleets also encounter relatively high numbers of undersized swordfish at certain times of the year. Longline vessels targeting HMS in the Caribbean use fewer hooks per set, on average, fishing deeper in the water column than the distant water fleet off New England, the northeast coastal fleet, and the Gulf of Mexico yellowfin tuna fleet. This fishery is typical of most pelagic fisheries, being truly a multi-species fishery, with swordfish as a substantial portion of the total catch. Yellowfin tuna, dolphin and, to a lesser extent, bigeye tuna, are other important components of the landed catch. Ports for this fishery include St. Croix, U.S. Virgin Islands; and San Juan, Puerto Rico. Many of these high quality fresh fish are sold to local markets to support the tourist trade in the Caribbean (NMFS, 1999).

*Management of the U.S. Pelagic Longline Fishery*

The U.S. Atlantic pelagic longline fishery is restricted by a limited swordfish quota, divided between the North and South Atlantic (separated at 5°N. Lat.). Other regulations include minimum sizes for swordfish, yellowfin, bigeye, and bluefin tuna, limited access permitting, bluefin tuna catch requirements, shark quotas, protected species incidental take limits, reporting requirements (including logbooks), and gear and bait requirements. Current billfish regulations prohibit the retention of billfish by pelagic longline vessels, or the sale of billfish from the Atlantic Ocean. As a result, all billfish hooked on pelagic longlines must be discarded, and are considered bycatch. This is a heavily managed gear type and, as such, is strictly monitored. Because it is difficult for pelagic longline fishermen to avoid undersized fish in some areas, NMFS has closed areas in the Gulf of Mexico and along the east coast. The intent of these closures is to decrease bycatch in the pelagic longline fishery by closing those areas with the highest rates of bycatch. There are also time/area closures for pelagic longline fishermen designed to reduce the incidental catch of bluefin tuna and sea turtles. In order to enforce time/area closures and to monitor the fishery, NMFS requires all pelagic longline vessels to report positions on an approved vessel monitoring system (VMS).

In June 2004, NMFS conditionally re-opened the NED to pelagic longline fishing. NMFS limited vessels with pelagic longline gear onboard in that area, at all times, to possessing onboard and/or using only 18/0 or larger circle hooks with an offset not to exceed ten degrees. Only whole mackerel and squid baits may be possessed and or utilized with allowable hooks. In August of 2004, NMFS limited vessels with pelagic longline gear onboard, at all times, in all areas open to pelagic longline fishing, excluding the NED, to possessing onboard and/or using only 16/0 or larger non-offset circle hooks and/or 18/0 or larger circle hooks with an offset not to exceed ten degrees. Only whole finfish and squid baits may be possessed and/or utilized with allowable hooks. All pelagic longline vessels must possess and use sea turtle handling and release gear in compliance with NMFS careful release protocols.

Permits

The 1999 FMP established six different limited access permit types: (1) directed swordfish, (2) incidental swordfish, (3) swordfish handgear, (4) directed shark, (5) incidental shark, and (6) tuna longline. To reduce bycatch in the pelagic longline fishery, these permits were designed so that the swordfish directed and incidental permits are valid only if the permit holder also holds both a tuna longline and a shark permit. Similarly, the tuna longline permit is valid only if the permit holder also holds both a swordfish (directed or incidental, not handgear) and a shark permit. This allows limited retention of species that might otherwise have been discarded.

As of February 1, 2006, approximately 214 tuna longline limited access permits had been issued. In addition, approximately 191 directed swordfish limited access permits, 86 incidental swordfish limited access permits, 240 directed shark limited access permits, and 312 incidental shark limited access permits had been issued. Vessels with limited access swordfish and shark permits do not necessarily use pelagic longline gear, but these are the only permits that allow for the use of pelagic longline gear in HMS fisheries.

Monitoring and Reporting

Pelagic longline fishermen and the dealers who purchase HMS from them are subject to reporting requirements. NMFS has extended dealer reporting requirements to all swordfish importers as well as dealers who buy domestic swordfish from the Atlantic. These data are used to evaluate the impacts of harvesting on the stock and the impacts of regulations on affected entities.

Commercial HMS fisheries are monitored through a combination of vessel logbooks, dealer reports, port sampling, cooperative agreements with states, and scientific observer coverage. Logbooks contain information on fishing vessel activity, including dates of trips, number of sets, area fished, number of fish, and other marine species caught, released, and retained. In some cases, social and economic data such as volume and cost of fishing inputs are also required.

Pelagic Longline Observer Program

During 2005, NMFS observers recorded 796 pelagic longline sets for an overall fishery coverage of 10.1 percent. In non-experimental fishing, the overall observer coverage was 7.2 percent. A total of 247 experimental pelagic longline sets were observed in the NEC, GOM, FEC, MAB, and SAB areas, primarily during the second and third quarters. These experimental sets (EXP) had 100 percent observer coverage and are separated from the normal commercial fishery in Table 3.23 (Walsh and Garrison, 2006). In 2004, NMFS observers recorded 702 pelagic longline sets for an overall coverage of 7.3 percent. During the first and second quarters of 2004, 60 experimental sets employing circle hooks were made in the Gulf of Mexico (EXP). These sets had 100 percent observer coverage (Garrison, 2005). One thousand eighty-eight pelagic longline sets were observed and recorded by NMFS observers in 2003 (11.5 percent overall coverage – 100 percent coverage in the NED; and 6.2 percent coverage in remaining areas) (Garrison and Richards, 2004). Table 3.23 details the amount of observer coverage in past years for this fleet. Generally, due to logistical problems, it has not always been possible to place observers on all selected trips. NMFS is working towards improving compliance with observer requirements and facilitating communication between vessel operators and observer program coordinators. In addition, fishermen are reminded of the safety requirements for the placement of observers specified at 50 CFR 600.746, and the need to have all safety equipment on board required by the U.S. Coast Guard.

**Table 3.23 Observer Coverage of the Pelagic Longline Fishery.** Source: Yeung, 2001; Garrison, 2003; Garrison and Richards, 2004; Garrison, 2005; Walsh and Garrison, 2006.

| | | | | Percentage of Total Number of Sets | | |
|---|---|---|---|---|---|---|
| 1999 | 420 | | | 3.8 | | |
| 2000 | 464 | | | 4.2 | | |
| | | | | | | NED |
| 2001* | 584 | 398 | 186 | 5.4 | 3.7 | 100.0 |
| 2002* | 856 | 353 | 503 | 8.9 | 3.9 | 100.0 |
| 2003* | 1088 | 552 | 536 | 11.5 | 6.2 | 100.0 |
| | | | | | | EXP |
| 2004** | 702 | 642 | 60 | 7.3 | 6.7 | 100.0 |
| 2005** | 796 | 549 | 247 | 10.1 | 7.2 | 100.0 |

*In 2001, 2002, and 2003, 100 percent observer coverage was required in the NED research experiment.
** In 2004 and 2005 there was 100 percent observer coverage in experimental fishing (EXP).

### 3.4.1.2 Recent Catch and Landings

U.S. pelagic longline catch (including bycatch, incidental catch, and target catch) is largely related to these vessel and gear characteristics, but is summarized for the whole fishery in Table 3.24. U.S. pelagic longline landings of Atlantic tunas and swordfish for 1999 – 2004 are summarized in Table 3.25. Additional information related to landings can be seen in Section 3.4.6

From May 1992 through December 2000, the Pelagic Observer Program (POP) recorded a total of 4,612 elasmobranchs (15 percent of the total catch) caught off the southeastern U.S. coast in fisheries targeting tunas and swordfish (Beerkircher *et al.*, 2004). Of the 22 elasmobranch species observed, silky sharks were numerically dominant (31.4 percent of the elasmobranch catch), with silky, dusky, night, blue, tiger, scalloped hammerhead, and unidentified sharks making up the majority (84.6 percent) (Beerkircher *et al.*, 2004).

**Table 3.24 Reported Catch of Species Caught by U.S. Atlantic Pelagic Longlines, in Number of Fish, for 1999-2004.** Source: Pelagic Longline Logbook Data.

| | | | | | | **2004** |
|---|---|---|---|---|---|---|
| Swordfish Kept | 67,120 | 62,978 | 47,560 | 49,320 | 51,835 | 46,440 |
| Swordfish Discarded | 20,558 | 17,074 | 13,993 | 13,035 | 11,829 | 10,675 |
| Blue Marlin Discarded | 1,253 | 1,443 | 635 | 1,175 | 595 | 712 |
| White Marlin Discarded | 1,969 | 1,261 | 848 | 1,438 | 809 | 1,053 |
| Sailfish Discarded | 1,407 | 1,091 | 356 | 379 | 277 | 424 |
| Spearfish Discarded | 151 | 78 | 137 | 148 | 108 | 172 |
| Bluefin Tuna Kept | 263 | 235 | 177 | 178 | 273 | 475 |
| Bluefin Tuna Discarded | 604 | 737 | 348 | 585 | 881 | 1,031 |
| Bigeye, Albacore, Yellowfin, Skipjack Tunas Kept | 114,438 | 94,136 | 80,466 | 79,917 | 63,321 | 76,962 |
| Pelagic Sharks Kept | 2,894 | 3,065 | 3,460 | 2,987 | 3,037 | 3,440 |
| Pelagic Sharks Discarded | 28,967 | 28,046 | 23,813 | 22,828 | 21,705 | 25,355 |
| Large Coastal Sharks Kept | 6,382 | 7,896 | 6,478 | 4,077 | 5,326 | 2,292 |
| Large Coastal Sharks Discarded | 5,442 | 6,973 | 4,836 | 3,815 | 4,813 | 5,230 |
| Dolphin Kept | 31,536 | 29,125 | 27,586 | 30,384 | 29,372 | 38,769 |
| Wahoo Kept | 5,136 | 4,193 | 3,068 | 4,188 | 3,919 | 4,633 |
| Turtles Discarded | 631 | 271 | 424 | 465 | 399 | 369 |
| *Number of Hooks (X 1,000)* | *7,902* | *7,976* | *7,564* | *7,150* | *7,008* | *7,276* |

**Table 3.25** Reported Landings in the U.S. Atlantic Pelagic Longline Fishery (in mt ww) for 1999-2004. **Source: NMFS, 2004a; NMFS, 2005.**

| | | | | | | **2004** |
|---|---|---|---|---|---|---|
| Yellowfin Tuna | 3,374 | 2,901 | 2,201 | 2,573 | 2,154 | 2,489 |
| Skipjack Tuna | 2.0 | 1.8 | 4.3 | 2.5 | 4.2 | 0.7 |
| Bigeye Tuna | 929.1 | 531.9 | 682.4 | 535.8 | 284.9 | 308.7 |
| Bluefin Tuna | 73.5 | 66.1 | 37.5 | 49.9 | 81.4 | 96.1 |
| Albacore Tuna | 194.5 | 147.3 | 193.8 | 155 | 110.9 | 117.4 |
| Swordfish N.* | 3,362.4 | 3,315.8 | 2,483 | 2,598.8 | 2,772.1 | 2,551 |
| Swordfish S.* | 185.2 | 143.8 | 43.2 | 199.9 | 20.9 | 15.7 |

* Includes landings and estimated discards from scientific observer and logbook sampling programs.

### *Marine Mammals*

Of the marine mammals that are hooked by U.S. pelagic longline fishermen, many are released alive, although some animals suffer serious injuries and may die after being released. The observed and estimated marine mammal interactions for 1992 – 2005 are summarized in Table 3.26 and Table 3.27. Marine mammals are caught primarily during the third and fourth quarters in the Mid-Atlantic Bight (MAB) and Northeast Coastal (NEC) areas (Figure 3.27). In 2005, the majority of observed interactions were with pilot whales in the MAB area (Walsh and Garrison, 2006).

In 2000, there were 14 observed takes of marine mammals by pelagic longlines. This number has been extrapolated based on reported fishing effort to an estimated 403 mammals fleet-wide (32 common dolphin, 93 Risso's dolphin, 231 pilot whales, 19 whales, 29 pygmy sperm whales) (Yeung, 2001). In 2001 and 2002, there were 16 and 24 observed takes of marine mammals, respectively. The majority of these interactions were observed in the MAB, followed by the NED research experiment. In 2001, there were an estimated total of 84 Risso's dolphin and 93 pilot whale interactions in the pelagic longline fishery. In 2002, there were an estimated 87 Risso's dolphin and 114 pilot whale interactions in the pelagic longline fishery. In the NED research experiment, an additional four Risso's dolphin and one northern bottlenose whale were recorded with serious injuries during 2001, as well as three Risso's dolphin, one unidentified dolphin, and one unidentified marine mammal in 2002. One striped dolphin was recorded as released alive during the NED experiment in 2001, as well as one Risso's dolphin, one common dolphin, one pilot whale, and one unidentified dolphin in 2002 (Garrison, 2003).

In 2003, there were 28 observed takes of marine mammals in the pelagic longline fishery. The majority of these interactions were observed in the MAB, followed by the NED experimental fishery, and the NEC area. This number has been extrapolated based on reported fishing effort to an estimated 300 mammals fleet wide (49 beaked whales, 16 dolphin, 30 Atlantic spotted dolphin, 46 common dolphin, 105 Risso's dolphin, 32 pilot whales, 22 minke whales). In addition, five Risso's dolphin, one striped dolphin, and one baleen whale were observed captured in the 2003 NED research experiment, with one Risso's dolphin recorded as dead (Garrison and Richards, 2004).

There were a total of 12 observed interactions with marine mammals in the pelagic longline fishery in 2004. The majority of these interactions was with pilot whales and was observed in the MAB area. During 2004, the pelagic longline fishery was estimated to have interacted with 108 pilot whales, 49 Risso's dolphins, and seven common dolphins (Garrison, 2005). In 2005, there were a total of 24 observed interactions with marine mammals in the pelagic longline fishery. The majority of these interactions was with pilot whales and was observed in the MAB area. During 2005, the pelagic longline fishery was estimated to have interacted with 294 pilot whales, 42 Risso's dolphin, six common dolphin, five bottlenose dolphin, four Atlantic spotted dolphin, one beaked whale, 13 unidentified marine mammals, three unidentified whales, and three unidentified dolphin (Walsh and Garrison, 2006). NMFS monitors observed interactions with sea turtles and marine mammals on a quarterly basis and reviews data for appropriate action, if any, as necessary. In June 2005, NMFS convened the Pelagic Longline Take Reduction Team (PLTRT) to assess and reduce marine mammal takes, specifically pilot whales and Risso's dolphins, by the pelagic longline fishery. At the time of writing, the Pelagic Longline Take Reduction Plan (PLTRP) was expected to be finalized soon.

**Table 3.26 Summary of Marine Mammal Interactions in the Pelagic Longline Fishery, 1992-1998.** Source: Yeung, 1999a; Yeung, 1999b.

| | | | | | | Alive | |
|---|---|---|---|---|---|---|---|
| | | | | | | | Est |
| 1992 | Risso's Dolphin | 3 | 121 | 2 | 74 | 1 | 47 |
| | Common Dolphin | 1 | 24 | | | 1 | 24 |
| | Dolphin | 1 | 17 | | | 1 | 17 |
| | Pilot Whale | 12 | 420 | 3 | 105 | 9 | 319 |
| 1993 | Risso's Dolphin | 3 | 62 | 1 | 36 | 2 | 26 |
| | Bottlenose Dolphin | 2 | 29 | | | 2 | 29 |
| | Pilot Whale | 16 | 193 | 1 | 15 | 15 | 178 |
| | Spotted Dolphin | 1 | 11 | | | 1 | 11 |
| 1994 | Atlantic Spotted Dolphin | 1 | 17 | 1 | 17 | | |
| | Pantropical Spotted Dolphin | 1 | 20 | | | 1 | 20 |
| | Killer Whale | 1 | 16 | 1 | 16 | | |
| | Pilot Whale | 14 | 161 | 12 | 137 | 2 | 26 |
| | Risso's Dolphin | 7 | 87 | 7 | 87 | | |
| 1995 | Risso's Dolphin | 5 | 101 | 4 | 85 | 1 | 16 |
| | Unidentified Marine Mammal | 1 | 22 | | | 1 | 22 |
| | Pilot Whale | 13 | 252 | 11 | 200 | 2 | 53 |
| | Shortfin Pilot Whale | 2 | 58 | 2 | 58 | | |
| 1996 | Risso's Dolphin | 4 | 99 | 2 | 52 | 2 | 47 |
| | Unidentified Marine Mammal | 1 | 43 | | | 1 | 43 |
| 1997 | Pilot Whale | 1 | 29 | | | 1 | 29 |
| | Short-Beaked Spinner Dolphin | 1 | 16 | | | 1 | 16 |
| 1998 | Beaked Whale | 1 | 88 | | | 1 | 88 |
| | Bottlenose Dolphin | 2 | 46 | 1 | 31 | 1 | 15 |
| | Risso's Dolphin | 2 | 47 | 1 | 23 | 1 | 24 |
| | Pilot Whale | 1 | 24 | | | 1 | 24 |

**Table 3.27 Summary of Marine Mammal Interactions in the Pelagic Longline Fishery, 1999-2005.** Sources: Yeung, 2001; Garrison, 2003; Garrison and Richards, 2004; Garrison, 2005; Walsh and Garrison, 2006.

| | | | | | | | | Alive | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | **Est** |
| 1999 | Risso's Dolphin | 1 | 23 | | | 1 | 23 | | |
| | Unidentified Marine Mammal | 1 | 14 | | | | | 1 | 14 |
| | Pilot Whale | 5 | 385 | 1 | 94 | 4 | 291 | | |
| 2000 | Common Dolphin | 1 | 32 | | | | | 1 | 32 |
| | Risso's Dolphin | 3 | 93 | 1 | 41 | 1 | 23 | 1 | 29 |
| | Pilot Whale | 8 | 231 | 1 | 24 | 4 | 109 | 3 | 98 |
| | Whale | 1 | 19 | | | 1 | 19 | | |
| | Pygmy Sperm Whale | 1 | 28 | | | 1 | 28 | | |
| 2001 | Risso's Dolphin | 8 | 83.6 | 1 | 24.4 | 6 | 48.9 | 1 | 14.3 |
| | Pilot Whale | 6 | 92.9 | 1 | 19.8 | 4 | 50.2 | 1 | 22.7 |
| | Striped Dolphin | 1 | 1 | | | | | 1 | 1 |
| | Northern Bottlenose Whale | 1 | 1 | | | 1 | 1 | | |
| 2002 | Risso's Dolphin | 10 | 87.2 | | | 4 | 11 | 6 | 59.6 |
| | Pilot Whale | 10 | 113.5 | | | 4 | 49.9 | 6 | 67.8 |
| | Common Dolphin | 1 | 1 | | | | | 1 | 1 |
| | Unidentified Dolphin | 2 | 2 | | | 1 | 1 | 1 | 1 |
| | Unidentified Marine Mammal | 1 | 1 | | | 1 | 1 | | |
| 2003 | Beaked Whale | 2 | 48.8 | | | 1 | 5.3 | 1 | 43.5 |
| | Dolphin | 1 | 16.2 | | | 1 | 16.2 | | |
| | Atlantic Spotted Dolphin | 1 | 29.8 | | | 1 | 29.8 | | |
| | Bottlenose Dolphin | 1 | 2 | | | | | 1 | 2 |
| | Common Dolphin | 2 | 45.6 | | | | | 2 | 45.6 |
| | Risso's Dolphin | 14 | 109.5 | 1 | 1 | 3 | 40.1 | 10 | 68.4 |
| | Striped Dolphin | 1 | 1 | | | | | 1 | 1 |
| | Pilot Whale | 4 | 32.1 | | | 2 | 21.4 | 1 | 11.3 |
| | Baleen Whale | 1 | 1 | | | | | 1 | 1 |
| | Minke Whale | 1 | 22.3 | | | | | 1 | 22.3 |
| 2004 | Pilot Whale | 8 | 107.5 | | | 6 | 74.1 | 2 | 33.8 |
| | Common Dolphin | 1 | 6.8 | | | | | 1 | 6.8 |
| | Risso's Dolphin | 3 | 49.4 | | | 2 | 27.5 | 1 | 21.9 |
| 2005 | Pilot Whale | 18 | 294.4 | | | 9 | 211.5 | 9 | 79.5 |
| | Risso's Dolphin | 2 | 42.1 | | | | 2.9 | 2 | 39.2 |
| | Common Dolphin | | 5.7 | | | | | | 5.7 |
| | Bottlenose Dolphin | 1 | 5.2 | | | | | 1 | 5.2 |
| | Beaked Whale | | 1 | | | | 1 | | |
| | Atlantic Spotted Dolphin | 1 | 4.3 | | | | | 1 | 4.3 |
| | Unidentified Marine Mammal | 1 | 13.2 | | | 1 | 13.2 | | |
| | Unidentified Whale | | 3.4 | | | | 3.4 | | |
| | Unidentified Dolphin | 1 | 2.6 | | | | | 1 | 2.6 |

*Sea Turtles*

Currently, many sea turtles are taken in the GOM and NEC areas (Figure 3.27) and most are released alive. In the past, the bycatch rate was highest in the third and fourth quarters. Loggerhead and leatherback turtles dominate the catch of sea turtles. In general, sea turtle captures are rare, but takes appear to be clustered (Hoey and Moore, 1999).

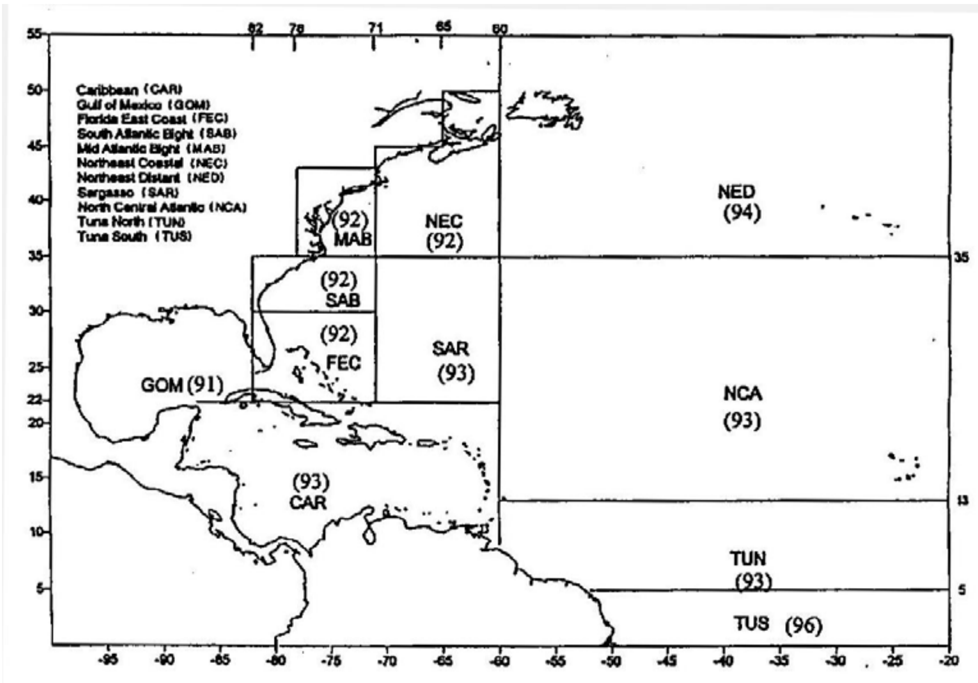



**Figure 3.27 Geographic Areas Used in Summaries of Pelagic Logbook Data.** Source: Cramer and Adams, 2000

The estimated take levels for 2000 were 1,256 loggerhead and 769 leatherback sea turtles (Yeung, 2001). The estimated sea turtle takes for regular fishing and experimental fishing effort for 2001 - 2005 are summarized in Table 3.28. The majority of leatherback interactions have occurred in the Gulf of Mexico. Loggerhead interactions are more widely distributed, however, the NEC, FEC, and Gulf of Mexico appear to be areas with high interaction levels each year.

In 2005, the pelagic longline fishery interacted with an estimated 351 leatherback sea turtles and 275 loggerhead sea turtles outside of experimental fishing operations. During 2005, the interactions with leatherback sea turtles were highest in the Gulf of Mexico (179 animals). The majority of loggerhead sea turtle interactions occurred in the NEC, MAB, CAR, SAR, and SAB areas (Walsh and Garrison, 2006). NMFS monitors observed interactions with sea turtles and marine mammals on a quarterly basis and reviews data for appropriate action, if any, as necessary.

**Table 3.28 Estimated number of leatherback and loggerhead sea turtle interactions in the U.S. Atlantic pelagic longline fishery, 2001-2005 by statistical area.** Sources: Walsh and Garrison, 2006; Garrison, 2005; Garrison and Richards, 2004; Garrison 2003.

| | | | | | | Loggerhead | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 2005 |
| CAR | 61 | 0 | 0 | 17 | 2 | 27 | 43 | 36 | 61 | 40 |
| GOM | 393 | 695 | 838 | 780 | 179 | 0 | 170 | 135 | 45 | 19 |
| FEC | 313 | 100 | 27 | 64 | 62 | 0 | 99 | 137 | 99 | 0 |
| SAB | 241 | 93 | 75 | 164 | 7 | 39 | 22 | 52 | 194 | 34 |
| MAB | 139 | 70 | 94 | 184 | 11 | 43 | 94 | 18 | 92 | 54 |
| NEC | 30 | 5 | 76 | 33 | 6 | 117 | 147 | 241 | 150 | 67 |
| NED | 32 | 0 | 0 | 98 | 63 | 72 | 0 | 0 | 52 | 20 |
| SAR | 0 | 0 | 0 | 18 | 20 | 0 | 0 | 70 | 41 | 38 |
| NCA | 1 | 0 | 2 | 0 | 0 | 13 | 0 | 39 | 0 | 3 |
| TUN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TUS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1208 | 962 | 1113 | 1359 | 351 | 312 | 575 | 728 | 734 | 275 |
| NED exp'tal fishery (2001-03) | 77 | 158 | 79 | -- | -- | 142 | 100 | 92 | -- | -- |
| Exp'tal fishery (2004-05) | -- | -- | -- | 3 | 17 | -- | -- | -- | 0 | 8 |
| Total | 1285 | 1120 | 1192 | 1362 | 368 | 454 | 675 | 820 | 734 | 283 |

As a result of the increased sea turtle interactions in 2001 and 2002, NMFS reinitiated consultation for the pelagic longline fishery and completed a new BiOp on June 1, 2004. The June 2004 BiOp concluded that long-term continued operation of the Atlantic pelagic longline fishery is not likely to jeopardize the continued existence of loggerhead, green, hawksbill, Kemp's ridley, or olive ridley sea turtles, but is likely to jeopardize the continued existence of leatherback sea turtles. The BiOp included a reasonable and prudent alternative (RPA) and an incidental take statement (ITS) for the combined years 2004 – 2006, and for each subsequent three-year period (NMFS, 2004b).

A final rule published in July 2004 (69 FR 40734) prohibited the possession of "J"-style hooks in the pelagic longline fishery and required the possession and use of specific sea turtle release and disentanglement gears, handling and release protocols, as well as requiring the use of specific circle hooks and baits.

<u>NED Research Experiment</u>

Consistent with the conservation recommendation of an earlier, 2001 BiOp, NMFS initiated a research experiment in the NED area in consultation and cooperation with the domestic pelagic longline fleet. The goal was to develop and evaluate the efficacy of new technologies and changes in fishing practices to reduce sea turtle interactions. In 2001, the experiment attempted to evaluate the effect of gangions placed two gangion lengths from floatlines, the effect of blue-dyed bait on target catch and sea turtle interactions, and the effectiveness of dipnets, line clippers, and dehooking devices. Eight vessels participated, making 186 sets, between August and November. During the course of the research experiment, 142 loggerhead and 77 leatherback sea turtles were incidentally captured and no turtles were released dead.

The data gathered during the 2001 experiment were analyzed to determine if the tested measures reduced the incidental capture of sea turtles by a statistically significant amount. The blue-dyed bait parameter decreased the catch of loggerheads by 9.5 percent and increased the catch of leatherbacks by 45 percent. Neither value is statistically significant. In examining the gangion placement provision, the treatment sections of the gear (with gangions placed 20 fathoms from floatlines) did not result in a statistically significant reduction in the number of loggerhead and leatherback sea turtle interactions than the control sections of the gear (with a gangion located under a floatline). The treatment section of the gear recorded an insignificant increase in the number of leatherback interactions. Following an examination of the data, NMFS discovered that the measures had no significant effect upon the catch of sea turtles (Watson *et al.*, 2003).

Dipnets and line clippers were examined for general effectiveness. The dipnets were found to be adequate in boating loggerhead sea turtles. Several line clippers were tested, with the La Force line clipper having the best performance. Several types of dehooking devices were tested, with the work on these devices continuing in the 2002 and 2003 NED research experiment.

In the summer and fall of 2002, NMFS conducted the second year of the research experiment. The use of circle and "J"-hooks, whole mackerel bait, squid bait, and shortened daylight soak time were tested to examine their effectiveness in reducing the capture of sea turtles. The data indicate there were 501 sets made by 13 vessels with 100 percent observer coverage. During the course of the experiment, 100 loggerhead and 158 leatherback sea turtles were captured and 11 were tagged with satellite tags. In addition to the sea turtles, the vessels interacted with one unidentified marine mammal, one unidentified dolphin, one common dolphin, one longfin pilot whale, and four Risso's dolphins; all were released alive (Watson *et al.*, 2003).

In 2003, the research experiment tested a number of treatments to verify the results of the 2002 experiment in addition to testing additional treatments. Data indicate that there were 539 sets made by 11 vessels with 100 percent observer coverage. During the course of the experiment, one olive ridley, 92 loggerhead, and 79 leatherback sea turtles were captured; all were released alive (Foster *et al.*, 2004; Watson *et al.*, 2004). In addition to the sea turtles, the vessels interacted with one striped dolphin, one baleen whale, and five Risso's dolphin resulting in one mortality (Garrison and Richards, 2004).

From 2001 through 2003, NMFS worked with the commercial fishing industry to develop new pelagic longline fishing technology to reduce interaction rates and bycatch mortality of threatened and endangered sea turtles. The cooperative gear technology research investigated line configurations, setting and retrieving procedures, hook types, hook sizes, bait types, and release and disentanglement gears. Ultimately, specific hook designs and bait types were found to be the most effective measures for reducing sea turtle interactions. Large circle hooks and mackerel baits were found to substantially reduce sea turtle interactions over the use of the industry standard “J”-hooks and squid baits. The gears developed to remove hooks and line from hooked and entangled sea turtles are anticipated to reduce post-hooking mortality associated with those interactions not avoided. Since the conclusion of the NED research experiment, NMFS has continued to investigate pelagic longline bycatch mitigation techniques in the Gulf of Mexico, Atlantic Ocean, and the Caribbean Sea. Additionally, NMFS held a series of voluntary workshops for U.S. pelagic longline fishermen providing outreach and training in sea turtle handling and release techniques.

NMFS believes that the transfer of this information to other fishing countries will result in significant reductions in interaction rates and post-release mortalities of threatened and endangered sea turtles throughout their ranges.

*Seabirds*

Gannets, gulls, greater shearwaters, and storm petrels are occasionally hooked by Atlantic pelagic longlines. These species and all other seabirds are protected under the Migratory Bird Treaty Act. Seabird populations are often slow to recover from excess mortality as a consequence of their low reproductive potential (one egg per year and late sexual maturation). The majority of longline interactions with seabirds occur as the gear is being set. The birds eat the bait and become hooked on the line. The line then sinks and the birds are subsequently drowned.

The United States has developed a National Plan of Action in response to the Food and Agriculture Organization of the United Nations (FAO) International Plan of Action to reduce the incidental takes of seabirds (www.nmfs.gov.gov/NPOA-S.html ). Although Atlantic pelagic longline interactions will be considered in the plan, NMFS has not identified a need to implement gear modifications to reduce seabird takes by Atlantic pelagic longlines. Takes of seabirds have been minimal in the fishery, most likely due to the setting of longlines at night and/or fishing in areas where birds are largely absent.

Observer data from 1992 through 2005 indicate that seabird bycatch is relatively low in the U.S. Atlantic pelagic longline fishery (Table 3.29). Since 1992, a total of 129 seabird interactions have been observed, with 95 observed killed (73.6 percent). In 2005, a total of four seabirds were observed taken.

Observed bycatch has ranged from one to 18 seabirds observed dead per year and zero to 15 seabirds observed released alive per year from 1992 through 2003. Half of the seabirds observed were not identified to species (n = 59). Of the seabirds identified, gulls represent the largest group (n = 35), followed by greater shearwaters (n = 23), and northern gannets (n = 8) (Table 3.30). Greater shearwaters experienced the highest mortality (96.2 percent), followed by gulls (80 percent), and unidentified seabirds (67.8 percent). Northern gannets had the lowest mortality rate (12.5 percent).

Preliminary estimates of expanded seabird bycatch and bycatch rates from 1995 – 2004, varied by year and species with no apparent pattern (Table 3.31). The estimated number of all seabirds caught and discarded dead ranged from zero to 468 per year, while live discards ranged from zero to 292 per year. The annual bycatch rate of birds discarded dead ranged from zero to 0.0486 birds per 1,000 hooks, while live discards ranged from zero to 0.0303 birds per 1,000 hooks.

**Table 3.29 Seabird Bycatch in the U.S. Atlantic Pelagic Longline Fishery, 1992-2005.** Source: NMFS, 2004a; NMFS PLL fishery observer program (POP) data.

| | | | | | Status |
|---|---|---|---|---|---|
| 1992 | 10 | MAB | GULL | 4 | dead |
| 1992 | 10 | MAB | SHEARWATER GREATER | 2 | dead |
| 1993 | 2 | SAB | GANNET NORTHERN | 2 | alive |
| 1993 | 2 | MAB | GANNET NORTHERN | 2 | alive |
| 1993 | 2 | MAB | GULL BLACK BACKED | 1 | alive |
| 1993 | 2 | MAB | GULL BLACK BACKED | 3 | dead |
| 1993 | 11 | MAB | GULL | 1 | alive |
| 1994 | 6 | MAB | SHEARWATER GREATER | 3 | dead |
| 1994 | 8 | MAB | SHEARWATER GREATER | 1 | dead |
| 1994 | 11 | MAB | GULL | 4 | dead |
| 1994 | 12 | MAB | GULL HERRING | 7 | dead |
| 1995 | 7 | MAB | SEA BIRD | 5 | dead |
| 1995 | 8 | GOM | SEA BIRD | 1 | dead |
| 1995 | 10 | MAB | STORM PETREL | 1 | dead |
| 1995 | 11 | NEC | GANNET NORTHERN | 2 | alive |
| 1995 | 11 | NEC | GULL | 1 | alive |
| 1997 | 6 | SAB | SEA BIRD | 11 | dead |
| 1997 | 7 | MAB | SEA BIRD | 1 | dead |
| 1997 | 7 | NEC | SEA BIRD | 15 | alive |
| 1997 | 7 | NEC | SEA BIRD | 6 | dead |
| 1998 | 2 | MAB | SEA BIRD | 7 | dead |
| 1998 | 7 | NEC | SEA BIRD | 1 | dead |
| 1999 | 6 | SAB | SEA BIRD | 1 | dead |
| 2000 | 6 | SAB | GULL LAUGHING | 1 | alive |
| 2000 | 11 | NEC | GANNET NORTHERN | 1 | dead |
| 2001 | 6 | NEC | SHEARWATER GREATER | 7 | dead |
| 2001 | 7 | NEC | SHEARWATER GREATER | 1 | dead |
| 2002 | 7 | NEC | SEABIRD | 1 | dead |
| 2002 | 8 | NED | SHEARWATER GREATER | 1 | dead |
| 2002 | 8 | NED | SEABIRD | 1 | dead |
| 2002 | 9 | NED | SHEARWATER GREATER | 3 | dead |
| 2002 | 9 | NED | SEABIRD | 3 | alive |
| 2002 | 9 | NED | SHEARWATER SPP | 1 | dead |
| 2002 | 10 | NED | GANNET NORTHERN | 1 | alive |

| | | | | | Status |
|---|---|---|---|---|---|
| 2002 | 10 | NED | SHEARWATER SPP | 1 | dead |
| 2002 | 10 | NED | SEABIRD | 2 | dead |
| 2002 | 10 | MAB | GULL | 3 | alive |
| 2002 | 10 | MAB | GULL | 1 | dead |
| 2002 | 11 | MAB | GULL | 3 | dead |
| 2003 | 1 | GOM | SEABIRD | 1 | alive |
| 2003 | 8 | NED | SEABIRD | 1 | dead |
| 2003 | 9 | MAB | SEABIRD | 1 | dead |
| 2004 | 1 | MAB | GULL | 5 | dead |
| 2004 | 3 | MAB | GREATER SHEARWATER | 1 | alive |
| 2004 | 3 | MAB | GREATER SHEARWATER | 4 | dead |
| 2004 | 4 | NED | SEABIRD | 1 | dead |
| 2005 | 1 | SAB | HERRING GULL | 1 | dead |
| 2005 | 1 | SAB | SHEARWATER | 1 | dead |
| 2005 | 3 [2] | NEC | GREATER SHEARWATER | 1 | alive |
| 2005 | 3 [2] | NEC | GREATER SHEARWATER | 1 | dead |

[1] Beginning in 2004, reports based on Quarters not month.
[2] Experimental fishery takes.

**Table 3.30 Status of Seabird Bycatch in the U.S. Atlantic Pelagic Longline Fishery, 1992-2005.** Source: NMFS PLL fishery observer program (POP) data.

| | Release | | | Percent Dead |
|---|---|---|---|---|
| | | | | |
| GULLS (incl. Blackback, Herring, Laughing, and unid. gulls) | 28 | 7 | 34 | 80% |
| UNIDENTIFIED SEABIRD | 40 | 19 | 59 | 67.8% |
| GREATER SHEARWATER | 22 | 1 | 23 | 95.6% |
| SHEARWATER SPP | 3 | 0 | 3 | 100% |
| NORTHERN GANNET | 1 | 7 | 8 | 12.5% |
| STORM PETREL | 1 | 0 | 1 | 100% |
| TOTAL ALL SEABIRDS | 95 | 34 | 129 | 73.6% |

**Table 3.31 Preliminary Expanded Estimates of Seabird Bycatch (D = discarded dead and A = discarded alive) and bycatch rates (all seabirds per 1,000 hooks) in the U.S. Atlantic pelagic longline fishery, 1997-2004.** Source: NMFS, 2004a; NMFS PLL fishery observer program (POP) data.

| | | | | | | | | | | | | | | | 2004 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | A |
| Unid. seabirds | 468 | 292 | 155 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 8 | 13 | 4 | 0 |
| Gulls | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 14 | 83 | 0 | 0 | 48 | 0 |
| Shearwaters | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 210 | 0 | 6 | 0 | 0 | 0 | 59 | 15 |
| Northern gannet | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Storm petrel | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | |
| All seabirds | 468 | 292 | 155 | 0 | 14 | 0 | 11 | 18 | 210 | 0 | 23 | 87 | 8 | 13 | 111 | 15 |
| | | | | | | | | | | | | | | | | |
| Total hooks set | 9,637,807 | | 8,019,183 | | 7,901,789 | | 7,975,529 | | 7,563,951 | | 7,150,231 | | 7,008,500 | | 7,186,000 | |
| | | | | | | | | | | | | | | | | |
| Bycatch rate | 0.0486 | 0.0303 | 0.0194 | 0 | 0.0017 | 0 | 0.0014 | 0.0023 | 0.0278 | 0 | 0.0032 | 0.0121 | 0.0011 | 0.0019 | 0.015 | 0.002 |

*Finfish*

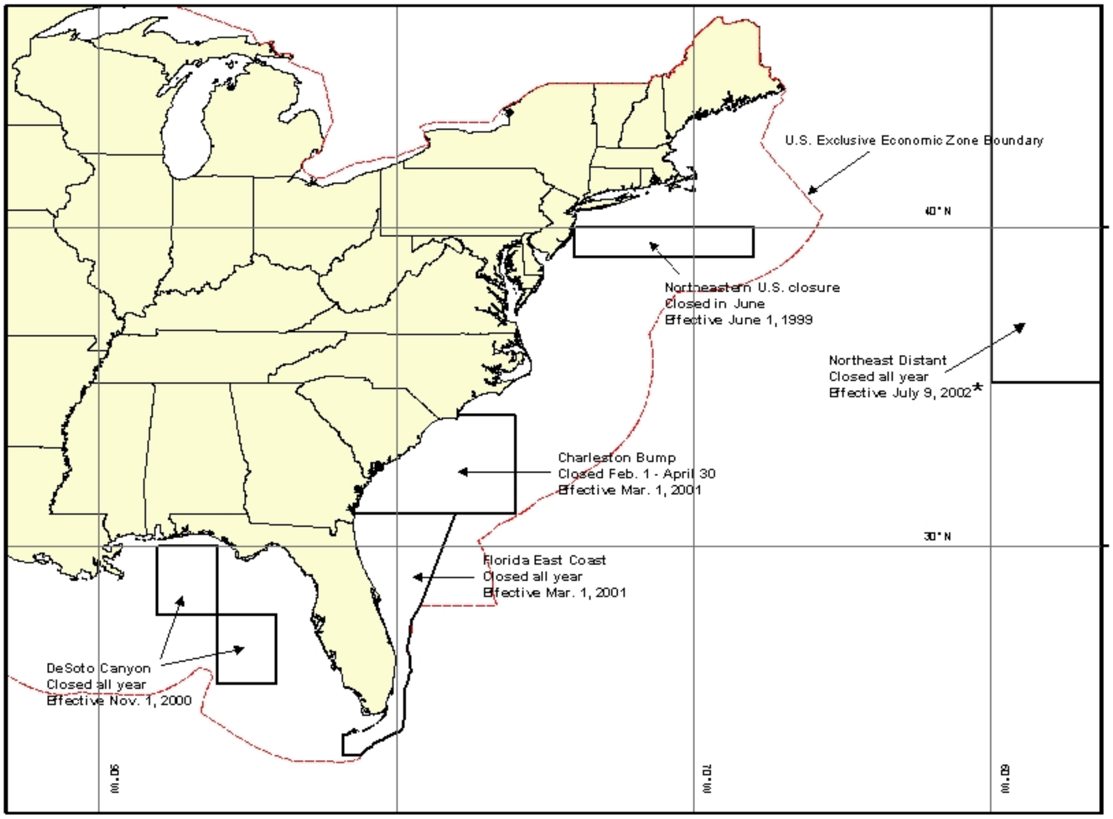
In the U.S. pelagic longline fishery, fish are discarded for a variety reasons. Swordfish, yellowfin tuna, and bigeye tuna may be discarded because they are undersized or unmarketable (*e.g.*, shark bitten). Blue sharks, as well as other species, are discarded because of a limited markets (resulting in low prices) and perishability of the product. Large coastal sharks are discarded during times when the shark season is closed. Bluefin tuna may be discarded because target catch requirements for other species have not been met. Also, all billfish are required to be released. In the past, swordfish have been discarded when the swordfish season was closed. Reported catch from 1999 – 2004 for the U.S. pelagic longline fishery (including reported bycatch, incidental catch, and target catch) is summarized in Table 3.24. Additional U.S. landings and discard data are available in the 2005 U.S. National Report to ICCAT (NMFS, 2005).

At this time, direct use of observer data with pooling for estimating dead discards in this fishery represents the best scientific information available for use in stock assessments. Direct use of observer data has been employed for a number of years to estimate dead discards in Atlantic and Pacific longline fisheries, including billfish, sharks, and undersized swordfish. Furthermore, the data have been used for scientific analyses by both ICCAT and the Inter-American Tropical Tuna Commission (IATTC) for a number of years.

Bycatch mortality of marlins, swordfish, and bluefin tuna from all fishing nations may significantly reduce the ability of these populations to rebuild, and it remains an important management issue. In order to minimize bycatch and bycatch mortality in the domestic pelagic longline fishery, NMFS implemented regulations to close areas to this gear type (Figure 3.28) and has banned the use of live bait by pelagic longline vessels in the Gulf of Mexico.

As part of the bluefin tuna rebuilding program, ICCAT recommends an allowance for dead discards. The U.S. annual dead discard allowance is approximately 68 mt ww. The estimate for the 2004 calendar year was used as a proxy to calculate the amount to be added to, or subtracted from, the U.S. bluefin tuna landings quota for 2005. The 2004 calendar year preliminary estimate of U.S. dead discards, as reported per the longline discards calculated from logbook tallies, adjusted as warranted when observer counts in quarterly/geographic stratum exceeded logbook reports, totaled 72 mt ww. Estimates of dead discards from other gear types and fishing sectors that do not use the pelagic longline vessel logbook are unavailable at this time, and thus, are not included in this calculation. As U.S. fishing activity is estimated to have exceeded the approximate 68 mt ww dead discard allowance by approximately 4.0 mt, the ICCAT recommendation and U.S. regulations state that the United States must account for this excess. Therefore, NMFS shall subtract the amount in excess (approximately 4.0 mt) from the amount of bluefin tuna that can be landed in the subsequent fishing year by those categories accounting for the dead discards.

The 2005 calendar year preliminary dead discard estimate is not yet available. The 2004 calendar year preliminary dead discard estimate, as reported in pelagic longline vessel logbooks and published in 2005 Final Initial Quota Specifications (70 FR 33033, June 7, 2005), totaled 71.8 mt ww. This preliminary estimate has been revised using the longline discards calculated from logbook tallies, adjusted as warranted when observer counts in stratum exceeded logbook reports. The revised 2004 calendar year dead discard estimate is 72.0 mt ww.




* Closed except to vessels complying with specific conditions (see 50 CFR 635 for details).

**Figure 3.28 Areas Closed to Pelagic Longline Fishing by U.S. Flagged Vessels**

### 3.4.1.3 Safety Issues

Like all offshore fisheries, pelagic longlining can be dangerous. Trips are often long, the work is arduous, and the nature of setting and hauling longline gear may result in injury or death. Like all other HMS fisheries, longline fishermen are exposed to unpredictable weather. NMFS does not wish to exacerbate unsafe conditions through the implementation of regulations. Therefore, NMFS considers safety factors when implementing management measures in the pelagic longline fishery. For example, all time/area closures are expected to be closed to fishing, not transiting, in order to allow fishermen to make a direct route to and from fishing grounds. NMFS seeks comments from fishermen on any safety concerns they may have. Fishermen have pointed out that, due to decreasing profit margins, they may fish with less crew or less experienced crew or may not have the time or money to complete necessary maintenance tasks. NMFS encourages fishermen to be responsible in fishing and maintenance activities.

#### 3.4.1.4 International Issues and Catch

Pelagic longline fisheries for Atlantic HMS primarily target swordfish and tunas. Directed pelagic longline fisheries in the Atlantic have been operated by Spain, the United States, and Canada since the late 1950s or early 1960s. The Japanese pelagic longline tuna fishery started in 1956 and has operated throughout the Atlantic since then (NMFS, 1999). Most of the 35 other ICCAT nations now also operate pelagic longline vessels.

ICCAT generally establishes management recommendations on a species (*e.g.*, swordfish) or issue basis (*e.g.*, data collection) rather than by gear type. For example, ICCAT typically establishes quotas or landing limits by species, not gear type. In terms of data collection, ICCAT may require use of specific collection protocols or specific observer coverage levels in certain fisheries or on vessels of a certain size, but these are usually applicable to all gears, and not specific to any one gear type. However, there are a handful of management recommendations that are specifically applicable to the international pelagic longline fishery. These include, a prohibition on longlining in the Mediterranean Sea in June and July by vessels over 24 meters in length, a prohibition on pelagic longline fishing for bluefin tuna in the Gulf of Mexico, and mandated reductions in Atlantic white and blue marlin landings for pelagic longline and purse seine vessels from specified levels, among others.

Because most ICCAT management recommendations pertain to individual species or issues, as discussed above, it is often difficult to obtain information specific to the international pelagic longline fishery. For example, a discussion of authorized total allowable catches (TAC) for specific species in this section of the document would be of limited utility because it is not possible to identify what percentage of quotas are allocated to pelagic longline. Division of quota, by gear type, is typically done by individual countries.

Nevertheless, ICCAT does report landings by gear type. Available data indicate that longline effort produces the second highest volume of catch and effort, and is the most broadly distributed (longitudinally and latitudinally) of the gears used to target ICCAT managed species (Figure 3.29) (SCRS, 2004). Purse seines produce the highest volume of catch of ICCAT managed species from the Atlantic (SCRS, 2004). From 1999 through 2002 (inclusive) there was a declining trend in estimated international landings of HMS for fisheries in which the United States participated. In 2004, international landings of HMS for fisheries in which the U.S. participated totaled 106,774 mt, which represented a modest decrease from 2003 (SCRS, 2005). Detailed information on international Atlantic pelagic longline catches can be found in

Table 3.33.

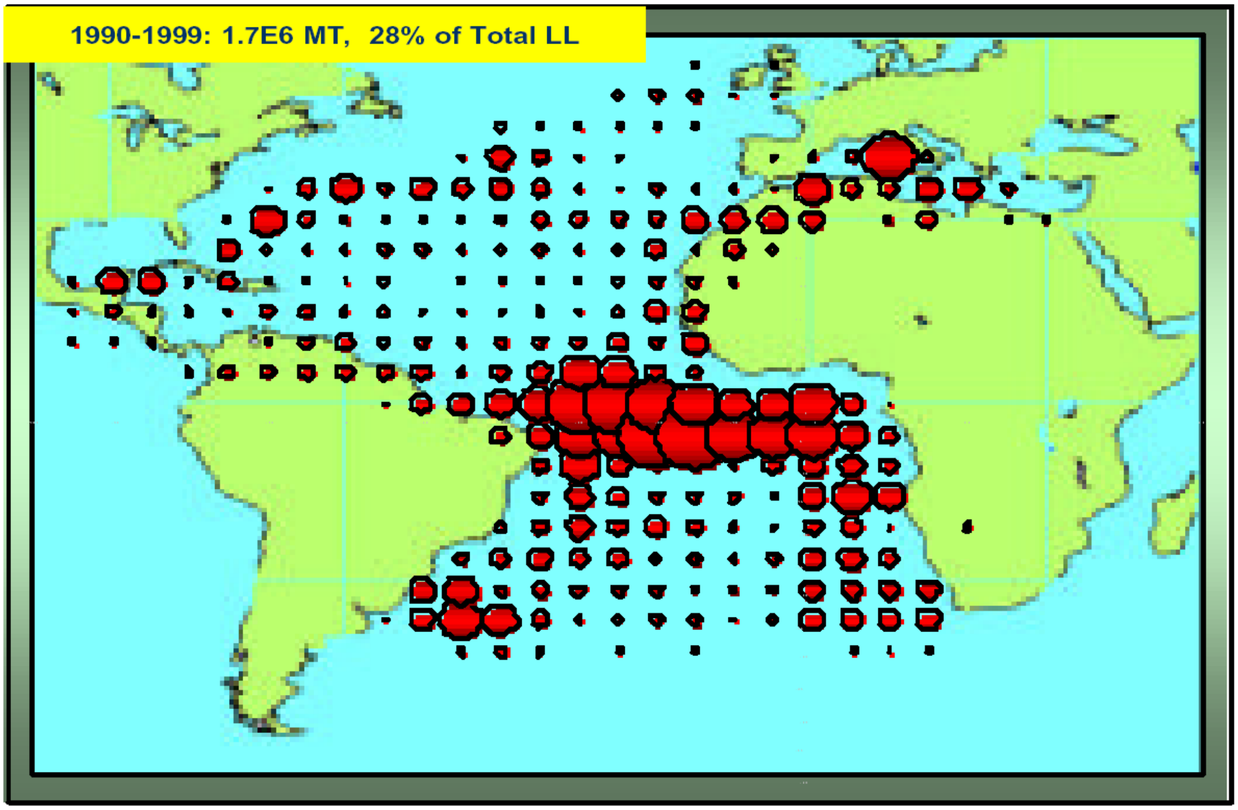



**Figure 3.29 Distribution of Atlantic Longline Catches for all Countries 1990-1999.** Source: SCRS, 2004

Scientific observer data are being collected on a range of pelagic longline fleets in the Atlantic and will be increasingly useful in better quantifying total catch, catch composition, and disposition of catch as these observer programs mature. Previous ICCAT observer coverage requirements of five percent for non-purse seine vessels that participated in the bigeye and yellowfin tuna fishery, including pelagic longline (per ICCAT Recommendation 96-01), are no longer in force. There is currently no ICCAT required minimum level of observer coverage specific to pelagic longline fishing. Nevertheless, the United States has implemented a mandatory observer program in the U.S. pelagic longline fishery. Japan is required to have eight percent observer coverage of its vessels fishing for swordfish in the North Atlantic, which are primarily pelagic longline vessels, however, the recommendation is not specific to vessel or gear type. ICCAT recommendation 04-01, a conservation and management recommendation for the bigeye tuna fishery, entered into force in mid-2005 and requires at least five percent observer coverage of pelagic longline vessels over 24 meters fishing for bigeye.

ICCAT has also developed a running tabulation of the diversity of species caught by the various gears used to target tunas and tuna like species in the Atlantic and Mediterranean (Table 3.32). For all fish species, longline gear shows the highest documented diversity of catch, followed by gillnets and purse seine. For seabirds, longline gear again shows the highest diversity of catch, while for sea turtles and marine mammals, purse seine and gillnet have a higher documented diversity of species for Atlantic tuna fleets (SCRS, 2004).

**Table 3.32 ICCAT Bycatch Table (LL, longline; GILL, gillnets; PS, purse-seine; BB, baitboat; HARP, harpoon; Trap, traps).** Source: SCRS, 2004.

ICCAT Bycatch Table (www.iccat.es)

| Count | Group | LL | GILL | PS | BB | HARP | TRAP | OTHER |
|---|---|---|---|---|---|---|---|---|
| 214 | *All Groups* | 149 | 110 | 78 | 12 | 33 | 20 | 43 |
| | | 69.6% | 51.4% | 36.4% | 5.6% | 15.4% | 9.3% | 20.1% |
| 12 | *Skates and Rays* | 10 | 6 | 6 | 0 | 2 | 0 | 1 |
| | | 83.3% | 50.0% | 50.0% | 0.0% | 16.7% | 0.0% | 8.3% |
| 46 | *Coastal Sharks* | 45 | 19 | 6 | 1 | 7 | 2 | 9 |
| | | 97.8% | 41.3% | 13.0% | 2.2% | 15.2% | 4.3% | 19.6% |
| 11 | *Pelagic Sharks* | 10 | 7 | 5 | 0 | 5 | 2 | 4 |
| | | 90.9% | 63.6% | 45.5% | 0.0% | 45.5% | 18.2% | 36.4% |
| 23 | *Teleosts (ICCAT Species)* | 23 | 18 | 16 | 9 | 6 | 7 | 11 |
| | | 100.0% | 78.3% | 69.6% | 39.1% | 26.1% | 30.4% | 47.8% |
| 82 | *Teleosts (excluding Scombridae and billfishes)* | 44 | 37 | 25 | 2 | 5 | 4 | 17 |
| | | 53.7% | 45.1% | 30.5% | 2.4% | 6.1% | 4.9% | 20.7% |
| 5 | *Sea Turtles* | 3 | 4 | 5 | 0 | 2 | 1 | 1 |
| | | 60.0% | 80.0% | 100.0% | 0.0% | 40.0% | 20.0% | 20.0% |
| 9 | *Sea Birds* | 8 | 2 | 0 | 0 | 0 | 0 | 0 |
| | | 88.9% | 22.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 26 | *Marine Mammals* | 6 | 17 | 15 | 0 | 6 | 4 | 0 |
| | | 23.1% | 65.4% | 57.7% | 0.0% | 23.1% | 15.4% | 0.0% |

*U.S. Pelagic Longline Catch in Relation to International Catch*

Highly Migratory Species

The U.S. pelagic longline fleet represents a small fraction of the international pelagic longline fleet that competes on the high seas for catches of tunas and swordfish. In recent years, the proportion of U.S. pelagic longline landings of HMS, for the fisheries in which the United States participates, has remained relatively stable in proportion to international landings (Table 3.33). The U.S. fleet accounts for less than 0.5 percent of the landings of swordfish and tuna from the Atlantic Ocean south of 5°N. latitude, and does not operate at all in the Mediterranean Sea. Tuna and swordfish landings by foreign fleets operating in the tropical Atlantic and Mediterranean are greater than the catches from the north Atlantic area where the U.S. fleet operates. Even within the area where the U.S. fleet operates, the U.S. portion of fishing effort (in numbers of hooks fished) is less than 10 percent of the entire international fleet's effort, and likely less than that due to differences in reporting effort between ICCAT countries (NMFS, 2001).

**Table 3.33 Estimated International Longline Landings of HMS, Other than Sharks, for All Countries in the Atlantic: 1999-2004 (mt ww)[1].** Source: SCRS, 2005.

| | | | | | | **2004** |
|---|---|---|---|---|---|---|
| Swordfish (N. Atl + S. Atl) | 25,268 | 25,091 | 22,702 | 22,278 | 21,746 | 23,872 |
| Yellowfin Tuna (W. Atl)[2] | 11,596 | 11,638 | 12,740 | 11,605 | 9,996 | 15,008 |
| Bigeye Tuna | 76,527 | 71,194 | 55,265 | 46,584 | 51,065 | 43,620 |
| Bluefin Tuna (W. Atl.)[2] | 914 | 859 | 610 | 727 | 228 | 542 |
| Albacore Tuna (N. Atl + S. Atl) | 27,209 | 28,896 | 29,722 | 27,798 | 27,893 | 20,940 |
| Skipjack Tuna (W. Atl)[2] | 58 | 23 | 60 | 143 | 95 | 231 |
| Blue Marlin (N. Atl. + S. Atl.)[3] | 2,359 | 2,209 | 1,638 | 1,331 | 1,690 | 1,376 |
| White Marlin (N. Atl. + S. Atl.)[3] | 981 | 893 | 592 | 725 | 582 | 528 |
| Sailfish (W. Atl.)[4] | 524 | 815 | 812 | 1,271 | 860 | 657 |
| **Total** | **145,436** | **141,618** | **124,141** | **112,462** | **114,155** | **106,774** |
| U.S. Longline Landings (from 2003, 2004, and 2005 U.S. Natl. Reports)[5] | **8,331.1** | **7,253.5** | **5,694.9** | **6,193.7** | **5,442.3** | **5649.1** |
| U.S. Longline Landings as a Percent of Total Longline Landings | **5.7** | **5.1** | **4.6** | **5.5** | **4.8** | **5.3** |

[1]Landings include those classified by the SCRS as longline landings for all areas
[2]Note that the United States has not reported participation in the E. Atl yellowfin tuna fishery since 1983 and has not participated in the E. Atl bluefin or the E. Atl skipjack tuna fishery since 1982.
[3]Includes U.S. *dead discards and Brazilian live discards.*
[4]Includes U.S. *dead discards.*
[5]Includes swordfish, blue marlin, white marlin, and sailfish longline discards.

### *Atlantic Sharks*

There is currently no comprehensive international reporting system for Atlantic shark catches and landings. While there are some international data, not all countries report shark catches and landings and those that do use varying reporting methods. The most recent landings reports for blue and shortfin mako sharks are presented in Table 3.34 and Table 3.35, respectively. In 2001, ICCAT passed a resolution on Atlantic sharks to determine needed improvements in data collection for Atlantic shortfin mako and blue sharks, and to conduct an interim meeting in 2003 to discuss the issue. In addition, the resolution called upon contracting parties and non-contracting parties to: (1) submit catch and effort data on Atlantic shortfin mako, porbeagle, and blue sharks; (2) encourage the release of live sharks that are caught incidentally; (3) minimize waste and discards from shark catches; and (4) voluntarily agree not to increase fishing effort targeting Atlantic porbeagle, shortfin mako and blue sharks until sustainable levels of harvest can be determined through stock assessments.

At its annual meeting in New Orleans in 2004, ICCAT adopted a recommendation to, among other things, ban shark finning, require vessels to fully utilize their entire catches of sharks, encourage the release of live sharks that are caught incidentally and are not used for food, and review the assessment of shortfin mako sharks in 2005, and reassess blue sharks and shortfin mako no later than 2007. The ICCAT recommendation also encouraged countries to engage in research to identify shark nursery areas, and collect data on shark catches.

**Table 3.34 Nominal Catches of Blue Shark Reported to ICCAT (landings and discards in t) by Major Gear and Flag between 1990 and 2002.** Source: SCRS, 2004; SCRS, 2005.

| | | | | | | | | | | | | | | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Atlantic Total* | | 2,348 | 3,533 | 2,343 | 7,879 | 8,310 | 8,422 | 9,036 | 36,895 | 33,211 | 34,208 | 33,462 | 34,301 | 31,357 |
| LANDINGS | longline | 1,387 | 2,265 | 1,667 | 5,749 | 7,366 | 7,501 | 7,767 | 36,279 | 32,578 | 33,790 | 32,616 | 33,415 | 31,146 |
| | others | 220 | 496 | 491 | 994 | 372 | 300 | 558 | 431 | 422 | 309 | 709 | 780 | 143 |
| DISCARDS | longline | 741 | 772 | 184 | 1136 | 572 | 618 | 609 | 185 | 189 | 105 | 137 | 105 | 68 |
| | others | 0 | 0 | 0 | 0 | 0 | 3 | 102 | 0 | 22 | 4 | 0 | 0 | 0 |
| LANDINGS | BENIN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 4 | 27 | 0 | 0 | 0 |
| | BRASIL | 0 | 0 | 0 | 0 | 0 | 0 | 743 | 1103 | 0 | 179 | 1689 | 2173 | 1971 |
| | CANADA | 0 | 0 | 0 | 0 | 0 | 276 | 12 | 11 | 5 | 54 | 18 | 0 | 5 |
| | CAP-VERT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | CHINA.PR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 750 | 420 |
| | EC-CYPRUS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| | EC-DENMARK | 2 | 1 | 1 | 0 | 1 | 2 | 3 | 1 | 1 | 0 | 2 | 1 | 13 |
| | EC-ESPANA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29,917 | 28,137 | 29,005 | 26,046 | 25,110 | 21,037 |
| | EC-FRANCE | 130 | 187 | 276 | 322 | 350 | 266 | 278 | 213 | 163 | 0 | 395 | 207 | 109 |
| | EC-IRELAND | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 9 | 66 | 11 |
| | EC-PORTUGAL | 1,387 | 2,257 | 1,583 | 5,726 | 4,669 | 5,569 | 5,710 | 3,966 | 3,318 | 3,337 | 4,220 | 4,713 | 4,602 |
| | EC-U.K | 1 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 1 | 0 | 12 | 9 | 6 |
| | JAPAN | 0 | 0 | 0 | 0 | 2,596 | 1,589 | 1,044 | 996 | 850 | 893 | 492 | 518 | 675 |
| | MEXICO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| | NAMIBIA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2213 |
| | PANAMA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 177 | 22 | 0 | 0 |
| | SENEGAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 456 | 0 |
| | SOUTHAFRICA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 21 | 0 | 83 | 63 |
| | TRINIDAD&TOBAG | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| | U.S.A | 87 | 308 | 215 | 680 | 29 | 23 | 283 | 211 | 255 | 217 | 291 | 42 | 0 |
| | UK-BERMUDA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 |
| | URUGUAY | 0 | 8 | 84 | 15 | 93 | 64 | 252 | 286 | 242 | 126 | 119 | 59 | 159 |
| DISCARDS | CANADA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 |
| | U.S.A | 741 | 772 | 184 | 1,136 | 572 | 618 | 710 | 185 | 195 | 101 | 137 | 106 | 68 |
| | UK-BERMUDA | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 8 | 0 | 0 | 0 |

**Table 3.35 Nominal Catches of Shortfin Mako Shark Reported to ICCAT (landings and discards in t) by Major Gear and Flag between 1990 and 2002.** Source: SCRS, 2004; SCRS, 2005.

| | | | | | | | | | | | | | | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Atlantic Total* | | *486* | *538* | *511* | *1,824* | *1,352* | *2,646* | *1,680* | *5,300* | *4,105* | *3,731* | *4,366* | *4,522* | *4,792* |
| LANDINGS | longline | 218 | 328 | 235 | 1,137 | 1,017 | 1,177 | 1,421 | 5,125 | 3,941 | 3,630 | 4,044 | 4,278 | 4,527 |
| | others | 268 | 210 | 250 | 667 | 317 | 1440 | 259 | 175 | 165 | 100 | 322 | 244 | 266 |
| DISCARDS | longline | 0 | 0 | 26 | 20 | 18 | 29 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| LANDINGS | BRASIL | 0 | 0 | 0 | 0 | 0 | 0 | 83 | 190 | 0 | 27 | 219 | 409 | 226 |
| | CANADA | 0 | 0 | 0 | 0 | 0 | 111 | 67 | 110 | 69 | 70 | 78 | 69 | 78 |
| | CHINA.PR | 0 | 0 | 0 | 34 | 45 | 23 | 27 | 19 | 74 | 126 | 306 | 22 | 208 |
| | COTE D'IVOIRE | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 10 | 9 | 15 | 0 |
| | EC-ESPANA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,777 | 3,347 | 2,895 | 2,679 | 2,921 | 2,859 |
| | EC-PORTUGAL | 193 | 314 | 220 | 796 | 649 | 749 | 785 | 519 | 425 | 446 | 706 | 523 | 471 |
| | EC-U.K | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2 | 1 |
| | JAPAN | 0 | 0 | 0 | 0 | 0 | 0 | 213 | 248 | 0 | 0 | 0 | 0 | 0 |
| | MEXICO | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 10 | 16 | 0 |
| | NAMIBIA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 459 |
| | PANAMA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 1 | 0 | 0 |
| | SOUTH AFRICA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 13 | 0 | 79 | 19 |
| | ST.VINCENT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| | TRINIDAD&TOBAGO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | U.S.A | 268 | 210 | 250 | 945 | 628 | 1703 | 465 | 408 | 148 | 69 | 292 | 395 | 413 |
| | UK-BERMUDA | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 |
| | URUGUAY | 25 | 14 | 15 | 29 | 12 | 21 | 24 | 28 | 21 | 43 | 63 | 70 | 58 |
| DISCARDS | MEXICO | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | U.S.A | 0 | 0 | 26 | 20 | 18 | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | UK-BERMUDA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |

Sea Turtles

From 1999 to 2003, the U.S. pelagic longline fleet targeting HMS captured an average of 772 loggerhead and 1,013 leatherback sea turtles per year, based on observed takes and total reported effort. In 2004, the U.S. pelagic longline fleet was estimated to have captured 734 loggerhead and 1,359 leatherback sea turtles (Garrison, 2005). In 2005, the U.S. pelagic longline fishery was estimated to have interacted with 274 loggerhead and 351 leatherback sea turtles outside of experimental fishing operations (Walsh and Garrison, 2006). Since other ICCAT nations do not monitor incidental catches of sea turtles, an exact assessment of their impact is not possible. However, high absolute numbers of sea turtle catches in the foreign fleets have been reported from other sources (NMFS, 2001). Throughout the Atlantic basin, including the Mediterranean Sea, a total of 210,000 – 280,000 loggerhead and 30,250 – 70,000 leatherback sea turtles are estimated to be captured by pelagic longline fisheries each year (Lewiston *et al.*, 2004).

Mortality in the domestic and foreign pelagic longline fisheries is just one of numerous factors affecting sea turtle populations in the Atlantic (National Research Council, 1990). Many sources of anthropogenic mortality are outside of U.S. jurisdiction and control. If the U.S. swordfish quota was relinquished to other fishing nations, the effort now expended by the U.S. fleet would likely be replaced by foreign effort. This could significantly alter the U.S. position at ICCAT and make the implementation of international conservation efforts more difficult. This would also eliminate the option of gear or other experimentation with the U.S. longline fleet, thus making it difficult to find take reduction solutions which could be transferred to other longlining nations to effect a greater global reduction in sea turtle takes in pelagic longline fisheries. The United States has, and will continue to make efforts at ICCAT, Inter-American Tropical Tuna Commission (IATTC), and other international forums, to encourage adoption of sea turtle conservation measures by international fishing fleets.

The first international agreement devoted solely to the protection of sea turtles – the Inter-American Convention for the Protection and Conservation of Sea Turtles – was concluded on September 5, 1996, in Salvador, Brazil, and entered into force in May 2001. The Inter-American Convention called for the Parties to establish national sea turtle conservation programs. In addition to domestic rulemaking in various fisheries, NMFS has been active at the international level in promoting sea turtle conservation efforts. A summery of some of these efforts is provided below.

In February 2003, the United States supported a workshop consisting of technical experts on sea turtle biology and longline fishery operations from interested nations in order to share information and discuss possible solutions to reduce incidental capture of marine turtles in these fisheries. The United States introduced the NED sea turtle bycatch mitigation research at the November 2003, ICCAT meeting in Dublin, Ireland, and co-sponsored ICCAT Resolution 03-11 which encouraged other nations to improve data collection and reporting on sea turtle bycatch and promote the safe handling and release of incidentally captured sea turtles. A poster and video describing the NED research experiment and preliminary results were displayed, as well as many of the experimentally tested release gears.

In January 2004, the Northeast Distant Waters Longline Research ad hoc advisory group met in Miami, Florida. The purpose of this meeting was to present a summary of the 2001 and 2002 NED pelagic longline sea turtle bycatch mitigation research and the preliminary results for the 2003 research, and to discuss future research needs. Also in January 2004, the IATTC - CIAT Bycatch Working Group met in Kobe, Japan. The purpose of U.S. attendance at this meeting was to present results of sea turtle mitigation research by the U.S, to hear research results on bycatch mitigation from other countries, to encourage IATTC countries to evaluate or adopt sea turtle mitigation technology in their fisheries, and to address other bycatch issues in longline fisheries. A Workshop was held in conjunction with the Sea Turtle Symposium in San Jose, Costa Rica in February 2004. The focus of this workshop was on providing information on the safe release of sea turtles to participants from nations with longline fleets. In June 2004, NMFS SEFSC staff conducted longline mitigation training and workshops in Peru, in cooperation with the IATTC. In August 2004, a workshop was held in Panama on conducting circle hook experiments similar to those undertaken in Ecuador (see description below) and on the use of dehooking devices and safe handling and release techniques. Also in August 2004, a workshop was held in Guatemala on conducting circle hook experiments similar to Ecuador and on the use of dehooking devices, safe handling and release techniques. In October 2004, Southwest Fisheries Science Center (SWFSC) staff followed up on a training workshop held in 2003 in cooperation with the Instituo del Mar del Peru (IMARPE) for fisheries observers, by working with Peruvian researchers to initiate circle hook implementation and experiments in the artisanal dolphin and shark fisheries.

At the Annual ICCAT meeting in New Orleans in November 2004, NMFS staff conducted a workshop discussing experimental results and the use of circle hooks, the use of dehooking devices, and safe handling and release techniques. Also in November, a workshop was conducted at the meeting of the Gulf and Caribbean Fisheries Institute in Saint Petersburg, Florida.

In collaboration with the World Wildlife Fund (WWF), IATTC, and the Western Pacific Regional Fishery Management Council (WPRFMC), NMFS provided hooks, dehooking devices, and technical assistance to Ecuador for the testing of non-offset 14/0 and 15/0 circle hooks in the dolphin fishery and 10 degree offset 16/0 and 18/0 circle hooks in the tuna/shark fisheries. Work began in March 2004 and initial results indicate that the majority of the bycatch is entangled, not hooked. Pacific Islands Fisheries Science Center (PIFSC) staff has been consulting with WPRFMC, Blue Ocean Institute, and Japan on a cooperative research design to test the efficiency of circle hooks in the Japanese tuna fishery. A draft research plan was reviewed in May 2004, and a meeting to refine the draft was held in Honolulu in Sept 2004. In June 2004, NMFS staff gave a presentation promoting cooperative research and the use of circle hooks at a Symposium on Bycatch Reduction hosted by the National Fisheries Research and Development Institute (NFRDI) in Korea.

The first Technical Assistance Workshop on Sea Turtle Bycatch Reduction Experiments in Longline Fisheries was held in April 2005, in Honolulu. This workshop was held to provide technical assistance for participants from the FAO Technical Consultation to design programs for the development and testing of turtle bycatch reducing technology appropriate to the longline fisheries of participating nations. The Third International Fishers Forum was held in Yokahama, Japan in July 2005, and United States' and regional research results on sea turtle bycatch avoidance methods were presented. In 2005, the United States assisted in designing experiments to evaluate sea turtle mitigation techniques and provided technical assistance for the following countries: Australia; Brazil; Costa Rica; Ecuador; Iceland; Italy; Japan; Korea; Taiwan; Mexico; Peru; Philippines; Spain; Uraquay; and, Vietnam.

### 3.4.2 Purse Seine

#### 3.4.2.1 Domestic History and Current Management

Purse seine gear consists of a floated and weighted encircling net that is closed by means of a drawstring; know as a purseline, threaded through rings attached to the bottom of the net. The efficiency of this gear can be enhanced by the assistance of spotter planes used to locate schools of tuna. Once a school is spotted, the vessel, with the aid of a smaller skiff, intercepts and uses the large net to encircle it. Once encircled, the purseline is pulled, closing the bottom of the net and preventing escape. The net is hauled back onboard using a powerblock, and the tunas are removed and placed onboard the larger vessel. Economic and social aspects of the fisheries are described in Sections 3.5 and Chapter 9.0 of this document, respectively.

Vessels using purse seine nets have participated in the U.S. Atlantic tuna fishery continuously since the 1950s; although a number of purse seine vessels did target and land BFT off the coast of Gloucester, MA as early as the 1930s. In 1958, continued commercial purse seining effort for Atlantic tunas began with a single vessel in Cape Cod Bay and expanded rapidly into the region between Cape Hatteras and Cape Cod during the early 1960s. The purse seine fishery between Cape Hatteras and Cape Cod was directed mainly at small and medium BFT, YFT, and at skipjack tuna, primarily for the canning industry. North of Cape Cod, purse seining was directed at giant BFT. High catches of juvenile BFT were sustained throughout the 1960s and into the early 1970s. These high catch rates by U.S. purse seine vessels are believed to have played a role in the decline in abundance during subsequent years. Currently these purse seine vessels focus their effort on giant BFT, versus other tunas, due to the international market that developed for giant BFT in the late 1970s. These fresh caught BFT are primarily flown directly to Japan for processing into sushi or sashimi. By the late 1980s, high ex-vessel prices and the increased importance of the Japanese market had increased effort on all size classes of BFT. In 1992, NMFS responded by banning the sale of school, large school, and small medium BFT (27 inches to less than 73 inches curved fork length).

A limited entry system with non-transferable individual vessel quotas (IVQs) for purse seining was established in 1982, effectively excluding any new entrants into this category. Equal baseline quotas of BFT are assigned to individual vessels by regulation; the IVQ system is possible given the small pool of ownership in this sector of the fishery. Currently, only five vessels comprise the Atlantic tuna purse seine fleet and in 1996 the quotas were made transferable among the five vessels.

Vessels that are participating in the Atlantic tunas purse seine fishery are required to target the larger size class BFT, more specifically the giant sized class (81 inches or larger) and are granted a tolerance limit of 15 percent by weight, of the total amount of giant BFT landed during a season. These vessels may commence fishing starting on July 15 of each year and may continue through December 31, provided the vessel has not fully attained its IVQ. Over the last few years, the Purse seine category has not fully harvested its allocated quota. This can be attributed to a number of different reasons outside of the industry's or NMFS' control, such as lack of availability or schools being comprised of mixed size classes. NMFS has issued several EFPs to this sector of the fishery and will continue to assess current regulations and their impact on providing reasonable opportunities to harvest available quota.

#### 3.4.2.2 Recent Catch and Landings

Table 3.36 shows purse seine landings of Atlantic tunas from 1999 through 2004. Purse seine landings typically make up approximately 20 percent of the total annual U.S. landings of BFT (about 25 percent of total commercial landings), but account for only a small percentage, if any, of the landings of other HMS. In the 1980s and early 1990s, purse seine landings of YFT were often over several hundred metric tons. Over 4,000 mt ww of YFT were recorded landed in 1985. In recent years, via informal agreements with other sectors of the tuna industry, the purse seine fleet has opted not to direct any effort on HMS other than BFT.

**Table 3.36 Domestic Atlantic Tuna Landings for the Purse Seine Fishery: 1999-2004 (mt ww). Northwest Atlantic Fishing Area. Source**: U.S. National Report to ICCAT: 2005.

| | | | | | | **2004** |
|---|---|---|---|---|---|---|
| Bluefin Tuna | 247.9 | 275.2 | 195.9 | 207.7 | 265.4 | 31.8 |
| Yellowfin Tuna | 0 | 0 | 0 | 0 | 0 | 0 |
| Skipjack Tuna | 0 | 0 | 0 | 0 | 0 | 0 |

#### 3.4.2.3 Safety Issues

Accidents that can occur on purse seine vessels include general injuries caused by handling fish (e.g., poisoning from being stuck by fin spines), as well as accidents related to the vessels fishing operations themselves, such as, deploying the skiff or using cables and winches to move giant BFT from the net to the hold.

#### 3.4.2.4 International Issues and Catch

The U.S. purse seine fleet has historically accounted for a small percentage of the total International Atlantic tuna landings. Over the past six years, the U.S. purse seine fishery has contributed to less than 0.15 percent of the total purse seine landings reported to ICCAT.

**Table 3.37 Estimated International Purse Seine Atlantic Tuna Landings in the Atlantic and Mediterranean: 1999-2004 (mt ww).** Source: SCRS, 2005

| | | | | | | **2004** |
|---|---|---|---|---|---|---|
| **Bluefin Tuna** | 15,884 | 17,616 | 17,520 | 18,548 | 15,525 | 122,309 |
| **Yellowfin Tuna** | 83,445 | 80,253 | 102,641 | 95,613 | 80,111 | 61,849 |
| **Skipjack Tuna** | 95,367 | 80,762 | 77,995 | 70,714 | 92,770 | 89,317 |
| **Bigeye Tuna** | 20,923 | 17,909 | 22,060 | 16,192 | 22,237 | 13,388 |
| **Albacore** | 238 | 244 | 288 | 158 | 998 | 674 |
| **Total** | **215,857** | **196,784** | **220,504** | **201,225** | **211,641** | **177,537** |
| **U.S. Total** | **248** | **275** | **196** | **208** | **265** | **32** |
| **U.S. Percentage** | **0.12%** | **0.14%** | **0.09%** | **0.10%** | **0.13%** | **0.02%** |

Since the 1999 ICCAT meeting, ICCAT has continued to implement a Fish Aggregation Device (FAD) closed area in the Gulf of Guinea. The closure (which became mandatory in mid-1999) was in response to concern over catches of juvenile and undersize tunas by non-U.S. internationally flagged purse seiners relying on FADs. The full evaluation of this program is somewhat hindered by the multi-species nature of surface fisheries and the existence of other types of fisheries. The updated analysis indicated that this regulation appeared effective at reducing mortality for juvenile bigeye. Full compliance with this regulation by all surface fisheries will greatly increase the effectiveness of this regulation.

### 3.4.3 Commercial Handgear

#### 3.4.3.1 Domestic History and Current Management

Commercial handgears, including handline, harpoon, rod and reel, and bandit gear are often used to fish for Atlantic HMS by fishermen on private vessels, charter vessels, and headboat vessels. Rod and reel gear may be deployed from a vessel that is at anchor, drifting, or underway (*i.e.*, trolling). In general, trolling consists of dragging baits or lures through, on top of, or even above the water's surface. While trolling, vessels often use outriggers, kites, or green-sticks to assist in spreading out or elevating baits or lures and to prevent fishing lines from tangling. For more information on green-stick fishing gear, and the configurations allowed under current regulations, please refer to the discussions of alternative H4 in Chapters 2 and 4 of this document. Operations, frequency and duration of trips, and distance ventured offshore vary widely. Most of the vessels are greater than seven meters in length and are privately owned by individual fishermen.

The handgear fisheries are typically most active during the summer and fall, although in the South Atlantic and Gulf of Mexico fishing occurs during the winter months. Fishing usually takes place between eight and 200 km from shore and for those vessels using bait, the baitfish typically includes herring, mackerel, whiting, mullet, menhaden, ballyhoo, butterfish, and squid. The commercial handgear fishery for BFT occurs mainly in New England, and more recently off the coast of southern Atlantic states, such as Virginia, North Carolina and South Carolina, with vessels targeting large medium and giant BFT. The majority of U.S. commercial handgear fishing activities for bigeye, albacore, yellowfin, and skipjack tunas take place in the northwest Atlantic. Beyond these general patterns, the availability of Atlantic tunas at a specific location and time is highly dependent on environmental variables that fluctuate from year to year.

Currently the U.S. Atlantic tuna commercial handgear fisheries are managed through an open access vessel permit program. Vessels that wish to sell their Atlantic tunas must obtain a commercial handgear permit in one of the following categories: General (rod and reel, harpoon, handline, bandit gear), Harpoon (harpoon only), or Charter/Headboat (rod and reel and handline). These vessels may also need permits from the states they operate out of in order to land and sell their catch. All commercial permit holders are encouraged to check with their local state fish/natural resource management office regarding these requirements. Permitted vessels are also required to sell their Atlantic tunas to federally permitted Atlantic tuna dealers. As the Atlantic tunas dealer permits are issued by the Northeast Region Permit Office, vessel owner/operators are encouraged to contact the permitting office directly, either by phone at (978) 281-9438 or via the web at http://www.nero.noaa.gov/ro/doc/vesdata1.htm, to obtain a list of permitted dealers in their area.

Vessels that are permitted in the General and Charter/Headboat categories commercially fish under the General category rules and regulations. For instance, regarding BFT, vessels that possess either of the two permits mentioned above have the ability to retain a daily bag limit of zero to three BFT, measuring 73 inches or greater curved fork length per vessel per day while the General category BFT fishery is open. The General category BFT fishery opens on June 1 of each year and remains open until January 31 of the subsequent year, or until the quota is filled. Vessel owner/operators should check with the agency via websites (www.hmspermits.gov) or telephone information lines (1-888-872-8862) to verify the BFT retention limit on any given day. The General category BFT quota is approximately 47 percent of the U.S. quota and equates to a base line allocation of approximately 690 mt.

Vessels that are permitted in the Harpoon category fish under the Harpoon category rules and regulations. For instance, regarding BFT, vessels have the ability to keep two bluefin measuring 73 inches to less than 81 inches curved fork length per vessel trip per day while the fishery is open. There is no limit on the number of BFT that measure longer than 81 inches curved fork length, as long as the Harpoon category season is open. The Harpoon category season also opens on June 1 of each year and remains open until November 15, or until the quota is filled. The Harpoon category BFT quota is approximately 3.9 percent of the U.S. quota and equates to a base line allocation of approximately 57 mt.

U.S. commercial swordfish fishing in the Atlantic Ocean is reported to have begun in the early 1800s as a harpoon fishery off the coast of New England. This fishery traditionally consisted of harpoon vessels operating out of Rhode Island and Massachusetts where they took extended trips for swordfish north and east of the Hudson Canyon and particularly off Georges Bank, and could land as many as 20 to 25 large swordfish over a ten-day period. These fish primarily consisted of large fish that finned on the surface and were available to the harpoon gear, some weighing as much as 600 lbs dw, but averaging about 225 to 300 lbs dw at the turn of the century. Because of the limited effort directed towards large fish, the stock was sufficient to support a sustainable seasonal swordfish fishery for more than 150 years. Most swordfish caught in the United States in the early 1900s were harvested with harpoons; harpoon landings declined from the 1940s through the 1960s. Due to a decreased availability of the large swordfish in the northeast this fishery has essentially ceased to exist. However, a recently emerging swordfish handgear fishery, both commercial and recreational, has appeared to develop off the east coast of Florida. This fishery is essentially prosecuted at night with rod and reel or handline gear. Some vessels participating in this fishery are currently utilizing individual handlines attached to free-floating buoys. This fishery has been operating under the current regulations, which require that handlines be restricted to no more than two hooks and be released and retrieved by hand. The current regulations do not limit the number of individual handlines/buoys that may be possessed or deployed.

Currently the U.S. commercial swordfish fishery is managed through limited access vessel permits. Vessels that possess a limited access handgear permit must abide by the minimum size limits for swordfish (*i.e.,* 29 inches form cleithrum to caudal keel; 47 inches lower jaw fork length; or 33 lbs dressed weight) and seasonal retention limits. When the directed swordfish fishery is open, permitted handgear vessel do not have a possession limit. However, during a directed fishery closure, permitted handgear vessels may land two swordfish per trip, provided these two fish were not taken with harpoon gear. Fishermen with a commercial handgear swordfish permit are required to report fishing activities in an approved logbook within 48 hours of each day's fishing activities for multi-day trips, or before offloading for one-day trips, and submit the logbook within seven days of offloading.

The shark commercial handgear fishery plays a very minor role in contributing to the overall shark landing statistics. For further information regarding the shark fishery refer to Section 3.4.5. Economic and social aspects of all the domestic handgear fisheries are described later in this document (Section 3.5 and Chapter 9.0 respectively).

#### 3.4.3.2 Recent Catch and Landings

The proportion of domestic HMS landings harvested with handgear varies by species, with Atlantic tunas comprising the majority of commercial landings. Commercial handgear landings of all Atlantic HMS (other than sharks) in the United States are shown in Table 3.38.

In 2004, BFT commercial handgear landings accounted for approximately 42 percent of the total U.S. BFT landings, and almost 75 percent of commercial BFT landings.

Also in 2004, four percent of the total yellowfin catch, or nine percent of the commercial yellowfin catch, was attributable to commercial handgear. Commercial handgear landings of skipjack tuna accounted for approximately ten percent of total skipjack landings, or about 30 percent of commercial skipjack landings. For albacore, commercial handgear landings accounted for approximately one percent of total albacore landings, or about six percent of commercial albacore landings. Commercial handgear landings of bigeye tuna accounted for approximately one percent of total bigeye landings and one percent of total commercial bigeye landings.

Updated tables of landings for the commercial handgear fisheries by gear and by area for 1999 – 2004 are presented in the following tables.

**Table 3.38 Domestic Landings for the Commercial Handgear Fishery, by Species and Gear, for 1999-2004 (mt ww).** Source: U.S. National Report to ICCAT: 2005

| | | | | | | | **2004** |
|---|---|---|---|---|---|---|---|
| Bluefin Tuna | Rod and Reel | 643.6 | 590.9 | 889.7 | 878.5 | 529.2 | 331.4 |
| | Handline | 15.5 | 3.2 | 9.0 | 4.5 | 2.6 | 1.3 |
| | Harpoon | 115.8 | 184.2 | 102.1 | 55.6 | 75.5 | 41.2 |
| | **TOTAL** | **774.9** | **778.3** | **1,000.8** | **938.6** | **607.3** | **373.9** |
| Bigeye Tuna | Troll | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Handline | 12.3 | 5.7 | 33.7 | 14.4 | 6.3 | 3.1 |
| | **TOTAL** | **12.3** | **5.7** | **33.7** | **14.4** | **6.3** | **3.1** |
| Albacore Tuna | Troll | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Handline | 4.4 | 7.9 | 3.9 | 6.6 | 3.4 | 5.6 |
| | **TOTAL** | **4.4** | **7.9** | **3.9** | **6.6** | **3.4** | **5.6** |
| Yellowfin Tuna | Troll | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Handline | 220.0 | 284.0 | 300.0 | 244.0 | 216.0 | 234.0 |
| | **TOTAL** | **220.0** | **284.0** | **300.0** | **244.0** | **216.0** | **234.0** |
| Skipjack Tuna | Troll | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Handline | 6.4 | 9.7 | 10.5 | 12.7 | 9.4 | 10.4 |
| | **TOTAL** | **6.4** | **9.7** | **10.5** | **12.7** | **9.4** | **10.4** |
| Swordfish | Handline | 5.0 | 8.9 | 8.9 | 11.7 | 20.6 | 20.0 |
| | Harpoon | 0.0 | 0.6 | 7.4 | 2.8 | 0.0 | 0.5 |
| | **TOTAL** | **5.0** | **9.5** | **16.3** | **14.5** | **20.6** | **20.5** |

**Table 3.39 Domestic Landings for the Commercial Handgear Fishery by Species and Region for 1999-2004 (mt ww).** Source: U.S. National Report to ICCAT: 2005

| | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|
| Bluefin Tuna | NW Atl | 774.4 | 778.3 | 1,000.8 | 938.3 | 607.3 | 373.9 |
| Bigeye Tuna | NW Atl | 11.9 | 4.1 | 33.2 | 13.8 | 6.0 | 3.0 |
| | GOM | 0.2 | 0.1 | 0.5 | 0.6 | 0.3 | 0.1 |
| | Caribbean | 0.2 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| Albacore Tuna | NW Atl | 0.6 | 2.9 | 1.7 | 3.9 | 1.4 | 5.4 |
| | GOM | ≤ .05 | 0.0 | 0.0 | 0.0 | ≤ .05 | 0.0 |
| | Caribbean | 3.8 | 5.0 | 2.2 | 2.7 | 2.0 | 2.1 |
| Yellowfin Tuna | NW Atl | 192.0 | 235.7 | 242.5 | 137.0 | 148.0 | 208.0 |
| | GOM | 12.7 | 28.6 | 43.4 | 100.0 | 59.0 | 19.0 |
| | Caribbean | 14.5 | 19.4 | 14.3 | 7.0 | 9.0 | 7.0 |
| Skipjack Tuna | NW Atl | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.6 |
| | GOM | 0.4 | 0.7 | 0.0 | 0.0 | 0.0 | 0.2 |
| | Caribbean | 5.8 | 8.8 | 10.3 | 12.5 | 9.2 | 9.6 |
| Swordfish | NW Atl | 5.0 | 8.3 | 16.0 | 11.6 | 10.8 | 18.9 |
| | GOM | ≤ .05 | 1.2 | 0.3 | 2.9 | 9.8 | 1.6 |

*Handgear Trip Estimates*

Table 3.40 displays the estimated number of rod and reel and handline trips targeting large pelagic species in 2001 through 2004. The trips include commercial and recreational trips, and are not specific to any particular species. It should be noted that these estimates are still preliminary and subject to change.

**Table 3.40 Estimated number of vessel trips targeting large pelagic species, 2001-2004.** Source: Large Pelagics Survey database

| | AREA | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **Private Vessels** | | | | | | | | |
| 2001 | 1,944 | 3,641 | 497 | 2,039 | 3,040 | 2,675 | 910 | 14,746 |
| 2002 | 5,090 | 15,180 | 2,558 | 7,692 | 2,762 | 22,757 | 6,524 | 62,563 |
| 2003 | 4,501 | 13,411 | 2,869 | 12,466 | 3,214 | 21,619 | 5,067 | 63,147 |
| 2004 | 2,025 | 10,033 | 3,491 | 11,525 | 3,632 | 22,433 | 4,406 | 57,545 |
| | | | | | | | | |
| **Charter Vessels** | | | | | | | | |
| 2001 | 133 | 567 | 203 | 280 | 660 | 655 | 307 | 2,805 |
| 2002 | 1,132 | 3,357 | 937 | 1,686 | 1,331 | 6,300 | 1,510 | 16,253 |
| 2003 | 221 | 2,561 | 1,246 | 2,035 | 1,331 | 5,201 | 546 | 13,141 |
| 2004 | 312 | 2,021 | 1,564 | 2,285 | 1,094 | 5,080 | 1,579 | 13,935 |

### 3.4.3.3 Safety Issues Associated with the Fishery

The U.S. Coast Guard (USCG) conducts routine vessel safety inspections at sea on a variety of vessels throughout the year. During the busy General category BFT season the USCG has been known to concentrate patrol activities on General category BFT boats. Boarding officers indicate that the majority of the commercial handgear vessels have the necessary safety equipment; however, many part-time fishermen operating smaller vessels do not meet the necessary safety standards. There have been several cases of vessels participating in the commercial handgear fishery that have capsized due to weight while attempting to boat commercial-sized BFT (measuring 73 inches or greater and weighing several hundred pounds).

Over the last few years, the USCG focused boardings on small vessels, especially those owned by "part-time" commercial handgear fishermen, and terminated several dozen trips due to the lack of safety equipment on board. If a vessel is boarded at sea and found to be lacking major survival equipment, the USCG will terminate the trip and escort the vessels back to port.

Currently, NMFS does not require proof of proper safety equipment as a condition to obtain a commercial handgear permit. Instead, NMFS informs permit applicants that commercial vessels are subject to the Fishing Vessel Safety Act of 1988 and advises them to contact their local USCG office for further information. The USCG District Boston office reports receiving 50 to 75 calls a week during the peak fishing season; officers speak with all callers to answer vessel questions. Since NMFS regulations do not require USCG inspection or safety equipment in order to obtain a commercial handgear permit, NMFS cannot be certain that all participants in the commercial handgear fisheries are adequately prepared for the conditions they may encounter. NMFS is concerned about the safety of all vessels participating in the commercial handgear fisheries and continues to work with the USCG to improve communication of vessel safety requirements to commercial handgear vessel operators.

It is unlawful for Atlantic tuna vessels to engage in fishing unless the vessel travels to and from the area where it will be fishing under its own power and the person operating that vessel brings any BFT under control (secured to the catching vessel or on board) with no assistance from another vessel, except when shown by the operator that the safety of the vessel or its crew was jeopardized or other circumstances existed that were beyond the control of the operator. NMFS Enforcement and USCG boarding officers have recently encountered vessels participating in the BFT fishery that are unable to transit to and from the fishing grounds due to their limited fuel capacity. Occasionally these smaller vessels will work in cooperation with a larger documented vessel to catch a BFT; others have been observed leaving lifesaving equipment at the dock to make room for extra fuel, bait, and staples. NMFS is concerned that use of such inadequately equipped vessels jeopardizes crew in that the vessel may not be able to safely return to shore without assistance of the larger vessel due to insufficient fuel or to adverse weather conditions.

Over the last couple of years, NMFS has received a number of vessel permit applications from kayak owner/operators. In addition to the requirement mentioned above, NMFS only issues permits to vessels that possess a USCG Documentation number, a state registration number, or a foreign registration number (recreational permit only). As kayaks typically do not require such documentation NMFS has denied all applications for a kayak to date.

NMFS also has concerns regarding individuals embarking on HMS trips by themselves. Recently there have been a few incidents of fishermen either severely injuring themselves or dying while pursing HMS by themselves. Certain hazardous situations could be mitigated by having an additional person onboard the vessel while conducting a trip targeting large pelagics. NMFS encourages vessel owner/operators to practice safe fishing techniques.

NMFS will consider all safety comments and information, including those from the USCG and NMFS Enforcement, when planning future General category effort control schedules and will discuss these issues in future meetings with the AP.

#### 3.4.3.4 U.S. vs. International Issues and Catch

SCRS data do not lend themselves to organize international landings into a commercial handgear category. While some countries report rod and reel landings, these numbers may include both commercial and recreational landings. International catches of all Atlantic HMS for 2004 are summarized in Table 3.21.

### 3.4.4 Recreational Handgear

The following section describes the recreational portion of the handgear fishery, and is primarily focused upon rod and reel fishing. The HMS Handgear (rod and reel, handline, and harpoon) fishery includes both commercial and recreational fisheries and is described fully in Section 2.5.8 of the 1999 FMP. Handgear components may also be deployed as a specialized trolling gear to target surface-feeding tunas. Under this configuration, the line and leaders are elevated and actively trolled so that the baits fish on or above the water's surface. This style of fishing is often referred to as "green-stick fishing," and reports indicate that it can be extremely efficient compared to conventional fishing techniques. For more information on green-stick fishing gear and the configurations allowed under current regulations, please refer to the discussions of alternative H4 in Chapters 2 and 4 of this document. The recreational billfish fishery is described fully in Section 2.1.3 of the 1999 Billfish Amendment. The commercial sale, barter or trade of Atlantic billfish by U.S. commercial interests is prohibited, only recreational landings are authorized.

#### 3.4.4.1 Overview of History and Current Management

Atlantic tunas, swordfish, and sharks are managed under the 1999 FMP and Amendment 1 to the 1999 FMP, while Atlantic billfish are managed separately under the Billfish FMP, as amended. Summaries of the domestic aspects of the Atlantic tuna fishery, the Atlantic swordfish fishery, and the Atlantic shark fishery are found in Sections 2.2.3, 2.3.3, and 2.4.3, respectively, of the 1999 FMP. A history of Atlantic billfish management is provided in Section 1.1.1 of the Billfish Amendment and Section 3.1.2 of this document.

Atlantic tunas, sharks, swordfish, and billfish are all targeted by domestic recreational fishermen using rod and reel gear. The recreational swordfish fishery had declined dramatically over the past twenty years, but recent information indicates that the recreational swordfish fishery is rebuilding in the Mid-Atlantic Bight, and off the east coast of Florida. Effective March 1, 2003, an HMS Angling category permit has been required to fish recreationally for any HMS-managed species (Atlantic tunas, sharks, swordfish, and billfish) (67 FR 77434, December 18, 2002). Prior to March 1, 2003, the regulations only required vessels fishing recreationally for Atlantic tunas to possess an Atlantic Tunas Angling category permit.

Recreational fishing for Atlantic HMS is managed primarily through the use of minimum size limits and bag limits. Recreational tuna fishing regulations are the most complex and include a combination of minimum sizes, bag limits, limited season-based quota allotment for bluefin tuna, and reporting requirements (depending upon the particular species and vessel type).

The recreational swordfish fishery has been managed through the use of a minimum size requirement and landings requirement (swordfish may be headed and gutted but may not be cut into smaller pieces). However, regulations effective March 2003 (68 FR 711) established a recreational retention limit of one swordfish per person up to three per vessel per day. Regardless of the length of a trip, no more than the daily limit of North Atlantic swordfish can be possessed onboard a vessel.

The recreational shark fishery is managed using bag limits, minimum size requirements, and landing requirements (sharks must be landed with head and fins attached). Additionally, the possession of 19 species of sharks is prohibited.

Atlantic blue and white marlin have a combined landings limit (*i.e.*, a maximum of 250 fish that can be landed per year); however, the primary management strategy for the recreational billfish fishery is through the use of minimum size limits. There are no recreational retention limits for Atlantic sailfish, blue marlin, and white marlin. Recreational anglers may not land longbill spearfish.

ICCAT has made several recommendations to recover billfish resources throughout the Atlantic Ocean that are discussed in detail in Section 3.1.2.

#### 3.4.4.2 Most Recent Catch and Landings Data

The recreational landings database for HMS consists of information obtained through surveys including the Marine Recreational Fishery Statistics Survey (MRFSS), Large Pelagic Survey (LPS), Southeast Headboat Survey (HBS), Texas Headboat Survey, and Recreational Billfish Survey Tournament Data (RBS). Descriptions of these surveys, the geographic areas they include, and their limitations, are discussed in Section 2.6.2 of the 1999 FMP and Section 2.3.2 of the 1999 Billfish Amendment.

Reported domestic landings of Atlantic bluefin tuna (1983 through 1998) and BAYS tuna (1995 through 1997) were presented in Section 2.2.3 of the 1999 FMP. As landings figures for 1997 and 1998 were preliminary in the 1999 FMP, updated landings for recreational rod and reel fisheries are presented in Table 3.41 through 2004. Recreational landings of swordfish are monitored by the LPS and the MRFSS. However, because swordfish landings are considered rare events, it is difficult to extrapolate the total recreational landings from dockside intercepts.

An ad hoc committee of NMFS scientists reviewed the methodology and data used to estimate recreational landings of Atlantic HMS during 2004. The Committee was charged with reviewing the 2002 estimates of U.S. recreational landings of bluefin tuna, white marlin and blue marlin reported by NMFS to ICCAT. The committee was also charged with recommending methods to be used for the estimation of 2003 recreational fishery landings of bluefin tuna and marlin. Although the Committee discovered and corrected a few problems with the raw data from the LPS and the estimation program used to produce the estimates, the Committee concluded that the estimation methods for producing the 2002 estimates were consistent with methods used in previous years. The report of the Committee is available at: http://www.nmfs.noaa.gov/sfa/hms/Tuna/2002-2003_Bluefin-Marlin_Report-120304.pdf.

**Table 3.41 Updated Domestic Landings for the Atlantic Tunas, Swordfish and Billfish Recreational Rod and Reel Fishery, 1997-2004 (mt ww)*.** Sources: NMFS, 2004; NMFS, 2005. (Recreational shark landings are provided in Table 3.44 through Table 3.47).

| | | | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|---|---|
| Bluefin tuna** | NW Atlantic | 299 | 184 | 103.0 | 49.5 | 242.9 | 519.4 | 314.6 | 387.8 |
| | GOM | 0 | 0 | 0.4 | 0.9 | 1.7 | 1.5 | 0 | 0 |
| | **Total** | **299** | **184** | **103.4** | **50.4** | **244.6** | **520.9** | **314.6** | **387.8** |
| Bigeye tuna | NW Atlantic | 333.5 | 228.0 | 316.1 | 34.4 | 366.2 | 49.6 | 188.5 | 94.6 |
| | GOM | 0 | 0 | 1.8 | 0 | 0 | 0 | 0 | 6 |
| | Caribbean | | | | | 0 | 0 | 4.0 | 0 |
| | **Total** | **333.5** | **228.0** | **317.9** | **34.4** | **366.2** | **49.6** | **192.5** | **100.6** |
| Albacore | NW Atlantic | 269.5 | 601.1 | 90.1 | 250.75 | 122.3 | 323.0 | 333.8 | 500.5 |
| | GOM | 65.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Total** | **334.7** | **601.1** | **90.1** | **250.75** | **122.3** | **323.0** | **333.8** | **500.5** |
| Yellowfin tuna | NW Atlantic | 3,560.9 | 2,845.7 | 3,818.2 | 3,809.5 | 3,690.5 | 2,624 | 4,672 | 3,434 |
| | GOM | 7.7 | 80.9 | 149.4 | 52.3 | 494.2 | 200 | 640 | 247 |
| | Caribbean | | | 0 | 0 | 0.1 | 7.2 | 16 | 0 |
| | **Total** | **3,569** | **2,927** | **3,967.6** | **3,861.8** | **4184.7** | **2,831.2** | **5,328** | **3,681** |
| Skipjack tuna | NW Atlantic | 42.0 | 49.5 | 63.6 | 13.1 | 32.9 | 23.3 | 34.0 | 27.3 |
| | GOM | 21.7 | 37.0 | 34.8 | 16.7 | 16.1 | 13.2 | 11.0 | 6.3 |
| | Caribbean | | | 0 | 0 | 0 | 13.2 | 15.7 | 40.4 |
| | **Total** | **63.7** | **86.5** | **98.4** | **29.8** | **49.0** | **49.7** | **60.7** | **74.0** |
| Blue marlin*** | NW Atlantic | 25.0 | 34.1 | 24.8 | 13.8 | 9.0 | | | |
| | GOM | 11.5 | 4.5 | 7.5 | 4.7 | 5.1 | | | |
| | Caribbean | 8.6 | 10.6 | 4.6 | 5.7 | 2.3 | | | |
| | **Total** | **45.1** | **49.2** | **36.9** | **24.2** | **16.4** | **5.6** | **19** | **24** |

| | | | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|---|---|
| White marlin *** | NW Atlantic | 0.9 | 2.4 | 1.5 | 0.23 | 2.8 | | | |
| | GOM | 0.9 | 0.2 | 0.1 | 0 | 0.3 | | | |
| | Caribbean | 0.0 | 0.02 | 0 | 0 | 0 | | | |
| | **Total** | **1.8** | **2.6** | **1.6** | **0.23** | **3.1** | **5.6** | **0.6** | **0.8** |
| Sailfish*** | NW Atlantic | 0 | 0.1 | 0.07 | 1.75 | 61.2 | | | |
| | GOM | 0.4 | 1.0 | 0.6 | 0.24 | 0.6 | | | |
| | Caribbean | 0.2 | 0.05 | 0 | 0.06 | 0 | | | |
| | **Total** | **0.6** | **1.5** | **0.67** | **2.05** | **61.8** | **103** | **53** | **33** |
| Swordfish | **Total** | **10.9** | **4.7** | **21.3** | **15.6** | **1.5** | **21.5** | **5.9** | **24.3** |

* Rod and reel catches and landings for Atlantic tunas represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** Rod and reel catch and landings estimates of bluefin tuna less than 73" curved fork length (CFL) based on statistical surveys of the U.S. recreational harvesting sector. Rod and reel catch of bluefin > 73" CFL are commercial and may also include a few metric tons of "trophy" bluefin (recreational bluefin 73").
*** Blue and white marlin (1997-2003), and sailfish (1997-2002) landings are based on prior U.S. National Reports to ICCAT and consist primarily of reported tournament landings. Reporting method was changed to a total count (blue and white marlin) in 2004.

*Atlantic Billfish Recreational Fishery*

Due to the rare nature of billfish encounters and the difficulty of monitoring landings outside of tournament events, reports of recreational billfish landings are sparse. However, the RBS provides a preliminary source for analyzing recreational billfish landings. Table 3.42 documents the number of billfish landed in 1999 – 2004, as reported by the RBS.

**Table 3.42 Preliminary RBS Recreational Billfish Landings in numbers of fish (calendar year).** Source: NMFS Recreational Billfish Survey (RBS).

| | | | | | | **2004** |
|---|---|---|---|---|---|---|
| Blue Marlin | 172 | 117 | 75 | 84 | 96 | 110 |
| White Marlin | 36 | 8 | 22 | 33 | 20 | 25 |
| Sailfish | 30 | 18 | 11 | 14 | 24 | 9 |
| Swordfish | - | - | 0 | 16 | 48 | 168 |

In support of the sailfish assessment conducted at the 2001 SCRS billfish species group meeting, document SCRS/01/106 developed indices of abundance of sailfish from the U.S. recreational billfish tournament fishery for the period 1973 – 2000. The index of weight per 100 hours fishing was estimated from numbers of sailfish caught and reported in the logbooks submitted by tournament coordinators and NMFS observers under the RBS, as well as available size information. Document SCRS/01/138 estimated U.S. sailfish catch estimates from various recreational fishery surveys.

All recreational, non-tournament landings of billfish, including swordfish, must be reported within 24 hours of landing to NMFS by the permitted owner of the vessel landing the fish. This requirement is applicable to all permit holders, both private and charter/headboat vessels, not fishing in a tournament. In Maryland and North Carolina, vessel owners should report their billfish landings at state-operated landings stations. A landed fish means a fish that is kept and brought to shore. Due to large-scale non-compliance with the call-in requirement, the landings in Table 3.43 are considered a minimum estimate of the non-tournament landings of billfish.

**Table 3.43 Number of billfish reported to NMFS via call-in system by fishing year, 2002-2005.** Source: G. Fairclough, pers. comm.

| | | | | **2005**** |
|---|---|---|---|---|
| Blue Marlin | 0 | 7 | 2 | 5 |
| White Marlin | 0 | 1 | 0 | 2 |
| Sailfish | 3 | 16 | 57 | 58 |
| Swordfish | 28 | 188 | 314 | 381 |

Based on a fishing year of June 1 – May 31.
* Reporting requirement did not go into effect until March 1, 2003
** 2005 landings as of May 16, 2006

*Swordfish Recreational Fishery*

The recreational swordfish fishery in the North Atlantic Ocean has been steadily expanding in recent years, probably due to increased availability of small swordfish and an increased interest in the sport. Fishermen typically fish off the east coast of Florida and off the coasts of New Jersey and New York. Fish have also occasionally been encountered on trips off Maryland and Virginia. In the past, the New York swordfish fishery occurred incidental to overnight yellowfin tuna trips. During the day, fishermen targeted tunas, while at night they fished deeper for swordfish. This appears to have evolved into a year-round directed fishery off Florida and a summer fishery off of New Jersey. The Florida fishery occurs at night with fishermen targeting swordfish using live or dead bait and additional attractants such as lightsticks, LED lights, and light bars suspended under the boat.

Historically, fishery survey strategies have not captured all landings of recreational handgear-caught swordfish. Although some handgear swordfish fishermen have commercial permits[1], many others land swordfish strictly for personal consumption. Therefore, NMFS published regulations to improve recreational swordfish monitoring and conservation. A trip limit of one swordfish per person, up to three per vessel, and mandatory reporting of all recreationally-landed swordfish and billfish via a toll-free call-in system became effective on March 2, 2003 (68 FR 711). Accordingly, all reported recreational swordfish landings are counted against the incidental swordfish quota.

Recreational fishing tournaments allow for the collection of a large volume of fishery-dependent data in a relatively short time period. Tournaments also provide a "snapshot" of the recreational fishery at a particular time and location. Analysis of tournament data collected over a period of years could provide valuable information regarding trends in the recreational swordfish fishery. A recent study documented recreational handgear-caught swordfish in three south Florida tournaments (J. Levesque, pers. comm.). The tournaments occurred from July though September 2002, two in Lighthouse Point and the other in Ft. Lauderdale. Data was obtained through direct at-sea observation, dockside interviews with anglers landing swordfish, and a telephone interview with a tournament organizer. A total of 156 vessels and between 468 – 624 individuals participated in the three tournaments.

[3] Access to the commercial swordfish fishery is limited; hand gear fishermen however may purchase permits from other permitted fishermen because the permits are transferable.

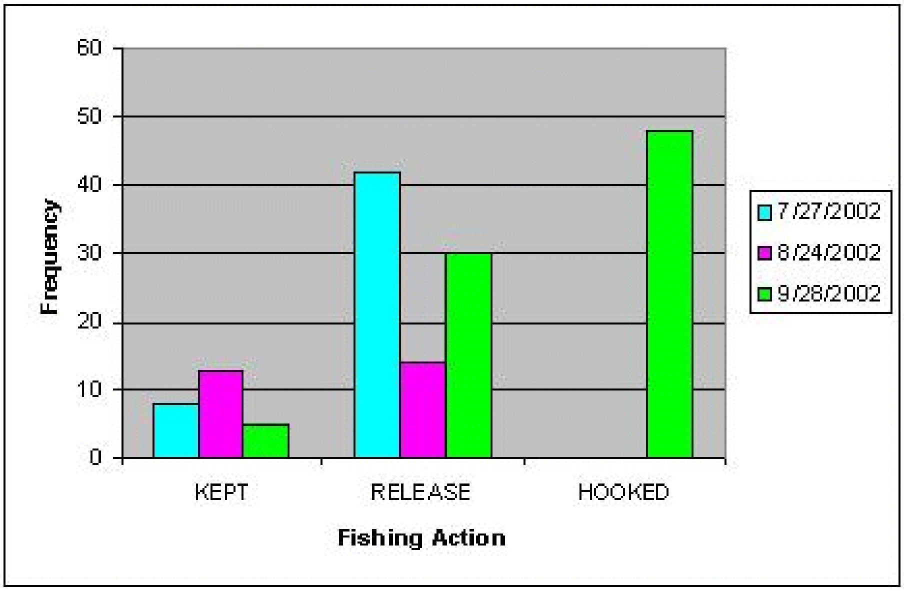



**Figure 3.30 Total Number of Swordfish Caught, Kept and Released in Three Sampled Recreational Swordfish Tournaments off Southeast Florida during 2002.** Source: J. Levesque, pers. comm.

Figure 3.30 indicates that 112 swordfish were caught during the three monitored tournaments. Of these, 26 swordfish were retained and 86 swordfish were released alive. Additional data from the September 28, 2002, tournament indicated that, in that tournament, 48 swordfish were hooked, 30 were released, and four were kept. The definition of hooked, for these purposes, was a swordfish that was on the line for any given amount of time. All hooked fish were assumed to be swordfish. The three fishing tournaments implemented a 55-inch, or 140 cm LJFL minimum size requirement for landed swordfish, although current federal regulations are 119 cm (46.9 in) LJFL.

Sizes for landed swordfish ranged from 130 – 230 cm (51.2 – 90.6 in) fork length. The mean size for landed swordfish was 160 cm (63 in) fork length. Weights for landed swordfish ranged from 36 – 144 kg (79.3 – 317.2 lb). The mean weight for the landed swordfish was 62.6 kg (137.9 lb). Estimated weights for the released swordfish ranged from 13 – 32 kg (28.6 – 70.5 lb). The mean estimated weight for released swordfish was 19.5 kg (43 lb).

The overall number of swordfish hooked per-unit-effort was .0615-swordfish/hr. or 6.15 swordfish per 100-hrs. drifting. The catch per-unit-effort was .0143-swordfish landed/hr. or 1.43 fish per 100-hrs. drifting.

Tournament caught swordfish reported to the RBS have increased in recent years. There were none reported in 2001, 16 in 2002, 48 in 2003, and 168 in 2004. While total tournament landings of swordfish are still low in terms of numbers of fish, it appears that as swordfish have recovered in the past few years, tournament landings of swordfish have increased.

*Shark Recreational Fishery*

Recreational landings of sharks are an important component of HMS fisheries. Recreational shark fishing with rod and reel is a popular sport at all social and economic levels, largely because the resource is accessible. Sharks can be caught virtually anywhere in salt water, depending upon the species. Recreational shark fisheries are oftentimes exploited in nearshore waters by private vessels and charter/headboats. However, there is also some shore-based fishing and some offshore fishing. The following tables provide a summary of landings for each of the three species groups. Amendment 1 to the 1999 Atlantic Tunas, Swordfish, and Shark FMP limited the recreational fishery to rod and reel and handline gear only.

**Table 3.44 Estimates of Total Recreational Harvest of Atlantic Sharks: 1998-2004 (numbers of fish in thousands).** Source: 1998-2000 (Cortés, pers. comm.); 2001-2004 (Cortés, 2005a; 2005b). Estimates for 2001-2004 do not include prohibited species.

| | | | | | | | **2004** |
|---|---|---|---|---|---|---|---|
| LCS | 169.6 | 92.3 | 131.5 | 127.9 | 76.3 | 86.1 | 66.3 |
| Pelagic | 11.8 | 11.1 | 13.3 | 3.8 | 4.7 | 4.3 | 5.1 |
| SCS | 175.1 | 125.7 | 197.8 | 211.6 | 154.6 | 134.7 | 128.5 |
| Unclassified | 8.0 | 6.9 | 11.0 | 22.2 | 5.3 | 18.1 | 27.3 |

**Table 3.45 Recreational Harvest of Atlantic Large Coastal Sharks (LCS) by Species, in number of fish: 1998-2004.** Sources: 1998-2000 (Cortés, pers. comm.); 2001-2004 (Cortés, 2005a; 2005b). Total estimates for 2001-2004 do not include prohibited species.

| | | | | | | | **2004** |
|---|---|---|---|---|---|---|---|
| Basking** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bignose* | 0 | 0 | 0 | 0 | 0 | 0 | 71 |
| Bigeye sand tiger** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Blacktip | 83,045 | 35,585 | 69,668 | 48,757 | 38,237 | 40,442 | 31,197 |
| Bull | 1,663 | 3,150 | 6,116 | 4,151 | 1,893 | 3,344 | 4,885 |
| Caribbean Reef* | 74 | 3 | 122 | 0 | 741 | 0 | 692 |
| Dusky* | 4,499 | 5,570 | 2,501 | 5,583 | 1,047 | 2,731 | 0 |
| Galapagos* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hammerhead, Great | 476 | 388 | 925 | 3,382 | 4 | 68 | 9 |
| Hammerhead, Scalloped | 2,052 | 1,367 | 3,433 | 1,087 | 1,061 | 2,816 | 714 |
| Hammerhead, Smooth | 375 | 1 | 2 | 703 | 2 | 1 | 0 |
| Hammerhead, Unclassified | 390 | 75 | 3,675 | 0 | 5,293 | 0 | 0 |
| Lemon | 2,161 | 173 | 2,785 | 5,488 | 3,454 | 4,879 | 5,710 |
| Night* | 133 | 50 | 24 | 0 | 0 | 0 | 0 |
| Nurse | 2,455 | 1,503 | 2,233 | 3,672 | 2,680 | 647 | 3,594 |
| Sandbar | 35,766 | 20,602 | 10,878 | 36,094 | 8,324 | 5,185 | 3,843 |
| Sand tiger** | 0 | 0 | 0 | 604 | 0 | 0 | 0 |

| | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|
| Silky | 5,376 | 3,863 | 5,120 | 3,808 | 1,780 | 1,998 | 502 |
| Spinner | 10,805 | 6,361 | 5,402 | 3,651 | 3,835 | 4,460 | 3,380 |
| Tiger | 1,380 | 153 | 1,480 | 758 | 170 | 110 | 1 |
| Whale** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| White** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Large Coastal Unclassified | 18,979 | 13,444 | 17,102 | 16,211 | 9,535 | 22,086 | 12,466 |
| Total: | 169,62 | 92,288 | 131,466 | 134,045 | 76,294 | 86,036 | 66,301 |

*indicates species that were prohibited in the recreational fishery as of July 1, 1999.
** indicates species that were prohibited as of April 1997.

**Table 3.46 Recreational Harvest of Atlantic Pelagic Sharks by Species, in number of fish: 1998-2004.** Sources: 1998-2000 (Cortés, pers. comm.); 2001-2004 (Cortés, 2005a; 2005b). Total estimates for 2001-2004 do not include prohibited species**.**

| | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|
| Bigeye thresher* | 0 | 0 | 0 | 0 | 65 | 0 | 0 |
| Bigeye sixgill* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Blue Shark | 6,085 | 5,218 | 7,010 | 950 | 0 | 376 | 0 |
| Mako, Longfin* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mako, Shortfin | 5,633 | 1,383 | 5,813 | 2,871 | 3,206 | 3,957 | 5,144 |
| Mako, Unclassified | 8 | 9 | 0 | 0 | 0 | 0 | 0 |
| Oceanic whitetip | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Porbeagle | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sevengill* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sixgill* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Thresher | 36 | 4,512 | 528 | 0 | 1,467 | 0 | 0 |
| Total: | 11,762 | 11,122 | 13,351 | 3,821 | 4,673 | 4,333 | 5,144 |

* indicates species that were prohibited in the recreational fishery as of July 1, 1999.

**Table 3.47 Recreational Harvest of Atlantic SCS by Species, in number of fish: 1998-2004.** Source: 1998-2000 (Cortés, pers. comm.); 2001-2004 (Cortés, 2005a; 2005b). Total estimates for 2001-2004 do not include prohibited species.

| | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|
| Atlantic Angel* | 110 | 0 | 0 | 0 | 0 | 0 | 0 |
| Blacknose | 10,523 | 6,049 | 9,795 | 15,179 | 11,416 | 6,705 | 15,126 |
| Bonnethead | 29,147 | 38,835 | 56,142 | 58,511 | 50,903 | 39,863 | 42,354 |
| Finetooth | 139 | 78 | 1,438 | 6,701 | 2,942 | 1,774 | 581 |
| Sharpnose, Atlantic | 135,137 | 80,694 | 130,371 | 131,165 | 89,365 | 86,340 | 70,469 |
| Sharpnose, Caribbean* | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Smalltail* | 0 | 4 | 26 | 26 | 0 | 0 | 11 |
| Total: | 175,056 | 125,660 | 197,772 | 211,582 | 154,626 | 134,682 | 128,530 |

*indicates species that were prohibited in the recreational fishery as of July 1, 1999.

### 3.4.4.3 Bycatch Issues and Data Associated with the Fishery

Bycatch in the recreational rod and reel fishery is difficult to quantify because many fishermen value the experience of fishing and may not be targeting a particular pelagic species. Recreational "marlin" or "tuna" trips may yield dolphin, tunas, wahoo, and other species, both undersized and legal sized. Bluefin tuna trips may yield undersized bluefin, or a seasonal closure may prevent landing of a bluefin tuna above a minimum or maximum size. In some cases, therefore, rod and reel catch may be discarded. The Magnuson-Stevens Act (16 USC 1802 (2)) stipulates that bycatch does not include fish under recreational catch-and-release.

The 1999 Billfish Amendment established a catch-and-release fishery management program for the recreational Atlantic billfish fishery. As a result of this program, all Atlantic billfish that are released alive, regardless of size, are not considered bycatch. NMFS believes that establishing a catch-and-release fishery in this situation will further solidify the existing catch-and-release ethic of recreational billfish fishermen, and thereby increase release rates of billfish caught in this fishery. Current billfish release rates range from 89 to 99 percent. The recreational white shark fishery is by regulation a catch-and-release fishery only and white sharks are not considered bycatch.

Bycatch can result in death or injury to discarded fish. Therefore, bycatch mortality should be incorporated into fish stock assessments, and into the evaluation of management measures. Rod and reel discard estimates from Virginia to Maine during June – October could be monitored through the expansion of survey data derived from the LPS (dockside and telephone surveys). However, the actual numbers of fish discarded for many species are so low that presenting the data by area could be misleading, particularly if the estimates are expanded for unreported effort in the future. The number of kept and released fish reported or observed through the LPS dockside intercepts for 1997 – 2004 is presented in Table 3.48.

Outreach programs to address bycatch were included in the 1999 FMP and the Billfish Amendment. These programs have not yet been implemented, but the preparation of program designs is currently in progress. One of the key elements in the outreach program will be to provide information that leads to an improvement in post-release survival from both commercial and recreational gear. Additionally, an outreach program to encourage the use of circle hooks to increase post-release survival within HMS fisheries was introduced in a proposed rule published in 2001 (66 FR 66386, December 26, 2001). The final rule to promote the voluntary use of circle hooks published in 2003 (68 FR 711, January 7, 2003). Initial implementation of the outreach program began in 2004 with workshops conducted on the proper handling and release of sea turtles.

A study by Graves *et al.* (2002), investigated short-term (five days) post-release mortality of Atlantic blue marlin using pop-up satellite tag technology. A total of nine recreationally caught blue marlin were tagged and released during July and August of 1999. All hooks employed in the study were "J" hooks. The attached tags were programmed to detach from the fish after five days and to record direct temperature and inclination of the buoyant tag to determine if the fish were actively swimming after being released. After detachment, the tags floated to the surface and began transmitting recorded position, temperature and inclination data to satellites of the Argos™ system. Three different lines of evidence provided by the tags (movement, water temperature, and tag inclination) suggested that at least eight of the nine blue marlin survived for five days after being tagged and released. One of the tags did not transmit any data, which precluded the derivation of a conclusion regarding the tagged marlin's survival.

This study was continued in 2003 for white marlin to evaluate post release survival and habitat use (NMFS, 2004). Pop-up satellite archival tags (PSATs) were used to estimate survival of white marlin released from four locations in the western North Atlantic recreational fishery. Forty-one tags were attached to white marlin caught using dead baits rigged on straight-shank ("J") hooks (n=21) or circle hooks (n=20) offshore of the U.S. Mid-Atlantic, the Dominican Republic, Mexico, and Venezuela. Survival was significantly higher ($p<0.01$) for white marlin caught on circle hooks (100 percent) relative to those caught on straight-shank ("J") hooks (65 percent). These results, along with previous studies on circle hook performance, suggest that a simple change in hook type can significantly increase the survival of white marlin released from recreational fishing gear. Data from these short term deployments also suggest that white marlin strongly associated with warm, near surface waters. However, based on the frequency, persistence, and patterns of vertical movements, white marlin appear to direct a considerable proportion of foraging effort well below surface waters, a behavior that may account for relatively high catch rates of white marlin on some pelagic longline sets.

**Table 3.48 Observed or reported number of HMS kept [1] and released in the rod and reel fishery, Maine through Virginia, 1997-2004.** Source: Large Pelagic Survey (LPS) Preliminary Data.

| | | | | | | | | | **Number of Fish Released Alive** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | **2004** |
| White Marlin [2] | 7 | 11 | 6 | 2 | 5 | 8 | 12 | 6 | 203 | 465 | 156 | 59 | 118 | 215 | 160 | 378 |
| Blue Marlin[2] | 3 | 3 | 3 | 0 | 1 | 0 | 4 | 5 | 30 | 27 | 28 | 17 | 14 | 30 | 39 | 80 |
| Sailfish[2] | 0 | 1 | 0 | 6 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 0 | 2 | 6 | 6 | 2 |
| Swordfish | 5 | 1 | 3 | 14 | 1 | 5 | 9 | 9 | 6 | 5 | 1 | 5 | 10 | 6 | 21 | 22 |
| Giant Bluefin Tuna [3] | 51 | 69 | 56 | 34 | 20 | 176 | 58 | 50 | 6 | 11 | 6 | 0 | 0 | 8 | 0 | 3 |
| Large Medium Bluefin Tuna[3] | 6 | 26 | 13 | 3 | 7 | 11 | 11 | 13 | 3 | 8 | 5 | 3 | 6 | 2 | 0 | 36 |
| Small Medium Bluefin Tuna | 28 | 19 | 8 | 30 | 87 | 62 | 83 | 30 | 34 | 26 | 44 | 37 | 5 | 8 | 13 | 21 |
| Large School Bluefin Tuna | 60 | 134 | 106 | 95 | 457 | 391 | 287 | 291 | 158 | 67 | 42 | 22 | 128 | 47 | 40 | 107 |
| School Bluefin | 1,000 | 392 | 212 | 151 | 338 | 556 | 509 | 927 | 840 | 412 | 136 | 159 | 58 | 200 | 174 | 1,297 |
| Young School Bluefin | 5 | 13 | 1 | 4 | 0 | 7 | 4 | 16 | 139 | 581 | 94 | 23 | 40 | 182 | 10 | 1,885 |
| Bigeye Tuna | 26 | 17 | 27 | 16 | 9 | 32 | 21 | 46 | 6 | 9 | 0 | 0 | 8 | 1 | 3 | 2 |
| Yellowfin Tuna | 2,472 | 2,646 | 2,501 | 2,366 | 2,423 | 2,595 | 3,216 | 3,858 | 222 | 645 | 682 | 97 | 74 | 328 | 200 | 1,093 |
| Skipjack Tuna | 296 | 261 | 146 | 32 | 100 | 117 | 681 | 197 | 468 | 267 | 88 | 69 | 130 | 250 | 526 | 362 |
| Albacore | 146 | 558 | 133 | 513 | 302 | 534 | 546 | 1,458 | 43 | 92 | 52 | 17 | 52 | 95 | 31 | 66 |
| Thresher Shark | 7 | 7 | 3 | 2 | 5 | 20 | 24 | 58 | 2 | 2 | 2 | 1 | 0 | 5 | 8 | 27 |
| Mako Shark | 74 | 78 | 49 | 49 | 27 | 72 | 141 | 216 | 94 | 92 | 49 | 114 | 65 | 120 | 208 | 350 |
| Sandbar Shark | 5 | 2 | 2 | 1 | 2 | 0 | 9 | 7 | 30 | 56 | 6 | 4 | 10 | 17 | 26 | 68 |
| Dusky Shark | 6 | 6 | 1 | 0 | 0 | 1 | 0 | 0 | 50 | 54 | 7 | 32 | 8 | 9 | 0 | 60 |
| Tiger Shark | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 5 | 5 | 0 | 3 | 2 | 3 | 12 | 0 |
| Porbeagle | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 6 | 0 | 0 | 0 | 14 | 3 | 1 |
| Blacktip Shark | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 5 | 0 | 0 | 6 | 0 | 1 |
| Atlantic | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | Number of Fish Released Alive | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | 2004 |
| Sharpnose Shark | | | | | | | | | | | | | | | | |
| Blue Shark | 27 | 26 | 11 | 12 | 2 | 36 | 65 | 74 | 1,897 | 780 | 572 | 374 | 141 | 505 | 2,061 | 2,242 |
| Hammerhead Shark | 2 | 1 | 1 | 1 | 2 | 0 | 0 | 1 | 4 | 4 | 5 | 0 | 1 | 6 | 38 | 2 |
| Wahoo | 10 | 71 | 45 | 41 | 34 | 49 | 68 | 110 | 1 | 2 | 0 | 0 | 13 | 6 | 3 | 5 |
| Dolphin | 1,022 | 7,263 | 2,139 | 955 | 1,294 | 2,509 | 4,209 | 3,050 | 61 | 194 | 73 | 48 | 108 | 111 | 677 | 192 |
| King Mackerel | 171 | 198 | 141 | 289 | 19 | 36 | 66 | 11 | 1 | 10 | 8 | 24 | 10 | 5 | 5 | 1 |
| Atlantic Bonito | 384 | 328 | 254 | 194 | 77 | 704 | 315 | 410 | 203 | 300 | 166 | 27 | 49 | 176 | 282 | 389 |
| Little Tunny | 428 | 1,231 | 97 | 139 | 48 | 240 | 121 | 231 | 1,015 | 1,507 | 133 | 118 | 118 | 585 | 443 | 1,130 |
| Amberjack | 3 | 6 | 9 | 6 | 19 | 7 | 44 | 0 | 18 | 40 | 24 | 20 | 14 | 57 | 111 | 1 |
| Spanish Mackerel | 0 | 2 | 1 | 13 | 3 | 5 | 35 | 9 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |

[1] NMFS typically expands these "raw" data to report discards of bluefin tuna by the rod and reel fishery to ICCAT. If sample sizes are large enough to make reasonable estimates for other species, NMFS may produce estimates for other species in future SAFE reports.
[2] Amendment One to the Atlantic Billfish FMP established billfish released in the recreational fishery as a "catch-and-release" program, thereby exempting these fish from bycatch considerations.
[3] Includes some commercial handgear landings.

### 3.4.4.4 Safety Issues Associated with the Fishery

The USCG does not maintain statistics on boating accidents, rescue, or casualty data specifically pertaining to recreational fishing as it does for the commercial industry. As a result, the 1999 FMP and the Billfish Amendment contain only minimal safety information regarding recreational HMS fisheries. Safety issues associated with handline fisheries for tunas are discussed in Section 3.4.4.4. The USCG compiles statistics on the total number of recreational boating accidents and casualties, independent of the activity or fishery in which they are engaged (Table 3.49). Two common situations often place recreational boaters in potential danger. Individuals in small vessels often venture out farther than their vessels are designed to travel without proper navigational equipment, and may encounter rougher water than their boats are designed to withstand. Since fishermen targeting HMS species, particularly marlin, often travel 75 to 100 miles offshore, having a properly equipped vessel of adequate size is very important for the safety of recreational HMS constituents. Additionally, as the recreational swordfish fishery off the southeastern coast of Florida occurs at night and usually in small boats ranging from 23 to 40 feet in length, it presents other unique risks. Shipping traffic regularly runs through the recreational swordfish fleet, which could lead to incidents if someone is not on watch at all times. Another frequent safety concern of the Coast Guard is when someone is up in the flying bridge. Both of these situations can lead to people falling overboard. In 2004, approximately 72 percent of all boating casualties were due to drowning and in 89 percent of the drowning deaths, the victim was not wearing a personal floatation device (PFD) (Table 3.50).

**Table 3.49 Total 2004 Reported Boating Accident Types.** Source: USCG Boating Statistics, 2004.

| | | | | Total Property Damage |
|---|---|---|---|---|
| Capsizing | 393 | 229 | 184 | $2,267,043 |
| Carbon Monoxide | 12 | 28 | 3 | $0 |
| Collision with Fixed Object | 525 | 382 | 46 | $4,271,785 |
| Collision with Floating Object | 95 | 62 | 6 | $499,692 |
| Vessel Collision | 1,479 | 999 | 68 | $8,037,552 |
| Departed Vessel | 19 | 10 | 9 | $0 |
| Ejected from Vessel | 45 | 32 | 16 | $244,500 |
| Falls within Boat | 176 | 189 | 3 | $106,496 |
| Falls on PWC | 50 | 49 | 2 | $27,433 |
| Fall Overboard | 488 | 339 | 199 | $288,205 |
| Fire/Explosion (fuel) | 162 | 89 | 4 | $8,297,780 |
| Fire/Explosion (other than fuel) | 56 | 14 | 1 | $2,462,181 |
| Flooding or Swamping | 257 | 81 | 52 | $1,853,848 |
| Grounding | 215 | 159 | 5 | $2,488,744 |

| | | | | Total Property Damage |
|---|---|---|---|---|
| Other Casualty | 69 | 56 | 3 | $93,200 |
| Sinking | 131 | 30 | 10 | $2,507,989 |
| Skier Mishap | 380 | 388 | 7 | $25,050 |
| Struck by Boat | 108 | 96 | 6 | $158,719 |
| Struck by Motor | 64 | 61 | 5 | $500 |
| Struck Submerged Object | 102 | 32 | 8 | $974,112 |
| **Total** | **4,904** | **3,363** | **676** | **$35,038,306** |

**Table 3.50 Overall 2004 Reported Boating Accident Cause-of-Death Statistics.** Source: USCG Boating Statistics, 2004.

| | | **PFD Worn** | |
|---|---|---|---|
| | | | **No** |
| Carbon Monoxide Poisoning | 2 | 0 | 2 |
| Drowning | 484 | 53 | 431 |
| Hypothermia | 10 | 3 | 7 |
| Other | 32 | 11 | 21 |
| Trauma | 114 | 50 | 64 |
| Unknown | 34 | 6 | 28 |
| **Total** | **676** | **123** | **553** |

### 3.4.4.5 U.S. vs. International Catch

Important directed recreational fisheries for HMS occur in the United States, Venezuela, the Bahamas, and Brazil. Many other countries and entities in the Caribbean and the west coast of Africa are also responsible for significant HMS recreational landings. Directed recreational fisheries for sailfish occur in the Western Atlantic and include the United States, Venezuela, the Bahamas, Brazil, Dominican Republic, Mexico, and other Caribbean nations. However, of these countries, the United States is the only country that currently reports recreational landings to ICCAT. Therefore, a comparison of the percentage of U.S. landings relative to recreational fisheries in other countries is not possible. Further, total landings data are incomplete because many countries that reported landings in 1996 failed to report their 1998 and 1999 landings, which hampered the 2000 Atlantic marlin stock assessments, as well.

As part of a 1997 SCRS survey, 12 ICCAT member countries as well as Chinese Taipei and Senegal provided information on the existence of, and level of data collection for, recreational and artisinal fisheries. The survey results indicated that Brazil, Canada, France, Italy, Morocco, UK, Bermuda, and the United States have recreational fisheries in the ICCAT area of concern. Levels of data collection varied widely from country to country, making any comparison of catch levels difficult and potentially inaccurate. The wide range of recreational catches across nations and species warrants further exploration of potential data sources and the feasibility of increased recreational monitoring.

At the 1999 ICCAT meeting in Rio de Janeiro, Brazil, the Commission adopted a resolution to improve the quantity and quality of recreational data collection. Recreational fisheries were to be discussed and assessed in each country's National Report beginning in the year 2000. In addition, the SCRS was called upon to examine the impact of recreational fishing on tuna and tuna-like species. At this time additional information is not available regarding international HMS recreational catches.

At the 2004 ICCAT meeting in New Orleans, U.S., the Commission adopted a recommendation concerning prohibited gear in the sport and recreational fisheries in the Mediterranean Sea (04-12). Prohibited gear includes towed and encircling nets, seine sliding, dredgers, gill nets, trammel net and longline to fish for tuna and tuna-like species. The recommendation also prohibits the sale of sport and recreational tuna and tuna-like species and stipulates that data on these fisheries be collected and transmitted to the SCRS.

### 3.4.5 Bottom Longline

#### 3.4.5.1 Domestic History and Current Management

In 1993, NMFS implemented the FMP for Sharks of the Atlantic Ocean, which established three management units: large coastal sharks (LCS), small coastal sharks (SCS), and pelagic sharks. At that time, NMFS identified LCS as overfished, and implemented commercial quotas for LCS and established recreational harvest limits for all sharks. In 2003, NMFS amended the measures enacted in the 1999 FMP based on the 2002 LCS and SCS stock assessments, litigation, and public comments. Implementing regulations for Amendment 1 to the 1999 FMP were published on December 24, 2003 (68 FR 74746). Management measures enacted in the amendment included: re-aggregating the large coastal shark complex, using maximum sustainable yield (MSY) as a basis for setting commercial quotas, eliminating the commercial minimum size restrictions, establishing three regional commercial quotas (Gulf of Mexico, South Atlantic, and North Atlantic) for LCS and SCS management units, implementing trimester commercial fishing seasons effective January 1, 2005, imposing gear restrictions to reduce bycatch, and a time/area closure off the coast of North Carolina effective January 1, 2005. As a result of using MSY to establish quotas, and implementing a new rebuilding plan, the overall annual landings quota for LCS in 2004 was established at 1,017 metric tons (mt) dressed weight (dw). The overall annual landings quota for SCS was established at 454 mt dw and the pelagic, blue, and porbeagle shark quotas were established at 488 mt dw, 273 mt dw, and 92 mt dw, respectively.

The regional quotas which were established in Amendment 1 to the 1999 HMS FMP for LCS and SCS were intended to improve overall management of the stocks by tailoring quotas to specific regions based on landings information. These quotas were based upon average historical landings (1999 – 2001) from the canvass and quota monitoring databases. The canvass database provides a near-census of the landings at major dealers in the southeast United States (including state landings) and the quota monitoring database collects information from dealers in the South Atlantic and Gulf of Mexico.

On November 30, 2004, NMFS issued a final rule (69 FR 69537), which established, among other things, new regional quotas based on updated landings information from 1999 –

2003. This final rule did not change the overall quotas for LCS, SCS, and pelagic sharks established in Amendment 1 to the 1999 HMS FMP, but did revise the percentages allocated to each of the regions. The updated information was based on several different databases, including the canvass and quota monitoring databases, the Northeast Commercial Fisheries Database (CFDBS), and the snapper grouper logbook. The new regional quotas and trimester seasons for the commercial Atlantic shark fishery became effective January 1, 2005.

Commercial shark fishing effort is generally concentrated in the southeastern United States and Gulf of Mexico (Cortes and Neer, 2002). During 1997 – 2003, 92 – 98 percent of LCS, 38 – 49 percent of pelagic sharks, and nearly all SCS (80 – 100 percent) came from the southeast region (Cortes, pers. comm.). McHugh and Murray (1997) found in a survey of shark fishery participants that the largest concentration of bottom longline fishing vessels is found along the central Gulf coast of Florida, with the John's Pass - Madeira Beach area considered the center of directed shark fishing activities. Consistent with other HMS fisheries, some shark fishery participants move from their homeports to other fishing areas as the seasons change and fish stocks move.

The Atlantic bottom longline fishery targets both LCS and SCS. Bottom longline is the primary commercial gear employed in the LCS and SCS fisheries in all regions. Gear characteristics vary by region, but in general, an approximately ten-mile long bottom longline, containing about 600 hooks, is fished overnight. Skates, sharks, or various finfishes are used as bait. The gear typically consists of a heavy monofilament mainline with lighter weight monofilament gangions. Some fishermen may occasionally use a flexible 1/16 inch wire rope as gangion material or as a short leader above the hook.

#### 3.4.5.2 Recent Catch and Landings Data

The following section provides information on shark landings as reported in the shark bottom longline observer program. For recent catch and landings data for the shark fishery as a whole, which includes landings from BLL and other gears combined, please refer to Section 3.4.7. In January 2002, the observer coverage requirements in the shark bottom longline fishery changed from voluntary to mandatory participation if selected. NMFS selects approximately 40 - 50 vessels for observer coverage during each season. Vessels are randomly selected if they have a directed shark limited access permit, have reported landings from sharks during the previous year, and have not been selected for observer coverage during each of the three previous seasons.

The U.S. Atlantic commercial shark bottom longline fishery has been monitored by the University of Florida and Florida Museum of Natural History, Commercial Shark Fishery Observer Program (CSFOP) since 1994. In June 2005, responsibility for the observer program was transferred to the Southeast Fisheries Science Center's Panama City Laboratory. The observer program trains and places the observers aboard vessels in the directed shark bottom longline fishery in the Atlantic and Gulf of Mexico to collect data on the commercial shark fishery and thus improve overall management strategies for the fishery. Observers provide baseline characterization information, by region, on catch rates, species composition, catch disposition, relative abundance, and size composition within species for the large coastal and small coastal shark bottom longline fisheries.

During 2003, six observers logged 263 sea days on shark fishing trips aboard 20 vessels in the Atlantic from North Carolina to Florida and in the eastern Gulf of Mexico off Florida. The number of trips taken on each vessel ranged from one to five and the number of sea days each observer logged ranged from nine to 35. Observers documented the catches and fishing effort on approximately 150 longline sets that fished 103,351 hooks. During 2004, five observers logged 196 sea days on 56 shark fishing trips aboard 11 vessels. Observers documented the catches and fishing effort during 120 longline sets that fished 90,980 hooks.

Data from the shark observer program between 2000 and 2002 show that LCS comprised 66.2 percent of the total catch (Burgess and Morgan, 2002). During 2003, LCS comprised 68.4 percent of the total catch, and in 2004 LCS comprised 66.7 percent of the total catch. Sandbar sharks dominated the observed catches with 30.6 percent of total LCS catch in 2003 and 26.6 percent in 2004 (Table 3.52). The overall catch and disposition of species for 2004 is listed in Table 3.53. Regional differences in sandbar shark abundance were evident. For example, in the Carolina region, sandbar sharks comprised 67.4 percent of the total catch and 77.2 percent of the large coastal shark catch. In the Florida Gulf region, sandbar sharks comprised 62.0 percent of the total catch and 66.5 percent of the large coastal catch, whereas in the Florida East Coast region, sandbar sharks comprised only 17.2 percent of the total observed catch, and 37.1 percent of the large coastal shark catch (Burgess and Morgan, 2003). Blacktip sharks comprised 13.9 percent of total observed catch and 20.3 percent of the large coastal catch (Burgess and Morgan, 2002). Tiger sharks comprised 7.5 percent of the total observed catch and 11.0 percent of the large coastal shark catch. A majority of tiger sharks (71.7 percent) and nurse sharks (98.8 percent) were tagged and released.

During 2003, shark observer program data indicate that SCS comprised 28.0 percent of the total observed catch (Burgess and Morgan, 2003; Burgess and Morgan 2004). Atlantic sharpnose shark dominated the SCS catch (80.3 percent). The remainder of the small coastal catch consisted of blacknose sharks (5.5 percent), bonnethead (0.03 percent), and finetooth (0.02 percent)(Table 3.52). In previous seasons, the Atlantic sharpnose shark was the most frequently caught shark in the Florida East Coast region and accounted for 51.6 percent of the total observed catch, and 96.0 percent of the small coastal catch in that region (Burgess and Morgan, 2002).

Bottom longlining for sharks has relatively low observed bycatch rates. Historically, finfish bycatch has averaged approximately five percent in the bottom longline fishery. Finfish bycatch for the bottom longline fishery includes, but is not limited to, skates, rays, cobia, redfish, bluefish, and great barracuda. During the second semi-annual season of 2003, observer data indicate that approximately 4,320 sharks were caught compared to 432 other fish, four invertebrates, and three sea turtles (Burgess and Johns, 1999). In terms of bycatch rates, observed shark catches constitute 91 percent of the 4,759 total animals caught, with other fish comprising 10 percent, invertebrates less than .01 percent, and sea turtles less than .01 percent. For more information on bycatch see Section 3.8.

#### 3.4.5.3 Bottom Longline Bycatch

Under the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 et seq.) the Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities), and the shark bottom longline as Category III (remote likelihood or no known serious injuries or mortalities) (July 20, 2004, 69 FR 43338). On October 29, 2003, NMFS issued a biological opinion (BiOp) pursuant to the Endangered Species Act (ESA) regarding Atlantic shark fisheries. This BiOp concluded that the level of anticipated take in the Atlantic shark fishery resulting from measures implemented in Amendment 1 to the 1999 FMP (68 FR 74746), were not likely to jeopardize the continued existence of endangered green, leatherback, and Kemp's ridley sea turtles, the endangered smalltooth sawfish, or the threatened loggerhead sea turtle. Furthermore, it concluded that the actions in the rule were not likely to adversely affect marine mammals. As a result of this conclusion, NMFS (NMFS, 2003) anticipates that the continued operation of the shark bottom longline fishery will result in a five year total incidental take of the following numbers of sea turtles: Leatherback – 172; loggerhead – 1,370; a total of 30 in any combination of hawksbill, green, and Kemp's ridley sea turtles. NMFS also anticipates a five year take of 261 smalltooth sawfish, of which no lethal takes are expected. If the actual calculated incidental captures or mortalities exceed the incidental take statement, a formal consultation for that gear type must be re-initiated immediately. More information is available in Amendment 1 to the 1999 FMP and the October 2003 BiOp and is not repeated here.

*Loggerhead Sea Turtles*

In the bottom longline fishery, a total of 65 sea turtles were observed caught from 1994 through 2006 (Table 3.54 Table 3.55 and Figure 3.31). Seasonal variation indicates that most of the sea turtles were caught early in the year. Of the 65 observed sea turtles, 50 were loggerhead sea turtles, of which 26 were released alive. Another nine loggerheads were released in an unknown condition and eight were released dead. Based on extrapolation of observer data in Amendment 1 to the 1999 FMP, it was estimated that a total of 2,003 loggerhead sea turtles were taken in the shark bottom longline fishery from 1994 through 2002 (NMFS, 2003a). An additional 503 unidentified sea turtles were estimated to have been taken. On average, 222 loggerhead sea turtles and 56 unidentified sea turtles were estimated to have been taken annually during this time period in the shark bottom longline fishery.

*Leatherback Sea Turtles*

Of the 65 observed sea turtle interactions in the bottom longline fishery from 1994 – 2006, six were leatherback sea turtles of which one was dead and three were released with their condition unknown (Table 3.54 Table 3.55 and Figure 3.31). Based on extrapolation of observer data done for Amendment 1 to the FMP, it was estimated that 269 leatherback sea turtles were taken in the shark bottom longline fishery from 1994 through 2002 (NMFS, 2003a). On average, 30 leatherback sea turtle interactions occurred each year in the shark bottom longline fishery during this period. This analysis only estimates takes without discriminating between live and dead releases. Of the observed leatherback takes, approximately 25 percent were lethal. Applying the observed mortality rate of 25 percent to the total leatherback takes and an additional 42 percent post-release mortality estimate due to hook ingestion to the remaining, results in an estimated total number of leatherbacks killed as a result of the interaction with bottom longline gear at 17 per year. The leatherback mortality is very conservative because it is known that leatherbacks rarely ingest or bite hooks, but are usually foul hooked on their flippers or carapaces, reducing the likelihood of post-hooking release mortality. However, leatherback-specific data for this fishery is not available and therefore the most conservative estimate is used.

*Smalltooth Sawfish*

As of April 1, 2003, NMFS listed smalltooth sawfish as an endangered species (68 FR 15674) under the ESA. After reviewing the best scientific and commercial information, the status review team determined that the continued existence of the U.S. Distinct Population Segment of smalltooth sawfish was in danger of extinction throughout all or a significant portion of its range from a combination of the following four listing factors: the present or threatened destruction, modification, or curtailment of habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence. NMFS is working on designating critical habitat for smalltooth sawfish.

Sawfish have been observed caught (12 known interactions, 11 released alive, one released in unknown condition) in shark bottom longline fisheries from 1994 through 2006 (Morgan pers. comm., Burgess and Morgan, 2004; Carlson ) (Figure 3.32). Based on these observations, expanded sawfish take estimates for 1994 – 2002 were developed for the shark bottom longline fishery (NMFS, 2003a). A total of 466 sawfish were estimated to have been taken in this fishery from 1994 – 2002, resulting in an average of 52 per year. All but one of the observed sawfish was released alive.

*Marine Mammals*

Four delphinids have been observed caught and released alive between 1994 and 2004 (G. Burgess, pers. comm.). Bycatch estimates for the shark bottom longline fishery have not been extrapolated for marine mammals.

*Seabirds*

Bycatch of seabirds in the shark bottom longline fishery has been virtually non-existent. A single pelican has been observed killed from 1994 through 2005. The pelican was caught in January 1995 off the Florida Gulf Coast (between 25° 18.68 N, 81° 35.47 W and 25° 19.11 N, 81° 23.83 W) (G. Burgess, University of Florida, pers. comm., 2001). No expanded estimates of seabird bycatch or catch rates are available for the bottom longline fishery.

**Table 3.51 Species composition of observed bottom longline catch during 2003.** Source: Burgess and Morgan, 2004.

| | | | % Management Category |
|---|---|---|---|
| **Large Coastal Sharks** | | | |
| Sandbar shark | 2719 | 30.63 | 44.78 |
| Blacktip shark | 1232 | 13.88 | 20.29 |
| Tiger shark | 665 | 7.49 | 10.95 |
| Spinner shark | 309 | 3.48 | 5.09 |
| Scalloped hammerhead | 259 | 2.92 | 4.27 |
| Bull shark | 257 | 2.90 | 4.23 |
| Nurse shark | 175 | 1.97 | 2.88 |
| Sand tiger | 108 | 1.22 | 1.78 |

| | | | % Management Category |
|---|---|---|---|
| Dusky shark | 108 | 1.22 | 1.78 |
| Silky shark | 105 | 1.18 | 1.73 |
| Lemon shark | 60 | 0.68 | 0.99 |
| Great hammerhead | 55 | 0.62 | 0.91 |
| Bignose shark | 8 | 0.09 | 0.13 |
| Night shark | 8 | 0.09 | 0.13 |
| White shark | 3 | 0.03 | 0.05 |
| Caribbean shark | 1 | 0.01 | 0.02 |
| **Total** | 6072 | 68.41 | 100 |
| | | | |
| **Small Coastal Sharks** | | | |
| Atlantic sharpnose shark | 1996 | 22.49 | 80.32 |
| Blacknose shark | 484 | 5.45 | 19.48 |
| Bonnethead | 3 | 0.03 | 0.12 |
| Finetooth | 2 | 0.02 | 0.08 |
| **Total** | 2485 | 28.00 | 100.00 |
| | | | |
| **Pelagic Sharks** | | | |
| Sevengill | 5 | 0.06 | 45.45 |
| Shortfin mako | 2 | 0.02 | 18.18 |
| Bigeye sixgill | 2 | 0.02 | 18.18 |
| Bigeye thresher shark | 1 | 0.01 | 9.09 |
| Sixgill shark | 1 | 0.01 | 9.09 |
| **Total** | 11 | 0.12 | 100.00 |
| | | | |
| **Dogfish/Other Sharks** | | | |
| Smooth dogfish | 298 | 3.36 | |
| Unidentified sharks | 10 | 0.113 | |

**Table 3.52 Species composition of observed bottom longline catch during 2004.** Source: Burgess and Morgan, 2005.

| | | | % Management Category |
|---|---|---|---|
| **Large Coastal Sharks** | | | |
| Sandbar shark | 2157 | 26.6 | 39.8 |
| Blacktip shark | 1107 | 13.6 | 20.4 |
| Tiger shark | 972 | 12.0 | 18.0 |
| Nurse shark | 440 | 5.4 | 8.1 |
| Silky shark | 254 | 3.1 | 4.7 |
| Scalloped hammerhead | 155 | 1.9 | 2.9 |
| Bull shark | 108 | 1.3 | 2.0 |
| Great hammerhead | 92 | 1.1 | 1.7 |

| | | | % Management Category |
|---|---|---|---|
| Dusky shark | 54 | 0.7 | 1.0 |
| Night shark | 42 | 0.5 | 0.8 |
| Lemon shark | 17 | 0.2 | 0.3 |
| Sandtiger shark | 12 | 0.1 | 0.2 |
| Bignose shark | 5 | 0.1 | 0.1 |
| **Total** | 5415 | 66.7 | 100 |
| | | | |
| **Small Coastal Sharks** | | | |
| Atlantic sharpnose shark | 2231 | 27.5 | 85.8 |
| Blacknose shark | 353 | 4.3 | 13.6 |
| Bonnetheat shark | 10 | 0.1 | 0.4 |
| Finetooth shark | 5 | 0.1 | 0.2 |
| **Total** | 2599 | 32.0 | 100 |
| | | | |
| **Pelagic Sharks** | | | |
| Sevengill shark | 2 | 0.02 | 25.0 |
| Sixgill shark | 1 | 0.01 | 12.5 |
| Shortfin mako shark | 3 | 0.01 | 37.5 |
| Bigeye thresher shark | 2 | 0.02 | 25.0 |
| **Total** | 8 | 0.1 | 100 |
| | | | |
| **Dogfish Sharks** | | | |
| Smooth dogfish | 85 | 1.0 | 97.7 |
| Spiny dogfish | 2 | 0.02 | 2.3 |
| **Total** | 87 | 1.1 | 100 |
| | | | |
| **Other Sharks** | | | |
| Unidentified | 5 | 0.1 | 71.4 |
| *Carcharhinus* sp. | 2 | 0.02 | 28.6 |
| **Total** | 7 | 0.1 | 100 |

**Table 3.53 Directed bottom longline shark observed catch and disposition, 2003.** Source: Burgess and Morgan, 2004.

| | | Percent total mortality | Number Carcassed* | Percent Carcassed | Other mortality** | Percent other mortality | Number Tagged released | Percent Released |
|---|---|---|---|---|---|---|---|---|
| **Small Coastal** | 2,485 | 94.85 | 295 | 11.87 | 2,062 | 82.98 | 127 | 5.11 |
| **Large Coastal** | 6,072 | 86.68 | 4,677 | 77.03 | 586 | 9.65 | 809 | 13.32 |
| **Pelagic** | 11 | 90.91 | 2 | 18.18 | 8 | 72.73 | 1 | 9.09 |
| | | | | | | | | |
| **Large coastal sharks:** | | | | | | | | |
| Sandbar | 2,719 | 97.35 | 2,597 | 95.51 | 50 | 1.84 | 72 | 2.65 |
| Blacktip | 1,232 | 99.51 | 1,207 | 97.97 | 19 | 1.54 | 6 | 0.49 |
| Tiger | 665 | 40.60 | 41 | 6.17 | 229 | 34.44 | 395 | 59.40 |
| Spinner | 309 | 100.00 | 302 | 97.73 | 7 | 2.27 | | 0.00 |
| Scalloped hammerhead | 259 | 98.84 | 86 | 33.20 | 170 | 65.64 | 3 | 1.16 |
| Bull | 257 | 96.89 | 248 | 96.50 | 1 | 0.39 | 8 | 3.11 |
| Nurse | 175 | 0.57 | 0 | 0.00 | 1 | 0.57 | 174 | 99.43 |
| Dusky | 108 | 76.85 | 38 | 35.19 | 45 | 41.67 | 25 | 23.15 |
| Sand tiger | 108 | 0.00 | 0 | 0.00 | 0 | 0.00 | 108 | 100.00 |
| Silky | 105 | 97.14 | 78 | 74.29 | 24 | 22.86 | 3 | 2.86 |
| Lemon | 60 | 86.67 | 52 | 86.67 | 0 | 0.00 | 8 | 13.33 |
| Great hammerhead | 55 | 96.36 | 25 | 45.45 | 28 | 50.91 | 2 | 3.64 |
| Bignose | 8 | 75.00 | 3 | 37.50 | 3 | 37.50 | 2 | 25.00 |
| Night | 8 | 100.00 | 0 | 0.00 | 8 | 100.00 | | 0.00 |
| White | 3 | 33.33 | 0 | 0.00 | 1 | 33.33 | 2 | 66.67 |
| Caribbean | 1 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 |
| | | | | | | | | |
| **Small coastal sharks:** | | | | | | | | |
| Sharpnose | 1,996 | 96.24 | 14 | 0.70 | 1,907 | 95.54 | 74 | 3.71 |
| Blacknose | 484 | 89.05 | 276 | 57.02 | 155 | 32.02 | 53 | 10.95 |
| Bonnethead | 3 | 100.00 | 3 | 100.00 | 0 | 0.00 | 0 | 0.00 |
| Finetooth | 2 | 100.00 | 2 | 100.00 | 0 | 0.00 | 0 | 0.00 |
| | | | | | | | | |
| **Pelagic sharks:** | | | | | | | | |
| Bigeye thresher | 5 | 100.00 | 0 | 0.00 | 5 | 100.00 | 0 | 0.00 |
| Sevengill | 2 | 0.00 | 0 | 0.00 | 2 | 100.00 | 0 | 0.00 |
| Shortfin mako | 2 | 0.00 | 2 | 100.00 | 0 | 0.00 | 0 | 0.00 |
| Sixgill | 1 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 | 100.00 |
| Bigeye sixgill | 1 | 0.00 | 0 | 0.00 | 1 | 100.00 | 0 | 0.00 |

* Carcassed means sharks that are retained

** Other mortality refers to sharks brought to the vessel dead, but not retained

**Table 3.54 Total number of Observed Sea Turtle Interactions by Species by Month for Years 1994-2006 in the Shark Bottom Longline Fishery.** Source: Shark Bottom Longline Observer Program.

| | | | | **Total** |
|---|---|---|---|---|
| Jan | 1 | 12 | 1 | 14 |
| Feb | 3 | 10 | 6 | 19 |
| Mar | | 7 | | 7 |
| Apr | | 4 | | 4 |
| May | 1 | | | 1 |
| Jun | | | | |
| July | | 11 | | 11 |
| Aug | | 3 | | 3 |
| Sept | 1 | 2 | 1 | 4 |
| Oct | | 1 | 1 | 2 |
| Nov | | | | |
| Dec | | | | |
| **Total** | 6 | 50 | 9 | 65 |

**Table 3.55 Total number of Observed Sea Turtle Interactions by Year for Years 1994-2006 in the Shark Bottom Longline Fishery.** Source: Shark Bottom Longline Observer Program. Letters in parentheses indicate whether the sea turtle was released alive (A), dead (D), or in an unknown (U) condition.

| | | | | **Total** |
|---|---|---|---|---|
| 1994 | 1 (1U) | 5 (5U) | 6 (6U) | 12 |
| 1995 | | 4 (3A, 1D) | | 4 |
| 1996 | 1 (1U) | 6 (3A, 2D, 1U) | | 7 |
| 1997 | 1 (1U) | 5 (3A, 2U) | | 6 |
| 1998 | | 2 (1A, 1D) | 1 (1A) | 3 |
| 1999 | | 2 (2A) | | 2 |
| 2001 | 1 (1D) | 2 (2A) | | 3 |
| 2002 | | 5 (3A, 1D, 1U) | | 5 |
| 2003 | | 7 (6A, 1D) | 1 (1U) | 8 |
| 2004 | | 5 (3A, 2D) | | 5 |
| 2005 | 2 (1A, 1D) | 4 (1A, 3D) | 1 (1U) | 7 |
| 2006 | | 2 (1D, 1U) | | 3 |
| Total | 6 | 50 | 9 | 65 |

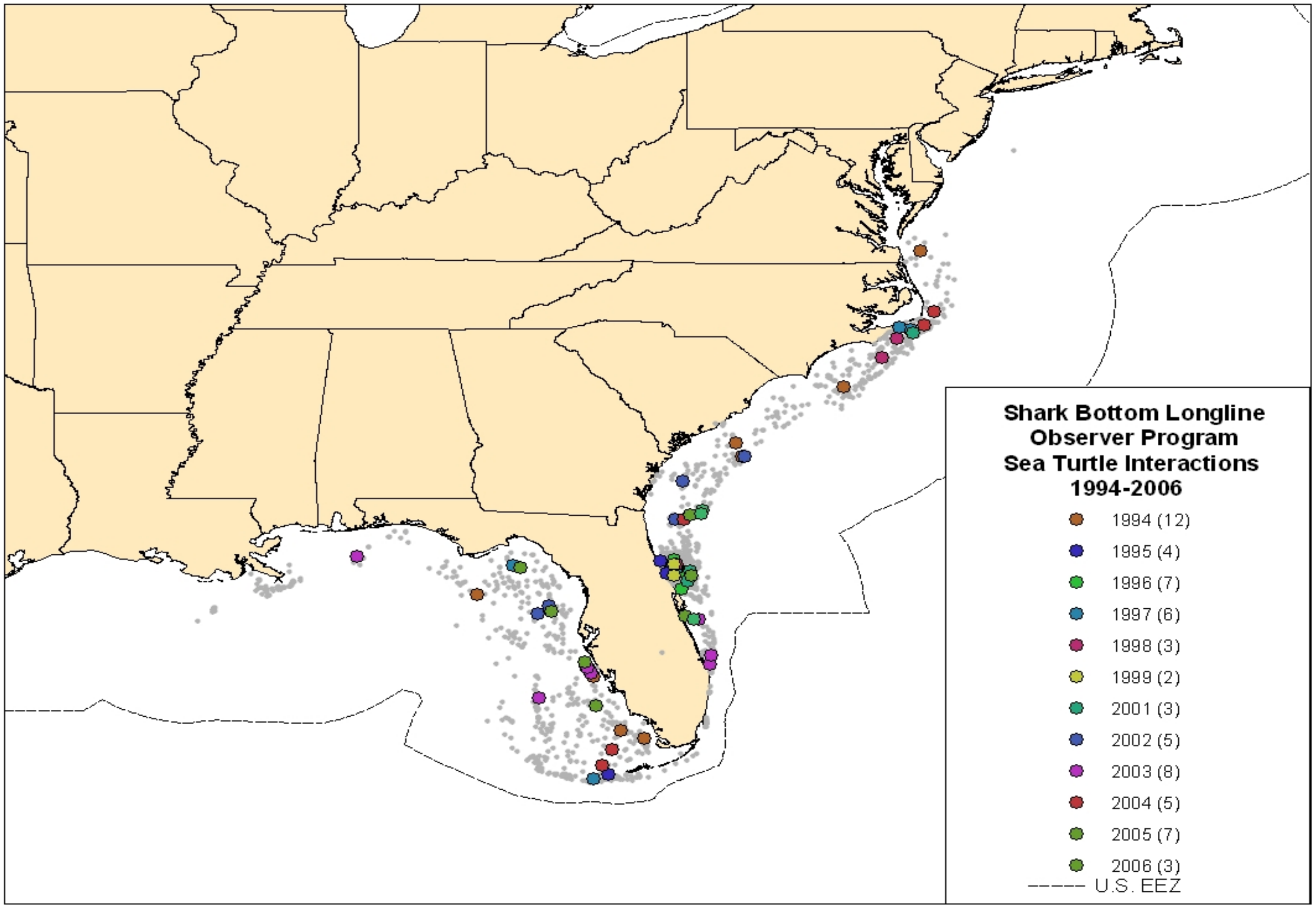



**Figure 3.31** **Observed sea turtle interactions and observed sets (smaller grey circles) in the shark bottom longline fishery from 1994-2004**. Source: Burgess and Morgan, 2004.

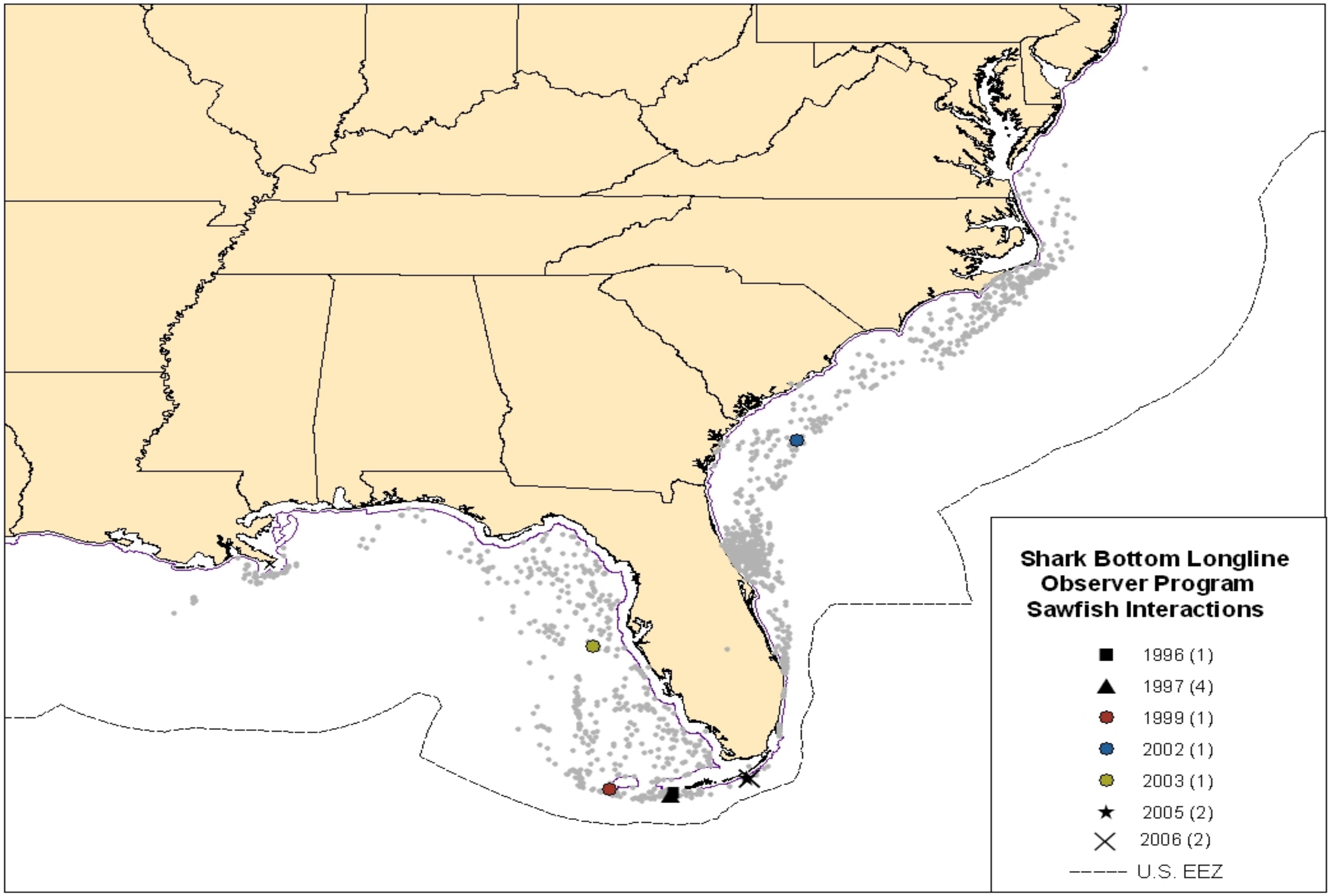



**Figure 3.32 Observed sawfish interactions and observed sets (smaller grey circles) in the shark bottom longline fishery from 1994-2006.** Source: Burgess and Morgan, 2004.

### 3.4.6 Gillnet Fishery

#### 3.4.6.1 Domestic History and Current Management

The southeast shark gillnet fishery is comprised of several vessels based primarily out of ports in northern Florida (South Atlantic Region) that use nets typically 456 to 2,280 meters long and 6.1 to 15.2 meters deep, with stretched mesh from 12.7 to 22.9 cm. This fishery is currently prohibited in the state waters off South Carolina, Georgia, and Florida, thereby forcing some of these vessels to operate in deeper waters under Federal jurisdiction, where gillnets are less effective. The entire process (set to haulback) takes approximately 9 hours (Carlson and Baremore, 2002a).

The 2005 Directed Shark Gillnet Fishery Observer Program report described the gear and soak time deployed by drift gillnet, strike gillnet, and sink gillnet fishermen. Set duration was generally 0.3 hours and haulback averaged 2.9 hours. The average time from setting the net through completion of haulback was 10.2 hours. The most frequently used mesh size for drift gillnets was 12.7 cm. Strikenetters use the largest mesh size (22.9 cm) and the set times were 2.7 hours. Sink gillnets used to target sharks generally use 17.8 cm mesh size and were soaked for approximately 0.8 hours. This gear was also observed being deployed to target non-HMS (kingfish or Spanish mackerel); using a stretched mesh size of 7.6 cm, to comply with mesh size regulations for the Spanish mackerel fishery, and soaked for approximately 5.9 hours (Carlson and Bethea, 2006).

In the southeast shark gillnet fishery, NMFS modified the requirement to have 100 percent observer coverage at all times on March 30, 2001 (66 FR 17370), by reducing the level required to a statistically significant level outside of right whale calving season (100 percent observer coverage is still required during the right whale calving season from November 15 through March 31). This modification of observer coverage reduced administrative costs while maintaining statistically significant and adequate levels of coverage to provide reasonable estimates of sea turtle and marine mammal takes outside the right whale calving season. The level of observer coverage necessary to maintain statistical significance will be reevaluated annually and adjusted accordingly. Additionally, in 2001, NMFS established a requirement to conduct net checks every two hours to look for and remove any protected species.

#### 3.4.6.2 Recent Catch and Landings

The following section provides information on shark landings as reported in the shark gillnet observer program. For recent catch and landings data for the shark fishery as a whole, which includes landings from gillnet, BLL, and other gears combined, please refer to Section 3.4.7. A total of 24 driftnet sets were observed on five vessels from February through September, 2004. Driftnet vessels carried nets ranging in length from 547.2 – 2736 m; depths from 7.6 – 13.7 m and stretched mesh sizes from 12.7 – 22.9 cm. The most frequently used mesh size was 12.7 cm. For all observed driftnet sets, set duration averaged 0.4 hrs. Sets were made in seawater averaging 15.4 m deep. Haulback and processing of the catch averaged 3.4 hrs. Average soak time for the driftnet (time net was first set minus time haulback began) was 10.8 hrs.

The observed driftnet catch consisted of nine species of sharks. Three species of sharks made up 92.9 percent (by number) of the observed shark catch (Table 3.57). These species were the Atlantic sharpnose shark, blacknose shark, and finetooth shark. By weight, the shark catch was made up of Atlantic sharpnose shark, (55.3 percent), blacknose shark (17.1 percent), blacktip shark (10.7 percent), and finetooth shark (10.3 percent). Total observed catch composition (percent of numbers caught) was 79.0 percent sharks, 20.7 percent teleosts, 0.3 percent rays, and 0.03 percent protected species (*i.e.*, marine mammals, sea turtles, sawfish).

*Gillnet Bycatch*

On September 23, 2002, NMFS implemented a restricted area to reduce bycatch of right whales from November 15 through March 31 (67 FR 59471). In this area, only gillnets used in a strikenet fashion can operate during times when right whales are present. Operation in this area at that time requires 100 percent observer coverage. Vessels fishing in a strikenet fashion used nets 364.8 meters long, 30.4 meters deep, and with mesh size 22.9 cm. Observed catch in the strikenet fishery consisted of 6 species of sharks (96.7 percent of total number caught) and seven species of teleosts and rays (3.3 percent of total number caught). No marine mammals or sea turtles were observed caught. The blacktip shark made up 97.5 percent of the number of sharks caught, and 86 percent of the overall catch. Bycatch included crevalle jack, red drum, and great barracuda (Table 3.56).

There were 23 species of teleosts, two species of rays, and one species of marine mammal observed caught during the driftnet season (Table 3.58). Four species of teleosts and rays made up 90.8 percent by number of the overall non-shark species in observed strikenet catches. These species were little tunny (45.6 percent); king mackerel (23.3 percent); great barracuda (11.8 percent); and red drum (10.2 percent). For incidental driftnet catch species, the highest proportion discarded dead (with observed catch greater than 10 specimens) was Atlantic sailfish, (100.0 percent), king mackerel (78.3 percent), and cobia (28.7 percent). Red drum had the highest discard proportion alive (98.1 percent) (Carlson and Baremore, 2003). Observed driftnet sets caught 23 species of teleosts and rays and no sea turtles or marine mammals. Only the great barracuda were retained, with all remaining bycatch discarded alive (Carlson, 2002).

Outside of right whale calving season, observed drift gillnet catch consisted of 26 species of teleosts and rays and one species of marine mammal, which was discarded dead. Five species of teleosts and one species of ray made up 90.6 percent by number of the overall non-shark catch. Little tunny (44.1 percent), king mackerel (20.8 percent), great barracuda (12.5 percent), Atlantic moonfish (9.4 percent), and cobia (3.8 percent) dominated the bycatch (Carlson and Baremore, 2002). During drift gillnet fishing, the highest proportion of species discarded dead (for species with greater than 10 individuals) was for tarpon, crevalle jack, king mackerel, and red drum. Cownose rays and red drum had the highest proportion of discarded alive with 78.1 percent and 50.0 percent, respectively (Carlson and Baremore, 2002).

On January 22, 2006, a dead right whale was spotted offshore of Jacksonville Beach, Florida. The survey team identified the whale as a right whale calf, and photos indicated the calf as having one large wound along the midline and smaller lesions around the base of its tail. The right whale calf was located at 30°14.4’ N. Lat., 81° 4.2′′ W. Long., which was approximately 1 nautical mile outside of the designated right whale critical habitat, but within the Southeast U.S. Restricted Area. NMFS determined that both the entanglement and death of the whale occurred within the Southeast U.S. Restricted Area, and all available evidence suggested the entanglement and injury of the whale by gillnet gear ultimately led to the death of the animal.

On February 16, 2006, NMFS published a temporary rule (71 FR 8223) to prohibit, through March 31, 2006, any vessel from fishing with any gillnet gear in the Atlantic Ocean waters between 32°00’ N. Lat. (near Savannah, GA) and 27°51’ N. Lat. (near Sebastian Inlet, FL) and extending from the shore eastward out to 80°00’ W. long under the authority of the Atlantic Large Whale Take Reduction Plan (ALWTRP) (50 CFR 229.32 (g)) and the Endangered Species Act. NMFS took this action based on its determination that a right whale mortality was the result of an entanglement by gillnet gear within the Southeast U.S. Restricted Area.

The regulations at 50 CFR 229.32(g)(1) also require NMFS to close the Southeast U.S. Restricted Area for the rest of the time period, and for the time period November 15 through March 31 in each subsequent year, unless NMFS revises the restricted period or unless other measures are implemented. NMFS plans to seek assistance and recommendations from the ALWTRT at their next meeting in order to evaluate whether permanent closures within the Southeast U.S. Restricted Area are necessary.

*Loggerhead Sea Turtles*

Loggerhead sea turtles are rarely caught in the shark gillnet fishery. During the 1999 right whale calving season, no loggerhead sea turtles were observed caught in this fishery (Carlson and Lee, 1999), and no loggerheads were observed caught with strikenets during the 2000 – 2002 right whale calving seasons (Carlson 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a). However, three loggerhead sea turtles were observed caught with drift gillnets during right whale calving season, one each year from 2000 to 2002 (Carlson, 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a; Garrison, 2003). In 2004 there were no observed sea turtle interactions in either the strikenet or drift gillnet fisheries.

No loggerhead sea turtles were caught outside of the right whale calving season in 2002 (Carlson and Baremore, 2002b), and no loggerhead turtles were observed caught during or after the right whale calving season in 2003 or 2004 in the directed shark gillnet fishery (Carlson and Baremore 2003; Carlson, pers. comm). In 2005 five loggerheads were observed caught, and in 2006 three loggerheads were observed caught (Table 3.59). All but two were released alive. One loggerhead sea turtle mortality was reported in abandoned fishing gear in January 2004, and was not considered part of normal fishing operations.

*Leatherback Sea Turtles*

In the shark gillnet fishery, leatherback sea turtles are sporadically caught. During the 1999 right whale calving season, two leatherback sea turtles were caught in this fishery, and both were released alive (Carlson and Lee, 1999). No leatherback sea turtles were observed caught with strikenets during the 2000 – 2002 right whale calving seasons (Carlson, 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a). Leatherback sea turtles have been observed caught in shark drift gillnets including 14 in 2001 and two in 2002 (Carlson, 2000; Carlson and

Baremore, 2001; Carlson and Baremore, 2002a; Garrison, 2003). NMFS temporarily closed the shark gillnet fishery (strikenetting was allowed) from March 9 to April 9, 2001, due to the increased number of leatherback interactions that year (66 FR 15045, March 15, 2001).

From 2003 – 2004, no leatherback sea turtles were observed caught in gillnets fished in strikenet or driftnet methods (Carlson and Baremore 2003; Carlson, pers. comm.).

*Smalltooth Sawfish*

To date there has been only one observed catch of a smalltooth sawfish in shark gillnet fisheries (Table 3.60). The sawfish was taken on June 25, 2003, in a gillnet off southeast Florida and was released alive (Carlson and Baremore, 2003). The set was characteristic of a typical drift gillnet set, with gear extending 30 to 40 feet deep in 50 to 60 feet of water. Prior to this event it was speculated that the depth at which drift gillnets are set above the sea floor may preclude smalltooth sawfish from being caught. Although sometimes described as a lethargic demersal species, smalltooth sawfish feed mostly on schooling fish, thus they would occur higher in the water column during feeding activity. In fact, smalltooth sawfish and Atlantic sharks may be attracted to the same schools of fish, potentially making smalltooth sawfish quite vulnerable if present in the area fished. The previous absence of smalltooth sawfish incidental capture records is more likely attributed to the relatively low effort in this fishery and the rarity of smalltooth sawfish, especially in Federal waters. These factors may result in little overlap of the species with the gear. The sawfish was cut from the net and released alive with no visible injuries. This indicates that smalltooth sawfish can be removed safely if entangled gear is sacrificed.

Given the high rate of observer coverage in the shark gillnet fishery, NMFS believes that smalltooth sawfish takes in this fishery are very rare. The fact that there were no smalltooth sawfish caught during 2001 when 100 percent of the fishing effort was observed indicates that smalltooth sawfish takes (observed or total) most likely do not occur on an annual basis. Based on this information, the 2003 BiOp estimated that one incidental capture of a sawfish (released alive) over the next five years, will occur as a result of the use of gillnets in this fishery (NMFS, 2003a).

*Marine Mammals*

Observed takes of marine mammals in the Southeast Atlantic shark gillnet fishery during 1999 – 2004, totaled 12 bottlenose dolphins and four spotted dolphins. Extrapolated observations from these data suggest serious injury and mortality of 25 bottlenose dolphin and one Atlantic spotted dolphin in the shark gillnet fishery from 1999 through 2002 (Garrison, 2003).

Table 3.56 Total Strikenet Shark Catch and Bycatch by Species in order of Decreasing Abundance for all Observed Trips, 2003. **Source: Carlson and Baremore, 2003.**

| | | | | **Discarded Dead (%)** |
|---|---|---|---|---|
| Blacktip shark | 6,401 | 97.5 | .6 | 1.9 |
| Blacknose shark | 343 | 100.0 | 0 | 0 |
| Crevalle jack | 215 | 96.2 | 3.3 | .5 |
| Red Drum | 18 | 0 | 100 | 0 |
| Great barracuda | 13 | 92.3 | 0 | 7.7 |
| Manta ray | 10 | 0 | 100 | 0 |
| Bull shark | 8 | 75 | 12.5 | 12.5 |
| Permit | 8 | 50 | 37.5 | 12.5 |
| Nurse shark | 1 | 0 | 100 | 0 |
| Spinner shark | 1 | 100 | 0 | 0 |
| Finetooth shark | 1 | 100 | 0 | 0 |
| Cobia | 1 | 100 | 0 | 0 |
| Atlantic bonito | 1 | 0 | 0 | 100 |
| **Total** | **7,021** | | | |

**Table 3.57 Total Shark Catch by Species and Species Disposition in Order of Decreasing Abundance for all Observed Driftnet Sets, 2003.** Source: Carlson and Baremore, 2003.

| | | | | **Discarded Dead (%)** |
|---|---|---|---|---|
| Atlantic sharpnose | 6,917 | 99.8 | 0 | .2 |
| Blacknose | 799 | 100 | 0 | 0 |
| Finetooth | 620 | 100 | 0 | 0 |
| Blacktip | 375 | 45 | 24 | 31 |
| Bonnethead | 168 | 100 | 0 | 0 |
| Scalloped Hammerhead | 62 | 3.2 | 0 | 96.8 |
| Spinner | 20 | 5 | 0 | 95 |
| Great Hammerhead | 6 | 100 | 0 | 0 |
| Lemon | 1 | 0 | 100 | 0 |
| **Total** | **8,968** | | | |

**Table 3.58 Total bycatch in NMFS observed drift gillnet sets in order of decreasing abundance and species disposition for all observed trips, 2003. Source: Carlson, 2003.**

| | | | | **Discard Dead (%)** |
|---|---|---|---|---|
| Little tunny | 1169 | 92.6 | 0 | 7.4 |
| King mackerel | 596 | 21.5 | .2 | 78.3 |
| Barracuda | 300 | 100 | 0 | 0 |
| Red drum | 262 | 0 | 98.1 | 1.9 |
| Cobia | 80 | 70 | 1.3 | 28.7 |
| Blackfin tuna | 36 | 100 | 0 | 0 |
| Atlantic sailfish | 30 | 0 | 0 | 100 |
| Cownose ray | 22 | 0 | 59.1 | 40.9 |
| Spanish mackerel | 11 | 100 | 0 | 0 |
| Remora | 9 | 0 | 33.4 | 66.6 |
| Crevalle jack | 8 | 0 | 0 | 100 |
| Blue runner | 8 | 87.5 | 0 | 12.5 |
| Tarpon | 5 | 0 | 0 | 100 |
| Manta ray | 5 | 0 | 100 | 0 |
| Dolphin | 5 | 100 | 0 | 0 |
| Tripletail | 4 | 100 | 0 | 0 |
| Spotted eagle ray | 2 | 0 | 100 | 0 |
| Blue marlin | 2 | 0 | 0 | 100 |
| Balloonfish | 2 | 0 | 0 | 100 |
| Wahoo | 1 | 100 | 0 | 0 |
| Pompano | 1 | 100 | 0 | 0 |
| Rainbow runner | 1 | 100 | 0 | 0 |
| Black drum | 1 | 0 | 100 | 0 |
| Bluefish | 1 | 0 | 0 | 100 |

**Table 3.59 Total number of Observed Sea Turtle Interactions by Year from 2000-2006 in the Shark Gillnet Fishery.** Source: Directed Shark Gillnet Observer Program. Letters in parentheses indicate whether the sea turtle was released alive (A), dead (D), or unknown (U).

| | | | **Total** |
|---|---|---|---|
| 2000 | | 1 (U) | 1 |
| 2001 | | 1 (U) | 1 |
| 2002 | | 1 (U) | 1 |
| 2003 | | | 0 |
| 2004 | | | 0 |
| 2005 | 1(A) | 5 (4A, 1D) | 6 |
| 2006 | | 3 (2A, 1D) | 3 |
| **Total** | 1 | 11 | 12 |

**Table 3.60 Protected Species Interactions in Drift Gillnet Sets During the Directed Shark Gillnet Fishery for All Observed Trips, 2003.** Source: Carlson, 2003.

| | | | | **Released Condition Unknown or Comatose** |
|---|---|---|---|---|
| Bottlenose dolphin | 2 | 0 | 1 | 1 |
| Smalltooth sawfish | 1 | 1 | 0 | 0 |

### 3.4.7 Fishery Data: Landings by Species

The following tables of finfish landings are taken from the 2005 National Report of the United States to ICCAT (NAT-038) (NMFS, 2005). The purpose of this section is to provide a summary of recent landings of HMS on a species by species basis for comparison to Sections 4.1 through 4.5 of the 2004 HMS SAFE report. Landings for sharks were compiled from the most recent stock assessment documents.

**Table 3.61 U.S. Landings (mt) of Bluefin Tuna by Gear and Area, 1997-2004.** Source: NMFS, 2005

| | | | | | | | | | **2004** |
|---|---|---|---|---|---|---|---|---|---|
| NW Atlantic | Longline | 26.0 | 30.5 | 25.1 | 22.8 | 17.7 | 7.8 | 16.3 | 28.8 |
| | Handline | 17.4 | 29.2 | 15.5 | 3.2 | 9.0 | 4.5 | 2.5 | 1.5 |
| | Purse Seine | 249.7 | 248.6 | 247.9 | 275.2 | 195.9 | 207.7 | 265.4 | 31.8 |
| | Harpoon | 97.5 | 133.1 | 115.8 | 184.2 | 101.9 | 55.5 | 87.9 | 41.2 |
| | *Rod and reel (>145 cm LJFL) | 752.6 | 610.4 | 657.5 | 632.8 | 993.4 | 1,008.4 | 684.8 | 329.0 |
| | *Rod and reel (<145 cm LJFL) | 178.9 | 166.3 | 103.0 | 49.5 | 249.3 | 519.3 | 314.6 | 387.8 |
| | Unclassified | 2.2 | 0.6 | 0.1 | 0.2 | 0.5 | 0.0 | 0.0 | 0.2 |
| Gulf of Mexico | Longline | 23.8 | 18.3 | 48.4 | 43.3 | 19.8 | 32.8 | 53.8 | 67.3 |
| | *Rod and reel | 0.0 | 0.0 | 0.4 | 0.9 | 1.7 | 1.5 | 0.0 | 0.0 |
| NC Area 94a | Longline | | | 0.0 | 0.0 | 0.0 | 9.3 | 11.3 | |
| All Areas | All Gears | 1,348.1 | 1,237 | 1,214.1 | 1,212.1 | 1,582.8 | 1,840.2 | 1,428.2 | 887.6 |

* Rod and Reel catches and landings represent estimates of landings and dead discards when available based on statistical surveys of the U.S. recreational harvesting sector.

**Table 3.62 U.S. Landings (mt) of Yellowfin Tuna by Gear and Area, 1997-2004.** Source: NMFS, 2005.

| | | | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|---|---|
| NW Atlantic | Longline | 838.9 | 464.9 | 581.3 | 734.5 | 631.8 | 400 | 272 | 654 |
| | Rod and reel* | 3,560.9 | 2,845.7 | 3,818.2 | 3,809.5 | 3,690.5 | 2,624 | 4,672 | 3,434 |
| | Troll | 218 | 177.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Purse seine | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Gillnet | 1.3 | 1.7 | 0.2 | 0.2 | 7.6 | 5 | 1 | 3 |
| | Trawl | 1.9 | 0.7 | 4.1 | 1.8 | 2.7 | 0 | 2 | 1 |
| | Harpoon | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Handline | 34.3 | 0.0 | 192 | 235.7 | 242.5 | 137 | 148 | 208 |
| | Trap | ** | 0.1 | 0.8 | 0.5 | 0.1 | 0.0 | 0.0 | 0 |
| | Unclassified | 0.0 | 0.0 | 2.1 | 1.3 | 6.8 | ** | 0.0 | 13 |
| Gulf of Mexico | Longline | 2,571.3 | 1,864.5 | 2,736.6 | 2,133 | 1,505.5 | 2,109 | 1,828 | 1,813 |
| | Rod and reel* | 7.7 | 80.9 | 149.4 | 52.3 | 494.2 | 200 | 640 | 247 |
| | Handline | 55.6 | 60.8 | 12.7 | 28.6 | 43.4 | 100 | 59 | 19 |
| | Gillnet | 0.0 | 0.0 | ** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Unclassified | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Caribbean | Longline | 135.4 | 58.6 | 24.4 | 11.8 | 23.1 | 12 | 7 | 5 |
| | Troll | 19.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Handline | 0.7 | 3.9 | 14.5 | 19.4 | 14.3 | 7 | 9 | 7 |
| | Gillnet | ** | 0.0 | 0.0 | 0.1 | 0.3 | 0.0 | ** | 0.0 |
| | Trap | 0.1 | 0.0 | 0.1 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 |
| NC Area 94a | Longline | 6.1 | 4.6 | 0.2 | 2.1 | 3.5 | 0.0 | 5 | 0.0 |
| SW Atlantic | Longline | 221.9 | 55.3 | 32.4 | 19.8 | 36.2 | 52 | 42 | 17 |
| All Areas | All Gears | 7,673.7 | 5,619.2 | 7,569 | 7,050.9 | 6,702.8 | 5,646 | 7,685 | 6,421 |

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** ≤= 0.05 mt

**Table 3.63 U.S. Landings (mt) of Skipjack Tuna by Gear and Area, 1997-2004.** Source: NMFS, 2005.

| | | | | | | | | | **2004** |
|---|---|---|---|---|---|---|---|---|---|
| NW Atlantic | Longline | 1.0 | 0.7 | 0.3 | 0.0 | 0.1 | ** | 0.9 | 0.1 |
| | Rod and reel* | 42.0 | 49.5 | 63.6 | 13.1 | 32.9 | 23.3 | 34.0 | 27.3 |
| | Troll | 0.6 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Purse seine | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Gillnet | 8.9 | 16.9 | 26.5 | 1.9 | 3.6 | ** | 0.9 | 15.8 |
| | Trawl | 0.0 | 0.2 | 1.0 | 0.0 | 0.2 | ** | 0.5 | 0.2 |
| | Handline | 0.1 | 0.0 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.6 |
| | Trap | 0.0 | 0.0 | 17.5 | 0.0 | 0.0 | ** | 1.5 | ** |
| | Pound | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Unclassified | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gulf of Mexico | Longline | 1.3 | 0.6 | 0.4 | 0.2 | 0.2 | ** | ** | 0.3 |
| | Rod and reel* | 21.7 | 37.0 | 34.8 | 16.7 | 16.1 | 13.2 | 11.0 | 6.3 |
| | Handline | 0.0 | 0.0 | 0.4 | 0.7 | 0.0 | 0.0 | ** | 0.2 |
| | Trap | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Unclassified | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Caribbean | Longline | 1.2 | 0.0 | 1.3 | 1.6 | 4.0 | 2.5 | 3.3 | 0.3 |
| | Gillnet | 0.2 | 0.0 | 0.4 | 0.6 | 1.6 | 0.6 | 0.4 | 0.3 |
| | Rod and Reel* | NA | NA | NA | NA | NA | NA | 15.7 | 40.4 |
| | Harpoon | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Handline | 0.0 | 0.0 | 5.8 | 8.8 | 10.3 | 12.5 | 9.2 | 9.6 |
| | Trap | ** | 0.0 | 0.1 | 0.3 | 0.4 | 0.7 | 0.2 | ** |
| | Troll | 7.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SW Atlantic | Unclassified | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| All Areas | Longline | ** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | All Gears | 84.3 | 105.3 | 152.3 | 44.1 | 69.6 | 53.0 | 77.8 | 101.4 |

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** ≤= 0.05 mt

**Table 3.64 U.S. Landings (mt) of Bigeye Tuna by Area and Gear, 1997-2004.** Source: NMFS, 2005.

| | | | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|---|---|
| NW Atlantic | Longline | 476.3 | 544.3 | 737.8 | 333.2 | 506.1 | 328.6 | 168.7 | 264.9 |
| | Rod and reel* | 333.5 | 228.0 | 316.1 | 34.4 | 366.2 | 49.6 | 188.5 | 94.6 |
| | Troll | 3.9 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Gillnet | ** | 0.4 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 |
| | Handline | 2.7 | 0.0 | 11.9 | 4.1 | 33.2 | 13.8 | 6.0 | 3.0 |
| | Trawl | 1.0 | 0.5 | 1.2 | 1.7 | 0.4 | 0.5 | ** | 0.3 |
| | Unclassified | 0.5 | 0.0 | 0.9 | 0.0 | 1.8 | 0.0 | 0.0 | 1.4 |
| Gulf of Mexico | Longline | 33.9 | 25.6 | 54.6 | 44.5 | 15.3 | 41.0 | 27.5 | 20.2 |
| | Rod and reel* | 0.0 | 0.0 | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 |
| | Handline | ** | 0.1 | 0.2 | 0.1 | 0.5 | 0.6 | 0.3 | 0.1 |
| Caribbean | Longline | 50.0 | 48.5 | 23.2 | 13.7 | 31.9 | 29.7 | 7.2 | 3.5 |
| | Handline | 0.0 | 0.0 | 0.2 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| NC Area 94a | Longline | 91.8 | 48.4 | 35.3 | 63.1 | 61.0 | 45.2 | 36.9 | 5.0 |
| SW Atlantic | Longline | 142.8 | 28.5 | 78.2 | 77.4 | 68.2 | 91.3 | 44.6 | 14.4 |
| All Areas | All Gears | 1,136.4 | 928.3 | 1,261.4 | 573.6 | 1,084.7 | 600.3 | 479.8 | 413.3 |

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** ≤= 0.05

**Table 3.65 U.S. Landings (mt) of Albacore Tuna by Gear and Area, 1997-2004.** Source: NMFS, 2005.

| | | | | | | | | | **2004** |
|---|---|---|---|---|---|---|---|---|---|
| NW Atlantic | Longline | 140.0 | 155.4 | 179.5 | 130.5 | 171.7 | 124.0 | 95.6 | 106.9 |
| | Gillnet | 42.8 | 40.1 | 27.0 | 0.8 | 3.3 | 2.6 | 0.1 | 4.7 |
| | Handline | 4.8 | 0.0 | 0.6 | 2.9 | 1.7 | 3.9 | 1.4 | 5.4 |
| | Trawl | 2.6 | 2.4 | 0.4 | 0.0 | 0.0 | 0.3 | ** | 2.6 |
| | Troll | 1.6 | 5.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Rod and reel* | 220.2 | 601.1 | 90.1 | 250.8 | 122.3 | 323.0 | 333.8 | 500.5 |
| | Pound | 1.3 | 0.9 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Unclassified | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| Gulf of Mexico | Longline | 16.9 | 3.9 | 3.8 | 4.1 | 4.9 | 9.5 | 7.7 | 9.8 |
| | Rod and reel* | 49.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Handline | 0.0 | 0.0 | ** | 0.0 | 0.0 | 0.0 | ** | 0.0 |
| Caribbean | Longline | 16.1 | 17.8 | 8.3 | 9.2 | 8.7 | 8.4 | 4.0 | 3.2 |
| | Troll | 3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Gillnet | ** | 0.0 | 0.2 | 0.1 | 0.5 | ** | ** | ** |
| | Trap | ** | 0.0 | ** | 0.2 | 0.3 | 0.6 | 0.2 | 0.0 |
| | Handline | 0.0 | 0.0 | 3.8 | 5.0 | 2.2 | 2.7 | 2.0 | 2.1 |
| NC Area 94a | Longline | 11.4 | 1.6 | 1.5 | 2.6 | 6.1 | 4.8 | 1.6 | 0.2 |
| SW Atlantic | Longline | 4.7 | 1.4 | 1.4 | 0.9 | 2.4 | 8.3 | 2.0 | 0.5 |
| All Areas | All Gears | 515.5 | 830.4 | 317 | 407.2 | 324.2 | 488.1 | 448.4 | 635.9 |

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** $\leq$= 0.05 mt

**Table 3.66 U.S. Catches and Landings (mt) of Swordfish by Gear and Area, 1997-2004.** Source: NMFS, 2005.

| | | | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|---|---|
| NW Atlantic | *Longline | 1,262.2 | 1,624.1 | 1,872.3 | 1,547.6 | 1,220.8 | 1,132.8 | 1,341.3 | 1,157.8 |
| | Gillnet | 0.4 | 36.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | ** |
| | Pair Trawl | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Handline | 1.3 | 0.0 | 5.0 | 7.7 | 8.6 | 8.8 | 10.8 | 18.4 |
| | Trawl | 8.0 | 5.9 | 7.5 | 10.9 | 2.5 | 3.9 | 6.0 | 7.6 |
| | Troll | 0.4 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | *Unclassified | 11.9 | 9.1 | 3.8 | 1.4 | 1.8 | 0.1 | 1.6 | 9.8 |
| | Harpoon | 0.7 | 1.5 | 0.0 | 0.6 | 7.4 | 2.8 | 0.0 | 0.5 |
| | ***Rod and Reel | 10.9 | 4.7 | 21.3 | 15.6 | 1.5 | 21.5 | 5.9 | 24.3 |
| | Trap | 0.0 | 0.1 | ** | 0.0 | 0.0 | ** | 0.1 | 0.0 |
| Gulf of Mexico | *Longline | 759.9 | 633.1 | 579.6 | 631.7 | 494.6 | 549.1 | 507.6 | 500.0 |
| | Handline | 0.0 | 0.0 | ** | 1.2 | 0.3 | 2.9 | 9.8 | 1.6 |
| Caribbean | *Longline | 688.9 | 516.0 | 260.5 | 331.9 | 347.0 | 329.0 | 274.5 | 295.8 |
| | Trap | | | 0.0 | 0.3 | 0.0 | 0.1 | ** | ** |
| NC Atlantic | *Longline | 688.2 | 658.6 | 650.0 | 804.6 | 420.6 | 587.9 | 632.8 | 597.4 |
| SW Atlantic | *Longline | 417.9 | 170.1 | 185.2 | 143.8 | 43.2 | 199.9 | 20.9 | 15.7 |
| All Areas | All Gears | 3,850.7 | 3,660.2 | 3,585.2 | 3,497.3 | 2,548.3 | 2,838.9 | 2,811.3 | 2,628.9 |

* Includes landings and estimated dead discards from scientific observer and logbook sampling programs.
** ≤ = 0.5 mt
*** Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.

**Table 3.67 U.S. Landings (mt) and dead discards of Blue Marlin, White Marlin and Sailfish by Gear and Area, 1998-2002.** Source: NMFS, 2003.

| | | | | | | | | | | | | Sailfish | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | **2002** |
| NW Atlantic | Longline* | 23.3 | 22.0 | 28.8 | 10.9 | 17.3 | 15.3 | 18.6 | 10.3 | 5.1 | 11.5 | 6.4 | 13.7 | 11.2 | 2.2 | 0.4 |
| | Unclassified* | 0.6 | 0.0 | 0.1 | 0.0 | 0.2 | 0.7 | 0.1 | 0.0 | 0.0 | 0.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Rod and reel** | 34.1 | 24.8 | 13.8 | 9.0 | 9.8 | 2.4 | - | - | - | - | 0.1 | - | - | - | - |
| Gulf of Mexico | Longline* | 18.5 | 55.2 | 29.6 | 9.4 | 17.8 | 11.8 | 31.5 | 29.9 | 10.1 | 15.6 | 17.0 | 57.4 | 33.9 | 8.2 | 6.3 |
| | Rod and reel** | 4.5 | 7.5 | 4.7 | 5.1 | 4.4 | 0.2 | - | - | - | - | 1.0 | - | - | - | - |
| Caribbean | Longline* | 2.3 | 1.6 | 0.5 | 1.2 | 0.8 | 1.3 | 5.0 | 0.5 | 0.7 | 1.5 | 0.2 | 0.5 | 0.1 | 0.0 | 0.2 |
| | Rod and reel** | 10.6 | 4.6 | 5.7 | 2.3 | 2.9 | <.05 | - | - | - | - | 0.05 | - | - | - | - |
| | Other | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Unknown & NC Area 94a | Longline* | 6.1 | 1.6 | 0.7 | 0.9 | 0.5 | 2.8 | 1.1 | 0.1 | 0.6 | 0.7 | 0.8 | <.05 | 0.1 | 0.3 | <.05 |
| SW Atlantic | Longline* | 1.6 | 1.7 | 0.0 | 0.0 | 0.0 | 0.9 | 0.5 | 0.0 | 0.0 | 0.0 | 2.7 | <.05 | 0.1 | 0.0 | 0.0 |
| NW Atlantic & Caribbean & Gulf of Mexico | Rod and reel*** | - | - | - | - | - | - | 5.2 | 1.3 | 3.4 | 5.6 | - | 163.0 | 75.7 | 57.8 | 103.0 |
| All Areas | All Gears | 101.6 | 119.0 | 83.9 | 38.8 | 54.7 | 35.4 | 62.0 | 42.1 | 19.9 | 35.3 | 28.3 | 234.6 | 121.1 | 68.5 | 109.9 |

* Includes landings and estimated discards from scientific observer and logbook sampling programs.
** Recreational billfish landings estimates are based on tournament reports and the Large Pelagic Survey (see Section 2.3 of the Billfish Amendment).
*** Estimation method no longer provides area-specific information.

**Table 3.68 Commercial landings of large coastal sharks in lb dw: 1999-2004.** Sources: Data from 1999-2001, Cortés pers. Comm.; data from 2002-2003, Cortés 2003; Cortés and Neer, 2005.

| | | | | | | **2004** |
|---|---|---|---|---|---|---|
| Basking** | 0 | 0 | 0 | 0 | 0 | 0 |
| Bignose* | 9,050 | 672 | 1,442 | 0 | 318 | 0 |
| Bigeye sand tiger** | 0 | 0 | 0 | 0 | 0 | 0 |
| Blacktip | 1,259,016 | 1,633,919 | 1,135,199 | 1,099,194 | 1,487,604 | 1,092,600 |
| Bull | 28,603 | 24,980 | 27,037 | 40,463 | 93,816 | 49,556 |
| Caribbean Reef* | 0 | 0 | 1 | 0 | 0 | 0 |
| Dusky* | 110,942 | 205,746 | 1,973 | 8,779 | 23,288 | 1,025 |
| Galapagos* | 0 | 0 | 0 | 0 | 0 | 0 |
| Hammerhead, Great | 0 | 0 | 0 | 0 | 0 | 0 |
| Hammerhead, Scalloped | 0 | 0 | 0 | 0 | 0 | 0 |
| Hammerhead, Smooth | 0 | 0 | 0 | 0 | 0 | 92 |
| Hammerhead, Unclassified | 53,393 | 35,060 | 69,356 | 108,160 | 153,548 | 116,546 |
| Large Coastal, Unclassified | 67,197 | 16,575 | 172,494 | 147,359 | 51,433 | 0 |
| Lemon | 25,298 | 45,269 | 24,453 | 56,921 | 80,688 | 67,460 |
| Narrowtooth* | 0 | 0 | 0 | 0 | 0 | 0 |
| Night* | 4,287 | 0 | 0 | 0 | 20 | 0 |
| Nurse | 1,176 | 429 | 387 | 69 | 70 | 317 |
| Sandbar | 1,320,239 | 1,491,908 | 1,407,550 | 1,863,420 | 1,436,838 | 1,223,082 |
| Sand Tiger** | 6,401 | 6,554 | 1,248 | 409 | 975 | 1,832 |
| Silky | 9,961 | 31,959 | 14,197 | 30,731 | 51,588 | 11,808 |
| Spinner | 629 | 14,473 | 6,970 | 8,447 | 12,133 | 14,806 |

| | | | | | | 2004 |
|---|---|---|---|---|---|---|
| Tiger | 30,779 | 24,443 | 26,973 | 16,115 | 18,536 | 30,976 |
| Whale** | 0 | 0 | 0 | 0 | 0 | 0 |
| White** | 82 | 1,201 | 26 | 0 | 1,454 | 58 |
| Unclassified, assigned to large coastal | 821,648 | 92,117 | 525,661 | 771,450 | 853,564 | 599,134 |
| Unclassified, fins | 116,570 | 87,820 | 23,988 | 142,565 | 181,431 | 128,409 |
| **Total** | **3,865,271 (1,753 mt dw)** | **3,713,125 (1,684 mt dw)** | **3,438,955 (1,560 mt dw)** | **4,294,082 (1,948 mt dw)** | **4,447,304 (2,017 mt dw)** | **3,206,377 (1,454 mt dw)** |

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.
** indicates species that were prohibited as of April 1997.
*** Preliminary data, species not yet available.

**Table 3.69 Commercial landings of small coastal sharks in lb dw: 1999-2004.** Source: Cortés and Neer, 2002; Cortés, 2003. Cortés and Neer, 2005.

| | | | | | | 2004 |
|---|---|---|---|---|---|---|
| Atlantic Angel* | 0 | 97 | 0 | 495 | 0 | 818 |
| Blacknose | 137,619 | 178,083 | 160,990 | 144,615 | 131,511 | 68,108 |
| Bonnethead | 58,150 | 69,411 | 63,461 | 36,553 | 38,614 | 29,402 |
| Finetooth | 285,230 | 202,572 | 303,184 | 185,120 | 163,407 | 121,036 |
| Sharpnose, Atlantic | 244,356 | 142,511 | 196,650 | 213,301 | 190,960 | 230,880 |
| Sharpnose, Atlantic, fins | 0 | 0 | 209 | 10 | 0 | 0 |
| Sharpnose, Caribbean* | 2,039 | 353 | 205 | 0 | 0 | 0 |
| Unclassified Small Coastal | 336 | 0 | 51 | 35,831 | 25,307 | 1,407 |
| **Total:** | **727,730 (330 mt dw)** | **593,027 (269 mt dw)** | **724,541 (329 mt dw)** | **615,915 (279 mt dw)** | **549,799 (249 mt dw)** | **450,833 (204 mt dw)** |

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.

**Table 3.70 Commercial landings of pelagic sharks in lb dw: 1999-2004.** Sources: Data from 2000-2001, Cortés pers. comm.; Cortés, 2003; Cortés and Neer, 2005.

| | | | | | | 2004 |
|---|---|---|---|---|---|---|
| Bigeye thresher* | 18,683 | 4,376 | 330 | 0 | 0 | 719 |
| Bigeye sixgill* | 0 | 0 | 0 | 0 | 0 | 0 |
| Blue shark | 886 | 3,508 | 65 | 137 | 6,324 | 423 |
| Mako, longfin* | 3,394 | 6,560 | 9,453 | 3,008 | 1,831 | 1,827 |
| Mako, shortfin | 150,073 | 129,088 | 171,888 | 159,840 | 150,076 | 217,171 |
| Mako, Unclassified | 56,625 | 74,690 | 73,556 | 58,392 | 33,203 | 51,413 |
| Oceanic whitetip | 1,480 | 657 | 922 | 1,590 | 2,559 | 1,082 |

| | | | | | | 2004 |
|---|---|---|---|---|---|---|
| Porbeagle | 5,650 | 5,272 | 1,152 | 2,690 | 1,738 | 5,779 |
| Sevengill* | 0 | 0 | 0 | 0 | 0 | 0 |
| Sixgill* | 0 | 0 | 0 | 0 | 0 | 0 |
| Thresher | 96,266 | 81,624 | 56,893 | 53,077 | 46,502 | 44,915 |
| Unclassified, pelagic | 0 | 233 | 0 | 5,965 | 79,439 | 0 |
| Unclassified, assigned to pelagic | 41,006 | 40,951 | 31,636 | 182,983 | 297,126 | 356,522 |
| Unclassified, pelagic, fins | 2,408 | 3,746 | 12,239 | 0 | 0 | 0 |
| **Total:** | **376,471 (171 mt dw)** | **350,705 (159 mt dw)** | **358,134 (162 mt dw)** | **467,682 (212 mt dw)** | **618,798 (281 mt dw)** | **677,305 (307 mt dw)** |

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.

**Table 3.71 Estimates of total landings and dead discards for large coastal sharks from 1981 through 2004 (numbers of fish in thousands).** Modified from the 1998 and 2002 Report of the Shark Evaluation Workshop (NMFS 1998, 2002), Cortés and Neer (2002), and Cortés (2003, 2005).

| | | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | | | | | | 282.1 |
| | | | | | | | 431.0 |
| | | | | | | | 765.0 |
| | | | | | | | 279.8 |
| | | | | | | | 389.0 |
| | | | | | | | 507.9 |
| | | | | | | | 499.0 |
| | | | | | | | 699.9 |

| | | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | | | | | | 678.8 |
| | | | | | | | 540.8 |
| | | | | | | | 512.4 |
| | | | | | | | 541.1 |
| | | | | | | | 437.0 |
| | | | | | | | 440.2 |
| | | | | | | | 446.3 |
| | | | | | | | 390.5 |
| | | | | | | | 337.7 |
| | | | | | | | 384.9 |
| | | | | | | | 241.1 |
| | | | | | | | 282.4 |
| | | | | | | | 261.1 |
| | | | | | | | 232.1 |
| | | | | | | | 243.4 |
| | | | | | | | 199.1 |

**Table 3.72 Commercial landings of LCS (including unclassified sharks) in the Atlantic and Gulf of Mexico by region and year in mt dw for QMS and Logbook data and mt ww for Canvass and CFDBS data from 1999-2003.**

| | | | | | | | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Canvass | QMS | Logbook | Canvass | QMS | Logbook | CFDBS* | Logbook | Canvass | QMS | Logbook |
| 1999 | 1246.9 | 474.5 | 789.2 | 1342.7 | 739.8 | 803.9 | 135.5 | 75.6 | 258.9 | 1415 | 1668.7 |
| 2000 | 1107 | 503.8 | 662.1 | 1255.3 | 912.1 | 760 | 168.7 | 167.6 | 2362.3 | 1591.3 | 1589.7 |
| 2001 | 1078.4 | 488.1 | 632.6 | 1270.4 | 639.4 | 898.8 | 254.4 | 98.9 | 2348.8 | 1390.1 | 1630.3 |
| 2002 | 1542 | 678.8 | 680.4 | 1406.5 | 614.7 | 1034.6 | 191.2 | 104 | 2948.5 | 1492.3 | 1819 |
| 2003 | 1226.7 | 674.9 | 635.7 | 1829.7 | 934.3 | 1168.4 | 178.3 | 64.6 | 3056.4 | 1804.9 | 1868.7 |
| Total | 6201 | 2820.1 | 3400 | 7104.6 | 3840.3 | 4665.7 | 928.1 | 510.7 | 13305.6 | 7693.6 | 8576.4 |
| Average | 1240.2 | 564.0 | 680 | 1420.9 | 768.1 | 933.1 | 185.6 | 102.1 | 2661.1 | 1538.7 | 1715.3 |
| Total Combined | 12526.2 | | | 15610.6 | | | 1438.8 | | 29575.6 | | |
| Average Combined | 835.1 | | | 1040.7 | | | 143.9 | | 2019.7 | | |
| Percent | 41% (416.9 mt dw) | | | 52% (528.8 mt dw) | | | 7% (71.2 mt dw) | | 100% | | |

*Northeast Commercial Fisheries Database System (CFDBS). There is no canvass data available for the North Atlantic.

**Table 3.73 Commercial landings of SCS in the Atlantic and Gulf of Mexico by region and year year in mt dw for QMS and Logbook data and mt ww for Canvass and CFDBS data from 1999-2003.**

| | | | | | | | | | **Total** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Canvass | QMS | Logbook | Canvass | QMS | Logbook | CFDBS* | Logbook | Canvass | QMS | Logbook |
| 1999 | 391.3 | 317.3 | 198.4 | 11.8 | 14.5 | 26.5 | 3.7 | 2.07 | 403.1 | 335.7 | 226.97 |
| 2000 | 357.5 | 229.9 | 74.5 | 11.6 | 24.1 | 13 | 12.6 | 9.3 | 369.1 | 266.6 | 96.8 |
| 2001 | 446.3 | 309 | 143.9 | 8.8 | 18.9 | 34.5 | 0.1 | 7.8 | 455.1 | 328 | 186.2 |
| 2002 | 311.1 | 248.9 | 156.7 | 36.9 | 11.4 | 42.4 | 15.4 | 5.4 | 348 | 275.7 | 204.5 |
| 2003 | 168.3 | 197.4 | 147.1 | 47.9 | 46.1 | 73.6 | 0 | 7.4 | 216.2 | 243.5 | 228.1 |
| Total | 1674.5 | 1302.5 | 720.6 | 117.0 | 115.0 | 190.0 | 31.8 | 31.97 | 1791.5 | 1449.5 | 942.57 |
| Average | 334.9 | 260.5 | 144.12 | 23.4 | 23.0 | 38.0 | 6.4 | 6.394 | 358.3 | 289.9 | 188.514 |
| Total Combined | 3697.6 | | | 422 | | | 63.8 | | 4183.4 | | |
| Average Combined | 246.5 | | | 28.1 | | | 6.4 | | 281.0 | | |
| Percent | 88% (398.2 mt dw) | | | 10% (45.4 mt dw) | | | 2% (10.3 mt dw) | | 100% | | |

*Northeast Commercial Fisheries Database System (CFDBS). There is no canvass data available for the North Atlantic.

## 3.5 Economic Status of HMS Fisheries

The review of each rule, and of HMS fisheries as a whole, is facilitated when there is a baseline against which the rule or fishery may be evaluated. In this analysis, as in past SAFE reports, NMFS used 1996 as a baseline. NMFS believes that this baseline is appropriate because the Regulatory Flexibility Act (RFA) and Magnuson-Stevens Act were both amended in 1996, NMFS began to collect economic information voluntarily for vessels using the pelagic logbook in 1996, and regarding HMS specifically, no rules were implemented in 1996 that were classified as significant under RFA. Additionally, while the Atlantic Tunas, Swordfish, and Shark FMP and the Billfish Amendment 1 were finalized in 1999, scoping for these two major documents and its final rule began in 1997. It is possible that anticipation of these documents and any potential changes in their implementing regulations could have begun to impact the decisions made by HMS fishermen and any associated businesses.

In addition to using the 1996 baseline, this FEIS also provides six years of data, when possible, in order to facilitate the analysis of trends. It also should be noted that all dollar figures are reported in nominal dollars (*i.e.,* current dollars). If analysis of real dollar (*i.e.,* constant dollar) trends controlled for inflation is desired, price indexes for 1996 to 2004 are provided in. To determine the real price in base year dollars, divide the base year price index by the current year price index, and then multiply this result by the price that is being adjusted for inflation. From 1996 to 2004, the Consumer Price Index (CPI-U) indicates that prices have risen by 20.4 percent, the Gross Domestic Product (GDP) Implicit Price Deflator indicates that prices have risen 16.3 percent, and the Producer Price Index (PPI) for unprocessed finfish indicates a 20.8 percent rise in prices. From 2002 to 2003, the CPI, GDP Deflator, and the PPI for unprocessed finfish indicate prices rose by 2.3 percent, 2.0 percent, and declined by 2.8 percent respectively. From 2003 to 2004, the CPI, GDP Deflator, and the PPI for unprocessed finfish indicate prices rose by 2.7 percent, 2.6 percent, and 14.5 percent respectively.

**Table 3.74** **Inflation Price Indexes.** The CPI-U is the standard Consumer Price Index for all urban consumers (1982-1984=100) produced by U.S. Department of Labor Bureau of Labor Statistics. The source of the Producer Price Index (PPI) for unprocessed finfish (1982=100) is also the Bureau of Labor Statistics. The Gross Domestic Product Implicit Price Deflator (200=100) is produced by the U.S. Department of Commerce Bureau of Economic Analysis and obtained from the Federal Reserve Bank of St. Louis (**http://www.stlouisfed.org/**).

| | | | PPI Unprocessed Finfish |
|---|---|---|---|
| 1996 | 156.9 | 93.8 | 185.5 |
| 1997 | 160.5 | 95.4 | 165.7 |
| 1998 | 163 | 96.5 | 170.7 |
| 1999 | 166.6 | 97.9 | 191.7 |
| 2000 | 172.2 | 100.0 | 182.4 |
| 2001 | 177.1 | 102.4 | 176.1 |
| 2002 | 179.9 | 104.2 | 201.5 |
| 2003 | 184 | 106.3 | 195.8 |
| 2004 | 188.9 | 109.1 | 224.1 |

### 3.5.1 Commercial Fisheries[4]

In 2003, the total commercial landings at ports in the 50 states by U.S. fishermen were 9.5 billion pounds valued at $3.3 billion. In 2004, the total commercial landings at ports in the 50 states by U.S. fishermen were 9.6 billion pounds and were valued at $3.7 billion. The overall value of landings between 2003 and 2004 had increased by nine percent. The total value of commercial HMS landings in 2004 was $43.9 million (Table 3.77). The 2004 ex-vessel price index indicated that 12 of the 17 finfish species tracked had increasing ex-vessel prices and five species had decreasing ex-vessel prices since 2003. The total edible finfish ex-vessel price index for 2004 was up eight percent from 2003.

The estimated value of the 2004 domestic production of all fishery products was $6.6 billion. This is $909 million less than the estimated value in 2003. The total import value of fishery products was $22.9 billion in 2004. This is an increase of $1.7 billion from 2003. The total import value in 1996 was $13.1 billion. The total export value of fishery products was $13.6 billion in 2004. This is an increase of $1.6 billion from 2003. The total export value in 1996 was $8.7 billion.

Consumers spent an estimated $61.9 billion for fishery products in 2004 including $42.8 billion at food service establishments, $18.9 billion in retail sales for home consumption, and $213.3 million for industrial fish products. The commercial marine fishing industry contributed $31.6 billion to the U.S. Gross National Product in 2004. In 1996, consumers spent an estimated $41.2 billion including $27.8 billion at food service establishments, $13.2 billion for home consumption, and $283.9 billion for industrial fish products. The commercial marine fishing industry contributed $21.0 billion to the U.S. Gross National Product in 1996.

[4] All the information and data presented in this section were obtained from NMFS 1997a and NMFS 2005b.

### 3.5.1.1 Ex-Vessel Prices

The average ex-vessel prices per pound dressed weight (dw) for 1996 and 1999 to 2004 by area, Atlantic HMS, and major gear types are summarized in Table 3.75. The average ex-vessel prices per lb dw for 1996 and 1999 to 2004 by species and area are summarized in Table 3.76. For both of these tables, prices are reported in nominal dollars. The ex-vessel price depends on a number of factors including the quality of the fish (*e.g.,* freshness, fat content, method of storage), the weight of the fish, the supply of fish, and consumer demand.

**Table 3.75 Average ex-vessel prices per lb dw for Atlantic HMS by gear and area.** Source: Dealer weighout slips from the Southeast Fisheries Science Center and Northeast Fisheries Science Center, and bluefin tuna dealer reports from the Northeast Regional Office. HND=Handline, harpoon, spears, trot lines, and trolls, PLL=Pelagic longline, BLL=Bottom longline, Net=Gillnets and pound nets, TWL=Trawls, SEN=Seines, TRP=Pots and traps, DRG=Dredge, and UNK=Unknown. Gulf of Mexico includes: TX, LA, MS, AL, and the west coast of FL. S. Atlantic includes: east coast of FL. GA, SC, and NC dealers reporting to Southeast Fisheries Science Center. Mid-Atlantic includes: NC dealers reporting to Northeast Fisheries Science Center, VA, MD, DE, NJ, NY, and CT. N. Atlantic includes: RI, MA, NH, and ME. For bluefin tuna, all NC landings are included in the Mid-Atlantic.

| Gulf of Mexico | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 2004 |
| Bigeye tuna | HND | $0.68 | $2.13 | $1.83 | $1.82 | $1.44 | $1.25 | $3.45 |
| | PLL | - | $4.04 | $2.82 | $2.64 | $5.09 | $3.41 | $4.58 |
| | BLL | - | $4.41 | $2.31 | $0.50 | $4.24 | $3.53 | $5.67 |
| Bluefin tuna | HND | - | - | $1.86 | $1.25 | $2.69 | - | - |
| | PLL | $5.83 | $6.32 | - | - | $6.40 | $6.32 | $4.64 |
| | BLL | - | - | - | - | $4.50 | - | - |
| Yellowfin tuna | HND | - | $2.38 | $2.48 | $2.55 | $2.83 | $2.34 | $2.56 |
| | PLL | - | $3.18 | $3.40 | $3.25 | $3.68 | $3.64 | $4.01 |
| | BLL | - | $3.06 | $3.68 | $3.31 | $3.23 | $3.73 | $4.01 |
| Other tunas | HND | $0.28 | $0.90 | $0.76 | $0.79 | $0.91 | $0.87 | $1.04 |
| | PLL | - | $0.78 | $0.72 | $0.70 | $0.79 | $0.66 | $0.58 |
| | BLL | - | $0.67 | $0.85 | $0.74 | $0.75 | $0.55 | $0.65 |
| | NET | $0.38 | $0.33 | $0.58 | $0.33 | $0.83 | $0.29 | $0.41 |
| | TWL | - | $0.70 | $0.61 | $0.78 | $0.40 | $0.30 | - |
| | SEN | - | $0.52 | - | $0.61 | $0.19 | - | $0.21 |
| | TRP | - | - | - | - | $0.30 | $0.30 | - |
| Swordfish | HND | - | $3.21 | $3.91 | $2.84 | $3.19 | $3.68 | $3.38 |
| | PLL | - | $3.39 | $3.33 | $3.41 | $2.94 | $2.91 | $3.32 |
| | BLL | - | $3.29 | $3.10 | $3.25 | $2.88 | $2.67 | $2.89 |
| Large coastal sharks | HND | $0.23 | $0.64 | $0.59 | $0.51 | $0.44 | $0.45 | $0.45 |
| | PLL | - | $0.79 | $0.48 | $0.45 | $0.36 | $0.38 | $0.53 |
| | BLL | $0.60 | $0.55 | $0.43 | $0.44 | $0.36 | $0.38 | $0.34 |
| | NET | $0.38 | $0.41 | $0.48 | $0.50 | $0.39 | $0.43 | $0.39 |
| | TWL | $0.15 | $0.49 | $0.15 | $0.25 | $0.25 | $0.25 | $0.25 |
| Pelagic sharks | HND | - | $1.35 | $1.38 | $1.48 | $0.93 | $1.04 | $1.21 |
| | PLL | - | $1.27 | $1.27 | $1.32 | $1.06 | $1.11 | $1.08 |
| | BLL | - | $1.43 | $1.31 | $1.42 | $1.19 | $1.15 | $1.03 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Small coastal sharks | HND | - | $0.59 | $0.93 | $0.37 | $0.38 | $0.32 | $0.59 |
| | PLL | - | $0.50 | $0.47 | $0.74 | $0.32 | $0.33 | $0.37 |
| | BLL | - | $0.52 | $0.41 | $0.61 | $0.53 | $0.50 | $0.45 |
| | NET | - | $0.67 | - | $0.45 | $0.46 | $0.36 | $0.50 |
| | TRP | - | - | - | $0.74 | - | - | - |
| Shark fins | HND | - | $8.51 | $21.57 | $15.90 | $21.28 | $13.97 | $12.49 |
| | PLL | - | $14.02 | $15.65 | $21.08 | - | $15.21 | $17.81 |
| | BLL | - | $14.34 | $15.89 | $21.50 | $22.72 | $20.17 | $21.95 |
| | NET | - | $7.78 | $15.50 | $11.02 | - | $6.05 | $5.86 |
| | TWL | - | - | $9.17 | - | - | - | - |
| **South Atlantic** | | | | | | | | |
| | | | | | | | | **2004** |
| Bigeye tuna | HND | $1.30 | $2.02 | $1.02 | $2.14 | $2.29 | $1.89 | $2.97 |
| | PLL | $1.33 | $2.87 | $2.27 | $2.78 | $2.33 | $2.26 | $2.85 |
| | BLL | $1.30 | $3.00 | $1.87 | $2.63 | $2.74 | $2.66 | - |
| | NET | $1.30 | - | - | - | - | - | - |
| Bluefin tuna | HND | - | - | $7.99 | $3.52 | $3.35 | - | $5.94 |
| | PLL | $4.62 | $4.71 | $5.36 | $4.82 | $4.95 | $4.11 | $4.91 |
| | BLL | - | - | - | $3.61 | $5.15 | - | - |
| Yellowfin tuna | HND | $1.55 | $1.41 | $1.56 | $1.41 | $1.54 | $1.54 | $1.24 |
| | PLL | $1.63 | $2.17 | $2.23 | $2.14 | $1.89 | $2.09 | $2.00 |
| | BLL | $1.41 | $2.45 | $2.29 | $2.45 | $2.29 | $2.60 | $0.90 |
| | NET | $1.07 | $0.87 | - | $1.21 | $1.12 | - | - |
| | TWL | - | - | - | - | $0.44 | - | - |
| Other tunas | HND | $0.75 | $0.67 | $0.59 | $0.61 | $0.47 | $0.58 | $0.52 |
| | PLL | $0.79 | $1.47 | $1.31 | $1.33 | $1.09 | $1.26 | $1.28 |
| | BLL | $0.87 | $1.41 | $1.49 | $1.86 | $1.67 | $1.13 | $0.48 |
| | NET | $0.35 | $0.19 | $0.20 | $0.23 | $0.21 | $0.21 | $0.20 |
| | TWL | $0.31 | $0.56 | $0.25 | $0.47 | $0.26 | - | $0.20 |
| | SEN | - | $0.11 | - | - | - | - | - |
| | TRP | - | - | - | $0.18 | - | - | - |
| Swordfish | HND | $2.48 | $3.04 | $3.92 | $4.24 | $3.93 | $3.91 | $4.44 |
| | PLL | $2.88 | $3.27 | $3.12 | $3.27 | $2.84 | $2.98 | $3.18 |
| | BLL | $2.46 | $3.39 | $3.42 | $3.14 | $2.76 | $3.19 | - |
| | NET | - | - | - | - | $2.50 | - | - |
| Large coastal sharks | HND | $0.72 | $0.66 | $0.59 | $0.96 | $1.01 | $0.49 | $0.43 |
| | PLL | $1.54 | $1.32 | $1.21 | $1.69 | $2.63 | $0.35 | $0.54 |
| | BLL | $0.73 | $1.13 | $0.78 | $0.89 | $1.10 | $0.39 | $0.44 |
| | NET | $1.30 | $1.70 | $0.91 | $1.49 | $1.59 | $0.30 | $0.35 |
| | TWL | $0.86 | $0.67 | $0.49 | $0.51 | $0.81 | $0.41 | $0.71 |
| | TRP | - | - | - | - | $0.23 | - | - |
| Pelagic sharks | HND | $0.82 | $0.95 | $0.78 | $0.71 | $0.68 | $0.84 | $0.97 |
| | PLL | $0.68 | $1.04 | $0.95 | $0.95 | $0.93 | $0.93 | $0.84 |
| | BLL | $0.59 | $0.89 | $0.90 | $0.78 | $0.75 | $0.87 | $0.81 |
| | NET | $0.33 | $0.28 | $0.35 | $0.36 | $0.34 | $0.34 | $0.29 |
| | TWL | - | $0.21 | $0.20 | $0.26 | $0.26 | - | - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Small coastal sharks | HND | $0.25 | $0.39 | $0.40 | $0.46 | $0.53 | $0.49 | $0.44 |
| | PLL | - | $0.57 | $0.57 | $0.63 | $0.41 | $0.24 | - |
| | BLL | - | $0.57 | $0.56 | $0.53 | $0.54 | $3.19 | $0.61 |
| | NET | $0.25 | $0.52 | $0.48 | $0.54 | $0.54 | $0.53 | $0.65 |
| | TWL | - | $0.52 | $0.23 | $0.23 | - | - | - |
| Shark fins | HND | $14.00 | $5.65 | $11.92 | $19.75 | $15.53 | $17.17 | $20.31 |
| | PLL | - | $11.18 | $10.34 | $11.44 | $6.81 | $12.72 | $9.91 |
| | BLL | $14.00 | $15.76 | $17.57 | $22.21 | $22.26 | $17.83 | $19.48 |
| | NET | - | $5.19 | $6.95 | $10.60 | $10.41 | $12.85 | $8.76 |
| | TWL | $9.11 | $6.61 | - | $12.17 | $14.00 | $10.77 | $5.90 |
| **Mid-Atlantic** | | | | | | | | |
| | | | | | | | | **2004** |
| Bigeye tuna | HND | $5.74 | $3.62 | $4.45 | $4.32 | $3.97 | $3.79 | $4.93 |
| | PLL | $3.51 | $3.19 | $4.30 | $3.81 | $4.12 | $3.92 | $4.48 |
| | BLL | $2.61 | $4.33 | $3.45 | $4.37 | $2.84 | $3.91 | $4.34 |
| | NET | $3.87 | $4.63 | $5.55 | $4.50 | - | - | - |
| | TWL | $4.68 | $3.16 | $5.68 | - | - | - | - |
| | DRG | - | - | - | - | $1.50 | - | - |
| | UNK | - | - | - | - | $5.00 | - | $5.36 |
| Bluefin tuna | HND | $14.70 | $3.51 | $6.60 | $4.93 | $4.06 | $7.54 | $10.25 |
| | PLL | $6.12 | $7.34 | $5.73 | $6.83 | $5.72 | $6.25 | $6.03 |
| | NET | $15.71 | - | - | $2.23 | - | - | - |
| | BLL | - | - | - | $7.00 | $7.00 | - | - |
| Yellowfin tuna | HND | $2.49 | $1.60 | $2.14 | $2.11 | $2.00 | $1.93 | $1.76 |
| | PLL | $2.51 | $2.15 | $2.32 | $2.30 | $2.14 | $2.00 | $1.91 |
| | BLL | $3.28 | $1.51 | $1.86 | $2.11 | $1.81 | $1.89 | $2.20 |
| | NET | $1.07 | $1.07 | $1.77 | $1.49 | $1.81 | $1.50 | $2.08 |
| | TWL | $2.40 | $1.59 | $1.56 | $1.53 | - | $1.48 | - |
| | TRP | - | - | - | - | $1.97 | $1.57 | $1.59 |
| | DRG | - | - | - | - | $1.94 | - | - |
| | UNK | - | - | - | - | $2.75 | - | $2.62 |
| Other tunas | HND | $1.34 | $0.89 | $0.94 | $0.89 | $0.69 | $0.66 | $0.65 |
| | PLL | $1.84 | $1.59 | $1.03 | $0.88 | $0.86 | $0.93 | $1.09 |
| | BLL | - | $0.83 | $1.17 | $0.78 | $0.83 | $1.08 | $0.97 |
| | NET | $0.45 | $0.54 | $0.44 | $0.49 | $0.75 | $0.48 | $0.35 |
| | TWL | $0.45 | $0.66 | $0.70 | $0.47 | $0.42 | $0.62 | $0.52 |
| | TRP | - | - | - | - | $0.57 | $0.47 | $0.58 |
| | DRG | - | - | - | - | $1.00 | - | - |
| | UNK | - | - | - | - | $1.03 | $1.69 | $0.65 |
| Swordfish | HND | $3.61 | $3.13 | $3.25 | $3.70 | - | - | - |
| | PLL | $4.31 | $3.53 | $3.59 | $3.47 | $3.18 | $2.97 | $2.86 |
| | BLL | $4.88 | $3.77 | $2.91 | $3.45 | $4.00 | - | $3.43 |
| | NET | $4.63 | $3.81 | - | $4.19 | $3.51 | - | - |
| | TWL | $4.56 | $3.29 | $3.94 | $2.86 | $3.34 | $3.21 | $3.55 |
| Large coastal sharks | HND | $0.74 | $0.96 | $0.50 | $0.88 | $2.09 | $2.19 | $1.06 |
| | PLL | $0.58 | $0.79 | $0.45 | $2.62 | $2.78 | $2.32 | $3.37 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| sharks | BLL | $0.54 | $0.56 | $0.41 | $0.55 | $1.11 | $2.08 | $2.32 |
| | NET | $0.45 | $0.46 | $0.53 | $0.89 | $1.02 | $1.02 | $1.52 |
| | TWL | $0.47 | $0.49 | $0.72 | $0.55 | $0.52 | $0.50 | $0.80 |
| | TRP | - | - | - | - | $2.50 | - | - |
| | SEN | - | - | - | - | $1.26 | - | - |
| | UNK | - | - | - | - | $0.50 | - | $0.68 |
| Pelagic sharks | HND | $1.47 | $1.71 | $1.41 | $1.26 | $1.41 | $1.57 | $1.26 |
| | PLL | $1.25 | $1.39 | $1.45 | $1.56 | $1.31 | $1.32 | $1.22 |
| | BLL | $1.47 | $1.04 | $1.24 | $0.97 | $1.12 | $1.17 | $1.41 |
| | NET | $0.99 | $0.99 | $1.02 | $1.02 | $0.97 | $1.08 | $1.32 |
| | TWL | $1.00 | $1.10 | $0.90 | $0.69 | $1.03 | $0.88 | $0.55 |
| | TRP | - | - | - | $0.40 | - | $1.43 | - |
| | DRG | - | - | - | $0.49 | $2.00 | - | - |
| | UNK | - | - | - | - | - | $0.57 | $1.78 |
| Small coastal sharks | HND | - | $0.46 | $0.38 | $0.51 | $0.45 | $0.36 | $0.50 |
| | PLL | $0.25 | - | $0.20 | $0.44 | $0.50 | $0.39 | - |
| | BLL | - | - | - | $0.95 | - | - | - |
| | NET | - | $0.45 | $0.40 | - | $0.42 | $0.39 | $0.44 |
| | TWL | - | $0.53 | - | - | $1.26 | - | - |
| Shark fins | HND | $2.74 | $3.60 | $6.17 | - | - | - | - |
| | PLL | $7.79 | $3.35 | $8.57 | - | - | - | - |
| | BLL | $8.00 | - | - | - | - | - | - |
| | NET | $4.77 | $3.96 | $3.38 | - | - | - | - |
| **North Atlantic** | | | | | | | | |
| | | | | | | | | **2004** |
| Bigeye tuna | HND | $3.69 | $3.41 | $4.22 | $6.00 | - | - | $4.89 |
| | PLL | $3.36 | $3.26 | $4.39 | $3.42 | $4.08 | $3.50 | $3.79 |
| | BLL | $2.15 | - | - | - | - | - | $4.30 |
| | NET | $3.31 | - | $0.42 | - | - | - | - |
| | TWL | $8.00 | $3.29 | $3.87 | $3.54 | $3.76 | - | - |
| Bluefin tuna | HND | $10.73 | $8.44 | $10.02 | $8.21 | $7.94 | $6.33 | $7.79 |
| | PLL | $5.56 | $7.06 | $5.65 | $5.24 | $5.96 | $4.21 | $5.38 |
| | NET | - | - | - | $4.26 | - | - | - |
| | SEN | $11.05 | $7.83 | $7.80 | $7.43 | $6.61 | $4.92 | $5.92 |
| | TWL | - | - | - | $3.80 | - | - | - |
| Yellowfin tuna | HND | $2.50 | $1.16 | $2.66 | $2.87 | $3.25 | $1.90 | $2.90 |
| | PLL | $2.14 | $2.44 | $2.77 | $3.01 | $2.76 | $2.57 | $2.89 |
| | BLL | $2.03 | $0.51 | $2.32 | $3.77 | - | - | $2.51 |
| | NET | $2.43 | $0.50 | - | - | $4.75 | - | - |
| | TWL | $2.67 | $2.21 | $2.31 | $2.10 | $2.19 | $1.65 | $3.25 |
| | TRP | - | - | - | - | $4.50 | $3.10 | - |
| Other tunas | HND | $1.90 | $1.41 | $1.59 | $2.39 | $2.03 | $1.56 | $1.78 |
| | PLL | $0.98 | $0.60 | $1.13 | $0.70 | $1.15 | $1.00 | $1.17 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | BLL | $1.50 | - | $0.50 | $3.00 | - | - | $0.66 |
| | NET | $0.73 | $0.20 | $0.50 | $0.36 | $0.70 | $1.14 | $0.44 |
| | TWL | $1.08 | $0.37 | $0.22 | $0.80 | $0.69 | $0.37 | $0.89 |
| | TRP | - | - | - | - | $0.34 | $0.44 | - |
| | DRG | - | - | - | - | $3.00 | - | - |
| Swordfish | HND | $5.20 | - | $8.00 | $5.69 | $5.32 | - | $4.79 |
| | PLL | $4.01 | $3.30 | $3.67 | $3.58 | $3.30 | $3.36 | $3.85 |
| | BLL | $3.07 | - | $2.00 | - | - | - | $3.75 |
| | NET | $5.62 | - | - | - | $4.25 | - | - |
| | TWL | $3.08 | $3.77 | $4.05 | $4.75 | $3.05 | $3.18 | $4.89 |
| | TRP | - | - | - | - | $3.74 | - | - |
| Large coastal sharks | HND | - | $0.74 | - | $0.50 | $0.45 | $0.74 | - |
| | PLL | $1.03 | - | $1.00 | $1.21 | $0.29 | $0.28 | $1.03 |
| | BLL | $0.99 | $1.03 | $0.65 | $1.43 | $1.00 | - | - |
| | NET | $0.83 | $0.64 | $1.06 | $0.99 | $0.89 | $0.89 | $0.68 |
| | TWL | $0.80 | $1.00 | $1.08 | $0.93 | $0.86 | $0.66 | $0.56 |
| | TRP | - | - | - | - | $0.28 | $0.22 | - |
| Pelagic sharks | HND | $1.60 | - | - | $1.38 | $1.71 | - | - |
| | PLL | $1.26 | $3.30 | $1.38 | $1.37 | $1.31 | $1.30 | $1.34 |
| | BLL | $1.85 | $0.89 | $1.50 | - | $0.65 | - | $1.07 |
| | NET | $1.12 | $0.70 | $0.82 | $0.98 | $0.60 | $1.30 | $1.99 |
| | TWL | $0.96 | $0.77 | $0.97 | $1.19 | $0.81 | $0.63 | $0.78 |
| | TRP | - | - | - | - | $0.69 | $0.68 | - |
| Small coastal sharks | HND | - | - | - | - | - | - | - |
| | NET | - | - | - | $1.51 | - | - | - |
| | TWL | - | - | - | - | $0.58 | - | - |
| Shark fins | PLL | $4.25 | - | $5.54 | - | - | - | - |
| | BLL | $3.00 | $0.33 | $25.19 | - | - | - | - |
| | NET | $1.96 | $2.79 | $2.41 | - | - | - | - |
| | TWL | $2.32 | $0.49 | $3.00 | - | - | - | - |

**Table 3.76 Average ex-vessel prices per lb for Atlantic HMS by area.**

| | | | | | | | | 2004 |
|---|---|---|---|---|---|---|---|---|
| Bigeye tuna | Gulf of Mexico | $0.68 | $3.38 | $2.26 | $1.94 | $4.33 | $3.29 | $4.54 |
| | S. Atlantic | $1.32 | $2.77 | $1.98 | $2.57 | $2.45 | $2.24 | $2.86 |
| | Mid-Atlantic | $3.99 | $3.52 | $4.39 | $4.26 | $3.82 | $3.77 | $4.56 |
| | N. Atlantic | $3.59 | $3.30 | $4.12 | $4.32 | $4.03 | $3.45 | $4.42 |
| Bluefin tuna | Gulf of Mexico | $5.83 | $6.32 | $1.86 | $1.25 | $5.56 | $6.32 | $4.64 |
| | S. Atlantic | $4.62 | $4.70 | $6.83 | $4.00 | $3.77 | $4.11 | $4.91 |
| | Mid-Atlantic | $9.48 | $5.90 | $5.98 | $5.25 | $4.70 | $7.38 | $9.62 |
| | N. Atlantic | $10.78 | $8.26 | $8.94 | $5.79 | $7.31 | $5.71 | $7.42 |
| Yellowfin tuna | Gulf of Mexico | - | $2.94 | $3.22 | $2.98 | $3.23 | $3.31 | $3.75 |
| | S. Atlantic | $1.56 | $1.77 | $1.88 | $1.70 | $1.73 | $1.76 | $1.53 |
| | Mid-Atlantic | $2.43 | $1.61 | $2.12 | $1.91 | $2.02 | $1.91 | $1.98 |
| | N. Atlantic | $2.35 | $1.52 | $2.65 | $2.93 | $2.90 | $2.38 | $2.65 |
| Other tunas | Gulf of Mexico | $0.29 | $0.86 | $0.74 | $0.76 | $0.84 | $0.75 | $0.89 |
| | S. Atlantic | $0.62 | $0.61 | $0.58 | $0.58 | $0.49 | $0.59 | $0.49 |
| | Mid-Atlantic | $1.10 | $0.80 | $0.76 | $0.70 | $0.73 | $0.70 | $0.63 |
| | N. Atlantic | $1.31 | $0.51 | $0.93 | $1.46 | $1.17 | $0.95 | $0.94 |
| Swordfish | Gulf of Mexico | - | $3.35 | $3.25 | $3.31 | $2.91 | $2.95 | $3.31 |
| | S. Atlantic | $2.79 | $3.27 | $3.24 | $3.43 | $3.14 | $3.26 | $3.52 |
| | Mid-Atlantic | $4.43 | $3.47 | $3.67 | $3.53 | $3.25 | $2.97 | $3.37 |
| | N. Atlantic | $4.09 | $3.45 | $3.87 | $4.67 | $3.47 | $3.33 | $4.06 |
| Large coastal sharks | Gulf of Mexico | $0.21 | $0.56 | $0.43 | $0.44 | $0.36 | $0.38 | $0.37 |
| | S. Atlantic | $1.02 | $1.10 | $0.78 | $1.12 | $1.27 | $0.39 | $0.44 |
| | Mid-Atlantic | $0.55 | $0.59 | $0.53 | $1.09 | $1.56 | $1.62 | $1.93 |
| | N. Atlantic | $0.88 | $0.77 | $1.01 | $1.02 | $0.77 | $0.72 | $0.70 |
| Pelagic sharks | Gulf of Mexico | - | $1.36 | $1.31 | $1.42 | $1.11 | $1.13 | $1.08 |
| | S. Atlantic | $0.62 | $0.83 | $0.76 | $0.68 | $0.67 | $0.71 | $0.65 |
| | Mid-Atlantic | $1.21 | $1.23 | $1.20 | $1.09 | $1.17 | $1.21 | $1.29 |
| | N. Atlantic | $1.31 | $0.81 | $1.10 | $1.23 | $1.00 | $1.12 | $1.46 |
| Small coastal sharks | Gulf of Mexico | - | $0.55 | $0.52 | $0.58 | $0.48 | $0.40 | $0.45 |
| | S. Atlantic | $0.25 | $0.50 | $0.48 | $0.52 | $0.53 | $0.51 | $0.61 |
| | Mid-Atlantic | $0.25 | $0.47 | $0.38 | $0.55 | $0.48 | $0.38 | $0.44 |
| | N. Atlantic | - | - | - | $1.51 | $0.58 | - | - |
| Shark fins | Gulf of Mexico | - | $14.01 | $15.99 | $20.90 | $22.64 | $18.12 | $17.93 |
| | S. Atlantic | $10.74 | $11.10 | $14.16 | $18.43 | $17.10 | $15.85 | $14.57 |
| | Mid-Atlantic | $4.60 | $3.41 | $4.90 | - | - | - | - |
| | N. Atlantic | $2.69 | $1.19 | $6.83 | - | - | - | - |

Table 3.75 and Table 3.76 indicate that the average ex-vessel prices for bigeye tuna have generally increased since 1996. Prices from 2003 to 2004 have increased in all four regions. The gears used also influenced the average price of bigeye tuna.

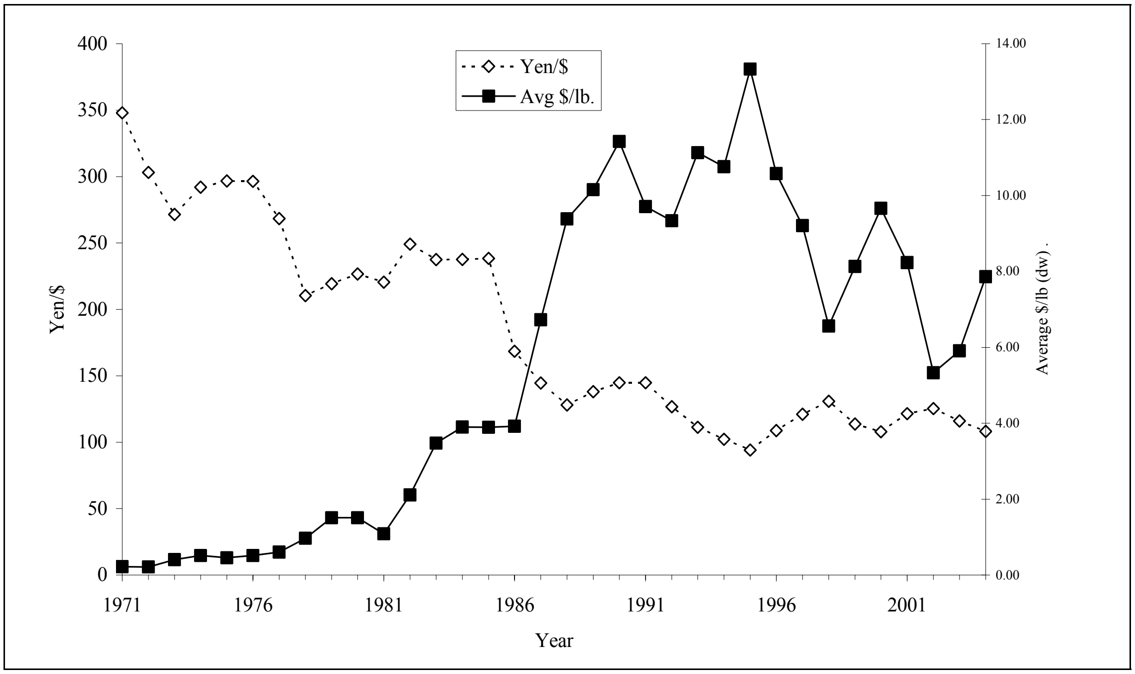



**Figure 3.33 Average Annual Yen/$ Exchange Rate and Average U.S. BFT Ex-vessel $/lb (dw) for all gears: 1971-2003.** Source: Federal Reserve Bank (www.stls.frb.org) and Northeast Regional Office.

Average ex-vessel prices for bluefin tuna have generally declined since 1996. Since 2002, however, prices increased in all regions except the North Atlantic (Table 3.76). The gear used also made a difference in the ex-vessel price (Table 3.75). In the North Atlantic and Mid-Atlantic, bluefin tuna caught with handgear had higher average prices than those caught with longline. This trend has been fairly consistent over the years between 1996 and 2004. The ex-vessel prices for bluefin tuna can be influenced by many factors, including market supply and the Japanese Yen/U.S. Dollar (¥/$) exchange rate. Figure 3.33 shows the average ¥/$ exchange rate, plotted with average ex-vessel bluefin tuna prices, from 1971 to 2003.

The average ex-vessel prices for yellowfin tuna have increased in 2004 in the Gulf of Mexico, Mid-Atlantic and North Atlantic while increasing slightly in the South Atlantic (Table 3.76). Yellowfin tuna caught with longline gear had higher average ex-vessel prices than fish caught with other gear types in 2004 (Table 3.75). The average ex-vessel price for other tunas decreased in all regions except the Gulf of Mexico in 2004 (Table 3.76). The average price of other tunas is lowest in the South Atlantic compared to other regions. The type of gear used did not appear to consistently influence the average ex-vessel prices of other tuna. Average ex-vessel prices for swordfish increased in 2004 in all regions (Table 3.76). Swordfish caught using handline gear had higher average ex-vessel prices than other gear types, except in the Mid-Atlantic where it was trawls (Table 3.75).

The average ex-vessel price for LCS slightly decreased in the Gulf of Mexico in 2004 and North Atlantic. However, prices for LCS increased in the Mid-Atlantic and South Atlantic (Table 3.76). The average ex-vessel prices for pelagic sharks increased in the Mid-Atlantic and North Atlantic regions in 2004 (Table 3.76), while prices decreased in Gulf of Mexico and South Atlantic. The 2004 prices for pelagic sharks are not significantly different than 1996 prices and are actually lower than 1996 when adjusting for inflation. The average ex-vessel prices for small coastal sharks (SCS) rebounded in all regions in 2004 (Table 3.76). Gear type did not consistently affect ex-vessel price of small coastal sharks in 2004 (Table 3.75).

#### 3.5.1.2 Revenues

Table 3.77 summarizes the average annual revenues of the Atlantic HMS fishery based on average ex-vessel prices and the weight reported landed as per the U.S. National Report (NMFS 2005), the Shark Evaluation Reports, information given to ICCAT (Cortes, 2005), as well as price and weight reported to the NMFS Northeast Regional Office by Atlantic bluefin tuna dealers. These values indicate that the estimated total annual revenue of Atlantic HMS fisheries has decreased 34 percent from approximately \$66.4 million in 1996 to approximately \$43.9 million in 2004. From 2003 to 2004, the tuna fishery's total revenue decreased significantly. A majority of that decrease can be attributed to reduced commercial landings of bluefin tuna and yellowfin tuna. From 2003 to 2004, the annual revenues from shark decreased by over 21 percent. In contrast, the annual revenues from swordfish from 2003 to 2004 increased by five percent after having been in decline for several years.

**Table 3.77 Estimates of the total ex-vessel annual revenues of Atlantic HMS fisheries.** Sources: NMFS, 1997; NMFS 2004a; Cortes, 2003; and bluefin tuna dealer reports from the Northeast Regional Office.

| | | | | | | | | **2004** |
|---|---|---|---|---|---|---|---|---|
| Bigeye tuna | Ex-vessel $/lb dw | $2.40 | $3.24 | $3.18 | $3.27 | $3.66 | $3.19 | $4.10 |
| | Weight lb dw | 1,212,706 | 1,664,385 | 1,012,352 | 2,391,350 | 1,267,645 | 846,191 | 551,503 |
| | Fishery Revenue | $2,910,494 | $5,395,971 | $3,222,636 | $7,827,218 | $4,637,372 | $2,697,233 | $2,258,404 |
| Bluefin tuna | Ex-vessel $/lb dw | $10.58 | $8.14 | $9.66 | $8.23 | $5.33 | $5.91 | $7.86 |
| | Weight lb dw | 1,652,989 | 1,926,442 | 2,137,580 | 2,176,016 | 4,133,625 | 2,519,345 | 885,720 |
| | Fishery Revenue | $17,488,624 | $15,677,959 | $20,648,413 | $17,904,240 | $22,042,839 | $14,889,328 | $6,961,760 |
| Yellowfin tuna | Ex-vessel $/lb dw | $2.11 | $1.96 | $2.46 | $2.38 | $2.48 | $2.34 | $2.48 |
| | Weight lb dw | 6,679,938 | 6,351,717 | 12,435,708 | 14,777,800 | 12,885,887 | 13,556,340 | 4,832,483 |
| | Fishery Revenue | $14,094,669 | $12,433,149 | $30,577,372 | $35,193,181 | $31,919,170 | $31,721,836 | $11,972,477 |
| Other tunas* | Ex-vessel $/lb dw | $0.83 | $0.69 | $0.75 | $0.87 | $0.81 | $0.75 | $0.74 |
| | Weight lb dw | 368,433 | 495,241 | 795,243 | 867,960 | 1,298,509 | 900,522 | 287,127 |
| | Fishery Revenue | $305,799 | $343,771 | $593,595 | $754,322 | $1,057,273 | $673,140 | $211,756 |
| **Total tuna** | **Fishery Revenue** | **$34,799,586** | **$33,850,849** | **$55,042,015** | **$61,678,960** | **$59,656,653** | **$49,981,537** | **$21,404,397** |
| Swordfish** | Ex-vessel $/lb dw | $3.77 | $3.38 | $3.51 | $3.74 | $3.20 | $3.13 | $3.57 |
| | Weight lb dw | 7,170,619 | 5,942,839 | 4,832,384 | 5,662,350 | 5,985,489 | 4,668,466 | 4,317,369 |
| | Fishery Revenue | $27,033,234 | $20,104,498 | $16,974,346 | $21,153,927 | $19,150,819 | $14,600,627 | $15,391,422 |
| Large coastal sharks | Ex-vessel $/lb dw | $0.67 | $0.76 | $0.68 | $0.91 | $0.99 | $0.78 | $0.86 |
| | Weight lb dw | 5,262,314 | 3,919,570 | 3,762,000 | 3,562,546 | 4,097,363 | 4,421,249 | 3,206,377 |
| | Fishery Revenue | $3,525,750 | $2,950,102 | $2,560,307 | $3,256,955 | $4,040,977 | $3,437,521 | $2,757,484 |
| Pelagic sharks | Ex-vessel $/lb dw | $1.05 | $1.06 | $1.09 | $1.11 | $0.99 | $1.04 | $1.12 |
| | Weight lb dw | 695,531 | 400,821 | 215,005 | 362,925 | 303,666 | 616,967 | 450,833 |
| | Fishery Revenue | $730,308 | $424,273 | $233,650 | $401,430 | $299,487 | $643,188 | $504,933 |
| Small coastal sharks | Ex-vessel $/lb dw | $0.25 | $0.51 | $0.46 | $0.79 | $0.52 | $0.43 | $0.50 |
| | Weight lb dw | 460,667 | 672,245 | 672245* | 719,484 | 579,441 | 549,799 | 677,305 |
| | Fishery Revenue | $115,167 | $340,890 | $309,926 | $568,441 | $299,023 | $236,414 | $338,653 |
| Shark fins (weight = 5% of all sharks landed) | Ex-vessel $/lb dw | $6.01 | $7.43 | $10.47 | $19.67 | $19.87 | $17.09 | $16.25 |
| | Weight lb dw | 320,926 | 249,632 | 232,462 | 232,248 | 249,024 | 279,401 | 216,726 |
| | Fishery Revenue | $218,561 | $1,854,313 | $2,434,344 | $4,568,937 | $4,949,056 | $4,774,959 | $3,521,793 |
| **Total sharks** | **Fishery Revenue** | **$4,589,786** | **$5,569,578** | **$5,538,227** | **$8,795,763** | **$9,588,545** | **$9,092,082** | **$7,112,863** |
| Total HMS | Fishery Revenue | $66,422,606 | $59,524,926 | $77,554,588 | $91,628,650 | $88,396,016 | $73,674,245 | $43,918,682 |

Note: Average ex-vessel prices may have some weighting errors, except for bluefin tuna which is based on a fleet-wide average. Other tunas includes skipjack and albacore. ** Swordfish estimates do not include dead discards.

#### 3.5.1.3 Wholesale Market

Currently, NMFS does not collect wholesale price information from dealers. However, the wholesale price of some fish species is available off the web (http://www.st.nmfs.gov/st1/market_news/index.html). The wholesale prices presented in Table 3.78 are from the annual reports of the Fulton Fish Market. As with ex-vessel prices, wholesale prices depend on a number of factors including the quality of the fish, the weight of the fish, the supply of fish, and consumer demand.

As reported by the Fulton Fish Market, Table 3.78 indicates that the average wholesale price of HMS sold in Atlantic and Gulf of Mexico states generally decreased from 1996 to 2003, except for blacktip shark. Prices have appeared to have rebounded in 2004, breaking from the declining trend. During that same period, the wholesale price of swordfish weighing over 100 pounds decreased 19 percent, swordfish weighing between 50 and 99 pounds decreased 25 percent, and swordfish cuts decreased 15 percent. The wholesale price of blacktip shark increased 27 percent from 1996 to 2003, with most of the increase occurring in 2003. The wholesale price of mako shark decreased 14 percent from 1996 to 2003, however 2003 wholesale prices were up from 2002. The wholesale price of thresher shark has decreased 22 percent from 1996 to 2003. Wholesale yellowfin tuna prices have remained relatively stable from 1996 to 2003. The yellowfin tuna wholesale price of #2 quality fish had decreased eight percent while the price of #2 cuts has increased seven percent from 1996 to 2003. Bigeye tuna wholesale prices from 1999 to 2003 have increased significantly for both high grade cuts and fish.

**Table 3.78 The overall average wholesale price per lb of fresh HMS sold in Atlantic and Gulf of Mexico states as reported by the Fulton Fish Market.** Source: NMFS, 2004.

| | | | | | | | | 2004 Price/lb |
|---|---|---|---|---|---|---|---|---|
| Blacktip | - | $1.05 | $1.04 | $1.04 | $1.05 | $1.00 | $1.33 | $1.08 |
| Mako | - | $2.77 | $2.74 | $3.18 | $3.00 | $2.00 | $2.37 | $2.24 |
| Thresher | - | $1.00 | $0.91 | $0.82 | $1.25 | $1.25 | $0.78 | $1.24 |
| Swordfish | 100# and up | $6.28 | $5.26 | $5.26 | $5.42 | $5.19 | $5.08 | $5.66 |
| | 50-99# | $6.02 | $4.54 | $4.72 | $4.81 | $4.59 | $4.50 | $5.15 |
| | 26-49# | $5.50 | $3.36 | $3.58 | $4.05 | $3.50 | - | $3.25 |
| | Cuts | $7.74 | $6.55 | $6.54 | $6.73 | $6.84 | $6.55 | $7.13 |
| Yellowfin tuna | #1: BTF | $7.00 | $5.97 | $5.69 | $5.50 | $7.42 | - | $6.00 |
| | #1: Cuts | $9.38 | $8.23 | $8.00 | $8.23 | $10.67 | - | $8.50 |
| | #2: BTF | $5.00 | $4.24 | $4.36 | $3.97 | $4.92 | $4.60 | $4.62 |
| | #2: Cuts | $6.52 | $6.22 | $6.20 | $6.00 | $7.29 | $6.98 | $7.32 |
| | #3: BTF | - | $3.00 | - | - | - | $2.50 | - |
| | #3: Cuts | - | $4.50 | - | - | - | - | $3.00 |
| Bigeye tuna | #1: BTF | - | $4.00 | - | - | - | $6.50 | $7.75 |
| | #1: Cuts | - | $5.50 | - | - | - | $8.50 | $11.00 |
| | #2: BTF | - | $4.26 | - | - | - | - | - |
| | #2: Cuts | - | $6.00 | - | - | - | - | - |

Note: #'s indicate quality (1 is highest, 3 is lowest); BTF is by the fish.

### 3.5.2 Recreational Fisheries

Although NMFS believes that recreational fisheries have a large influence on the economies of coastal communities, NMFS has only recently been able to gather additional information on the costs and expenditures of anglers or the businesses that rely on them.

An economic survey done by the U.S. Fish and Wildlife Service[2] in 2001 found that for the entire United States 9.1 million saltwater anglers (including anglers in state waters) went on approximately 72 million fishing trips and spent approximately $8.4 billion (USFWS, 2001). Expenditures included lodging, transportation to and from the coastal community, vessel fees, equipment rental, bait, auxiliary purchases (*e.g.*, binoculars, cameras, film, foul weather clothing, *etc.*), and fishing licenses (USFWS, 2001). Saltwater anglers spent $4.5 billion on trip-related costs and $3.9 billion on equipment (USFWS, 2001). Approximately 76 percent of the saltwater anglers surveyed fished in their home state (USFWS, 2001). The next USFWS survey is expected in 2006.

Specific information regarding angler expenditures for trips targeting HMS species was extracted from the recreational fishing expenditure survey add-on (1998 in the Northeast, 1999 – 2000 in the Southeast) to the National Marine Fisheries Service's Marine Recreational Fisheries Statistics Survey (MRFSS). These angler expenditure data were analyzed on a per person per trip-day level and reported in 2003 dollars. The expenditure data include the costs of tackle, food, lodging, bait, ice, boat fuel, processing, transportation, party/charter fees, access/boat launching, and equipment rental. The overall average expenditure on HMS related trips is estimated to be $122 per person per day. Specifically, expenditures are estimated to be $686 per person per day on billfish directed trips (based on a low sample size), $85 on pelagic shark directed trips, $95 on large coastal shark directed trips, $81 on small coastal sharks, and $106 on tuna trips.

The American Sportfishing Association (ASA) also has a report listing the 2001 economic impact of sportfishing on specific states. This report states that all sportfishing (in both Federal and state waters) has an overall economic importance of $116 billion dollars (ASA, 2001). Florida, Texas, North Carolina, New York, and Alabama are among the top ten states in terms of overall economic impact for both saltwater and freshwater fishing (ASA, 2001). Florida is also one of the top states in terms of economic impact of saltwater fishing with $2.9 billion in angler expenditures, $5.4 billion in overall economic impact, $1.5 billion in salaries and wages related to fishing, and 59,418 fishing related jobs (ASA, 2001). California followed Florida with $0.8 billion in angler expenditures, $1.7 billion in overall economic impact, $0.4 billion in salaries and wages, and 15,652 jobs (ASA, 2001). Texas and New Jersey were the next highest states in terms of economic impact (ASA, 2001).

At the end of 2004, NMFS began collecting market information regarding advertised charterboat rates. This preliminary analysis of the data collected includes 99 observations of advertised rates on the internet for full day charters. Full day charters vary from six to 14 hours long with a typical trip being 10 hours. Most vessels can accommodate six passengers, but this

[2] This survey interviewed over 77,000 households during phase 1 and approximately 25,070 sports persons during phase 2. The response rate during phase two of the survey was 75 percent.

also varies from two to 12 passengers. Table 3.79 summarizes the average charterboat rate for full day trips on vessels with HMS Charter/Headboat permits. The average price for a full day boat charter was $1,053 in 2004. Sutton *et al.*, (1999) surveyed charterboats throughout Alabama, Mississippi, Louisiana, and Texas in 1998 and found the average charterboat base fee to be $762 for a full day trip. Holland *et al.* (1999) conducted a similar study on charterboats in Florida, Georgia, South Carolina, and North Carolina and found the average fee for full day trips to be $554, $562, $661, and $701, respectively. Comparing these two studies conducted in the late 1990s to the average advertised daily HMS charterboat rate in 2004, it is apparent that there has been a significant gain in charterboat rates.

**Table 3.79 Average Atlantic HMS charterboat rates for day trips.** Source: NMFS searches for advertised daily charter rates of HMS Charter/Headboat permit holders. (Observations=99)

| | **2004 Average Daily Charter Rate** |
|---|---|
| AL | $1,783 |
| CT | $1,500 |
| DE | $1,060 |
| FL | $894 |
| LA | $1,050 |
| MA | $777 |
| MD | $1,167 |
| ME | $900 |
| NC | $1,130 |
| NJ | $1,298 |
| NY | $1,113 |
| RI | $917 |
| SC | $1,300 |
| TX | $767 |
| VA | $825 |
| **Overall Average** | **$1,053** |

In 2003, Ditton and Stoll published a paper that surveyed the literature regarding what is currently known about the social and economic aspects of recreational billfish fisheries. It was estimated that 230,000 anglers in the United States spent 2,136,899 days fishing for billfish in 1991. This is approximately 3.6 percent of all saltwater anglers over age 16. The states with the highest number of billfish anglers are Florida, California, North Carolina, Hawaii, and Texas in descending order. Billfish anglers studied in the U.S. Atlantic, Puerto Rico, and Costa Rica fished between 39 and 43 days per year.

Billfish recreational anglers tend to spend a great deal of money on trips. Ditton and Stoll (2003) report that a 1990 study of U.S. total trip costs for a typical billfish angler estimated a mean expenditure of $2,105 per trip for the Atlantic and $1,052 per trip for Puerto Rico. The aggregate economic impact of billfish fishing trips in the U.S. Atlantic is conservatively estimated to be $22.7 million annually.

In addition to the economic impact of recreational billfish angling, Ditton and Stoll (2003) report that using a contingent valuation method they estimated consumer's surplus or net economic benefit to maintain current billfish populations in the U.S. Atlantic to be $497 per billfish angler per year in the U.S. Atlantic and $480 in Puerto Rico. They also estimate that the number of annual billfish anglers in the U.S. Atlantic to be 7,915 and 1,627 in Puerto Rico. The aggregate willingness-to-pay for maintaining current billfish populations is $3.93 million in the U.S. Atlantic and 0.78 million in Puerto Rico. The aggregate direct impact of billfish expenditures is estimated to be $15.13 million for the U.S. Atlantic and $32.40 million for Puerto Rico. Thus, the total aggregate economic value of billfish angler fishing is $19.06 million per year for the U.S. Atlantic and $33.18 million per year for Puerto Rico.

Generally, HMS tournaments last from three to seven days, but lengths can range from one day to an entire fishing season. Similarly, average entry fees can range from approximately $0 to $5,000 per boat (average approximately $500/boat – $1,000/boat), depending largely upon the magnitude of the prize money that is being awarded. The entry fee would pay for a maximum of two to six anglers per team during the course of the tournament. Additional anglers can, in some tournaments, join the team at a reduced rate of between $50 and $450. The team entry fee did not appear to be directly proportional to the number of anglers per team, but rather with the amount of money available for prizes and, possibly, the species being targeted. Prizes may include citations, T-shirts, trophies, fishing tackle, automobiles, boats, or other similar items, but most often consists of cash awards. In general, it appears that billfish and tuna tournaments charge higher entry fees and award more prize money than shark and swordfish tournaments, although all species have a wide range.

Cash awards distributed in HMS tournaments can be quite substantial. Several of the largest tournaments, some of which are described below, are part of the World Billfish Series Tournament Trail whereby regional winners are invited to compete in the World Billfish Series Grand Championship for a new automobile and a bronze sculpture. Other tournament series include the International Game Fish Association (IGFA) Rolex Tournament of Champions, and the South Carolina Governor's Cup. White marlin is a top billfish species from Cape Hatteras, North Carolina to the eastern tip of Georges Bank from June through October each year. The White Marlin Open in Ocean City, Maryland, which is billed as the "world's richest fishing tournament," established a new world record payout for catching a fish when it awarded $1.32 million in 2004 to the vessel catching the largest white marlin. The 21st Annual Pirates Cove Billfish Tournament in North Carolina awarded over $1 million in prizes in 2004, with the top boat garnering over $400,000 for winning in six categories. Total prize money awarded in the Big Rock Tournament in North Carolina has exceeded $1 million since 1998.

Blue marlin, sailfish, and tunas are also often targeted in fishing tournaments, including those discussed above. In 2004, blue marlin was the HMS most frequently identified as a prize category in registered HMS tournaments. Forty-five teams participated in the 2004 Emerald Coast Blue Marlin Classic at Sandestin, Florida, with over $482,000 in cash prizes and the top boat receiving over $58,000. The 34th Annual Pensacola (Florida) International Billfish

Tournament indicated that it would award over $325,000 in cash and prizes in 2004. The World Sailfish Championship in Key West, Florida has a $100,000 guaranteed first prize for 2005. In South Carolina, the Megadock Billfishing Tournament offers a $1,000,000 prize for any boat exceeding the current blue marlin state record. The 2004 Florida Billfish Masters Tournament in Miami, Florida awarded over $123,000 in prize money, with the top boat receiving over $74,000. Sixty-two boats competed in the 2003 Babylon Tuna Club Invitational in Babylon, New York for over $75,000 in cash prizes, and the Mid-Atlantic Tuna Tournament sponsored by the South Jersey Marina in Cape May, New Jersey anticipates awarding over $25,000 in prizes in 2005.

Several tournaments target sharks. Many shark tournaments occur in New England, New York, and New Jersey, although other regions hold shark tournaments as well. In 2004, the 24th Annual South Jersey Shark Tournament hosted over 200 boats and awarded over $220,000 in prize money, with an entry fee of $450 per boat. The "Mako Fever" tournament, sponsored by the Jersey Coast Shark Anglers, in 2004 awarded over $55,000 in prizes, with the first place vessel receiving $25,000. In 2004, the 18th Annual Monster Shark Tournament in Martha's Vineyard, Massachusetts was broadcast on ESPN, and featured a new fishing boat valued at over $130,000 awarded to the winner.

Swordfish tournaments have gained increased popularity in recent years, especially on the east coast of Florida, as the swordfish population has recovered. Events include the Islamorada Swordfish Tournament that began in 2004, and the Miami Swordfish Tournament that began in 2003. Both of these tournaments anticipated awarding over $30,000 in total cash and prizes, assuming that 50 boats would participate.

In addition to official prize money, many fishing tournaments may also conduct a "calcutta" whereby anglers pay from $200 to $5,000 to win more money than the advertised tournament prizes for a particular fish. Tournament participants do not have to enter calcuttas. Tournaments with calcuttas generally offer different levels depending upon the amount of money an angler is willing to put down. Calcutta prize money is distributed based on the percentage of the total amount entered into that Calcutta. Therefore, first place winner of a low level Calcutta (entry fee ~$200) could win less than a last place winner in a high level calcutta (entry fee ~$1000). On the tournament websites, it was not always clear if the total amount of prizes distributed by the tournament included prize money from the calcuttas or the estimated price of any equipment. As such, the range of prizes discussed above could be a combination of fish prize money, Calcutta prize money, and equipment/trophies.

Fishing tournaments can sometimes generate a substantial amount of money for surrounding communities and local businesses. Besides the entry fee to the tournament and possibly the calcutta, anglers may also pay for marina space and gas (if they have their own vessel), vessel rental (if they do not have their own vessel), meals and awards dinners (if not covered by the entry fee), hotel, fishing equipment, travel costs to and from the tournament, camera equipment, and other miscellaneous expenses. Fisher and Ditton (1992) found that the average angler who attended a billfish tournament spent $2,147 per trip (2.59 days), and that billfish tournament anglers spent an estimated $180 million (tournament and non-tournament trips) in 1989. Ditton and Clark (1994) estimated annual expenditures for Puerto Rican billfish fishing trips (tournaments and non-tournaments) at $21.5 million. More recently, Ditton, *et al.*,

(2000) estimated that the total expenditure (direct economic impact) associated with the 1999 Pirates Cove Billfish Tournament, not including registration fees, was approximately $2,072,518. The total expenditure (direct economic impact) associated with the 2000 Virginia Beach Red, White, and Blue Tournament was estimated at approximately $450,359 (Thailing, *et al*., 2001). These estimated direct expenditures do not include economic effects that may ripple through the local economy leading to a total impact exceeding that of the original purchases by anglers (*i.e*., the multiplier effect). Less direct, but equally important, fishing tournaments may serve to generally promote the local tourist industry in coastal communities. In a survey of participants in the 1999 Pirates Cove Billfish Tournament, Ditton, *et al*., (2000) found that almost 80 percent of tournament anglers were from outside of the tournament's county. For this reason, tourism bureaus, chambers of commerce, resorts, and state and local governments often sponsor fishing tournaments.

## 3.6 Community and Social Update

According to National Standard 8 (NS 8), conservation and management measures should, consistent with conservation requirements, attempt to both provide for the continued participation of a community and, to the extent practicable, minimize the economic effects on the community. The information presented here addresses new data concerning the social and economic well-being of participants in the fishery and considers the impact of significant regulatory measures enacted in the past year.

### 3.6.1 Overview of Current Information and Rationale

The Magnuson-Stevens Act requires, among other things, that all FMPs include a fishery impact statement intended to assess, specify, and describe the likely effects of the measures on fishermen and fishing communities (§303(a)).

The National Environmental Policy Act (NEPA) also requires federal agencies to consider the interactions of natural and human environments by using a "systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making" (§102(2)(A)). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects which may be direct, indirect, or cumulative. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. The consequences of management actions need to be examined to better ascertain and, if necessary, mitigate impacts of regulations on affected constituents.

Social impacts are generally the consequences to human populations that follow from some type of public or private action. Those consequences may include alterations to the ways in which people live, work or play, relate to one another, and organize to meet their needs. In addition, cultural impacts which may involve changes in values and beliefs that affect people's way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Although public hearings and scoping meetings provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

While geographic location is an important component of a fishing community, the transient nature of HMS may necessitate permitted fishermen to shift location in an attempt to follow the fish. Because of this characteristic, management measures for HMS often have the most identifiable impacts on fishing fleets that use specific gear types. The geographic concentrations of HMS fisheries may also vary from year to year as the behavior of these migratory fish is unpredictable. The relationship between these fleets, gear types, and geographic fishing communities is not always a direct one; however, they are important variables for understanding social and cultural impacts. As a result, the inclusion of typical community profiles in HMS management decisions is somewhat difficult as geographic factors and the use of a specific gear type have to be considered.

NMFS (2001) guidelines for social impact assessments specify that the following elements are utilized in the development of FMPs and FMP amendments:

1. The size and demographic characteristics of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region.
2. The cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities.
3. The effects of proposed actions on social structure and organization; that is, on the ability to provide necessary social support and services to families and communities.
4. The non-economic social aspects of the proposed action or policy; these include life-style issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats.
5. The historical dependence on and participation in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights.

The information used in the 1999 FMP and the 1999 Billfish Amendment was obtained through a contract with Dr. Doug Wilson, from the Ecopolicy Center for Agriculture, Environmental and Resource Issues at Rutgers, the State University of New Jersey. Dr. Wilson and his colleagues completed their field work in July 1998. Their study considered HMS that have important commercial and recreational fisheries extending along the Atlantic and Gulf Coast from Maine to Texas and in the Caribbean. The study investigated the social and cultural characteristics of fishing communities in five states and one U.S. territory: Massachusetts, New Jersey, North Carolina, Florida, Louisiana, and Puerto Rico. These areas were selected because they each have important fishing communities that could be affected by measures included in the 1999 FMP and the 1999 Billfish Amendment, and because they are fairly evenly spread along the Atlantic and Gulf Coast and the Caribbean. For each state or territory, a profile of basic sociologic information was compiled, with at least two coastal communities visited for further analysis. Towns were selected based on HMS landings data, the relationship between the geographic communities and the fishing fleets, the existence of other community studies, and inputs from the Advisory Panels for HMS and Billfish. Complete descriptions of the study results can be found in Chapter 9 of the 1999 FMP and Chapter 7 of the Billfish Amendment.

In 2002, NMFS contracted the Virginia Institute of Marine Science (VIMS) at the College of William and Mary to re-evaluate several of the baseline communities and, specifically, to determine if the 1999 HMS FMP had a negative social impact on the communities dependent upon HMS. The 2005 report provided a brief overview and examination of changes in social and economic structures of communities which land HMS. The analysis of change since the 1999 HMS FMP regulations were implemented was based on demographics, landings information, and informal interviews with individuals from three different communities. Some of the report's findings are incorporated into the community profiles in Chapter 9 of this document.

### 3.6.2 Social Impacts of Selected 2005 Regulatory Actions

*Final Rule Implementing Atlantic Bluefin Tuna Quota Specifications for 2004 (70 CFR 43, March 7, 2005)*

This action set BFT quotas for each of the established domestic fishing categories and sets General category effort controls for the 2004 fishing year (June 1, 2004 – May 31, 2005) and established a catch-and-release provision, in addition to the tag-and release provision, for recreational and commercial BFT handgear vessels during a respective quota category closure.

The action was not expected to have any significant, positive or negative, social or economic impacts. The final action was expected to have modest positive social and economic impacts, by implementing the ICCAT-recommended adjusted BFT TAC for the United States in the western Atlantic management area of 1,489.6 mt. The action was not expected to have highly controversial effects on the human environment. There were no highly uncertain effects associated with this action due to the fact that the BFT fishery has been in operation for years. Thus, implementing the 2002 ICCAT BFT quota recommendation is consistent with the past, would not set a new precedence, and would provide positive economic impacts due to the application of the additional BFT quota. Although controversial issues associated with the BFT fishery remain, they are beyond the scope of this particular rulemaking and will be addressed in future regulatory and FMP amendments. The action is not expected to have substantial adverse impacts on public health and safety. Fishing activity or behavior would not change, although fishing effort may increase slightly as a result of this action.

*Final Rule Implementing Atlantic Bluefin Tuna Quota Specifications and General Category Effort Controls for 2005 (70 FR 108, June 7, 2005)*

This action set BFT quotas for each of the established domestic fishing categories and set General category effort controls for the 2005 fishing year (June 1, 2005 – May 31, 2006). NMFS also established the restricted fishing days to extend the General category BFT fishery into the late season for the southern Atlantic region. This action implemented the recommendations of the International Commission for the Conservation of Atlantic Tunas (ICCAT), as required by the Atlantic Tunas Convention Act, and were implemented to achieve domestic management objectives under the Magnuson-Stevens Fishery Conservation and Management Act.

NMFS prepared an EA for the final rule, concluding that the action is not expected to have any significant, positive or negative, social or economic impacts. The selected action was expected to have modest positive social and economic impacts, by implementing the ICCAT-recommended adjusted BFT TAC for the United States in the western Atlantic management area of 1,489.6 mt and is consistent with the ICCAT recommendation regarding the eight-percent tolerance of school BFT harvest. The action is not expected to be highly controversial on the human environment. There are no highly uncertain effects associated with this action due to the fact that the BFT fishery has been in operation for years. The action is not expected to have substantial adverse impacts on public health and safety. Fishing activity or behavior would not change, although fishing effort may increase slightly. For further background information, please see the Environmental Assessment and associated Final Regulatory Flexibility Analysis for this rule, http://www.nmfs.noaa.gov/sfa/hms/Tuna/05_Specs_Final_EA.RIR.FRFA.0523.pdf.

### 3.6.3 Summary of New Social and Economic Data Available

#### 3.6.3.1 2005 Social Science Publications

The following two reports were delivered in 2005. An additional two reports, completing the community profiles for the Gulf of Mexico, are currently in peer review. Both reports are summarized in the abstract below.

Impact Assessment. 2005. *Identifying communities associated with the fishing industry in Alabama and Mississippi.* La Jolla, California. (NOAA-NMFS-Contract WC133F-02-SE-0297). p.661.

Impact Assessment. 2005. *Identifying communities associated with the fishing industry in Louisiana*. La Jolla, California. (NOAA-NMFS-Contract WC133F-02-SE-0297). p. 661.

> *Abstract*. The research has been conducted for NOAA Fisheries Southeast Regional Office (SERO), in fulfillment of its goal to effectively manage the various fisheries upon which residents of certain towns and cities in the Gulf of Mexico have depended and/or continue to depend, to greater and lesser degrees, for economic and social purposes. A systematic methodology was developed to investigate and describe Gulf communities likely to exhibit some or all of the attributes of "fishing communities" as defined by the Magnuson-Stevens Fishery Conservation and Management Act as Amended (the Magnuson Act; MSFCMA), and by National Standard 8 (NS-8). The project methodology emphasized: (a) collection and geospatial analysis of various fishing license, landings, economic, and demographic attribute data, and (b) collection and analysis of a variety of descriptive economic and social data considered viable indicators of fishing community status. The scope of this study is quite large, encompassing 30 communities in three counties in Alabama, 14 communities in three counties in Mississippi, and 106 communities in Louisiana. The overarching goal of the project was to provide the information needed to make preliminary determinations about whether, or to what degree, each community fits the federal definition of "fishing community." This report provides: (a) fisheries-relevant narrative description of historic and contemporary life in the study parishes, cities, and towns, (b) tabular and spatial description of fisheries infrastructure and services, and fleet characteristics specific to those study areas; and (c) preliminary assessment of the manner in, and degree to which, each study town or city does or does not approximate the National Standard 8 definition of fishing community. As the final version of these reports is being submitted

immediately following the passage of Hurricane Katrina in late August of 2005, the reports and associated data may also serve as a timely and accurate baseline for assessing the effects of the event on the study counties, cities, and towns, and their residents.

Jacob, S., M. Jepson, and F.L. Farmer. 2005. *What you see is not always what you get: Aspect dominance as a confounding factor in the determination of fishing dependent communities. Human Organization* 64(4):374-385.

*Abstract*. Many residents of coastal towns believe that they live in communities that are economically dependent upon commercial fishing. However, employment data indicate that fishing is a relatively minor economic component of many of these communities. We apply the concept of aspect dominance from the field of ecology to help explain this discrepancy. In addition we explore other forms of ecological dominance in regard to perceptions of fishing dependence. A key idea is that residents and sometimes researchers confuse forms of ecological dominance with economic dependence. Our study relied upon secondary and key informant data for six Florida coastal communities. In addition, we conducted a random telephone sample with 1,200 residents of these villages to establish their perceptions of the importance of commercial fishing to their communities.

Sutton, S.G., and R.B. Ditton. 2005. *The substitutability of one type of fishing for another*. North American Journal of Fisheries Management 25:536-546.

*Abstract*. We investigated the willingness of saltwater anglers in Florida and Texas to substitute other types of fishing for the type of fishing they most preferred. Anglers were asked if there was a suitable substitute for their most preferred species and, if so, what species would provide them with the same satisfaction and enjoyment as their most preferred species at the same cost. Most anglers (86 percent) reported that other species would provide acceptable substitutes for their preferred species and were able to identify acceptable substitutes from a list of common saltwater species in Texas and Florida. Logistic regression was used to determine the effects of demographic and fishing participation variables on willingness to substitute. Willingness to substitute was positively related to years of education and negatively related to age and the importance placed on trophy-seeking experiences. Also, females were more willing to substitute than males. Results suggest that for some species substitution behavior in response to biologically or managerially imposed constraints on fishing activity could result in increased effort for other species in the saltwater fisheries of Texas and Florida.

#### 3.6.3.2 Summary of Social Data and Information for FEIS

This document consolidates all of the community profiles from previous HMS management plans or amendments and updates the community information, where possible. To ensure continuity with the 1999 HMS FMP and previous amendments, if a community was selected and described as being involved with an HMS fishery, the same community was included in this assessment. The communities profiled were originally selected due to the proportion of HMS landings, the relationship between the geographic communities and the fishing fleets, the existence of other community studies, and input from the HMS and Billfish Advisory Panels. The communities selected for detailed study are Gloucester and New Bedford, Massachusetts; Barnegat Light and Brielle, New Jersey; Wanchese, and Hatteras Township, North Carolina; Pompano Beach, Fort Pierce, Madeira Beach, Panama City Beach, and Islamorada, Florida; Boothville/Venice and Dulac, Louisiana; and Arecibo, Puerto Rico. These communities are not intended to be an exhaustive list of every HMS-related community in the United States; rather the objective is to give a broad perspective of representative areas.

The demographic profiles in this document have been modified to include the same baseline information for each community profiled; as a result, most of the tables include more information than portrayed in the 1999 HMS FMP and its amendments. The demographic tables still use both 1990 and 2000 Bureau of the Census data for comparative purposes. The descriptive community profiles include the same information provided by the Wilson, *et al.,* (1998) and Kirkley (2005) analyses with some new information provided by Impact Assessment, Inc (2004) on the Gulf of Mexico communities. Unlike the Wilson, *et al.,* (1998) study used in the 1999 HMS FMP, it was not possible to undertake field research for this assessment.

This assessment also reviewed the HMS permit databases to incorporate information about residence. This information was also used to identify additional HMS-related fishing communities that should be profiled in the future. Six GIS maps were generated to identify the communities where angler, charter/headboat, HMS dealers (tunas, shark, and swordfish combined), commercial tuna (all gear categories combined), directed and incidental shark, and swordfish (directed, incidental, and handgear combined) permit holders reside (Figure 9.1 to Figure 9.6). In past community profile and social impact analyses, it was difficult to identify where recreational HMS fishermen were located because no data were available for the number of recreational fishermen, as well as recreational landings by community. Previous social impact assessments report on charter fishing operations, fishing tournaments, and related activities to identify the scope of recreational fishing for each of the communities described. The information provided by the HMS permit databases should facilitate the identification of recreational HMS communities that should be profiled in the future.

#### 3.6.3.3 HMS Community Profile Needs

For future social impact analyses, the HMS permit databases, landings information, and HMS APs should be consulted to determine the most appropriate community profiles for HMS-related fisheries. The 2005 HMS permit data indicate that several new community profiles should be developed and some of the previously profiled communities may no longer be as significantly involved in the fishery as they were in the past (Figure 9.1 to Figure 9.6). Wakefield, Rhode Island should be considered due to the number of commercial tuna and swordfish permit holders in the area. Montauk, New York has a large concentration of charter/headboat, commercial tuna, and HMS dealer permit holders in the community. A large number of Cape May, New Jersey residents hold an HMS angling, charter/headboat, shark and/or swordfish permits. Morehead City, North Carolina is home to a number of HMS angling, charter/headboat, and commercial tuna permit holders. Each of these towns is actively involved with more than one sector of the HMS fisheries and therefore be impacted be any changes to HMS regulations.

While the permit holders in Puerto Rico and the Virgin Islands are not as numerous as the permit holders on the U.S. mainland, HMS fisheries are active in these two areas and several of the communities benefit from those activities. Due to the number of HMS permit holders in these areas, future HMS actions should consider developing community profiles for Christiansted, St. Croix, as well as San Juan, Guaynabo, Aguadilla, Mayaguez, and/or Vega Baja, Puerto Rico. While NMFS may have community profiles describing these areas, an HMS-specific community profile should be developed for these towns to best determine the impact of changes to HMS-related regulations.

## 3.7 International Trade and Fish Processing

Several regional fishery management organizations (RFMOs) including ICCAT have taken steps to improve collection of international trade data to further international conservation policy for management of HMS. While RFMOs cannot re-create information about stock production based on trade data, this information can be used provisionally to estimate landings related to these fisheries, and to identify potential compliance problems with certain ICCAT management measures. United States participation in HMS related international trade programs, as well as a review of trade activity, is discussed in this section. This section also includes a review of the available information on the processing industry for Atlantic HMS species.

### 3.7.1 Overview of International Trade for Atlantic HMS

#### 3.7.1.1 Trade Monitoring

The United States collects general trade monitoring data through the U.S. Bureau of Customs and Border Protection (CBP; imports) and the U.S. Bureau of the Census (Census Bureau; exports and imports). These programs collect data on the amount and value of imports and exports categorized under the Harmonized Tariff Schedule (HTS). Many HMS have distinct HTS codes, and some species are further subdivided by product (*e.g.* fresh or frozen, fillets, steaks, etc.). NMFS provides Census Bureau trade data for marine fish products online for the public at http://www.st.nmfs.gov/st1/trade/index.html. Some species, such as sharks, are grouped together, which can limit the value of these data for fisheries management when species specific information is needed. These data are further limited since the ocean area of origin for each product is not distinguished. For example, the HTS code for Atlantic, Pacific, and even Indian Ocean bigeye tuna is the same.

Trade data for Atlantic HMS are of more use as a conservation tool when they indicate the flag of the harvesting vessel, the ocean of origin, and the species for each transaction. Under the authority of ATCA and the Magnuson-Stevens Act, NMFS collects this information while monitoring international trade of bluefin tuna, swordfish, southern bluefin tuna, and frozen bigeye tuna. These programs implement ICCAT recommendations and support rebuilding efforts by collecting data necessary to identify nations and individuals that may be fishing in a manner that diminishes the effectiveness of ICCAT fishery conservation and management measures. Copies of all trade monitoring documents associated with these programs may be found on the NMFS HMS Management Division webpage at http://www.nmfs.noaa.gov/sfa/hms/. These and several other trade monitoring programs established by NMFS for HMS are described in further detail below.

#### 3.7.1.2 Bluefin Tuna Statistical Document

The trade of bluefin tuna is tracked internationally as a result of the ICCAT recommendation to implement the Bluefin Statistical Document (BSD) program

(Recommendation 92-01). Japan's support for the program, as a major importer of bluefin tuna, is partially responsible for the success of this program. In the United States, each bluefin tuna is tagged when documented, and for all nations, the BSD travels with each shipment until the final point of destination. This document is used to track both imports and exports of bluefin tuna by ICCAT and other participating nations. If bluefin tuna are exported from, or imported to, the United States, the document is submitted to NMFS as part of the monitoring program. Since 1997, NMFS has also received CBP data (derived from Entry Form 7501) on imports of fresh and frozen bluefin tuna and swordfish on a monthly basis. Comparison of these data with BSD data allows NMFS to identify shipments without BSDs in order to obtain missing data and enforce dealer reporting requirements. In 2003, ICCAT updated the BSD program to include the collection of farming related information on the BSD. In 2005, NMFS added a re-export certificate to the program and expanded it to include southern bluefin tuna as well. Data collected under the BSD program are discussed in Sections 3.7.2 and 3.7.3 addressing U.S. exports and imports of HMS.

#### 3.7.1.3 Swordfish Certificate of Eligibility and Statistical Document

The U.S. Swordfish Certificate of Eligibility (COE) has tracked U.S. imports of swordfish since it was implemented in 1999. In 2005, this program was replaced by a swordfish statistical document (SD) program similar to the BSD program described above. The swordfish SD program is based on a 2001 ICCAT recommendation (01-22), and incorporates all of the prior functions of the COE, including the following: ensuring that all imported swordfish are greater than the minimum size of 14.9 kg (33 lb) dw, identifying the flag of the harvesting vessel, and indicating ocean area of origin. Similar to the BSD program, CBP data on swordfish imports is also used to obtain missing data and identify dealers that are not following the required reporting procedures. With implementation of the swordfish SD program, the swordfish COE is longer in effect.

#### 3.7.1.4 Bigeye Tuna Statistical Document

Like the two previous trade monitoring programs, the bigeye tuna SD program is used to track movement of internationally traded bigeye tuna to its final destination. ICCAT recommended the implementation of a bigeye tuna SD program in 2001 (01-21). The initial program was implemented in 2005 along with the swordfish SD, and applies only to frozen bigeye tuna. It may be expanded to cover fresh product in the future. Other RFMOs including the Inter-American Tropical Tuna Commission and the Indian Ocean Tuna Commission have also adopted frozen bigeye SD programs.

#### 3.7.1.5 Yellowfin Tuna Form 370

Since the late 1970s, NOAA Form 370 has been used to document imports of yellowfin tuna and other species of tuna for the purpose of protecting dolphins in the Eastern Tropical Pacific Ocean. Form 370 is filed with other documents necessary for entry of yellowfin tuna into the United States. The form is *not* required for fresh tuna, animal food, or canned petfood made from tuna.

#### 3.7.1.6 Billfish Certificate of Eligibility

The Billfish Certificate of Eligibility is used to ensure that any billfish being imported or sold in the United States (outside of the Pacific states) is not of Atlantic origin. In the Pacific states, billfish involved in trade are presumed to be of Pacific origin. Any statement that contains the specified information is sufficient to meet the certificate of eligibility documentation requirements; it is not necessary to use the form available from NMFS or to submit the form to NMFS upon final disposition of the billfish.

### 3.7.2 U.S. Exports of HMS

"Exports" may include merchandise of both domestic and foreign origin. The Census Bureau defines exports of "domestic" merchandise to include commodities which are grown, produced, or manufactured in the United States (*e.g.*, fish caught by U.S. fishermen). For statistical purposes, domestic exports also include commodities of foreign origin which have been altered in the United States from the form in which they were imported, or which have been enhanced in value by further manufacture in the United States. The value of an export is the f.a.s. (free alongside ship) value defined as the value at the port of export based on a transaction price including inland freight, insurance, and other charges incurred in placing the merchandise alongside the carrier. It excludes the cost of loading the merchandise, freight, insurance, and other charges or transportation costs beyond the port of exportation.

#### 3.7.2.1 Atlantic and Pacific Bluefin Tuna Exports

As discussed in the previous section, NMFS collects detailed export data on Atlantic and Pacific bluefin tuna through the BSD program. Table 3.80 gives bluefin tuna export data for exports from the United States. Recent decreases in Atlantic BFT exports since 1999 could in part be a result of the growing U.S. market for high-quality fresh bluefin tuna meat. In 2003 – 2004, exports also could have been impacted by a reduction in U.S. landings. BFT re-exports are discussed separately in Section 3.7.3.1 and shown in Table 3.7.

**Table 3.80 United States exports of Atlantic and Pacific bluefin tuna, 1999-2004.** Sources: NMFS BSD Program, NERO, and Census Bureau.

| | | | | | | **Value of U.S. Exports (Census Bureau, $ million)** |
|---|---|---|---|---|---|---|
| 1999 | 876.0 | 735.6 | 95.7 | 831.3 | 1,183 | 9.37 |
| 2000 | 903.9 | 758.0 | 76.0 | 834.0 | 1,044 | 11.20 |
| 2001 | 987.0 | 812.3 | 67.0 | 879.0 | 1,020 | 10.70 |
| 2002 | 964.0 | 730.4 | 0.1 | 730.5 | 922 | 10.74 |
| 2003 | 756.9 | 572.2 | 2.1 | 574.3 | 998 | 11.36 |
| 2004 | 495.0 | 247.2 | 0.0 | 247.2 | 370 | 4.50 |

Note: most exports of Pacific BFT were in round (whole) form, although some exports were of dressed and gilled/gutted fish; Atlantic exports included whole, dressed, and product forms (dw); data are preliminary and subject to change.

### 3.7.2.2 Other Tuna Exports

Export data for other tunas is gathered by the Census Bureau, and includes trade data for albacore, yellowfin, bigeye, and skipjack tuna from all ocean areas of origin combined. Behind bluefin tuna, albacore tuna accounts for the next most valuable tuna export from the United States (Table 3.81). Comparing the last five years, the amount and value of exported albacore was greatest for the year 2004. In general, the amount and value of albacore exports appears to be on the rise. During the time period covered by this table, the annual amount and value of frozen exports exceeded fresh exports for every year.

**Table 3.81 Amount and value of U.S. exports of albacore tuna from all ocean areas, 1999-2004 (Census Bureau data) and U.S. landings of North Atlantic albacore tuna (*2005 U.S. National Report to ICCAT*).**

| | | **Exports** (from all ocean areas) | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | **Total for all Exports** | |
| | | | | | | | **US$ (million)** |
| 1999 | 317 | 517 | 1.01 | 2,743 | 5.52 | 3,260 | 6.54 |
| 2000 | 407 | 263 | 0.78 | 2,747 | 6.04 | 3,010 | 6.83 |
| 2001 | 324 | 1,542 | 3.62 | 4,609 | 9.83 | 6,151 | 13.45 |
| 2002 | 488 | 680 | 1.50 | 4,483 | 8.28 | 5,163 | 9.78 |
| 2003 | 448 | 894 | 1.86 | 9,731 | 18.85 | 10,624 | 20.71 |
| 2004 | 636 | 1,360 | 3.28 | 10,737 | 24.11 | 12,097 | 27.38 |

Note: Landings may be calculated on a calendar or fishing year basis; exports may be in whole (ww) or product weight (dw); data are preliminary and subject to change.

Table 3.82 and Table 3.83 show U.S. Atlantic landings and U.S. exports from all ocean areas combined for yellowfin and skipjack tuna, respectively. Yellowfin exports were greater and more valuable than exports for skipjack or bigeye tuna (Table 3.84), although yellowfin tuna exports decreased markedly in 2004. Export of fresh yellowfin product exceeded the value of frozen yellowfin product for all years except 2001. Fresh product exports were highest in 2002 and 2003. The amount and value of exported fresh and frozen skipjack tuna has varied over the six year period covered in Table 3.83, without any discernable trends. Exports and landings of skipjack in 1999 far exceeded values for the following five years.

**Table 3.82 Amount and value of U.S. exports of yellowfin tuna from all ocean areas, 1999-2004 (Census Bureau data) and U.S. landings of Atlantic yellowfin tuna (*2005 U.S. National Report to ICCAT).***

| | | **Exports** (from all ocean areas) | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | **Total for all Exports** | |
| | | | | | | | **US$ (million)** |
| 1999 | 7569 | 947 | 2.09 | 390 | .84 | 1337 | 2.93 |
| 2000 | 7051 | 412 | 1.12 | 406 | .76 | 819 | 1.89 |
| 2001 | 6703 | 290 | .71 | 834 | 1.45 | 1124 | 2.17 |
| 2002 | 5653 | 1612 | 2.37 | 420 | .81 | 2033 | 3.19 |
| 2003 | 7701 | 1792 | 2.93 | 176 | .68 | 1968 | 3.62 |
| 2004 | 6421 | 306 | 1.54 | 242 | .31 | 549 | 1.86 |

Note: Landings may be calculated on a calendar or fishing year basis; exports may be in whole (ww) or product weight (dw); data are preliminary and subject to change.

**Table 3.83 Amount and value of U.S. exports of skipjack tuna from all ocean areas, 1999-2004 (Census Bureau data) and U.S. landings of West Atlantic skipjack tuna (*2005 U.S. National Report to ICCAT*).**

| | | **ports** (from all ocean areas) | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | **Total for all Exports** | |
| | | | | | | | **US$ (million)** |
| 1999 | 152 | 88 | .20 | 1092 | .89 | 1,181 | 1.10 |
| 2000 | 44 | 7 | .01 | 83 | .05 | 91 | .06 |
| 2001 | 69 | 82 | .15 | 34 | .04 | 117 | .20 |
| 2002 | 66 | 66 | .17 | 11 | .01 | 77 | .18 |
| 2003 | 77 | 81 | .22 | 0 | 0 | 81 | .22 |
| 2004 | 61 | 55 | .30 | 140 | .78 | 196 | .48 |

Note: Landings data may have been ported on either a fishing year or calendar year basis; exports may be in whole (ww) or product weight (dw); data are preliminary and subject to change.

Bigeye tuna exports and Atlantic landings are given in Table 3.84. No data were available for bigeye tuna exports in 2001, and prior to 2001 bigeye exports were included in the category of unspecified tuna. Annually, bigeye tuna exports include more fresh than frozen product, and have increased gradually from 2002 to 2004.

**Table 3.84 Amount and value of U.S. exports of bigeye tuna from all ocean areas, 1999-2004 (Census Bureau data) and U.S. landings of Atlantic bigeye tuna (*2005 U.S. National Report to ICCAT*).**

| | | **rts** (from all ocean areas) | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | **Total for all Exports** | |
| | | | | | | | **US$ (million)** |
| 2002 | 600 | 95 | .22 | 8 | .01 | 104 | .24 |
| 2003 | 480 | 255 | .47 | 40 | .08 | 295 | .56 |
| 2004 | 418 | 361 | 1.40 | 48 | .10 | 410 | 1.51 |

NOTE: Landings data may have been reported on either a fishing year or calendar year basis; exports may be in whole (ww) or product weight (dw); data are preliminary and subject to change.

#### 3.7.2.3 Shark Exports

Export data for sharks is gathered by the Census Bureau, and includes trade data for sharks from any ocean area of origin. Shark exports are not categorized down to the species level with the exception of dogfish, and are not identified by specific product code other than fresh or frozen meat and fins. Due to the popular trade in shark fins and their high relative value compared to shark meat, a specific HTS code was assigned to shark fins in 1998. It should be noted that there is no tracking of other shark products besides meat and fins. Therefore, NMFS cannot track trade in shark leather, oil, or shark cartilage products.

Table 3.85 indicates the magnitude and value of shark exports by the United States from 1999 – 2004. The reduction in shark fin exports from 2001 to 2002 and 2003 is of particular note, as is the increase in the unit value of shark fins during this time period. Decreases in shark fin trade are expected to be the result of the Shark Finning Prohibition Act, which was enacted in December of 2000 and implemented by final rule in February 2002.

**Table 3.85 Amount and value of U.S. shark product exports from 1999-2004.** Source: Census Bureau.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | **US$ (million)** |
| 1999 | 106 | .91 | 8.54 | 270 | .48 | 1.80 | 155 | .46 | 2.97 | 532 | 1.86 |
| 2000 | 365 | 3.51 | 9.62 | 430 | .78 | 1.82 | 345 | .81 | 2.35 | 1140 | 5.10 |
| 2001 | 335 | 3.16 | 9.44 | 332 | .54 | 1.64 | 634 | 2.34 | 3.69 | 1301 | 6.04 |
| 2002 | 123 | 3.46 | 28.00 | 968 | 1.47 | 1.52 | 982 | 2.34 | 2.38 | 2075 | 7.28 |
| 2003 | 45 | 4.03 | 87.79 | 837 | 1.31 | 1.57 | 592 | 1.34 | 2.28 | 1476 | 6.70 |
| 2004 | 63 | 3.02 | 47.53 | 536 | 1.18 | 2.21 | 472 | .98 | 2.09 | 1071 | 5.18 |

Note: Exports may be in whole (ww) or product weight (dw); data are preliminary and subject to change.

#### 3.7.2.4 Re-exports of Atlantic HMS

For purposes of international trade tracking of HMS, the term “re-export” refers to a product that has been entered for consumption into the United States and then exported to another country, with or without further processing in the United States (from 50 CFR Part 300, Subpart M, International trade documentation and tracking programs for HMS). For most HMS species, re-export activity is a small fraction of export activity and well below reference points of 1000 mt and/or one million dollars annually. Exceptions to this include fresh yellowfin tuna re-exports which were valued at $1.5 million in 2003 and fresh and frozen yellowfin valued at $1.1 million in 2002 (Census Bureau data). In 2004, dried shark fin re-exports reached a six year maximum value of $1.8 million (29 mt, down from 34 mt in 2003).

Bluefin tuna re-exports also reached a five year maximum in 2004 at 2,118 mt valued at $29.46 million (Census Bureau data), which exceeded the amount of bluefin exports for the year, for the first time in the history of the BSD program (K. Goldsmith, pers. com.). Further investigation into BSD program data found that the recent increases in bluefin re-exports reflects the growth of the Mexican farming/mariculture industry which exports product to the United States for re-export to Japan.

#### 3.7.2.5 Summary of Atlantic HMS Exports

Nationally, the value of HMS exports (from all ocean areas combined) is dominated by bluefin tuna, albacore tuna, and shark products. In 2003, fresh and frozen products of these three species accounted for 14,873 mt dw or 1.3 percent of the 1,120,354 mt dw of fresh and frozen seafood products exported from the United States, as indicated in *Fisheries of the United States, 2004*. The value of these HMS products accounted for $40.77 million, out of a national total of $2.8 billion.

Data reflecting international trade of HMS species harvested from all ocean areas are of limited value for describing trade of HMS harvested from the Atlantic Ocean. For example, Atlantic landings of albacore tuna (commercial and recreational) for 2003 were reported in the *2004 U.S. National Report to ICCAT* as 448 mt (Table 3.81). National trade data show that over 10,000 mt of albacore were exported, which indicates that the majority of albacore exports were Pacific Ocean product. Trade tracking programs such as the bluefin tuna, swordfish, and bigeye tuna statistical document programs are much more useful for describing the international disposition of Atlantic HMS.

### 3.7.3 U.S. Imports of Atlantic HMS

All import shipments must be reported to the U.S. Bureau of Customs and Border Protection. “General” imports are reported when a commodity enters the country, and "consumption" imports consist of entries into the United States for immediate consumption combined with withdrawals from CBP bonded warehouses. “Consumption” import data reflect the actual entry of commodities originating outside the United States into U.S. channels of consumption. As discussed previously, CBP data for certain products are provided to NMFS for use in implementing statistical document programs. U.S. Census Bureau import data are used by NMFS as well.

#### 3.7.3.1 Bluefin Tuna Imports

United States imports and re-exports of bluefin tuna for 1999 through 2004, as reported through both CBP and BSD program data, are shown in Table 3.86. The difference in import numbers between the CBP and BSD data may be explained by a lack of knowledge and compliance with the BSD program by importers, especially those on the Pacific coast.

The rise in popularity of sashimi in the United States has generated increased imports of bluefin tuna, and dealers are reporting an expanded domestic market for both locally-caught and imported raw tuna. As discussed previously, the large amount of re-exports in the last several years resulted from the increase in importation of farmed bluefin from Mexico and re-exportation to Japan.

**Table 3.86 Imports of Atlantic and Pacific bluefin tuna into the United States: 1999-2004.** Sources: NMFS BSD program and CBP data.

| | | | **U.S. CBP Data** | |
|---|---|---|---|---|
| | | | | **VALUE (US$ million)** |
| 1999 | 411.9 | 16.6 | 558.6 | 3.02 |
| 2000 | 361.9 | 99.3 | 453.4 | 7.67 |
| 2001 | 512.9 | 7.0 | 532.3 | 8.21 |
| 2002 | 529.3 | 94.1 | 605.0 | 9.75 |
| 2003 | 649.9 | 691.0 | 780.3 | 11.67 |
| 2004 | 823.4 | 684.8 | 886.1 | 15.25 |

Note: Most imports of BFT were in dressed form, and some were round and gilled/gutted fish, fillets or belly meat (dw); data are preliminary and subject to change. Southern bluefin tuna trade was included in figures for Atlantic and Pacific bluefin tuna trade prior to 2002.

### 3.7.3.2 Other Tuna Imports

Since January 2001, CBP has been collecting species specific import information for bigeye tuna (grouped to include all ocean areas). Previously, bigeye tuna had been included under general tuna imports. The total amount and value of bigeye tuna imports have been gradually increasing over the last four years, as shown in Table 3.87.

**Table 3.87 Imports of bigeye tuna into the United States from all ocean areas combined: 2001-2004.** Source: Census Bureau data.

| | | | | | Total for all Imports | |
|---|---|---|---|---|---|---|
| | | | | | | US$ (million) |
| 2001 | 4684 | 25.70 | 135 | .32 | 4,820 | 26.02 |
| 2002 | 6312 | 39.84 | 319 | .70 | 6,632 | 40.55 |
| 2003 | 7312 | 51.01 | 560 | 1.48 | 7,872 | 52.49 |
| 2004 | 6752 | 49.10 | 1175 | 2.62 | 7928 | 51.73 |

Note: Imports may be whole weight (ww) or product weight (dw); data are preliminary and subject to change.

Annual yellowfin tuna imports into the United States for all ocean areas combined are given in Table 3.88. As indicated by the data in this section, yellowfin tuna are imported in the greatest quantity of all fresh and frozen tuna products. The annual value of yellowfin imports has increased gradually from 1999 – 2004. The total annual amount of product imported has remained fairly consistent, with a slight dip in 2000.

**Table 3.88 Imports of yellowfin tuna into the United States from all ocean areas combined: 1999-2004.** Source: Census Bureau data.

| | | | | | Total for all Imports | |
|---|---|---|---|---|---|---|
| | | | | | | US$ (million) |
| 1999 | 11,756 | 63.04 | 9411 | 24.90 | 21,168 | 87.94 |
| 2000 | 13,153 | 70.27 | 3290 | 18.73 | 16,443 | 89.00 |
| 2001 | 15,563 | 85.50 | 3967 | 23.45 | 19,530 | 108.95 |
| 2002 | 15,966 | 95.22 | 4619 | 29.31 | 20,585 | 124.53 |
| 2003 | 15,299 | 94.03 | 5579 | 39.67 | 20,878 | 133.71 |
| 2004 | 15,624 | 99.41 | 5833 | 35.35 | 21,457 | 134.96 |

NOTE: Imports may be whole weight (ww) or product weight (dw); data are preliminary and subject to change.

The amount of fresh albacore imports from all ocean areas have been fairly consistent since 2001 while imports of frozen product have decreased dramatically over the last six years, with the greatest reduction occurring between 2001 and 2002 (Table 3.89). In 1999, albacore imports were valued at $144 million while in 2004 the value dropped to approximately $15 million. (Products in airtight containers are not included in these data.)

**Table 3.89 Imports of albacore tuna into the United States from all ocean areas combined: 1999-2004.**
Source: Census Bureau data.

| | | | | | Total for all Imports | |
|---|---|---|---|---|---|---|
| | | | | | | US$ (million) |
| 1999 | 1776 | 5.39 | 63,284 | 139.50 | 65,060 | 144.89 |
| 2000 | 1843 | 6.42 | 51,001 | 127.33 | 52,845 | 133.76 |
| 2001 | 1107 | 3.85 | 40,428 | 105.58 | 41,536 | 109.43 |
| 2002 | 1296 | 4.81 | 11,903 | 24.49 | 13,200 | 29.31 |
| 2003 | 1062 | 4.11 | 12,569 | 25.90 | 13,632 | 30.02 |
| 2004 | 1004 | 3.12 | 4943 | 11.67 | 5947 | 14.80 |

Note: Imports may be whole weight (ww) or product weight (dw); data are preliminary and subject to change.

Skipjack tuna imports into the United States are comprised mainly of frozen product (Table 3.90). Like albacore tuna, the amount and value of skipjack imports have also decreased dramatically since 1999. The amount of product imported fell from over 8,000 mt dw in 1999 to 112 mt dw in 2004. Likewise, the value of these products during this time period fell from $6.3 million to $0.27 million.

**Table 3.90 Imports of skipjack tuna from all ocean areas combined into the United States: 1999-2004.**
Source: U.S. Census Bureau data.

| | | | | | Total for all Imports | |
|---|---|---|---|---|---|---|
| | | | | | | US$ (million) |
| 1999 | 0 | 0 | 8,238 | 6.30 | 8,238 | 6.30 |
| 2000 | 0 | 0 | 904 | 2.75 | 904 | 2.75 |
| 2001 | <1 | <0.01 | 377 | 0.61 | 378 | 0.62 |
| 2002 | <1 | 0.01 | 824 | 0.83 | 825 | 0.84 |
| 2003 | 0 | 0 | 224 | 0.43 | 224 | 0.43 |
| 2004 | <1 | <0.01 | 110 | 0.26 | 112 | 0.27 |

Note: Imports may be whole weight (ww) or product weight (dw); data are preliminary and subject to change.

### 3.7.3.3 Swordfish Imports

Table 3.91 summarizes swordfish import data collected by NMFS' Swordfish Import Monitoring Program for the 2004 calendar year. According to these data, most swordfish imports were Pacific Ocean product. For Atlantic product, the most imports came from Brazil (48 percent), followed by Canada (22 percent) and Uruguay (16 percent). CBP data located at the bottom of the table reflect a larger amount of imports than reported by the import monitoring program, and may be used by NMFS staff to follow up with importers, collect statistical documents that have not been submitted, and enforce dealer reporting requirements.

**Table 3.91 Swordfish import data for the 2004 calendar year collected under the NMFS Swordfish Import Monitoring Program.**

| | Ocean Area of Origin | | | | TOTAL (mt dw) |
|---|---|---|---|---|---|
| | | | | | |
| Not Provided | 0.00 | 9.12 | 0.00 | 11.10 | 20.22 |
| Australia | 0.00 | 111.94 | 6.59 | 0.00 | 118.53 |
| Barbados | 0.08 | 0.00 | 0.00 | 0.00 | 0.08 |
| Belize | 0.00 | 6.10 | 0.00 | 0.00 | 6.10 |
| Bolivia | 12.42 | 0.00 | 0.00 | 0.00 | 12.42 |
| Brazil | 721.11 | 0.00 | 0.00 | 0.00 | 721.11 |
| Canada | 328.26 | 0.00 | 0.00 | 0.00 | 328.26 |
| Chile | 0.00 | 442.38 | 0.00 | 0.00 | 442.38 |
| China | 0.00 | 0.00 | 58.91 | 0.00 | 58.91 |
| Cook Islands | 0.00 | 9.85 | 0.00 | 0.00 | 9.85 |
| Costa Rica | 0.00 | 242.92 | 0.00 | 0.00 | 242.92 |
| Ecuador | 0.00 | 133.65 | 0.00 | 0.00 | 133.65 |
| El Salvador | 0.00 | 1.80 | 0.00 | 0.00 | 1.80 |
| Fiji Islands | 0.00 | 33.62 | 0.00 | 0.00 | 33.62 |
| Georgia | 0.00 | 4.28 | 0.00 | 0.00 | 4.28 |
| Grenada | 33.48 | 0.00 | 0.00 | 0.00 | 33.48 |
| Indonesia | 0.00 | 0.00 | 16.54 | 0.00 | 16.54 |
| Malaysia | 0.00 | 17.49 | 73.19 | 0.00 | 90.68 |
| Mexico | 0.00 | 249.56 | 0.00 | 0.00 | 249.56 |
| New Zealand | 0.00 | 147.88 | 0.00 | 0.00 | 147.88 |
| Nicaragua | 0.00 | 0.25 | 0.00 | 0.00 | 0.25 |
| Panama | 0.00 | 649.75 | 0.00 | 0.00 | 649.75 |
| Philippines | 0.00 | 4.77 | 0.00 | 0.00 | 4.77 |
| Singapore | 0.00 | 0.00 | 33.58 | 0.00 | 33.58 |
| South Africa | 10.23 | 0.00 | 53.19 | 0.00 | 63.42 |
| Taiwan | 59.31 | 323.81 | 1,073.33 | 0.00 | 1,456.44 |
| Tonga | 0.00 | 7.81 | 0.00 | 0.00 | 7.81 |
| Trinidad & Tobago | 36.44 | 0.00 | 0.00 | 0.00 | 36.44 |
| Uruguay | 234.59 | 0.00 | 0.00 | 0.00 | 234.59 |
| Venezuela | 64.51 | 0.00 | 0.00 | 0.00 | 64.51 |
| Vietnam | 0.00 | 270.15 | 0.00 | 0.00 | 270.15 |
| Total Imports Reported by COEs | 1500.4 | 2667.1 | 1315.3 | 11.1 | 5494.0 |
| Total Imports Reported by U.S. Customs & Border Patrol | | | | | 11,265.00 |
| Total Imports Not Reported by COEs | | | | | 5771.03 |

COE Data as of 8/18/05

Table 3.92 indicates the amount and value of swordfish product imports by the United States from 1999 – 2004, as recorded by the U.S. Census Bureau, for all ocean areas combined. The amount of each product imported per year and annual totals for product and value were fairly consistent for the time period covered, although the data show a slight decrease in 2004.

**Table 3.92 Imported swordfish products by year: 1999-2004.** Source: Census Bureau data.

| Year | | | | | | Total for all Imports | |
|---|---|---|---|---|---|---|---|
| | | Other | | | | | US$ (million) |
| 1999 | 81 | 8595 | 4377 | 401 | 386 | 13,842 | 71.70 |
| 2000 | 161 | 8626 | 4833 | 524 | 167 | 14,314 | 85.57 |
| 2001 | 71 | 8982 | 3814 | 710 | 119 | 13,697 | 81.89 |
| 2002 | 195 | 9726 | 4156 | 956 | 677 | 15,711 | 88.26 |
| 2003 | 147 | 8079 | 3929 | 433 | 560 | 13,150 | 75.62 |
| 2004 | 157 | 6568 | 3261 | 387 | 351 | 10,726 | 70.95 |

NOTE: Imports may be whole weight (ww) or product weight (dw); data are preliminary and subject to change.

#### 3.7.3.4 Shark Imports

Similar to tuna imports other than bluefin tuna and frozen bigeye tuna, NMFS does not require importers to collect and submit information regarding the ocean area of catch. Shark imports are also not categorized by species, and lack specific product information on imported shark meat such as the proportion of fillets, steaks, or loins. The condition of shark fin imports; *e.g.*, wet, dried, or further processed products such as canned shark fin soup, is also not collected. There is no longer a separate tariff code for shark leather, so its trade is not tracked by CBP or Census Bureau data.

The United States may be an important transshipment port for shark fins, which may be imported wet, processed and then exported dried. It is also probable that U.S.-caught shark fins are exported to Hong Kong or Singapore for processing, and then imported back into the United States for consumption by urban-dwelling Asian Americans (Rose, 1996).

Table 3.93 summarizes Census Bureau data on shark imports for 1999 through 2004. Imports of fresh shark products and shark fins have decreased significantly since 1999. The 2004 ICCAT recommendation addressing the practice of shark finning may result in a further reduction of imports in the near future. Over the last 5 years, the overall annual amount and value of shark imports decreased fairly consistently year after year to equal approximately half the 1999 amount and value in 2003, with a slight increase in each product category in 2004.

**Table 3.93 U.S. imports of shark products from all ocean areas combined: 1999-2004.** Source: Census Bureau data.

| | | | | | | | Total For All Imports | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | US$ (million) |
| 1999 | 59 | 2.10 | 1,095 | 2.03 | 105 | .62 | 1,260 | 4.76 |
| 2000 | 66 | 2.35 | 1,066 | 1.85 | 90 | .57 | 1,222 | 4.79 |
| 2001 | 50 | 1.08 | 913 | 1.38 | 123 | 1.78 | 1,087 | 4.25 |
| 2002 | 39 | 1.02 | 797 | 1.24 | 91 | 1.09 | 928 | 3.35 |
| 2003 | 11 | 0.01 | 515 | 0.72 | 100 | 0.99 | 626 | 1.82 |
| 2004 | 14 | 0.34 | 650 | 1.00 | 156 | 2.35 | 821 | 3.70 |

NOTE: Imports may be whole weight (ww) or product weight (dw); data are preliminary and subject to change.

#### 3.7.3.5 Summary of U.S. Imports of Atlantic HMS

The import data in this section show that many HMS species are part of a valuable import market. As discussed previously regarding exports, most data documenting imports include products harvested from many ocean areas, not just the Atlantic Ocean. However, the statistical document programs for bluefin tuna, swordfish, and frozen bigeye tuna provide information specifically about product harvested from the Atlantic Ocean and imported into the United States.

In 2004, the U.S. domestic market for swordfish supported a domestic fishery of 2,896 mt round weight worth $14.64 million (Pritchard 2005) and an active import market of 10,726 mt dw valued at $70.95 million (Table 3.13). Despite recent increases in the U.S. quota of North Atlantic swordfish (consistent with ICCAT rebuilding programs), swordfish from the Pacific and Indian Oceans are expected to continue to supply the lucrative U.S. swordfish market during the near future.

### 3.7.4 The Use of Trade Data for Conservation Purposes

Trade data has been used in a number of ways to support international management of HMS. When appropriate, the SCRS uses trade data on bluefin tuna, swordfish, bigeye tuna, and yellowfin tuna that are submitted to ICCAT as an indication of landings trends. These data can then be used to augment estimates of fishing mortality rates (F) of these species, which improves scientific stock assessments. In addition, these data can be used to assist in assessing compliance with ICCAT recommendations and identify those countries whose fishing practices diminish the effectiveness of ICCAT conservation and management measures. On numerous occasions, ICCAT has adopted recommendations to address the lack of compliance with management programs for the bluefin tuna, bigeye tuna, and North and South Atlantic swordfish fisheries by ICCAT members. Penalties for non-compliance or fishing in a manner that diminishes the effectiveness of ICCAT conservation measures may include catch limit reductions and, if necessary, trade restrictive measures.

For example, an analysis of vessel sighting and Japanese BSD data led to the 1996 determination that fishing vessels from the countries of Panama, Honduras, and Belize were fishing in a manner that diminished the effectiveness of the bluefin tuna rebuilding program, and resulted in a 1996 ICCAT recommendation for sanctions against the import of bluefin tuna from these countries (Table 3.94). In 1999, ICCAT recommended this trade restriction on Panama be lifted as a result of the Government of Panama's efforts to substantially reduce fishing vessel activities deemed inconsistent with ICCAT measures. In 2001, Honduras became a member of ICCAT, and based on this change in status and Honduras' significant efforts to control its fleet and address ICCAT concerns, ICCAT recommended lifting trade sanctions for bluefin tuna. The bluefin sanction for Belize was lifted by ICCAT in 2002.

In another example, import data from 1997–1999 revealed significant Atlantic bluefin tuna exports from Equatorial Guinea despite the fact that a zero catch limit was in effect for that country. The government of Equatorial Guinea had not responded to ICCAT inquiries and had reported no bluefin tuna catch data to ICCAT, and as a result ICCAT recommended trade restrictions as a penalty for non-compliance. Based on information regarding improved compliance presented by Equatorial Guinea at the 2004 ICCAT meeting, specifically, that Equatorial Guinea had canceled licenses and flags of large-scale longline vessels previously participating in IUU tuna fishing in the Convention area and guaranteed compliance with ICCAT conservation and management measures, the trade sanction was lifted by ICCAT.

As indicated in Table 3.94, most of the trade sanctions recommended by ICCAT since 1996 have been lifted. In fact, only trade sanctions for Bolivia and Georgia remain in effect. Thus, the imposition of trade sanctions seems to be an effective measure for ensuring that countries involved in international trade operate in a manner consistent with ICCAT recommended conservation programs. As illustrated above, the data obtained by monitoring international trade in HMS is instrumental in the development of ICCAT trade restrictions. Current discussions at ICCAT include expanding the statistical document program to a catch documentation scheme, which may better assist in preventing IUU fishing.

**Table 3.94 Summary and current status of ICCAT recommended trade sanctions for bluefin tuna, swordfish, and bigeye tuna implemented by the United States.**

| | | | | | **U.S. Sanction Lifted** |
|---|---|---|---|---|---|
| **Panama** | Bluefin | 1996 | 1997 | 1999 | 2000 |
| **Honduras** | Bluefin | 1996 | 1997 | 2001 | 2004 |
| | Bigeye | 2000 | 2002 | 2002 | 2004 |
| | Swordfish | 1999 | 2000 | 2001 | 2004 |
| **Belize** | Bluefin | 1996 | 1997 | 2002 | 2004 |
| | Swordfish | 1999 | 2000 | 2002 | 2004 |
| | Bigeye | 2000 | 2002 | 2002 | 2004 |
| **Equatorial Guinea** | Bluefin | 1999 | 2000 | 2004 | 2005 |
| | Bigeye | 2000 | 2002 | 2004 | 2005 |
| **Cambodia** | Bigeye | 2000 | 2002 | 2004 | 2005 |
| **St. Vincent & the Grenadines** | Bigeye | 2000 | 2002 | 2002 | 2004 |
| **Bolivia** | Bigeye | 2002 | 2004 | In effect | In effect |
| **Sierra Leone** | Bluefin | 2002 | 2004 | 2004 | 2005 |
| | Bigeye | 2002 | 2004 | 2004 | 2005 |
| | Swordfish | 2002 | 2004 | 2004 | 2005 |
| **Georgia** | Bigeye | 2003 | 2004 | In effect | In effect |

### 3.7.5 Overview of the Processing Industry for Atlantic HMS

Understanding the harvesting and processing sectors is essential when analyzing world trade in highly migratory fish species. The processing related entities that depend on Atlantic HMS are as diverse as the species and products themselves. Processing techniques range from the simple dressing and icing of swordfish at sea, to elaborate grading and processing schemes for bluefin tuna, to processing shark fins. Like all other seafood, HMS are perishable and may pose health hazards if not handled properly. Products range from those having a long shelf-life, such as swordfish, to highly perishable species like yellowfin tuna. Improperly handled yellowfin tuna can produce histamine, swordfish and sharks may contain high levels of mercury, and shark meat requires careful handling due to the high concentrations of urea in the body of the shark. Processing companies are aware of these characteristics and their costs of doing business vary accordingly to protect consumers. The Food and Drug Administration (FDA) works closely with NOAA Office of Law Enforcement to monitor incoming shipments of seafood, including highly migratory species.

FDA's Seafood Hazard Analysis Critical Control Point (HACCP) program implemented regulations that require processors of fish and fishery products to operate preventive control systems to ensure human food safety. Among other things, processors must effectively maintain the safety of their products, systematically monitor the operation of critical control points to ensure that they are working as they should, and keep records of the results of that monitoring. Processors must also develop written HACCP plans that describe the details and operation of their HACCP systems. Each processor may tailor its HACCP system to meet its own circumstances. The best way for FDA to determine whether a processor is effectively operating a HACCP system is by inspecting the processor. Federal review of monitoring and other records generated by the HACCP system is a critical component of an inspection because it allows the inspector to match records against the practices and conditions being observed in the plant and it discourages fraud. NMFS works closely with the FDA, in support of the HACCP program.

Just as HACCP plans vary between processors, transportation of the seafood to market also varies widely from the direct domestic sale of some shark or swordfish meat by a fisherman to a restaurant (carried by truck) to the quick, and sometimes complicated, export of bluefin tuna from fisherman to dealer to broker to the Japanese auction (carried by a commercial airline carrier). Frozen swordfish and tunas are often brought to the United States by overseas shipping companies and sharks and other products may be exported from the United States, processed overseas, and imported in a final product form.

It is unknown how many U.S. companies depend on HMS fisheries, other than the registered dealers who buy fish directly from U.S. fishermen and/or who import bluefin tuna or swordfish. The proportion of those companies that depend solely on Atlantic HMS versus those that handle other seafood and/or products is also unknown. This section provides a summary of the most recent trade data that NMFS has analyzed, as well as a brief description of the processing and trade industries employed in transitioning Atlantic HMS from the ocean to the plate.

#### 3.7.5.1 Processing and Wholesale Sectors

NMFS has limited quantitative information on the processing sector, including the amount of HMS products sold in processed forms. In addition, knowledge regarding the utilization of Atlantic HMS is largely limited to the major or most valuable product forms, such as export quality bluefin tuna.

Much of the processing of export-quality Atlantic bluefin tuna occurs onboard the vessel harvesting the fish, which serves to maximize fish quality. Bluefin are gutted and bled, and protected from the heat and sunlight by immersion in ice or an icy brine. Upon landing, bluefin are immediately graded and prepared for export to Japan's fresh fish market. The fish are either refrigerated or exported immediately in insulated crates or "coffins" filled with ice or icepacks.

Other Atlantic tunas, especially bigeye tuna, are frequently shipped fresh to Japan in dressed form. Swordfish are sold fresh and frozen in dressed form and as processed products (*e.g.*, steaks and fillets). The utilization of sharks is also not well known since trade statistics frequently do not indicate product forms such as skins and leather, jaws, fishmeal and fertilizer, liver oil, and cartilage (Rose, 1996). Domestically-landed sandbar and blacktip shark meat may be sold to supermarkets and processors of frozen fish products. NMFS continues to work with industry to collect information specific to U.S. and foreign processing of Atlantic HMS to better track markets, conserve stocks, and manage sustainable fisheries.

The U.S. processing and wholesale sectors are dependent upon both U.S. and international HMS fisheries. Individuals involved in these businesses buy the seafood, cut it into pieces that transform it into a consumer product, and then sell it to restaurants or retail outlets. Employment varies widely among processing firms. Often employment is seasonal unless the firms also process imported seafood or a wide range of domestic seafood. The majority of firms handles other types of seafood and is not solely dependent on HMS. Other participants in the commercial trade sector include brokers, freight forwarders, and carriers (primarily commercial airlines, trucking, and shipping companies). Swordfish, tunas, and sharks are important commodities on world markets, generating significant amounts in export earnings in recent years.

NMFS has recently observed that many seafood dealers that buy and sell highly migratory species and other seafood products have expanded their operations into internet-powered trading platforms specifically designed to meet the needs of other seafood professionals. Through these platforms, interested parties can conduct very detailed negotiations with many trading partners simultaneously. Buyers and sellers can bargain over all relevant elements of a market transaction (not just price) and can specify the product needed to buy or sell in detail, using seafood-specific terminology. The platforms are purportedly very easy to use because they mimic the pattern of traditional negotiations in the seafood industry. NMFS expects that the use of the internet will continue to change the way HMS trade occurs in the future.

## 3.8 Bycatch, Incidental Catch, and Protected Species

Bycatch in commercial and recreational fisheries has become an important issue for the fishing industry, resource managers, scientists, and the public. Bycatch can result in death or injury to the discarded fish, and it is essential that this component of total fishing-related mortality be incorporated into fish stock assessments and evaluation of management measures. Bycatch precludes other more productive uses of fishery resources and decreases the efficiency of fishing operations. Although not all discarded fish die, bycatch can become a large source of mortality, which can slow the rebuilding of overfished stocks. Bycatch imposes direct and indirect costs on fishing operations by increasing sorting time and decreasing the amount of gear available to catch target species. Incidental catch concerns also apply to populations of marine mammals, sea turtles, seabirds, and other components of ecosystems which may be protected under other applicable laws and for which there are no commercial or recreational uses but for which existence values may be high.

In 1998, NMFS developed a national bycatch plan, *Managing the Nation's Bycatch* (NMFS, 1998), which includes programs, activities, and recommendations for Federally managed fisheries. The national goal of the Agency's bycatch plan activities is to implement conservation and management measures for living marine resources that will minimize, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided. Inherent in this goal is the need to avoid bycatch, rather than create new ways to utilize bycatch. The plan also established a definition of bycatch as fishery discards, retained incidental catch, and unobserved mortalities resulting from a direct encounter with fishing gear.

### 3.8.1 Bycatch Reduction and the Magnuson-Stevens Act

The Magnuson-Stevens Act defines bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic and regulatory discards. Fish is defined as finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds. Seabirds and marine mammals are therefore not considered bycatch under the MSA but are examined as incidental catch. Bycatch does not include fish released alive under a recreational catch-and-release fishery management program.

National Standard 9 of the Magnuson-Stevens Act requires that fishery conservation and management measures shall, to the extent practicable, minimize bycatch and minimize the mortality of bycatch that cannot be avoided. In many fisheries, it is not practicable to eliminate all bycatch and bycatch mortality. Some relevant examples of fish caught in Atlantic HMS fisheries that are included as bycatch or incidental catch are marlin, undersized swordfish and bluefin tuna caught and released by commercial fishing gear; undersized swordfish and tunas in recreational hook and line fisheries; species for which there is little or no market such as blue sharks; and species caught and released in excess of a bag limit.

There are benefits associated with the reduction of bycatch, including the reduction of uncertainty concerning total fishing-related mortality, which improves the ability to assess the status of stocks, to determine the appropriate relevant controls, and to ensure that overfishing levels are not exceeded. It is also important to consider the bycatch of HMS in fisheries that target other species as a source of mortality for HMS and to work with fishery constituents and resource manager partners on an effective bycatch strategy to maintain sustainable fisheries. This strategy may include a combination of management measures in the domestic fishery, and if appropriate, multi-lateral measures recommended by international bodies such as ICCAT or coordination with Regional Fishery Management Councils or States. The bycatch in each fishery is summarized annually in the SAFE report for Atlantic HMS fisheries. The effectiveness of the bycatch reduction measures is evaluated based on this summary.

A number of options are currently employed (*) or available for bycatch reduction in Atlantic HMS fisheries. These include but are not limited to:

Commercial

1. *Gear Modifications (including hook and bait types)
2. *Circle Hooks
3. *Time/Area Closures
4. Performance Standards
5. *Education/Outreach
6. *Effort Reductions (*i.e.*, Limited Access)
7. Full Retention of Catch
8. *Use of De-hooking Devices (mortality reduction only)

Recreational

1. Use of Circle Hooks (mortality reduction only)
2. Use of De-hooking Devices (mortality reduction only)
3. Full Retention of Catch
4. *Formal Voluntary or Mandatory Catch-and-Release Program for all Fish or Certain Species
5. Time/Area Closures

There are probably no fisheries in which there is zero bycatch because none of the currently legal fishing gears are perfectly selective for the target of each fishing operation (with the possible exception of the swordfish/tuna harpoon fishery and proposed speargun fishery). Therefore, to totally eliminate bycatch of all non-target species in Atlantic HMS fisheries would be impractical. The goal then is to minimize the amount of bycatch to the extent practicable and minimize the mortality of species caught as bycatch.

### 3.8.2 Standardized Reporting of Bycatch

Section 303(a)(11) of the Magnuson-Stevens Act requires that a fishery management plan establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery. In 2004, NMFS published a report entitled *"Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs,"* which described the current status of and guidelines for bycatch monitoring programs (NMFS, 2004a). The data collection and analyses that are used to estimate bycatch in a fishery constitute the "standardized bycatch reporting methodology" (SBRM) for that fishery (NMFS, 2004a). Appendix 5 of the report specifies the protocols for SBRMs established by NMFS throughout the country.

As part of the Agency's National Bycatch Strategy, NMFS established a National Working Group on Bycatch (NWGB) to develop a national approach to standardized bycatch reporting methodologies and monitoring programs. This work is to be the basis for regional teams, established in the National Bycatch Strategy, to make fishery-specific recommendations.

The NWGB reviewed regional issues related to fisheries and bycatch and discussed advantages and disadvantages of various methods for estimating bycatch including: (1) fishery-independent surveys; (2) self-reporting through logbooks, trip reports, dealer reports, port sampling, and recreational surveys; (3) at-sea observation, including observers, digital video cameras, digital observers, and alternative platform and remote monitoring; and (4) stranding networks. All of the methods may contribute to useful bycatch estimation programs, but at-sea observation (observers or electronic monitoring) provides the best mechanism to obtain reliable and accurate bycatch estimates for many fisheries. Often, observer programs also will be the most cost-effective of these alternatives. However, observers are not always the most cost-effective or practicable method for assessing bycatch (NMFS, 2004a).

The effectiveness of any SBRM depends on its ability to generate estimates of the type and quantity of bycatch that are both precise and accurate enough to meet the conservation and management needs of a fishery. The National Bycatch Report (NMFS, 2004a) contains an in-depth examination of the issues of precision and accuracy in estimating bycatch. Accuracy refers to the closeness between the estimated value and the (unknown) true value that the statistic was intended to measure. Precision refers to how closely multiple measurements of the same statistic cluster to one another when obtained under the same protocol. The more precise an estimate is the tighter the cluster. The precision of an estimate is often expressed in terms of the coefficient of variation (CV) defined as the standard error of the estimator divided by the estimate. The lower the CV, the more precise the estimate is considered to be. A precise estimate is not necessarily an accurate estimate. The National Bycatch Report (NMFS, 2004a) contains an extensive discussion of how precision relates to sampling and to assessments.

The other important aspect of obtaining bycatch estimates that are useful for management purposes is accuracy. Accuracy is the difference in the mean of the sample and the true value of that property in the sampled universe (NMFS, 2004a). In other words, accuracy refers to how correct the estimate is. Efficient allocation of sampling effort within a stratified survey design improves the precision of the estimate of overall discard rates (Rago *et al.*, 2005). Accuracy of sample estimates can be evaluated by comparing performance measures (e.g., landings, trip duration) between vessels with and without observers present. While there are differences between the terms accuracy and bias they have been used interchangeably. A "biased" estimate is inaccurate while an "accurate" estimate is unbiased (Rago *et al.*, 2005).

The NWGB recommended that at-sea sampling designs should be formulated to achieve precision goals for the least amount of observation effort, while also striving to increase accuracy (NMFS, 2004a). This can be accomplished through random sample selection, developing appropriate sampling strata and sampling allocation procedures, and by implementing appropriate tests for bias. Sampling programs will be driven by the precision and accuracy required by managers to address management needs for estimating management quantities such as allowable catches through a stock assessment, for evaluating bycatch relative to a management standard such as allowable take, and for developing mitigation mechanisms.

The recommended precision goals for estimates of bycatch are defined in terms of the coefficient of variation (CV) of each estimate. For marine mammals and other protected species, including seabirds and sea turtles, the recommended precision goal is a 20 to 30 percent CV for estimates of interactions for each species/stock taken by a fishery. For fishery resources, excluding protected species, caught as bycatch in a fishery, the recommended precision goal is a 20 to 30 percent CV for estimates of total discards (aggregated over all species) for the fishery; or if total catch cannot be divided into discards and retained catch, then the goal is a 20 to 30 percent CV for estimates of total catch (NMFS, 2004a). The report also states that attainment of these goals may not be possible or practical in all fisheries and should be evaluated on a case-by-case basis.

The CV of an estimate can be reduced and the precision increased by increasing sample size. In the case of observer programs, this would entail increasing the number of trips or gear deployments observed. Increasing the number of trips observed increases both the cost in terms of funding, but also the logistical complexities and safety concerns. However, the improvements in precision will decline at a decreasing rate as sample size is increased to a point where it will not be cost-effective to increase sample size any further. This concept is illustrated in Figure 1 of the National Bycatch Report (NMFS, 2004a). As a result of this statistical relationship, fishery managers select observer coverage levels that should achieve the desired or required balance between precision of bycatch estimates and cost.

While the relationship between precision and sample size is relatively well known (NMFS, 2004), the relationship between sample size and accuracy is not reliable. Observer programs strive to achieve samples that are representative of both fishing effort and catches. Representativeness of the sample is critical not only for obtaining accurate (*i.e.*, unbiased) estimates of bycatch, but also for collecting information about factors that may be important for mitigating bycatch. Bias may be introduced at several levels: when vessels are selected for coverage, when hauls are selected for sampling, or when only a portion of the haul can be sampled (NMFS, 2004a).

Rago *et al.*, (2005) examined potential sources of bias in commercial fisheries of the Northeast Atlantic by comparing measures of performance for vessels with and without observers. Bias can arise if the vessels with observers onboard consistently catch more or less than other vessels, if trip durations change, or if vessels fish in different areas. Average catches (pounds landed) for observed and total trips compared favorably and the expected differences of the stratum specific means and standard deviations for both kept weight and trip duration was near zero (Rago *et al.*, 2005). Although mean trip duration was slightly longer on observed trips, the difference was not significantly different from zero. The spatial distribution of trips matched well based on a comparison of VMS data with observed trips (Murawski *et al.*, in press; as cited by Rago *et al.*, 2005). The authors concluded that the level of precision in discard ratios as a whole was high and that there was little evidence of bias. The results of this study indicate that bias may not be as large an issue in self-reported data as has been suggested by Babcock *et al.*

(2003), but additional analyses would need to be conducted to determine the applicability to HMS fisheries.

A simplistic approach in trying to get more accurate bycatch estimates is to increase observer coverage. A report by Babcock *et al.* (2003) suggests that relatively high percentages of observer coverage are necessary to adequately address potential bias in bycatch estimates from observer programs. However, the examples cited by Babcock *et al.* (2003) as successful in reducing bias through high observer coverage levels are fisheries comprised of relatively few vessels compared to many other fisheries, including the Atlantic HMS fisheries. Their examples are not representative of the issues facing most observer programs and fishery managers, who must work with limited resources to cover large and diverse fisheries. It is also incorrect to assume that simply increasing observer coverage ensures accuracy of the estimates (Rago *et al.*, 2005). Bias due to unrepresentative sampling may not be reduced by increasing sample size due to logistical constraints, such as if certain classes of vessels cannot accommodate observers. Increasing sample size may only result in a larger, but still biased, sample.

Although the precision goals for estimating bycatch are important factors in determining observer coverage levels, other factors are also considered when determining actual coverage levels. These may result in lower or higher levels of coverage than that required to achieve the precision goals for bycatch estimates. Factors that may justify lower coverage levels include lack of adequate funding; incremental coverage costs that are disproportionately high compared to benefits; and logistical consideration such as lack of adequate accommodations on a vessel, unsafe conditions, and lack of cooperation by fishermen (NMFS, 2004a).

Factors that may justify higher coverage levels include incremental coverage benefits that are disproportionately high compared to costs and other management focused objectives for observer programs. The latter include total catch monitoring, in-season management of total catch or bycatch, monitoring bycatch by species, monitoring compliance with fishing regulations, monitoring requirements associated with the granting of Experimental Fishery Permits, or monitoring the effectiveness of gear modifications or fishing strategies to reduce bycatch. In some cases, management may require one or even two observers to be deployed on every fishing trip. Increased levels of coverage may also be desirable to minimize bias associated with monitoring "rare" events with particularly significant consequences (such as takes of protected species), or to encourage the introduction of new "standard operating procedures" for the industry that decrease bycatch or increase the ease with which bias can be monitored (NMFS, 2004a).

NMFS utilizes self-reported logbook data (Fisheries Logbook System or FLS, and the supplemental discard report form in the reef fish/snapper-grouper/king and Spanish mackerel/shark logbook program), at-sea observer data, and survey data (recreational fishery dockside intercept and telephone surveys) to produce bycatch estimates in HMS fisheries. These data are collected with respect to fishing gear type (see Section 3.8.2). The number and location of discarded fish are recorded, as is the disposition of the fish (*i.e.*, released alive vs. released dead). Post-release mortality of HMS can be accounted for in stock assessments to the extent that the data allow.

The fishery logbook systems in place are mandatory programs, and it is expected that the reporting rates are generally high (Garrison, 2005). Due to the management focus on HMS fisheries, there has been close monitoring of reporting rates, and observed trips can be directly linked to reported effort. In general, the gear characteristics and amount of observed effort is consistent with reported effort. However, under-reporting is possible, which can lead to a negative bias in bycatch estimates. Cramer (2000) compared dead discards of undersized swordfish, sailfish, white and blue marlin, and pelagic sharks from HMS logbook and POP data in the U.S. Atlantic pelagic longline fishery. Cramer (2000) provided the ratio of catch estimated from the POP data divided by the reported catch in the HMS logbooks. The ratio indicated the amount of underreporting for each species in a given area. However, the data analyzed by Cramer (2000), was based on J-hook data from 1997 – 1999 and that gear is illegal now. In some instances, logbooks are used to provide effort information against which bycatch rates obtained from observers is multiplied to estimate bycatch. In other sectors/fisheries, self-reporting provides the primary method of reporting bycatch because of limited funding, priorities, etc.

The following section provides a review of the bycatch reporting methodologies for all HMS fisheries currently in place. Future adjustments may be implemented based on evaluation of the results of studies developed as part of the HMS Bycatch Reduction Implementation Plan, or as needed due to changing conditions in the fisheries. In addition, NMFS is in the process of developing a National Bycatch Report which may provide additional insight and guidance on areas to be addressed for each fishery. Further analyses of bycatch in the various HMS fisheries may be conducted as time, resources and priorities allow.

#### 3.8.2.1 U.S. Atlantic Pelagic Longline Fishery

NMFS utilizes both self-reported data (mandatory logbooks for all vessels) and observer data to monitor bycatch in the pelagic longline fishery. The observer program has been in place since 1992 to document finfish bycatch, characterize fishery behavior, and quantify interactions with protected species (Beerkircher *et al.*, 2002). The program is mandatory for those vessels selected and all vessels with directed and indirect swordfish permits are selected. The program had a target coverage level of five percent of the U.S. fleet within the North Atlantic (waters north of $5^{o}$ N. latitude), as was agreed to by the United States at ICCAT. Actual coverage levels achieved from 1992 – 2003 ranged from two to nine percent depending on quarter and year. Observer coverage was 100 percent for vessels participating in the NED experimental fishery during 2001 – 2003. Overall observer coverage in 2003 was 11.5 percent of the total sets made, including the NED experiment. The program began requiring an eight percent coverage rate due to the requirements of the 2004 Biological Opinion for Atlantic Pelagic Longline Fishery for HMS. Observer coverage in 2004 ranged from 6.2 – 9.0 percent per quarter. Since 1992, data collection priorities have been to collect catch and effort data of the U.S. Atlantic pelagic longline fleet on highly migratory fish species, although information is also collected on bycatch of protected species.

Fishery observer effort is allocated among eleven large geographic areas and calendar quarter based upon the historical fishing range of the fleet (Walsh and Garrison, 2006). The target annual coverage is eight percent of the total reported sets, and observer coverage is randomly allocated based upon reported fishing effort during the previous fishing year/quarter/statistical reporting area (Beerkircher *et al.*, 2002). Bycatch rates of protected species (catch per 1,000 hooks) are quantified based upon observer data by year, fishing area, and quarter (Garrison, 2005). The estimated bycatch rate is then multiplied by the fishing effort (number of hooks) in each area and quarter reported to the FLS program to obtain estimates of total interactions for each species of marine mammal and sea turtle (Garrison, 2005).

#### 3.8.2.2 Purse Seine Fishery

Vessels operating in the bluefin tuna purse seine fishery submit either Vessel Trip Reports (NERO) or HMS logbooks (Southeast) based on the type of Federal permits they hold in addition to their HMS permit. Observers were placed on purse seine vessels operating in this fishery in 1996 and 2001 in order to monitor groundfish bycatch in closed areas in the Northwest Atlantic (B. McHale, pers. comm., 2005). The purse seine fishery was observed to have very little bycatch of groundfish or other species of fish and no protected species interactions. As a result, observer coverage has not been used recently to document bycatch or validate logbook reports.

#### 3.8.2.3 Shark Bottom Longline Fishery

Vessels participating in the bottom longline fishery for sharks are required to submit snapper/grouper/reef fish/shark logbooks to report their catch and effort, including bycatch species. All vessels having Shark Limited Access Permits are required to report. The Commercial Shark Fishery Observer Program (CSFOP) has monitored the shark bottom longline fishery since 1994. The program has been mandatory for vessels selected to carry observers beginning in 2002. Prior to that, it was a voluntary program relying on cooperating vessels/captains to take observers. From 2002 – 2005, the objective of the vessel selection was to achieve a representative five percent level of coverage of the total fishing effort in each fishing area (North Atlantic, South Atlantic, and Gulf of Mexico) and during each fishing season of that year (Smith *et al*., 2006). Beginning in 2006, target coverage level will be 3.9 percent of the total fishing effort. This level is estimated to attain a sample size needed to provide estimates of sea turtle, smalltooth sawfish, or marine mammal interactions with an expected CV of 0.3 (Carlson, unpubl., as cited in Smith *et al*., 2006)

Effective August 1, 2001, selected Federal permit holders that report on the Gulf of Mexico reef fish, South Atlantic snapper-grouper, king and Spanish mackerel, and shark fisheries logbook must report all species and quantities of discarded (alive and dead) sea turtles, marine mammals, birds, and finfish on a supplemental discard form. A randomly selected sample of 20 percent of the vessels with active permits in the above fisheries is selected each year. The selection process is stratified across geographic area (Gulf of Mexico and South Atlantic), gear (handline, longline, troll, gillnet, and trap), and number of fishing trips (ten or less trips and more than 11 trips). Of the 3,359 vessels with Federal permits in these fisheries in 2003, a total of 452 vessels were selected to report. Of the 3,517 vessels with Federal permits in the fisheries in 2004, 428 were selected to report. Shark fishermen can use the pelagic longline logbook or the northeast vessel trip reports depending on the permits held by the vessel. If they use either the PLL logbook or VTR, they need to report all of the catch and effort, as well as all the bycatch or incidental catch.

#### 3.8.2.4 Shark Gillnet Fishery

Vessels participating in the gillnet fishery for sharks are required to submit logbooks to report their catch and effort, including bycatch species. An observer program for the directed shark gillnet fishery has been in place from 1993 – 1995 and from 1998 to the present. The objectives of this program are to obtain estimates of catch and bycatch and bycatch mortality rates of protected species, juvenile sharks, and other fish species. Catch and bycatch estimates are produced to meet the mandates of the Atlantic Large Whale Take Reduction Plan and the October 2003 Biological Opinion.

During right whale calving season (15 November to 31 March), 100 percent observer coverage is required for shark gillnet vessels operating from West Palm Beach, FL, to Sebastian Inlet, FL. Outside right whale calving season, observer coverage is equal to that which would obtain a sample size needed to provide estimates of sea turtle or marine mammal interactions with an expected CV of 0.3 (in 2003, this was 33.8 percent of the total trips) (Carlson and Baremore, 2002). On June 21, 2005, NMFS proposed modifying the time and areas where 100 percent observer coverage is required during right whale calving season (70 FR 35894). NMFS has proposed that, from November 15 to April 15, 100 percent observer coverage would be required for gillnet vessels fishing between the SC/GA border and 29$^{o}$ 00 N. Gillnet vessels fishing between 29$^{o}$ 00 N and 26$^{o}$ 46.5 N would be required to have 100 percent observer coverage from December 1 to March 31.

Starting in 2005, a pilot observer program was begun to include all vessels that have an active directed shark permit and fish with sink gillnet gear (Carlson and Bethea, 2006). These vessels were not subject to observer coverage because they were either targeting non-highly migratory species or were not fishing gillnets in a drift or strike fashion. These vessels were selected for observer coverage in an effort to determine their impact on finetooth shark landings and their overall impact on shark resources when not targeting sharks. One of the alternatives to reduce mortality of finetooth sharks in this document would thereby increase observer coverage to these vessels with directed shark permits that report landing sharks with gillnet.

#### 3.8.2.5 Commercial Handgear Fishery

The commercial handgear fishery includes vessels using handline, harpoon, rod and reel, or bandit gear to fish for HMS. NMFS has the authority to use observers to collect bycatch information from commercial vessels fishing for tunas. Many of these vessels are already required to complete Federal and/or state logbooks (*e.g.*, the NMFS Northeast Region Vessel Trip Report (VTR) Program), in which they are required to report all fishing information, including that for HMS and bycatch. NMFS is currently evaluating various alternatives to increase fishery data collection of vessels fishing for HMS with handgear, such as selecting additional HMS permitted vessels to report in logbooks or to be selected for observer coverage, and is investigating alternatives for electronic reporting. Therefore, no estimates of bycatch are available at this time. Bycatch and bycatch mortality are considered to be low due to the nature of the gear but this should be validated in the future.

#### 3.8.2.6 Recreational Handgear Fishery

NMFS collects recreational catch-and-release data from dockside surveys (the Large Pelagics Survey and the Marine Recreational Fishery Statistics Survey) for the rod and reel fishery and uses these data to estimate total landings and discards of bycatch or incidental catch. Statistical problems associated with small sample size remain an obstacle to estimating bycatch reliably in the rod and reel fishery. CVs can be high for many HMS (rare event species in the MRFSS) and the LPS does not cover all times/geographic areas for non-bluefin tuna species. New survey methodologies are being developed, however, especially for the Charter/Headboat sector of the rod and reel fishery, which should help to address some of the problems in estimating bycatch for this fishery. In addition, selecting recreational vessels for voluntary logbook reporting may be an option for collecting bycatch information for this sector of the HMS fishery.

NMFS has the authority to use observers to voluntarily collect bycatch information from vessels with HMS Charter/Headboat or Angling category permits. Many of the charter/headboat vessels are required to complete Federal and/or state logbooks (*e.g.*, the NMFS Northeast Region Vessel Trip Report (VTR) Program), in which they are required to report all fishing information, including that for HMS and bycatch. NMFS is currently evaluating various alternatives to increase logbook coverage of vessels fishing for HMS, such as selecting additional HMS vessels to report in logbooks or be selected for observer coverage, and is investigating alternatives for electronic reporting.

The National Academy of Sciences assembled a committee to review current marine recreational fishing surveys at the request of NMFS (NAS, 2006). The committee was tasked with developing recommendations for improvements to current surveys and to recommend the implementation of possible alternative approaches. The committee's final report was published in April 2006, and NMFS is in the process of evaluating the recommendations. At the present time, no other alternative approach is available.

### 3.8.3 Bycatch Reduction in HMS Fisheries

The NMFS HMS bycatch reduction program includes an evaluation of current data collection programs, implementation of bycatch reduction measures such as gear modifications and time/area closures, and continued support of data collection and research relating to bycatch (Table 3.107). Additional details on bycatch and bycatch reduction measures can be found in Section 3.5 of the Fishery Management Plan for Atlantic Tunas, Swordfish and Sharks (NMFS, 1999), in Regulatory Amendment 1 to the 1999 FMP (NMFS, 2000), in Regulatory Adjustment 2 to the 1999 FMP (NMFS, 2002), and in Amendment 1 to the 1999 FMP (NMFS, 2003a). In addition, an HMS Bycatch Reduction Implementation Plan was developed in late 2003 which identify priority issues to be addressed in the following areas: 1) monitoring, 2) research, 3) management, and 4) education/outreach. Individual activities in each of these areas were identified and new activities may be added or removed as they are addressed or identified.

## 3.9 HMS Permits and Tournaments

This section provides updates for the number of permits that were issued in conjunction with HMS fishing activities as of February 2006. Furthermore, Section 3.9.6, Atlantic HMS Tournaments, provides a comprehensive synthesis of recreational fishing tournaments and their role in the context of HMS management.

NMFS' HMS Management Division continues to monitor capacity in HMS fisheries. Updated permit numbers for HMS fisheries as of April 2005, are included in Table 3.95 through Table 3.101. These tables have been updated since the Draft Consolidated HMS FMP, which listed numbers of permits as of April 2005. The overall number of limited access permits for Atlantic swordfish, tunas, and sharks increased from 1,128 to 1,131 (Table 3.95) between October 2005 and February 2006, however, these numbers are subject to change based upon on-going permit renewal or expiration. The overall number of tuna permits increased in all categories between October 2005 and February 2006 (Table 3.96). The HMS Angling Permit category went into effect on March 1, 2003 (67 FR 77434, December 18, 2003), and there has been a significant increase in Angling category permits over the past few years (Table 3.96). The number of tuna dealer permits increased from 364 (April 20, 2005) to 416 (February 1, 2006) (Table 3.99).

**Table 3.95 Distribution of Shark, Swordfish, and Tuna longline Limited Access Permits Between 2001 and 2006. Data for 2001-2005 are as of October 1 for each year.**

| | | | | | | | **# Permit Holders/# Permits** |
|---|---|---|---|---|---|---|---|
| ME | 2 | - | 4 | 2 | 3 | 1 | 9/12 |
| NH | - | - | - | - | 1 | - | 1/1 |
| MA | 13 | 1 | 21 | 4 | 13 | 8 | 37/60 |
| RI | 2 | 4 | 19 | - | 10 | 1 | 24/36 |
| CT | 1 | - | 1 | - | 1 | 1 | 2/4 |
| NY | 12 | 2 | 9 | 7 | 8 | 12 | 24/50 |
| NJ | 22 | 13 | 9 | 22 | 21 | 30 | 48/117 |
| DE | 4 | - | - | 3 | 1 | 3 | 4/11 |
| MD | 6 | - | - | 3 | 6 | 6 | 9/24 |
| VA | - | 3 | - | 3 | 3 | 3 | 6/12 |
| NC | 9 | 10 | 2 | 21 | 16 | 15 | 37/73 |
| SC | 2 | 1 | - | 7 | 14 | 4 | 20/28 |
| GA | 1 | - | - | 2 | 2 | - | 4/5 |
| FL | 66 | 32 | 22 | 144 | 137 | 76 | 299/477 |
| AL | - | 1 | - | 2 | 1 | 1 | 3/5 |
| MS | - | 2 | - | 1 | 7 | 1 | 8/11 |
| LA | 37 | 7 | - | 7 | 43 | 44 | 49/138 |
| TX | 1 | 5 | - | 2 | 10 | 6 | 12/24 |
| CA | - | - | - | - | - | 1 | 1/1 |
| PA | 2 | 2 | - | 2 | 4 | 1 | 6/11 |
| VI | 1 | - | - | - | 1 | 1 | 1/3 |
| No Vessel ID | 10 | 3 | 1 | 8 | 10 | - | - |
| | | | | | | | **604/1131** |
| | | | | | | | **639/1128** |

| | | | | | | | # Permit Holders/# Permits |
|---|---|---|---|---|---|---|---|
| | | | | | | | 657/1201 |
| | | | | | | | 696/1245 |
| | | | | | | | 713/1262 |
| | | | | | | | 752/1275 |

* Number of permit holders in each category, and state, is subject to change as permits are renewed or expire.
** Totals for 2006 are as of February 1, 2006

### 3.9.1 Upgrading and Safety Issues

When the limited access program was implemented, NMFS included upgrading restrictions that were the same as those implemented by the New England Fishery Management Council (NEFMC) and Mid-Atlantic Fishery Management Council (MAFMC) in order to help minimize the number of regulations for fishermen in those areas. These regulations restrict vessels from any increase over ten percent length overall (LOA), ten percent gross or net tonnage, and 20 percent horsepower. NMFS continues to receive comments that these vessel upgrading restrictions are not appropriate for longline fisheries, may inhibit full utilization of the domestic swordfish quota, are not the preferred vessel characteristics to limit overcapitalization, and have caused safety at sea concerns. In developing the current upgrading restrictions, hold capacity was identified by constituents as a vessel characteristic that would not impact safety at sea and would meet the objective of addressing overcapitalization in HMS commercial fisheries. NMFS did not implement hold capacity as a measure to limit vessel upgrading in 1999 due to the lack of standard measurements of vessel hold capacity as well as the lack of consistent collection of this information for HMS commercial vessels as part of existing vessel registration systems. NMFS has considered other possible options including: eliminating upgrading restrictions; limiting hold capacity instead of, or in addition to, the current restrictions; allowing a greater percentage increase; and creating vessel categories. NMFS heard similar comments as those listed above from the Advisory Panel (AP) in February of 2004. NMFS is considering these options, and, as with any potential changes in the permitting system, will allow for adequate public comment during the rulemaking process before making any changes to the regulations.

### 3.9.2 Atlantic Tunas Permits

The number of Atlantic Tunas permit holders by category is listed in Table 3.96. The number of permits in the Longline, General, and Charter/Headboat (CHB) categories increased between 2004 and April 2005. In previous years, CHB vessels fishing for HMS only needed a CHB permit if they were fishing for Atlantic tunas.

**Table 3.96 The number of Atlantic tuna permit holders in each category as of October 2001 through 2005. Permit numbers for 2006 are as of February 1, 2006. The actual number of 2006 permit holders in each category is subject to change as individuals renew or allow their permits to expire.**

| | | | | | | **2006** |
|---|---|---|---|---|---|---|
| Longline | 213 | 226 | 235 | 222 | 200 | 214 |
| Angling * | 12,685 | 13,263 | 18,804 | 20,245 | 24,127 | 25,238 |
| Harpoon | 53 | 56 | 47 | 49 | 40 | 40 |
| Trap | 1 | 6 | 2 | 2 | 7 | 7 |
| General | 6,072 | 6,431 | 5,526 | 5,057 | 4,494 | 4,824 |
| Purse Seine | 5 | 5 | 5 | 5 | 5 | 5 |
| CHB** | 3,260 | 3,659 | 4,167 | 3,881 | 3,963 | 4,173 |
| | | | | | | **34,501** |

* HMS Angling permit became effective March 1, 2003 (67 FR 77434, December 18, 2003) and includes all HMS, not just tunas.
****** No longer a tuna-only permit, became a HMS CHB permit on March 1, 2003

In December 2002, NMFS published a final rule (67 FR 77434, December 18, 2002) that required the owner of each vessel used to fish recreationally for Atlantic HMS or on which Atlantic HMS are retained or possessed, to obtain an HMS Angling permit. Effective March 1, 2003, this permit replaced the Atlantic Tunas Angling category permit. It is discussed in greater detail in the HMS Angling Permit section.

### 3.9.3 HMS CHB Permits

In 2002, NMFS published a final rule (67 FR 77434, Dec. 18, 2002) expanding the HMS recreational permit from tuna only to include all HMS and define CHB operations. This established a requirement that owners of charterboats or headboats that are used to fish for, take, retain, or possess Atlantic tunas, sharks, swordfish, or billfish must obtain a HMS CHB permit. This permit replaced the Atlantic Tunas CHB permit. A vessel issued a HMS CHB permit for a fishing year will not be issued an HMS Angling permit or any Atlantic Tunas permit in any category for that same fishing year, regardless of a change in the vessel's ownership. The total number of CHB increased between April 2005 and February 2006.

**Table 3.97 CHB Permits by State as of February 1, 2006.**

| | | | CHB Permits |
|---|---|---|---|
| AL | 76 | NH | 47 |
| CT | 91 | NJ | 643 |
| DE | 129 | NV | -- |
| FL | 673 | OH | 2 |
| GA | 31 | PA | 11 |
| LA | 93 | PR | 27 |
| MA | 557 | RI | 163 |
| MD | 198 | SC | 141 |
| ME | 64 | TN | -- |
| MI | 2 | TX | 166 |
| MS | 32 | VA | 142 |
| NC | 465 | VI | 18 |
| NY | 373 | Other | 23 |
| **Total** | | | **4,173** |

### 3.9.6 HMS Angling Permit

Effective March 2003 (67 FR 77434, Dec. 18, 2002), the HMS Angling category permit allows all recreational anglers aboard permitted vessels to fish for HMS and is required to fish for, retain, or possess, including catch and release fishing, any federally regulated HMS. These species include: sharks, swordfish, white and blue marlin, sailfish, spearfish, and federally regulated Atlantic tunas (bluefin, yellowfin, bigeye, skipjack, and albacore). Atlantic HMS caught, retained, possessed, or landed by persons on board vessels with an HMS Angling permit may not be sold or transferred to any person for a commercial purpose. By definition, recreational landings of Atlantic HMS are those that cannot be marketed through commercial channels, therefore it is not possible to monitor anglers' catches through ex-vessel transactions as in the commercial fishery. Instead, NMFS conducts statistical sampling surveys of the recreational fisheries. These survey programs have been used for over a decade and include the Marine Recreational Fisheries Statistics Survey (MRFSS) and the Large Pelagic Survey (LPS). A vessel issued an HMS Angling permit for a fishing year shall not be issued an HMS Charter/ Headboat permit or an Atlantic Tunas permit in any category for that same fishing year, regardless of a change in the vessel's ownership.

### 3.9.4 Dealer Permits

Dealer permits are required for commercial receipt of Atlantic tuna, swordfish, and sharks, and are described in further detail in the 1999 Tunas, Swordfish, and Sharks FMP. Dealer permits are not limited access. Fishermen caught selling HMS to unpermitted dealers and persons without a dealer permit buying HMS from fishermen could be subject to enforcement action. Similarly, persons caught buying HMS from non-commercial fishermen could also be subject to enforcement action. All dealer permit holders are required to submit reports detailing the nature of their business. For swordfish and shark permit holders (including those who *only* import swordfish), dealers must submit bi-weekly dealer reports on all HMS they purchase. Tuna dealers must submit, within 24 hours of the receipt of a bluefin tuna, a landing report for each bluefin purchased from U.S. fishermen. Dealers must also submit bi-weekly reports that include additional information on tunas that they purchase. To facilitate quota monitoring "negative reports" for shark and swordfish are also required from dealers when no purchases are made (*i.e.*, NMFS can determine who has not purchased fish versus who has neglected to report). NMFS continues to automate and improve its permitting and dealer reporting systems and plans to make additional permit applications and renewals available online in the near future.

Starting July 1, 2005, dealers who import and/or export certain HMS species are required to obtain the NMFS HMS International Trade Permit (ITP) (69 FR 67268, November 17, 2004) (Table 3.100). The permit has been established to coordinate U.S. implementation of ICCAT and IATTC trade tracking recommendations. The HMS ITP is required for trade of bluefin tuna, southern bluefin tuna, swordfish, and frozen bigeye tuna. Reporting associated with the HMS ITP will include biweekly reports and submission of swordfish, bluefin tuna, southern bluefin tuna and bigeye tuna statistical documents. Atlantic tunas and swordfish dealer permits will no longer be required for international trade of these species, and will be necessary only for domestic transactions. Additionally, the Pacific Ocean bluefin tuna dealer permit will no longer be in effect.

**Table 3.98 Number of shark and swordfish dealer permits issued in each state or country as of October 2001-2005. Permits for 2006 are as of February 1, 2006. The actual number of permits per may change as permit holders move or sell their businesses.**

| | | | # of permits |
|---|---|---|---|
| AL | 2 | 5 | 7 |
| CA | 29 | 29 | 58 |
| FL | 94 | 119 | 213 |
| GA | 1 | 1 | 2 |
| HI | 7 | 7 | 14 |
| LA | 12 | 13 | 25 |
| MA | 31 | 31 | 62 |
| MD | 6 | 6 | 12 |
| ME | 3 | 3 | 6 |
| MO | -- | 1 | 1 |
| MS | -- | 1 | 1 |
| NC | 14 | 20 | 34 |
| NJ | 14 | 14 | 28 |
| NY | 18 | 18 | 36 |
| OH | -- | -- | -- |
| PA | 2 | 2 | 4 |

| | | | # of permits |
|---|---|---|---|
| PR | 1 | 1 | 2 |
| RI | 10 | 10 | 20 |
| SC | 11 | 20 | 31 |
| TX | 8 | 11 | 19 |
| VA | 4 | 6 | 10 |
| VI | 1 | 1 | 2 |
| WA | 8 | 8 | 16 |
| Canada | 8 | 8 | 16 |
| Chile | 1 | 1 | 2 |
| New Zealand | -- | -- | -- |
| Ecuador | -- | -- | -- |
| | | | **621** |
| | | | **522** |
| | | | **559** |
| | | | **573** |
| | | | **588** |
| | | | **551** |

**Table 3.99 Number of Atlantic tuna dealer permits by state issued in the 2005 calendar year. Dealers may obtain a permit to sell and purchase only bluefin tuna, only BAYS tunas, or both bluefin and BAYS tunas.**

| | | | | Total Atlantic Tunas Dealer Permits |
|---|---|---|---|---|
| AL | -- | -- | 1 | 1 |
| CA | 8 | -- | 5 | 13 |
| CT | -- | -- | 2 | 2 |
| DE | -- | -- | 3 | 3 |
| FL | 1 | 1 | 16 | 18 |
| GA | -- | -- | 2 | 2 |
| IL | 1 | -- | -- | 1 |
| HI | -- | -- | 2 | 2 |
| LA | 1 | -- | 11 | 12 |
| MA | 14 | 5 | 77 | 96 |
| MD | -- | 1 | 9 | 10 |
| ME | 10 | -- | 13 | 23 |
| NC | 6 | 7 | 25 | 38 |
| NH | -- | -- | 5 | 5 |

| | | | | Total Atlantic Tunas Dealer Permits |
|---|---|---|---|---|
| NJ | 1 | 9 | 32 | 42 |
| NY | 3 | 14 | 49 | 66 |
| PA | -- | -- | 3 | 3 |
| PR | -- | 4 | 2 | 6 |
| RI | -- | 5 | 30 | 35 |
| SC | -- | 4 | 8 | 12 |
| TX | -- | 1 | 2 | 3 |
| VA | 1 | 6 | 14 | 21 |
| VI | -- | 3 | 1 | 4 |
| WA | -- | -- | 1 | 1 |
| **Total** | **43** | **60** | **313** | **416** |

- Does not include Pacific bluefin tuna dealer permits which were eliminated July 1, 2005.

**Table 3.100 Number of International Trade Permits (ITP) by state (province) as of February 1, 2006.**

| | Number of ITPs |
|---|---|
| CA | 13 |
| FL | 22 |
| GA | 1 |
| HI | 2 |
| LA | 3 |
| MA | 23 |
| ME | 4 |
| NC | 4 |
| NJ | 7 |
| NY | 13 |
| RI | 3 |
| VA | 2 |
| WA | 1 |
| Nova Scotia, Canada | 2 |
| **Total** | **100** |

### 3.9.5 Exempted Fishing Permits (EFPs), Display Permits, Chartering Permits, and Scientific Research Permits (SRPs)

EFPs, display permits, and SRPs are requested and issued under the authority of the Magnuson-Stevens Act (16 U.S.C. 1801 et seq.) and/or the ATCA (16 U.S.C. 971 et seq.). EFPs are issued to individuals interested in being exempted from regulations for the purpose of conducting research or other fishing activities using private (non-NOAA) vessels, whereas an SRP would be issued to agency scientists who are using NOAA vessels as their research platform. Display permits are issued to individuals who are fishing for, catching, and then transporting HMS to certified aquariums for public display. Regulations at 50 CFR 600.745 and 50 CFR 635.32 govern scientific research activity, exempted fishing, and exempted educational activity with respect to Atlantic HMS. Amendment 1 to the Atlantic Tunas, Swordfish, and Sharks FMP implemented and created a separate display permitting system, which operates apart from the exempted fishing activities that are focusing on scientific research. However, the application process for display permits is similar to that required for EFPs and SRPs. The quota is 60 mt ww for all sharks collected under exempted fishing permits.

Issuance of EFPs, display permits, and SRPs may be necessary because possession of certain shark and billfish species are prohibited, possession of billfishes on board commercial fishing vessels is prohibited, the commercial fisheries for bluefin tuna, swordfish and large coastal sharks may be closed for extended periods during which collection of live animals and/or biological samples would otherwise be prohibited, or for other reasons. These EFPs, SRPs, and display permits would authorize collections of tunas, swordfish, billfishes, and sharks from Federal waters in the Atlantic Ocean and Gulf of Mexico for the purposes of scientific data collection and public display. In addition, NMFS regulations at 50 CFR 635.32 regarding implantation or attachment of archival tags in Atlantic HMS require prior authorization and a report on implantation activities.

In order to implement the chartering recommendations of ICCAT, NMFS recently published a rule on December 6, 2004 (69 FR 70396), requiring U.S. vessel owners with HMS permits to apply for and obtain a chartering permit before fishing under a chartering arrangement outside U.S. waters. These permits are issued in a similar manner as other EFPs. Under this final rule and consistent with the ICCAT recommendations, vessels issued a chartering permit are not authorized to use the quota or entitlement of the United States until the chartering permit expires or is terminated. This is because of the fact that under a chartering arrangement it is assumed that vessels have attained temporary authorization to harvest another ICCAT Contracting Parties' quota. Having a chartering permit does not obviate the need to obtain a fishing license, permits, or other authorizations issued by the chartering nation in order to fish in foreign waters, or obtain other authorizations such as a High Seas Fishing Compliance Act Permit, 50 CFR 300.10 et seq. Additionally, incidental takes of, or interactions with, protected resources are included against the Incidental Take Statement specified in any relevant Biological Opinions. A U.S. vessel shall not be authorized to fish under more than one chartering arrangement at the same time. NMFS will issue chartering permits only if it determines that the chartering arrangement is in conformance with ICCAT's conservation and management programs.

The number of EFPs, display permits, and SRPs issued from 2002 – 2006 by category and species are listed in Table 3.101. Year-end reports for permits issued for 2004 are required, and are expected to be submitted to NMFS in early 2005.

**Table 3.101 Number of Exempted Fishing Permits (EFPs), Display Permits, and Scientific Research Permits (SRPs) issued between 2002 and 2006.**

| | | | | | | **2006*** |
|---|---|---|---|---|---|---|
| Exempted Fishing Permit | Sharks for display | 7 | 8 | 8 | 6 | 3 |
| | HMS for display | 1 | 1 | 1 | 1 | -- |
| | Tunas for display | 0 | 0 | 1 | 0 | -- |
| | Shark research on a non-scientific vessel | 5 | 9 | 6 | 5 | -- |
| | Tuna research on a non-scientific vessel | 4 | 5 | 11 | 7 | 1 |
| | HMS research on a non-scientific vessel | 5 | 18 | 5 | 3 | 3 |
| | Billfish research on a non-scientific vessel | 0 | 0 | 1 | 2 | 1 |
| | Shark Fishing | 1 | 1 | 0 | 0 | -- |
| | HMS Chartering | 0 | 0 | 1 | 0 | -- |
| | Tuna Fishing | 6 | 7 | 2 | 0 | |
| | | | | | | **8** |
| Scientific Research Permit | Shark research | 2 | 1 | 3 | 4 | -- |
| | Tuna research | 1 | 0 | 0 | 0 | -- |
| | Billfish research | 0 | 0 | 0 | 0 | -- |
| | HMS (multi-species) research | 1 | 1 | 1 | 4 | 3 |
| | | | | | | **3** |
| Letters of Acknowledgement | Shark research | 3 | 3 | 2 | 4 | 1 |
| | | | | | | **1** |

***** Permit numbers for 2006 are as of February 1, 2006.

### 3.9.6 Atlantic HMS Tournaments

Fishing tournaments are an important component of HMS recreational fisheries. A tournament is defined in the HMS regulations as any fishing competition involving Atlantic HMS in which participants must register or otherwise enter or in which a prize or award is offered for catching or landing such fish. Since 1999, Federal regulations have required that each HMS tournament operator register their tournament with NMFS at least four weeks prior to the commencement of tournament fishing activities. Tournament operators may be selected for reporting and must submit tournament results to NMFS within seven days of the conclusion of the tournament.

Tournament registration and reporting is necessary because it provides an important source of information used to assess HMS fish stocks and to estimate the annual catch of Atlantic HMS. The information may be used by NMFS to plan for the assignment of tournament observers to assist in catch/effort data compilation and to obtain biological data and samples from landed fish (length/weight, stomach contents, injuries, parasites, hard and soft tissue samples for age determination, genetic and microconstituent analysis, spawning condition, fecundity, etc.). Additionally, with an accurate tournament database, NMFS may better assess the practicality of using tournaments for angler educational outreach efforts including distribution of written informational materials, notification of public hearings, and explanation of HMS regulations. HMS tournament registration and reporting information further allows NMFS, in the course of developing fishery management plans, to evaluate the social and economic impact of tournament angling in relation to other types of angling (*e.g*., commercial, non-tournament recreational) and the relative effect of tournament angling on populations of various regulated HMS. Finally, the information is essential for the U.S. to meet its reporting obligations to ICCAT.

When registering an HMS tournament, the following information is required to be submitted to the HMS Management Division in St. Petersburg, FL: (1) Tournament name; (2) tournament location; (3) name, address, phone number, fax number, and e-mail address of tournament operator; (4) fishing dates; and (5) HMS species for which points or prizes are awarded. If selected for reporting, operators must submit the following information to the SEFSC: (1) Tournament name; (2) tournament dates; (3) tournament location; (4) number of boats fishing; (5) hours fished; (6) recorder's name, phone number, and e-mail address; (7) the number of each species kept; (8) the number of each species lost; (9) the number of each species tagged and released; (10) the number of each species released without a tag; (11) the number of each species released dead; and, (12) the weight and length of all fish boated. This information is routinely collected during tournament operations to award prizes. Generally, 100 percent of all billfish tournaments are selected for reporting, as this information is critical to determining billfish landings. Tournament registration forms are available at: http://www.nmfs.noaa.gov/sfa/hms/linkpages/reporting_forms.htm.

The reasons for participation in fishing tournaments include, but are not limited to, competition, camaraderie, and the opportunity to win valuable prizes. A search on the Internet for fishing tournaments (December, 2004) indicated that many saltwater tournaments target HMS. It has been estimated that approximately 300 – 400 HMS fishing tournaments occur annually along the U.S. Atlantic coast, including the Gulf of Mexico and Caribbean (NMFS, 1999). These tournaments may range from smaller, club member-only events with as few as ten participating boats (40 – 60 anglers) to larger, statewide tournaments with 250 or more participating vessels (1,000 – 1,500 anglers). For the larger tournaments, corporate sponsorship from tackle manufactures, marinas, boat dealers, beverage distributors, resorts, publications, chambers of commerce, restaurants, and others are often involved.

Many HMS fishing tournaments, particularly those that target billfish, promote strict conservation principles in their rules. For example, significant numbers of blue marlin, white marlin, and sailfish tournaments are "release-only," utilizing observers, angler affidavits, polygraph tests, photographs, or video cameras to document the live release of marlins.

Minimum sizes for fish that are landed are often larger than state and Federal requirements. Also, some tournaments prohibit treble hooks and may require circle hooks on certain baits. Because tournament participants are often well-respected anglers (*i.e*. highliners), these conservation trends and ethics likely influence the general angling population in a positive manner.

For anglers in HMS tournaments, winning the prize money may not be the only motive for participation. Many HMS fishing tournaments support charitable organizations; an internet search revealed that some of the charities who have benefited from fishing tournaments include: the Cystic Fibrosis Foundation, Make-A-Wish Foundation, Sloan-Kettering Skin Cancer Center, Boy Scouts of America, Ducks Unlimited, The Boys and Girls Club, The Broadstreet Clinic, Core Sound Waterfowl Museum, Hope Mission Christian Ministries, Sertoma by the Bay (breast cancer research), Take A Kid Fishing, Capt. Bob Lewis Scholarship Fund, South Nassau Communities Hospital, South Texas Children's, T. H. Rogers School for Impaired Children's Home, The Billfish Foundation, and Kids In Distress.

Table 3.102 presents the number of registered HMS tournaments, by state, between 2001 and 2005. This table indicates that, in 2005, HMS fishing tournaments were conducted most frequently in Florida, Louisiana, Puerto Rico, North Carolina, Texas, New Jersey, Maryland, Georgia, New York, Virgin Islands, and South Carolina. By far, the largest number of registered HMS tournaments has consistently occurred in the state of Florida.

**Table 3.102 Number of Registered HMS Tournaments by State between 2001 and 2005.** Source: NMFS Atlantic HMS Tournament Registration Database

| | | | | | **2005** |
|---|---|---|---|---|---|
| ME | 2 | 3 | 3 | 5 | 3 |
| NH | 0 | 0 | 0 | 0 | 0 |
| MA | 7 | 1 | 7 | 10 | 4 |
| RI | 2 | 2 | 3 | 3 | 2 |
| CT | 1 | 0 | 0 | 0 | 1 |
| NY | 5 | 4 | 14 | 14 | 10 |
| NJ | 11 | 5 | 18 | 17 | 16 |
| DE | 2 | 0 | 0 | 1 | 0 |
| MD | 4 | 2 | 14 | 14 | 14 |
| VA | 5 | 1 | 5 | 4 | 5 |
| NC | 11 | 5 | 15 | 16 | 18 |
| SC | 6 | 3 | 13 | 9 | 9 |
| GA | 6 | 1 | 12 | 3 | 13 |
| FL | 46 | 26 | 66 | 57 | 74 |
| AL | 7 | 7 | 9 | 8 | 7 |
| MS | 3 | 2 | 7 | 2 | 2 |
| LA | 19 | 0 | 20 | 22 | 26 |
| TX | 14 | 1 | 17 | 10 | 17 |
| MI | 1 | 0 | 0 | 0 | 0 |
| PR | 16 | 4 | 13 | 17 | 22 |

| | | | | | 2005 |
|---|---|---|---|---|---|
| USVI | 9 | 0 | 6 | 1 | 10 |
| Bahamas[1] | 3 | 2 | 1 | 2 | 2 |
| Bermuda[1] | 0 | 0 | 0 | 0 | 1 |
| Mexico[1] | 1 | 0 | 0 | 0 | 0 |
| Turks/Caicos[1] | 0 | 0 | 1 | 0 | 0 |
| **TOTAL** | **181** | **68** | **244** | **215** | **256** |

[1]Some foreign tournaments voluntarily registered because the participants were mostly U.S. citizens.

Table 3.103 shows the number and percentage of HMS tournaments awarding points or awards for a particular HMS, based upon 2005 tournament registrations. Blue marlin, white marlin, sailfish, and yellowfin tuna are the predominant target species in HMS fishing tournaments.

**Table 3.103 Number and Percent of All 2005 HMS Tournaments Awarding Points or Prizes for an HMS.**
Source: NMFS Atlantic HMS Tournament Registration Database

| | | Percent of tournaments |
|---|---|---|
| Blue Marlin | 174 | 67.9% |
| White Marlin | 164 | 64.1% |
| Sailfish | 162 | 63.3% |
| Yellowfin Tuna | 161 | 62.9% |
| Bluefin Tuna | 83 | 32.4% |
| Swordfish | 71 | 27.7% |
| Bigeye Tuna | 53 | 20.1% |
| Pelagic Sharks | 48 | 18.8% |
| Albacore Tuna | 13 | 5.1% |
| Skipjack Tuna | 9 | 3.5% |
| Small Coastal Sharks | 5 | 2.0% |
| Ridgeback Sharks | 5 | 2.0% |
| Non-Ridgeback Sharks | 5 | 2.0% |

Table 3.106 indicate the percentage and number of 2005 HMS registered tournaments, by state (or country), for blue marlin, white marlin and sailfish, respectively. These tables indicate that Florida is the leading state in terms of numbers of registered billfish tournaments, especially for sailfish.

**Table 3.104 Registered Blue Marlin Tournaments, 2005.** Source: NMFS Atlantic HMS Tournament Registration Database.

| | | **Percent of Total 2005 Tournaments Awarding Points or Prizes for Blue Marlin** |
|---|---|---|
| Florida | 36 | 20.7% |
| Louisiana | 25 | 14.4% |
| Puerto Rico | 17 | 9.8% |
| Texas | 17 | 9.8% |
| North Carolina | 15 | 8.6% |
| Georgia | 11 | 6.3% |
| Maryland | 11 | 6.3% |
| New Jersey | 9 | 5.2% |
| U.S. Virgin Islands | 9 | 5.2% |
| South Carolina | 8 | 4.6% |
| Alabama | 5 | 2.9% |
| Virginia | 3 | 1.7% |
| Massachusetts | 2 | 1.1% |
| Bahamas[1] | 2 | 1.1% |
| Mississippi | 1 | 0.6% |
| New York | 1 | 0.6% |
| Rhode Island | 1 | 0.6% |
| Bermuda[1] | 1 | 0.6% |
| **TOTAL** | **174** | **100%** |

**Table 3.105 Registered White Marlin Tournaments, 2005.** Source: NMFS Atlantic HMS Tournament Registration Database.

| | | **% of Total 2005 Tournaments Awarding Points or Prizes for White Marlin** |
|---|---|---|
| Florida | 36 | 22.0% |
| Louisiana | 25 | 15.2% |
| North Carolina | 15 | 9.1% |
| Texas | 15 | 9.1% |
| Georgia | 11 | 6.7% |
| Maryland | 11 | 6.7% |
| New Jersey | 9 | 5.5% |
| Puerto Rico | 9 | 5.5% |
| South Carolina | 8 | 4.9% |
| U.S. Virgin Islands | 8 | 4.9% |

| | | % of Total 2005 Tournaments Awarding Points or Prizes for White Marlin |
|---|---|---|
| Alabama | 6 | 3.6% |
| Virginia | 3 | 1.8% |
| Massachusetts | 2 | 1.2% |
| Bahamas[1] | 2 | 1.2% |
| Rhode Island | 1 | 0.6% |
| Mississippi | 1 | 0.6% |
| New York | 1 | 0.6% |
| Bermuda[1] | 1 | 0.6% |
| **TOTAL** | **164** | **100%** |

**Table 3.106 Registered Sailfish Tournaments, 2005.** Source: NMFS Atlantic HMS Tournament Registration Database.

| | | % of Total 2005 Tournaments Awarding Points or Prizes for Sailfish |
|---|---|---|
| Florida | 58 | 35.8% |
| Louisiana | 25 | 15.4% |
| Texas | 16 | 9.9% |
| North Carolina | 15 | 9.2% |
| Georgia | 11 | 6.8% |
| Puerto Rico | 10 | 6.2% |
| South Carolina | 7 | 4.3% |
| Alabama | 6 | 3.7% |
| Maryland | 3 | 1.8% |
| U.S. Virgin Islands | 3 | 1.8% |
| Virginia | 3 | 1.8% |
| Bahamas[1] | 2 | 1.2% |
| Massachusetts | 1 | 0.6% |
| Mississippi | 1 | 0.6% |
| Bermuda[1] | 1 | 0.6% |
| **TOTAL** | **162** | **100%** |

**Table 3.107 Summary of bycatch species in HMS fisheries, Marine Mammal Protection Act (MMPA) category, endangered Species Act (ESA) requirements, data collection, and management measures by fishery/gear type.** (Excerpted from HMS Bycatch Priorities and Implementation Plan and updated through May 2006)

| | | | | | Management Measures |
|---|---|---|---|---|---|
| Pelagic Longline | Bluefin tuna<br>Billfish<br>Undersize target species<br>Marine mammals<br>Sea turtles<br>Seabirds<br>Non-target finfish<br>Prohibited shark species<br>Large Coastal Shark species after closure | Category I | Jeopardy findings in 2000 & 2004, Reasonable and Prudent Alternative implemented 2001-04 | Permit requirement (1985); logbook requirement (SWO- 1985; SHK - 1993); observer requirement (1992), EFPs (2001-03) | BFT target catch requirements (1981); quotas (SWO - 1985; SHK - 1993); prohibit possession of billfish (1988); minimum size (1995); gear marking (1999); line clippers, dipnets (2000); MAB closure (1999); limited access (1999); limit the length of mainline (1996-1997 only); move 1 nm after an interaction (1999); voluntary vessel operator workshops (1999); GOM closure (2000); FL, Charleston Bump, NED closures (2001); gangion length, corrodible hooks, de-hooking devices, handling & release guidelines (2001); NED experiment (2001); VMS (2003); circle hooks and bait requirements (2004) |
| Shark Bottom Longline | Prohibited shark species<br>Target species after closure<br>Sea turtles<br>Smalltooth sawfish<br>Non-target finfish | Category III | ITS, Terms & Conditions, RPMs | Permit requirement (1993); logbook requirement (1993); observer coverage (1994) | Quotas (1993); trip limit (1994); gear marking (1999); handling & release guidelines (2001); line clippers, dipnets, corrodible hooks, de-hooking devices, move 1 nm after an interaction (2004); South Atlantic closure, VMS (2005) |
| Shark Gillnet | Prohibited shark species<br>Sea turtles<br>Marine mammals<br>Non-target finfish<br>Smalltooth sawfish | Category II | ITS, Terms & Conditions, RPMs | Permit requirement (1993); logbook requirement (1993); observer coverage (1994) | Quotas (1993); trip limit (1994); gear marking (1999); deployment restrictions (1999); 30-day closure for leatherbacks (2001); handling & release guidelines (2001); net checks (2002); whale sighting (2002); VMS (2004); closure for right whale mortality (2006) |
| BFT Purse Seine | Undersize target species<br>Non-target finfish | Category III | ITS, Terms & Conditions | Permit requirement (1982); observer requirement (1996, 2001 only); EFPs (2002-05) | Quotas (1975); limited access, individual vessel quotas (1982); minimum size (1982) |

| | | | | | Management Measures |
|---|---|---|---|---|---|
| BFT & SWO Harpoon | Undersize target species | Category III | ITS, Terms & Conditions | Permit requirement (BFT - 1982; SWO - 1987); SWO logbook requirement (1987) | Quotas (BFT - 1982; SW0 - 1985); minimum size (BFT - 1982; SWO - 1985) |
| Handgear - Commercial | Undersize target species<br>Non-target finfish | Category III | ITS, Terms & Conditions | Permit requirement (BFT - 1982; SWO 1987; SHK - 1993); logbook requirement (SWO - 1985; SHK - 1993) | Regulations vary by species, including quotas, minimum sizes, retention limits, landing form |
| Handgear - Recreational | Undersize target species<br>Non-target finfish | Category III | ITS, Terms & Conditions | Large Pelagic Survey (1992); MRFSS (1981) | Regulations vary by species, including minimum sizes, retention limits, landing form; BFT quotas |

### 3.9.7 Evaluation and Monitoring of Bycatch

The identification of bycatch in Atlantic HMS fisheries is the first step in reducing bycatch and bycatch mortality. The Magnuson-Stevens Act requires the amount and type of bycatch to be summarized in the annual SAFE reports. Bycatch reporting is addressed in Section 3.8.3. Additional species and fishery specific data have already been presented in Section 3.2.

Pelagic longline dead discards of swordfish, billfish, large coastal sharks and pelagic sharks are estimated using data from NMFS observer reports and pelagic logbook reports. Shark bottom longline and shark gillnet discards can be estimated using logbook data and observer reports as well. Shark gillnet discards have also been estimated using logbook data when observer coverage is equal to 100 percent.

NMFS has not estimated bycatch in the swordfish harpoon fishery. NMFS has limited historical observer data on harpooned swordfish from driftnet trips in which harpoons were sometimes used. Swordfish harpoon fishermen are required to submit pelagic logbooks and NMFS can examine those for their utility in estimating bycatch. NMFS has not estimated bycatch in the bluefin tuna harpoon fishery because these fishermen have not been selected to submit logbooks. NMFS has not estimated bycatch in the General category commercial rod and reel tuna fishery although anecdotal evidence indicates that some undersized bluefin tuna may be captured. Studies of post-release mortality are ongoing.

There is concern about the accuracy of discard estimates in the recreational rod and reel fishery for HMS due to the low number of observations by the LPS and the MRFSS. Recreational bycatch estimates (numbers of fish released alive and dead) are not currently available, except for bluefin tuna. For some species, encounters are considered rare events, which might result in bycatch estimates with considerable uncertainty. Due to improvements in survey methodology, increased numbers of intercepts (interviews with fishermen) have been collected since 2002. NMFS intends to develop bycatch estimates (live and dead discards) and estimates of uncertainty from the recreational fishery from the LPS. These data will be included in future SAFE reports. Bycatch estimates may also be examined by using tournament data for the recreational fishery.

### 3.9.8 Bycatch Mortality

#### 3.9.8.1 Introduction

The reduction of bycatch mortality is an important component of National Standard 9. Physical injuries may not be apparent to the fisherman who is quickly releasing a fish because there may be injuries associated with the stress of being hooked or caught in a net. Little is known about the mortality rates of many of the species managed under this FMP but there are some data for certain species. Information on bycatch mortality of these fish should continue to be collected, and in the future, could be used to estimate bycatch mortality in stock assessments.

NMFS submits annual data (Task I) to ICCAT on mortality estimates (dead discards). These data are included in the SAFE reports and National Reports to ICCAT to evaluate bycatch trends in HMS fisheries.

#### 3.9.8.2 Mortality by Fishery

*Pelagic Longline Fishery*

NMFS collects data on the disposition (released alive or dead) of bycatch species from logbooks submitted by fishermen in the pelagic longline fishery. Observer reports also include disposition of the catch as well as information on hook location, trailing gear and injury status of protected species interactions. These data are used to estimate post-release mortality of sea turtles and marine mammals based on guidelines for each (Angliss and DeMaster 1998, Ryder *et al*. 2006). See Section 3.4.1 for estimates of sea turtle and marine mammal bycatch estimates.

*Purse Seine Fishery*

NMFS has limited observer data on the bluefin tuna purse seine fishery. There are no recorded instances of non-tuna finfish, other than minimal numbers of blue sharks, caught in tuna purse seines. Anecdotal evidence indicates that if fish are discarded, they are easily released out of the net with minimal bycatch mortality.

*Bottom Longline Fishery*

The shark bottom longline fishery has relatively low observed bycatch rates. Historically, finfish bycatch has averaged approximately five percent in the bottom longline fishery. Observed protected species bycatch (sea turtles) has typically been much lower, less than 0.01 percent of the total observed catch. See Section 3.4.5.1 for more information. Disposition of discards is recorded by observers and can be used to estimate discard mortality.

*Shark Gillnet Fishery*

The shark gillnet fishery has relatively low observed bycatch rates. Finfish bycatch during the 2003 fishery ranged from 3.3 to 20.7 percent of the total catch. Observed protected species bycatch (sea turtles and marine mammals) was very low, less than 0.1 percent. See Section 3.4.5 for more information. Disposition of discards is recorded by observers and can be used to estimate discard mortality.

*Commercial Handgear Fishery*

Vessels targeting bluefin tuna with harpoon gear have not been selected for observer coverage since the deliberate fishing nature of the gear is such that bycatch is expected to be low. Therefore, there are no recorded instances of non-target finfish caught with harpoons and NMFS cannot quantify the bycatch of undersized bluefin tuna in this fishery. Bycatch in the swordfish harpoon fishery is virtually if not totally, non-existent. Since bycatch approaches zero in this fishery, it follows that bycatch mortality is near zero. Disposition of bycatch reported in logbooks is used to estimate mortality of bycatch in the hook and line handgear fisheries.

*Recreational Handgear Fishery*

The LPS collects data on disposition of bycatch (released alive or dead) in recreational HMS fisheries. Rod and reel discard estimates from Virginia to Maine during June through October can be monitored through the expansion of survey data derived from the LPS (dockside and telephone surveys). However, the actual numbers of fish discarded for many species are low. See Section 3.4.4 for more information.

Post-release mortality studies have been conducted on few HMS at this time. Immediate mortality in recreational hook and line-caught juvenile bluefin tuna can be high (29.2 percent) due to injuries or predation (Belle, 1997). This is thought to be a conservative estimate because scientific personnel in the study were professionally trained and had extensive experience in fish handling techniques designed to reduce mortality. Mortality often occurs ten minutes or longer after the fish is released under normal circumstances. Injuries may not be readily apparent to the angler and seemingly minor capture injuries may be related to substantial internal injuries. Forty percent of sampled tuna that died during that study did not have injuries that would be apparent to the angler in the boat. Skomal and Chase (1996) provided evidence that the stress of rod and reel angling did not cause immediate post-release mortality in larger bluefin tuna (50 to 150 kg). However, they did document metabolic and pH disturbances in bluefin tuna sampled off Cape Hatteras, NC. The physiological consequences of angling stress are poorly understood for several species of large pelagic fishes (Skomal and Chase, 1996).

A study by Graves *et al.* (2002), investigated short-term (five days) post-release mortality of Atlantic blue marlin using pop-up satellite tag technology. A total of nine recreationally-caught blue marlin were tagged and released during July and August of 1999. All hooks employed in the study were "J" hooks. The attached tags were programmed to detach from the fish after five days and to record direct temperature and inclination of the buoyant tag to determine if the fish were actively swimming after being released. After detachment, the tags floated to the surface and began transmitting recorded position, temperature and inclination data to satellites of the Argos™ system. Three different lines of evidence provided by the tags (movement, water temperature, and tag inclination) suggested that at least eight of the nine blue marlin survived for five days after being tagged and released. One of the tags did not transmit any data which precluded the derivation of a conclusion regarding the tagged marlin's survival.

The study was continued in 2003 to evaluate post release survival and habitat use of white marlin using pop-up satellite archival tags (PSATs) caught and released from four locations in the western North Atlantic recreational fishery (Horodysky and Graves, 2005). Forty-one tags were attached to white marlin caught using dead baits rigged on straight shank ("J") hooks (n = 21) or circle hooks (n = 20) offshore of the U.S. Mid-Atlantic, the Dominican Republic, Mexico, and Venezuela. Survival was significantly higher ($p<0.01$) for white marlin caught on circle hooks (100 percent) relative to those caught on straight-shank ("J") hooks (65 percent). These results, along with previous studies on circle hook performance, suggest that a change in hook type can significantly increase the survival of white marlin released from recreational fishing gear. Data from these short term deployments also suggest that white marlin strongly associate with warm, near surface waters. However, based on the frequency, persistence, and patterns of vertical movements, white marlin appear to direct a considerable proportion of foraging effort well below surface waters, a behavior that may account for relatively high catch rates of white marlin on some pelagic longline sets. NMFS continues to support studies on recreational post-release mortality and intends to account for this source of mortality when additional information becomes available.

#### 3.9.8.3 Code of Angling Ethics

NMFS developed a Code of Angling Ethics as part of implementing Executive Order 12962 – Recreational Fisheries. NMFS implemented a national plan to support, develop, and implement programs that were designed to enhance public awareness and understanding of marine conservation issues relevant to the wellbeing of fishery resources in the context of marine recreational fishing. This code is consistent with National Standard 9, minimizing bycatch and bycatch mortality, and is therefore reproduced below. These guidelines are discretionary, not mandatory, and are intended to inform the angling public of NMFS views regarding what constitutes ethical angling behavior. Part of the code covers catch-and-release fishing and is directed towards minimizing bycatch mortality.

**Code of Angling Ethics**

- Promotes, through education and practice, ethical behavior in the use of aquatic resources.
- Values and respects the aquatic environment and all living things in it.
- Avoids spilling, and never dumps any pollutants, such as gasoline and oil, into the aquatic environment.
- Disposes of all trash, including worn-out lines, leaders, and hooks, in appropriate containers, and helps to keep fishing sites litter-free.
- Takes all precautionary measures necessary to prevent the spread of exotic plants and animals, including live baitfish, into non-native habitats.
- Learns and obeys angling and boating regulations, and treats other anglers, boaters, and property owners with courtesy and respect.
- Respects property rights, and never trespasses on private lands or waters.
- Keeps no more fish than needed for consumption, and never wastefully discards fish that are retained.
- Practices conservation by carefully handling and releasing alive all fish that are unwanted or prohibited by regulation, as well as other animals that may become hooked or entangled accidentally.
- Uses tackle and techniques, which minimize harm to fish when engaging in "catch-and-release" angling.

### 3.9.9 Interactions of HMS Fishing Gears with Protected Species

This section examines the interaction between protected species and Atlantic HMS fisheries under consideration in this FMP. As a point of clarification, interactions are different than bycatch. Interactions take place between fishing gears and marine mammals, sea turtles, and seabirds while bycatch consists of discards of fish. Following a brief review of the three acts (Marine Mammal Protection Act, Endangered Species Act, and Migratory Bird Treaty Act) affecting protected species, the interactions between HMS gears and each species is examined. Additionally, the interaction of seabirds and longline fisheries are considered under the auspices of the United States "National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries" (NPOA – Seabirds).

#### 3.9.9.1 Interactions and the Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972 as amended (MMPA) is one of the principal Federal statutes that guide marine mammal species protection and conservation policy. In the 1994 amendments, section 118 established the goal that the incidental mortality or serious injury of marine mammals occurring during the course of commercial fishing operations be reduced to insignificant levels approaching a zero mortality rate goal (ZMRG) and serious injury rate within seven years of enactment (*i.e*,. April 30, 2001). In addition, the amendments established a three-part strategy to govern interactions between marine mammals and commercial fishing operations. These include the preparation of marine mammal stock assessment reports, a registration and marine mammal mortality monitoring program for certain commercial fisheries (Category I and II), and the preparation and implementation of take reduction plans (TRP).

NMFS relies on both fishery-dependent and fishery-independent data to produce stock assessments for marine mammals in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. Draft stock assessment reports are typically published around January and final reports are typically published in the Fall. Final 2005 stock assessment reports are available and can be obtained on the web at:
http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars.html

The following marine mammal species occur off the Atlantic and Gulf Coasts that are or could be of concern with respect to potential interactions with HMS fisheries.

| Common Name | Scientific Name |
|---|---|
| Atlantic spotted dolphin | *Stenella frontalis* |
| Blue whale | *Balaenoptera musculus* |
| Bottlenose dolphin | *Tursiops truncatus* |
| Common dolphin | *Delphinis delphis* |
| Fin whale | *Balaenoptera physalus* |
| Harbor porpoise | *Phocoena phocoena* |
| Humpback whale | *Megaptera novaeangliae* |
| Killer whale | *Orcinus orca* |
| Long-finned pilot whale | *Globicephela melas* |
| Minke whale | *Balaenoptera acutorostrata* |
| Northern bottlenose whale | *Hyperoodon ampullatus* |
| Northern right whale | *Eubalaena glacialis* |
| Pantropical spotted dolphin | *Stenella attenuata* |
| Pygmy sperm whale | *Kogia breviceps* |
| Risso's dolphin | *Grampus griseus* |
| Sei whale | *Balaenoptera borealis* |

| | |
|---|---|
| Short-beaked spinner dolphin | *Stenella clymene* |
| Short-finned pilot whale | *Globicephela macrorhynchus* |
| Sperm whale | *Physeter macrocephalus* |
| Spinner dolphin | *Stenella longirostris* |
| Striped dolphin | *Stenella coeruleoalba* |
| White-sided dolphin | *Lagenorhynchus acutus* |

Under MMPA requirements, NMFS produces an annual list of Fisheries (LOF) that classifies domestic commercial fisheries, by gear type, relative to their rates of incidental mortality or serious injury of marine mammals. The LOF includes three classifications:

1. Category I fisheries are those with frequent serious injury or mortality to marine mammals;
2. Category II fisheries are those with occasional serious injury or mortality; and
3. Category III fisheries are those with remote likelihood of serious injury or mortality to marine mammals.

The final 2005 MMPA LOF was published on January 4, 2004 (71 FR 247) and the draft 2006 MMPA LOF was published on April 24, 2006 (71 FR 20941). The Atlantic Ocean, Caribbean, and Gulf of Mexico large pelagic longline fishery is classified as Category I (frequent serious injuries and mortalities incidental to commercial fishing) and the southeastern Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities). The following Atlantic HMS fisheries are classified as Category III (remote likelihood or no known serious injuries or mortalities): Atlantic tuna purse seine; Gulf of Maine and Mid-Atlantic tuna, shark and swordfish, hook-and-line/harpoon; southeastern Mid-Atlantic and Gulf of Mexico shark bottom longline; and Mid-Atlantic, southeastern Atlantic, and Gulf of Mexico pelagic hook-and-line/harpoon fisheries. Commercial passenger fishing vessel (charter/headboat) fisheries are subject to Section 118 and are listed as a Category III fishery. Recreational vessels are not categorized since they are not considered commercial fishing vessels. For additional information on the fisheries categories and how fisheries are classified, see http://www.nmfs.noaa.gov/pr/interactions/lof/.

Fishermen participating in Category I or II fisheries are required to register under the MMPA and to accommodate an observer aboard their vessels if requested. Vessel owners or operators, or fishermen, in Category I, II, or III fisheries must report all incidental mortalities and serious injuries of marine mammals during the course of commercial fishing operations to NMFS. There are currently no regulations requiring recreational fishermen to report takes, nor are they authorized to have incidental takes (*i.e.*, they are illegal).

NMFS continues to investigate serious injuries to marine mammals as they are released from fishing gear. In April 1999, NMFS held a joint meeting of the three regional scientific review groups to further discuss the issue. NMFS is continuing to develop marine mammal serious injury guidelines and until these are published, NMFS will apply the criteria listed by the review groups to make determinations for specific fisheries. The current Biological Opinions for Atlantic HMS fisheries have resulted in a conclusion of no jeopardy for marine mammals.

However, a Pelagic Longline Take Reduction Team (PLTRT) was recently formed and first met on June 29-30, 2005. The PLTRT replaces the disbanded Atlantic Offshore Cetacean Take Reduction Team (AOCTRT). The PLTRT must develop a Take Reduction Plan (TRP) for pilot whales within 11 months. The Draft TRP has been transmitted to NMFS and will be published shortly. The 1999 HMS FMP implemented several of the recommendations of the AOCTRT including: 1) a requirement that vessels fishing for HMS move one nautical mile (nm) after an entanglement with protected species; 2) limiting the length of the mainline to 24 nm in the MAB from August 1, 1999 through November 30, 2000; 3) voluntary vessel operator education workshops for HMS pelagic longline vessels; 4) handling and release guidelines; and 5) limited access for swordfish, shark and tuna longline permits. A summary of the observed and estimated marine mammal interactions with the pelagic longline fishery is presented in Table 3.26 and Table 3.27 of Section 3.4.1.

#### 3.9.9.2 Interactions and the ESA

The Endangered Species Act of 1973 as amended (16 U.S.C. 1531 et seq.) provides for the conservation and recovery of endangered and threatened species of fish, wildlife, and plants. The listing of a species is based on the status of the species throughout its range or in a specific portion of its range in some instances. Threatened species are those likely to become endangered in the foreseeable future [16 U.S.C. §1532(20)] if no action is taken to stop the decline of the species. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range [16 U.S.C. §1532(20)]. Species can be listed as endangered without first being listed as threatened. The Secretary of Commerce, acting through NMFS, is authorized to list marine and anadromous fish species, marine mammals (except for walrus and sea otter), marine reptiles (such as sea turtles), and marine plants. The Secretary of the Interior, acting through the USFWS, is authorized to list walrus and sea otter, seabirds, terrestrial plants and wildlife, and freshwater fish and plant species.

In addition to listing species under the ESA, the service agency (NMFS or USFWS) generally must designate critical habitat for listed species concurrently with the listing decision to the "maximum extent prudent and determinable" [16 U.S.C. §1533(a)(3)]. The ESA defines critical habitat as those specific areas that are occupied by the species at the time it is listed that are essential to the conservation of a listed species and that may be in need of special consideration, as well as those specific areas that are not occupied by the species that are essential to their conservation. Federal agencies are prohibited from undertaking actions that are likely to destroy or adversely modify designated critical habitat.

| Marine Mammals | Status |
|---|---|
| Blue whale *(Balaenoptera musculus)* | Endangered |
| Fin whale *(Balaenoptera physalus)* | Endangered |
| Humpback whale *(Megaptera novaeangliae)* | Endangered |
| Northern right whale *(Eubalaena glacialis)* | Endangered |
| Sei whale *(Balaenoptera borealis)* | Endangered |
| Sperm whale *(Physeter macrocephalus)* | Endangered |

| | |
|---|---|
| **<u>Sea Turtles</u>** | |
| Green turtle *(Chelonia mydas)* | *Endangered/Threatened |
| Hawksbill sea turtle *(Eretmochelys imbricata)* | Endangered |
| Kemp's ridley sea turtle *(Lepidochelys kempii)* | Endangered |
| Leatherback sea turtle *(Dermochelys coriacea)* | Endangered |
| Loggerhead sea turtle *(Caretta caretta)* | Threatened |
| Olive ridley sea turtle *(Lepidochelys olivacea)* | Threatened |
| | |
| **<u>Critical Habitat</u>** | |
| Northern right whale | Endangered |
| | |
| **<u>Finfish</u>** | |
| Smalltooth sawfish *(Pristis pectinata)* | Endangered |

*Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters.

*Sea Turtles*

NMFS has taken several steps in the past few years to reduce sea turtle bycatch and bycatch mortality in domestic longline fisheries. On March 30, 2001, NMFS implemented via interim final rule requirements for U.S. flagged vessels with pelagic longline gear on board to have line clippers and dipnets to remove gear on incidentally captured sea turtles (66 FR 17370). Specific handling and release guidelines designed to minimize injury to sea turtles were also implemented. NMFS published a final report which provides the detailed guidelines and protocols (Epperly *et al*., 2004) and a copy can be found at http://www.nmfs.noaa.gov/sfa/hms/Protected%20Resources/TM_524.pdf

A Biological Opinion completed on June 14, 2001, found that the actions of the pelagic longline fishery jeopardized the continued existence of loggerhead and leatherback sea turtles. This document reported that the pelagic longline fishery interacted with an estimated 991 loggerhead and 1,012 leatherback sea turtles in 1999. The estimated take levels for 2000 were 1,256 loggerhead and 769 leatherback sea turtles (Yeung 2001).

On July 13, 2001 (66 FR 36711), NMFS published an emergency rule that closed the Northeast Distant (NED) area to pelagic longline fishing (effective July 15, 2001), modified how pelagic longline gear may be deployed effective August 1, 2001, and required that all longline vessels (pelagic and bottom) post safe handling guidelines for sea turtles in the wheelhouse. On December 13, 2001 (66 FR 64378), NMFS extended the emergency rule for 180 days through July 8, 2002. On July 9, 2002, NMFS published a final rule (67 FR 45393) that closed the NED to pelagic longline fishing. As part of the Reasonable and Prudent Alternative, the BiOp required NMFS to conduct an experiment with commercial fishing vessels to test fishery-specific gear modifications to reduce sea turtle bycatch and mortality. This rule also required the length of any gangions to be 10 percent longer than the length of any floatline on vessels where the length of both is less than 100 meters; prohibited stainless steel hooks; and required gillnet vessel operators and observers to report any whale sightings and required gillnets to be checked every 0.5 to 2 hours.

The experimental program required in the BiOp was initiated in the NED area in 2001 in cooperation with the U.S. pelagic longline fleet that historically fished on the Grand Banks fishing grounds. The goal of the experiment was to test and develop gear modifications that might prove useful in reducing the incidental catch and post-release mortality of sea turtles captured by pelagic longline gear while striving to minimize the loss of target catch. The experimental fishery had a three-year duration and utilized 100 percent observer coverage to assess the effectiveness of the measures. The gear modifications tested in 2001 included blue-dyed squid and moving gangions away from floatlines. In 2002, the NED experimental fishery examined the effectiveness of whole mackerel bait, squid bait, circle and "J" hooks, and reduced daylight soak time in reducing the capture of sea turtles. The experiment tested various hook and bait type combinations in 2003 to verify the results of the 2002 experiment.

On November 28, 2003, based on the conclusion of the three-year NED experiment, and preliminary data that indicated that the Atlantic pelagic longline fishery may have exceeded the Incidental Take Statement in the June 14, 2001, BiOp, NMFS published a Notice of Intent to prepare an SEIS to assess the potential effects on the human environment of proposed alternatives and actions under a proposed rule to reduce sea turtle bycatch (68 FR 66783). A new BiOp for the Atlantic pelagic longline fishery was completed on June 1, 2004. The BiOp concluded that long-term continued operation of the Atlantic pelagic longline fishery, authorized under the 1999 FMP, was not likely to jeopardize the continued existence of loggerhead, green, hawksbill, Kemp's ridley, or olive ridley sea turtles; and was likely to jeopardize the continued existence of leatherback sea turtles.

On July 6, 2004, NMFS implemented additional regulations for the Atlantic pelagic longline fishery to further reduce the mortality of incidentally caught sea turtles (69 FR 40734). These measures include requirements on hook type, hook size, bait type, dipnets, lineclippers, and safe handling guidelines for the release of incidentally caught sea turtles. These requirements were developed based on the results of the 2001 – 2003 NED experiment (Watson *et al*., 2003; Watson *et al*., 2004a; Shah *et al*., 2004). These requirements are predicted to decrease the number of total interactions, as well as the number of mortalities, of both leatherback and loggerhead sea turtles (NMFS, 2004c). Post-release mortality rates are expected to decline due to a decrease in the number of turtles that swallow hooks which engage in the gut or throat, a decrease in the number of turtles that are foul-hooked and improved handling and gear removal protocols. NMFS is working to export this new technology to pelagic longline fleets of other nations to reduce global sea turtle bycatch and bycatch mortality. U.S gear experts have presented this bycatch reduction technology and data from research activities at approximately 15 international events that included fishing communities and resource managers between 2002 and mid-2005 (NMFS, 2005).

Internationally, the United States is pursuing sea turtle conservation through international, regional, and bilateral organizations such as ICCAT, the Asia Pacific Fisheries Commission, and FAO Committee on Fisheries (COFI). The United States intends to provide a summary report to FAO for distribution to its members on bycatch of sea turtles in U.S. longline fisheries and the research findings as well as recommendations to address the issue. At the 24th session of COFI held in 2001, the United States distributed a concept paper for an international technical experts meeting to evaluate existing information on turtle bycatch, to facilitate and standardize collection of data, to exchange information on research, and to identify and consider solutions to reduce turtle bycatch. COFI agreed that an international technical meeting could be useful despite the lack of agreement on the specific scope of that meeting. The United States has developed a prospectus for a technical workshop to address sea turtle bycatch in longline fisheries as a first step. Other gear-specific international workshops may be considered in the future.

*Smalltooth sawfish*

On April 1, 2003, NMFS listed smalltooth sawfish as an endangered species (68 FR 15674) under the Endangered Species Act (ESA). After reviewing the best scientific and commercial information, the status review team determined that the U.S. DPS (Distinct Population Segment) of smalltooth sawfish is in danger of extinction throughout all or a significant portion of its range from a combination of the following four listing factors: the present or threatened destruction, modification, or curtailment of habitat or range; over utilization for commercial, recreational, scientific, or educational purposes; inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence. NMFS is working on designating critical habitat for smalltooth sawfish.

NMFS believes that smalltooth sawfish takes in the shark gillnet fishery are rare given the high rate of observer coverage. The fact that there were no smalltooth sawfish caught during 2001, when 100 percent of the fishing effort was observed, indicates that smalltooth sawfish takes (observed or total) most likely do not occur on an annual basis. Based on this information, the 2003 BiOp estimates that one incidental capture of a sawfish (released alive) over the next five years, will occur as a result of the use of gillnets in this fishery (NMFS, 2003a).

Smalltooth sawfish have been observed caught (eight known interactions, seven released alive, one released in unknown condition) in shark bottom longline fisheries from 1994 through 2004 (A. Morgan pers. comm., 2003). Based on these observations, expanded sawfish take estimates for 1994 – 2002 were developed for the shark bottom longline fishery (NMFS, 2003a). A total of 466 sawfish were estimated to have been taken in this fishery during 1994 – 2002, resulting in an average of 52 per year. It is important to note that all of the sawfish takes observed, except for one, were released alive.

#### 3.9.9.3 Interactions with Seabirds

Observer data from 1992 through 2005 indicate that seabird bycatch is relatively low in the U.S. Atlantic pelagic longline fishery (Table 3.29). Since 1992, a total of 129 seabird interactions have been observed, with 95 observed killed (73.6 percent). In 2005, there were 110 active U.S. pelagic longline vessels fishing for swordfish in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea that reportedly set approximately 5.9 million hooks. A total of four seabirds were observed taken.

The National Plan of Action (NPOA) for Reducing the Incidental Catch of Seabirds in Longline Fisheries was released in February 2001. The NPOA for Seabirds calls for detailed assessments of longline fisheries, and, if a problem is found to exist within a longline fishery, for measures to reduce seabird bycatch within two years. NMFS, in collaboration with the appropriate Councils and in consultation with the U.S. Fish and Wildlife Service, will prepare an annual report on the status of seabird mortality for each longline fishery. The United States is committed to pursuing international cooperation, through the Department of State, NMFS, and U.S. Fish and Wildlife Service, to advocate the development of National Plans of Action within relevant international fora. NMFS intends to meet with longline fishery participants and other members of the public in the future to discuss possibilities for complying with the intent of the plan of action. Because interactions appear to be relatively low in Atlantic HMS fisheries, the adoption of immediate measures is unlikely.

Bycatch of seabirds in the shark bottom longline fishery has been virtually non-existent. A single pelican has been observed killed from 1994 through 2005. No expanded estimates of seabird bycatch or catch rates for the bottom longline fishery have been made due to the rarity of seabird takes.

### 3.9.10 Measures to Address Protected Species Concerns

NMFS has taken a number of actions designed to reduce interactions with protected species over the last few years. Bycatch reduction measures have been implemented through the Fishery Management Plan for Atlantic Tunas, Swordfish and Sharks (NMFS, 1999), in Regulatory Amendment 1 to the 1999 FMP (NMFS, 2000), in Regulatory Adjustment 2 to the 1999 FMP (NMFS, 2002), in Amendment 1 to the 1999 FMP (NMFS, 2003a), and in the June 2004 Final Rule for Reduction of Sea Turtle Bycatch and Bycatch Mortality in the Atlantic Pelagic Longline Fishery (69 FR 40734). NMFS closed the Southeast U.S. Restricted Area to gillnet fisheries from February 15, 2006, to March 31, 2006, as a result of an entanglement and subsequent mortality of a right whale with gillnet gear (71 FR 8223). NMFS continues to monitor observed interactions with marine mammals and sea turtles on a quarterly basis and reviews data for appropriate action, if any, as necessary.

### 3.9.11 Bycatch of HMS in Other Fisheries

NMFS is concerned about bycatch mortality of Atlantic HMS in any Federal or state-managed fishery which captures them. NMFS plans to address bycatch of these species in the appropriate FMPs through coordination with the responsible management body. For example, capture of swordfish and tunas incidental to squid trawl operations is addressed in the Squid, Mackerel, and Butterfish FMP. Capture rates of tunas in coastal gillnet fisheries are being explored through issuance of exempted fishing permits and reporting requirements. NMFS continues to solicit bycatch data on HMS from all state, interjurisdictional, and Federal data collection programs. NMFS supports development of an interstate management plan for coastal sharks by the ASMFC to protect sharks caught incidentally in state-managed fisheries. NMFS has requested assistance from the ASMFC, GSMFC, and Atlantic and Gulf Regional Fishery Management Councils in identifying potential sources of bycatch of finetooth sharks in state waters fisheries or other fisheries outside the jurisdiction of this FMP.

### 3.9.11.1 Squid Mid-Water Trawl

U.S. squid trawl fishermen, using mid-water gear, landed 8.6 mt ww of yellowfin tuna, skipjack tuna, albacore tuna, bigeye tuna, and swordfish in 2003 incidental to the squid, mackerel, and butterfish trawl fishery (Table 3.108). Bycatch of HMS in other trawl fisheries may be included as a portion of the overall reported trawl landings in Table 3.108. Landings decreased from 2002 for bigeye and albacore tuna, and increased slightly for yellowfin and skipjack tuna. Swordfish landings increased by 50 percent but remain at a low level relative to the directed fishery landings. A retention limit of five swordfish per trip allows squid trawl fishermen with swordfish limited access permits to land some of the swordfish that are encountered, although regulatory discards still occur.

**Table 3.108 Atlantic HMS Landed (mt ww) Incidental to Trawl Fisheries, 1998-2004.** Source: NMFS, 2003, NMFS, 2005.

| | | | | | | | **2004** |
|---|---|---|---|---|---|---|---|
| Yellowfin tuna | 0.7 | 4.1 | 1.76 | 2.7 | 0.3 | 2 | 1 |
| Skipjack Tuna | 0.2 | 1.0 | <0.05 | 0.2 | <0.05 | 0.5 | 0.2 |
| Bigeye Tuna | 0.5 | 1.2 | 1.7 | 0.4 | 0.5 | <0.05 | 0.3 |
| Albacore | 2.4 | 0.4 | <0.05 | 0.0 | 0.3 | <0.05 | 2.6 |
| Swordfish | 5.9 | 7.5 | 10.9 | 2.5 | 3.9 | 6.0 | 7.6 |
| Total | 9.7 | 14.2 | 14.43 | 5.8 | 4.8 | 8.6 | 11.7 |

### 3.9.11.2 Menhaden Purse Seine Fishery

In the menhaden purse seine fishery, sharks were caught incidentally in approximately 30 percent of the purse seine sets observed (deSilva *et al.*, 2001). Ten species of sharks were identified with blacktip sharks being the most common species. Approximately 20 percent of the sharks were not identified to species. An estimated 30,000 sharks were taken in this fishery annually in 1994 and 1995. At the time of release, 75 percent of sharks were dead, 12 percent were disoriented, and eight percent were healthy. The odds of observing shark bycatch was highest in April and May. Stomach analyses of sharks suggest that their occurrence in the fishery is probably the result of sharks preying on gulf menhaden (deSilva *et al.*, 2001). No new data are available at this time.

Industry workers in this fishery employ a fish excluder device to reduce the retention of sharks and other large species (Rester and Condrey, 1999). In addition, a recently introduced hose cage modification may prove to be effective in reducing shark bycatch. These devices vary in effectiveness and no standards exist for such bycatch reduction measures in this fishery. In addition, there are currently no reporting requirements for takes of sharks in the menhaden purse seine fishery. Recent estimates of large coastal sharks discarded in this fishery range from 24,000 – 26,200 individuals (Cortés, 2005).

### 3.9.11.3 Shrimp Trawl Fishery

Shark bycatch in the shrimp trawl fishery consists mainly of sharks too small to be highly valued in the commercial market. As a result, few sharks are retained. Bycatch estimates of LCS in this fishery have been generated and were reviewed in the most recent LCS assessment (Cortés *et al*. 2002). Cortés (2002) estimated bycatch in the south Atlantic shrimp trawl fishery (North Carolina, South Carolina, Georgia, and Florida) for Atlantic sharpnose, bonnethead, and finetooth sharks based on expansion by fishing effort. Annual estimates of bycatch ranged from zero to almost six million sharks from 1992 to 1997 (Table 3.109) (Cortés, 2002). The 2002 SCS assessment included estimates of SCS bycatch because they were likely to exceed the actual landings for those species (Cortés, 2002). However, requirements for turtle excluder devices in this fishery have probably resulted in less bycatch because sharks are physically excluded from entering the gear.

**Table 3.109 Expanded estimates of bycatch (number of fish) of bonnethead, Atlantic sharpnose, and finetooth sharks in the U.S. south Atlantic shrimp trawl fishery based on within stratum expansion by effort as trips by fishing year.** Source: Cortés, 2002.

| | | | | Finetooth |
|---|---|---|---|---|
| 1992-93 | 20,181 | 53,674 | 1,753,829 | 0 |
| 1993-94 | 20,445 | 0 | 5,873,333 | 447,495 |
| 1995-96 | 23,333 | 34,378 | 0 | 0 |
| 1996-97 | 19,320 | 38,517 | 358,457 | 0 |

Bycatch of the SCS complex in the Gulf of Mexico shrimp trawl fishery consists mainly of Atlantic sharpnose and bonnethead sharks (Cortés, 2002). Estimates of the bycatch of SCS in this fishery ranged from 3.2 to 1.3 million sharks per year from 1972 - 2000 (Table 3.110). Finetooth sharks were added as a select species for the shrimp trawl observer program in 2005 to help determine if this fishery has bycatch of finetooth sharks. Prior to this, data on finetooth shark bycatch was not recorded.

**Table 3.110 Estimates (in thousands of individuals and pounds dressed weight) of the bycatch of small coastal sharks (as a complex and by species) in the shrimp trawl fishery operating in the Gulf of Mexico.** Source: S. Nichols, NMFS Pascagoula Lab., pers. comm. as cited in Cortés, 2002.

| | | | | | | Bonnethead (lb dw) |
|---|---|---|---|---|---|---|
| 1972 | 1,575 | 1,500 | 1,051 | 1,010 | 468 | 371 |
| 1973 | 1,579 | 1,580 | 831 | 842 | 620 | 525 |
| 1974 | 1,903 | 1,899 | 1,508 | 1,407 | 420 | 400 |
| 1975 | 2,055 | 1,997 | 1,587 | 1,473 | 347 | 313 |
| 1976 | 2,193 | 2,209 | 1,706 | 1,632 | 456 | 436 |
| 1977 | 2,187 | 2,142 | 1,507 | 1,457 | 520 | 427 |
| 1978 | 2,223 | 2,156 | 1,799 | 1,625 | 367 | 370 |
| 1979 | 2,829 | 2,754 | 2,384 | 2,254 | 388 | 341 |
| 1980 | 2,591 | 2,436 | 2,148 | 1,933 | 368 | 330 |

| | | | | | | Bonnethead (lb dw) |
|---|---|---|---|---|---|---|
| 1981 | 2,081 | 2,007 | 1,830 | 1,649 | 242 | 252 |
| 1982 | 2,281 | 2,203 | 1,850 | 1,661 | 302 | 310 |
| 1983 | 2,138 | 2,193 | 1,856 | 1,821 | 255 | 250 |
| 1984 | 1,551 | 1,509 | 1,277 | 1,191 | 232 | 230 |
| 1985 | 1,767 | 1,796 | 1,451 | 1,442 | 260 | 249 |
| 1986 | 2,222 | 2,234 | 1,464 | 1,519 | 624 | 506 |
| 1987 | 3,216 | 3,123 | 2,636 | 2,392 | 516 | 519 |
| 1988 | 2,535 | 2,272 | 1,959 | 1,664 | 421 | 404 |
| 1989 | 2,116 | 2,216 | 1,632 | 1,713 | 336 | 286 |
| 1990 | 1,981 | 2,069 | 1,503 | 1,507 | 489 | 431 |
| 1991 | 2,350 | 2,322 | 1,784 | 1,756 | 365 | 323 |
| 1992 | 2,759 | 2,879 | 1,968 | 1,997 | 494 | 459 |
| 1993 | 2,226 | 2,213 | 1,710 | 1,626 | 416 | 400 |
| 1994 | 2,197 | 2,243 | 1,586 | 1,591 | 395 | 347 |
| 1995 | 2,401 | 2,362 | 1,806 | 1,636 | 311 | 299 |
| 1996 | 2,923 | 2,457 | 2,069 | 1,644 | 519 | 428 |
| 1997 | 2,883 | 2,926 | 1,732 | 1,681 | 486 | 439 |
| 1998 | 2,657 | 2,410 | 1,662 | 1,494 | 376 | 329 |
| 1999 | 1,282 | 1,257 | 906 | 848 | 218 | 198 |
| 2000 | 1,282 | 1,257 | 906 | 848 | 218 | 198 |

#### 3.9.11.4 Southeast Gillnet Fishery

Gillnet fisheries operating in the south Atlantic, particularly off Florida, have been shown to incidentally take various species of sharks (see Section 4.2.2 for full description). These fisheries are primarily targeting Spanish mackerel and whiting (kingfish). Vessels participating in these fisheries either have a mackerel permit and a commercial shark permit which allows retention and landing of sharks, or may be operating in an unmanaged fishery (whiting) that requires no permit at this time. Vessels operating in these fisheries and holding a Federal permit are required to file trip reports (Coastal Fisheries Logbook). Preliminary data from observed gillnet trips not targeting sharks indicate that Atlantic sharpnose, bonnethead, blacktip, finetooth, scalloped hammerhead, blacknose, spinner and tiger sharks were caught (Carlson and Bethea, 2006). Expanding observer coverage in South Atlantic gillnet fisheries that are landing sharks could provide additional data on the extent of the bycatch of HMS species in these fisheries and thereby improving the stock assessments for these species. NMFS will attempt to continue expanded observer coverage in these fisheries as resources allow.

### 3.9.12 Effectiveness of Existing Time/Area Closures in Reducing Bycatch

During the past several years, NMFS has implemented several time/area closures in the Atlantic Ocean and Gulf of Mexico for the PLL fishery to reduce discards and bycatch of a number of species (juvenile swordfish, bluefin tuna, billfish, sea turtles, etc.). Analyses of the effectiveness of these closures are included in Section 4.1.2 and summarized here.

The combined effects of the individual area closures were examined by comparing the 2001 – 2003 catch and discards to the averages for 1997 – 1999 throughout the entire U.S. Atlantic fishery. Changes in the numbers of fish caught and discarded were compared to the predicted values from Regulatory Amendment 1 to the 1999 FMP (NMFS, 2000). Overall effort, expressed as the number of hooks set, declined by 15 percent between the two time periods. Declines were noted for both the numbers of kept and discards of all species examined including swordfish, tunas, sharks, billfish, and sea turtles. The number of reported discards of swordfish, bluefin and bigeye tuna, pelagic sharks, dolphin, wahoo, blue and white marlin, sailfish, and spearfish all declined by more than 30 percent. The reported discards of blue and white marlin declined by about 50 percent and sailfish discards declined by almost 75 percent. The reported number of sea turtles caught and released declined by almost 28 percent.

The reported declines in swordfish kept and discarded, large coastal sharks kept and discarded, and dolphin kept were similar to the predicted values developed for Regulatory Amendment 1. Reported discards of bluefin tuna, pelagic sharks, all billfish (with the exception of spearfish for which no predicted change was developed in Regulatory Amendment 1), and total BAYS tunas kept all declined more than the predicted values.

#### 3.9.12.1 Prohibition of Live Bait in the Gulf of Mexico

Regulatory Amendment 1 to the 1999 FMP also prohibited the use of live bait on pelagic longline gear in the Gulf of Mexico due to concerns over the incidental bycatch of billfish. Based on logbook data, the number of hooks reported set with live bait or a combination of live and dead bait in the Gulf of Mexico decreased from 22.7 percent in 2000, to less than 0.1 percent in 2003 (Table 3.111). However, the number of hooks reported set with no bait type specified increased from zero in 1999 – 2001 to 3.7 percent in 2003, but declined to less than one percent in 2004. Also, the reported number of hooks set in the Gulf of Mexico has increased in recent years. The reported effort in 2004 represents an increase of 21.8 percent from 2000. NMFS will continue to analyze the effectiveness of the live bait prohibition in the Gulf of Mexico pelagic longline fishery.

**Table 3.111 Comparison of the number of hooks reported set in the Gulf of Mexico with dead or live bait, or a combination of both baits, 1999-2004 (numbers in parentheses are percent of the total number of hooks set in the Gulf of Mexico).** Source: PLL Logbook data.

| | | | | | | **2004** |
|---|---|---|---|---|---|---|
| | 2,335,845 | 2,598,083 | 3,176,493 | 3,494,577 | 3,668,687 | 4,089,018 |
| Dead | (70.9) | (77.3) | (98.3) | (97.6) | (96.3) | (99.8) |
| | 372,162 | 259,256 | 5,500 | 750 | 1,514 | 0 |
| Live | (11.3) | (7.7) | (0.2) | (>0.1) | (>0.1) | (0) |
| | 584,473 | 505,582 | 49,250 | 13,115 | 1,000 | 0 |
| Both | (17.8) | (15.0) | (1.5) | (0.4) | (>0.1) | (0) |
| | 0 | 0 | 0 | 71,011 | 139,569 | 8,000 |
| Unknown | (0) | (0) | (0) | (2.0) | (3.6) | (0.2) |
| Total hooks | 3,292,480 | 3,362,921 | 3,231,243 | 3,579,453 | 3,810,770 | 4,097,018 |

### 3.9.12.2 Conclusions

The time/area closures and live bait prohibition in the Gulf of Mexico have been relatively successful at reducing bycatch in the HMS pelagic longline fishery. Reported discards of all species of billfish have declined (Table 4.8). The reported number of turtles caught, swordfish discarded, bluefin tuna discarded, and pelagic and large coastal shark discards have also declined. However, the reported number of target species kept, such as swordfish and BAYS tuna, have decreased more than was predicted. This is contrary to the other objective of the time/area closures, which was to minimize the reduction in target catch. NMFS will continue to analyze these measures as additional data become available and examine the effects of ongoing regulatory change over time.

### 3.9.13 Evaluation of Other Bycatch Reduction Measures

NMFS continues to monitor and evaluate bycatch in HMS fisheries through direct enumeration (pelagic and bottom longline observer programs, shark gillnet observer program), evaluation of management measures (closed areas, trip limits, gear modifications, etc.), and vessel monitoring systems (VMS).

The following section provides a review of additional management measures or issues that may address bycatch reduction:

- Atlantic Large Whale Take Reduction Plan (ALWTRP) regulations

Observers were placed on shark gillnet vessels during the 2005 season and covered 33 strikenet and 31 driftnet sets during and outside of right whale calving season (Carlson and Bethea, 2006). In addition, observers were placed on vessels fishing with sink gillnets as part of a pilot program and observed 88 sets. Protected species interactions occurred with all three types of gear. One leatherback and four loggerhead sea turtles were observed with all but one loggerhead released alive. One loggerhead was observed taken by strikenet and one with sink net. Both were released alive. No marine mammals or smalltooth sawfish were observed taken. NMFS has published a proposed rule to modify the right whale areas and the time periods when 100 percent observer coverage would be required (70 FR 35894; 21 June 2005).

- Atlantic Bottlenose Dolphin Take Reduction Team

Due to the observed takes of Atlantic bottlenose dolphin in the shark drift gillnet fishery, representatives of the fishery have been included in the Atlantic Bottlenose Dolphin Take Reduction Team. The Team held seven meetings during 2001 – 2003 and developed a set of recommendations which formed the basis for a TRP. NMFS published a proposed rule on November 10, 2004, to implement the TRP (69 FR 65127), and a final rule was published on April 26, 2006 (71 FR 24776). Included in the final rule are: 1) effort reduction measures; 2) gear proximity rules; 3) gear or gear deployment modifications; 4) fishermen training; and 5) outreach and education measures to reduce dolphin bycatch below the stock’s potential biological removal level. The final rule also includes time/area closures and size restrictions on large mesh fisheries to reduce incidental takes of endangered and threatened sea turtles as well as to reduce dolphin bycatch.

- MMPA List of Fisheries Update/Stock Assessment

NMFS continues to update the MMPA List of Fisheries and the 2005 final list is available at http://www.nmfs.noaa.gov/pr/pdfs/fr/fr71-247.pdf. The proposed 2006 List of Fisheries published on April 24, 2006 (71 FR 20941). Final 2005 marine mammal stock assessment reports and draft 2006 reports are also available. See Section 3.9.9.1 for information on obtaining these reports.

- Atlantic Offshore Cetacean Take Reduction Team (AOCTRT)

NMFS has disbanded the AOCTRT due to the fact that two of the three fisheries addressed by the AOCTRT were closed by fishery management actions, leaving only the pelagic longline fishery in operation. This fishery has been the subject of recent fishery management actions and increased observer coverage related to bycatch. As discussed below, a take reduction team specific to the pelagic longline fishery has been formed.

- Pelagic Longline Take Reduction Team (PLTRT)

NMFS appointed a PLTRT in June 2005, to address marine mammal interactions in the longline fishery, specifically pilot whales. As required by the MMPA, the PLTRT must develop a TRP within eleven months. The PLTRT has met four times since and a draft TRP should be available shortly. NMFS intends to continue reviewing the fishery and any marine mammal interactions to determine if additional take reduction measures are necessary.

- Observer coverage of shark drift gillnet fleet

On March 30, 2001, NMFS reduced the level of observer coverage required in the shark drift gillnet fishery from 100 percent year-round to 100 percent during right whale calving season and to a statistically significant level during the rest of the year. Recent scientific analyses indicate that a 33.8 percent level of coverage is statistically significant and adequate to provide reasonable estimates of sea turtle and marine mammal takes outside of the right whale calving season. The level of observer coverage necessary will be re-evaluated annually and adjusted accordingly. During the 2005 season, 33 strikenet and 31 driftnet sets were observed (Carlson and Bethea, 2006). No interactions with marine mammals were observed in either drift gillnet or strikenet sets. Four loggerhead sea turtles were observed caught in drift gillnet sets (three released alive, one released injured and assumed to be dead). One leatherback sea turtle was caught in drift gillnet gear and released alive. NMFS began placing observers on vessels with directed shark permits that were targeting species other than sharks in 2005. Management options to address issues in the shark drift gillnet fishery, particularly overfishing of finetooth sharks, are considered in this document.

- Vessel monitoring systems in the pelagic longline fishery

NMFS adopted fleet-wide VMS requirements in the Atlantic pelagic longline fishery in May 1999, but was subsequently sued by an industry group. By order dated September 25, 2000, the U.S. District Court for the District of Columbia prevented any immediate implementation of VMS in the Atlantic pelagic longline fishery, and instructed to "undertake further consideration of the scope of the [VMS] requirements in light of any attendant relevant conservation benefits." On October 15, 2002, the court issued a final order that denied plaintiff's objections to the VMS regulations. Based on this ruling, NMFS implemented the VMS requirement in September 2003.

- Vessel monitoring systems in other HMS fisheries

Starting in 2004, gillnet vessels with a directed shark permit and gillnet gear onboard were required to install and operate a VMS unit during the Right Whale Calving Season (November 15 – March 31). In an attempt to better quantify bycatch, NMFS will require all vessels with Limited Access Shark Permits to participate in the Directed Shark Gillnet Observer program. Directed shark bottom longline vessels located between 33$^{o}$ N and 36$^{o}$ 30' N need to install and operate a VMS unit from January through July.

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# 4.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

## 4.1 Bycatch Reduction

### 4.1.1 Workshops

The 1999 FMP identified reducing bycatch and bycatch mortality as a critical management goal pursuant to National Standard 9 of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The October 29, 2003, Biological Opinion (BiOp) for the Atlantic shark fishery and the June 1, 2004, BiOp for the Atlantic pelagic longline fishery recommend and in some cases require further actions to reduce bycatch and bycatch mortality of protected resources in the HMS fisheries. The following sections evaluate a number of alternatives to meet these goals. Workshops enabling fishermen to become more proficient with the techniques, protocols, and equipment for dehooking and disentanglement of protected resources, as well as proper identification of these species, are an integral component to ensuring that the post-release mortality reduction goals are realized.

#### *4.1.1.1 Protected Species Safe Handling, Release, and Identification Workshops for Pelagic Longline, Bottom Longline, and Gillnet Fishermen*

The October 2003 Biological Opinion for the Atlantic shark fishery determined that the shark fishery (*i.e.*, bottom longline and drift gillnet) is not likely to jeopardize the continued existence of endangered green, leatherback, and Kemp's ridley sea turtles, endangered smalltooth sawfish, threatened loggerhead turtles, or adversely affect marine mammals. However, it requires the implementation of workshops or other programs to distribute information on gear handling techniques, protocols for gear entanglements and the safe release of protected species, information on smalltooth sawfish, and HMS requirements and regulations to reduce serious injuries or mortalities (NMFS, 2003). The June 2004 BiOp for the Atlantic pelagic longline fishery required that all captains or operators be proficient with the safe release and disentanglement gears and protocols due, in part, to a jeopardy conclusion for leatherback sea turtles (NMFS, 2004a). The protected species release, disentanglement and identification workshops are intended to help further reduce the mortality of sea turtles, smalltooth sawfish, and other protected resources captured incidentally in the HMS pelagic (PLL) and bottom (BLL) longline and shark gillnet fisheries. Through these workshops, participants would be trained to safely disentangle, resuscitate, release, and identify protected species, as per the current NMFS standards for the pelagic and bottom longline fisheries. Participants may also receive instruction on disentanglement and release for protected resources that lack formal protocols. The incidental take statements issued in the October 2003 and June 2004 BiOps were contingent upon fishermen becoming increasingly proficient with required release equipment and protocols, while reducing the number of sea turtle mortalities resulting from longline and gillnet interactions over time. The dissemination of this information is an important element in further reducing post-release mortality of protected resources in the PLL, BLL, and shark gillnet fisheries.

In addition to BiOp requirements, the Pelagic Longline Take Reduction Team has recommended the implementation of a mandatory certification program for owners and operators of pelagic longline vessels, as one measure for reducing the bycatch and bycatch mortality of long-finned pilot whales (*Globicephala melas*), short-finned pilot whales (*Globicephala macrorhynchus*), common dolphins (*Delphinus delphis*), and other protected species in the Atlantic pelagic longline fishery. Specifically, the recommendation suggests that the certification program incorporate safe handling and release techniques; disseminate information on relevant regulations; provide guidelines specific to marine mammal bycatch in the fishery; an explanation of information that needs to be recorded in log books and auxiliary forms; provideguidelines for operator communications; provide updates on NMFS observer program; description of research and monitoring projects aimed to reduce marine mammal bycatch; and species identification.

The protected species safe handling, release, and identification workshops would be held at several locations to minimize travel costs for most participants and during non-peak fishing times to minimize disruptions to fishing activities. The workshops would be held in areas where there is a high concentration of permit holders, according to the addresses provided when applying for an HMS permit. A schedule of workshops would be released in advance to provide fishermen with an opportunity to attend the workshop most convenient to them. The Agency may provide an opportunity for the industry to schedule one-on-one training at the expense of the individual, if they are unable to attend any of the previously scheduled workshops.

The individuals that attended the PLL industry-sponsored safe handling and release workshops would be grandfathered-in to the requirements for all of the preferred alternatives, meaning all owners and operators that attended and successfully completed the industry certification workshops, as documented by workshop facilitators, held on April 8, 2005, in Orlando, Florida, and on June 27, 2005, in New Orleans, Louisiana, would automatically receive valid protected species workshop certificates. To the extent practicable, anyone who attends and successfully completes the hands on training could be certified (*e.g.*, enforcement, crew, environmentalists, and recreational fishermen). Priority would be given to those who are required to be certified if space is an issue.

In order to ensure that fishery participants are able to use the release and disentanglement equipment effectively, workshop participants would be given hands-on instruction and a practical examination. Participants who successfully complete the workshops would receive a multi-year certification. A certificate would be required to be on board each longline and gillnet vessel during fishing operations and would serve as proof that the participant completed the necessary training workshop.

The Agency received public comment both in support of and opposed to the protected species workshops. Some commenters were concerned about potential lost revenue on longline trips if bycatch were to be handled correctly. Some comments supported extending the workshop requirements to include all HMS fishermen, as well as expanding the release techniques to include additional species. NMFS received many comments suggesting that various combinations of owners, operators, and crew members be required to participate in the workshops. And if the crew members are not required to attend, then the operators should be responsible for training the crew. A few comments supported grandfathering in the industry certified individuals, so that they do not need to attend the mandatory workshops. Additionally, the Agency received comment on the recertification timeframes, and provided recommendations for scheduling and selecting venues to mitigate any negative impacts to participants. The Agency has considered all of these comments when selecting the final alternatives.

As described in Chapter 2, the alternatives considered for pelagic longline, bottom longline, and gillnet fishery workshops are:

A1 Voluntary protected species safe handling, release, and identification workshops for longline fishermen (No Action)

*A2 Mandatory protected species safe handling, release, and identification workshops and certification for all HMS pelagic or bottom longline vessel owners – Preferred Alternative*

*A3 Mandatory protected species safe handling, release, and identification workshops and certification for vessel operators actively participating in HMS pelagic and bottom longline fisheries – Preferred Alternative*

A4 Mandatory protected species safe handling, release, and identification workshops and certification for all HMS longline vessel owners, operators, and crew

*A5 Mandatory protected species safe handling, release, and identification workshops and certification for shark gillnet vessel owners and operators – Preferred Alternative*

*A6 Protected species safe handling, release, and identification certification renewal (every 3-years) – Preferred Alternative*

*Ecological Impacts*

A summary of protected species interactions in the HMS PLL, BLL, and gillnet fisheries are found in Table 4.1, 4-4Table 4.2, and Table 4.3, respectively. More information on gear-specific HMS fisheries as well as observed and extrapolated takes of protected species is provided in Chapter 3. The June 2004 BiOp sets specific post-release mortality (PRM) targets for the PLL fishery that decrease each year starting at 32.8 in 2004 and declining to 13.1 percent in 2007 for leatherback turtles and from 21.8 to 17 percent for loggerhead sea turtles during the same years. While NMFS does not have estimates of PRM for BLL and gillnet gears, observed estimates of protected species takes are available and are summarized in Table 4.2 and Table 4.3.

**Table 4.1 Extrapolated Total Sea Turtle and Marine Mammal Interactions in the HMS PLL fishery for 1999-2005 and the 3 Year ITSs for 2004-2006 and 2007-2009.** Sources: Yeung, 2001; Garrison, 2003; Garrison and Richards, 2004; Garrison, 2005; NMFS, 2004b; Walsh and Garrison, 2006

| PLL | 1999 | 2000 | 2001+ | 2002+ | 2003+ | 2004 | 2005 | Average* | 3 year ITS, 2004-2006 / 2007-2009 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Total | Per Year |
| Leatherback | 1,016 | 769 | 1,208 | 962 | 1,112 | 1,359 | 351 | 969 | 1,981 / 1,764 | 660 / 588 |
| Loggerhead | 994 | 1,256 | 312 | 575 | 727 | 734 | 274 | 696 | 1,869 / 1,905 | 632 / 635 |
| Other/Unidentified Sea Turtles | 66 | 128 | N/A | 50 | N/A | N/A | N/A | N/A | 105 / 105 | 35 / 35 |
| Marine Mammals | N/A | 403 | 177 | 201 | 300 | 164 | 372 | N/A | N/A | N/A |

* An average was not provided for species without an estimate for all seven years.
+ The extrapolated total interactions in this table do not include any interactions associated with the NED experiment, 2001-2003.

**Table 4.2 Extrapolated (1994-2002) and Observed (2003-2005) Takes and Five Year ITS for Sea Turtles and Sawfish in the HMS Bottom Longline Fishery*.** Source: NMFS, 2005, Smith *et al.*, 2006

| BLL | 1994 - 2002 | | 2003 | 2004 | 2005 | 5 year ITS, (mortality) (starting in 2004) | |
|---|---|---|---|---|---|---|---|
| | Total | Per Year | | | | Total | Per Year |
| Leatherback | 269 | 30 (17) | 0 | 0 | 1(1) | 150 (85) | 30 (17) |
| Loggerhead | 2,003 | 222 (123) | 8(3) | 5(2) | 1(1) | 1,360 (754)** | 272 (150) |
| Unidentified Sea Turtles | 503 | 56 | 1 | 1 | 0 | 30 (5) + | 6 (1) |
| Sawfish | 466 | 52 | 1 | 0 | 2 | 260 (0) | 52 |

* All values include total takes with mortalities listed in parentheses, when available.
** 1,360 = 1,110 + 250 of the expected 280 unidentified, which are most likely loggerhead sea turtles.
+ 30 for all species (i.e., hawksbill, green, and Kemp's ridley sea turtles), remaining 30 of the expected 280 unidentified. Five lethal takes per species.

**Table 4.3 Extrapolated (1999-2002) and Observed (2003-2005) Takes and Five Year ITS for Protected Resources in the Shark Gillnet Fishery*.** Source: Carlson, 2003; NMFS, 2003a; Carlson *et al.*, 2004; Carlson and Bethea, 2005

| GILLNET | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 5 year ITS (starting in 2004) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Total | Per Year |
| Leatherback | 0 | 0 | 14 (2) | 3.4 | 0 | 0 | 1 | 22 (3) | 4.4 |
| Loggerhead | 0 | 5.4 (1) | 1 | 1.7 | 0 | 0 | 5 (1) | 10 (1) | 2 |
| Sawfish | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 (0) | <1 |
| Bottlenose Dolphin | 12.4 (12.4) | 2 (2) | 4 (4) | 6.7 (6.7) | 2 (1) | 0 | 0 | N/A | N/A |
| Spotted Dolphin | 1(1) | 2 | 0 | 0 | 0 | 0 | 0 | N/A | N/A |

* All values include total takes with mortalities listed in parentheses. Extrapolated estimates of the drift gillnet fishery were provided for the 1999-2002 period and 2003-2005 are observed interactions for the entire shark gillnet fishery.

Under alternative A1, the No Action alternative, NMFS would continue to provide voluntary workshops for longline fishermen and continue to distribute wheelhouse placards, the safe release protocols, and educational videos, as well as additional information through the activities of the NMFS PLL Point of Contact (POC). Two separate PLL industry-sponsored workshops were held on April 8, 2005, in Orlando, Florida, and on June 27, 2005, in New Orleans, Louisiana, to teach the safe handling and release protocols for sea turtles. NMFS hosted a series of nine voluntary workshops in June 2005 that included instruction on the safe handling and release of protected resources in the commercial shark fishery; however, these voluntary workshops were poorly attended. Furthermore, the Agency is engaged in a proposed rulemaking (March 29, 2006, 71 FR 15680) that would update the requirements for dehooking equipment that must be possessed, maintained, and utilized by participants in the Atlantic shark BLL fishery, and additional training in the use of this new equipment may be necessary.

This alternative could provide some positive ecological impacts by continuing to provide voluntary workshops and outreach activities through the NMFS PLL POC. A critical component of achieving the post-release mortality targets is to ensure that participants in the PLL fisheries are proficient with the safe handling, dehooking, and resuscitation techniques, including the proper use of all the required equipment. These efforts would increase the amount of gear removed from sea turtles, increasing their probability of survival. To comply with the BiOps, voluntary hands-on training would be provided for participants in the longline fisheries. Additionally, NMFS would continue to distribute wheelhouse placards, safe release protocols, educational videos, and additional information as needed.

Alternative A1 would not maintain compliance with the October 2003 or June 2004 BiOps because attendance at these workshops would not be mandatory and may not result in the certification of operators. Alternative A1 might reduce the post-release mortality of protected species captured in HMS fisheries; however, the voluntary nature of the workshops and minimal attendance observed thus far may limit the dissemination of the safe release, disentanglement, and protected resource identification information, reducing potential ecological benefits. Furthermore, it is essential that fishermen are able to properly identify the protected resources with which they interact, in order to comply with regulations. In the past, voluntary workshops have not been well attended. The post-release mortality targets established for the PLL fishery would not likely be met because current rates under the status quo exceed those targets, which could further jeopardize threatened or endangered sea turtles and result in negative ecological impacts to these species.

Alternative A2, a preferred alternative, would require mandatory protected species safe handling, release, and identification workshops and certification for all vessel owners that have pelagic or bottom longline gear on board their vessel and that have been issued or are required to be issued HMS limited access permits. To further strengthen the requirement for longline vessel owners to attend the protected species workshops, their attendance and demonstrated understanding of the handling, disentanglement, resuscitation, release, and identification techniques would be linked to the renewal of their HMS permit(s). Mandatory attendance and the link to the permit renewal would increase industry participation compared to the poorly attended voluntary workshops. Longline vessel owners would be required to obtain the workshop certification prior to renewing their HMS permit(s) in 2007. Proof of successful completion of a workshop would need to be submitted in order to renew a HMS permit(s), and those without a workshop certification would be prohibited from participating in HMS fisheries. Public comment both supported and opposed alternative A2, stating that mandatory owner attendance may discourage them from hiring inexperienced operators who may not know how to properly handle sea turtles and other protected resources, handling protected resources wastes time on money making trips, and owners of a vessel may not always be the vessel operator.

Alternative A2 would ensure that owners are aware of the certification requirement and the need for the PLL and BLL fisheries to meet or achieve the post-release mortality targets set in the 2004 BiOp (NMFS, 2004a). Alternative A2 would likely have positive ecological impacts. The ecological benefits of reduced post-release mortality would depend upon the number of longline owners who are active in the fishery and/or take the initiative to properly train the operators and crew working on their vessel. Longline vessels can have several different operators in any given year; therefore, the owner may not always be on board the vessel and able to disseminate the information and skills learned during the protected species workshops.

NMFS believes that allowing proxies to attend workshops on behalf of longline and gillnet vessel owners would reduce the likelihood that those involved in the operation of individual vessels would be the ones attending the workshops. NMFS is concerned that vessel owners would select proxies that are not involved in the day-to-day operation of their fishing operations, thus compromising the goal of these workshops. If permit holders were to send proxies involved with the day-to-day activities of the vessel (i.e., crew or operators), the permit holder runs the risk of having no proxy available on the boat due to the high turnover of crew and operators. The proxy may not be employed on permit holder's vessel for the entire three years that the permit is valid. Additionally, NMFS does not have the means to validate a connection between the permit holder and the proxy. It is important for vessel owners that are not actually involved in the day-to-day operations of their vessels to be aware of the regulations and management of the fisheries in which their vessels are participating in order to fully and effectively implement the techniques taught at the workshops. Vessel owners should be aware of the concepts and breadth of material, as well as the tools and techniques, that would be covered in the workshops to understand the requirements for engaging fishing activities with PLL, BLL or gillnets on board the vessel and to understand what is expected of the vessel's crew. Non-compliance with the requirements of the 2003 and 2004 BiOps could result in additional, more restrictive management measures in the future.

Based on the estimated takes presented in Table 4.1, there were an average of 969 leatherback and 696 loggerhead sea turtles interactions per year in the PLL fishery between 1999 and 2005. Until mid-2004, the standard hooks used by the industry were 7/0 and 9/0 J-hooks. In mid-2004, NMFS implemented mandatory circle hook and bait requirements in the fishery intended to reduce sea turtle bycatch and bycatch mortality. J-hooks can increase the number of sea turtle interactions and increase the likelihood of hook ingestion, compared to using circle hooks and specific baits (NMFS, 2004b). The post-release mortality target identified in the 2004 BiOp would require a 4.8 and 19.7 percent decrease in post release mortality for loggerhead and leatherback sea turtles, respectively, between 2004 and 2007 (NMFS, 2004a). Decreasing the post-release mortality is dependent upon vessel owners disseminating information from the workshops to operators and crew involved in fishing activities. As a result of the jeopardy finding for leatherback sea turtles, the 2004 BiOp included additional requirements for PLL closures or other comparable actions if the sea turtle incidental take and post-release mortality targets are not met (NMFS, 2004a). The potential for additional regulations imposed upon the fishery may provide adequate incentive for vessel owners to informally train their operators and crew. The Agency received public comment in favor of owners/operators being required to train all crew members onboard. NMFS encourages all workshop participants to disseminate this information to all crew members involved with haul-back or fishing activities, however, is not preferring an alternative requiring owners to train crew members at this time.

The October 2003 BiOp estimates that 42 percent of sea turtles die as a result of interactions with BLL gear. Table 4.2 shows the extrapolated estimates in the BLL fishery (1994 - 2002) and the observed interactions for 2003 and 2004. The post-release mortality has not been estimated for sea turtle interactions in the BLL fishery; therefore, it is difficult to estimate the post-release mortality reduction benefits of this alternative, but there may be positive ecological impacts from the transfer of safe release and disentanglement protocols to owners in the BLL fishery. NMFS is in the process of a rulemaking (March 29, 2006, 71 FR 15680) that would update the safe handling, release and disentanglement equipment for sea turtles and other non-target catch in this fishery. The current preferred alternative would require participants in the BLL fishery to possess, maintain, and utilize the same equipment and protocols currently required for the PLL fishery. While the available data show that the BLL fishery has fewer interactions with sea turtles than the PLL fishery, the BLL fishery is not currently required to use circle hooks or specific baits to reduce sea turtle interactions.

In addition to providing information and ensuring proficiency with the safe handling, dehooking, and release of sea turtles, these workshops would also include information on the proper techniques for safe release of smalltooth sawfish. Extrapolated estimates indicate that, on average, the BLL fishery interacts with 52 smalltooth sawfish a year (Table 4.2). The October 2003 BiOp found that Atlantic shark fisheries would result in the temporary disturbance of behavior and short term injury of smalltooth sawfish, but fishing activities are not expected to affect the reproduction of the individuals that are caught, nor result in mortality. Alternative A2 would ensure BLL vessel owners understand safe release techniques, which would likely reduce any mortality of smalltooth sawfish. Ecological benefits would likely be increased if vessel owners are involved in fishing activities or successfully train their operators and crew members in safe techniques covered in the workshops.

There have been no documented interactions between PLL gear and smalltooth sawfish to date. However, if PLL owners are aware of safe handling and release techniques, this information would likely benefit them in case of future interactions or if they participate in other fisheries. Since PLL fishermen are required to possess at least an incidental shark permit and because of the relative ease of modifying pelagic to bottom longline, fishermen could set bottom longline gear on their way back to port, target sharks or other species, and potentially interact with smalltooth sawfish.

In addition to safe release and disentanglement protocols, alternative A2 would also provide information related to the proper identification of protected species. The proper identification of protected species listed under the ESA or MMPA is an important skill for PLL and BLL vessel owners to possess. The MMPA classifies the PLL and BLL fishery as Category I and III, respectively. A Category I fishery results in frequent serious injuries and mortalities of marine mammals, whereas a Category III fishery has a remote likelihood or no known serious injuries or mortalities. Most longline interactions with marine mammals are in the PLL fishery. Species commonly encountered include: Risso's dolphin; pilot whales; pygmy sperm whales; beaked whales; spotted dolphins; common dolphin; and, Minke whales. Table 4.1 contains the estimated interactions with marine mammals in the PLL fisheries. The shark BLL fishery has only interacted with two marine mammals (Delphinids) between 1994 and 2002. Improved identification skills may increase the accuracy of logbook data and assist fishermen in complying with the regulations.

Protected species can be difficult to identify, especially since interactions with them are a relatively rare occurrence. Alternative A2 would provide information on key morphological characteristics, distribution, and basic life history to improve identification of protected resources. Positive identification of sea turtles and marine mammals in fishermen's logbook reports could reduce uncertainty and increase the accuracy of extrapolated estimates of interactions by species. This is essential information for agency biologists, managers, and law enforcement officials who seek to increase the knowledge of home range, habitat use, and abundance. Furthermore, interactions with specific longline configurations (depth, hook type, bait, target-fish species) may assist fishermen, managers, gear experts, and scientists in designing experiments and gear to reduce interactions. Positive ecological impacts would likely occur as a result of disseminating this information to the longline vessel owners. In addition to benefiting protected resources, alternative A2 could benefit non-target HMS and other finfish by reducing post-release mortality by increasing the proficiency with the currently required dehooking and disentanglement equipment for sea turtles. Alternative A2 would likely result in positive ecological impacts, however, the extent of these impacts are dependent upon the dissemination of this information between owners and their operators and crew.

Alternative A3, a preferred alternative, would require mandatory protected species safe handling, release, and identification workshops and certification for HMS PLL and BLL vessel operators before the vessel's permit expires in 2007. This alternative would have ecological benefits similar to alternative A2; however, these benefits would be greater in magnitude as operators are generally directly involved in fishing activities, including gear retrieval, when sea turtles or other protected resources are most likely to be encountered. The initial operator certification would be linked to the renewal of the vessel's HMS LAP(s) in 2007; therefore, an operator would need to attend a workshop and receive the certification prior to the owner renewing any of the vessel's HMS LAP(s) in 2007. If the vessel owner holds multiple HMS LAPs, the operator would need to be certified prior to the earliest expiration date on any of the permits in 2007. After the initial certification, the operator's certification is no longer linked to the renewal of a vessel's HMS LAP and would need to be renewed prior to the expiration date on the operator's workshop certificate. The workshop certification would not be transferable any other person and would have the operator's name on the certificate. This alternative would ensure that at least one person directly involved with a vessel's fishing activities would be certified in the safe handling and release protocols and identification of protected resources.

Alternative A3 was supported by public comment. Commenters suggested that vessel operators should be certified and that they should, in turn, train each individual crew member working aboard their vessel to ensure that the crew is informed and that proper procedures are followed. Operators are encouraged to transfer the knowledge and skills obtained from successfully completing the workshops to the crew members, potentially increasing the proper release, disentanglement, and identification of protected resources. While this alternative would not require crew members to attend the workshops, to the extent practicable, the workshops would be open to anyone who wishes to attend and receive certification.

Alternative A4 would require owners, operators, and crew to attend protected species safe handling, release, and identification workshops and become certified. This alternative would certify the largest group of individuals involved with fishing activities, and therefore, would likely have the greatest positive ecological impact. Alternative A4 would provide similar benefits to those of alternatives A2 and A3 combined, in addition to including all crewmembers associated with a vessel's fishing activities. Vessel crew members are generally directly involved during gear retrieval activities as the operator may be operating the vessel from the wheelhouse. Furthermore, all of these participants would be provided with protected resource identification information, which would have positive ecological impacts, likely increasing proportionally to the number of individuals who attain certification. NMFS anticipates having several operators and/or crew members per HMS vessel permit attend these workshops, as vessels often have two operators and multiple crew members. Ensuring that operators and/or crew are skilled at handling and release of sea turtles and adept at identification of protected resources would increase the likelihood of achieving the post-release mortality targets prescribed by the 2004 BiOp. The Agency received several comments opposing the requirement to have crew certified because of their transient nature and the fact that some crew members are not U.S. citizens and may not be available to attend workshops.

An indirect positive ecological benefit of involving vessel owners, operators, and/or crew in these safe handling, resuscitation, release, and protected resource identification workshops, may be to promote or transfer this technology to other countries that also target HMS and other species with longline gear. Because of the migratory nature of most sea turtle species, these animals frequently travel thousands of miles and may enter into the jurisdiction of other nations or the high seas. Longline gear employed by different nations is relatively similar between countries, therefore, the protocols discussed and materials employed in these workshops could be translated by interested nations into languages appropriate for their use. Some materials are already available in English, Spanish, and Vietnamese. Since many HMS are managed by an international Atlantic-wide commission (ICCAT), there are numerous opportunities for transfer of technology between the United States and other ICCAT contracting parties, reinforcing the United States' role as a leader in global marine conservation.

Alternative A5, a preferred alternative, would mandate that all gillnet vessel owners issued a shark permit and operators of vessels employing this gear attend workshops on the safe release and disentanglement of protected resources, including sea turtles, smalltooth sawfish, and marine mammals and obtain certification before the vessel's HMS permit expires in 2007. The shark gillnet fishery currently has several requirements intended to reduce interactions and mortalities of protected species, such as observer coverage, net checks, and Atlantic Whale Take Reduction Plan (ALWTRP) requirements. This alternative may provide positive ecological impacts by reducing the mortality of protected species and teaching fishermen how to identify, disentangle, and safely release protected species. The Agency received public comment supporting alternative A5; however, requiring both owners and operators of these vessels to be certified was a concern. The Agency realizes that many vessel owners may not operate or be present on the vessels during fishing trips; therefore, certifying vessel owners ensures that they are aware of the certification requirements and protocols. The owners would then be accountable for having a certified operator on board while engaged in fishing activities.

As with the PLL and BLL requirements, the initial operator certification for gillnet vessels would be linked to the vessel's HMS permit renewal. An operator would be required to attend a workshop and receive the certification prior to the owner renewing the vessel's certification in 2007. The owner would be required to submit proof of certification before the HMS permit would be renewed. The initial operator certification would be linked to the renewal of the vessel's HMS LAP(s) in 2007. If the vessel owner holds multiple HMS LAPs, the operator would need to be certified prior to the earliest expiration date on any of the permits in 2007. After the initial certification, the operator's certification is no longer linked to the renewal of a vessel's HMS LAP and would need to be renewed prior to the expiration date on the operator's workshop certificate. The workshop certification would not be transferable any other person and would have the operator's name on the certificate. This alternative would ensure that at least one person directly involved with a vessel's fishing activities would be certified in the safe handling and release protocols and identification of protected resources.

This alternative may result in positive ecological impacts by increasing the industry awareness of the need to reduce protected species interactions, post-release mortality, and keep the number of interactions and mortalities below the five year ITS for sea turtles and smalltooth sawfish (Table 4.3). The combination of hands-on experience with the safe release and disentanglement protocols for sea turtle interactions with gillnets, as well as proper sea turtle identification and information on Atlantic shark regulations, would likely lead to decreased post-release mortalities in the shark gillnet fishery. Workshops will help train operators to safely handle and release sea turtles and reduce mortalities. While the interactions between gillnet gear and marine mammals are relatively low, the workshops could also provide a positive ecological impact through the education of vessel owners and operators regarding protected resource identification and release techniques for marine mammals (Table 4.3). Furthermore, the gillnet vessel owners and operators, who properly identify protected resources, would be able to apply the appropriate safe release and resuscitation protocols. Finally, proper species identification may improve the accuracy and usefulness of logbooks, as well as quota monitoring and stock assessments.

The Southeastern U.S. Atlantic shark gillnet fishery is listed as a Category II fishery under the MMPA indicating that occasional mortalities and serious injuries occur in this fishery (69 FR 48407). The listing is attributed to interactions with bottlenose dolphins, North Atlantic right whales, and Atlantic spotted dolphins. Category II fisheries are required to report incidental injuries and mortalities of marine mammals, accommodate an observer, if requested, and comply with the provisions of Take Reduction Plans (TRPs). Marine mammals are often difficult to identify due to the infrequency with which they are encountered in the gillnet fishery. It is essential for fishermen to know the morphological characteristics and distribution of protected resources to positively identify these animals to the species level. When marine mammals are encountered and properly recorded, the logbook reports provide significant information regarding home range, habitat use, and abundance. All of this information is important to Agency biologists, managers, and law enforcement officials because it may improve accuracy of stock assessments and quota monitoring. For these reasons, the protected resources identification component of these workshops would likely have positive ecological impacts for marine mammals.

On February 16, 2006, NMFS issued a temporary rule (February 16, 2006, 71 FR 8223) that prohibited the use of all gillnet gear in the Atlantic Right Whale Calving Area until March 31, 2006, because of a right whale calf interaction with gillnet gear. Dissemination of information related to release and disentanglement of marine mammals from gillnet gear may prevent additional closures in the future and would result in positive ecological impacts to endangered Atlantic right whales.

Mandatory workshops for HMS gillnet vessel owners and operators could increase the likelihood of the safe release of the rarely encountered and endangered smalltooth sawfish. In the case of the one observed interaction with gillnet gear and the smalltooth sawfish, the sawfish was cut from the net and released alive with no visible injuries (Carlson and Baremore, 2003). If the entangled gear is sacrificed, smalltooth sawfish can be removed safely. The workshops would inform owners and operators that smalltooth sawfish are listed as an endangered species, enable them to identify the species, and educate them on the safe-handling and release techniques to reduce potential sawfish mortalities occurring as a result of encounters with gillnet gear.

An additional ecological benefit of training the vessel owners and operators on the safe handling and release techniques for gillnet fishing gear is to potentially reduce the mortality of non-target species, such as red drum, manta and cownose rays, king mackerel, great barracuda, billfish, and little tunny. This alternative would likely benefit non-target species by increasing post-release survival of all species discarded.

Alternative A6, a preferred alternative, considered several different timetables for renewing the workshop certification under alternative A6 (*e.g.*, two, three, or five year timetable). The Agency may also consider additional recertification options in the future as new information arises related to safe handling and release of protected resources. Requiring renewal of mandatory workshop certification every two years would likely have slightly positive ecological impacts. NMFS assumes that participants engaged in a hands-on, day-long, workshop that requires participants to pass a practical examination demonstrating proficiency at the culmination of the workshop would maintain familiarity with the protocols for a reasonable period of time afterward. All new participants in the fishery would still be required to attain certification before being able to attain their permit and permit holders would need to renew their certification within two years of their original attendance to maintain an HMS permit.

Requiring re-certification every three years may have slightly less positive ecological impacts than every two years. Recertification every three years is a reasonable frequency to ensure that participants are kept abreast of the safe handling and release protocols and to also maintain awareness of new research and development related to workshop curricula. Permit holders would be required to recertify every three years before being able to renew their shark, swordfish, or tuna permits that allow the use of longline or gillnet gear.

Requiring re-certification every five years would likely have less positive ecological impacts than the two previously mentioned timeframes. Recertification every five years would allow a more time to lapse between certification workshops than necessary to maintain proficiency and provide updates on research and development of handling and dehooking protocols. These impacts may be mitigated somewhat by also selecting alternative A3 (certification for operators) or A4 (certification for owners, operators, and crew) which ensures that both operators and vessel owners are certified, thereby, increasing the number of fishery participants who interact with sea turtles and/or other protected species and are aware of how to safely handle and release them.

NMFS received several comments in support of alternative time periods for renewal of certification; however, the Agency prefers to maintain the original preferred alternative of recertification every three years. NMFS would require owners and operators of HMS longline and shark gillnet vessels to renew the mandatory workshop certification every three years. A three year period for recertification would likely maintain proficiency in the release, disentanglement and identification protocols, and allow NMFS to update owners and operators on new research and developments related to the subject matter while not placing an excessive burden on the participants (*e.g.*, lost fishing time and travel to attend workshops).

*Social and Economic Impacts*

Under alternative A1, there may be some negative economic impacts, related to protected species safe handling, release, and identification workshop travel costs and lost fishing time, which may be incurred by fishery participants who choose to attend; however, the travel costs and lost fishing time for participants attending the voluntary workshops are discretionary, and not mandatory. In addition to the participant cost, there is an Agency cost associated with the implementation of these workshops as well. Determining the Agency cost for holding these workshops is somewhat uncertain because no decision has been made on the instructors, locations, curriculum, or materials for the course. Based on the voluntary workshops held in 2005, NMFS estimates that one protected species workshop would cost about $3,500. The hands on training component would limit the number of participants in each workshop to a maximum of about 48 people. Due to the voluntary nature of alternative A1, it is uncertain how many workshops would be held. If one workshop were held each month, then the Agency cost would be about $42,000 per year. In addition to running the workshops, materials would need to be developed and reproduced for distribution at these workshops. Because the materials have not yet been developed, this aspect of the Agency cost is unknown at this time.

Voluntary workshops hosted by NMFS or industry may be viewed more favorably by the affected public than mandatory workshops; however, past experience has shown that these workshops are generally not well attended. Poor attendance, and the resulting impact on post-release mortality of threatened and endangered species, may hinder achieving the targets issued for protected resources due to lack of proficiency with the dehooking techniques and equipment on the behalf of the participants. Failure to achieve the target post-release mortality rates may result in future time/area closures as specified in the BiOp, including a closure of the entire Gulf of Mexico, which would result in extensive negative social and economic impacts to the pelagic and bottom longline fisheries. Voluntary workshops may improve communication between constituents and the Agency and would improve awareness of Agency actions.

Alternatives A2 - A4 would also likely result in some negative economic and social impacts, as a result of traveling to the protected species safe handling, release, and identification workshops and the fact that lost fishing time may be incurred by participants that would be required to attend these mandatory workshops. In order to provide fishermen and vessel owners time to prepare for economic costs associated with this mandatory requirement, owners and operators would have until their permit expires in 2007 to obtain the workshop certification.

Additionally, the Agency will strive to host a number of workshops in regional fishing hubs to minimize travel and lost fishing time. The workshops would be held during periods when the fishery is typically inactive, effectively minimizing lost fishing time to the extent practicable. For example, the workshops may be held when the fishery is closed and prior to the start of the next trimester for sharks. However, since the Agency does not know what other fisheries fishermen may be participating in, the Agency cannot guarantee that all workshops will be held at appropriate times to minimize all lost fishing opportunities. The timing and location of these workshops should lessen the negative social and economic impacts of taking the time away from fishing, work, or other responsibilities. While these alternatives would have an economic impact to the industry, these impacts may be mitigated by the benefits associated with increased industry education (*i.e.*, increased compliance, skills, and stewardship). These alternatives could result in some social benefits.

NMFS conducted an opportunity cost analysis to determine the economic costs associated with attending the various workshop alternatives. This analysis utilized the economic information gathered in the PLL Logbook, and in particular the information in the economic costs section that is required to be completed by selected vessels. For the vessels that completed the economic portion of the PLL Logbook in 2004, revenues per trip were estimated by taking the number of fish caught per trip, multiplying the number of fish by average weight for each species harvested, and multiplying the total weight for each species by average prices for each species as reported in the dealer landings system. The costs reported for each trip were then subtracted from the estimated revenue for each trip. Then the number of days at sea, as reported in logbooks, was used to determine the average net revenue per day at sea for each trip taken. Finally, the information provided on crew shares was used to allocate the net revenue per day at sea to owner, captain, and crew. The BLL cost earnings data set is limited compared to the PLL cost earnings data in the HMS Logbook, therefore, the sample size is not as significant for BLL trips. Information from the HMS permits database was then used to estimate the potential number of participants in each of the workshop alternatives. Since information on the number of operators per permitted vessel was not available, NMFS conservatively estimated that there could be two operators per permit for PLL vessels, and one captain for all others. Net revenues per day for owners, operators, and crew was then multiplied by the number of participants expected for each workshop alternative to estimate the opportunity cost for a one day workshop. The economic impacts (*i.e*., out of pocket cash costs) associated with attending workshops is likely to be less than the economic opportunity costs estimated since NMFS intends to schedule workshops on less productive fishing days to avoid lost time at sea.

As of February 2006, there are about 549 vessel owners permitted to fish for HMS with pelagic and bottom longline gear, which would be the estimated number of participants included in the workshops for alternative A2. According to an analysis of 2004 cost-earnings information as reported in HMS logbooks, the median opportunity cost for individual, bottom and pelagic longline vessel owners to participate in a one-day workshop would be \$281 and \$448, respectively. Alternative A3 would apply to vessel operators. NMFS assumed there are approximately two operators per vessel owner (permit), resulting in a total of 1,098 participants. According to the cost-earnings analysis mentioned above, the median opportunity cost for individual, bottom and pelagic longline vessel operators to participate in a one-day workshop would be \$345 and \$149, respectively. Alternative A4 would include vessel owners, operators, and crew. Based on logbook data, an estimated average of four crewmembers is associated with any particular vessel. These workshops would have 3,843 participants, thus, alternative A4 would have the largest economic impacts. According to the cost-earnings analysis mentioned above, the median opportunity cost for individual, bottom, and pelagic longline vessel crewmembers to participate in a one-day workshop would be $90 and $109, respectively. These individual costs when added to the individual opportunity costs of owners and operators, results in a combined individual opportunity cost of $716 for bottom longline fishery participants and $706 for pelagic longline fishery participants to participate in a one-day workshop. These opportunity cost estimates should be considered upper bounds on the potential economic costs associated with attending workshops. Information quantifying the economic value of time spent at the workshops is not currently available to further refine the upper bound cost estimates used in the economic analysis of workshop alternatives. Additional information regarding economic impacts for each of these alternatives can be reviewed in Chapter 6.

The cost to the Agency varies for each of these alternatives due to the number of people that would be required to attend and achieve the workshop certification. Alternative A2 calls for at least 549 workshop participants. If each workshop can accommodate 45 people, then a minimum of 12 workshops would need to be held. At a cost of $3,500 per workshop, alternative A2 has an Agency cost of about $42,000 plus the cost of outreach materials. Alternative A3 requires 1,098 owners and operators to obtain the workshop certification. The Agency would need to hold about 23 workshops at a total cost of $80,500 plus materials. Alternative A4 requires 3,843 owners, operators, and crew members to obtain a workshop certification; therefore, the Agency would need to hold at least 81 workshops at total cost of $283,500 plus materials. The greater the number of people certified, the greater the number of copies that need to be made for the outreach materials.

Under alternative A5, shark gillnet vessel owners and operators would be required to attend workshops discussing safe release and disentanglement protocols, protected resources identification, and current regulations. The administrative costs for workshops are high, but may be mitigated by the benefits associated with increased industry education (*i.e.*, increased compliance, skills, and stewardship). This alternative would likely result in social benefits. On February 14, 2006, NMFS issued a temporary rule that banned the use of all gillnet gears in the Atlantic Right Whale Calving Area until March 31, 2006, because of a right whale calf that interacted with gillnet gear on January 22, 2006. A closure results in a negative economic impact to the fishery. Dissemination of information related to release and disentanglement of marine mammals from gillnet gear may prevent additional closures in the future.

The costs incurred by vessel owners and operators would be related to travel and time to attend the workshop, resulting in out of pocket expenses and lost opportunity costs. NMFS estimates that there are approximately 20 participants in the shark gillnet fishery that would attend workshops; 80 percent of the identified shark gillnet permit holders and operators are located in Florida, and 20 percent are in North Carolina and New Jersey. As mentioned earlier, NMFS conducted an analysis of 2004 cost-earnings information as reported in HMS logbooks. Individual opportunity costs are not available for gillnet vessel owners and operators due to confidentiality concerns, however the median opportunity cost for vessel owners and operators of all gear types combined, including gillnets, to participate in a one-day workshop would be

$578 ($424 owner's share plus $154 captain's share). Additional information regarding economic impacts of this alternative can be reviewed in Chapter 6. To minimize cost to the owners and operators, NMFS would offer workshops in the areas where the shark gillnet fishery participants are located. Workshops would be held during periods when the shark gillnet fishery is typically inactive, effectively minimizing lost fishing time to the extent practicable. For example, the workshops may be held when the fishery is closed and prior to the start of the next season. However, the Agency does not know what other fisheries the fishermen may be participating in when the shark gillnet fishery is closed. The timing and location of these workshops should lessen the negative social and economic impact of taking time away from fishing, work, or other responsibilities. Additionally, owners and operators would have until the vessel's HMS permit expires in 2007 to receive the workshop certification. This delayed effectiveness would provide fishermen and vessel owners with time to prepare for economic costs associated with this mandatory requirement.

While there are only 20 participants associated with alternative A5, the participants are spread out between Florida, North Carolina, and New Jersey. To reduce the burden to the industry, three workshops would need to be held, which would cost the Agency about $10,500. If the all three preferred alternatives A2, A3, and A5 are considered together, the Agency would likely hold at least one workshop in Florida, North Carolina, and New Jersey, which could accommodate the additional 20 participants associated with the gillnet fishery. The Agency cost for all three workshops would be about $126,000 plus the cost of materials.

Most trades and professions require practitioners to obtain licenses demonstrating competence; however, there is still an economic opportunity cost associated with any required activity that would not otherwise be taken voluntarily. When analyzing the economic costs associated with workshop alternatives, the next best activity that workshop participants would be engaged in would be fishing. In the economic literature, it is common practice to use wage rates from primary job activities as the opportunity cost of engaging in other activities.

Workshop attendance may increase the time spent away from family, particularly if the workshops are scheduled during the fishery's downtime. Because the workshops would be scheduled where the permit holders are located in significant concentrations, attending the workshop should not take more than a day to a day and a half away from their family, responsibilities, or other fishing activities. The owners and operators would benefit from participating in the workshop by advancing their knowledge and skills in their industry. The training provided by workshops would be valuable to fishermen and could offset some unquantifiable portion of the estimated opportunity costs.

These workshops would provide a forum for discussion and education. The vessel owners and operator would have an opportunity learn about the latest advances in safe release and disentanglement protocols, as well as protected species identification and the latest regulations pertaining to their fishery. This knowledge also translates into a skill that could be used to increase operators' bargaining position for employment. Finally, these workshops are a dedicated opportunity for the Agency to interact and communicate with the industry.

Recertification every two years would likely have the greatest economic impact on participants; however, the extent of the impacts would depend on the mechanism for recertification: in-person workshops versus the use of alternative sources of media including CD-ROM, DVDs, or web-based media that would not result in travel costs or lost fishing time. The Agency will consider ways to moderate the cost involved with recertification for all of the alternatives considered. The potential economic impacts of having to get recertified in-person would increase proportionately as the number of participants increase. Certifying the participants every five years would result in the least negative economic impacts to the fishing community because potentially it would result in the most infrequent recertification schedule. If in-person recertification workshops were selected, travel costs, and lost fishing time would be minimized.

Under the preferred alternatives, the Agency cost to recertify all HMS longline and gillnet owners and operators every three years is difficult to estimate. Every three years, there would likely be a large pulse of individuals that would need to be recertified in order for the owners to renew their HMS permits. In these years, the Agency cost may be similar to the initial year. During the interim years, there may be an unquantifiable number of new entrants to the fishery or latent permit holders that would need to be certified. Because the number of individuals is unknown, it is difficult to determine the number of workshops that would be needed. At a minimum, one workshop each month would be held at total cost of $42,000 per year plus materials.

A recertification frequency of three years would allow for sufficient retraining to maintain proficiency and update fishermen on new research and development related to the subject matter while not placing an excessive economic burden on the participants due to lost fishing time and travel resulting from attending a recertification workshop in person.

*Conclusion*

Mandatory protected species safe handling, release, and identification workshops for PLL, BLL, and gillnet vessel owners and operators would result in positive ecological impacts by reducing the mortality of protected resources. These workshops are essential for complying with BiOp requirements by reducing the post-release mortality of sea turtles and other protected resources. Workshop certification would be linked to the renewal of the vessel's permit, ensuring well attended workshops. Requiring certification for vessel operators would guarantee at least one person on board the vessel during fishing activities trained in the safe handling and release protocols. Educating vessel owners and operators on the proper identification of protected resources would enable them to apply the appropriate safe handling and release protocols, improve compliance with regulations, and enhance the utility of vessel logbook data. To the extent that interactions cannot be avoided, the safe handling and release workshops should result in increased survival rates of protected resources hooked or entangled by HMS fishing gears. None of the alternatives considered for workshops on safe release, disentanglement, and identification of protected resources are expected to have any impacts on EFH. The one-day workshops are not expected to result in excessive economic impacts as they would be scheduled at numerous locales along the Atlantic coast, minimizing travel, lost fishing time, and other opportunity costs. The Agency would delay the workshop certification deadline to facilitate the attendance of owners and operators. Requiring that owners and operators in longline and gillnet fisheries to recertify every three years would balance the ecological benefits of maintaining familiarity with the protocols and the economic impacts of workshop attendance due to travel costs and lost fishing opportunities. Owners and operators of longline and gillnet vessels would be required to recertify every three years in an effort to maximize ecological benefits and minimize economic impacts of attending workshops.

#### *4.1.1.2 HMS Identification Workshops*

The purpose of HMS identification workshops is to enhance the ability of individuals involved in the HMS fisheries to identify sharks at the species level. Participants who successfully complete the workshops would receive a multi-year certification, which would serve as proof that the participant has completed the necessary training. To the extent practicable, these workshops would be open to other interested individuals (*e.g*,, individuals participating in the shark fishery, port agents, law enforcement officers, and state shark dealers) on a voluntary basis, but mandatory for Federally permitted shark dealers.

Accurate species identification is important for compliance with HMS fishery regulations, including the avoidance of prohibited species, maintaining quota limits, and accurate data collection. Species data collected on vessels and by dealers are entered into vessel logbooks and dealer reports, and are used to establish and monitor quotas and for stock assessments. It is important that fishery scientists and managers have the most reliable data possible for assessing the status of stocks and for formulating appropriate fishery management strategies based on this information, both to prevent overfishing and to rebuild those stocks that are already overfished. However, a large proportion of commercially landed sharks are reported as "unclassified" (*i.e*., unidentified), creating gaps in data collection in terms of actual species. As shown in Tables 3.40, 3.41, and 3.42, 19 percent of total 2004 LCS landings were unidentified, 0.3 percent of total 2004 SCS landings were unidentified, and 53 percent of the pelagic shark landings were unidentified. Of the total 2004 shark landings, 71 percent were unclassified shark species. Species identification workshops could reduce this problem by improving species specific reporting, thereby enhancing the quality of the data used in setting quotas and for stock assessments.

As described in Chapter 2, the alternatives considered for conducting species identification workshops are:

A7 No HMS identification workshops (No Action)

A8 Voluntary HMS identification workshops for dealers, all commercial vessel owners and operators, and recreational fishermen

*A9 Mandatory shark identification workshops for all shark dealers – Preferred Alternative*

A10 Mandatory HMS identification workshops for all swordfish, shark, and/or tuna dealers

A11 Mandatory HMS identification workshops for all commercial longline vessel owners

A12 Mandatory HMS identification workshops for all commercial longline vessel operators

A13 Mandatory HMS identification workshops for all commercial vessel owners (longline, CHB, General category, and handgear/harpoon)

A14 Mandatory HMS identification workshops for all commercial vessel operators (longline, CHB, General category, and handgear/harpoon)

A15 Mandatory HMS identification workshops for all HMS Angling permit holders

*A16 HMS identification certification renewal (every 3-years) – Preferred Alternative*

*Ecological Impacts*

Under alternative A7, the No Action alternative, NMFS would continue to make available for purchase the HMS identification manual, *Guide to Sharks, Tunas, & Billfishes of U.S. Atlantic & Gulf of Mexico*, and distribute wheelhouse placards at no cost, as well as other related educational materials. Although these materials enhance fishery participants' ability to identify HMS commonly caught in U.S. fisheries, discerning subtle identification features using these materials is less effective compared to hands-on workshops, particularly when attempting to distinguish species that are similar in appearance (*e.g.*, certain sharks). Furthermore, this guide does not contain pictures or information that may be beneficial for HMS carcass identification, which is generally how the catch is offloaded to HMS dealers. Also, there is no assurance that fishery participants will utilize or fully understand the materials distributed. As species identification data is entered into fisheries logbooks and dealer reports, which are used in quota monitoring and in preparing stock assessments, identification inaccuracies could be reflected in the resulting quotas and assessments, thereby affecting associated fishery management strategies.

Implementing voluntary workshops under alternative A8 could provide some ecological benefits, provided fishery participants attend the voluntary workshops. In the past, however, voluntary workshops conducted by NMFS have not been well attended, and could also be the case if future identification workshops are voluntary. The hands-on approach of workshops would enhance understanding of identification features so that those who do attend would be better able to identify HMS and thus provide more accurate information in logbooks and dealer reports. This, in turn, could provide some level of improvement in the accuracy of data used for quota monitoring and stock assessments. In addition, those who attend and gain a better understanding of identification features would be in a better position to comply with fishery regulations, such as identifying prohibited species. All of these factors would indirectly contribute to stock rebuilding efforts and, therefore, result in positive ecological effects on HMS fishery resources.

Under alternative A9, a preferred alternative, HMS identification workshop attendance and certification would be required for all Federally permitted shark dealers by December 31, 2007, with successful completion and mandatory recertification linked to the dealer's ability to obtain and renew their Federal dealer permit. Mandatory attendance by shark dealers is the preferred alternative because: (1) a single dealer must identify offloaded catches from a number of vessels, involving not only large numbers of fish but many different species of fish, as well; (2) not only are some shark species difficult to distinguish from one another, but dealers need to identify fish that have been dressed, making accurate identification even more difficult; and, (3) while both logbook and dealer data are used for stock assessments, the dealer is ultimately responsible for identifying the sharks, and their data is used for both quota monitoring and stock assessments. Additionally, sharks on the prohibited species list are not to be purchased by shark dealers. The shark identification workshops would improve dealer identification of prohibited species, leading to the reduction of the number of prohibited species landed and purchased. Without a market for prohibited shark species, shark fishermen would have greater pressure to correctly identify sharks at the species level and land more non-prohibited sharks. The identification workshops would help reduce the number of prohibited sharks landed and possibility differentiate between SCS and LCS, thus facilitating dealer compliance with preferred alternatives, I3b, to make it illegal for dealers to purchase sharks in excess of the 4,000 pound LCS retention limit. With accurate shark identification, there may be a better understanding of shark bycatch in the fleet.

The Agency received comment regarding the need for proxies; flexibility in certifying newly hired proxies, and the need for multiple proxies. Shark dealers would be encouraged to send as many proxies as is necessary to train the individuals responsible for shark species identification within the dealer's business. As all permitted dealers may not be geographically located where vessels unload their catches, a proxy could attend the workshop to allow the permitted dealer to meet mandatory attendance requirements. If a dealer opts to send a proxy, then the dealer would be required to designate a proxy from each place of business covered by the dealer's permit. A proxy would be a person who is employed by a place of business, covered by a dealer's permit, a primary participant in identification, weighing, or first receipt of fish as they are offloaded from a vessel, and involved in filling out dealer reports.

Public comment on the HMS Identification Workshops were supportive of mandatory workshops for Federally permitted shark dealers, but also suggested that these workshops be available to others, such as the recreational and commercial fishery, law enforcement, port agents, and state shark dealers. While these workshops would be mandatory for Federally permitted shark dealers, NMFS will accommodate other interested individuals when it is feasible. The ecological benefits of alternative A9 would be similar to those described in alternative A8, voluntary workshops, but would be expanded in magnitude, as a greater number of individuals would be trained in identification, thereby substantially improving the accuracy of data entered into dealer reports. Mandatory workshops for shark dealers, in turn, would contribute to improved stock assessments, quota monitoring, and stock rebuilding efforts.

Under alternative A10, mandatory HMS identification workshops and certification would be required not only for shark dealers, but for swordfish and tuna dealers as well. Benefits of this alternative are that training would be increased to include additional participants compared to only including shark dealers, in which case training would include identification of commercially fished HMS as well as sharks. Although ecological benefits would be similar to those described under alternative A9, they would be expanded to include other HMS fisheries, and would likely result in greater ecological benefits. As with alternative A9, a proxy could attend the workshop in order for the dealer to meet mandatory attendance requirements.

Under alternative A11, HMS identification workshops and certification would be required for vessel owners issued limited access permits and using pelagic or bottom longline gear during fishing operations. Workshop completion and mandatory periodic recertification would be tied to Federal shark dealer permit issuance and renewal. Training of vessel owners could serve to improve species data entry in vessel logbooks, but only if owners are on board the vessel. In some cases, the vessel owner may not be the vessel operator, and thus not involved in daily fishing activities or be available to identify catches. Because of the potentially limited involvement of longline vessel owners in the vessel's fishing activities, ecological benefits would likely be narrower in scope than expected under alternatives A8, A9, and A10.

Under alternative A12, HMS identification workshops would be required for all commercial pelagic or bottom longline vessel operators. Ecological benefits to the fisheries, although similar in nature to those expected under alternative A11, would be expanded in magnitude, because operators are more actively involved in fishing activities and fish identification. This would result in increased accuracy of species-specific data reported in logbooks. Ecological benefits would be similar in nature as described for the alternatives above, resulting in improved stock assessments and indirect benefits to stock rebuilding.

Under alternative A13, attending HMS identification workshops and obtaining a certification in HMS identification would be required for all HMS permitted commercial fishing vessel owners. Participants who have more than one permit would only be required to attend one workshop. Successful workshop completion and mandatory periodic recertification would be tied to the issuance and renewal of Federal HMS permits. Under this alternative, training and identification accuracy would be significantly expanded in magnitude beyond that conducted under alternatives A8 through A12. However, this alternative would only improve species data entered into reports if the owners are on board the vessel, involved in daily fishing activities, and available to identify fish landed. Given that in many cases the vessel owner is the operator aboard the vessel during fishing activities, ecological benefits to HMS fishery resources could be expanded beyond that expected under the other alternatives listed above, resulting in increased indirect benefits to stock rebuilding.

Under alternative A14, mandatory HMS identification workshops and certification would be required for all HMS permitted commercial fishing vessel operators. For the CHB, General category, and handgear/Harpoon categories the Agency assumes that the vessel owners (permit holders) are also the primary operators. Participants who are operators on multiple vessels fishing under different permits would only be required to attend one identification workshop. Due to the large number of participants, training and identification skills would be significantly expanded beyond that under the other alternatives, resulting in a greater indirect benefit to HMS fishery resources. This includes an improvement over alternative A13, as well, since in all cases it can be expected that the vessel operator is on board the vessel, involved in daily fishing activities, and available to identify catches. Therefore, training of all commercial vessel operators could serve to significantly improve species data for fishing activities that are required to submit a logbook and thereby improve the basis for quotas and stock assessments, as well as regulatory compliance. Accordingly, ecological benefits to HMS fishery resources would also be expanded beyond that expected under the previous alternatives, as a result of more accurate species catch data, and improved regulatory compliance.

Under alternative A15, mandatory HMS identification workshops and certification would be required for all HMS Angling category permit holders. The number of individuals trained would be significantly greater than under the other alternatives, resulting in potentially greater positive ecological benefits for HMS fisheries. NMFS received public comment in support of

HMS identification workshops for the angling community; however, this alternative does not resolve the data quality issues associated with commercial vessel logbooks and dealer reports. Thus, quota monitoring, commercial regulatory compliance, and stock assessments would not benefit as they would under the other alternatives.

Alternative A16 requires HMS identification workshop certification renewal every three years. The Draft Consolidated HMS FMP considered and analyzed three timetables for certification renewal - two, three, or five-year timetables. NMFS assumes that participants engaged in a hands-on, day-long workshop that requires participants to pass a practical examination demonstrating proficiency at the culmination of the workshop would maintain familiarity with identification protocols for a reasonable period of time afterward. All new entrants/owners into the fishery would still be required to obtain HMS identification workshop certification before acquiring the Federal HMS permit, and permit holders would need to renew their certification within three years of their prior attendance to maintain an active Federal HMS permit. Requiring renewal of workshop certification every two years would likely have the most positive ecological impacts. Requiring re-certification every three years would have somewhat less positive ecological impacts. Requiring re-certification every five years would likely have the least positive ecological impact, as this would allow a more extensive period of time to lapse between certification workshops than may be necessary to maintain species identification proficiency. Requiring workshops recertification every three years strikes a balance between ecological benefits and economic costs.

*Social and Economic Impacts*

Under alternative A7, the No Action alternative, the social and economic impacts would not change, positively or negatively, primarily because current activities related to the dissemination of information to assist in identifying HMS would remain the same. Alternative A7 would not have any additional Agency costs as it is the No Action alternative.

Under the remaining alternatives, the identification workshops would serve an educational purpose and as a forum where the industry could also exchange information about their business. This atmosphere could provide attendees with more information about their fisheries and create a forum for participants to express their comments regarding fisheries management and regulations. This communication could lead to better working relationships with the Agency.

Under alternative A8, voluntary HMS identification workshops, there would be neither positive nor negative social and economic impacts, primarily because attendance would be voluntary and at the convenience of the participants. For those who do attend, there would be some social benefit related to sharing of fishery information. Any associated travel costs would be minimal, as it is not likely that participants would go to substantial expense and trouble for this type of voluntary training. In the past, voluntary workshops conducted by NMFS have not been well attended, and this could also be the case if identification workshops are voluntary.

The voluntary nature of the workshops proposed in alternative A8 makes it difficult to estimate the number of individuals that would attend the workshops. As with the protected species workshops, the number of workshops held is driven by the number of participants with the maximum being 30 people and the location of the individuals. Determining the Agency cost for holding these workshops is also uncertain at this time because the instructors, locations, curriculum, and materials have not yet been determined. At this time, the NMFS estimates one HMS identification workshop to cost about $2,100 including the cost of outreach materials and staff time. If the Agency held one workshop per month, the Agency cost associated with alternative A8 would be $25,200.

Under alternatives A9 through A15, social and economic impacts would be similar in nature, the main difference being the number of attendees and the associated overall total costs, taking all individuals into consideration. On an individual basis, the costs anticipated to be incurred by fishermen would be those related to travel and time to attend the workshops, resulting in out of pocket expenses and lost opportunity costs. Alternative A9 would require that approximately 336 shark dealers attend mandatory workshops, alternative A10 would also require tuna and swordfish dealers to attend, raising the total to 1,037 dealers. Daily opportunity cost estimates for dealers are not currently known. Alternative A11 would require approximately 549 pelagic and bottom longline vessel owners to participate in identification workshops, resulting in an individual opportunity cost ranging between $448 (median pelagic longline owner's share) and $281 (median bottom longline owner's share) per day. Alternative A12 would include longline vessel operators. With 549 permitted vessels and an estimated two operators per vessel, alternative A12 would call for about 1,098 participants in addition to the owners (1,647 total). This estimated number of operators may be an overestimate because some owners also operate the vessel, and not all vessels have two operators. Alternative A12 would result in an individual opportunity cost ranging between $149 (median pelagic longline captain's share) and $345 (median bottom longline captain's share) per day. Alternative A13 would include all commercial HMS owners (longline, CHB, General category, and handgear/harpoon) and would require approximately 9,636 participants to attend mandatory workshops. This alternative would result in an individual opportunity cost of $424 (median owner's share for all gear types combined). Daily opportunity cost estimates for CHB owners are not currently known. Alternative A14 would include operators of commercial HMS vessels. Alternative A14 would have an additional 1,098 participants as the Agency estimates two operators per vessel in the longline fisheries for a total of 10,374 operators. Alternative A14 would result in a combined opportunity cost of $578 (median owner's share $424 plus median captain's share $154 for all gear types combined). Daily opportunity cost estimates for CHB owners/operators are not currently known. Alternative A15 would require all HMS Angling permit holders to attend workshops, which is the largest single category of HMS permit holders, including approximately 25,238 participants. Daily opportunity cost estimates for HMS Angling permit holders are not currently known. Additional information regarding economic impacts of these alternatives can be reviewed in Chapter 6.

To minimize costs to fishermen, NMFS intends to offer workshops at a variety of locations near high concentrations of dealers, according to the addresses listed on the permits. NMFS would also try to hold workshops during off-peak times to minimize interruption to the businesses. However, since the Agency does not know what state fisheries dealers may be involved with, the Agency cannot guarantee that all workshops will be held at appropriate times to minimize all lost opportunities. Further, the requirement to obtain workshop certification would be delayed until December 31, 2007, to provide dealers more time to prepare for the economic costs associated with this mandatory requirement. The administrative costs to NMFS for the workshops is high, but may be exceeded by the benefits associated with the possible impacts from increased education. Before implementation, NMFS would attempt to identify ways to minimize costs to attendees as much as possible.

As with the protected species workshops, the Agency cost will vary depending upon the number of participants required to obtain a workshop certification. Alternative A9, the preferred alternative, requires the attendance of all Federally permitted shark dealers, which is about 336 individuals, plus any additional proxies involved with shark identification. At a minimum the Agency would need to hold 12 workshops, accommodating a maximum of 30 people per workshop. At a cost of $2,100 per workshop, 12 workshops would cost the Agency an estimated $252,000. Alternative A10 would require all Federal HMS dealers or about 701 individuals to be workshop certified; holding 24 workshops would cost the Agency about $50,400. Alternative A11 would certify 549 commercial longline vessel owners at about 19 different workshops for an Agency cost of $39,900. To certify all commercial longline operators (alternative A12), the Agency would need to hold about 37 workshops with an estimated Agency cost of $77,700. Expanding the universe of certified individuals in alternative A13 to all commercial HMS permit holders would require at least 322 workshops and the Agency cost would be about $676,200. The Agency would need to hold at least 346 workshops to accommodate all 10,374 commercial HMS operators. Alternative A14 would have an estimated Agency cost of $726,600. The largest number of individuals would be certified under alternative A15 with 25,328 Angling permit holders. This alternative would cost the Agency an estimated $1,768,200.

Alternative A16 has a range of social and economic impacts depending on the frequency of recertification workshop attendance. In the Draft Consolidated HMS FMP, NMFS considered requiring the workshop certification renewal every two, three, or five years. The two additional years of a five-year timetable may compromise dealer proficiency in shark identification and may have greater economic impacts to dealers because of the expense of one-on-one training, as well as the cost of travel to the trainer location. In an effort to reduce economic impacts to shark dealers, the schedule for HMS Identification Workshops would be available in advance to allow dealers to select workshops close to them and most convenient to their schedule. If a dealer and/or proxy is unable to attend a scheduled workshop, NMFS will consider granting one-on-one training at the expense of the dealer. The Federally permitted shark dealer would be held accountable for ensuring that the appropriate individuals receive the required training in shark identification. The attendance of multiple proxies per shark dealer may ensure that the dealer has at least one certified staff member and the skills to properly identify sharks if another certified employee is terminated. According to public comment, NMFS should anticipate turnover in dealer proxies. These one-on-one training sessions would accommodate the replacement of a proxy whose employment was terminated on short notice, but, again, these sessions would be at the expense of the permit holder. If dealer employee turnover is high and the renewals are scheduled every five-years, a dealer may pay for a greater number of one-on-one training sessions than with a three-year timetable.

In addition to the frequency, economic impacts would be dependent on the type of recertification selected by the Agency, such as hands-on, in-person or training via the Internet, DVD, and/or printed materials. In the future, the Agency intends to investigate the use of alternative media to train shark dealers and/or renew the shark identification workshop certification, however the initial training would be in-person and hands-on. If NMFS does transition to Internet training, the Agency will look at the option of making any online training available to all interested parties. Hands-on, in-person recertification workshops would result in additional travel costs and lost fishing time. To the extent possible, NMFS would schedule recertification workshops so as to minimize these factors, but the negative economic impacts would be greater for hands-on, in-person recertification due to more frequent travel costs and potential increased fishing down time.

Under the preferred alternative, to recertify every three years, there would likely be a large pulse of individuals seeking to be recertified every three years when certificates expire. In these years, the Agency cost may be similar to the initial year as discussed above. During the interim years, there may be an unquantifiable number of new entrants to the industry or business or latent permit holders that would need to be certified. Because the number of individuals needing the workshop certification in the interim years is unknown, it is difficult to determine the number of workshops that would be needed. At a minimum, one workshop each month would be held at total annual cost of $25,200.

*Conclusion*

Alternative A9, mandatory workshops for all Federally permitted shark dealers, is the preferred alternative because species-specific identification of offloaded shark carcasses is much more difficult than for other HMS as evidenced by the large proportion of “unclassified” sharks listed on shark dealer reports. This uncertainty compromises quota monitoring and stock assessment efforts. Dealers are a focal point for gathering shark landings information as sharks from numerous vessels are offloaded at each individual dealer. Positive identification is often less difficult for fishermen than dealers as they know exactly where (depth, type of habitat, etc) a shark has been caught and often see the sharks alive and intact. These workshops would be open to other interested individuals (*e.g.,* individuals participating in the shark fishery, port agents, law enforcement officers, and state shark dealers) on a voluntary basis, but would be mandatory Federally permitted shark dealers. Federally permitted shark dealers would be required to receive this training in an effort to reduce unclassified shark landings and improve species-specific landings data. Improvements in shark dealer data could improve the existing quota monitoring program, as well as future stock assessments. The HMS identification workshops are also not expected to have any impacts on EFH. Additionally, these workshops are not expected to alter existing fishing effort or practices, and therefore, should not result in increased interactions with protected resources. The Agency would attempt to minimize economic impacts to shark dealers by delaying the date of effectiveness until January 1, 2007, meaning shark dealers would need to be certified by December 31, 2007. Additionally, workshops would be held at fishing ports to minimize travel costs and during non-peak fishing times to minimize perturbations to business activity, to the extent possible. Based on the Draft Consolidated HMS FMP analyses and public comment, the Agency has determined that the HMS identification workshop certification for all Federally permitted shark dealers would be most appropriately renewed on a three-year timetable. Recertification every three years is a reasonable frequency to ensure that participants are kept abreast of identification protocols.

### 4.1.2 Time Area Closures

NMFS considered alternatives ranging from maintaining existing closures (No Action) to a complete prohibition of pelagic longline (PLL) gear in all areas in order to reduce the bycatch and bycatch mortality of non-target HMS and protected species, such as sea turtles, in Atlantic HMS fisheries. While NMFS primarily focused on pelagic and bottom longline gear in this section, other gear types and other approaches to reduce bycatch and bycatch mortality are considered in other sections (*e.g.,* Workshops in Section 4.1.1.1; restrictions on recreational gears in Section 4.2.3). Alternatives B4 (complementary closures in Madison-Swanson and Steamboat Lumps) and B5 (criteria to use when implementing or modifying area closures) are the preferred alternatives. The No Action alternative (B1) is shown in Figure 4.1. Alternatives B2(a) through B2(e) are shown in Figure 4.2. Alternatives B3(a) and (b) are shown in Figure 4.3. and alternatives B4 and B6 area shown in Figure 4.4 and Figure 4.5.

The alternatives were grouped according to the primary objectives of the time/area closure. Alternatives B2(a) through B2(e) consider new closures for PLL gear to primarily address white marlin, bluefin tuna (BFT), and sea turtle bycatch. Alternatives B3(a) and B3(b) consider modifying existing closures for PLL gear. Regardless of the grouping, bycatch of non-target species and protected species, such as sea turtles, was taken into consideration for all of the alternatives. Alternatives B4 through B7 consider either complementary measures, criteria for time/area closures, closures for bottom longline (BLL) gear, or complete closure of the HMS PLL fishery. Several other alternatives, B2(f) – (k) and B3(c) – (d), were initially considered for new closures and modifications to existing closures but were not further analyzed (See Chapter 2 and Appendix A). Explanations of why certain alternatives were not further analyzed are included in Chapter 2, and tables summarizing data for each of the alternatives that were considered are included in Appendix A. The time/area closure alternatives considered are:

B1 Maintain existing time/area closures; no new time/area closures (No Action)

B2(a) Prohibit the use of PLL gear in HMS fisheries in the central portion of the Gulf of Mexico from May through November (7 months), annually

B2(b) Prohibit the use of PLL gear in HMS fisheries in an area of the Northeast during the month of June (1 month), each year

B2(c) Prohibit the use of PLL gear in HMS fisheries in the central Gulf of Mexico from April through June (3 months), annually

B2(d) Prohibit the use of PLL gear in HMS fisheries in the Gulf of Mexico west of 86 degrees W. Longitude year-round

B2(e) Prohibit the use of PLL gear in HMS fisheries in an area of the Northeast to reduce sea turtle interactions year-round

B3(a) Modify the existing Charleston Bump time/area closure to allow the use of PLL gear in all areas seaward of the axis of the Gulf Stream

B3(b) Modify the existing Northeastern U.S. time/area closure to allow the use of PLL gear in areas west of 72º 47’ W. Long. during the month of June each year

*B4* *Implement complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves year-round – Preferred Alternative*

*B5* *Establish criteria to consider when implementing new time/area closures or making modifications to existing time/area closures – Preferred Alternative*

B6 Prohibit the use of bottom longline gear in an area southwest of Key West to protect endangered smalltooth sawfish year-round

B7 Prohibit the use of PLL gear in HMS fisheries in all areas

*Ecological Impacts*

<u>Brief Summary of the Analyses for New Closures</u>

As described below, each of the alternatives would have varying degrees of ecological impacts. To help identify potential benefits and impacts of the various alternatives, NMFS conducted analyses using available data. These analyses are fully explained in Appendix A and a summary is provided below. Within this section, NMFS presents summary tables that were created to show the changes in the numbers of discards of white marlin, blue marlin, sailfish, spearfish, leatherback sea turtles, loggerhead sea turtles, other sea turtles, and BFT based on data from the Pelagic Observer Program (POP) (Table 4.4) or the Highly Migratory Species (HMS) Logbook (this is the logbook used by the PLL fleet) (Table 4.5) for the various time/area closure alternatives. In addition, individual tables for each of the alternatives are presented to show the monthly discards or landings of non-target or target HMS respectively, that include pelagic and large coastal sharks, and the percent reduction in numbers of hooks set. Data are also presented for the estimated change in targeted and retained catch of swordfish, bluefin, bigeye, albacore, yellowfin, and skipjack tunas (BAYS).

The analyses of the time/area closure alternatives utilized data from the POP, the HMS logbook, and the Commercial Shark Fishery Observer Program (CSFOP). Data from the observer program is referred to in the text as "observed," and data from the HMS Logbook is referred to as "reported" or "logbook" data. To determine the effectiveness of the current closures, NMFS compared data prior to implementation of the closed areas (1997 – 1999) with effort and catch data from 2001 – 2003 for various species. The analyses of the new time/area closures considered data primarily from the POP and HMS logbook from 2001 – 2003. Data from 2001 – 2003 were used because they include data after the most recent closures went into effect in 2000. For the alternatives considering modifications to existing time/area closures, NMFS compared data prior to implementation of the closed areas (1997 – 1999) for various species. In all cases, the POP and HMS logbook data were used to summarize monthly U.S. PLL catches throughout the operational range of the U.S. fleet in the Atlantic Ocean, Gulf of Mexico, and Caribbean (throughout the rest of this Section, the range of the PLL fishery is considered the Atlantic Ocean, Gulf of Mexico, and the Caribbean, although all three areas may not be explicitly referenced).

Complete, finalized data from 2004 were not available for the analyses presented in the Draft HMS FMP. Once the 2004 POP and HMS logbook data became available, NMFS conducted an analysis of a subset of the HMS logbook dataset from 2001 – 2004 (first six months of 2004 only) to determine whether there were any substantial differences from the 2001

– 2003 data presented in the Draft HMS FMP. NMFS took this approach because the 2001 – 2003 data are based largely on the use of J-hooks (as are the data for the first six months of 2004 before the circle hook requirement went into effect (July 6, 2004, 69 FR 40734)) whereas the second six months of 2004 are based on circle hook data. The results of the analyses on the subset of this dataset (*i.e.*, the first half of 2004) are included in Appendix A. In general, the inclusion of the January through June 2004 data with the 2001 – 2003 HMS logbook data did not change the predicted percent change in bycatch and discards for the different closures. Therefore, the inclusion of the additional six months of data from 2004 did not substantially alter any of the data presented in the Draft HMS FMP, or result in any changes to the overall conclusions or preferred alternatives in the Draft HMS FMP. Because these analyses were based on data (*i.e.*, 2004 HMS logbook data) that became available during the public comment period, these additional analyses were not available for public comment and are not included in this section (but are included in Appendix A). Given the additional six months of 2004 did not change the results of the time/area analyses done in the Draft HMS FMP, NMFS used 2001 – 2003 HMS logbook and POP data for the analyses throughout the rest of this section, except where other years are explicitly discussed.

NMFS used a Geographic Information System (GIS) program to plot observed (POP) and reported (HMS logbook) effort and catches of all non-target HMS (white marlin, blue marlin, sailfish, spearfish, and BFT), protected species (leatherback, loggerhead, and other sea turtles comprised of green, hawksbill, and Kemp's ridley sea turtles), and retained HMS species (swordfish, BFT, yellowfin, bigeye, and all BAYS tunas combined). Data for each of the species were mapped and compared spatially to one another in order to select the areas of highest concentration of bycatch. The areas of highest concentrations of bycatch for all species were then selected for further analysis. For these analyses, estimates of discards of all target and non-target HMS are comprised of both live and dead discards. All of the areas presented in this section and Appendix A were initially selected by examining the HMS logbook and POP data from 2001 - 2003 and identifying areas and times where bycatch was concentrated. NMFS has provided maps of bycatch for individual species (Figure 4.6 through Figure 4.13). In response to a specific request, NMFS has provided a map showing the spatial overlap of BFT, white marlin, and sea turtle bycatch in appendix A (Figure A-9 in Appendix A). For the spatial overlap analysis, NMFS combined the bycatch data from the HMS logbook for BFT, white marlin, and sea turtles into one combined dataset, and then joined them to a 10 x 10 minute grid (which is equivalent to approximately 100 $nm^2$) to get the number of discards for all species combined per 100 $nm^2$. A color scale is included to show the number of observations per 100 $nm^2$. The map shows the areas of highest bycatch for the three species combined. Monthly interactions for the different species (*i.e.*, temporal variability) were considered in the redistribution of effort analyses and can be seen in Table 4.13 and Table 4.16.

NMFS also took into account a closure area and time period received in a petition for rulemaking and considered an additional closure to reduce BFT discards in a reported spawning area in the Gulf of Mexico (Blue Ocean Institute *et al*., 2005; Block *et al*., 2005) (see alternative B2(c) discussion below). In addition, NMFS took into account a settlement agreement relating to white marlin, which was approved by the court in Center for Biological Diversity v. NMFS, Civ. Action No. 04-0063 (D.D.C.). With regard to the settlement agreement, NMFS specifically took into account five suggested white marlin time/area closures in the U.S. EEZ described on page 10 in a February 14, 2002, letter from the Biodiversity Legal Foundation, re: Atlantic White Marlin Critical Habitat Designation (see alternatives B2(g) – (k) in Section 2.1.2). The data used to analyze these potential closure areas include more recent data than was presented in the February 14, 2002, letter that relied on data from 1994 – 1996. All other time/area closure boundaries were selected based on the areas of highest interactions for a number of species (primarily white marlin, BFT, and leatherback and loggerhead sea turtles) (Figure 4.6 through Figure 4.12).

Following the selection of specific areas, NMFS performed spatial analyses to determine the fishing effort (number of hooks) and number of each species observed and reported caught inside each time/area closure in comparison to the rest of the Atlantic, Gulf of Mexico, and Caribbean, excluding the Northeast Distant restricted fishing area (NED). The NED data were not included in the analyses because the area was closed to commercial PLL fishing, except for a research experiment, during the period 2001 through 2003 (the years used in the analyses).

NMFS analyzed both absolute numbers of discards as well as areas of highest catch and catch per unit effort (CPUE: number of animals per 1,000 hooks) for non-target HMS and protected resources (white marlin, BFT, and sea turtles). In some cases these areas overlapped, in others, they did not (Figure 4.6, Figure 4.8, Figure 4.10, and Figure 4.11). This may be due to the fact that there are localized areas of high CPUE that may not necessarily represent the areas of highest bycatch in terms of absolute numbers. In order to avoid underestimation of bycatch reduction, in cases where the highest CPUE did not overlap with the areas of highest absolute numbers of discards, NMFS decided to further analyze the area that had the highest overall discards (in absolute terms), rather than areas with the highest CPUE. Thus, NMFS based the analyses on absolute numbers to maximize the reduction in overall number of discards. Under this approach, the projected number of discards may actually increase when redistribution of fishing effort is taken into account because high levels of effort are displaced into open areas with high CPUEs. Unlike other research on time/area closures (*e.g.*, Block *et al*., 2005), NMFS did not analyze CPUE in terms of soak hours (*i.e.*, the number of animals caught per hour of a longline set; soak time could be calculated by subtracting the time recorded when hooks were set in the water from the time recorded when hooks were pulled out of the water). Because of the variability between fishermen in reporting the soak time per set, NMFS felt the uncertainty associated with this measure was too high to accurately calculate effort in terms of soak hours (*i.e.*, was the start time recorded when the first hook went in the water or when the entire set was placed in the water? Or, similarly, was the end time recorded when the first hook was brought back onboard or when the entire set was retrieved?). Rather, NMFS used absolute numbers of catch as the most appropriate measure to assess time/area closures for bycatch reduction.

For all of the alternatives, NMFS compared monthly observed and reported catch and CPUE in each of the potential time/area closures to catch and CPUE fleet-wide, excluding the NED. Changes in bycatch and incidental catch resulting from time/area closures are thus expressed as a percentage of total U.S. Atlantic PLL catch, calculated on a monthly basis. NMFS evaluated the impacts of the closures both with and without redistribution of effort. The full redistribution of effort model assumed that fishing effort in a closure would be redistributed to all the remaining open areas. Therefore, evaluating impacts of a closure with and without redistribution of effort provides NMFS the potential range for which changes in catch could occur as a result of the closure(s). One end of the range assumes that all fishing effort within a given closed area will be eliminated (*e.g.*, fishermen will completely stop fishing in the closed area not displace that effort into other areas for the duration of the closure). Thus, the number and percent reduction in catch of both non-target and targeted species in these analyses represents the highest possible expected reduction. This would also represent the greatest negative social and economic impact that is anticipated for the industry. The other end of the spectrum assumes that all fishing effort in a closed area is distributed to open areas (*e.g.*, fishermen will move out of the closed area but continue fishing in surrounding open areas, move their business, or sell their permits to someone near an open area). The method used to calculate the resulting catch of target and non-target species is to multiply the effort that is being redistributed due to the closure by the CPUE for each species in all remaining open areas (for a complete description of the methodology used for redistribution of effort, please see Appendix A.) This end of the continuum would be expected to provide the least amount of bycatch reduction for a given closure depending on the CPUE of each species in all remaining open areas, which often provides mixed results regarding impacts on catch and bycatch and the economic and social impacts. In reality, the actual result may lie between the results obtained from these two different scenarios. In addition, if fishermen switch to different fisheries, this in turn, may have unanticipated consequences from gear interactions with other gear types and increased exploitation of other species not caught by PLL. Predicting fishermen's behavior is difficult, especially as some factors that may determine whether to stay in the fishery, relocate, or leave the fishery are beyond NMFS' control (fuel prices, infrastructure, hurricanes, etc.). While some fishermen will continue to fish in open areas of the Atlantic and Gulf of Mexico, others may be forced to leave the fishery entirely as a result of the closure.

During the comment period on the Draft HMS FMP, a number of commenters expressed concern over the effort redistribution model. These commenters felt that PLL vessels were not mobile enough to redistribute effort uniformly and that vessels in a certain area would move to adjacent areas (*e.g.*, vessels homeported in the Gulf of Mexico would stay in the Gulf of Mexico and would not move into the mid-Atlantic bight). Thus, the commenters felt that NMFS' "random" redistribution model did not accurately reflect the reality of the fleet.

As described in the Draft HMS FMP, the fleet-wide redistribution of effort model approach was used because an analysis of the mobility of the PLL fleet, completed in 2001 as part of a remand document regarding the implementation of a vessel monitoring system (NMFS, 2001), indicated that PLL vessels generally exhibit a high degree of mobility and are as likely to fish in areas away from their homeport as they are to fish in areas immediately adjacent to their homeport. This approach is also consistent with the methods used to analyze other time/area closures for the PLL fishery (NMFS, 2000; NMFS, 2004). The 1999 closure in the Northeastern United States to reduce BFT discards considered an effort displacement model for areas immediately adjacent to the closures because it was small in geographic size and short in duration compared to other time/area closures, and it was presumed fishermen would remain in this general area to retain incidentally-caught BFT while targeting other species. In the Draft HMS FMP, a similar approach of limiting the redistribution of effort to adjacent areas (Gulf of Mexico only) was used for alternative B2(a). NMFS analyzed redistribution of effort in the Gulf of Mexico only for alternative B2(a) because it is the smallest of the three closures considered in the Gulf of Mexico and represents the most likely case in which fishermen would stay in the

Gulf of Mexico. Since there would still be open areas left to fish in the Gulf of Mexico during this period (May through November), fishermen may turn to those areas rather than move out of the Gulf of Mexico and into the Atlantic.

Due to the difficulty with predicting fishermen's behavior once a closure is implemented, NMFS cannot predict with precision where fishing effort will be displaced. As described above, the effort redistribution model multiplied the effort seen in a potential closed area by the CPUE for each species in all remaining open areas. Thus, under this scenario, fishing effort is as likely to be displaced into areas with high bycatch rates as into areas with low bycatch rates, which could potentially result in an increase in bycatch of certain species. For example, interactions with leatherback sea turtles tend to be higher in the Gulf of Mexico, whereas interactions with loggerhead sea turtles tend to be higher along the Atlantic coast. If fishing effort is redistributed from the Gulf of Mexico into the Atlantic, there may be an increase in loggerhead sea turtle interactions. Conversely, if fishing effort is redistributed from the Atlantic to the Gulf of Mexico, leatherback turtle interactions may increase. Similar positive and negative results occur with the redistribution of effort model for other species. This indicates that, as fishing effort is squeezed into smaller open areas, bycatch of one species may decrease, while bycatch of another species may increase.

While the current redistribution of effort model could be improved in the future, the model used by NMFS in this rulemaking has been successfully used by NMFS in past rulemakings and is the based on the best science currently available for the Atlantic HMS PLL fishery. The current redistribution of effort model accounts for displaced effort due to a closure, and provides quantitative estimates of changes in bycatch, discards, and retained catch as a result of a closure. Other models have been used for time/area analyses; however, in many cases, these models did not consider redistribution of fishing effort (*e.g.*, SCRS/2005/011; Block *et al.*, 2005). Those models that have investigated redistribution of effort as a result of time/area closures have been random utility models (RUMs) that have been used for the Hawaiian PLL fishery (*e.g.*, Curtis and McConnell, 2004), and a closed area model used by the New England Fishery Management Council (NEFMC) to evaluate closures for the groundfish fishery (NEFMC, 2003). Both types of models are econometric models, which predict where fishermen will reallocate effort based on maximizing revenues and/or profits. However, neither model is currently designed to be used for the HMS PLL fishery, and in order for either framework to be applicable to a time/area analysis for the Atlantic HMS PLL fishery, NMFS would have to develop a specific model for the PLL fleet based the current economics, fishing grounds, and fishing effort of the Atlantic HMS PLL fleet. Such development will take additional time and effort. An additional RUM was developed for HMS (Strand, 2004) based on 1996 data. While NMFS considered using this model, it was not used for the current analyses because it was based on very large areas that were not applicable to the current time/area closures being considered, and because the data were outdated (*i.e.*, 1996 versus 2001 – 2003). In addition, the Strand (2004) model was based on J-hook bycatch and economic data. Given the current PLL fishery regulations require circle hooks, and that the applicability of J-hook data is questionable, NMFS may want to develop a random utility model once it has circle hook bycatch and economic data. Once NMFS has complete and finalized circle hook data, NMFS may consider revising the model in the future to make it applicable to the current closed areas. In the meantime, NMFS has chosen to use the current redistribution of effort model that has been used in past rulemakings.

As noted in earlier chapters, the Office of Management and Budget (OMB) issued a directive requiring Federal Agencies to have “influential scientific information” and “highly influential scientific assessments” peer reviewed. Since NMFS decided that sections of the HMS FMP, including the time/area section, could be classified as “influential scientific information,” NMFS had three independent (*i.e.*, people not involved in the drafting of the document) scientists review these sections pursuant of the OMB directive. Two of the peer reviewers were NOAA scientists and one peer reviewer was an independent scientist outside of NOAA. One of the peer reviewers (Appendix E) stated that, “The model is based on generally accepted principles in fisheries science. In general, such models rely on a set of assumptions related to static patterns of relative abundance at some temporal and spatial resolution, limited consideration of fish movements, and incomplete understanding of the effects of closure areas on redistribution of effort. Nonetheless, such models can provide useful insights for comparison of alternative management strategies. Without such a model there would be no such pragmatic way of comparing the potential closed areas. In general, it is probably safe to assume that the limitations of the model will be comparable across alternatives. Thus, the rankings of each alternative should be relatively insensitive to the assumptions.” Another OMB reviewer suggested testing “other plausible assumptions” or “redistribution scenarios.” The third OMB reviewer stated that, “Given the assumption of effort redistribution, it is difficult to believe that NMFS will be able to implement a time/area closure that does not have ecological impacts that counter gains. Hence, for time/area closures to be effective, assumptions on effort redistribution need to be rigorously tested…[and] reality likely lies between no effort redistribution and complete redistribution.”

In response to the public comments received and to some of the comments by the OMB peer reviewers, NMFS investigated the movement of the PLL fleet from 2001 through June of 2004 to see where vessels fished in relation to their reported homeports. This mobility analysis broke the Atlantic, Caribbean and Gulf of Mexico into six distinct areas, with one area, Area 2, split along the west and east coasts of Florida (Areas 2A and 2B, respectively; Figure A.5). Using GIS, NMFS plotted vessels according to where they fished (*i.e.*, made sets) in those six different areas in relation to their reported homeport. This provided NMFS with a spatial understanding of the distance different vessels could move. Figure A.6 shows the results of this analysis. Overall, most of the movement and effort (in terms of hooks) out of the Gulf of Mexico (Areas 1 and 2A) went to Area 6, the high seas, but some other effort was also moved up along the eastern seaboard (Figure A.7). Conversely, a few vessels that fished along the eastern seaboard also moved into the Gulf of Mexico, although the movement was somewhat limited.

NMFS also investigated the physical characteristics of vessels to see if there were any differences in the vessels that reported fishing only in the Gulf of Mexico compared to vessels that reporting fishing out of the Gulf of Mexico. NMFS found no significant differences in the vessels’ length ($t_{104} = 0.43$, $P = 0.35$) or vessels’ horsepower ($t_{104} = 0.43$, $P = 0.66$) for vessels that fished only in the Gulf of Mexico versus those that fished out of the Gulf of Mexico (Table A.36). These results indicate that vessels that fish exclusively in the Gulf of Mexico have the physical capability (in terms of vessel size and horsepower) to fish outside of the Gulf of Mexico. Furthermore, despite the upgrading restrictions, this indicates that the vessel owners could sell their permits and/or boats to fishermen who may like to fish outside the Gulf of Mexico.

NMFS also provided maps showing where the PLL sets have occurred inside and outside the U. S. EEZ (Figure A.8a). These maps show the true extent of fishing effort by the U.S. PLL fleet whereas most of the other figures in Chapter 4 and Appendix A are focused on the U.S. EEZ. Figure A.8b shows the size of closures B2(a) and B2(c) in the Gulf of Mexico relative to the entire Gulf of Mexico and shows that the U.S. PLL fleet has been fishing within and outside the U. S. EEZ. Figure A.8c shows that PLL vessels can relocate to distant ports and fish outside of their immediate homeport region (in some cases, up to 4,000 miles) whereas movement from the Gulf of Mexico to the Mid-Atlantic Bight is only 1,500 miles (Figure A.8d).

Based on these analyses, NMFS evaluated several different scenarios of the redistribution of fishing effort model for some of the closed areas where each scenario had different assumptions regarding how fishing effort would be redistributed into open areas. NMFS evaluated different scenarios for redistribution of fishing effort for B2(a) since it was the smallest closure in the Gulf of Mexico. NMFS also evaluated different scenarios of redistribution of effort for the B2(c) based on substantive issues identified during from public comments on this alternative. Finally, NMFS also evaluated different scenarios for the redistribution of effort model for B2(b) because it was the smallest closure along the eastern seaboard. Specifically, NMFS calculated redistribution of effort only to open areas along the eastern seaboard for a closure in the Northeast [B2(b)]. NMFS also redistributed fishing effort in the open areas of the Gulf of Mexico and Area 6 for two closures in the Gulf of Mexico (B2(a) and B2(c); see Appendix A). By doing this, NMFS was able to investigate how different assumptions of redistribution of fishing effort for different size closures in different regions of the Gulf of Mexico and Atlantic would effect predictions of bycatch, discards, and retained catch.

Taken with the results from both no redistribution of effort and the full redistribution of effort model, these additional scenarios provide estimates of changes in bycatch and retained catch somewhere in-between the two base scenarios (*i.e.*, some movement is expected, and thus, some redistribution of effort is expected into a particular area (in this case, Area 6)). However, these additional scenarios assume that the same amount of effort is moved out of the Gulf of Mexico regardless of the size of the closure in the Gulf of Mexico, when in reality, larger closures may result in more movement out of the Gulf of Mexico since a smaller area in the Gulf of Mexico will be open for fishing. These scenarios also assume that fishermen do not relocate, possibly due to community ties to unloading docks, processing plants, etc. However, it should be noted that while fishermen may prefer not to disrupt ties to their communities, the available data indicate that fishermen from the Gulf of Mexico already fish outside of the Gulf of Mexico. If a large closure were implemented in the Gulf of Mexico, it is likely that additional fishermen would move their fishing locations or sell their permits rather than go out of business. However, in the future, NMFS intends to investigate the choices fishermen have made regarding previous closures (*i.e.*, did they move, sell their permits, go out of business, retain their permit but fish for something else, etc?). This type of analysis could help NMFS improve the redistribution of effort models used in the future.

Data for each of the new closures (alternatives B2(a) through (e)) were analyzed with and without redistribution of effort. Both POP and HMS logbook data were used to analyze bycatch and discards without redistribution of effort. However, only the HMS logbook data were used to estimate bycatch with redistribution of effort because these data are collected for the entire fleet and provide an effort estimate for the entire fleet needed for redistribution calculations, whereas the POP data are only collected from a portion of the fleet. NMFS is aware that discards may be underreported in the HMS logbook data compared to the POP data. However, if there are no differences in underreporting for different species between different regions, then the relative effect of each closure on bycatch reduction for each species should be comparable across alternatives. Cramer (2000) compared dead discards from the HMS logbook and POP data. In her paper, Cramer used POP data to estimate dead discards of undersized swordfish, sailfish, white and blue marlin, and pelagic sharks from the PLL fishery operating in the U.S. Atlantic, Caribbean and Gulf of Mexico. Cramer (2000) provided the ratio of catch estimated from the POP data divided by the reported catch in the HMS logbooks. This ratio indicated the amount of underreporting for different species in a given area. Due to public comment that expressed concern over using HMS logbook data rather than POP, NMFS analyzed the ratios in Cramer (2000) to test whether underreporting varied for different species in different parts of the Atlantic, Caribbean and Gulf of Mexico. NMFS used a Kruskal-Wallis test (a non-parametric test equivalent to a parametric Analysis of Variance) to account for small sample sizes and non-normally distributed data. NMFS found that there was no difference in the ratio of estimated catch versus reported catch for undersized swordfish, sailfish, blue marlin, white marlin, or pelagic sharks (undersized swordfish: Chi-square = 3.63; *d.f.* = 5; $P$ = 0.60; sailfish: Chi-square = 1.72; *d.f.* = 5; $P$ = 0.89; blue marlin: Chi-square = 3.89; *d.f.* = 5; $P$ = 0.57; white marlin: Chi-square = 2.97; *d.f.* = 5; $P$ = 0.70; pelagic sharks: Chi-square = 4.78; *d.f.* = 5; $P$ = 0.44). Therefore, there were no differences in underreporting between the POP and HMS logbooks for the above species in the Atlantic, Caribbean, or Gulf of Mexico. Based on the available information, NMFS believes HMS logbooks may underestimate the amount of bycatch, however, the relative effect of each closure for each species should be comparable across alternatives. While the data used in the Cramer (2000) study represented an earlier time period (1997 – 1998) compared to the 2001 – 2003 data used here, it gives some indication that the use of HMS logbook data over POP data should not invalidate or bias the results of the time/area analyses. NMFS will continue to investigate potential differences in reporting between HMS logbook and POP data for all discarded species as well as potential biases in reporting between geographical areas for different species.

Results of the Analyses

The No Action alternative, B1, would maintain the existing time/area closures (Figure 4.1) and would not implement any new time/area closures. These areas include the June Northeastern U.S. closure (effective June 1, 1999), the DeSoto Canyon (effective November 1, 2000), the Charleston Bump and Florida East Coast closures (effective March 1, 2001), and the Northeast Distant closed area (effective July 9, 2002, and modified July 6, 2004). The Northeast Distant area is currently a restricted fishing area with specific gear requirements (69 FR 40734, July 6, 2004). Since most of the time/area closures were implemented in 2001 or earlier, data from 2001 – 2003 provide the basis for evaluating the effectiveness of the closures. The following sections provides an overview of the effectiveness of the existing time/area closures at reducing discards and bycatch and in maintaining target catches for the entire fishery. These analyses are ongoing and additional data are collected and reviewed annually.

Data used in these analyses were taken from the HMS logbook database administered through the NMFS Southeast Region. The reported catch and discards for each species and the number of hooks set were pooled by month (Table 4.6 and Table 4.7). The monthly and annual Atlantic wide totals catch and discards were calculated for each species. A reference period of 1997 – 1999 was chosen for the initial comparisons to examine the effect of closures implemented in 2000 – 2001. The percent change from 1997 – 1999 to 2001 – 2003 in numbers kept and discarded were calculated for the domestic PLL fleet for the entire Atlantic basin (Table 4.6 and Table 4.7). Changes in the numbers of fish caught and discarded were compared to the predicted changes presented in Regulatory Amendment 1 to the 1999 FMP (NMFS, 2000). The reported distribution of hooks set by area each year was examined to evaluate trends and/or shifts in fishing effort (Table 4.8). In addition, the reported number of fish kept and discarded in the MAB and NEC was compared to the reported numbers for all other areas combined in order to evaluate the effectiveness of the June Northeastern U.S. closure (Table 4.9).

The analyses showed that the existing closures have been effective at reducing bycatch of protected species and non-target HMS and have provided positive ecological benefits. For example, the overall number of reported discards of swordfish, BFT and bigeye tunas, pelagic sharks, blue and white marlin, sailfish, and spearfish have all declined by more than 30 percent. The reported discards of blue and white marlin declined by about 50 percent and sailfish discards declined by almost 75 percent. The reported number of sea turtles caught and released declined by almost 28 percent (Table 4.6 and Table 4.7). Thus, the No Action alternative would continue to have a positive ecological impact by maintaining a low overall byctach of non-target and protected species.

The closures have had an impact on landings of target species as well. For example, from 1997 to 2003, the number of swordfish kept declined by nearly 28 percent, the number of yellowfin tuna kept declined by 23.5 percent, and the total number of BAYS kept (including yellowfin tuna) declined by 25.1 percent (Table 4.6). The reported declines (without redistribution of effort) in swordfish kept and discarded, large coastal sharks kept and discarded, and dolphins kept were similar to the predicted values developed for Regulatory Amendment 1. Reported discards of BFT, pelagic sharks, all billfish (with the exception of spearfish for which no predicted change was developed in Regulatory Amendment 1) and total BAYS kept have all declined more than the predicted values. Thus, the existing closures appear to have had a positive ecological impact on these species as well. However, such declines in landings may also have had negative economic impacts on commercial fisheries as discussed later in this section.

Overall effort in the Atlantic PLL fishery based on reported number of hooks set declined by 15 percent during the pre- to post-closure period (Table 4.8). The distribution of effort does not indicate a major shift in fishing effort as a result of the time/area closures (Table 4.8). The average number of hooks reported set in 2001 – 2003 by area was compared to the average for 1997 – 1999. Declines in effort were reported for the majority of the areas. However, fishing effort increased during the pre- to post-closure period in the Gulf of Mexico, by slightly more than eight percent (Table 4.8). This increase could be the result of a shift in effort attributable to the implementation of East Florida Coast closure area. Reported effort also increased in the Sargasso (SAR) and North Central Atlantic (NCA) statistical areas where little activity had been reported prior to 2002. This increase could also represent a shift in effort due to implementation of the East Florida Coast closed area, and possibly the seasonal Charleston Bump closure. Effort in the South Atlantic Bight, where the Charleston Bump closure is located, declined by 30 percent from the 1997 – 1999 level. Effort in the MAB and NEC also declined, 26 and 31 percent, respectively. The June Northeastern U.S. closed area is located within these two areas.

The June Northeastern U.S. closed area (64 FR 29090, May 28, 1999) was implemented in order to decrease BFT discards in the Atlantic PLL fishery. The closure spans a portion of two statistical reporting areas, the MAB and the NEC. The reported effort, catch, and discards were combined for these two areas to evaluate the effectiveness of the closure (Table 4.9). The reported effort, catch, and discards for the remaining areas were also combined and presented.

It appears that BFT discards in the MAB and NEC have been considerably reduced since the implementation of the June closure in 1999 (Table 4.9). Reported discards of BFT prior to implementation of the closure ranged from 558 to over 2,700 per year. Since 1999, the number of BFT reported discarded has remained below 500 per year. The number of swordfish kept in the MAB and NEC has increased since the closure was implemented while the number of billfish discarded has declined.

Analysis of the change in effort and bycatch after implementation of existing closures indicates that reduction in bycatch may have been greater than predicted with redistribution of effort, and in some cases, without redistribution of effort. There are several possible explanations for the higher than predicted decline in bycatch and effort resulting from time/area closures that may have ecological impacts as well as economic repercussions on fishing behavior and the PLL fishing industry: (1) stocks may be declining; (2) time/area closures may have acted synergistically with declining stocks to produce greater declines in catch than predicted; (3) fishermen may have left the fishery; and (4) fishing effort may have been displaced into areas with lower CPUEs. With regard to the last point, the redistribution of effort model is incapable of making predictions based on a declining CPUE. Instead the model assumes a current CPUE that remains constant in the remaining open areas when estimating reductions. It is possible that one or more of these factors, or others, may have contributed to the observed decline in landings and bycatch in recent years. However, despite these declines, several species continue to be overfished with overfishing still occurring, warranting further consideration of closures or the other alternatives described in this Final HMS FMP.

In addition to B1, the No Action alternative, NMFS analyzed several new potential time/area closures. After comparing the potential bycatch reduction for all of the closures that NMFS initially considered (see Chapter 2), NMFS chose five closures with the highest overall bycatch for further analysis in addition to complementary measures in the Madison-Swanson and Steamboat Lumps Marine Reserves and BLL closures to protect smalltooth sawfish. Alternatives B2(a) and B2(b) were chosen for analysis because they had higher overall discards of white marlin, BFT, and most other species than any of the other closures. Alternative B2(c) was chosen for analysis in response to a petition received by NMFS from several conservation organizations requesting consideration of a closure of the "Gulf of Mexico bluefin spawning area" (Figure 4.2) (Blue Ocean Institute *et al*., 2005). The area analyzed was obtained directly from the petition. Alternatives B2(d) and B2(e) were chosen for analysis in order to determine if any other closure, or combination of closures, would be more effective at reducing bycatch than the alternatives B2(a), B2(b), or B2(c). The analyses indicated that almost all of the closures and combinations of closures considered for white marlin, BFT, or sea turtles would result in a net increase in bycatch for at least some of the primary species considered when redistribution of fishing effort was taken into account (Table 4.5). In addition, the predicted reduction in bycatch when redistribution of fishing effort was taken into account was typically less than 30 percent for any given species, with overall reduction in the number of individual species being very low (Table 4.5 and Table A.1 in Appendix A).

Currently, in terms of new closures, NMFS has chosen to go forward with only the complementary measures in the Madison-Swanson and Steamboat Lumps Marine Reserves. This is due, in part, to all the available data used in the time/area analyses being based on J-hook data. A circle hook requirement for the PLL fishery went into effect on June 30, 2004, in the NED (69 FR 40734), and in all remaining areas on August 6, 2004. NMFS currently only has finalized data on the catch associated with circle hooks from July through December of 2004 (see Appendix A). Based on the NED experiment, it is expected that circle hooks likely have significantly different catch rates than J-hooks. However, since the impact of circle hooks on bycatch is uncertain for most species (except sea turtles and swordfish), further investigation is required to determine the impact of any new time/area closures. NMFS anticipates that 2005 HMS logbook data will become available in the summer of 2006, and NMFS will continue to monitor and analyze the effect of circle hooks and bycatch reduction. NMFS is also awaiting additional information regarding the status of the PLL fleet after the devastating hurricanes that occurred in the Gulf of Mexico during the fall of 2005. The number of active vessels and level of fishing effort will be assessed beginning in the summer of 2006, when the 2005 HMS logbook final data becomes available.

Alternative B2(a) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in an 11,991 $nm^2$ area of the central Gulf of Mexico (Figure 4.2) from May through November of each year (7 months). The effectiveness of alternative B2(a), and all subsequent closure alternatives, was evaluated by determining the percent reduction in bycatch of non-target HMS, protected species, and retained species on a monthly basis with and without redistribution of effort. Without redistribution of effort, the observer program data indicate that the alternative B2(a) from May through November would potentially reduce discards (live and dead combined) of all non-target HMS and sea turtles from 4.0 percent for loggerhead sea turtles to 19.6 percent for sailfish (Table 4.4). Without redistribution of effort, the logbook data indicate that alternative B2(a) from May through November would potentially reduce discards from 3.4 percent for loggerhead sea turtles to 17.6 percent blue marlin discards (Table 4.5). Thus, the percent reductions in most bycatch species were very similar for both the observed and reported data.

Data from monthly catches and discards were examined for both a year-round closure and a seven-month closure (Table 4.4 and Table 4.5). The annual seven-month closure was selected for further analysis because the reductions in bycatch were similar to the year-round closure without redistribution of effort, except for BFT. In some cases, reductions in bycatch were higher than the year-round closure with redistribution of effort (Table 4.5). For example, white marlin discards (live and dead combined) increased 0.9 percent with redistribution of effort for the year-round closure, as did sailfish (1.1 percent), spearfish (4 percent), and BFT discards (7.9 percent). The May through November closure, on the other hand, would reduce discards of all species except loggerhead sea turtles and BFT.

With redistribution of effort, the logbook data indicate that there would be a reduction in bycatch for some species, but an increase in others. For example, the bycatch of leatherback sea turtles would be decreased by eight percent (76 leatherback sea turtles over a three year period, or 25 per year; yearly averages can be calculated by dividing the numbers in the tables by three), whereas loggerhead sea turtle interactions would potentially increase by 7.9 percent (six loggerhead sea turtles over a three year period, or two per year) (Table 4.5), pelagic and LCS discards would increase by 14.5 percent and 11.7 percent, respectively (Table 4.10a), and BFT discards would increase by 10.3 percent (75 discards over a three year period, or 25 per year; Table 4.11a). For some of the species, the percent reduction in discards was minimal. For example, white marlin discards are predicted to decrease by only 2.7 percent. This amounts to a projected decrease of 85 white marlin over three years, or 28 white marlin per year (3,143 x 0.027 = 85) (Table 4.5 and Table 4.10a). When compared to the overall annual reported white marlin discards (1,047 annually; Table 4.10a), this reduction would provide minimal benefit. Thus, while there may be an ecological benefit for some species, such as leatherback sea turtles and blue marlin, the benefits to other species as a result of this closure are less clear.

As explained above, NMFS considered redistribution of effort in the Gulf of Mexico only for alternative B2(a) because it was the smallest closure in the Gulf of Mexico and the most likely scenario where fishermen would stay in the Gulf of Mexico while this closure was in place (*i.e.*, there would still be enough fishing areas open in the Gulf of Mexico to fish in unlike the larger closures). The result was a predicted increase in bycatch for some species and reductions in bycatch for others (Table 4.10b). Interactions with spearfish and discards of LCS, for example, could increase by 3.3 percent and 3.6 percent, respectively (Table 4.10b), whereas BFT discards could decrease by 1.2 percent (Table 4.11b). Interestingly, the catch of all targeted species, with the exception of BFT, are predicted to increase as a result of the closure (Table 4.11b). With redistribution of effort in the Gulf of Mexico and Area 6 combined, the logbook data from 2001 – 2004 indicated that there could be reductions in bycatch for some species, but increases in others. For example, bycatch could range from a 15.4 percent decrease for other sea turtles to an increase of 4.7 percent for sailfish (Table A.37). Bluefin tuna discards could increase by 1.6 percent with redistribution of effort (Table A.38). These results indicate that for alternative B2(a), even when effort was assumed to be redistributed in the Gulf of Mexico only, or in the Gulf and Area 6, there was still a potential for increased discards of certain species.

Alternative B2(b) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in a 2,251 $nm^2$ area of the Northeast in June primarily to reduce BFT discards (Figure 4.2). NMFS decided to further analyze this area because it had a high concentration of BFT discards, with a greater number of discards than any other area in the Atlantic or the Gulf of Mexico. For example, from 2001 – 2003, there were 461 reported BFT discards in this comparatively small area, compared to 470 reported discards in the entire Gulf of Mexico (~300,000 $nm^2$) (Figure 4.13). Furthermore, approximately 80 percent of the discards in alternative B2(b) (365 BFT discards) occurred in the month of June only (Table 4.12). In contrast, the majority of BFT discards in the Gulf of Mexico occurred over a three-month period from March through May and were much more randomly and broadly distributed (Table 4.13).

Additionally, alternative B2(b) had a lower number of BFT kept (34 over three years; Table 4.12) than the B2(a) closure in the Gulf of Mexico (133 over three years; Table 4.11b), which may have potential social and economic consequences for both areas, as discussed in greater detail later in this section. NMFS considered both a year-round and a June only closure, but decided not to analyze a year-round closure because the percent reductions were similar to the June only closure for most of the species considered (Table 4.5). The following information thus pertains to the June only closure.

According to observer program data, alternative B2(b) would reduce BFT discards by 15.4 percent and loggerhead sea turtles by 6.0 percent. All other non-target HMS and protected resources would experience zero-percent reductions (Table 4.4). Without redistribution of effort, the logbook data indicate that alternative B2(b) would result in a 22.6 percent decrease in BFT discards (461 BFT over 3 years, or an average of 154 per year) (Table 4.12) and an 11.2 percent decrease in loggerhead sea turtle interactions (Table 4.14). Therefore, the percent reductions predicted from HMS logbook and POP data were similar. While not large, most other species would have reductions in bycatch as predicted from the logbook data as well, ranging from a zero-percent reduction in sailfish and spearfish discards to 14.9 percent for pelagic sharks (Table 4.14). With redistribution of effort, the area would result in a 21.9 percent reduction in BFT discards (354 BFT over three years or 118 per year) (Table 4.15 and Table A.5 in Appendix A), but relatively small increases in bycatch for nearly all of the other species except leatherback (-1.3 percent; Table 4.14) and loggerhead sea turtles (-10.3 percent; Table 4.14).

Although there may be an ecological benefit for BFT and loggerhead sea turtles as a result of this closure, the benefits to other species are less clear and may, in fact, be negative. Clearly, alternative B2(b) would reduce BFT discards, but would potentially increase the bycatch of other species. This is likely the result of a lower than average CPUE for most of the other species in the area. When redistribution of effort is considered, there may be an increase in bycatch of species such as blue and white marlin, spearfish, sailfish, and LCS.

As explained above, NMFS considered redistribution of effort in the Atlantic only for alternative B2(b) given its small size and temporal duration (as opposed to redistribution of effort in all areas of the Atlantic and Gulf of Mexico). The result was a predicted slight increase in bycatch for some species and slight reductions in bycatch for others. Interactions with leatherback and loggerhead sea turtles could decrease by 0.8 percent and 5.9 percent, respectively, whereas blue and white marlin discards could increase by 0.9 and 2.0 percent, respectively (Table A.39). However, BFT discards could decrease by 15.1 percent resulting in 333 fewer discards over three years or 111 fewer per year (Table A.40).

Alternative B2(c) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in a 101,670 $nm^2$ area in the Gulf of Mexico from April through June (three months) each year (Figure 4.2). According to observer program data, without redistribution of effort alternative B2(c) would reduce discards of all non-target HMS and protected resources from a minimum of 2.3 percent for spearfish to a maximum of 25.0 percent for other sea turtles (Table 4.4). Without redistribution of effort, the logbook data indicate that alternative B2(c) would potentially reduce discards of all of the species being considered from a minimum of 0.8 percent for pelagic sharks to a maximum 21.5 percent for BFT (Table 4.5 and Table 4.16). With redistribution of effort, however, bycatch is predicted to increase for all species except leatherback and other sea turtles (Table 4.16). Even BFT discards, which showed a fairly dramatic decline without redistribution of effort, are predicted to increase by 9.8 percent with redistribution of effort (for an overall increase of 158 BFT over three years or an average increase of 53 per year) (Table 4.13 and Table A.5 in Appendix A). The apparent increase in predicted BFT discards with redistribution of effort is likely due to the fact that BFT are caught in months other than April through June in the Gulf of Mexico, as well as the high number of BFT discards in other areas, as described in alternative B2(b) above. However, it must be noted that the increase of BFT discards in other areas outside of the Gulf of Mexico are most likely discards of non-spawning BFT such as non-spawning adults, juveniles, and sub-adults. Therefore, there is not necessarily a 1-to-1 equivalency between benefits to individual spawning BFT in the Gulf of Mexico and individual non-spawning BFT outside of the Gulf of Mexico. However, increasing the number of discards of BFT in areas outside the Gulf of Mexico could still be detrimental to the stock. Bluefin tuna kept (landed), on the other hand, would be reduced by 18.3 percent (a decrease of 110 BFT kept over three years, or an average of 37 per year), indicating that the Gulf of Mexico has a high number of BFT landed in addition to BFT discards (Table 4.13 and Table A.5 in Appendix A). As with the alternatives described above, with redistribution of effort, there may be an ecological benefit to some species, but negative impacts on others. For example, LCS discards are predicted to increase 25.9 percent and loggerhead sea turtles by 23.5 percent under this alternative Table 4.16.

NMFS also performed a second scenario of the redistribution of effort analysis where effort was redistributed to open areas of the Gulf of Mexico and Area 6 of the Atlantic only (see Figure A.5 in Appendix A). The results of this analysis indicated a potential reduction in bycatch for white marlin, leatherback and other sea turtles, and pelagic shark discards, bluefin discards, yellowfin discards, and BAYS tuna discards, with the largest being for BFT (19.3 percent decrease over 3 ½ years or ~ 122 discards per year) (Tables A.41 and A.42, Appendix A). However, the analysis also predicted an increase in bycatch of blue marlin, sailfish, spearfish and large coastal sharks (Table A.41 in Appendix A). The largest expected increase would be for LCS of 12.8 percent or 2,454 LSC over 3 ½ years. Interestingly, the analysis suggested that this closure could result in an increase in the amount of swordfish kept. This is expected to be from more fishermen utilizing the area around the Desoto Canyon closure, since effort in the western portion of the Gulf of Mexico would be squeezed into the eastern portion of the Gulf of Mexico where swordfish catch rates are higher. However, it is unknown how realistic this result is; if increased effort in the eastern portions of the Gulf of Mexico could occur, more fishermen may leave the Gulf of Mexico to fish in Area 6 due to overcrowding in the Gulf of Mexico.

According to the full redistribution of effort model, the petition to close 101,670 $nm^2$ in the Gulf of Mexico from April through June each year (alternative B2(c)) was predicted to decrease the number of BFT kept by an average of 37 fish per year and is predicted to increase the number of BFT discards by an average of 53 fish per year (Table A.5 in Appendix A). Alternative B2(b), on the other hand, would close 2,251 $nm^2$ in the Northeast for the month of

June only, and would potentially reduce the number of BFT discards by 118 per year (Table A.5 in Appendix A). Although alternative B2(b) is not considered a BFT spawning area, data from the observer program indicate that large fish (>171 cm TL) are present in the area (2001 – 2003 POP data). Additionally, there is evidence to indicate that the area is utilized as a feeding and staging area by BFT prior to migrating to the Gulf of Mexico to spawn (Block *et al*., 2005). Pop-up satellite tags on BFT tagged in feeding areas of the Northeast show fairly rapid (~ one month) migrations from the Northeast to the Gulf of Mexico (Block *et al*., 2005). Hence, while NMFS recognizes that the same proportion of western spawning BFT would not be protected from a closure in the Northeast as one in the Gulf of Mexico, potentially a small proportion of western spawning-size BFT could be protected by a closure like B2(b), especially given the prevalence of larger individuals in Northeast area from the POP data. Therefore, a closure like B2(b) may be able to protect a few spawning-size individuals as well as pre-spawners, or sub-adults, which are also valuable age classes with regard to the stock (although, presumably, there is a mixture of eastern and western origin fish in this area, and a closure in this area may protect sub-adults of western as well as eastern origin). Furthermore, the total proportion of dead discards in the Northeast was similar to the Gulf of Mexico. In the Northeast, 48 percent (219 out of 461) of all BFT discards from 2001 – 2003 were discarded dead, whereas 53 percent (249 out of 470) of all BFT discards from the Gulf of Mexico were discarded dead (as reported in the 2001 – 2003 HMS Logbook). Given the high number of discards in the Northeast, a closure there may provide similar ecological benefits compared to a closure in the Gulf of Mexico (depending on post-release survival in the two areas). In addition, a small closure in the Northeast would minimize the economic impacts when compared to a closure of 101,670 nm$^2$ in the Gulf of Mexico, as discussed in more detail later in this section.

Alternative B2(d) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in a 162,181 nm$^2$ area in the Gulf of Mexico west of 86 degrees W. Long. year-round (Figure 4.2), thus closing an area where approximately 50 percent of all domestic effort (Atlantic, Gulf of Mexico, and Caribbean) and 90 percent of all domestic effort in the Gulf of Mexico has been reported in recent years (2001 – 2003). According to observer program data, alternative B2(d) would have the greatest positive ecological impact of all the alternatives considered (Table 4.4). It would potentially reduce discards (live and dead combined) of all non-target HMS and protected resources by a minimum of 14 percent for loggerhead sea turtles to a maximum of 75 percent for other sea turtles (Table 4.4). Similarly, the logbook data without the redistribution of effort indicated that there could be large reductions in all non-target HMS, ranging from a 10.1 percent reduction in loggerheads to 83.5 percent reduction in spearfish discards (Table 4.5 and Table 4.17).

With redistribution of effort, alternative B2(d) is predicted to reduce discards of blue marlin, sailfish, spearfish, and leatherback sea turtles, but increase discards of white marlin, BFT, pelagic sharks, LCS, and loggerhead sea turtles (Table 4.5, Table 4.17, and Table 4.18). Loggerhead sea turtles, in particular, would be of great concern since interactions could potentially increase by 65.5 percent (117 over three years, or an average of 39 per year; Table A.1 in Appendix A). BFT discards could increase by 38 percent (614 over three years or 205 per year; Table A.5 in Appendix A), and pelagic shark discards could increase by 88 percent (30,194 over three years, or an average of 10,064 per year; Table 4.17). The reason for the dramatic increase in discards for some species with redistribution of effort is that these species are more commonly encountered in the Atlantic than the Gulf of Mexico. With nearly 50 percent of overall effort predicted to redistribute into open areas of the Atlantic, the discards of these species would likely increase. Given approximately 90 percent of the fishing effort in the Gulf of Mexico has in recent years occurred in this area, if this closure were implemented, very few areas would be left open for fishing in the Gulf of Mexico. As a result, in order to stay in business, fishermen would likely have to move out of the Gulf of Mexico. Fishermen might also sell their permits to fishermen outside of the Gulf, resulting in a further increase in fishing effort in open areas. For an example of the impact of redistribution of effort, see Table A.28 in Appendix A. Since a majority of leatherback sea turtles interactions occur in the Gulf of Mexico, and a majority of loggerhead interactions occur in the Atlantic, closing an area of this size in the Gulf of Mexico could potentially redistribute effort to areas of the Atlantic where loggerhead interactions are higher.

Alternative B2(e) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in a 46,956 $nm^2$ area in the Northeast year-round (Figure 4.2). The area was primarily considered to reduce loggerhead sea turtle interactions, which occur with greater frequency there than in nearly all other areas. Without redistribution of effort, the closure is predicted to decrease bycatch and discards of all non-target HMS and protected species by a minimum of 0.3 percent for spearfish, to a maximum of 40.7 percent for BFT discards (Table 4.5, Table 4.19, and Table 4.20). However, with redistribution of effort, bycatch of all species except pelagic sharks, BFT, leatherback, and loggerhead sea turtles, is predicted to increase (Table 4.19).

Given the mixed results for some of the species in each of the alternatives analyzed individually above, NMFS considered combining alternatives B2(a) and B2(b), as well as alternatives B2(d) and B2(e) to maximize bycatch reduction. Combining these areas could potentially reduce the number of discards beyond what could be achieved by a single closure. For alternatives B2(a) and B2(b), NMFS considered both a year-round closure and a closure during the months of May through November for alternative B2(a), combined with a closure during June only for alternative B2(b), similar to the individual closures described previously. For alternatives B2(d) and B2(e), NMFS considered a year-round closure only. It should be noted that percent reduction in discards and retained catch without redistribution of effort for the combination of closures is simply the addition of percent reduction without redistribution of effort for the individual closures (Table 4.5 and Table 4.15). Therefore, only a discussion of predicted impacts of combinations of closures with redistribution of effort is included below.

With redistribution of effort, combining alternatives B2(a) and B2(b) year-round would increase discards of most species except BFT and sea turtles (Table 4.5 and Table 4.21). Thus, a year-round closure of both of these areas could have a positive ecological impact on BFT and all sea turtle species, but a negative impact on blue and white marlin, sailfish, spearfish, pelagic sharks, and LCS. Combining alternatives B2(a) and B2(b) on a seasonal basis from May through November for B2(a) and June only for B2(b), as described above, would result in reductions in discards of all species except sailfish (which would increase 1.5 percent, or 15 over three years), pelagic sharks (which would increase 9.6 percent or 3,276 over three years), LCS (which would increase 10.1 percent or 1,680 over three years), and other sea turtles (which would increase 7.1 percent or one sea turtle over three years) (Table 4.21 and Table 4.22). The net ecological benefit of combining the closures with redistribution of effort would be an 8.4 percent decline in leatherback sea turtle interactions (~41 leatherback sea turtles from 2001 – 2003, or 14 per year), a 3.1 percent decline in loggerhead interactions (~ six loggerheads from 2001 – 2003, or two per year), a 13.6 percent decline in BFT discards (~220 BFT from 2001 – 2003, or 73 per year), a 1.7 percent decline in white marlin discards (~53 white marlin from 2001 – 2003, or 18 per year), and a 6.7 percent decline in blue marlin discards (~164 blue marlin from 2001 – 2003, or an average of 55 per year) (Table 4.21 and Table 4.22). Thus, the overall benefit would be greater for a seasonal closure than a year-round closure. In particular, the seasonal closure would potentially decrease leatherback and loggerhead sea turtle interactions, BFT discards, and blue and white marlin discards. However, the overall reduction in bycatch for most species was relatively low when combining closures, resulting in some ecological benefit to most species. Although discards of some species may decline with combined seasonal closures of alternatives B2(a) and B2(b), the positive ecological impacts would be offset by an increase in discards of other species. In addition, NMFS must also consider the social and economic impacts of such combination of closures (see discussion below).

With redistribution of effort, combining alternative B2(d) and B2(e) year-round would increase discards of white marlin, spearfish, pelagic sharks, LCS, and loggerhead sea turtles (Table 4.5 and Table 4.23). Discards of pelagic sharks and LCS, in particular, are predicted to increase by 65 percent and 102 percent, respectively, because these species are discarded at much higher rates in the Atlantic than in the Gulf of Mexico. Redistributing a large amount of effort from the Gulf of Mexico into the Atlantic would thus increase discards of these and other species. The only species for which there would be a substantial positive benefit would be BFT and leatherback sea turtles; 35.2 fewer dead discards of BFT are predicted, and leatherback sea turtle interactions would decrease by 30.2 percent over three years or an average of 50 fewer interactions per year (Table 4.5, Table 4.15, Table 4.23, and Table 4.24).

In addition to proposing new closed areas, NMFS initially considered modifying current or existing time/area closures (alternatives B3(a) and B3(b); see Section 2.1.2). In general, closed areas considered for modification (*i.e.*, partial re-opening) were chosen based on examining the HMS logbook and POP data from 1997 through 1999. The data were analyzed in GIS, allowing NMFS to identify areas associated with minimal bycatch within current time/area closures for re-opening (*e.g.*, Figure 4.3, Figure 4.14, and Figure 4.15). The overall goal was to modify existing areas, if possible, using the latest analysis techniques and technology available to NMFS, while minimizing bycatch and maximizing catch of retained species. This is especially pertinent for target species such as swordfish, where the United States is currently not fully utilizing its swordfish quota. In addition, due to the natural variability of many of the HMS fisheries, it may be necessary to change or refine the boundaries of time/area closures over time to reduce bycatch of non-target species.

Given that fishing effort and landings have declined in recent years, NMFS considered modifying existing closures to increase the opportunity to harvest the swordfish quota (Figure 4.3). In addition, if new time/area closures were to be implemented, then NMFS wanted to consider possible ways to offset those additional economic impacts by lifting restrictions in areas that had minimal bycatch. Originally four modifications to existing time/area closures were considered: B3(a) (the Charleston Bump), B3(b) (the Northeastern United States (NEC)), B3(c) (the Florida East Coast (FEC)), and B3(d) (DeSoto Canyon) (Figure A.2 in Appendix A). However, only alternatives B3(a) and B3(b) were further analyzed because they minimized bycatch while maximizing retained catch when compared to the other two alternatives (see Chapter 2 and Tables A.22 through A.27 in Appendix A). For each modification further analyzed, NMFS considered the bycatch and retained species catch that would be affected by re-opening a portion of a current closure (Table 4.25 through Table 4.30). In addition, NMFS considered the size of swordfish caught in the portions that would remain closed to the size of swordfish in the areas that were considered for reopening (Table 4.31).

Alternative B3(a) would modify the Charleston Bump time/area closure boundary to include only those areas shoreward of the axis of the Gulf Stream. The remaining areas seaward of the axis of the Gulf Stream would be reopened from February 1 through April 30. The B3(a) modification area (*i.e.*, the hatched area in Figure 4.3) was chosen because a minimal increase in bycatch would be expected with the 0.5 percent predicted increase in fishing effort associated with this re-opening, based on 1997 – 1999 logbook data and fishing practices from that time. For instance, the largest increase in discards would be for blue marlin (0.7 percent; Table 4.25) whereas no increase is predicted for interactions for leatherback or other sea turtles (Table 4.25). In addition, there was minimal increase in retained catch associated with modifying the Charleston Bump. There was a predicted increase in swordfish catches of 1.1 percent and yellowfin tuna catches of 0.16 percent (Table 4.27). The majority of the bycatch from 1997 – 1999 occurred in the portion that would remain closed (*i.e.*, the shaded area of Figure 4.14 and Figure 4.15; Table 4.25). For instance, the highest increase in bycatch would be expected for sailfish (3.0 percent), spearfish (2.4 percent), and white marlin (2.0 percent) (Table 4.25). On average, the area considered for re-opening in B3(a) would have an increase in bycatch of 0.5 percent whereas the predicted average bycatch associated with the area that would remain closed was 2.7 percent (Table 4.25). Thus, by using refined GIS maps (see Figure 4.14 and Figure 4.15) that were not available to NMFS when the time/area closures were first implemented, NMFS is now able to identify and refine areas of higher bycatch within current time/area closures.

As described above, NMFS considered re-opening existing closures in conjunction with new time/area closures (Table 4.5). Such combinations would help balance social and economic impacts of additional closures, while mitigating any potential negative ecological impacts of opening or modifying existing time/area closures. Year-round closures of B2(a) and B2(b) in combination with the B3(a) modification would potentially result in increases of bycatch of all species considered except sea turtles and BFT. Leatherback sea turtles interactions and BFT discards would decline by slightly more than 20 percent (Table 4.5). However, seasonal closures of the B2(a)/B2(b) in conjunction with the B3(a) modification would result in a decrease, albeit small (on average, 5.5 percent), in bycatch of all species considered except sailfish (Table 4.5). This could result in small, but net positive ecological impacts. Similarly, NMFS considered B3(a) in conjunction with the B2(d)/B2(e) year-round closure. This combination could result in decreases of discards for blue marlin, sailfish, spearfish, leatherback sea turtles and BFT (Table 4.5). However, it could also result in increases of discards for white marlin, and loggerhead sea turtles (Table 4.5). Therefore, the ecological effects of such a combination would be variable.

Alternative B3(b) would modify the existing Northeastern U. S. closed area to allow the use of PLL gear in areas west of 72° 47’ W Longitude during the month of June. This area was mainly considered as a way to refine the Northeastern U. S. closed area and re-open areas where there were few swordfish or BFT discards (Figure 4.14 through Figure 4.16; Table 4.28). Based on fishing effort from 1997 – 1999 before the closures went into effect (taken from logbook data from 1997 – 1999), there could be an estimated 0.2 percent increase in fishing effort associated with this modification. However, this modification could result in additional fishing effort given management actions that have taken place since 2000 (*i.e.*, time/area closure put into place in 2000). While there is a predicted minimal increase in retained catch, there would be virtually no increase in bycatch associated with this modification (Table 4.26 and Table 4.28). For example, there is only one predicted BFT discard associated with this modification (Table 4.28). Discards of sailfish and sea turtles are not predicted to increase. Thus, such a modification would have minimal to no ecological impact.

Since the bycatch associated with B3(b) was essentially zero (Table 4.5 and Table 4.26), combinations of this modification with any time/area closure would mirror the benefits in bycatch reduction associated with the particular time/area closure. For instance, seasonal closures of B2(a)/B2(b) in conjunction with the B3(b) modification could result in small decreases (on average, six percent), in bycatch of all species considered except sailfish (Table 4.5). This could result in a small, but net positive ecological impact. NMFS also considered a combination of B3(b) with year-round closures of B2(a)/B2(b). However, this combination resulted in a higher number of discards (with the exception of sea turtles and BFT) than the combination with seasonal closures (Table 4.5). When B3(b) was considered in conjunction with the B2(d)/B2(e) closure, there could be increases in bycatch for white marlin, spearfish, and loggerhead sea turtles (Table 4.5). Decreases in bycatch could be seen for blue marlin, sailfish, leatherback sea turtles, and BFT. So, as with the B2(d)/B2(e) closure, this modification in combination with this closure could have variable ecological effects.

As described in Chapter 2, alternative B4 would implement year-round complementary HMS management measures in the Madison-Swanson and Steamboat Lumps Marine Reserves, consistent with the recommendations of the Gulf of Mexico Fishery Management Council (GMFMC) (Figure 4.4). Specifically, this alternative would prohibit all HMS-permitted vessels from fishing or deploying any fishing gear in the marine reserves from November through April. From May through October, surface trolling would be the only HMS fishing activity allowed. Surface trolling is defined as fishing with lines trailing behind a vessel that is in constant motion, at speeds in excess of four knots, and with a visible wake (in accordance with the Southeast regional regulations, 622.34(k)(5), NMFS is adopting the same definition for surface trolling in the final rule associated with this document). Such surface trolling may not involve the use of down riggers, wire lines, planers, or similar devices. The two marine reserves are located shoreward of the Desoto Canyon Closed Area (see Section 2.1.2).

At a July 14 – 17, 2003, meeting, the Gulf Council approved a six-year extension of these two marine reserves, originally implemented in 2000, to protect spawning aggregations of gag grouper. An Environmental Assessment (EA) describing the ecologic, economic, and social impacts associated with the marine reserves was prepared and submitted to the Secretary in August 2003. On September 3, 2003, NMFS received a formal request from the Gulf Council for the Secretary to implement "compatible" regulations for HMS fisheries in these two areas. The final rule, effecting non-HMS fishing activities, published in the Federal Register on May 4, 2004 (69 FR 24532), and became effective on June 3, 2004. It will expire on June 16, 2010. The complementary HMS management measures described above in alternative B4 would similarly expire on June 16, 2010.

The purpose of this alternative is to implement compatible HMS regulations in the Madison-Swanson and Steamboat Lumps Marine Reserves to provide, as described in the EA prepared by the GMFMC (August 2003), protection for spawning aggregations of gag grouper to prevent overfishing, improve spawning success, protect a portion of the offshore population of male gag grouper, and facilitate continued evaluation of the effect and usefulness of marine reserves as a fishery management tool. These two marine reserves were originally implemented in 2000 by the Gulf Council (for Gulf species) in response to a determination by NMFS that gag grouper were experiencing overfishing and scientific information indicating that the proportion of male gag had declined substantially since the 1970s. A four-year timeframe for the reserves was initially established in 2000, so that their effects could be evaluated before deciding whether to continue with the marine reserves. In 2002, NMFS reclassified gag grouper as neither overfished, nor undergoing overfishing. However, the stock was not at optimum yield. Therefore, the Gulf Council voted to extend the marine reserves an additional six years, for a total of ten years, and to request compatible HMS management measures. This alternative would significantly reinforce the protections afforded gag grouper and other Gulf reef species by closing a potential loophole whereby vessels can currently fish for HMS in the marine reserves. Closing this loophole should provide a better opportunity to evaluate the effectiveness of the marine reserves as a fishery management tool.

As described in the EA (GMFMC, 2003), anticipated conservation benefits of the marine reserves include the protection of seasonal spawning aggregations of gag grouper, and the year-round protection of a portion of the male gag grouper population. Other reef species that may also benefit from the marine reserves include red grouper, snowy grouper, red snapper, silk snapper, vermillion snapper, scamp, speckled hind, red porgy, knobbed porgy, triggerfish, greater amberjack, honeycomb moray, and bank sea bass. A complete description of the ecological benefits for Gulf reef fish is provided in the EA (GMFMC, August 2003) and is not repeated here. Although this alternative is not specifically intended to provide protection for HMS, it could provide some minor ancillary conservation benefits for HMS as a result of the year-round prohibition on HMS fishing activities in the reserves (except for surface trolling from May through October). Any positive ecological impacts on HMS are expected to be minimal because there has been little reported or observed HMS fishing effort in the area in recent years; however, such complementary management measures would help prevent future potential increases in fishing efforts, thus offering protection to the gag grouper spawning aggregations until 2010. From 1997 to 2003, only one PLL set and one bottom longline set were reported in the HMS logbook in these areas. Both sets occurred in the Madison-Swanson site. Four swordfish were kept on the PLL set, and eight swordfish were discarded. There were no reported HMS caught on the bottom longline set, and there were no new PLL or bottom longline sets recorded in 2004. One bottom longline vessel carried an observer onboard in the Madison-Swanson site. The observed set occurred in 1996 and kept eight sandbar sharks (CSFOP data). No new sets were recorded for the CSFOP in 2004. In summary, NMFS anticipates positive ecological benefits for gag grouper and other Gulf reef species. Any conservation benefits for HMS, however, are expected to be minor for several reasons, but are expected to enhance the protection for spawning gag grouper aggregations. Because the closure areas are relatively small, any HMS fishing activity that otherwise would have occurred in these areas would likely relocate to nearby open areas with similar catch rates. Furthermore, because possession of Gulf reef species is already prohibited within the areas (except when transiting), bottom longline sets targeting both sharks and Gulf reef species have already likely decreased since initial implementation of the reserves in 2000. Finally, recreational and charter/headboat fishing trips for HMS in the marine reserves are not likely to be significantly curtailed due to the allowance for surface trolling from May through October, which are the prime fishing months.

Preferred alternative B5 would establish criteria for regulatory framework adjustments to implement new time/area closures or make modifications to existing time/area closures. These adjustments would allow NMFS would to implement and/or modify time/area closures through proposed and final rulemaking through a framework action rather than adjusting the HMS FMP amendment. The criteria would provide a more definitive process for the establishment or modification of time/area closures while allowing for greater transparency and predictability in the decision making process. Criteria that would be considered may include, but are not limited to, the following: any ESA-related issues, concerns, or requirements including applicable Biological Opinions; bycatch rates of protected species, prohibited HMS, or non-target species both within the specified or potential closure area (s) and throughout the fishery; bycatch rates and post-release mortality rates of bycatch species associated with different gear types; applicable research; new or updated landings; bycatch and fishing effort data; social and economic impacts; and the practicability of implementing new or modified closures, including consistency with the FMP, Magnuson-Stevens Act, ATCA, and other applicable law. If the species is an ICCAT managed species, NMFS would need to determine the overall effect of the United States' catch on that species before implementing time/area closures. In these cases, other factors that NMFS would consider before implementing time/area closures include, but are not limited to, gear types and the location and timing of a closed area. NMFS would attempt to balance the ecological benefits with economic and social impacts. NMFS would also consider alternatives to closed areas, such as reducing quotas, mandatory gear modifications, or alternative fishing practices such as designated fishing days. Thus, before the implementation of a time/area closure, NMFS would determine that such a closure would be the best option for a given set of management goals, consistent with the FMP, the Magnuson-Stevens Act, and applicable law.

Ultimately, the criteria are aimed to develop smaller, more focused time/area closures that maximize bycatch reduction and catch of retained species. While new time/area closures or modifications to current closures may have ecological, social, and economic impacts, the criteria themselves would not be expected to have positive ecological impacts and minimal, to the extent practicable, economic and social impacts.

The primary goals of time/area closures are to maximize the reduction of bycatch or non-target and protected species while minimizing the reduction in the catch of target species. However, closures are not the only means of addressing bycatch and in some cases may increase bycatch (see Table 4.5). Bycatch in and of itself would not necessitate implementation of a time/area closure. However, if the HMS stock was either overfished and/or experiencing overfishing; the bycatch is a prohibited, threatened or endangered species; no other option exists to reduce interactions in the time period required; and analyses indicate that an appropriate time/area could be designed that would not significantly increase bycatch of other species, then NMFS may consider a time/area closure. In such cases, NMFS could include time/area closures as part of a rebuilding plan for overfished species and/or serve as a method for decreasing interactions with protected species.

If the public believes that modification to an existing time/area closure or the establishment of a new time/area closure is warranted based on these criteria, they can submit a petition for rulemaking to NMFS. A petition for rulemaking should contain sufficient information for NMFS to consider the substance of the petition. For a petition regarding a new time/area closure or a change or modification to an existing time/area closure, pursuant to 5 U.S.C. § 553(e), the petition should, at a minimum:

- Indicate the area that should be considered as a time/area closure or the current time/area closure that should be modified
- Identify which criteria warrant the addition or modification of a time/area closure
- Provide data, information, etc., relevant to those identified criteria
- State the resources necessary to develop the proposed regulations
- Explain the interest of the petitioner in the action requested
- Indicate the size of the population affected (*i.e.*, who is affected by the action)
- Indicate the public interest in the proposed regulation
- Explain the importance of the action requested to promoting NMFS' established priorities and policies.

During the comment period, NMFS heard from commenters and the peer reviewers that the Agency should design a "decision matrix" that could help to guide the choices that NMFS would have to make between different closures and different species. This request is interpreted to mean that NMFS should decide whether, for example, it is more important to protect spawning BFT during particular times and areas than leatherback sea turtles. If NMFS decided that were the case, then an area would be closed to protect spawning BFT even though it could potentially increase takes of leatherback sea turtles. Related to this idea of a decision matrix, some commenters noted that NMFS should set bycatch reduction goals. For example, NMFS would need to reduce BFT discards by some set percent; under this concept, NMFS would need to find ways to reduce BFT discards by the appropriate percent, possibly to the detriment of other species. Once that percent reduction was made, NMFS would no longer need to reduce BFT discards. Similarly, if NMFS implements measures that reduce BFT discards by more than the decided amount, NMFS could potentially relax some of the measures to bring the reduction down to the pre-decided level. Finally, NMFS received comments from commercial interests indicating that the bycatch reduction goals of the existing closures have already been met and, therefore, the Agency should reopen at least portions of the current closures.

During the rulemaking process that implemented the East Florida Coast, the DeSoto Canyon, and the Charleston Bump closures, NMFS heard similar comments from all interested parties (commercial, recreational, and environmental) that the Agency should establish bycatch reduction goals for all species. At that time, NMFS did not establish such goals, and stated that establishing pre-determined target reduction goals for specific species is inappropriate because it does not consider the impact on the remaining portion of the catch. This statement remains valid. While not a formalized decision matrix, NMFS used the analyses in the time/area closure section, which considered all species, to evaluate the effects of the potential time/area closures, including all species for a combination of closures. NMFS used the results of the analyses to guide the Agency in determining which management measures are appropriate at this time. NMFS, however, cannot place more value on one species over another species and believes that setting pre-determined or pre-set reduction goals in bycatch and/or discards will compromise NMFS' ability to consider multiple species. Consideration of the overall catch is critical when implementing a multispecies or ecosystem-based approach to management. Furthermore, while the Magnuson-Stevens Act provides NMFS the authority to manage all species, NMFS must balance the impacts of management measures on all managed species and my choose protections for one species to the detriment of protected or overfished species (*e.g.*, choosing to protect BFT even if sea turtle interactions may increase substantially). National Standard 1, which requires NMFS to prevent overfishing while achieving on a continuing basis, the optimum yield from each fishery for the United States fishing industry, clearly applies to all species and all fisheries. Similarly, National Standard 9, which requires NMFS to minimize bycatch and bycatch mortality to the extent practicable, applies to all species and fisheries. By not choosing a specific threshold or establishing a decision matrix, NMFS retains the flexibility to balance the needs of all the species encountered and the fishery as a whole. If NMFS is given a specific goal (*e.g.*, a jeopardy conclusion regarding the PLL fishery and leatherback sea turtles), this flexibility allows NMFS to close certain areas or take other actions to protect that specific species while also protecting, to the extent practicable, the other species and the rest of the fishery. Absent this flexibility, NMFS might potentially have to implement more restrictive measures to protect one species causing potential cascade effects (*e.g.*, closing one area may increase the bycatch of another species which could result in closing another area, etc.). This approach also provides NMFS with the flexibility to re-examine the need for existing closures and modify them appropriately based on the analyses rather than the attainment of a specific goal (*e.g.*, NMFS would not have to wait for 30 percent to be met; it could open the closure at 25 percent, depending on the result of reducing bycatch of other species or other consideration, as appropriate). This does not preclude NMFS from considering the establishment of a more formalized decision matrix in the future if such a matrix could be designed that would provide for the flexibility to consider all the species involved. This may be more appropriate when NMFS has a longer temporal dataset on the simultaneous effect of circle hooks and the current time/closures. At this time, NMFS believes that the criteria contained in the preferred alternative B5 provides the guidance needed, consistent with the Magnuson-Stevens Act and this FMP, to help NMFS make the appropriate decisions regarding the use of time/area closures in HMS fisheries.

Alternative B6 would prohibit the use of all bottom longline gear targeting HMS in an area southwest of Key West to protect endangered smalltooth sawfish (Figure 4.5). Smalltooth sawfish were listed under the ESA in 2001, but critical habitat has not yet been designated. NMFS has assembled a Smalltooth Sawfish Recovery Team (SSRT) comprised of researchers, managers, and representatives from constituent groups to develop a recovery plan for the U.S.

population of smalltooth sawfish. Once a plan is completed, NMFS may consider time/area closures to reduce sawfish interactions. Preliminary analysis of some of the SSRT data (Burgess, unpublished data) documented approximately 178 smalltooth sawfish interactions, mainly in state and Federal waters off the state of Florida, between 1990 and 2004. Of the 178, three (1.7 percent) were caught on hook and line, five (2.8 percent) were caught in shrimp trawl gear, and three were observed while people were swimming. All other interactions (167 out of 178 or 94 percent) occurred with shark bottom longline gear. The data represents a comprehensive data set that the SSRT has accumulated over time; however, it is preliminary and anecdotal in nature and will be formally analyzed by the SSRT. Therefore, NMFS focused on smalltooth sawfish interactions from the CSFOP, Gillnet, and POP, which represents more recent and well-documented data. In addition, most interactions with smalltooth sawfish have occurred with bottom longline gear. From 1994 – 2006, these combined observer programs only documented one interaction of smalltooth sawfish with gillnet gear in 2003 off the southeast coast of Florida, and only one smalltooth sawfish interaction was documented in the POP, which occurred during a bottom longline set. Therefore, since smalltooth sawfish seem to be much more susceptible to bottom longline gear, only bottom longline would be prohibited in this closure.

The interactions with smalltooth sawfish from 1994 to 2006 during the CSFOP are shown in Figure 4.5 (these interactions were specific to observed interactions from the CSFOP and bottom longline gear unlike the SSRT data). A total of 12 smalltooth sawfish were observed on bottom longline gear (out of 1,563 total observed sets) from South Carolina to the west coast of Florida. Given how widely dispersed and few in number the interactions with smalltooth sawfish were, NMFS tried to choose the smallest area possible that would encompass the highest number of interactions. The result was a 49 $nm^2$ area off the southwest tip of the Key West (Figure 4.5). This area encompasses 18 of the 1,563 total observed sets and is where five of the 12 smalltooth sawfish were observed caught with bottom longline gear from 1994 to 2006.

While this area is small compared to the other closures being considered for other species and could have a positive ecological impact percentage-wise (*i.e.*, upwards of 42 percent or five out of 12 observed interactions), it still translates into five individuals. In addition, this high percentage of bycatch reduction would depend on whether sawfish occur regularly in the area or whether the high number of interactions observed during 1997 was an anomaly. There have been no observed interactions in the area since 1997 (*i.e.*, nine years), and only a total of seven observed interactions occurred since 1997 through 2006 in different areas (1 in 1999, 1 in 2002, 1 in 2003, 2 in 2005 and 2 in 2006; Figure 4.17). Of the five observed sawfish interactions that occurred in this area on BLL gear, four were on a single set, highlighting the episodic nature of sawfish interactions. Additionally, 11 of 12 sawfish were released alive, and one was released in unknown condition. The one sawfish observed caught in the shark gillnet fishery was also released alive. Given the limited amount of data available, it is difficult to determine whether the area being considered would result in overall reduction in interactions, or whether sawfish exhibit a higher degree of mobility, and are as likely to be caught in other areas. If the latter is the case, then such a closure could redistribute effort into areas where there are higher interactions with smalltooth sawfish and cause increases in these interaction rates. The SSRT is currently in the process of identifying sawfish critical habitat, which may be helpful in determining an appropriate closure area in the future.

Alternative B7 would prohibit the use of PLL gear in all HMS fisheries. Prohibiting the use of PLL gears would likely have positive ecological benefits on HMS, non-target HMS, and protected species. The number of discards would potentially be reduced by 1,047 white marlin, 816 blue marlin, 343 sailfish, 141 spearfish, 11,340 pelagic sharks, 5,524 LCS, 165 leatherback sea turtles, 60 loggerhead sea turtles, and 539 BFT annually (Table 4.11; annual discards were estimated by dividing the total from 'All Areas' by three). The number of retained species would also be reduced by a significant amount. The number of fish kept would be reduced by 42,500 swordfish, 200 BFT, 55,734 yellowfin tuna, 12,378 bigeye tuna, and 75, 385 BAYS annually (Table 4.11). However, elimination of this retained catch would result in substantial negative social and economic impacts as described below. In addition, any ecological benefits may be lost if ICCAT reallocates U.S. quota to other countries that may not implement comparable bycatch reduction measures as the United States. The PLL fishery has undergone many management measures to reduce bycatch including circle hooks implementation, live bait restrictions in the Gulf of Mexico, no targeted catch of billfish and BFT, time/area closures, and safe handling and release protocols for protected resources. These restrictions have been successful. Methods that have been employed and designed by U.S. PLL fishermen, such as circle hooks and safe handling and release protocols for protected resources, are being transferred around the world to reduce bycatch world-wide. Therefore, this alternative could ultimately provide support for the fisheries of other countries that do not implement conservation and bycatch reduction measures.

Lastly, the alternatives considered in this section are not expected to have any negative impacts on essential habitat or protected resources. The preferred alternative, B4, will help protect spawning aggregations of gag grouper, and therefore, would be expected to have a positive impact on essential fish habitat for these species. In addition, any potential impacts to protected resources (*i.e.*, leatherback and loggerhead sea turtles) were discussed for each alternative. However, since no closures were preferred at this time, except the Madison-Swanson and Steamboat Lumps Marine Reserves, and the other preferred alternative, B5, would establish criteria to implement and/or modify closed areas in the future, no impacts on protected resources are anticipated at this time.

*Social and Economic Impacts*

Each of the alternatives considered for time/area closures would have varying degrees of social and economic impacts. To determine the potential impacts, NMFS estimated the amount of fishing effort (number of hooks), total number of vessels, landings of retained species, and total loss or gain in gross revenues for each species that would be affected by any new closure with and without redistribution of fishing effort. A similar approach was used to predict the economic impact of any potential modifications to existing closures. To estimate the loss (or gain) in gross revenues for a single species, NMFS first estimated the total weight (lb dw) of each species harvested by PLL gear only (Table 4.32) based on data from Section 3.4.5, and then calculated the total weight lost or gained for each species as a result of the closure. Total weight for each species was then multiplied by the average ex-vessel price ($/lb dw) by area based on 2003 prices (Section 3.5.1). The gross revenues for all species were then added together to estimate a total annual loss or gain in gross revenues as a result of the closure. As described above, not considering redistribution of fishing effort assumes that all fishing effort within the time/area closures alternative is eliminated (and not transferred outside the closure). While this may not be realistic, it provides a worst-case scenario of the potential economic impacts of any new closure(s). The redistribution of effort analysis, on the other hand, assumes that all fishing effort is displaced into open areas, which also may not be realistic given that a closure of a prime fishing area may force some fishermen out of business, to switch fisheries, or that some fishermen may relocate nonrandomly, etc. Overall effort may also increase slightly if there is a need to compensate for increased operating costs. Therefore, the actual result may lie somewhere in between. NMFS considered both estimates because they provide a range of potential economic impacts depending upon the response of the PLL industry. As mentioned above, the NEFMC is aware of different econometric optimization models to predict impacts of time/area closures (*e.g.*, NEFMC, 2003). However, such models are not currently designed to be used for the current HMS PLL fishery. Therefore, NMFS chose to evaluate the economic impacts of different closures based on the redistribution of effort model described in this rulemaking.

During the Draft HMS FMP, 2004 ex-vessel prices and 2004 dollars were not available. However, subsequent to the Draft HMS FMP, these values have become available, and NMFS analyzed the potential cost and/or gain to the PLL fishery associated with the implementation of each closures and modification. Total weight for each species was multiplied by the average ex-vessel price ($/lb dw) by area based on 2004 prices (Section 3.5.1). The total 2004 annual loss or gain to the fishery was calculated by converting the 2003 total gross revenues into 2004 dollars (2003 value was multiplied by 1.0266). Therefore, the total gain or loss associated with 2004 is similar to what was seen in 2003. These results are shown in Table 4.33, Table 4.34, and Table 4.35.

The estimates of gross revenues lost or gained as a result of a closure do not take into account additional costs that may be incurred by having to relocate to new fishing grounds. These costs may be substantial. For example, alternative B2(d), a closure of nearly the entire Gulf of Mexico, would likely require fishermen to move to the Atlantic, resulting in relocation costs, additional travel and fuel costs, additional crew costs, losses to fish dealers and distributors, and other associated social and economic costs. Other impacts may include intense competition for existing resources as fishermen are forced into smaller open areas resulting in potential gear conflicts, shifting to other fisheries, or fishermen going out of business. There may also be a concern for species whose landings are predicted to rise substantially with redistribution of effort, and whether those species can sustain a large increase in harvest.

NMFS also examined the impacts of each of the alternatives on gross vessel revenues based on the number of vessels that reported fishing in potential closed areas from 2001 to 2003 (Table 4.36), as well as the number of vessels per state potentially impacted by a particular closure (Table 4.37). This information was also updated with finalized data from January through June 2004 when J-hooks were still being used. However, since this is only six months of data, the information is provided in Table 4.36 and Table 4.37, but is not included in the discussion below.

Alternative B1, the No Action alternative that would maintain existing closures has, and would likely continue to have, negative economic impacts on the PLL industry revenues, relative to pre-closure revenues. As described earlier, when comparing pre- and post-closure logbook reported data, the existing closures may have contributed to the reported 15 percent decline in fishing effort (Table 4.8), and the ten percent decline in the number of directed and incidental limited access permits from 1,275 permits in 2001 to 1,144 permits in 2005 (Table 3.92 in Section 3.9.2). The number of retained species kept has declined by 37.4 percent for bigeye tuna, 27.9 percent for swordfish, 23.5 percent for yellowfin tuna, and 25.1 percent for BAYS tunas (Table 4.6). In addition, there are a number of other species that are frequently retained by PLL fishermen, and landings of these species have also been declining (Table 4.7). For example, the number of pelagic sharks kept declined by 18.9 percent, LCS by 38.9 percent, dolphin by 25.9 percent, and wahoo by 25 percent. Although an exact figure is not available, the estimated annual loss in gross fishery revenues when compared to other alternatives with similar reductions in retained species may have been in the millions of dollars. However, the decline in landings reflect the period immediately after the closures were implemented, and do not reflect continuing loss of revenue into the future for the fishery.

Another factor which may have impacted the landings and effort is the implementation of a mandatory circle hook requirement for the PLL fishery in 2004 (69 FR 40734). Preliminary analyses of the logbook data from July to December of 2004 against the same time period for 1997 – 1999 (pre-closures) and 2001 – 2003 (post-closures) indicate that landings and discards of most retained species and bycatch have declined (Tables A.34 and A.35 in Appendix A). Percent declines reported in this analysis should be considered preliminary as it is based on only six months of data post circle hook implementation.

A number of factors may be contributing to the decline in permits and overall fishing effort including, but not limited to: (1) the time/area closures implemented in 1999 to 2002; (2) a decline in ex-vessel prices for swordfish and some tunas (Table 3.65 in Section 3.5) in combination with increasing fuel and operational costs that may have forced fishermen to curtail fishing effort; and (3) fishermen transitioning to other fisheries to adjust for declining revenues. It is unclear at this point whether the decline in fishing effort and number of permits will continue, or whether the fishery has stabilized at its current level. Given the North Atlantic swordfish stock is estimated to be at 94 percent of $B_{MSY}$ (SCRS, 2004), overfishing is no longer occurring, and there have been large underharvests in recent years resulting in an ever larger quota, it is possible that effort may stabilize and possibly increase despite the existence of current time/area closures.

Alternative B2(a), a closure in the Gulf of Mexico from May through November each year, would potentially impact a total of 61 vessels that reported fishing in the area from 2001 – 2003, or an average of 46 vessels per year (Table 4.36). A total of 2,918 sets were reported from 2001 – 2003, or an average of 973 sets per year (Table 4.36). Without redistribution of effort, alternative B2(a) would potentially result in an 11.4 percent decline in fishing effort, and reductions in landings of retained species ranging from a minimum of 1.1 percent for bigeye tuna to a maximum 14.3 percent for yellowfin tuna. For yellowfin tuna, the most lucrative species affected by a Gulf of Mexico closure, this would amount to a loss of $1,796,654 in annual gross revenues based on Gulf of Mexico prices (Table 4.33). Swordfish landings would potentially decrease by 3.1 percent for a loss of approximately $423,382, BFT landings would decrease by 6.7 percent for a loss of $60,791, and bigeye tuna landings would decrease by 1.1 percent for a loss of approximately $18,190 (Table 4.33). Thus, the combined total loss in gross revenues for alternative B2(a) without redistribution of effort would be approximately $2,299,018 annually (Table 4.33), or $49,978 per vessel annually ($2,299,018 / 46 vessels). Of the three major states bordering the Gulf of Mexico with vessels permitted to fish for HMS with PLL gear (Florida, Louisiana, Texas), Louisiana had the highest number of vessels (40 out of 61, or 66 percent) that fished in the area from 2001 – 2003 (Table 4.37). The vessels with homeports in Louisiana also reported a majority (88 percent) of all sets in the area. There were some changes in anticipated losses from B2(a) when 2004 prices were considered. The ex-vessel price for BFT went down in the Gulf region for 2004, unlike the price of swordfish, yellowfin or bigeye tuna (Table 4.33). Therefore, the loss associated with BFT was less using 2004 ex-vessel prices, whereas the greatest loss was anticipated for yellowfin tuna followed by swordfish (Table 4.33).

With redistribution of fishing effort, alternative B2(a) is predicted to result in an increase in all retained species landings and gross revenues except yellowfin tuna, which are predicted to decrease by 1.1 percent for a loss of approximately $138,204 annually (Table 4.33). Swordfish landings, on the other hand, would potentially increase by 9.1 percent for a gain in gross revenues of $1,242,832. Similarly, bluefin and bigeye tuna gross revenues are predicted to increase by $27,871 and $42,997 respectively (Table 4.33). Thus, the combined total gain in gross revenues for alternative B2(a) with redistribution of effort would be approximately $1,175,496 annually (Table 4.33), or $25,554 per vessel annually ($1,175,496 / 46 vessels). The analysis based on 2004 prices indicated that the largest gain in gross revenues would come from increase swordfish catch whereas the biggest loss in gross revenues would be from decreased yellowfin tuna landings (Table 4.33). Gross revenues from increased landings of BFT would be less in 2004 compared to 2003, but there would be an increase in gross revenues with 2004 ex-vessel prices associated with bigeye tuna landings (Table 4.33).

These results reflect differences in abundance and CPUEs for different HMS in different regions, and the variability in landings and economic estimates with redistribution of effort. For example, the entire Gulf of Mexico accounted for 68.8 percent of all yellowfin tuna landings, 57.6 percent of all BFT landings, but only 22.8 percent of all swordfish landings from 2001 – 2003 (Table 4.38). As a consequence, with redistribution of effort outside of the Gulf of Mexico, yellowfin tuna landings would be expected to decrease and swordfish landings to increase. However, one potential economic incentive would be reducing the interaction with non-target HMS and protected species. For instance, the Gulf of Mexico also accounted for the highest interactions of non-target HMS species, such as 62.8 percent of the leatherback sea turtle interactions (Table 4.39). Moving fishing effort out of this area could reduce interactions with protected resources; however, this may result in unanticipated interactions with other non-target and/or protected species in the Atlantic and high seas. In the event that effort is displaced into open areas of the Gulf of Mexico only, NMFS analyzed the landings from alternative B2(a) in comparison to landings from the Gulf of Mexico only (as opposed to overall landings from the Atlantic and Gulf of Mexico). Without redistribution of effort, landings of all retained species are predicted to decrease with a total loss in gross revenues of $5,003,298 (Table 4.35), or $108,767 per vessel annually ($5,003,298 / 46 vessels). This equated to -$5,136,386 in 2004. With redistribution of effort, there would be an increase in all retained species kept except bigeye tuna resulting in a predicted increase in gross revenues of $679,212 (Table 4.35), or $14,765 per vessel annually ($679,212 / 46 vessels). Incidentally caught BFT and targeted bigeye tuna are the only two species for which landings are predicted to decrease by 0.8 percent and 8.7 percent, respectively, with redistribution of effort in the Gulf of Mexico only. However, since the 2004 ex-vessel price of BFT went down in the Gulf of Mexico, the loss associated with decreased BFT landings was less than in 2003. However, the loss associated with bigeye tuna using 2004 ex-vessel prices was larger, due to the increase in ex-vessel prices for bigeye tuna in the Gulf of Mexico in 2004. Thus, the predicted economic impacts to gross revenues for the fleet could range from a loss of approximately $5.1 million to a gain of approximately $1.2 million (Table 4.35).

The apparent increase in landings and gross revenues for several of the species with redistribution of effort in the Gulf of Mexico only is somewhat surprising, and may point to the fact that tunas other than bluefin and bigeye tuna are more likely to be caught outside the alternative B2(a) area. This may indicate that fishermen are targeting not only yellowfin tuna, which has the highest overall economic value, but also BFT. In other words, even though catches of yellowfin tuna may be higher outside the alternative B2(a) area, fishermen may be targeting the area for the increased opportunity to catch an occasional BFT. The incidental catch limit in all areas, at all times, is 2,000 lb to retain one BFT, 6,000 lb to retain two BFT, and 30,000 lb to retain three BFT. The analysis of both the observer program and logbook data indicates that the central Gulf of Mexico is one of the prime areas for BFT discards, as well as bluefin and yellowfin tuna landings. NMFS is concerned about the potential negative economic impacts of closing this prime fishing ground for tunas as well as indications that PLL vessels may be targeting BFT (as incidental only species). By comparison, alternative B2(b) could result in a much higher reduction in BFT discards, with a much lower decrease in overall landings than alternative B2(a). Additionally, anecdotal information suggests that a proportion of the Gulf of Mexico PLL fishing fleet is comprised of Vietnamese fishermen, who may be reluctant to leave their traditional homeports and would likely stay in the Gulf of Mexico (Wilson *et al*., 1998; NMFS, 2004), perhaps making a redistribution model of effort in the Gulf of Mexico more realistic. Closing this area could thus have potential social impacts in addition to economic impacts.

Alternative B2(a), and most of the other time/area closures described in this section, could have numerous social impacts ranging from disruption of local fishing communities to relocation of vessels and homeports, loss of crew, and other social hardships associated with loss of income. A majority of the vessels (66 percent) impacted by alternative B2(a) have a homeport in Louisiana (Table 4.37), whereas 23 percent have a homeport in Florida and 11 percent have a homeport in Texas. Depending on the extent of redistributed fishing effort, revenues could range from a loss of $5.1 million to a gain of approximately $1.2 million (Table 4.35). Thus, the homeports and communities associated with those homeports in TX, LA, and FL could experience either loss of fishery revenues and social hardship associated with the loss, or they could potentially benefit from increased revenues. Given that this is the smallest closure considered for the Gulf of Mexico, the types of impacts described above would be similar for most other alternatives, although the scale of impacts from other alternatives considered would likely be greater.

Alternative B2(b), would potentially impact a total of 20 vessels that fished in an area of the Northeast from 2001 – 2003, or an average of 10 vessels per year. There were a total of 226 sets reported from 2001 – 2003, or an average 75 sets per year (Table 4.36). Without redistribution of effort, alternative B2(b) would potentially result in a 0.9 percent decrease in fishing effort, with reductions in landings of retained species ranging from a minimum of 0.3 percent for yellowfin tuna to a maximum 1.8 percent for incidentally caught BFT (Table 4.15). Swordfish landings would potentially decrease by 1.5 percent for a loss of approximately $231,252, yellowfin tuna landings would decrease by 0.3 percent for a loss of $27,102 and bigeye tuna landings would decrease by 1.5 percent for a loss of approximately $26,011. Thus, the combined total loss in gross revenues for a alternative B2(b) closure without redistribution of effort would be approximately $299,120 annually (Table 4.33), or $29,912 per vessel annually ($299,120 / 10 vessels). In general, the loss associated with decreased landings from B2(b) increased for all species when 2004 prices were considered (Table 4.33). This was due to an increase in ex-vessel prices for these species in 2004 in the North Atlantic region. Vessels with homeports in ten different states reported landings from the area in 2001 – 2003, with the highest number of vessels from New York (Table 4.37).

With redistribution of fishing effort, alternative B2(b) was predicted to result in a decrease in all retained species landings and gross revenues except yellowfin tuna, which are predicted to increase by 0.9 percent for a predicted gain of approximately $81,306 annually (Table 4.33). Swordfish landings would potentially decrease by 0.8 percent for a loss in gross revenues of $123,334, and bigeye tuna and incidental BFT gross revenues are predicted to decrease by $20,809 and $9,837 annually, respectively. Thus, the combined total loss in gross revenues for alternative B2(b) with redistribution of effort would be approximately $72,675 annually (Table 4.33), or $7,267 per vessel annually ($72,675 / 10 vessels). Using 2004 prices, a greater gain in gross revenues was predicted for yellowfin tuna with the consideration of redistribution of effort (Table 4.33). However, a greater loss was predicted for swordfish, BFT, and bigeye tuna, resulting in a total loss of $74, 608 for 2004 (Table 4.33).

Alternative B2(c), would potentially impact a total of 75 vessels that fished in the area from 2001 – 2003, or an average of 64 vessels per year. A total of 12,623 sets were reported from 2001 – 2003, or an average of 4,207 sets per year (Table 4.36). Without redistribution of effort, alternative B2(c) would potentially result in a 13.4 percent decrease in fishing effort, and reductions in landings ranging from a minimum of 0.2 percent for bigeye tuna (kept) to a maximum 29.0 percent for incidentally-caught BFT (kept) (Table 4.15). For yellowfin tuna, the most lucrative species affected by alternative B2(c), a 19.8 percent reduction in landings would amount to an estimated loss of $2,483,678 annually based on Gulf of Mexico prices (Table 4.33). Swordfish landings would potentially decrease by 2.8 percent for a loss of approximately $384,981, and incidental BFT landings would decrease by 29.0 percent for a loss of approximately $263,563 annually (Table 4.33). Thus, the total loss in gross revenues for alternative B2(c) without redistribution of effort would be approximately $3,136,229 annually (Table 4.33), or $49,003 per vessel annually ($3,136,229 / 64 vessels). As with B2(a), there were some changes in anticipated losses from B2(c) when 2004 prices were considered. The ex-vessel price for BFT went down in the Gulf region for 2004, unlike the price of swordfish, yellowfin or bigeye tuna (Table 4.33). Therefore, the loss associated with decreased BFT was less using 2004 ex-vessel prices whereas the greatest loss was anticipated for yellowfin tuna followed by swordfish (Table 4.33). Similar to alternative B2(a), a majority of the vessels that would be affected by the closure were from Louisiana (Table 4.37).

With redistribution of fishing effort, alternative B2(c) is predicted to result in a decrease in bluefin and yellowfin tuna landings of 18.3 and 11.0 percent respectively, for estimated losses of approximately \$166,040 and \$1,382,042 annually (Table 4.33). Swordfish and bigeye tuna landings would potentially increase by 21.1 and 11.4 percent respectively for a gain in gross revenues of approximately \$2,881,732 and \$188,520 annually, respectively. Thus, there would be a net gain in gross revenues for alternative B2(c) with redistribution of effort of approximately \$1,522,170 annually (Table 4.33), or \$23,783 per vessel annually (\$1,522,170 / 64 vessels). 2004 ex-vessel prices resulted in a greater gain for bigeye tuna gross revenues and smaller loss in BFT gross revenues (Table 4.33). The largest gain in gross revenues with 2004 ex-vessel prices would be for swordfish landings, and the greatest loss would be for yellowfin tuna (Table 4.33)

Alternative B2(d), closing all areas west of 86 degrees W. Long. to pelagic longlining in the Gulf of Mexico, would potentially impact a total of 78 vessels that fished in the area from 2001 – 2003, or an average of 65 vessels per year. A total of 12,897 sets were reported from 2001 – 2003, or an average 4,299 sets per year (Table 4.36). Without redistribution of fishing effort, alternative B2(d) would potentially result in a 47.4 percent decrease in fishing effort, and reductions in landings ranging from a minimum of 3.5 percent for bigeye tuna to a maximum of 64 percent for yellowfin tuna (Table 4.15). For yellowfin tuna, this would amount to an estimated loss of \$8,035,791 annually. The total loss for all species combined would be approximately \$10,638,133 annually (Table 4.33), or \$163,663 per vessel annually (\$10,638,133 / 65 vessels). The estimated losses using 2004 ex-vessel data were even larger than those anticipated in 2003, except for BFT (Table 4.33). The total lost gross revenue in 2004 dollars was estimated as -\$10,921,107 (Table 4.33). The closure of a major portion of the Gulf of Mexico would have the largest impact on Louisiana, where approximately 56 percent of all the vessels that reported 72 percent of all sets from the area have their homeports (Table 4.37).

With redistribution of fishing effort, alternative B2(d) is predicted to result in an overall increase in gross revenues of approximately \$6,014,934 annually, or \$92,537 per vessel, due primarily to the large potential increase in swordfish landings (62.5 percent) and bigeye tuna landings (80.6 percent) that are predicted to occur with redistribution of effort (Table 4.33). 2004 ex-vessel prices indicated largest gross revenues associated with swordfish and yellowfin tuna landings (Table 4.33). Losses associated with decreased BFT landings were less than those predicted by 2003 ex-vessel prices (-\$80,601 vs. -\$109,786; Table 4.33). As discussed earlier, these estimates do not take into account fishermen who may not relocate to open areas in the Atlantic, but may instead stay in the Gulf of Mexico where competition for existing resource may be intense, potentially resulting in fishermen going out of business.

Alternative B2(e), a 46,956 $nm^2$ closure in the Northeast, would potentially impact a total of 49 vessels that fished in the area from 2001 – 2003, or an average of 35 vessels per year. A total of 2,587 sets were reported from 2001 – 2003, or an average 862 sets per year (Table 4.36). Without redistribution of effort, total gross revenues losses would amount to approximately \$3,234,660 annually (Table 4.33), or \$92,418 per vessel annually (\$3,234,660 / 35 vessels). 2004 ex-vessel prices indicated an increase in gross losses from those anticipated with 2003 ex-vessels prices for all species without the redistribution of effort (Table 4.33). With redistribution of effort, gross revenues losses are predicted to total \$820,132 annually (Table 4.33), or \$23,432 per vessel annually ($820,132 / 35 vessels). This translated into a total gross loss of -$841,948 in 2004 (Table 4.33).

NMFS also considered combining alternatives B2(a) and B2(b), as well as alternatives B2(d) and B2(e), as described earlier under ecological impacts, to maximize bycatch reduction. Combining closures B2(a) from May through November and B2(b) in June only, resulted in the highest overall reduction in bycatch for the largest number of species under consideration. Combining these alternatives would potentially impact a total of 81 vessels that fished in the area from 2001 – 2003. A total of 3,144 sets were reported from 2001 – 2003 (Table 4.36). Without redistribution of effort, the economic impact of combining these closures would be a decrease in landings of all retained species for a loss of $5,428,120 annually (Table 4.33), or $96,930 per vessel annually ($5,428,120 / 56 vessels). This was estimated as a loss of -$5,572,508 in 2004 (Table 4.33). With redistribution of effort, the landings of all retained species are predicted to increase. The percent increase ranged from a minimum 0.3 percent for yellowfin tuna to a maximum of 10.0 percent for bigeye tuna. The result would be an increase in total gross revenues of approximately $1,091,570 annually (Table 4.33), or $19,492 per vessel annually ($1,091,570 / 56 vessels). Thus, the overall economic cost of combining alternatives B2(a) and B2(b) could potentially range from a loss of $5.42 million to a gain of $1.09 million. Using 2004 ex-vessel prices, the overall economic cost of combining the two alternatives would be a range of a loss of $5.57 million to an increase of $1.1 million (Table 4.33). Given that the actual decline in overall effort of previously enacted time/area closures was nearly twice what was predicted (Section 3.8.9; Table 4.6 and Table 4.7), the combined closures are likely to have a substantial negative economic impact. When considering the comparatively low numbers of leatherback and loggerhead sea turtle interactions, and BFT and white marlin discards that would be avoided by this closure, the economic costs appear to be high in comparison to the ecological benefits.

Combining closures B2(d) and B2(e) year-round would potentially impact a total of 127 vessels that fished in the area from 2001 – 2003. A total of 15,484 sets were reported from 2001 – 2003. Without redistribution of effort, the economic impact of combining these closures would result in a decrease in landings for a loss of $12.9 million annually (Table 4.33), or $101,633 per vessel annually ($12,907,345 / 127 vessels). In 2004, the total gross loss was estimated as -$13.25 million (Table 4.33). With redistribution of effort, the landings of swordfish and bigeye tuna are predicted to increase, whereas the remaining species are predicted to decrease. The percent increase ranged from a minimum of 63.1 percent for swordfish to a maximum of 78.4 percent for bigeye tuna (Table 4.15). The result would be an increase in total gross revenues of approximately $7,600,258 annually (Table 4.33), or $59,845 per vessel annually ($7,600,258 / 127 vessels). In 2004, the total gross revenues when the redistribution of effort considered was $7,802,425 (Table 4.33). Thus, the overall economic cost of combining alternatives B2(d) and B2(e) could potentially range from a loss of $12.9 million to a gain of $7.8 million.

In addition to any economic impacts, there could be a range of social impacts from disruption of local fishing communities to relocation of vessels and homeports as a result of any additional closures. Anecdotal information suggests that many PLL fishermen own several permits in addition to HMS limited access permits and engage in other fisheries during periods when they are not pursuing HMS. Fishermen may have had to diversify to continue to meet financial obligations and remain in business due to time/area closures; however, many changes in the HMS fisheries have been out of NMFS' control, such as increases in fuel prices and hurricanes. However, NMFS realizes that any additional economic hardship such as a time/area closure could potentially result in fishermen going out of business.

The modifications to the two closed areas, B3(a) and B3(b), would potentially result in positive social and economic impacts. Re-opening areas of either closure would allow fishermen access to previously closed fishing grounds, potentially resulting in increased landings of retained species. In addition, the modified area of B3(b) would be inshore, which would allow fishermen to have access to nearshore fishing grounds, reducing fuel costs and time at sea. However, this may create gear conflicts between recreational and commercial fishermen. Conversely, the modified area of B3(a) would be along the axis of the Gulf Stream, which would afford recreational fishermen closed portions inshore and allow PLL gear to fish in re-opened areas offshore.

Alternative B3(a), the Charleston Bump modification, would potentially result in a 0.5 percent increase in fishing effort based on 1997 – 1999 logbook data. The most prominent increase in landings would be for swordfish (1.1 percent; Table 4.27). This potential increase could result in increased revenue of $220,806 annually for swordfish alone (Table 4.34). In addition, the modification could result in increased landings of yellowfin tuna (0.16 percent; Table 4.27) and bigeye tuna (0.02 percent; Table 4.27). The total increase in potential revenues from increased landings resulting from this modification would be $234,460 annually (Table 4.34). Using 2004 ex-vessel prices, this translates into $238,417 in swordfish landings, a decrease in yellowfin tuna landings ($11,625 vs. $13,372), and approximately the same for bigeye tuna landings ($282 vs. $281; Table 4.34)

Alternative B3(b), the Northeastern U.S. modification, would potentially result in a very small increase in fishing effort (0.01 percent; Table 4.28). As with B3(a), the largest increase in landings would be for swordfish, which would translate into an increase in an annual revenue of $482 (Table 4.34). There is also a small predicted increase in yellowfin tuna landings, making the total increase in revenue associated with this modification is $550, annually (Table 4.34). 2004 ex-vessel prices predicted a slight increase for both swordfish landings ($588 vs. $482) and yellowfin tuna landings ($74 vs. $68; Table 4.34). While this is small in comparison to B3(a), this modification serves as a way for NMFS to pinpoint areas of high bycatch and refine current closed areas.

While NMFS considered each alternative individually, there is the possibility that a closure, or a combination of closures, could also be implemented in concert with a potential modification to a closed area. Since the potential modifications would most likely have positive social and economic impacts, any combination of closures with potential modifications could result in an increase in revenue. When looking at revenues associated with the potential closures after the consideration of the redistribution of fishing effort (Table 4.33), B3(a), in combination with most of the potential closed areas or combinations of potential closed areas, would result in a net increase in revenue (Table 4.33 and Table 4.34). The largest increase in annual revenue based on 2003 prices would be $7,834,718 for the B2(d)/B2(e) closure combination ($7,600,258; Table 4.33) with the B3(a) modification ($234,460; Table 4.34), or $6,249,394 for the B2(d) closure ($6,014,934; Table 4.33) and the B3(a) modification ($234,460; Table 4.34). Conversely, the greatest loss in annual revenue would be $-819,582 from the B2(e) closure (-$820,132; Table 4.33) and the B3(b) modification ($550; Table 4.34). One drawback to such combinations of closed areas and modifications would be the difficulty of compliance by the public and subsequent enforcement. Such combinations of closures and modifications during different time periods could add complex regulations for the public to adhere to and enforcement to monitor.

The preferred alternative B4 to implement complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves could potentially impact commercial and recreational fishery participants that have (1) traditionally harvested HMS from the two marine reserves, (2) provided charter or headboat trips for HMS to the areas, or (3) would be expected to harvest HMS from the two areas prior to the sunset date associated with this alternative (June 16, 2010).

As described above, from 1997 – 2003, only one PLL set and one bottom longline set were reported in the HMS logbook in these areas (Figure 4.4). No new sets were reported in 2004. Both sets occurred in the Madison-Swanson site. Four swordfish were kept on the PLL set, and eight swordfish were discarded. With regard to observer data, only one set was observed within the areas from 1994 – 2003, out of a total of 1,433 observed sets in the CSFOP during that period. No new sets were reported for the Observer Program in 2004. These data indicate that comparatively little HMS commercial fishing activity has historically occurred within these two areas, although some sandbar sharks and swordfish have been caught. Most HMS fishing activity has been reported to the west of Madison-Swanson and Steamboat Lumps.

The EA prepared by the Gulf Council estimated that the closures could affect 356 commercial fishing vessels that reported fishing in the larger Statistical Areas 6 or 8, in the snapper/grouper logbook and unknown number of for-hire vessels. The Council's closures were projected to reduce total gross revenues of commercial vessels fishing primarily in the snapper-grouper and reef fish fishery by $352,000 annually, based upon pre-closure fishing information. This was estimated to represent approximately one percent to four percent of individual gross vessel revenues if equally divided among the 356 affected vessels, or two percent to five percent of individual gross vessel revenues if 59 trap vessels (which fish in shallower waters) are excluded from the universe of affected vessels. The vast majority of the revenues derived from these areas were from landings of shallow-water groupers and other reef fish. In 2001 and 2002, coastal migratory pelagics represented only 2.1 percent of gross revenues derived from Statistical Areas 6 and 8. Based upon this information, CSFOP data, and reported sets in the HMS Logbook, NMFS does not anticipate any significant reduction in gross vessel revenues of commercial HMS vessels associated with implementing complementary HMS regulations in the Madison-Swanson and Steamboat Lumps marine reserves beyond those already projected in the Gulf Council EA (GMFMC, 2003). Because the preferred closure areas are relatively small, any HMS fishing activity that otherwise would have occurred in these areas would likely relocate to nearby open areas with similar catch rates.

The extent of HMS recreational and charter/headboat fishing activity within the marine reserves is unknown. It is, therefore, not possible to provide an estimate of the impacts of the two marine reserves on the gross revenues and profits of charter/headboat vessels. However, given the interest that this topic generated among the recreational fishing community during 2003 Gulf Council deliberations on extending the duration of the marine reserves, it may be inferred that traditionally there has been some HMS recreational fishing activity within these areas. The Gulf Council recommended that NMFS implement compatible regulations that would provide for a seasonal allowance (May – October) for surface trolling to partially alleviate any negative social or economic impacts associated with the marine reserves. Because this alternative includes the seasonal surface trolling allowance, it is not expected to substantially impact the HMS recreational or charter/headboat sector. These months coincide with a period of increased HMS recreational fishing activity in the western Gulf of Mexico. This alternative strives to balance the need to ensure adequate conservation benefits for reef species while minimizing regulatory effects on fisheries, which have limited impacts on reef species.

Preferred alternative B5 would establish criteria for regulatory framework adjustments to implement new time/area closures or make modifications to existing time/area closures. This alternative would help provide greater transparency and predictability in the decision making process and would allow fishermen to plan for future changes. Although there are no direct economic impacts resulting from the establishment of the criteria themselves, the implementation of new closures or modification of existing closures could have variable economic impacts. Positive economic impacts could result from modifications or removals of time/area closures, which would reopen areas to commercial fishing. Such modifications could allow fishermen to more readily utilize retained species, resulting in additional economic opportunity for fishermen. However, modifications to current time/area closures (*i.e.*, opening up current closures) could lead to negative social impacts if there is gear conflicts involved between recreational and commercial fishermen. Additional closures could also result in negative economic impacts in the short-term. Since the economic and social impacts related to the criteria are difficult to predict, specific economic and social impacts would be analyzed when a particular closure is contemplated.

There are expected to be minimal negative economic or social impacts due to alternative B6, the closure off the southwest tip of Key West to bottom longline gear to protect smalltooth sawfish. However, calculating the economic and social impact of this closure is more difficult than calculating the impacts of closures for PLL gear; impacts for this closure are based on the CSFOP, which only covers approximately 1.6 percent of the commercial shark bottom longline vessels (based on the number of hooks set). Commercial shark bottom longline vessels typically report their landings in the snapper/grouper logbook, however, these landings are reported according to statistical reporting areas, and not according to locations of individual sets as is reported in the HMS logbook. Therefore, NMFS must extrapolate the number of sets that may have occurred from 2001 – 2003 in the B6 closure from the 1994 – 2006 CSFOP.

Since this closure is small in size, it is expected to affect very few bottom longline fishermen. For instance, 18 sets of the total 1,563 sets observed by the CSFOP from 1994 – 2006 occurred in the potential closed area. The level of observer coverage has ranged from approximately 1.6 percent (based on the number of hooks set) to four percent (based on LCS landings) of the HMS-permitted bottom longline vessels. Using a mid-range value of observer coverage (2.8 percent), it is estimated that approximately 55,821 HMS commercial bottom longline sets (1,563 sets / 2.8 percent observer coverage) occurred during this time, with 642 sets occurring in the closure area (18 sets / 2.8 percent observer coverage). Since bottom longline vessels in the Gulf of Mexico soak their gear an average of 11.25 hr/set (Burgess and Morgan, 2003), NMFS estimates that each vessel would have made one set per day. Thus, the closed area could affect 1.2 percent (642 sets / 55,821 sets) of the sets based on the number of sets between 1994 – 2006 or approximately 49 fishing days a year for the entire HMS bottom longline fleet (*i.e.*, 642 sets / 13 years ~ 49 sets per year). Given the extrapolated nature of these estimates, NMFS cannot estimate the economic impact of this closure in 2003 or 2004 dollars nor can NMFS determine which state would be most impacted by such a closure.

In addition, the closed area would help reduce the number of interactions with smalltooth sawfish by the bottom longline fishing industry, thereby helping the bottom longline industry stay below their Incidental Take Statement (ITS) for smalltooth sawfish (which is 260 interactions over five years with no reported fishing mortalities). Staying below the ITS will have positive economic and social impacts by keeping the entire bottom longline fishery open and operating, allowing economic gain by the bottom longline fishermen and their associated communities.

Alternative B7, which would prohibit pelagic longlining in all areas, would potentially impact a total of 177 active vessels that made 30,409 sets from 2001 – 2003 (Table 4.36). Active vessels are defined as vessels that reported landings in the HMS logbook during the years in question. It would have immediate and significant economic and social impacts on the longline vessel owners, vessel operators, and crew that would need to re-rig their vessels to continue fishing for HMS, find alternative fisheries, or discontinue fishing. It would also negatively impact dealers that purchase fish from PLL vessels, and families who own the fishing vessels that would either have to re-rig or discontinue fishing. It would also indirectly impact the local communities that support the PLL fishery. Figures 9.4 and 9.7 show the spatial distribution of tuna and swordfish permit holders, and Tables 9.36 and 9.39 show the number of tuna or swordfish permit holders per state. The states with the most tuna permit holders are Massachusetts (31.5 percent), North Carolina (12.9 percent), Maine (10.2 percent), New Jersey (7.0 percent), and New York (6.4 percent) (Table 9.36). The states with the most swordfish permit holders are Florida (32.4 percent), New Jersey (13.9 percent), Louisiana (11.9 percent), Massachusetts (9.1 percent), and New York (8.0 percent) (Table 9.39). In 2004, the total fishery revenue was $21.4 million for tunas (compared to $49.9 million in 2003) and $15.4 million for swordfish (compared to $14.6 million in 2003; Table 3.65 in Section 3.5.1.2). In 2004, the PLL fishery accounted for annual gross revenues of $14.9 million for swordfish, $871,187 for BFT, $9.1 million for yellowfin tuna, and $1.6 million for bigeye tuna based on average ex-vessel prices ($/lb dw) for 2004 (Table 4.32 and Table 3.65 in Section 3.5.1.2). Thus, closing the PLL fishery would result in, at a minimum, a loss of $26.5 million in revenue. However, this does not include revenue lost from sharks and other tunas and finfish landings. In addition, this estimate does not take into account the negative indirect economic and social impacts that small local businesses and fishing communities, which support the PLL industry, will also experience from such an industry closure.

In addition, under ATCA, the United States cannot implement measures that have the effect of raising or lowering quota, although NMFS has the ability to change the allocation of that quota among different gear groups. The swordfish fishery is confined, by regulation, to three gear types: harpoon, longline, and handlines. Since it is unlikely that the handgear sector would be able to catch the quota given the size distribution of the stock, prohibiting longline gear may reduce the ability of U.S. fishermen to harvest the full quota. It would also have the effect of reducing traditional participation in the swordfish fishery by U.S. vessels relative to the foreign competitors because the United States would harvest a vastly reduced proportion of the overall quota.

Summary of Alternatives

After carefully reviewing the results of all the different time/area closures analyses, including different scenarios of redistributed effort, NMFS is preferring not to implement any new closures, except the complementary measures in the Madison-Swanson and Steamboat Lumps Marine Reserves, and not to modify any existing closures at this time. Alternatives B4 and B5 are the preferred alternatives. Alternative B4 would establish complementary HMS regulations in the Madison-Swanson and Steamboat Lumps Marine Reserves at the request of the GMFMC with minimal ecological, economic, or social impacts. Alternative B5 would establish criteria that would guide future decision-making regarding implementation or modification of time/area closures. This alternative was a preferred alternative because it would provide enhanced transparency, predictability, and understanding of HMS management decisions, allow for more adaptive management, and should result in minimal social and economic impacts. Any impacts for specific closures would be analyzed when those closures are considered.

At this time, the following alternatives are not preferred for a variety of reasons. The ecological benefits of alternatives B2(a) through B2(e) for white marlin, BFT, and sea turtles are predicted to be variable with redistribution of effort, with potential negative ecological impacts to several species. All closures had predicted reductions in bycatch and discards without consideration of redistributed effort. For instance, B2(d) predicted some of the largest decreases in spearfish bycatch (83.5 percent), leatherback turtle interactions (57.5 percent) and yellowfin tuna discards (66.4 percent). However, no redistribution of effort assumes that all fishing effort that occurred in the closed area would cease if a closure was implemented and would not be transferred elsewhere. Therefore, a closure such as B2(d) was also predicted to have large negative economic impacts with a predicted 53.6 percent and 64 percent reduction in retained bluefin and yellowfin tuna, respectively. Under redistribution of effort assumptions, each of these alternatives (B2(a) through B2(e)) was predicted to result in an increase in bycatch of at least one, and in several cases, more than one of the species considered (Table 4.5 and Table A.37 through Table A.42 in Appendix A). For example, alternative B2(a) (May-November), intended primarily to reduce leatherback sea turtle interactions, and white marlin and BFT discards, could result in a 7.9 percent increase in loggerhead sea turtle interactions and a 10.3 percent increase in BFT discards (Table 4.5). Even the modified redistribution of effort model for alternative B2(a) predicted increases in sailfish discards (4.7 percent; Table A.37 in Appendix A), LCS discards (4.4 percent; Table A.37 in Appendix A), BFT discards (1.6 percent; Table A.38 in Appendix A), and BAYS discards (0.7 percent; Table A.38 in Appendix A). When closure areas were combined, the redistribution of effort model predicted similar results with an increase in discards of several species. For example, combining alternatives B2(a) (May – Nov) with B2(b) (June only) would result in a 1.5 percent increase in sailfish, 9.6 percent increase in pelagic sharks, and 10.1 percent increase in LCS discards (Table 4.21). Combining alternatives B2(d) with B2(e) (year-round) would result in a 6.5 percent increase in white marlin, a 12.1 percent increase in spearfish discards, and a 4.8 percent increase in loggerhead sea turtle interactions (Table 4.23).

Alternatives B3(a) and B3(b) were considered to refine existing closures and to provide additional opportunity to harvest legal-sized swordfish while not increasing bycatch. Additional swordfish catch is desirable because the United States has not lately met its quota under ICCAT. As of April 30, 2006, only 18 percent of the directed North Atlantic swordfish quota and 2 percent of the incidental North Atlantic swordfish quota had been filed, leaving 4,905.9 mt and 294.7 mt of directed and incidental quota, respectively, still available for the 2005 fishing year. NMFS, however, is not preferring any modifications to the existing closures. None of the modifications considered would have resulted in a large enough increase in retained catch to alleviate concerns over uncaught portions of the swordfish and BFT quotas. For instance, B3(a) was predicted to increase retained swordfish catch by only 30.72 mt, and B3(a) was predicted to increase the retained swordfish catch by 0.07 mt. In addition, modifications to existing closures could result in increased bycatch of blue and white marlin, which is a concern given the stock status of blue and white marlin and the scheduled white marlin ESA review. Increased interactions with sea turtles and marine mammals (*e.g.*, pilot whales and Risso's dolphins) are an additional concern.

Finally, all of the analyses (those analyzing the impacts of new closures and those analyzing the impacts of modifications to existing closures) were conducted using J-hook data. New circle hook management measures were put into place in 2004, and NMFS is still assessing the effects of circle hooks on bycatch rates for HMS. Until NMFS can better evaluate the effects of circle hooks on bycatch reduction, especially with regard to sea turtles interactions and bycatch of other non-target HMS, NMFS prefers, at this time, not to modify the current time/area closures. NMFS intends to reconsider modifications to existing closures once further analyses of circle hook data are available as well as the results of stock assessments for blue marlin, white marlin, north and south swordfish, eastern and western BFT, and LCS when they become available. Given the general anticipation that the North Atlantic swordfish stock will be identified as fully rebuilt, per the pending September 2006 stock assessment, a number of fishermen and others have asked NMFS to assist in revitalizing this fishery. One option that has been raised is opening the time/area closures. While NMFS does not prefer modifying any existing closures at this time, under the preferred alternative, NMFS could modify the closed areas and/or allow experiments to test gears or other fishing methods in the closed areas. Similarly, pending the results of the marlin and BFT stock assessments, the criteria could allow for additional closures to be considered for all HMS fisheries.

Alternative B6, to prohibit bottom longline gear in an area southwest of Key West to protect endangered smalltooth sawfish, is not preferred due to the low number of observed interactions of smalltooth sawfish with BLL gear, the highly variable and episodic nature of interactions with smalltooth sawfish, and the fact that almost all of the smalltooth sawfish observed caught on BLL gear were released alive (one was released in unknown condition). Only one smalltooth sawfish has been observed in the shark gillnet fishery, and it was also released alive. There is also a lack of current information on smalltooth sawfish critical habitat. Once critical habitat has been designated by the SSRT, NMFS may consider a closure in areas where bottom longline or other HMS gears overlap with critical habitat. Until the SSRT and NMFS can coordinate on appropriate areas to close for smalltooth sawfish, NMFS feels it is premature to implement a closure for smalltooth sawfish at this time.

Finally, while alternative B7 (close all areas to PLL gear in HMS fisheries) would result in the greatest short-term ecological benefits of all the alternatives, it would also have severe economic impacts on permit holders in multiple communities and states ranging from Maine to Texas. As described above under social/economic consequences, in recent years there have been 177 active PLL vessels with annual gross fishery revenues in excess of $25 million in 2003. This revenue was ~27 million in 2004. Therefore, this alternative would have a significant impact on communities, individuals, and small businesses. Additionally, fishing mortality of several species of concern (*i.e.*, marlin, BFT, and sea turtles) may increase if the Unites States' quota is reallocated to other ICCAT countries that do not have comparable conservation bycatch reduction methods. NMFS does not prefer eliminating the entire PLL fishery at this time because of the significant economic impacts, the potential effect of shifting quota to other countries, and the likely increase in fishing mortality of both HMS and protected species. NMFS is addressing bycatch and bycatch mortality in other sections of this FMP (Chapters 6, 7, 8, and 9 and other sections within Chapter 4 such as workshops and Atlantic billfish).

<u>Overall Conclusion</u>

NMFS used POP and HMS logbook data to identify new areas for time/area closures and selected alternatives based on these data to further analyze 10 different closures or modifications for this rulemaking. NMFS also considered new time/area closures based on a settlement agreement relating to white marlin, which was approved by the court in <u>Center for Biological Diversity v. NMFS</u>, Civ. Action No. 04-0063 (D.D.C.), and a petition for rulemaking received by the Blue Ocean Institute. NMFS chose to use absolute numbers of discards and bycatch instead of CPUEs to identify areas for closures as well as for the time/area analyses in order to maximize the reduction in the overall number of discards (for further discussion, please see page 4-28). In addition, NMFS used HMS logbook data to analyze redistribution of effort. While NMFS is aware that discards may be underreported in the HMS logbook, the HMS logbook data were collected over the entire PLL fleet and provided an effort estimate for the entire fleet, which is needed for redistribution calculations, whereas POP data are only collected from a portion of the fleet (for further discussion, please see pages 4-32 to 4-33). NMFS also calculated the ecological, social, and economic impacts of each closure with and without the consideration of redistributed effort.

NMFS evaluated the reduction in discards of white marlin, blue marlin, sailfish, spearfish, leatherback sea turtles, loggerhead sea turtles, other sea turtles, and BFT without redistribution of effort based on POP data (Table 4.4) and the HMS logbook data (Table 4.5 and Table 4.15) for the various time/area closure alternatives. In addition, individual tables for each of the alternatives are presented to show the monthly discards or landings of non-target or target HMS respectively, that include pelagic and large coastal sharks, and the percent reduction in numbers of hooks set based on HMS logbook data. A time series of HMS logbook data are also presented for the estimated change in targeted and retained catch of swordfish, bluefin, bigeye, albacore, yellowfin, and skipjack tunas (BAYS) for each closure (please see Table 4.6 and Table 4.19).

NMFS evaluated different scenarios for redistribution of fishing effort, where each scenario had different assumptions regarding how fishing effort would be redistributed into open areas. The model used in this time/area analysis was the same model used in previous time/area rulemakings that resulted in implementation of closed areas (for more information on redistribution of effort model selection, please see page 4-30). Additional redistribution scenarios were considered based on comments received on the Draft Consolidated HMS FMP and the OMB reviews. Considering redistribution of fishing effort is important because fishermen are unlikely to stop fishing as a result of a closure, and are more likely to move to open areas to continue fishing. Thus it is important to take into account any additional effort in open areas that may result in an increase in bycatch. In addition, HMS and protected species are not uniformly distributed throughout the ocean, and tend to occur in higher concentrations in certain areas. Therefore, a closure in one area might reduce the bycatch of one or two species, but may increase bycatch of others as fishing effort in those areas increases.

The scenario(s) used for each closure depend on the spatial size and temporal duration of the individual closure. One scenario assumed that fishing effort (*i.e.*, hooks) from a closed area would be displaced into all remaining open areas. In this case, effort from a closed area was multiplied by the average CPUE for each species from all the remaining open areas (for further discussion, refer to Appendix A and Table A.28). NMFS also considered scenarios that assumed all fishing effort would only be redistributed within a) the Gulf of Mexico only, b) the Gulf of Mexico and the eastern seaboard, and c) the Gulf of Mexico and other areas of the Atlantic. The last scenario assumed that fishing effort would be displaced within the Gulf of Mexico and into another area where the majority of vessels with Gulf of Mexico homeports have reported fishing during 2001 – 2004 (*i.e.*, Area 6). In each of these scenarios, the effort from a closure was multiplied by the CPUE for each species either for the Gulf of Mexico only or for only the eastern seaboard, or by the CPUE for the Gulf of Mexico and Area 6 (for further discussion, please refer to pages 4-32 and 4-33, Appendix A, and Tables A.29 and A.30). These different scenarios were developed after NMFS evaluated the movement of the PLL fleet based on 2001 – 2004 HMS logbook data, which indicated where the fleet has been fishing in the Atlantic, Caribbean, and Gulf of Mexico (for further discussion, please refer to pages 4-32 and 4-33).

Each scenario of the redistribution of effort model had different assumptions. For instance, the scenario where effort from a closed area was redistributed to all open areas assumed that all fishing effort in a closed area would be distributed to open areas in the Gulf of Mexico and the Atlantic (*e.g.*, fishermen will move out of the closed area but continue fishing in surrounding open areas, move their business, or sell their permits to someone near an open area). This scenario also assumed fishermen could fish far away from their homeports, and fishermen have the ability to leave their communities, unloading docks, and other associated infrastructure to fish in the remaining open areas. Other scenarios assumed the movement of fishermen was confined to areas near their homeports assumed that fishermen do not relocate, possibly due to community ties to unloading docks, processing plants, etc. These additional scenarios also assumed that the same amount of effort would be moved out of a given area regardless of the size of the closure implemented. In reality, larger closures may result in more movement in order for fishermen to find open areas to fish and stay in business.

Predicting fishermen's behavior is difficult, especially as some factors that may determine whether to stay in the fishery, relocate, or leave the fishery are beyond NMFS' control (fuel prices, infrastructure, hurricanes, etc.). While some fishermen will continue to fish in the remaining open areas of the Atlantic, Caribbean, and Gulf of Mexico, others may be forced to leave the fishery entirely, such as selling their permits and going out of business, as a result of the closure. In addition, given the limited access restrictions of permits for other fisheries, NMFS predicts that it would be difficult for fishermen to switch to a different gear and different fisheries unless they currently possess other permits. NMFS has looked at the effect of the current closures on a fishery-wide basis (please see the analysis of alternative B1 on pages 4-33 through 4-35). This analysis indicated that there was an overall 15 percent decline in fishing effort between 1997-1999 and 2001 – 2003 or since the existing closures went into place (Table 4.8). However, there was also a reported increase in fishing effort of about eight percent in the Gulf of Mexico during this time period (Table 4.8), suggesting some shift in effort, possibly due to the existing closures. At this time, NMFS cannot precisely predict how individual vessels would move in response to a closure. For the purpose of this analysis, NMFS believes it is reasonable to assume that some redistribution of effort will occur even though NMFS cannot predict how much or where. However, in the future, NMFS intends to investigate the choices fishermen have made regarding previous closures (*i.e.*, did they move, sell their permits, go out of business, retain their permit but fish for something else, etc?). This type of analysis could help NMFS improve the effort redistribution models used in the future.

NMFS' decision to not prefer any new closures, except the complementary measures in the Madison-Swanson and Steamboat Lumps Marine Reserves, and not to modify any existing closures at this time is based primarily upon the analyses described in this section indicating that no single closure or combination of closures would reduce the bycatch of all species considered, assuming there is some redistribution of effort (Table 4.5 and Table 4.15 and Tables A.37 through A.42). NMFS decision assumes that there will be some redistribution of effort if a new closure is implemented. While NMFS recognizes that the analysis of the change in effort and bycatch after implementation of existing closures indicates that reduction in bycatch may have been greater than predicted with redistribution of effort (Table 4.6 and Table 4.7), and in some cases, without redistribution of effort, there was also an increase in fishing effort in the open areas in the Gulf of Mexico after the implementation of the existing closures (Table 4.8), which suggests that fishing effort will be displaced to other areas. In addition, the existing closures were the first round of closures implemented for HMS. The reported reduction in bycatch and discards as a result of these initial closures may not be seen in the future from additional closures, especially given the reduced size of the PLL fleet since 1997 – 1999. Based on the results of these analyses and considering that some level of displaced effort will occur, NMFS does not feel it is appropriate to implement additional closures or modify existing closures at this time. Furthermore, while the Magnuson-Stevens Act provides NMFS the authority to manage all species, NMFS must balance the impacts of management measures on all managed species and may not choose protections for one species to the detriment of protected and overfished species (*e.g.*, NMFS may not choose to protect BFT even if sea turtle interactions or bycatch of overfished species may increase substantially). For instance, even with the additional scenarios of redistributed effort for B2(c), there is a predicted increase for LCS discards (12.8 percent or 2,545 over 3 ½ years), blue marlin discards (0.7 percent or 20 over 3 ½ years), sailfish discards (21.7 percent or 281 over 3 ½ years), and spearfish discards (2 percent or 10 over 3 ½ years)

(Table A.41). Given either the overfished stock status or unknown stock status of these species, NMFS does not prefer to implement a new closure, such as B2(c), at this time. National Standard 1, which requires NMFS to prevent overfishing while achieving on a continuing basis, the optimum yield from each fishery for the United States fishing industry, applies to all species and all fisheries. Similarly, National Standard 9, which requires NMFS to minimize bycatch and bycatch mortality to the extent practicable, applies to all species and fisheries. Furthermore, the economic impacts of each of the alternatives may be substantial, ranging in losses of up to several million dollars annually, depending upon the alternative, and displacement of a significant number of fishing vessels (Table 4.33 and Table 4.35). Thus, NMFS feels that the impact on all species must be considered and any negative impacts must be minimized.

Future Efforts

With regard to the Gulf of Mexico, although NMFS has decided to not move forward with B2(c), or any other closure in the Gulf of Mexico at this time, NMFS will be pursuing alternatives to reduce bycatch in the Gulf of Mexico, especially for BFT. NMFS has currently adopted all of the ICCAT recommendations regarding BFT, a rebuilding plan is in place domestically for this species, and NMFS has implemented measures to rebuild this overfished stock. NMFS is currently trying to assess how protecting one age class at the potential detriment of other age classes will affect the fish stock as a whole. For instance, how will protecting spawning BFT help rebuild the stock if it results in increased discards of non-spawning adults, juveniles, and sub-adult BFT along the eastern seaboard? Therefore, more information is needed to further understand how to manage this species given its complex migratory patterns, life history, and age structure. NMFS is also considering developing incentives that would dissuade fishermen from keeping incidentally caught BFT, particularly spawning BFT, in the Gulf of Mexico. This may involve research on how changes in fishing practices may help reduce bycatch of non-target species as well as the tracking of discards (dead and alive) by all gear types. In addition, sea surface temperatures in the Gulf of Mexico have recently been thought to be associated with congregations of BFT and putative BFT spawning grounds in the Gulf of Mexico (Block, pers. comm.). NMFS intends to investigate the variability associated with sea surface temperatures as well as the temporal and spatial consistency of the association of BFT with these temperatures regimes. By better understanding what influences the distribution and timing of BFT in the Gulf of Mexico, NMFS can work on developing tailored management measures over space and time to maximize ecological benefits while minimizing economic impacts to the extent practicable.

In addition, NMFS prefers not to implement new closures or modify existing closures because all of the data used in the time/area analyses were based on J-hook data. New circle hook management measures were put into place in 2004, and NMFS is still assessing the effects of circle hooks on bycatch rates for HMS. Until NMFS can better evaluate the effects of circle hooks on bycatch reduction, especially with regard to sea turtles interactions and bycatch of other non-target HMS, NMFS prefers not to implement new or modify the current time/area closures at this time. While time/area closures play an important part in resource management, a number of time/area closures have been implemented since 2000. Those closures are beginning to demonstrate their conservation benefits (for further discussion of the effect of current closures, refer to pages 4-33 through 4-35); however, NMFS is still trying to assess the effect of additional management measures, such as circle hooks, that have been implemented since 2000. NMFS currently only has finalized data on the catch associated with circle hooks from July through December of 2004 (see Appendix A). Based on the NED experiment, circle hooks likely have a significantly different catch rate than J-hooks. Therefore, further investigations are required to determine the potential impact of any new time/area closures as well as assess the cumulative affect of current time/area closures and circle hooks. NMFS anticipates that 2005 HMS logbook final data will become available in the summer of 2006 when the quality control procedures on the 2005 HMS logbook data are complete.

NMFS is also awaiting additional information regarding the status of the PLL fleet after the devastating hurricanes in the Gulf of Mexico during the fall of 2005. A majority of the PLL fleet was thought to be severely damaged or destroyed during the 2005 hurricane season. The amount of PLL fishing effort, especially within the Gulf of Mexico, will be assessed in the summer of 2006 when 2005 HMS logbook final data becomes available. Until NMFS can better estimate the current fishing effort and potential recovery of the PLL fleet, NMFS believes it is premature to implement any new time/area closures at the present time. Additionally, a number of stock assessments will be conducted during 2006 (LCS, blue marlin, white marlin, North and South Atlantic swordfish, and eastern and western Atlantic BFT). NMFS is awaiting the results of these stock assessments to help determine domestic measures with regard to management of these species, especially for North Atlantic swordfish, white marlin and western Atlantic BFT.

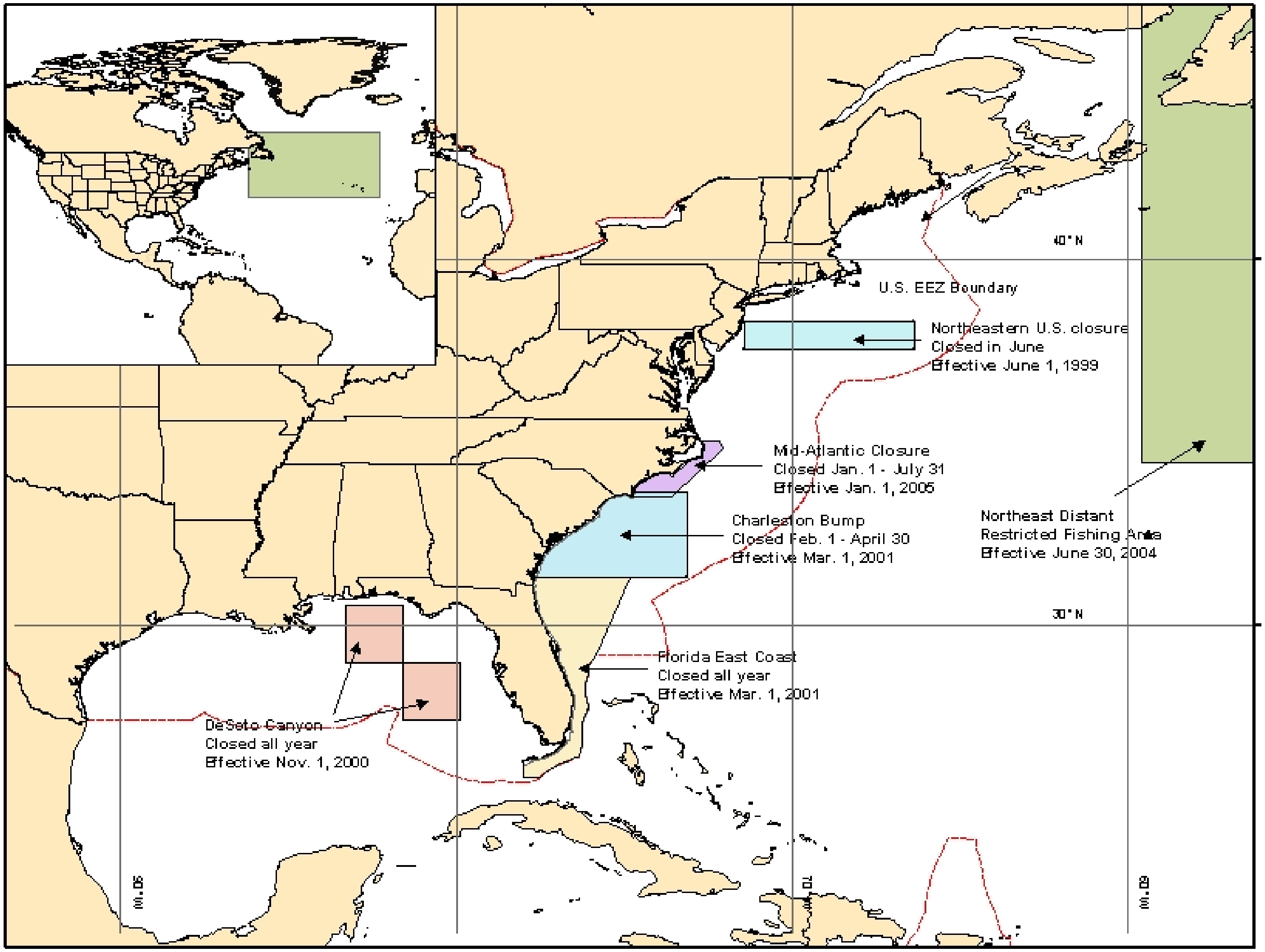



**Figure 4.1** **Existing time/area closures in HMS fisheries. Inset shows extent of the Northeast Distant restricted fishing area. All closures except the Mid-Atlantic are applicable to PLL gear only. The Mid-Atlantic Closure is applicable to bottom longline gear only. Note: the Northeast Distant (NED) was a closed area to all vessels as of 2001. It became the NED Restricted Fishing Area on June 30, 2004 when it was opened to those participating in the NED experiment.**

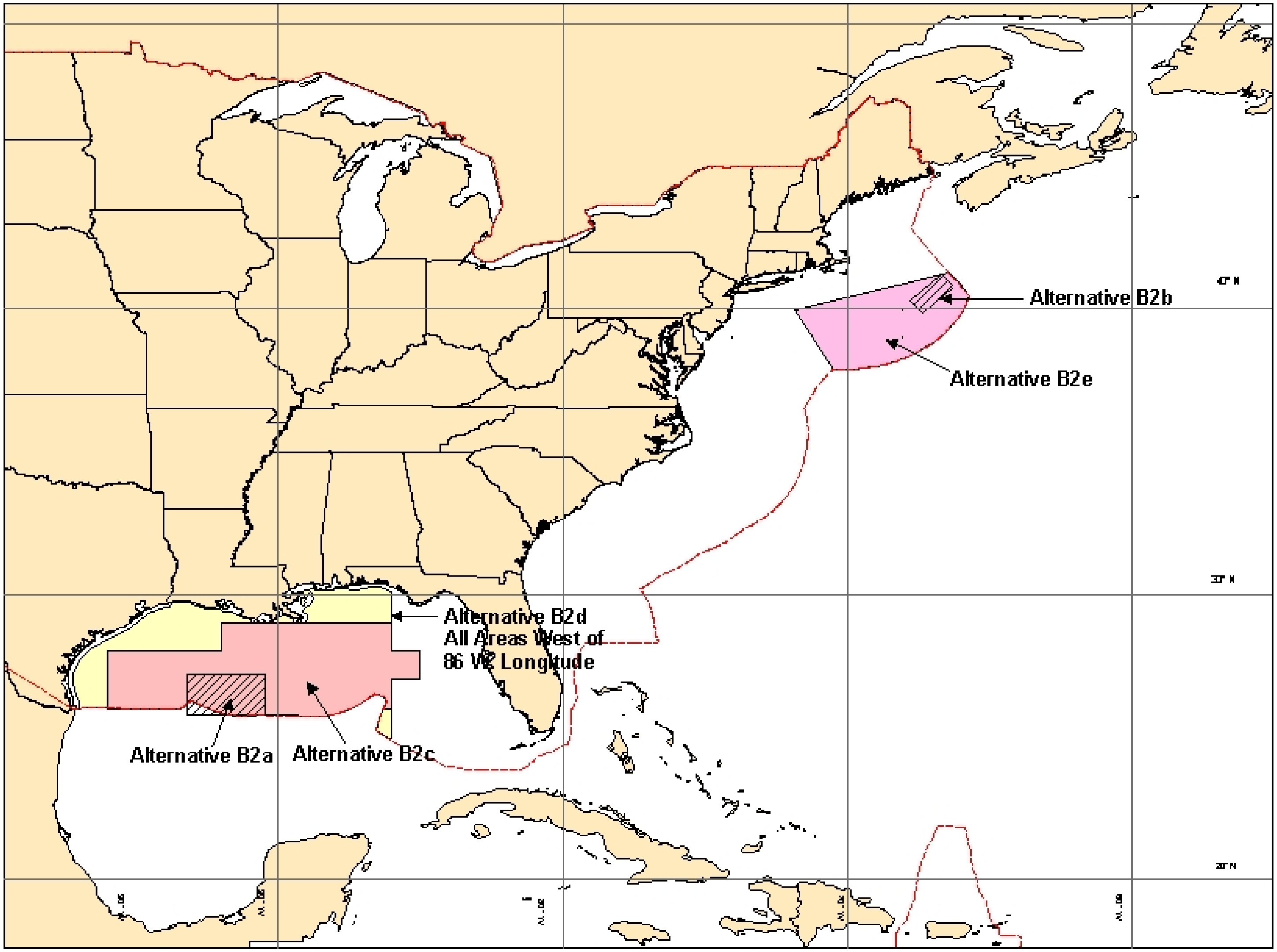



**Figure 4.2** **Map showing areas being considered for new time/area closures to reduce non-target HMS and protected species interactions.**

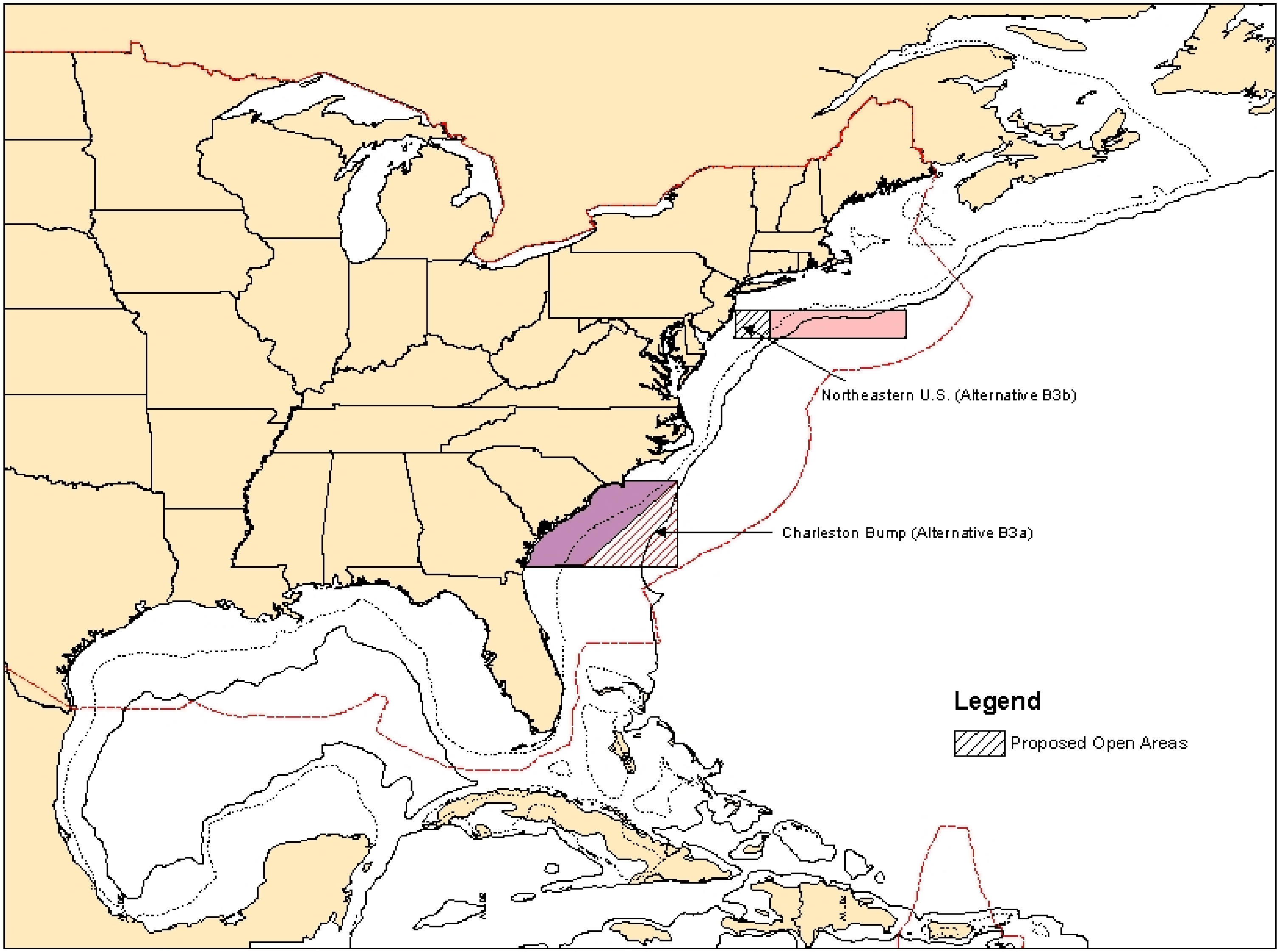



**Figure 4.3 Map showing areas being considered for modifications to existing closures.**

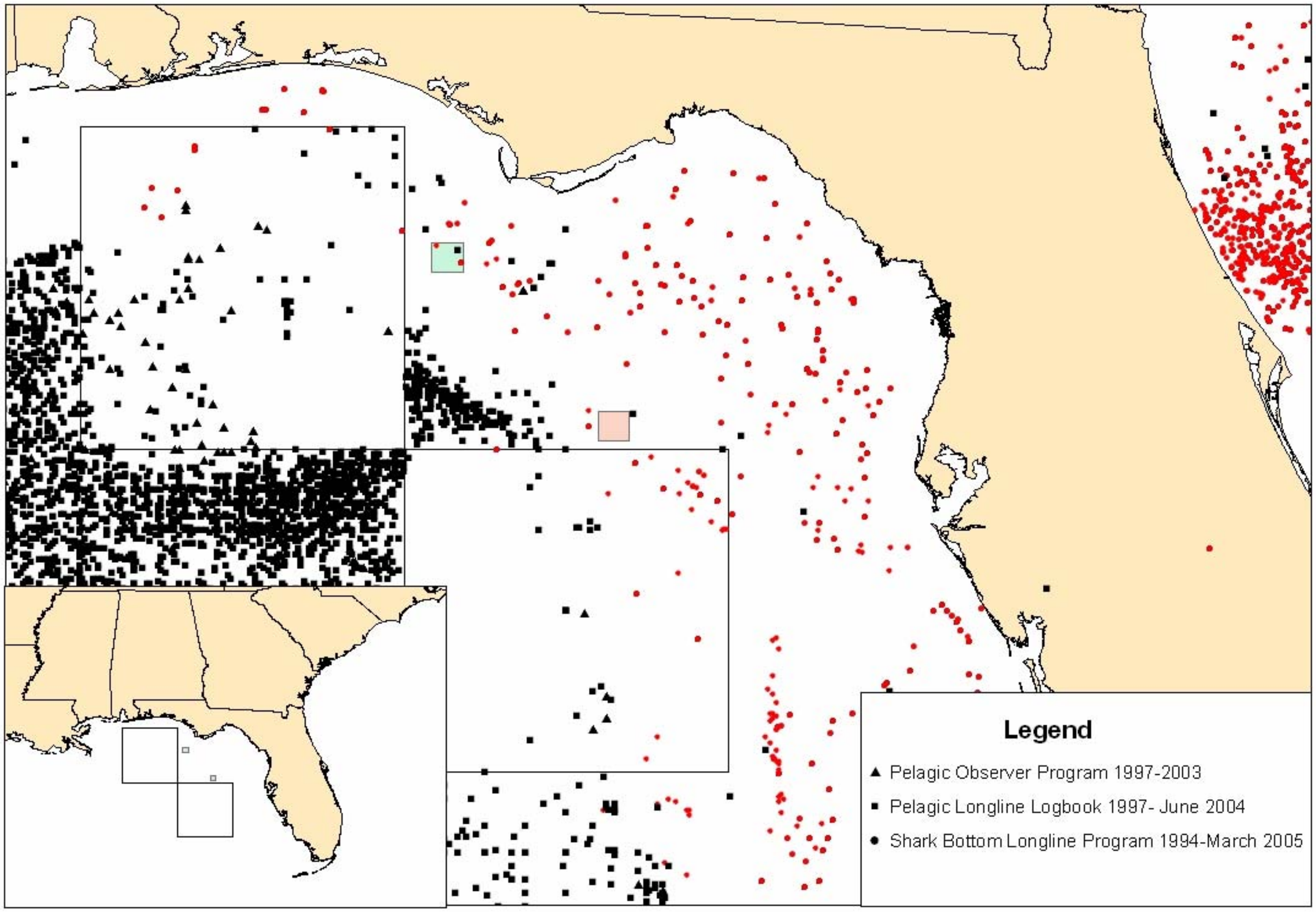



**Figure 4.4 Pelagic and Bottom Longline Sets in the Madison-Swanson (upper left) and Steamboat Lumps (lower right) Marine Reserves. Note: one set for the CSFOP was in 2005. Although not indicated, no new sets were recorded for the CSFOP in 2004.** Source: HMS Logbook, Pelagic Observer Program, Shark Observer Program. The Desoto Canyon closure is also shown for reference.

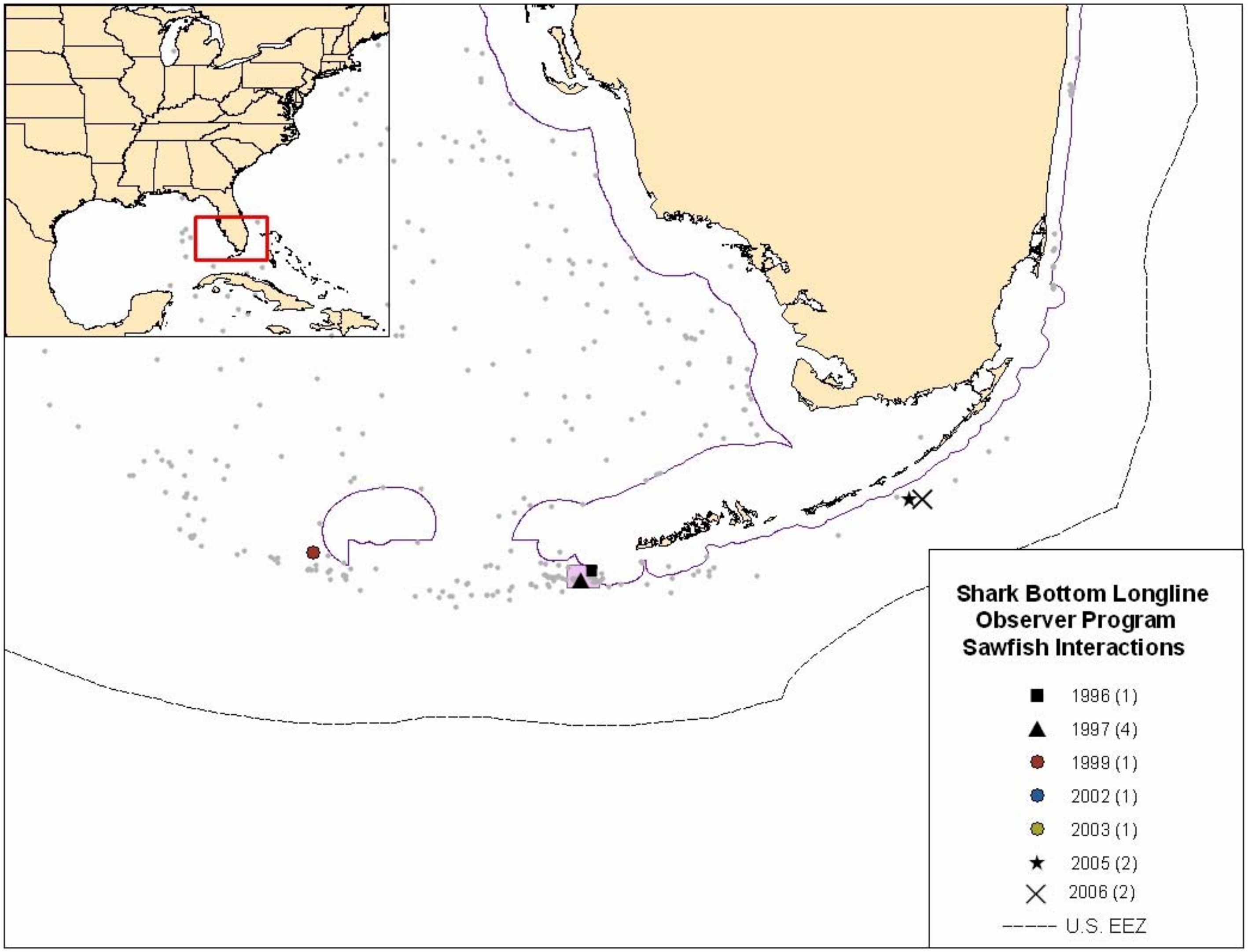
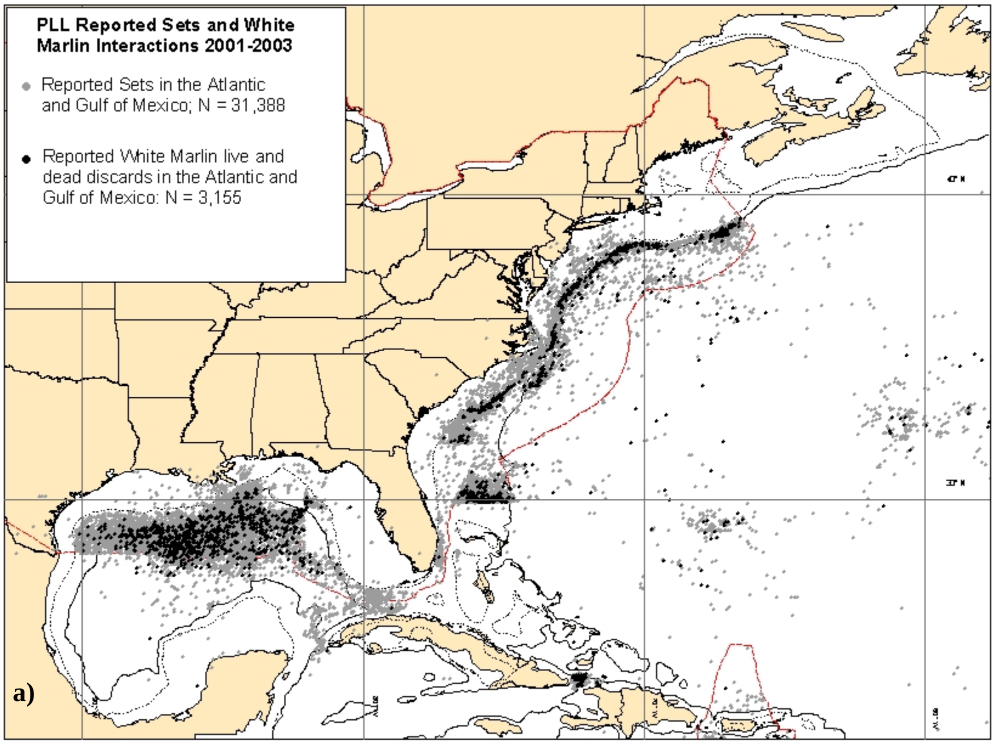



**Figure 4.5** **Map showing the potential closed area to bottom longline gear to reduce bycatch of endangered smalltooth sawfish. Grey dots are locations of observed bottom longline sets.** Source: CSFOP 1994 – 2006.



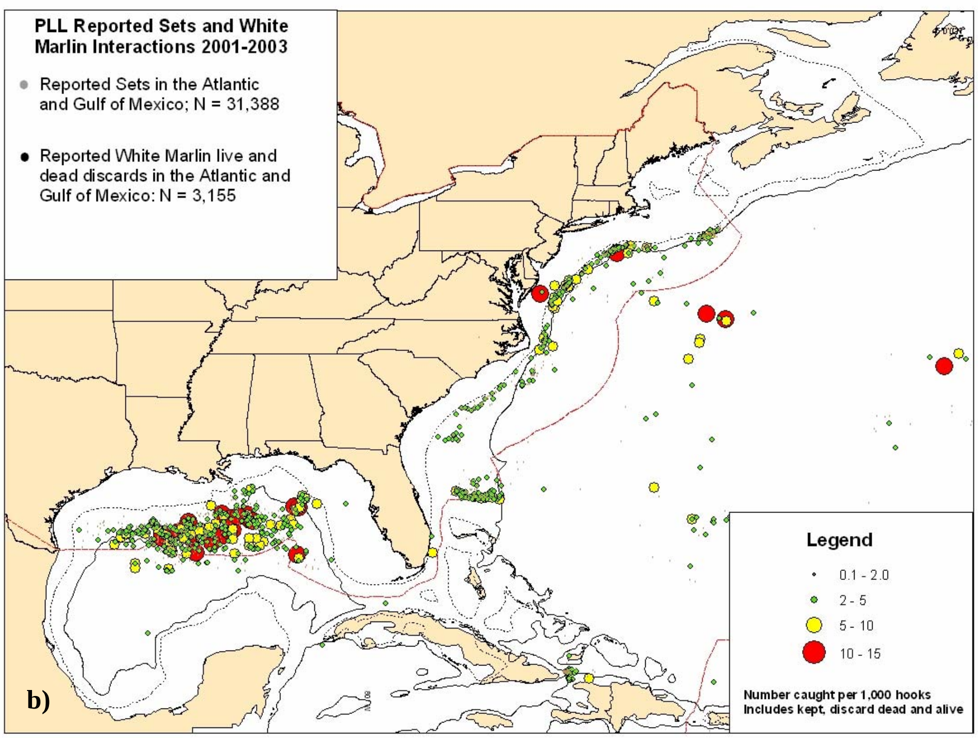




**Figure 4.6 Map showing all reported sets and white marlin interactions: a) shows the number of interactions in absolute numbers, b) shows CPUE (per 1,000 hooks).** Source: HMS Logbook 2001-2003.

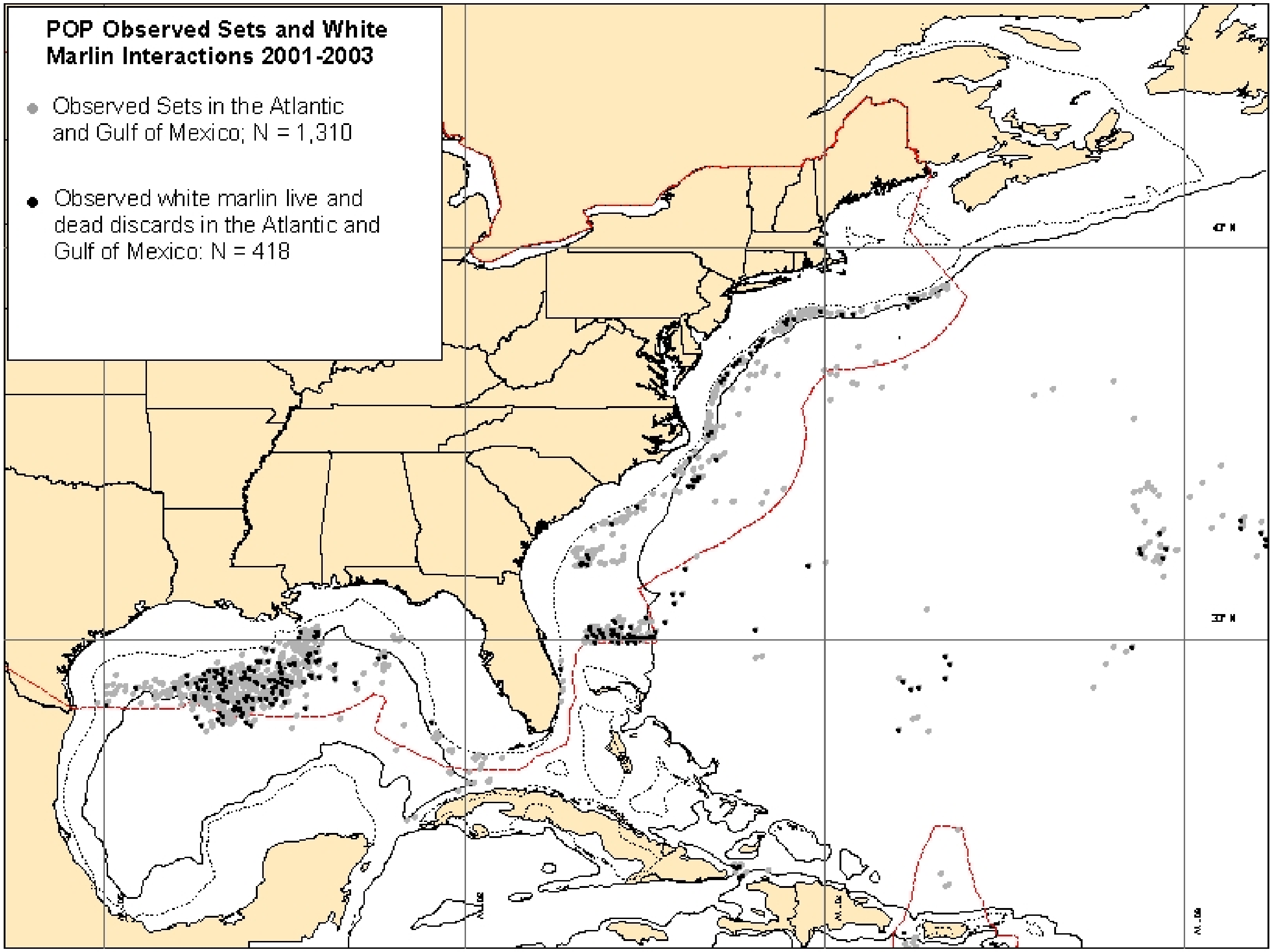



**Figure 4.7 Map showing all observed sets and white marlin interactions.** Source: Pelagic Observer Program 2001-2003.

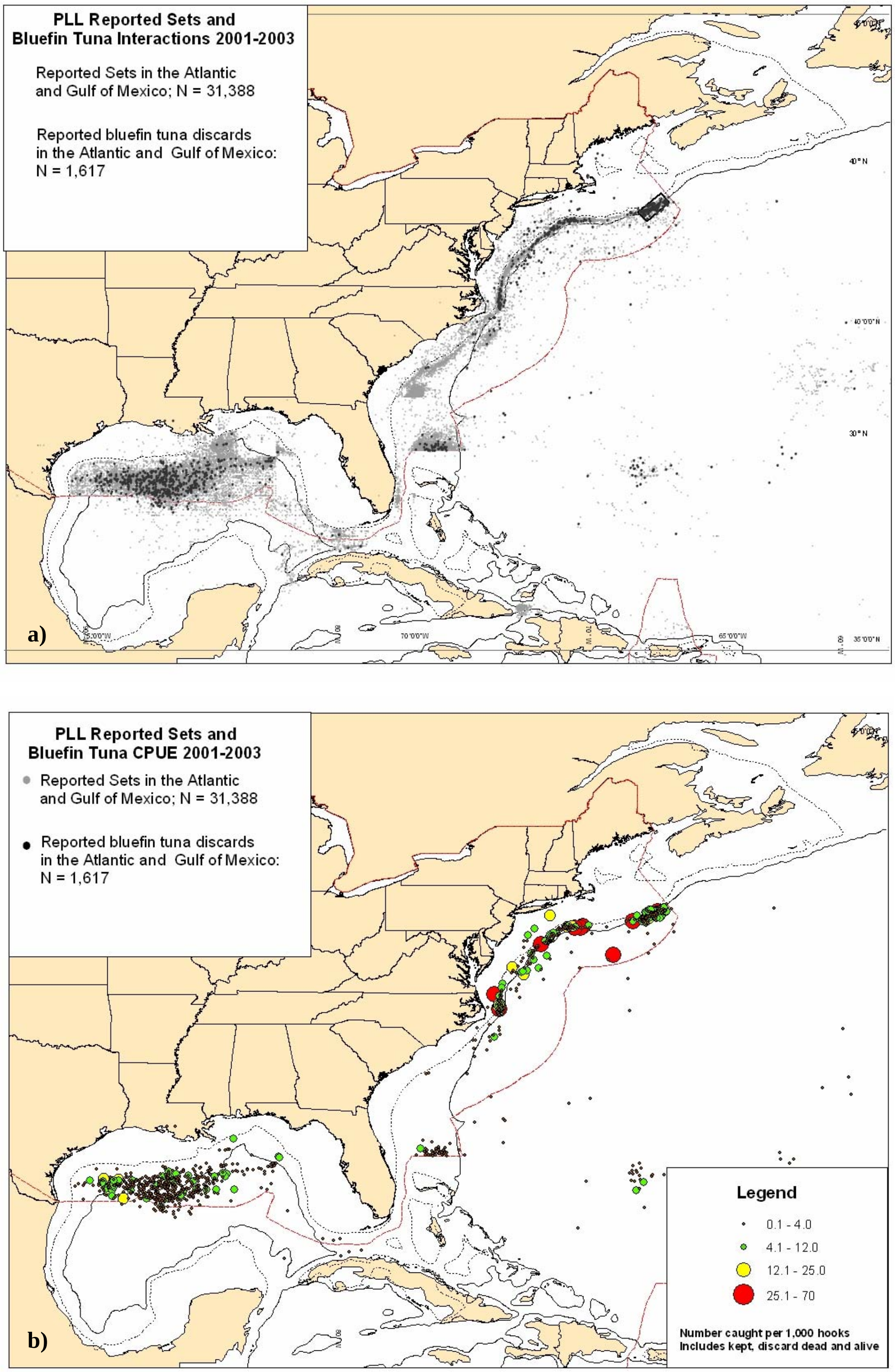



**Figure 4.8 Map showing all reported sets and bluefin tuna discards: a) shows the number of interactions in absolute numbers, b) shows CPUE (per 1,000 hooks).** Source: HMS Logbook 2001-2003.

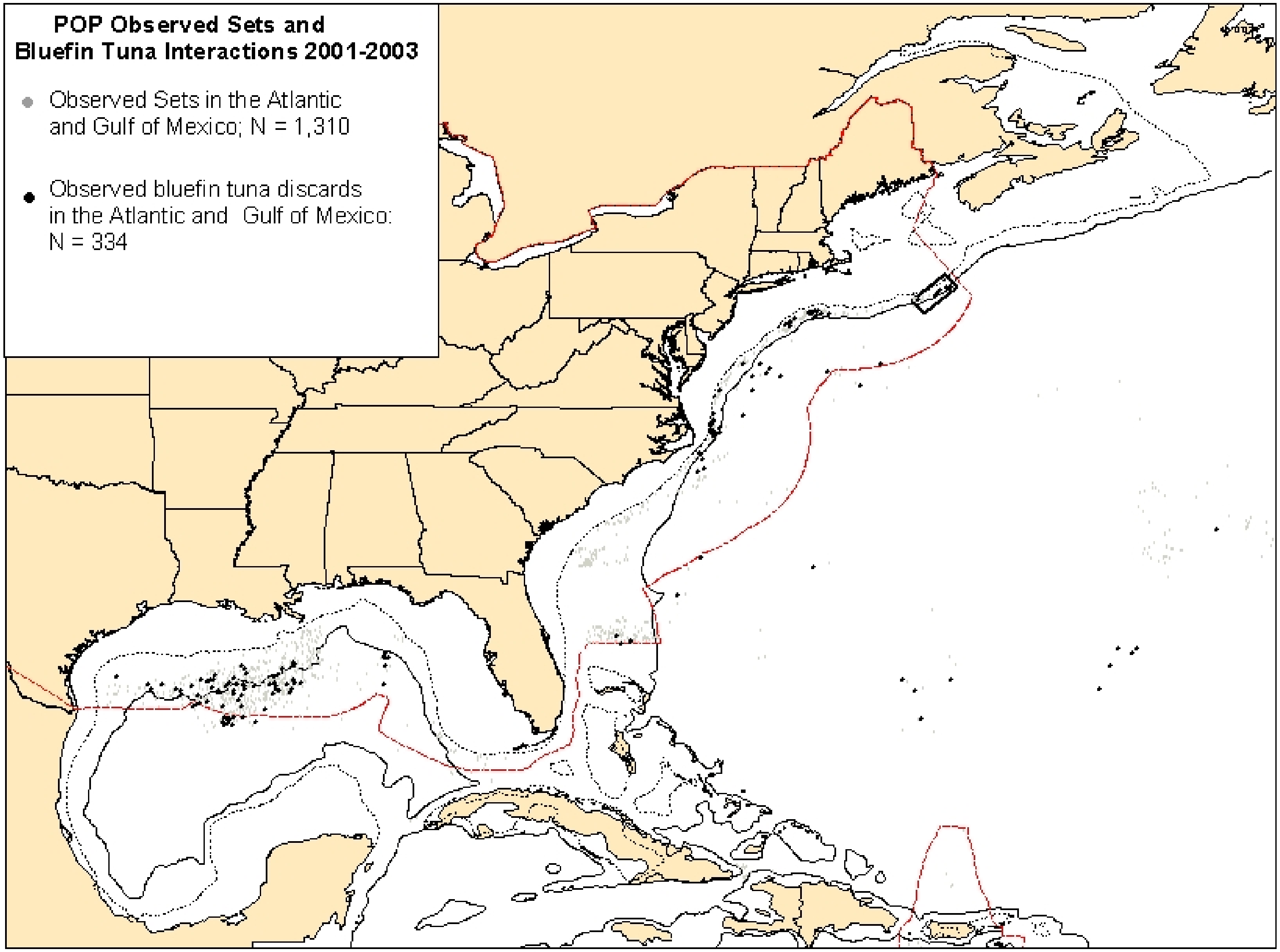



**Figure 4.9 Map showing all observed sets and bluefin tuna discards. Source:** Pelagic Observer Program 2001-2003.

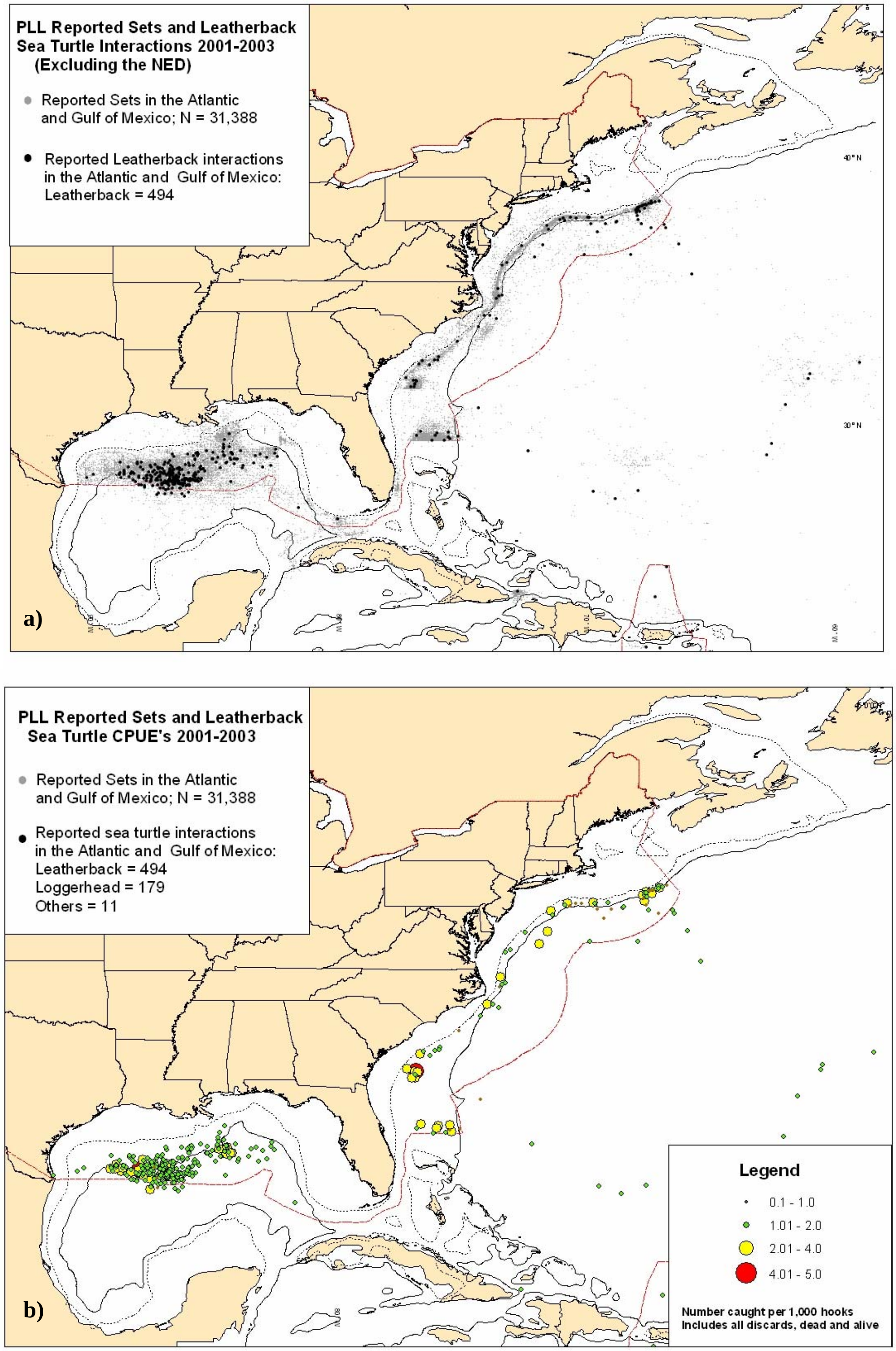
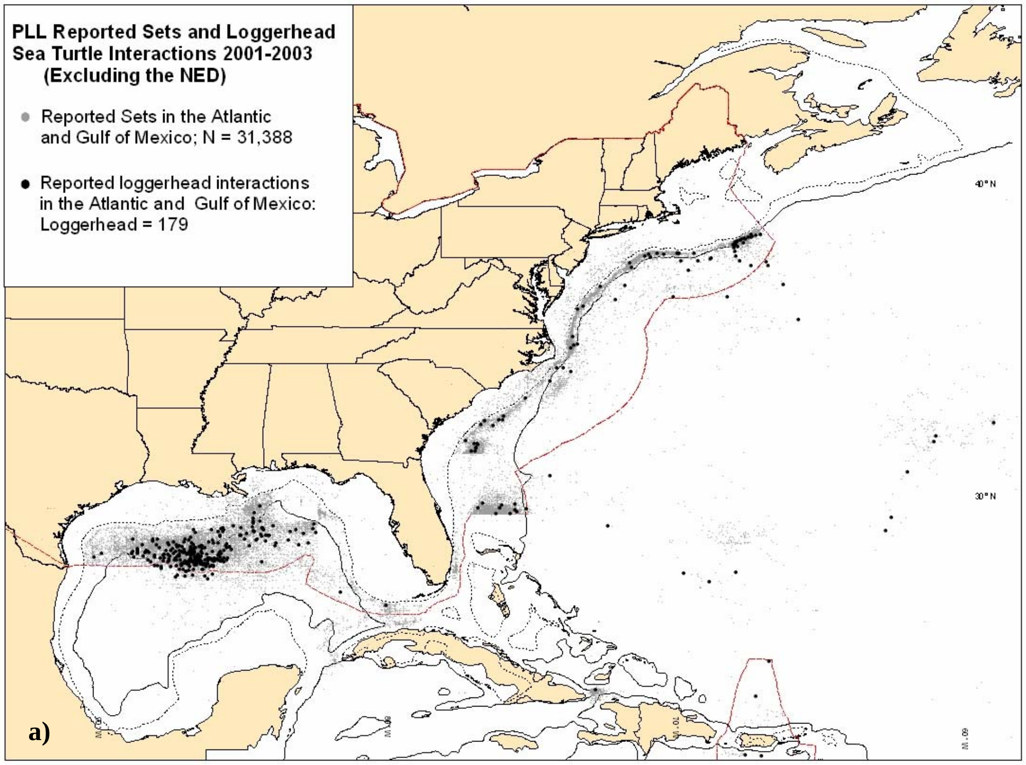



**Figure 4.10 Map showing all reported sets and leatherback sea turtle interactions: a) shows the number of interactions in absolute numbers, b) shows CPUE (per 1,000 hooks). Source: HMS Logbook 2001-2003.**



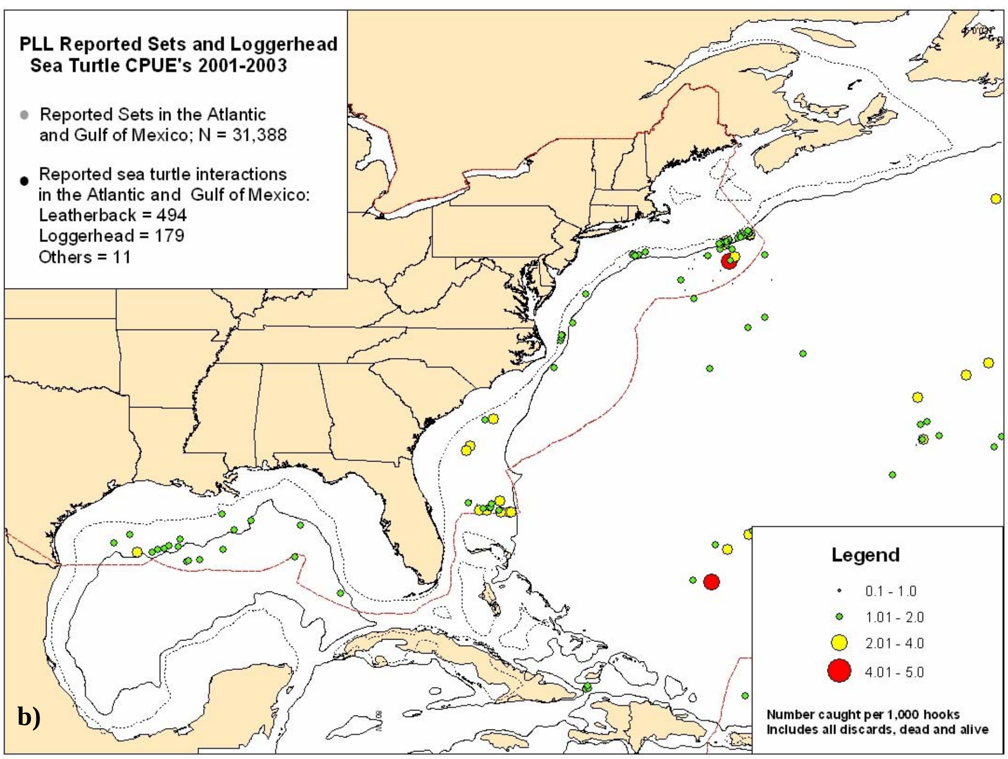




**Figure 4.11 Map showing all reported sets and loggerhead sea turtle interactions: a) shows the number of interactions in absolute numbers, b) shows CPUE (per 1,000 hooks).** Source: HMS Logbook 2001-2003.

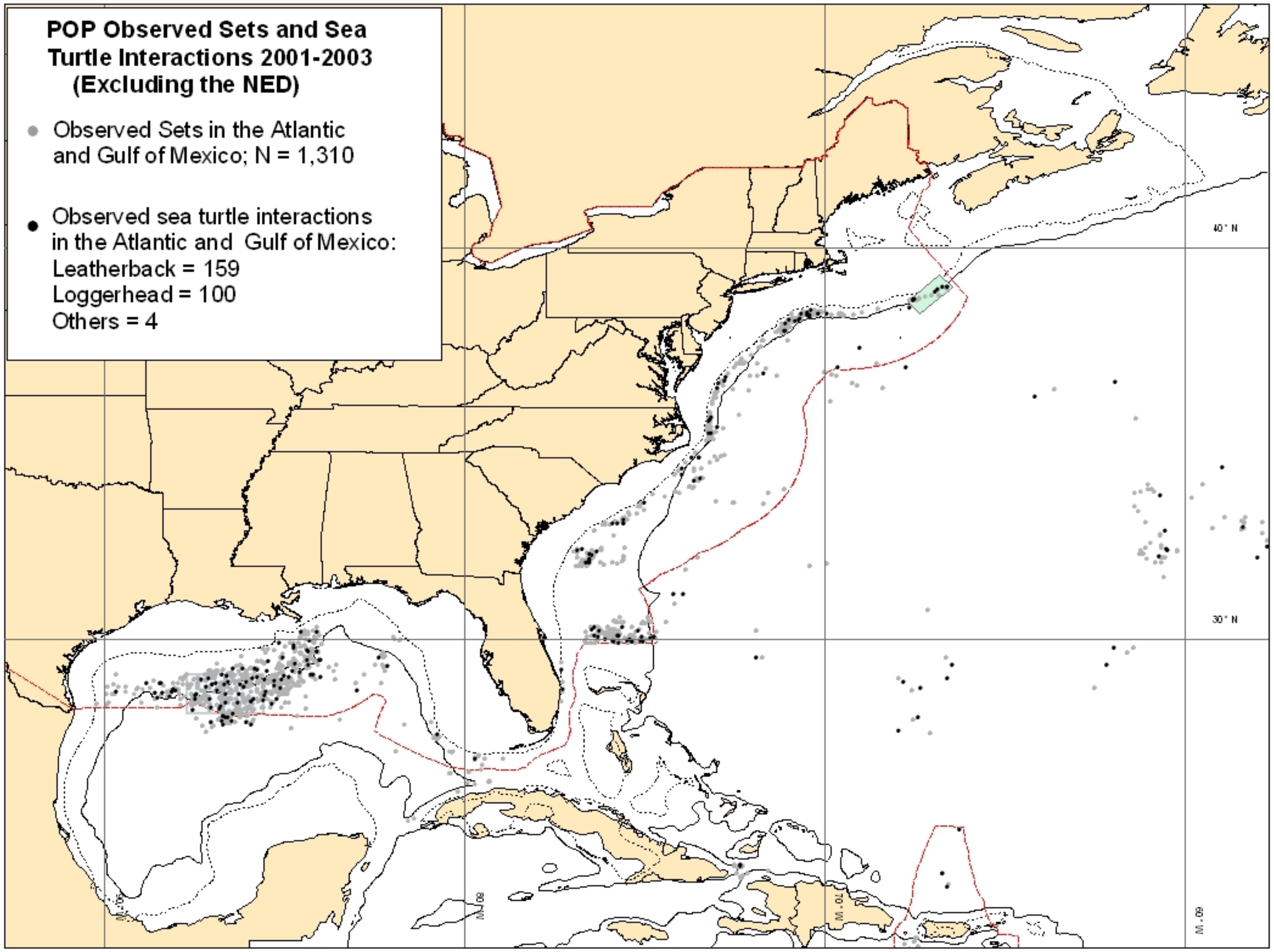



**Figure 4.12 Map showing all observed sets and sea turtle interactions.** Source: Pelagic Observer Program 2001 – 2003.

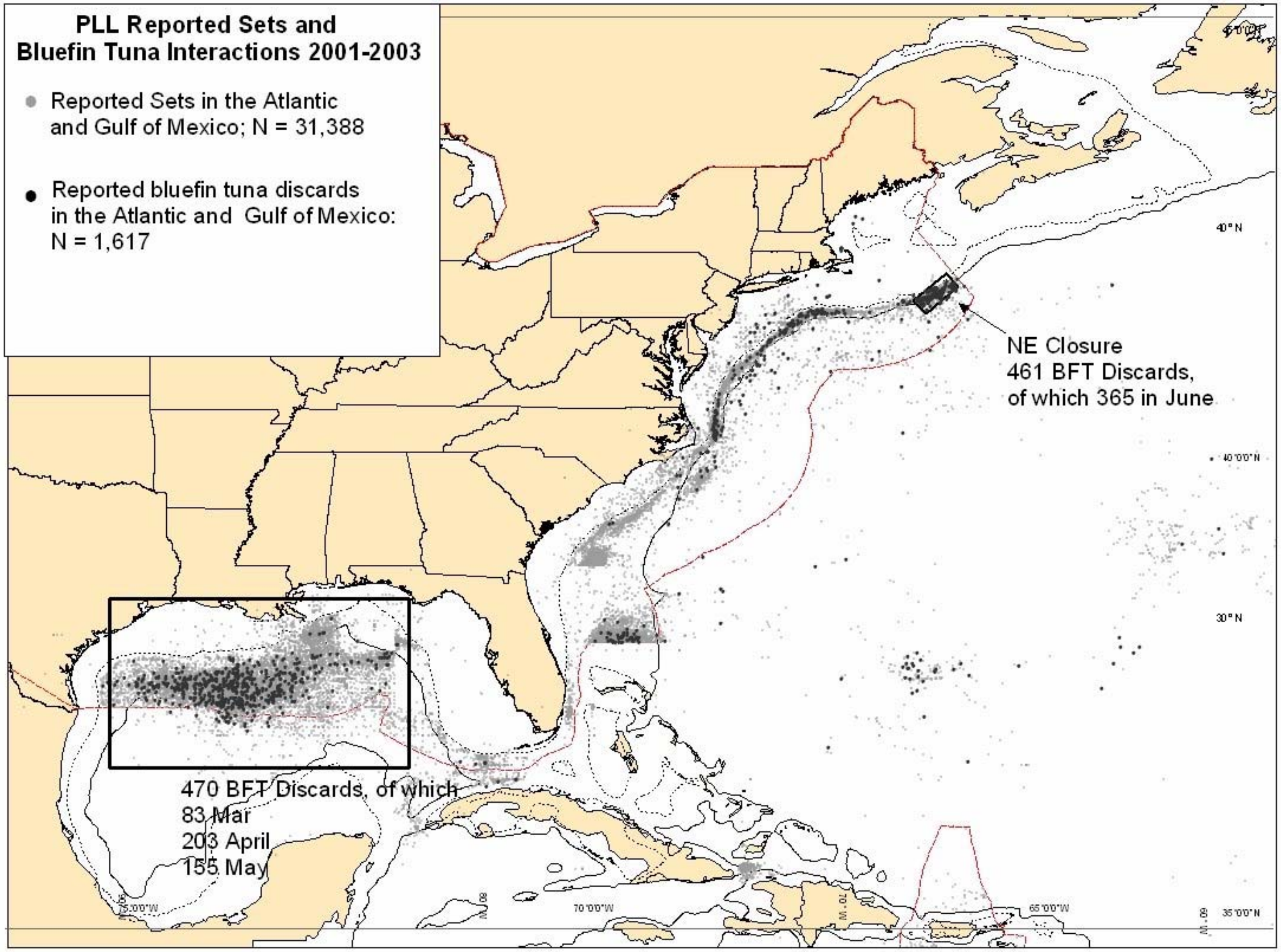



**Figure 4.13 Map showing discards of bluefin tuna in the Atlantic and Gulf of Mexico from 2001-2003. The large box is not a proposed time/area closure, but is shown for illustrative purpose only to delineate an area with high bluefin tuna discards. The bluefin tuna discards are listed by month below the box.** Source: HMS Logbook 2001-2003.

**Table 4.4 Percent change in discards of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and other sea turtles, and bluefin tuna kept and discards combined, based on various time/area closure alternatives without redistribution of effort. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: Pelagic Observer Program data (2001 – 2003).

| Alternative | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Bluefin Tuna Discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| Alternative B2(a) (year-round) | -14.6% | -11.1% | -20.9% | -4.5% | -12.2% | -18.9% | -7.0% | -25.0% |
| Alternative B2(a) (May-Nov) | -13.2% | -9.3% | -19.6% | -4.5% | -7.0% | -11.3% | -4.0% | 0.0% |
| Alternative B2(b) (year-round) | -1.4% | -0.7% | 0.0% | 0.0% | -16.2% | -0.6% | -9.0% | 0.0% |
| Alternative B2(b) (June only) | 0.0% | 0.0% | 0.0% | 0.0% | -15.4% | 0.0% | -6.0% | 0.0% |
| Alternative B2(c) (April-June) | -8.4% | -11.1% | -14.2% | -2.3% | -18.4% | -15.1% | -7.0% | -25.0% |
| Alternative B2(d) (year-round) | -38.8% | -26.8% | -52.0% | -15.9% | -24.3% | -52.8% | -14.0% | -75.0% |
| Alternative B2(e) (year-round) | -3.3% | -1.1% | 0.0% | -2.3% | -44.3% | -6.9% | -16.0% | 0.0% |

**Table 4.5 Percent change in discards of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and bluefin tuna based on various time/area closure alternatives with and without redistribution of effort. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001 – 2003).

| Alternative | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Bluefin Tuna discards |
|---|---|---|---|---|---|---|---|
| | **WITHOUT REDISTRIBUTION OF EFFORT** | | | | | | |
| Alternative B2(a) (year-round) | -16.0% | -19.9% | -15.8% | -14.9% | -34.6% | -5.0% | -12.2% |
| Alternative B2(a) (May-Nov) | -14.7% | -17.6% | -14.2% | -11.3% | -15.4% | -3.4% | -4.6% |
| | | | | | | | |
| Alternative B2(b) (year-round) | -3.9% | -0.9% | -0.1% | -0.5% | -5.7% | -20.7% | -28.5% |
| Alternative B2(b) (June only) | -0.4% | -0.2% | 0.0% | 0.0% | -2.0% | -11.2% | -22.6% |
| | | | | | | | |
| Alternative B2(c) (April-June) | -10.3% | -10.0% | -12.1% | -8.3% | -11.1% | -3.9% | -21.5% |
| Alternative B2(d) (year-round) | -47.3% | -57.0% | -62.4% | -83.5% | -57.5% | -10.1% | -27.1% |
| Alternative B2(e) (year-round) | -8.7% | -1.6% | -0.3% | -1.9% | -9.9% | -36.3% | -43.3% |
| | **WITH REDISTRIBUTION OF EFFORT** | | | | | | |
| Alternative B2(a) (year-round) | 0.9% | -4.0% | 1.1% | 4.0% | -20.0% | 15.0% | 7.9% |
| Alternative B2(a) (May-Nov) | -2.7% | -7.3% | -0.8% | -2.1% | -8.0% | 7.9% | 10.3% |
| | | | | | | | |
| Alternative B2(b) (year-round) | 3.5% | 6.7% | 8.3% | 4.8% | -1.7% | -18.5% | -27.0% |
| Alternative B2(b) (June only) | 1.0% | 0.9% | 1.7% | 0.8% | -1.3% | -10.3% | -21.9% |
| | | | | | | | |
| Alternative B2(c) (April-June) | 7.0% | 2.0% | 4.4% | 13.2% | -2.6% | 23.5% | 9.8% |
| Alternative B2(d) (year-round) | 0.3% | -20.3% | -26.8% | -73.3% | -21.3% | 65.5% | 38% |
| Alternative B2(e) (year-round) | 6.0% | 14.7% | 17.7% | 9.1% | -0.6% | -33.3% | -40.7% |
| | **COMBINATIONS WITH REDISTRIBUTION OF EFFORT** | | | | | | |
| Alternative B2(a)/B2(b) (year-round) | 4.3% | 3.3% | 11.9% | 8.6% | -22.7% | -7.3% | -19.1% |
| Alternative B2(a) (May-Nov)/B2(b) (June) | -1.7% | -6.7% | 1.5% | -2.3% | -8.4% | -3.1% | -13.6% |
| Alternative B2(d)/B2(e) (year-round) | 6.5% | -3.5% | -3.1% | 12.1% | -30.2% | 4.8% | -35.2% |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| Alternative | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Bluefin Tuna discards |
|---|---|---|---|---|---|---|---|
| | **COMBINATIONS W/ REDISTRIBUTION OF EFFORT & REOPENED AREAS** | | | | | | |
| B3(a): Partial Reopening of Charleston Bump and: | | | | | | | |
| Alternative B2(a)/B2(b) (year-round) | 4.9% | 4.0% | 12.9% | 9.5% | -22.7% | -6.7% | -24.3% |
| Alternative B2(a) (May-Nov)/B2(b) (June) | -1.4% | -6.1% | 2.5% | -1.4% | -8.4% | -2.5% | -13.6% |
| Alternative B2(d)/B2(e) (year-round) | 6.8% | -3.6% | -2.4% | -13.1% | -30.2% | 5.4% | -35.2% |
| | | | | | | | |
| B3(b): Partial Reopening of Northeastern U.S. closure and: | | | | | | | |
| Alternative B2(a)/B2(b) (year-round) | 4.3% | 3.3% | 11.9% | 8.6% | -22.7% | -7.3% | -24.24% |
| Alternative B2(a) (May-Nov)/B2(b) (June) | -1.7% | -6.7% | 1.5% | -2.3% | -8.4% | -3.1% | -13.54% |
| Alternative B2(d)/B2(e) (year-round) | 6.5% | -3.5% | -3.1% | 12.1% | -30.2% | 4.8% | -35.14% |

**Table 4.6 Total number of swordfish, bluefin tuna, yellowfin tuna, bigeye tuna, total BAYS (bigeye, albacore, yellowfin and skipjack tuna), reported landed or discarded in the U.S. Atlantic PLL fishery, 1997 – 2003. Pred [1] = without redistribution of effort, Pred [2] = with redistribution of effort. Predictions were predicted back in 2000.** Source: HMS Logbook data.

| Year | Number of hooks set (x1000) | Swordfish kept | Swordfish discards | Bluefin Tuna kept | Bluefin Tuna discards | Yellowfin Tuna kept | Yellowfin Tuna discards | Bigeye Tuna kept | Bigeye Tuna discards | Total BAYS kept | Total BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1997** | 9,637.8 | 68,691 | 20,433 | 178 | 681 | 74,035 | 1,847 | 21,405 | 1,611 | 102,706 | 4,223 |
| **1998** | 8,019.2 | 70,310 | 23,234 | 231 | 1,320 | 54,662 | 2,628 | 19,259 | 874 | 81,610 | 3,932 |
| **1999** | 7,901.8 | 67,120 | 20,558 | 263 | 604 | 83,619 | 2,885 | 22,467 | 906 | 114,438 | 4,384 |
| **2000** | 7,975.5 | 62,978 | 17,074 | 235 | 737 | 72,385 | 1,769 | 13,678 | 344 | 94,136 | 2,944 |
| **2001** | 7,564.0 | 47,560 | 13,993 | 177 | 348 | 52,337 | 1,798 | 18,216 | 554 | 80,466 | 3,757 |
| **2002** | 7,150.2 | 49,320 | 13,035 | 178 | 585 | 59,255 | 1,635 | 13,826 | 277 | 79,917 | 2,552 |
| **2003** | 7,008.1 | 51,835 | 11,829 | 273 | 881 | 50,817 | 1,987 | 7,473 | 337 | 63,321 | 2,763 |
| | | | | | | | | | | | |
| **1997-99** | 8,519.6 | 68,707 | 21,408 | 224 | 868 | 70,772 | 2,453 | 21,044 | 1,130 | 99,585 | 4,180 |
| **2001-03** | 7,240.8 | 49,572 | 12,952 | 209 | 605 | 54,136 | 1,807 | 13,172 | 389 | 74,568 | 3,024 |
| **% dif** | -15.0 | -27.9 | -39.5 | -6.7 | -30.3 | -23.5 | -26.3 | -37.4 | -65.6 | -25.1 | -27.7 |
| **Pred 1** | | -24.6 | -41.5 | | -1.0 | | | | | -5.2 | |
| **Pred 2** | | -13.0 | -31.4 | | 10.7 | | | | | 10.0 | |

**Table 4.7 Total number of pelagic sharks, large coastal sharks, dolphin (mahi mahi), and wahoo reported landed or discarded and number of billfish (blue and white marlin, sailfish, spearfish) and sea turtles caught and discarded in the U.S. Atlantic PLL fishery, 1997 – 2003. Pred [1] = without redistribution of effort, Pred [2] = with redistribution of effort. Predictions were predicted back in 2000.** Source: HMS logbook data.

| Year | Number of hooks set (x1000) | Pelagic Sharks kept | Pelagic Shark discards | Large Coastal Sharks kept | Large Coastal Shark discards | Dolphin kept | Dolphin discards | Wahoo kept | Wahoo discards | Blue Marlin discards | White Marlin discards | Sailfish discards | Spearfish discards | Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1997** | 9,637.8 | 5,078 | 81,518 | 13,217 | 7,762 | 62,770 | 1,201 | 4,503 | 90 | 2,290 | 2,422 | 1,735 | 380 | 267 |
| **1998** | 8,019.2 | 3,717 | 44,516 | 6,401 | 5,470 | 23,503 | 298 | 5,253 | 305 | 1,295 | 1,506 | 843 | 103 | 886 |
| **1999** | 7,901.8 | 2,894 | 28,967 | 6,382 | 5,442 | 31,536 | 320 | 5,136 | 128 | 1,253 | 1,969 | 1,407 | 151 | 631 |
| **2000** | 7,975.5 | 3,065 | 28,046 | 7,896 | 6,973 | 29,125 | 292 | 4,193 | 46 | 1,443 | 1,261 | 1,091 | 78 | 271 |
| **2001** | 7,564.0 | 3,460 | 23,813 | 6,478 | 4,836 | 27,586 | 325 | 3,068 | 62 | 635 | 848 | 356 | 137 | 424 |
| **2002** | 7,150.2 | 2,987 | 22,828 | 4,077 | 3,815 | 30,384 | 185 | 4,188 | 32 | 1,175 | 1,438 | 379 | 148 | 465 |
| **2003** | 7,008.1 | 3,037 | 21,705 | 5,326 | 4,813 | 29,372 | 451 | 3,919 | 126 | 595 | 809 | 277 | 108 | 399 |
| | | | | | | | | | | | | | | |
| **1997 – 1999** | 8,519.6 | 3,896 | 51,667 | 8,667 | 6,225 | 39,270 | 606 | 4,964 | 174 | 1,613 | 1,966 | 1,328 | 211 | 595 |
| **2001 – 2003** | 7,240.8 | 3,161 | 22,782 | 5,294 | 4,488 | 29,114 | 320 | 3,725 | 73 | 802 | 1,032 | 337 | 131 | 429 |
| **% dif** | -15.0 | -18.9 | -55.9 | -38.9 | -27.9 | -25.9 | -47.2 | -25 | -58.1 | -50.3 | -47.5 | -74.6 | -37.9 | -27.9 |
| **Pred 1** | | -9.5 | -2.0 | -32.1 | -42.5 | -29.3 | | | | -12.0 | -6.4 | -29.6 | | -1.9 |
| **Pred 2** | | 4.1 | 8.4 | -18.5 | -33.3 | -17.8 | | | | 6.5 | 10.8 | -14.0 | | 7.1 |

**Table 4.8 Reported distribution of hooks set by area, 1995-2003 (CAR=Caribbean, GOM=Gulf of Mexico, FEC=Florida East Coast, SAB=South Atlantic Bight, MAB=Mid-Atlantic Bight, NEC=Northeast Coastal, NED=Northeast Distant, SAR=Sargasso, NCA=North Central Atlantic, and TUNS=Tuna North & Tuna South).** Source: HMS logbook data.

| Year | CAR | GOM | FEC | SAB | MAB | NEC | NED | SAR | NCA | TUNS | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1995** | 688,754 | 2,662,303 | 646,841 | 852,230 | 2,394,364 | 1,072,433 | 765,485 | 16,430 | 785,727 | 297,730 | 10,182,297 |
| **1996** | 651,673 | 3,530,127 | 574,284 | 1,588,944 | 1,039,594 | 1,137,229 | 588,782 | 87,285 | 501,674 | 611,116 | 10,310,708 |
| **1997** | 473,500 | 3,402,436 | 784,920 | 946,220 | 1,203,832 | 1,226,406 | 688,344 | 21,640 | 209,946 | 680,563 | 9,637,807 |
| **1998** | 333,766 | 3,003,054 | 667,592 | 719,125 | 1,319,860 | 883,059 | 503,579 | 3,500 | 247,457 | 338,191 | 8,019,183 |
| **1999** | 177,628 | 3,619,402 | 709,809 | 769,738 | 1,276,008 | 587,225 | 338,719 | 17,795 | 117,031 | 288,434 | 7,901,789 |
| **2000** | 259,369 | 3,648,345 | 700,505 | 810,272 | 1,032,173 | 610,103 | 544,549 | 10,959 | 236,864 | 122,390 | 7,975,529 |
| **2001** | 196,733 | 3,453,533 | 467,155 | 725,951 | 1,092,030 | 865,531 | 316,559 | 11,437 | 256,383 | 178,639 | 7,563,951 |
| **2002** | 169,562 | 3,577,753 | 495,245 | 435,231 | 1,011,138 | 550,096 | 456,668 | 104,165 | 215,121 | 135,252 | 7,150,231 |
| **2003** | 137,315 | 3,808,066 | 494,113 | 537,660 | 692,196 | 448,438 | 576,727 | 112,787 | 132,205 | 68,600 | 7,008,107 |
| | | | | | | | | | | | |
| **1997 – 1999** | 328,298 | 3,341,631 | 720,774 | 811,694 | 1,266,567 | 898,897 | 510,214 | 14,312 | 191,478 | 435,729 | 8,519,593 |
| **2001 – 2003** | 167,870 | 3,613,117 | 485,504 | 566,281 | 931,788 | 621,355 | 449,985 | 76,130 | 201,236 | 127,497 | 7,240,763 |
| | | | | | | | | | | | |
| **% dif** | -48.9 | 8.1 | -32.6 | -30.2 | -26.4 | -30.9 | -11.8 | 431.9 | 5.1 | -70.7 | -15.0 |

**Table 4.9 Number of bluefin tuna (BFT), swordfish (SWO), sharks (PEL-pelagic; LCS-Large Coastal Sharks), billfish, and turtles kept and/or discarded in the Mid-Atlantic Bight (MAB) and Northeast Coastal (NEC) areas combined versus all other areas as reported in the pelagic logbook data, 1995-2003.** Source: HMS logbook Data.

| | | | SPECIES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Area** | **Year** | **Hooks set (x1000)** | **BFT kept** | **BFT discards** | **SWO kept** | **SWO discards** | **PEL shark kept** | **PEL shark discards** | **LCS kept** | **LCS discards** | **Billfish discards** | **Turtle interactions** |
| **MAB & NEC** | 1995 | 3,466.8 | 95 | 2,755 | 5,824 | 5,382 | 2,647 | 36,395 | 7,717 | 2,121 | 1,454 | 80 |
| | 1996 | 2,176.8 | 74 | 1,596 | 3,108 | 871 | 2,456 | 37,638 | 6,433 | 1,975 | 1,179 | 20 |
| | 1997 | 2,430.2 | 71 | 558 | 6,247 | 3,642 | 3,043 | 40,085 | 6,423 | 928 | 800 | 52 |
| | 1998 | 2,209.2 | 93 | 1,156 | 9,659 | 4,943 | 2,136 | 27,889 | 1,837 | 907 | 399 | 54 |
| | 1999 | 1,863.2 | 70 | 335 | 8,168 | 4,308 | 1,727 | 12,468 | 1,974 | 746 | 816 | 174 |
| | 2000 | 1,892.5 | 29 | 437 | 11,168 | 3,756 | 2,229 | 15,689 | 4,796 | 1,433 | 262 | 39 |
| | 2001 | 1,957.6 | 45 | 200 | 10,559 | 3,981 | 2,506 | 8,903 | 4,383 | 991 | 307 | 69 |
| | 2002 | 1,561.2 | 18 | 380 | 10,704 | 4,212 | 2,324 | 7,005 | 2,331 | 1,207 | 311 | 40 |
| | 2003 | 1,140.6 | 67 | 471 | 10,752 | 2,951 | 2,135 | 6,875 | 2,761 | 1,384 | 169 | 42 |
| | | | | | | | | | | | | |
| **All Other Areas (non-MAB/NEC)** | 1995 | 6,715.5 | 137 | 96 | 66,795 | 24,367 | 3,007 | 53,787 | 17,469 | 6,121 | 6,165 | 1,047 |
| | 1996 | 8,137.3 | 124 | 105 | 70,168 | 23,514 | 2,978 | 47,388 | 13,815 | 8,246 | 6,445 | 472 |
| | 1997 | 7,210.6 | 107 | 123 | 62,470 | 16,801 | 2,037 | 41,433 | 6,794 | 6,834 | 6,029 | 215 |
| | 1998 | 5,816.3 | 138 | 164 | 60,651 | 18,291 | 1,581 | 16,627 | 4,564 | 4,563 | 3,348 | 832 |
| | 1999 | 6,038.6 | 193 | 269 | 58,952 | 16,250 | 1,167 | 16,499 | 4,408 | 4,696 | 3,964 | 457 |
| | 2000 | 6,333.2 | 209 | 382 | 54,319 | 13,743 | 970 | 15,038 | 3,106 | 5,563 | 3,633 | 241 |
| | 2001 | 5,606.4 | 132 | 148 | 37,001 | 10,012 | 954 | 14,910 | 2,095 | 3,845 | 1,669 | 355 |
| | 2002 | 5,589 | 160 | 205 | 38,616 | 8,823 | 663 | 15,823 | 1,746 | 2,608 | 2,829 | 425 |
| | 2003 | 5,867.5 | 206 | 410 | 41,083 | 8,878 | 902 | 14,830 | 2,565 | 3,429 | 1,620 | 357 |

**Table 4.10 Alternative B2(a). Example of temporal variation in effectiveness of the closure on discards from May through November with redistribution of effort in (a) all open areas and (b) in the Gulf of Mexico only. Totals and percent changes are for months of May-Nov only. * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| a) Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Pelagic Shark discards | Large Coastal Shark discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 354,851 | 14 | 16 | 5 | 4 | 19 | 24 | 11 | 1 | 0 |
| **2** | 183,157 | 2 | 4 | 1 | 0 | 18 | 61 | 9 | 0 | 0 |
| **3** | 239,525 | 3 | 4 | 2 | 3 | 19 | 56 | 18 | 1 | 0 |
| **4** | 337,802 | 7 | 13 | 5 | 5 | 27 | 27 | 16 | 0 | 2 |
| **5** | 412,790 | 37 | 21 | 14 | 5 | 25 | 35 | 10 | 5 | 0 |
| **6** | 343,018 | 124 | 89 | 26 | 7 | 15 | 45 | 12 | 0 | 0 |
| **7** | 287,935 | 121 | 127 | 37 | 13 | 10 | 24 | 9 | 1 | 0 |
| **8** | 354,682 | 67 | 66 | 22 | 5 | 13 | 24 | 5 | 0 | 0 |
| **9** | 277,354 | 45 | 58 | 21 | 4 | 15 | 31 | 7 | 0 | 0 |
| **10** | 329,758 | 40 | 49 | 13 | 11 | 10 | 38 | 18 | 0 | 0 |
| **11** | 341,643 | 29 | 22 | 13 | 3 | 11 | 24 | 15 | 0 | 0 |
| **12** | 347,767 | 14 | 18 | 4 | 3 | 20 | 21 | 41 | 1 | 3 |
| **Total (May-Nov)** | 2,347,180 | 463 | 432 | 146 | 48 | 99 | 410 | 76 | 6 | 0 |
| | | | | | | | | | | |
| **All Areas*** | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 34,020 | 16,573 | 494 | 179 | 11 |
| | | | | | | | | | | |
| **% Reduction without redistribution of effort** | -11.1% | -14.7% | -17.6% | -14.2% | -11.3% | -0.3% | -2.5% | -15.4% | -3.4% | 0.0% |
| **% Reduction with redistribution of effort** | 0.0% | -2.7% | -7.3% | -0.8% | -2.1% | 14.5% | 11.7% | -8.0% | 7.9% | -7.1% |

| b) Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Pelagic Shark discards | Large Coastal Shark discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 354,851 | 14 | 16 | 5 | 4 | 19 | 24 | 11 | 1 | 0 |
| **2** | 183,157 | 2 | 4 | 1 | 0 | 18 | 61 | 9 | 0 | 0 |
| **3** | 239,525 | 3 | 4 | 2 | 3 | 19 | 56 | 18 | 1 | 0 |
| **4** | 337,802 | 7 | 13 | 5 | 5 | 27 | 27 | 16 | 0 | 2 |
| **5** | 412,790 | 37 | 21 | 14 | 5 | 25 | 35 | 10 | 5 | 0 |
| **6** | 343,018 | 124 | 89 | 26 | 7 | 15 | 45 | 12 | 0 | 0 |
| **7** | 287,935 | 121 | 127 | 37 | 13 | 10 | 24 | 9 | 1 | 0 |
| **8** | 354,682 | 67 | 66 | 22 | 5 | 13 | 24 | 5 | 0 | 0 |
| **9** | 277,354 | 45 | 58 | 21 | 4 | 15 | 31 | 7 | 0 | 0 |
| **10** | 329,758 | 40 | 49 | 13 | 11 | 10 | 38 | 18 | 0 | 0 |
| **11** | 341,643 | 29 | 22 | 13 | 3 | 11 | 24 | 15 | 0 | 0 |
| **12** | 347,767 | 14 | 18 | 4 | 3 | 20 | 21 | 41 | 1 | 3 |
| **Total (May-Nov)** | 2,347,180 | 463 | 432 | 146 | 48 | 99 | 221 | 76 | 6 | 0 |
| | | | | | | | | | | |
| **All Areas*** | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 34,020 | 16,573 | 494 | 179 | 11 |
| | | | | | | | | | | |
| **% Reduction without redistribution of effort** | -11.1% | -14.7% | -17.6% | -14.2% | -11.3% | -0.3% | -1.3% | -15.4% | -3.4% | 0.0% |
| **% Reduction with redistribution of effort** | | -4.4% | -5.8% | 1.8% | 3.3% | 0.3% | 3.6% | -9.4% | -1.4% | 0.0% |
| **No. reduced with redist. of effort** | | -139 | -142 | 18 | 14 | 112 | 598 | -46 | -3 | 0 |

**Table 4.11 Alternative B2(a). Percent change in incidental bluefin tuna and target catch and discards with and without redistribution of effort year-round and May-November with redistribution of effort into (a) all open areas and (b) in the Gulf of Mexico only. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| a) Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 355,191 | 1,110 | 488 | 9 | 2 | 3,425 | 105 | 95 | 1 | 3,563 | 110 |
| 2 | 193,937 | 928 | 361 | 14 | 2 | 853 | 13 | 40 | 1 | 904 | 14 |
| 3 | 242,885 | 718 | 468 | 29 | 36 | 1,678 | 42 | 9 | 0 | 1,691 | 48 |
| 4 | 347,360 | 556 | 656 | 32 | 82 | 3,726 | 121 | 10 | 0 | 3,738 | 122 |
| 5 | 424,810 | 526 | 991 | 31 | 71 | 3,923 | 335 | 2 | 0 | 3,928 | 345 |
| 6 | 352,129 | 597 | 543 | 7 | 3 | 4,333 | 176 | 17 | 0 | 4,350 | 198 |
| 7 | 304,242 | 414 | 241 | 0 | 0 | 3,978 | 103 | 33 | 0 | 4,017 | 120 |
| 8 | 351,376 | 602 | 239 | 0 | 0 | 3,184 | 85 | 46 | 0 | 3,249 | 96 |
| 9 | 281,104 | 452 | 262 | 0 | 1 | 2,515 | 45 | 34 | 0 | 2,553 | 80 |
| 10 | 337,578 | 635 | 396 | 0 | 0 | 3,053 | 139 | 121 | 2 | 3,226 | 166 |
| 11 | 351,773 | 733 | 316 | 2 | 0 | 2,860 | 69 | 147 | 0 | 3,097 | 147 |
| 12 | 356,739 | 1,098 | 484 | 9 | 1 | 3,369 | 77 | 130 | 1 | 3,622 | 140 |
| Total | 3,899,124 | 8,369 | 5,445 | 133 | 198 | 36,897 | 1,310 | 684 | 5 | 37,938 | 1,586 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction | -18.4% | -6.6% | -14.8% | -22.2% | -12.2% | -22.1% | -23.9% | -1.8% | -0.5% | -16.8% | -17.6% |
| **MAY THROUGH NOVEMBER ONLY** | | | | | | | | | | | |
| 5 | 424,810 | 526 | 991 | 31 | 71 | 3,923 | 335 | 2 | 0 | 3,928 | 345 |
| 6 | 352,129 | 597 | 543 | 7 | 3 | 4,333 | 176 | 17 | 0 | 4,350 | 198 |
| 7 | 304,242 | 414 | 241 | 0 | 0 | 3,978 | 103 | 33 | 0 | 4,017 | 120 |
| 8 | 351,376 | 602 | 239 | 0 | 0 | 3,184 | 85 | 46 | 0 | 3,249 | 96 |
| 9 | 281,104 | 452 | 262 | 0 | 1 | 2,515 | 45 | 34 | 0 | 2,553 | 80 |
| 10 | 337,578 | 635 | 396 | 0 | 0 | 3,053 | 139 | 121 | 2 | 3,226 | 166 |
| 11 | 351,773 | 733 | 316 | 2 | 0 | 2,860 | 69 | 147 | 0 | 3,097 | 147 |
| Total | 2,403,012 | 3,959 | 2,988 | 40 | 75 | 23,846 | 952 | 400 | 2 | 24,420 | 1,152 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction w/out redistribution | -11.4% | -3.1% | -8.1% | -6.7% | -4.6% | -14.3% | -17.4% | -1.1% | -0.2% | -10.8% | -12.8% |
| % Reduction with redistribution | | 9.1% | 4.4% | 3.4% | 10.3% | -1.1% | 3.0% | 2.6% | 11.6% | 2.6% | 0.0% |

| b) Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kepts | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 355,191 | 1,110 | 488 | 9 | 2 | 3,425 | 105 | 95 | 1 | 3,563 | 110 |
| 2 | 193,937 | 928 | 361 | 14 | 2 | 853 | 13 | 40 | 1 | 904 | 14 |
| 3 | 242,885 | 718 | 468 | 29 | 36 | 1,678 | 42 | 9 | 0 | 1,691 | 48 |
| 4 | 347,360 | 556 | 656 | 32 | 82 | 3,726 | 121 | 10 | 0 | 3,738 | 122 |
| 5 | 424,810 | 526 | 991 | 31 | 71 | 3,923 | 335 | 2 | 0 | 3,928 | 345 |
| 6 | 352,129 | 597 | 543 | 7 | 3 | 4,333 | 176 | 17 | 0 | 4,350 | 198 |
| 7 | 304,242 | 414 | 241 | 0 | 0 | 3,978 | 103 | 33 | 0 | 4,017 | 120 |
| 8 | 351,376 | 602 | 239 | 0 | 0 | 3,184 | 85 | 46 | 0 | 3,249 | 96 |
| 9 | 281,104 | 452 | 262 | 0 | 1 | 2,515 | 45 | 34 | 0 | 2,553 | 80 |
| 10 | 337,578 | 635 | 396 | 0 | 0 | 3,053 | 139 | 121 | 2 | 3,226 | 166 |
| 11 | 351,773 | 733 | 316 | 2 | 0 | 2,860 | 69 | 147 | 0 | 3,097 | 147 |
| 12 | 356,739 | 1,098 | 484 | 9 | 1 | 3,369 | 77 | 130 | 1 | 3,622 | 140 |
| Total | 3,899,124 | 8,369 | 5,445 | 133 | 198 | 36,897 | 1,310 | 684 | 5 | 37,938 | 1,586 |
| All Other Areas | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction | -18.4% | -6.6% | -14.8% | -22.2% | -12.2% | -22.1% | -23.9% | -1.8% | -0.5% | -16.8% | -17.6% |
| **MAY THROUGH NOVEMBER ONLY** | | | | | | | | | | | |
| 5 | 424,810 | 526 | 991 | 31 | 71 | 3,923 | 335 | 2 | 0 | 3,928 | 345 |
| 6 | 352,129 | 597 | 543 | 7 | 3 | 4,333 | 176 | 17 | 0 | 4,350 | 198 |
| 7 | 304,242 | 414 | 241 | 0 | 0 | 3,978 | 103 | 33 | 0 | 4,017 | 120 |
| 8 | 351,376 | 602 | 239 | 0 | 0 | 3,184 | 85 | 46 | 0 | 3,249 | 96 |
| 9 | 281,104 | 452 | 262 | 0 | 1 | 2,515 | 45 | 34 | 0 | 2,553 | 80 |
| 10 | 337,578 | 635 | 396 | 0 | 0 | 3,053 | 139 | 121 | 2 | 3,226 | 166 |
| 11 | 351,773 | 733 | 316 | 2 | 0 | 2,860 | 69 | 147 | 0 | 3,097 | 147 |
| Total | 2,403,012 | 3,959 | 2,988 | 40 | 75 | 23,846 | 952 | 400 | 2 | 24,420 | 1,152 |
| All GOM only | 11,138,444 | 29,070 | 14,517 | 345 | 470 | 114,961 | 4,025 | 1,505 | 34 | 117,172 | 5,313 |
| % Reduction w/out Redist. of effort | -21.6% | -13.6% | -20.6% | -11.6% | -16.0% | -20.7% | -23.7% | -26.6% | -5.9% | -20.8% | -21.7% |
| % Reduction with Redist. of effort | | 0.6% | 4.4% | -0.5% | -1.2% | 2.7% | 22.3% | -0.4% | 0.4% | 11.8% | 1.0% |
| No. reduced **with** redist. of effort | | 703 | 1,635 | -3 | -20 | 4,571 | 1,224 | -131 | 4 | 4,365 | 91 |

**Table 4.12 Alternative B2(b). Percent change in incidental bluefin tuna and target catch and discards without redistribution of effort. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **YEAR-ROUND** | | | | | | | | | | | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 648 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 183,851 | 1,867 | 256 | 11 | 365 | 505 | 11 | 557 | 0 | 1,337 | 15 |
| 7 | 256,598 | 2,712 | 394 | 14 | 43 | 552 | 5 | 197 | 0 | 929 | 8 |
| 8 | 235,512 | 2,327 | 499 | 3 | 2 | 2,625 | 12 | 157 | 2 | 3,019 | 16 |
| 9 | 225,096 | 2,875 | 509 | 2 | 48 | 3,407 | 51 | 373 | 3 | 4,167 | 54 |
| 10 | 78,630 | 1,076 | 207 | 1 | 0 | 524 | 2 | 180 | 0 | 980 | 3 |
| 11 | 10,086 | 85 | 124 | 3 | 3 | 39 | 0 | 159 | 0 | 266 | 1 |
| 12 | 1,500 | 25 | 8 | 0 | 0 | 10 | 0 | 4 | 0 | 15 | 0 |
| Total | 991,921 | 10,974 | 1,997 | 34 | 461 | 7,662 | 81 | 1,627 | 5 | 10,713 | 97 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction | -4.7% | -8.6% | -5.4% | -5.7% | -28.5% | -4.6% | -1.5% | -4.4% | -0.5% | -4.7% | -1.1% |
| **JUNE ONLY** | | | | | | | | | | | |
| 6 | 183851 | 1,867 | 256 | 11 | 365 | 505 | 11 | 557 | 0 | 1,337 | 15 |
| Total | 183851 | 1,867 | 256 | 11 | 365 | 505 | 11 | 557 | 0 | 1,337 | 15 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction w/out redistribution | -0.9% | -1.5% | -0.7% | -1.8% | -22.6% | -0.3% | -0.2% | -1.5% | 0.0% | -0.6% | -0.2% |
| % Reduction with redistribution | | -0.8% | -0.1% | -1.2% | -21.9% | 0.9% | 1.1% | -1.2% | 0.3% | 0.4% | 0.9% |

**Table 4.13 Alternative B2(c). Percent change in incidental bluefin tuna and target catch and discards without redistribution of effort. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | YEAR-ROUND | | | | | | | | | | |
| 1 | 734,991 | 2,334 | 1,052 | 26 | 2 | 8,144 | 278 | 212 | 6 | 8,454 | 303 |
| 2 | 480,238 | 2,512 | 931 | 31 | 4 | 2,274 | 91 | 72 | 3 | 2,371 | 98 |
| 3 | 533,964 | 1,872 | 1,104 | 49 | 73 | 3,657 | 122 | 22 | 0 | 3,688 | 134 |
| 4 | 814,452 | 1,288 | 1,176 | 92 | 189 | 7,772 | 370 | 20 | 0 | 7,796 | 380 |
| 5 | 1,075,255 | 1,185 | 1,520 | 64 | 151 | 11,768 | 571 | 13 | 0 | 11,804 | 641 |
| 6 | 954,628 | 1,121 | 925 | 18 | 8 | 13,513 | 539 | 57 | 2 | 13,576 | 656 |
| 7 | 1,102,300 | 1,294 | 994 | 3 | 0 | 15,432 | 528 | 84 | 0 | 15,545 | 714 |
| 8 | 1,101,773 | 1,412 | 752 | 0 | 5 | 13,612 | 300 | 76 | 1 | 13,716 | 436 |
| 9 | 807,867 | 1,002 | 663 | 20 | 1 | 8,615 | 147 | 77 | 0 | 8,715 | 254 |
| 10 | 818,964 | 1,132 | 726 | 0 | 1 | 7,728 | 234 | 198 | 5 | 7,992 | 340 |
| 11 | 715,282 | 1,186 | 600 | 2 | 4 | 5,745 | 163 | 264 | 1 | 6,166 | 281 |
| 12 | 714,878 | 1,747 | 894 | 13 | 1 | 6,780 | 235 | 199 | 1 | 7,194 | 344 |
| Total | 9,854,592 | 18,085 | 11,337 | 318 | 439 | 105,040 | 3,578 | 1,294 | 19 | 107,017 | 4,581 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction | -46.6% | -14.2% | -30.9% | -53.1% | -27.1% | -62.8% | -65.2% | -3.5% | -1.9% | -47.3% | -51.0% |
| | APRIL THROUGH JUNE ONLY | | | | | | | | | | |
| 4 | 814,452 | 1,288 | 1,176 | 92 | 189 | 7,772 | 370 | 20 | 0 | 7,796 | 380 |
| 5 | 1,075,255 | 1,185 | 1,520 | 64 | 151 | 11,768 | 571 | 13 | 0 | 11,804 | 641 |
| 6 | 954,628 | 1,121 | 925 | 18 | 8 | 13,513 | 539 | 57 | 2 | 13,576 | 656 |
| Total (Apr-Jun) | 2,844,335 | 3,594 | 3,621 | 174 | 348 | 33,053 | 1,480 | 90 | 2 | 33,176 | 1,677 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction w/out redistribution | -13.4% | -2.8% | -9.9% | -29.0% | -21.5% | -19.8% | -27.0% | -0.2% | -0.2% | -14.7% | -18.7% |
| % Reduction with redistribution | | 21.1% | 6.0% | -18.3% | 9.8% | -11.0% | -18.3% | 11.4% | 1.7% | -5.4% | -11.8% |

**Table 4.14 Alternative B2(b). Example of temporal variation in effectiveness of the closure on discards in June. Totals and percent decreases are for month of June only. * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001 – 2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Pelagic Shark discards | Large Coastal Shark discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 648 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 |
| 6 | 184,435 | 12 | 4 | 0 | 0 | 1,302 | 7 | 10 | 20 | 0 |
| 7 | 256,598 | 31 | 3 | 0 | 0 | 1,720 | 196 | 7 | 9 | 0 |
| 8 | 235,512 | 49 | 6 | 0 | 0 | 645 | 85 | 5 | 3 | 0 |
| 9 | 224,296 | 26 | 7 | 1 | 2 | 603 | 41 | 1 | 3 | 0 |
| 10 | 78,130 | 6 | 2 | 0 | 0 | 457 | 13 | 0 | 1 | 0 |
| 11 | 10,086 | 0 | 0 | 0 | 0 | 310 | 2 | 4 | 0 | 0 |
| 12 | 1,500 | 0 | 0 | 0 | 0 | 13 | 0 | 1 | 1 | 0 |
| Total (June) | 184,435 | 12 | 4 | 0 | 0 | 5,071 | 344 | 10 | 20 | 0 |
| | | | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 34,020 | 16,573 | 494 | 179 | 11 |
| | | | | | | | | | | |
| % Reduction without redistribution of effort | -0.9% | -0.4% | -0.2% | 0.0% | 0.0% | -14.9% | -2.5% | -2.0% | -11.2% | 0.0% |
| % Reduction **with** redistribution of effort | | 1.0% | 0.9% | 1.7% | 0.8% | -2.6% | 2.2% | -1.3% | -10.3% | 0.0% |

**Table 4.15 Percent change in kept and discarded catch based on different time/area closure alternatives with and without redistribution of effort. - = decrease and + = increase in kept and discarded catch; * with redistribution of effort assumes no reduction in the number of hooks set. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Alternative | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **WITHOUT REDISTRIBUTION OF EFFORT** | | | | | | | | | | |
| Alternative B2(a) (year-round) | -18.4% | -6.6% | -14.8% | -22.2% | -12.2% | -22.1% | -23.9% | -1.8% | -0.5% | -16.8% | -17.6% |
| Alternative B2(a) (May-Nov) | -11.4% | -3.1% | -8.1% | -6.7% | -4.6% | -14.3% | -17.4% | -1.1% | -0.2% | -10.8% | -12.8% |
| | | | | | | | | | | | |
| Alternative B2(b) (year-round) | -4.7% | -8.6% | -5.4% | -5.7% | -28.5% | -4.6% | -1.5% | -4.4% | -0.5% | -4.7% | -1.1% |
| Alternative B2(b) (June only) | -0.9% | -1.5% | -0.7% | -1.8% | -22.6% | -0.3% | -0.2% | -1.5% | 0.0% | -0.6% | -0.2% |
| | | | | | | | | | | | |
| Alternative B2(c) (April-June) | -13.4% | -2.8% | -9.9% | -29.0% | -21.5% | -19.8% | -27.0% | -0.2% | -0.2% | -14.7% | -18.7% |
| Alternative B2(d) (year-round) | -47.4% | -15.1% | -31.5% | -53.6% | -27.1% | -64.0% | -66.4% | -3.5% | -1.9% | -48.2% | -51.8% |
| Alternative B2(e) (year-round) | -10.1% | -13.7% | -11.0% | -12.4% | -43.3% | -7.6% | -3.6% | -19.7% | -13.8% | -12.0% | -8.3% |
| | **WITH REDISTRIBUTION OF EFFORT** | | | | | | | | | | |
| Alternative B2(a) (year-round) | * | 15.3% | 5.4% | -3.9% | 7.9% | -4.6% | -6.9% | 21.2% | 20.8% | 2.3% | 1.4% |
| Alternative B2(a) (May-Nov) | * | 9.1% | 4.4% | 3.4% | 10.3% | -1.1% | 3.0% | 2.6% | 11.6% | 2.6% | 0.04% |
| | | | | | | | | | | | |
| Alternative B2(b) (year-round) | * | -5.5% | -1.9% | -3.5% | -27.0% | 1.3% | 4.1% | -0.5% | 5.6% | 0.7% | 4.5% |
| Alternative B2(b) (June only) | * | -0.8% | -0.1% | -1.2% | -21.9% | 0.9% | 1.1% | -1.2% | 0.3% | 0.4% | 0.9% |
| | | | | | | | | | | | |
| Alternative B2(c) (April-June) | * | 21.1% | 6.0% | -18.3% | 9.8% | -11.0% | -18.3% | 11.4% | 1.7% | -5.4% | -11.8% |
| Alternative B2(d) (year-round) | * | 62.5% | 31.9% | -12.1% | 38.0% | -29.8% | -35.6% | 80.6% | 84.8% | -0.6% | -6.9% |
| Alternative B2(e) (year-round) | * | -6.8% | -2.9% | -7.6% | -40.7% | 5.5% | 8.3% | -11.9% | -2.5% | -0.3% | 4.1% |
| | **COMBINATIONS WITH REDISTRIBUTION OF EFFORT** | | | | | | | | | | |
| Alternative B2(a)/B2(b) (year-round) | * | 9.8% | 3.6% | -7.4% | -19.1% | -3.2% | -2.9% | 20.8% | 26.5% | 2.9% | 5.9% |
| Alternative B2(a) (May-Nov)/B2(b) (June) | * | 5.8% | 4.4% | 5.4% | -13.6% | 0.3% | 2.2% | 10.0% | 11.8% | 3.2% | 3.5% |
| Alternative B2(d)/B2(e) (year-round) | * | 63.1% | 36.1% | -22.0% | -35.2% | -25.1% | -21.6% | 78.4% | 117.4% | -0.4% | 5.6% |

**Table 4.16 Alternative B2(c). Example of temporal variation in effectiveness of the time/area closure on discards from April through June. Totals and percent changes are for month of June only. * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001 – 2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Pelagic Shark discards | Large Coastal Shark discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 734,991 | 19 | 29 | 17 | 10 | 60 | 93 | 11 | 1 | 0 |
| 2 | 480,238 | 8 | 6 | 4 | 0 | 55 | 138 | 12 | 0 | 0 |
| 3 | 533,964 | 6 | 9 | 3 | 5 | 44 | 161 | 17 | 1 | 0 |
| 4 | 814,452 | 22 | 28 | 12 | 6 | 71 | 130 | 19 | 0 | 2 |
| 5 | 1,075,255 | 78 | 54 | 36 | 9 | 147 | 294 | 15 | 6 | 0 |
| 6 | 954,628 | 225 | 162 | 76 | 20 | 69 | 195 | 21 | 1 | 0 |
| 7 | 1,102,300 | 545 | 547 | 178 | 58 | 58 | 123 | 65 | 3 | 0 |
| 8 | 1,100,973 | 248 | 187 | 110 | 23 | 52 | 102 | 28 | 1 | 0 |
| 9 | 807,867 | 110 | 146 | 71 | 26 | 41 | 96 | 25 | 1 | 0 |
| 10 | 818,964 | 120 | 92 | 42 | 13 | 60 | 132 | 29 | 0 | 0 |
| 11 | 715,282 | 53 | 44 | 20 | 6 | 30 | 228 | 19 | 1 | 0 |
| 12 | 714,878 | 35 | 34 | 5 | 9 | 46 | 64 | 67 | 3 | 3 |
| Total April-June | 2,844,335 | 325 | 244 | 124 | 35 | 287 | 619 | 55 | 7 | 2 |
| | | | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 34,020 | 16,573 | 494 | 179 | 11 |
| | | | | | | | | | | |
| % Reduction without redistribution of effort | -13.4% | -10.3% | -10.0% | -12.1% | -8.3% | -0.8% | -3.7% | -11.1% | -3.9% | -18.2% |
| % Reduction with redistribution of effort | | 7.0% | 2.0% | 4.4% | 13.2% | 17.1 | 25.9 | -2.6% | 23.5% | -18.2% |

**Table 4.17 Alternative B2(d). Example of temporal variation in effectiveness of the time/area closure on discards. * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001 – 2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Pelagic Shark discards | Large Coastal Shark discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 739,191 | 19 | 29 | 17 | 13 | 60 | 101 | 11 | 1 | 0 |
| 2 | 488,238 | 8 | 6 | 5 | 0 | 58 | 175 | 12 | 0 | 0 |
| 3 | 546,944 | 6 | 9 | 3 | 6 | 47 | 188 | 17 | 1 | 0 |
| 4 | 825,627 | 22 | 28 | 12 | 9 | 78 | 146 | 19 | 0 | 2 |
| 5 | 1,085,255 | 78 | 55 | 37 | 17 | 149 | 309 | 14 | 6 | 0 |
| 6 | 978,848 | 224 | 173 | 108 | 49 | 70 | 197 | 18 | 1 | 0 |
| 7 | 1,136,250 | 547 | 583 | 209 | 108 | 59 | 347 | 47 | 3 | 0 |
| 8 | 1,125,483 | 248 | 188 | 110 | 59 | 52 | 138 | 21 | 1 | 0 |
| 9 | 820,167 | 126 | 151 | 74 | 46 | 43 | 97 | 14 | 1 | 0 |
| 10 | 828,954 | 120 | 95 | 42 | 28 | 60 | 132 | 26 | 0 | 0 |
| 11 | 725,772 | 53 | 46 | 20 | 10 | 30 | 233 | 19 | 1 | 0 |
| 12 | 720,028 | 36 | 34 | 5 | 9 | 47 | 80 | 67 | 3 | 3 |
| Total | 10,020,757 | 1,487 | 1,397 | 642 | 354 | 753 | 2,143 | 285 | 18 | 5 |
| | | | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 34,020 | 16,573 | 494 | 179 | 11 |
| | | | | | | | | | | |
| % Reduction without redistribution of effort | -47.4% | -47.3% | -57.0% | -62.4% | -83.5% | -2.2% | -2.5% | -57.7% | -10.1% | -45.5% |
| % Reduction with redistribution of effort | | 0.3% | -20.3% | -26.8% | -73.3% | 88.8% | 66.9% | -21.3% | 65.5% | -3.3% |

**Table 4.18 Alternative B2(d). Percent change in incidental bluefin tuna and target catch and discards without redistribution of effort. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 739,191 | 2,354 | 1,067 | 26 | 2 | 8,158 | 278 | 214 | 6 | 8,470 | 305 |
| 2 | 488,238 | 2,746 | 986 | 31 | 4 | 2,274 | 91 | 72 | 3 | 2,371 | 98 |
| 3 | 547,564 | 2,230 | 1,168 | 50 | 73 | 3,660 | 122 | 22 | 0 | 3,691 | 134 |
| 4 | 825,627 | 1,591 | 1,248 | 93 | 189 | 7,780 | 370 | 20 | 0 | 7,804 | 380 |
| 5 | 1,085,255 | 1,260 | 1,530 | 64 | 151 | 11,836 | 571 | 14 | 0 | 11,873 | 641 |
| 6 | 978,848 | 1,134 | 924 | 18 | 8 | 14,310 | 582 | 56 | 2 | 14,372 | 705 |
| 7 | 1,136,250 | 1,304 | 998 | 3 | 0 | 15,687 | 530 | 84 | 0 | 15,800 | 716 |
| 8 | 1,127,083 | 1,442 | 758 | 0 | 5 | 13,864 | 301 | 77 | 1 | 13,969 | 446 |
| 9 | 820,167 | 1,023 | 668 | 20 | 1 | 8,832 | 154 | 78 | 0 | 8,933 | 261 |
| 10 | 828,954 | 1,140 | 727 | 0 | 1 | 7,839 | 234 | 199 | 5 | 8,104 | 340 |
| 11 | 725,772 | 1,243 | 610 | 3 | 4 | 5,829 | 169 | 264 | 1 | 6,250 | 287 |
| 12 | 720,028 | 1,748 | 895 | 13 | 1 | 6,872 | 239 | 199 | 1 | 7,286 | 348 |
| Total | 10,022,977 | 19,215 | 11,579 | 321 | 439 | 106,941 | 3,641 | 1,299 | 19 | 108,923 | 4,661 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction w/out Redistribution | -47.4% | -15.1% | -31.5% | -53.6% | -27.1% | -64.0% | -66.4% | -3.5% | -1.9% | -48.2% | -51.8% |
| % Reduction with redistribution | | 62.5% | 31.9% | -12.1% | 38.0% | -29.8% | -35.6% | 80.6% | 84.8% | -0.6% | -6.9% |

**Table 4.19 Alternative B2(e). Example of temporal variation in effectiveness of the time/area closure on discards. * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Pelagic Shark discards | Large Coastal Shark discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9,800 | 0 | 0 | 0 | 0 | 157 | 2 | 0 | 1 | 0 |
| 2 | 6,300 | 0 | 0 | 0 | 0 | 90 | 0 | 0 | 1 | 0 |
| 3 | 4,200 | 0 | 0 | 0 | 0 | 65 | 0 | 0 | 2 | 0 |
| 4 | 999 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 |
| 5 | 8,913 | 0 | 0 | 0 | 0 | 72 | 0 | 1 | 0 | 0 |
| 6 | 247,068 | 16 | 5 | 0 | 1 | 1750 | 11 | 11 | 27 | 0 |
| 7 | 476,917 | 52 | 3 | 1 | 2 | 2257 | 284 | 9 | 10 | 0 |
| 8 | 515,418 | 121 | 10 | 1 | 4 | 1290 | 204 | 9 | 6 | 0 |
| 9 | 395,521 | 71 | 19 | 1 | 1 | 1192 | 75 | 3 | 3 | 0 |
| 10 | 277,781 | 9 | 2 | 0 | 0 | 1755 | 102 | 3 | 8 | 0 |
| 11 | 137,838 | 4 | 1 | 0 | 0 | 1724 | 18 | 10 | 6 | 0 |
| 12 | 46,755 | 1 | 0 | 0 | 0 | 372 | 2 | 3 | 1 | 0 |
| Total | 2,127,510 | 274 | 40 | 3 | 8 | 10,759 | 698 | 49 | 65 | 0 |
| | | | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 34,020 | 16,573 | 494 | 179 | 11 |
| | | | | | | | | | | |
| % Reduction without redistribution of effort | -10.1% | -8.7% | -1.6% | -0.3% | -1.9% | -31.6% | -2.5% | -9.9% | -36.3% | 0.0% |
| % Reduction with redistribution of effort | | 6.0% | 14.7% | 17.7% | 9.1% | -23.9% | 5.8% | -0.6% | -33.3% | 5.7% |

**Table 4.20 Alternative B2(e). Percent change in incidental bluefin tuna and target catch and discards without redistribution of effort. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9,800 | 37 | 36 | 0 | 0 | 27 | 0 | 72 | 0 | 187 | 0 |
| 2 | 7,700 | 28 | 23 | 0 | 2 | 0 | 0 | 10 | 0 | 70 | 0 |
| 3 | 4,200 | 5 | 4 | 0 | 2 | 1 | 0 | 9 | 0 | 16 | 0 |
| 4 | 999 | 0 | 1 | 0 | 40 | 2 | 0 | 0 | 0 | 3 | 0 |
| 5 | 8,913 | 45 | 9 | 0 | 12 | 6 | 0 | 12 | 1 | 39 | 2 |
| 6 | 247,068 | 2,344 | 322 | 13 | 388 | 729 | 17 | 705 | 0 | 1,762 | 21 |
| 7 | 475,917 | 4,016 | 590 | 20 | 66 | 1,313 | 10 | 450 | 5 | 2,188 | 23 |
| 8 | 515,418 | 3,532 | 838 | 5 | 2 | 3,997 | 32 | 1,463 | 48 | 6,345 | 91 |
| 9 | 394,621 | 3,856 | 805 | 2 | 52 | 4,175 | 88 | 1,592 | 62 | 6,786 | 187 |
| 10 | 277,781 | 2,648 | 897 | 11 | 49 | 1,548 | 41 | 1,350 | 14 | 5,357 | 105 |
| 11 | 138,463 | 647 | 495 | 23 | 86 | 690 | 10 | 1,109 | 2 | 3,111 | 205 |
| 12 | 46,755 | 264 | 34 | 0 | 1 | 204 | 2 | 531 | 7 | 1,277 | 114 |
| Total | 2,127,635 | 17,422 | 4,054 | 74 | 700 | 12,692 | 200 | 7,303 | 139 | 27,141 | 748 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction w/out Redistribution | -10.1% | -13.7% | -11.0% | -12.4% | -43.3% | -7.6% | -3.6% | -19.7% | -13.8% | -12.0% | -8.3% |
| % Reduction with Redistribution | | -6.8% | -2.9% | -7.6% | -40.7% | 5.5% | 8.3% | -11.9% | -2.5% | -0.3% | 4.1% |

**Table 4.21 B2(a) and B2(b) Combined. Example of temporal variation in effectiveness of the time/area closure on discards for combined alternatives B2(a) and B2(b) year-round, and from May through November for B2(a) and in June for B2(b). * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Pelagic Shark discards | Large Coastal Shark discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea turtles |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 352,141 | 14 | 16 | 5 | 4 | 19 | 24 | 11 | 1 | 0 |
| 2 | 176,609 | 2 | 4 | 1 | 0 | 18 | 61 | 9 | 0 | 0 |
| 3 | 232,645 | 3 | 4 | 2 | 3 | 19 | 56 | 18 | 1 | 0 |
| 4 | 330,682 | 7 | 13 | 5 | 5 | 27 | 27 | 16 | 0 | 2 |
| 5 | 397,942 | 37 | 19 | 13 | 5 | 46 | 35 | 10 | 5 | 0 |
| 6 | 514,590 | 135 | 90 | 20 | 8 | 1,317 | 52 | 22 | 20 | 0 |
| 7 | 524,443 | 149 | 128 | 35 | 13 | 1,730 | 220 | 16 | 10 | 0 |
| 8 | 564,244 | 107 | 65 | 16 | 5 | 658 | 109 | 10 | 3 | 0 |
| 9 | 489,540 | 71 | 64 | 22 | 5 | 618 | 72 | 8 | 3 | 0 |
| 10 | 399,058 | 46 | 50 | 12 | 11 | 467 | 51 | 18 | 1 | 0 |
| 11 | 344,368 | 29 | 22 | 13 | 3 | 321 | 26 | 18 | 0 | 0 |
| 12 | 341,864 | 14 | 13 | 4 | 2 | 33 | 21 | 41 | 2 | 2 |
| Total | 4,668,126 | 614 | 488 | 148 | 64 | 5,273 | 754 | 197 | 46 | 4 |
| | | | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 34,020 | 16,573 | 494 | 179 | 11 |
| | | | | | | | | | | |
| % Decrease without redistribution of effort | -22.1% | -19.5% | -19.9% | -14.4% | -15.1% | -15.5% | -4.5% | -39.9% | -25.7% | -36.4% |
| % Decrease with redistribution of effort (Year-round) | | 4.3% | 3.3% | 11.9% | 8.6% | 9.2% | 21.9% | -22.7% | -7.3% | -20.3% |
| % Decrease with redistribution of effort B2(a) (May-Nov) and B2(b) (June) | | -1.7% | -6.7% | 1.5% | -2.3% | 9.6% | 10.1% | -8.4% | -3.1% | 7.1% |
| No. reduced with redist. of effort | | -53 | -164 | 15 | -10 | 3,276 | 1,680 | -42 | -6 | 1 |

**Table 4.22 B2(a) and B2(b) Combined. Percent change in incidental bluefin tuna and target catch and discards without redistribution of effort. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 355,191 | 1,110 | 488 | 9 | 2 | 3,425 | 105 | 95 | 1 | 3,563 | 110 |
| 2 | 193,937 | 928 | 361 | 14 | 2 | 853 | 13 | 40 | 1 | 904 | 14 |
| 3 | 242,885 | 718 | 468 | 29 | 36 | 1,678 | 42 | 9 | 0 | 1,691 | 48 |
| 4 | 347,360 | 556 | 656 | 32 | 82 | 3,726 | 121 | 10 | 0 | 3,738 | 122 |
| 5 | 425,458 | 533 | 991 | 31 | 71 | 3,923 | 335 | 2 | 0 | 3,928 | 345 |
| 6 | 535,980 | 2,464 | 799 | 18 | 368 | 4,838 | 187 | 574 | 0 | 5,687 | 213 |
| 7 | 560,840 | 3,126 | 635 | 14 | 43 | 4,530 | 108 | 230 | 0 | 4,946 | 128 |
| 8 | 586,888 | 2,929 | 738 | 3 | 2 | 5,809 | 97 | 203 | 2 | 6,268 | 112 |
| 9 | 506,200 | 3,327 | 771 | 2 | 49 | 5,922 | 96 | 407 | 3 | 6,720 | 134 |
| 10 | 416,208 | 1,711 | 603 | 1 | 0 | 3,577 | 141 | 301 | 2 | 4,206 | 169 |
| 11 | 361,859 | 818 | 440 | 5 | 3 | 2,899 | 69 | 306 | 0 | 3,363 | 148 |
| 12 | 358,239 | 1,123 | 492 | 9 | 1 | 3,379 | 77 | 134 | 1 | 3,637 | 140 |
| Total | 4,891,045 | 19,343 | 7,442 | 167 | 659 | 44,559 | 1,391 | 2,311 | 10 | 48,651 | 1,683 |
| All Other Areas | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction w/out Redistribution | -23.1% | -15.2% | -20.3% | -27.9% | -40.8% | -26.6% | -25.4% | -6.2% | -1.0% | -21.5% | -18.7% |
| % Reduction with Redistribution (year-round) | | 9.3% | 3.4% | -7.6% | -24.3% | -3.1% | -2.2% | 21.6% | 29.0% | 3.2% | 7.1% |
| % Reduction with Redistribution B2(a) (May-Nov) and B2(b) (June) | | 5.8% | 4.4% | 5.4% | -13.6% | 0.3% | 2.2% | 10.0% | 11.8% | 3.2% | 3.5% |
| No. reduced with redist. of effort | | 7,350 | 1,635 | 32 | -221 | 458 | 118 | 3,695 | 119 | 7,209 | 314 |

**Table 4.23 B2(d) and B2(e) Combined. Example of temporal variation in effectiveness of the time/area closure on discards for combined alternatives B2(d) and B2(e)year-round. * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Pelagic Shark discards | Large Coastal Shark discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 748,991 | 19 | 29 | 17 | 10 | 217 | 103 | 11 | 2 | 0 |
| 2 | 494,538 | 8 | 6 | 5 | 0 | 148 | 175 | 12 | 1 | 0 |
| 3 | 551,144 | 6 | 9 | 3 | 5 | 112 | 188 | 17 | 3 | 0 |
| 4 | 826,626 | 22 | 28 | 12 | 6 | 113 | 146 | 19 | 0 | 2 |
| 5 | 1,094,168 | 78 | 55 | 37 | 9 | 221 | 309 | 15 | 6 | 0 |
| 6 | 1,225,916 | 240 | 178 | 108 | 21 | 1820 | 208 | 29 | 28 | 0 |
| 7 | 1,615,167 | 599 | 586 | 210 | 60 | 2322 | 631 | 56 | 13 | 0 |
| 8 | 1,640,901 | 369 | 198 | 111 | 27 | 1342 | 342 | 30 | 7 | 0 |
| 9 | 1,215,688 | 197 | 170 | 75 | 28 | 1235 | 172 | 17 | 4 | 0 |
| 10 | 1,106,735 | 129 | 97 | 42 | 13 | 1815 | 234 | 29 | 8 | 0 |
| 11 | 863,610 | 57 | 47 | 20 | 6 | 1754 | 251 | 29 | 7 | 0 |
| 12 | 766,783 | 37 | 34 | 5 | 9 | 419 | 82 | 70 | 4 | 3 |
| Total | 12,150,267 | 1,761 | 1,437 | 645 | 194 | 11,518 | 2,841 | 334 | 83 | 5 |
| | | | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 34,020 | 16,573 | 494 | 179 | 11 |
| | | | | | | | | | | |
| % Reduction without redistribution of effort | -57.5% | -56.0% | -58.7% | -62.7% | -45.8% | -33.9% | -17.1% | -67.6% | -46.4% | -45.5% |
| % Reduction with redistribution of effort | | 6.5% | -3.5% | -3.1% | 12.1% | 65.0% | 102.0% | -30.2% | 4.8% | 18.3% |
| No. reduced with redist. of effort | | 205 | -86 | -32 | 51 | 22,098 | 16,970 | -149 | 9 | 2 |

**Table 4.24 B2(d) and B2(e) Combined. Percent change in incidental bluefin tuna and target catch and discards without redistribution of effort. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 748,991 | 2,391 | 1,103 | 26 | 2 | 8,185 | 278 | 286 | 6 | 8,657 | 305 |
| 2 | 495,938 | 2,774 | 1,009 | 31 | 6 | 2,274 | 91 | 82 | 3 | 2,441 | 98 |
| 3 | 551,764 | 2,235 | 1,172 | 50 | 75 | 3,661 | 122 | 31 | 0 | 3,707 | 134 |
| 4 | 826,626 | 1,591 | 1,249 | 93 | 229 | 7,782 | 370 | 20 | 0 | 7,807 | 380 |
| 5 | 1,094,168 | 1,305 | 1,539 | 64 | 163 | 11,842 | 571 | 26 | 1 | 11,912 | 643 |
| 6 | 1,225,916 | 3,478 | 1,246 | 31 | 396 | 15,039 | 599 | 761 | 2 | 16,134 | 726 |
| 7 | 1,615,167 | 5,355 | 1,589 | 23 | 66 | 17,006 | 540 | 538 | 5 | 17,998 | 739 |
| 8 | 1,642,501 | 4,974 | 1,596 | 5 | 7 | 17,861 | 333 | 1,540 | 49 | 20,314 | 537 |
| 9 | 1,214,788 | 4,879 | 1,473 | 22 | 53 | 13,007 | 242 | 1,670 | 62 | 15,719 | 448 |
| 10 | 1,106,735 | 3,788 | 1,624 | 11 | 50 | 9,387 | 275 | 1,549 | 19 | 13,461 | 445 |
| 11 | 864,235 | 1,890 | 1,105 | 26 | 90 | 6,519 | 179 | 1,373 | 3 | 9,361 | 492 |
| 12 | 766,783 | 2,012 | 929 | 13 | 2 | 7,076 | 241 | 730 | 8 | 8,563 | 462 |
| Total | 12,153,612 | 36,672 | 15,634 | 395 | 1,139 | 119,639 | 3,841 | 8,606 | 158 | 136,074 | 5,409 |
| All Other Areas | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction w/out Redistribution | -57.5% | -28.8% | -42.5% | -65.9% | -70.4% | -71.6% | -70.0% | -23.2% | -15.7% | -60.2% | -60.2% |
| % Reduction with Redistribution | | 63.1% | 36.1% | -22.0% | -35.2% | -25.1% | -21.6% | 78.4% | 117.4% | -0.4% | 5.6% |
| No. reduced with redist. of effort | | 80,468 | 13,262 | -132 | -570 | -41,986 | -1,186 | 29,114 | 1,181 | -980 | 502 |

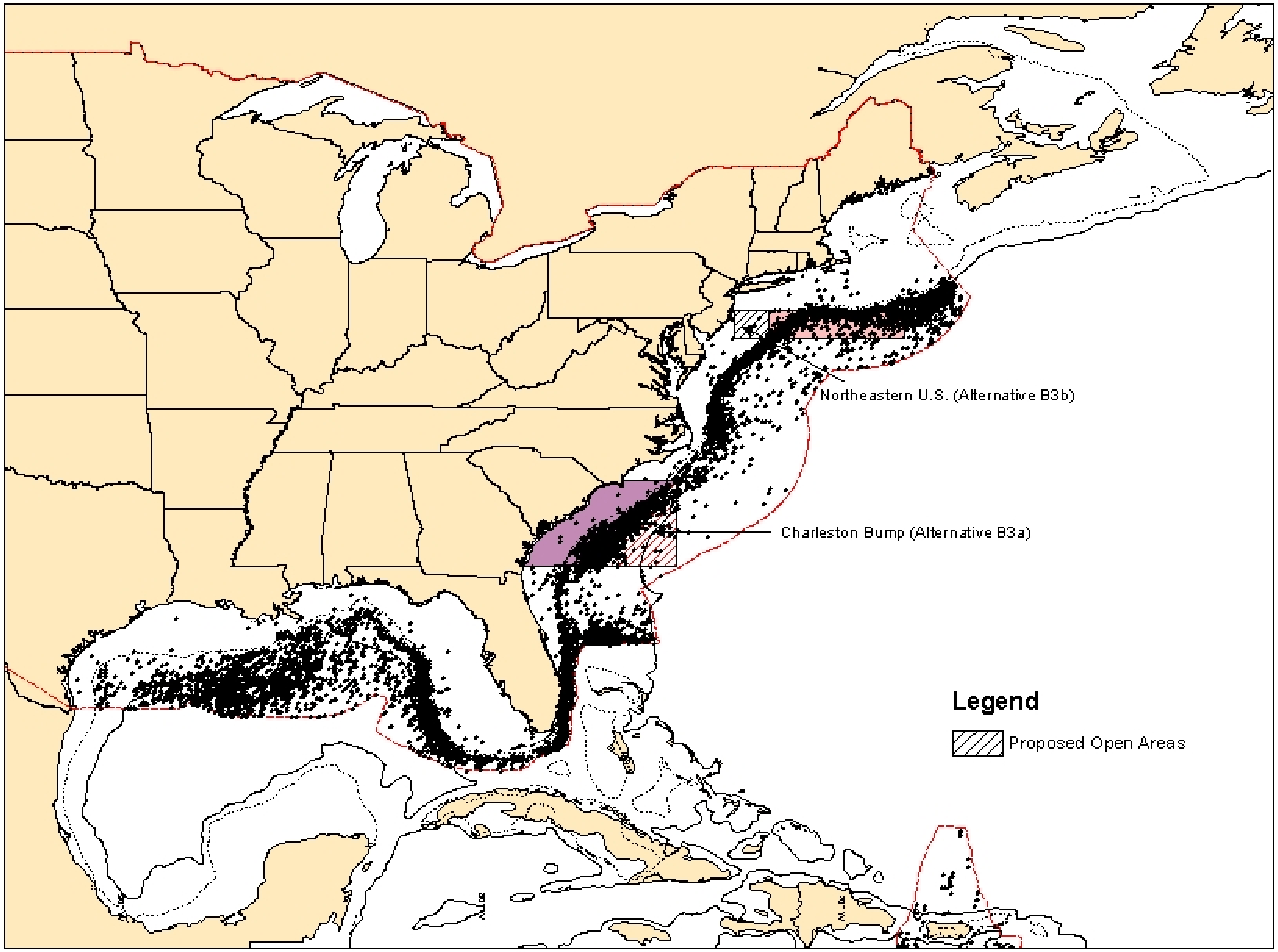



**Figure 4.14 Map showing areas being considered for modifications to existing closures and juvenile swordfish data (<180 cm LJFL). The minimum size limit for swordfish is 119 cm LJFL.** Source: Pelagic Observer Program 1997-1999**.**

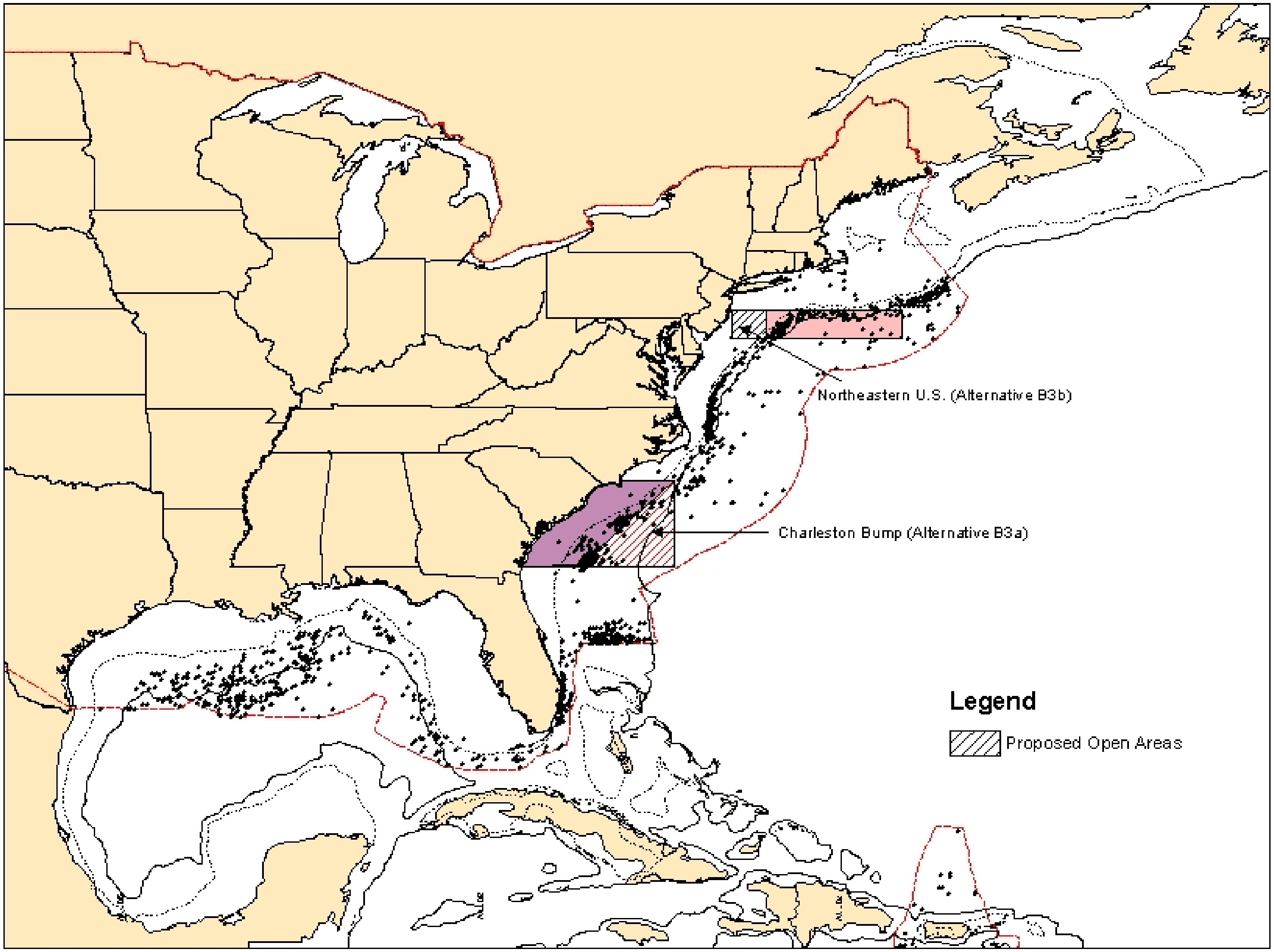



**Figure 4.15 Map showing areas being considered for modifications to existing closures and adult swordfish data (>180 cm LJFL) from the Pelagic Observer Program.** Source: Pelagic Observer Program 1997-1999

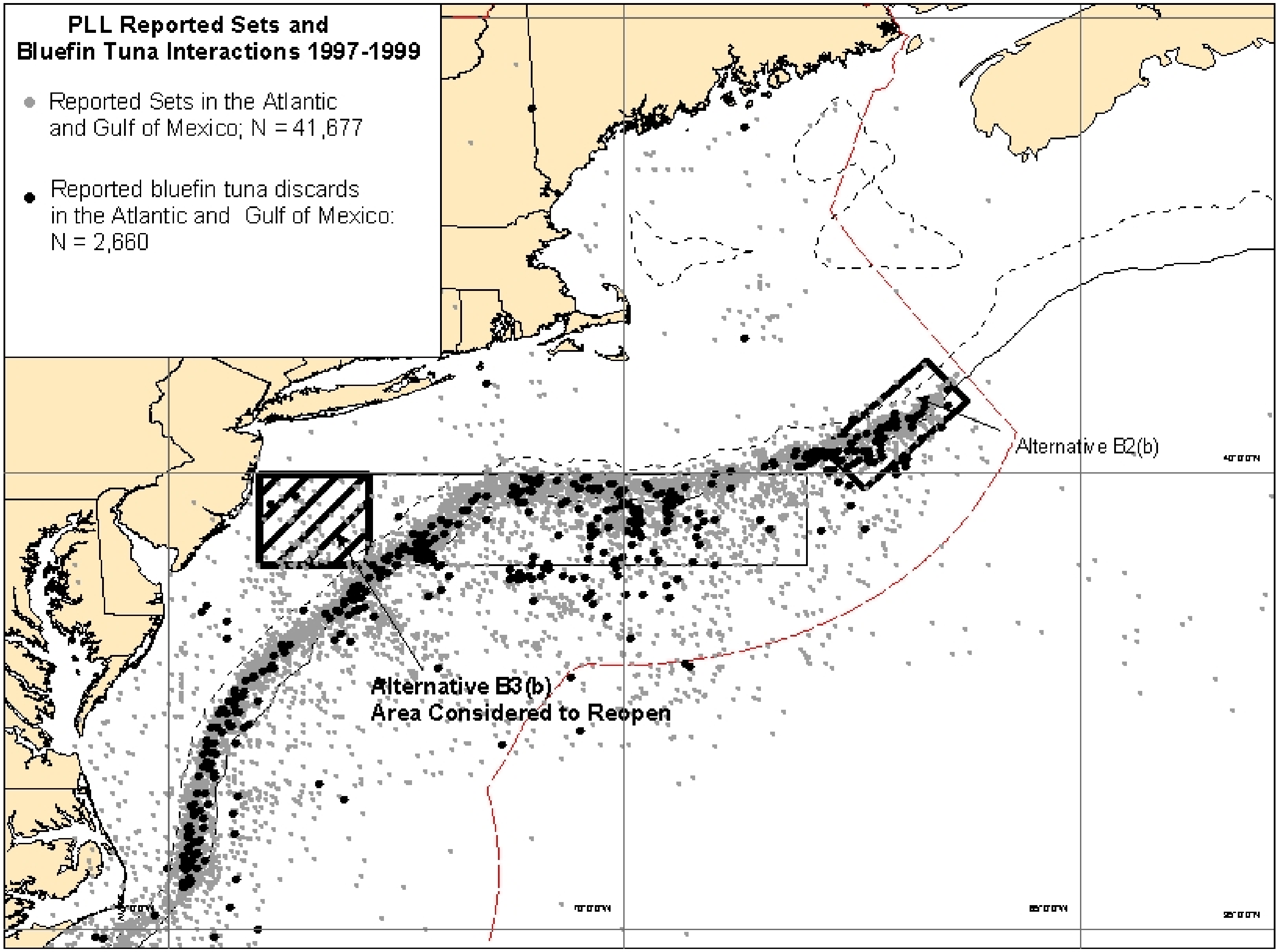



**Figure 4.16 Map showing modification to the existing Northeast United States closure and bluefin tuna discards.** Source: HMS Logbook 1997-1999.

**Table 4.25 Alternative B3(a) Charleston Bump modification. Discards of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead and other sea turtles from the portion of the Charleston Bump to remain closed and the portion of the area considered for reopening. * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook 1997-1999.

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA TO REMAIN CLOSED** | | | | | | | |
| 1 | 154,536 | 7 | 4 | 7 | 2 | 0 | 0 | 1 |
| 2 | 156,595 | 11 | 7 | 5 | 3 | 0 | 1 | 1 |
| 3 | 302,955 | 35 | 7 | 15 | 1 | 0 | 1 | 0 |
| 4 | 117,133 | 18 | 17 | 11 | 6 | 0 | 0 | 0 |
| 5 | 229,426 | 24 | 26 | 16 | 2 | 0 | 0 | 0 |
| 6 | 210,309 | 53 | 54 | 45 | 7 | 6 | 3 | 1 |
| 7 | 99,983 | 11 | 27 | 45 | 0 | 1 | 1 | 0 |
| 8 | 42,198 | 3 | 17 | 31 | 0 | 1 | 0 | 0 |
| 9 | 24,456 | 2 | 11 | 10 | 0 | 1 | 0 | 0 |
| 10 | 28,830 | 4 | 7 | 6 | 1 | 1 | 0 | 0 |
| 11 | 26,455 | 4 | 5 | 7 | 0 | 2 | 0 | 0 |
| 12 | 30,934 | 1 | 9 | 5 | 0 | 0 | 0 | 0 |
| Total (Feb - April) | 576,683 | 64 | 31 | 31 | 10 | 0 | 2 | 1 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| % of All Areas* | 2.7% | 2.0% | 1.3% | 3.0% | 2.4% | 0.0% | 1.1% | 9.1% |
| | **PORTION OF AREA CONSIDERED FOR REOPENING** | | | | | | | |
| 1 | 28,429 | 2 | 3 | 4 | 1 | 0 | 1 | 0 |
| 2 | 35,545 | 4 | 7 | 2 | 1 | 0 | 0 | 0 |
| 3 | 29,920 | 8 | 2 | 5 | 1 | 0 | 1 | 0 |
| 4 | 42,938 | 7 | 8 | 3 | 2 | 0 | 0 | 0 |
| 5 | 50,773 | 7 | 3 | 2 | 0 | 0 | 0 | 0 |
| 6 | 84,298 | 33 | 15 | 18 | 5 | 0 | 0 | 0 |
| 7 | 42,229 | 2 | 7 | 21 | 1 | 0 | 0 | 0 |
| 8 | 33,900 | 1 | 15 | 24 | 3 | 0 | 0 | 0 |
| 9 | 57,915 | 4 | 38 | 27 | 2 | 0 | 0 | 0 |
| 10 | 69,360 | 6 | 23 | 19 | 1 | 0 | 1 | 0 |
| 11 | 27,882 | 3 | 10 | 4 | 1 | 0 | 1 | 0 |
| 12 | 26,765 | 0 | 8 | 3 | 0 | 0 | 0 | |
| Total (Feb - April) | 108,403 | 19 | 17 | 10 | 4 | 0 | 1 | 0 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| % of All Areas* | 0.5% | 0.6% | 0.7% | 1.0% | 0.9% | 0.0% | 0.6% | 0.0% |

**Table 4.26 Alternative B3(b) Northeastern U.S. closure modification. Discards of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead and other sea turtles from the portion of the Northeastern U.S. closure to remain closed and the portion of the area considered for reopening. * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook 1997 - 1999.

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA CONSIDERED FOR REOPENING** | | | | | | | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 2,400 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 32,535 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 2,550 | 4 | 1 | 0 | 0 | 0 | 0 | 0 |
| 9 | 8,739 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 10 | 1,200 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 47,424 | 4 | 2 | 0 | 0 | 0 | 0 | 0 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| % of All Areas* | 0.2% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| | **PORTION OF AREA CONSIDERED FOR REOPENING (June only)** | | | | | | | |
| 6 | 2,400 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 2,400 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| % of All Areas* | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

**Table 4.27 Alternative B3(a) Charleston Bump modification. Catches and discards of incidental bluefin tuna and target species in the portion of the area considered for reopening. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook 1997-1999.

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA CONSIDERED FOR REOPENING (Year-round)** | | | | | | | | | | |
| 1 | 28,429 | 644 | 196 | 0 | 0 | 65 | 11 | 0 | 0 | 65 | 11 |
| 2 | 35,545 | 484 | 164 | 0 | 0 | 97 | 3 | 5 | 0 | 105 | 3 |
| 3 | 29,920 | 461 | 181 | 0 | 0 | 53 | 3 | 3 | 1 | 57 | 4 |
| 4 | 42,938 | 426 | 203 | 0 | 0 | 125 | 13 | 0 | 0 | 135 | 14 |
| 5 | 50,773 | 359 | 77 | 1 | 1 | 118 | 4 | 6 | 0 | 134 | 4 |
| 6 | 84,298 | 963 | 202 | 2 | 0 | 323 | 7 | 9 | 0 | 339 | 8 |
| 7 | 42,229 | 969 | 227 | 0 | 0 | 85 | 7 | 1 | 0 | 86 | 7 |
| 8 | 33,900 | 787 | 199 | 0 | 0 | 54 | 10 | 2 | 0 | 56 | 10 |
| 9 | 57,915 | 2,192 | 540 | 0 | 0 | 282 | 13 | 16 | 0 | 301 | 14 |
| 10 | 69,360 | 2,864 | 1,007 | 0 | 0 | 536 | 17 | 4 | 3 | 540 | 20 |
| 11 | 27,882 | 880 | 312 | 1 | 2 | 150 | 12 | 0 | 2 | 152 | 14 |
| 12 | 26,765 | 717 | 157 | 0 | 0 | 115 | 15 | 1 | 2 | 116 | 17 |
| Total | 529,954 | 11,746 | 3,465 | 4 | 3 | 2,003 | 115 | 47 | 8 | 2,086 | 126 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Increase | 2.5% | 9.2% | 9.4% | 0.7% | 0.2% | 1.2% | 2.1% | 0.1% | 0.8% | 0.9% | 1.4% |
| | **PORTION OF AREA CONSIDERED FOR REOPENING (Feb-April)** | | | | | | | | | | |
| 2 | 35,545 | 484 | 164 | 0 | 0 | 97 | 3 | 5 | 0 | 105 | 3 |
| 3 | 29,920 | 461 | 181 | 0 | 0 | 53 | 3 | 3 | 1 | 57 | 4 |
| 4 | 42,938 | 426 | 203 | 0 | 0 | 125 | 13 | 0 | 0 | 135 | 14 |
| Total | 108,403 | 1,371 | 548 | 0 | 0 | 275 | 19 | 8 | 1 | 297 | 21 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Increase | 0.51% | 1.1% | 1.5% | 0.0% | 0.0% | 0.16% | 0.35% | 0.02% | 0.1% | 0.13% | 0.23% |

**Table 4.28 Alternative B3(b) Northeastern U.S. closure modification. Catches and discards of incidental bluefin tuna and target species in the portion of the area considered for reopening. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook 1997-1999.

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA CONSIDERED FOR REOPENING (Year-round)** | | | | | | | | | | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 2,400 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 7 | 32,535 | 0 | 1 | 0 | 1 | 9 | 0 | 0 | 0 | 10 | 0 |
| 8 | 2,550 | 27 | 2 | 0 | 0 | 13 | 0 | 12 | 0 | 28 | 0 |
| 9 | 8,739 | 20 | 20 | 0 | 0 | 129 | 0 | 29 | 1 | 161 | 1 |
| 10 | 1,200 | 6 | 0 | 0 | 0 | 9 | 0 | 5 | 0 | 18 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 47,424 | 56 | 23 | 0 | 2 | 161 | 0 | 46 | 1 | 218 | 1 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Increase | 0.2% | 0.0% | 0.1% | 0.0% | 0.1% | 0.1% | 0.0% | 0.1% | 0.1% | 0.1% | 0.0% |
| | **PORTION OF AREA CONSIDERED FOR REOPENING (June only)** | | | | | | | | | | |
| 6 | 2,400 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| Total | 2,400 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Increase | 0.01% | 0.002% | 0.0% | 0.0% | 0.06% | 0.001% | 0.0% | 0.0% | 0.0% | 0.0004% | 0.0% |

**Table 4.29 Comparison of discards of white marlin, blue marlin, sailfish, spearfish, leatherback and loggerhead sea turtles in the portion of the areas considered for reopening. * excluding the NED. + = increase and - = decrease in discards or bycatch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook 1997-2000.

| | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA CONSIDERED FOR REOPENING** | | | | | | | |
| B3(a) Charleston Bump (Feb - Apr) | 108,403 | 19 | 17 | 10 | 4 | 0 | 1 | 0 |
| B3(b) Northeastern U.S. (June) | 2,400 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| | % of All Areas | | | | | | | |
| B3(a) Charleston Bump (Feb - Apr) | 0.3% | 0.6% | 0.7% | 1.0% | 0.9% | 0.0% | 0.6% | 0.0% |
| B3(b) Northeastern U.S. | 0.01% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

**Table 4.30 Comparison of of swordfish, incidental bluefin tuna, yellowfin tuna, bigeye tuna, and BAYS in the portion of the areas considered for reopening. * excluding the NED. + = increase and - = decrease in discards or retained catch. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook 1997-1999.

| | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA CONSIDERED FOR REOPENING** | | | | | | | | | | |
| B3(a) Charleston Bump (Feb-Apr) | 108,403 | 1,371 | 548 | 0 | 0 | 275 | 19 | 8 | 1 | 297 | 21 |
| B3(b) Northeastern U.S. (June) | 2,400 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| | | | | | | | | | | | |
| | % of All Areas | | | | | | | | | | |
| B3(a) Charleston Bump (Feb-Apr) | 0.51% | 1.1% | 1.5% | 0.0% | 0.0% | 0.16% | 0.35% | 0.02% | 0.1% | 0.13% | 0.23% |
| B3(b) Northeastern U.S. (June) | 0.01% | 0.002% | 0.0% | 0.0% | 0.06% | 0.001% | 0.0% | 0.0% | 0.0% | 0.0004% | 0.0% |

**Table 4.31 Average swordfish lengths (cm LJFL) in the portion of the areas to remain closed and the portion of the areas considered for reopening. The minimum size limit for swordfish is 119 cm LJFL. The mature size is > 180 cm LJFL.** Source: Pelagic Observer Program 1992-1999.

| Closed Area | **Portion Considered for Reopening** | **Sample Size** | **Portion to Remain Closed** | **Sample Size** | ***t*-test** |
|---|---|---|---|---|---|
| | **1992-1999** | | | | |
| B3(a) Charleston Bump | 124 | 3,374 | 125 | 1,664 | *P* = 0.372 |
| B3(b) Northeastern U.S. | 96 | 1695 | 71 cm LJFL | 2 | *P* = 0.34 |
| | **1997 - 1999** | | | | |
| B3(a) Charleston Bump | 125 | 2,067 | 126 | 455 | *P* = 0.10 |
| B3(b) Northeastern U.S. | 112 | 409 | 71 | 2 | *P* = 0.05 |

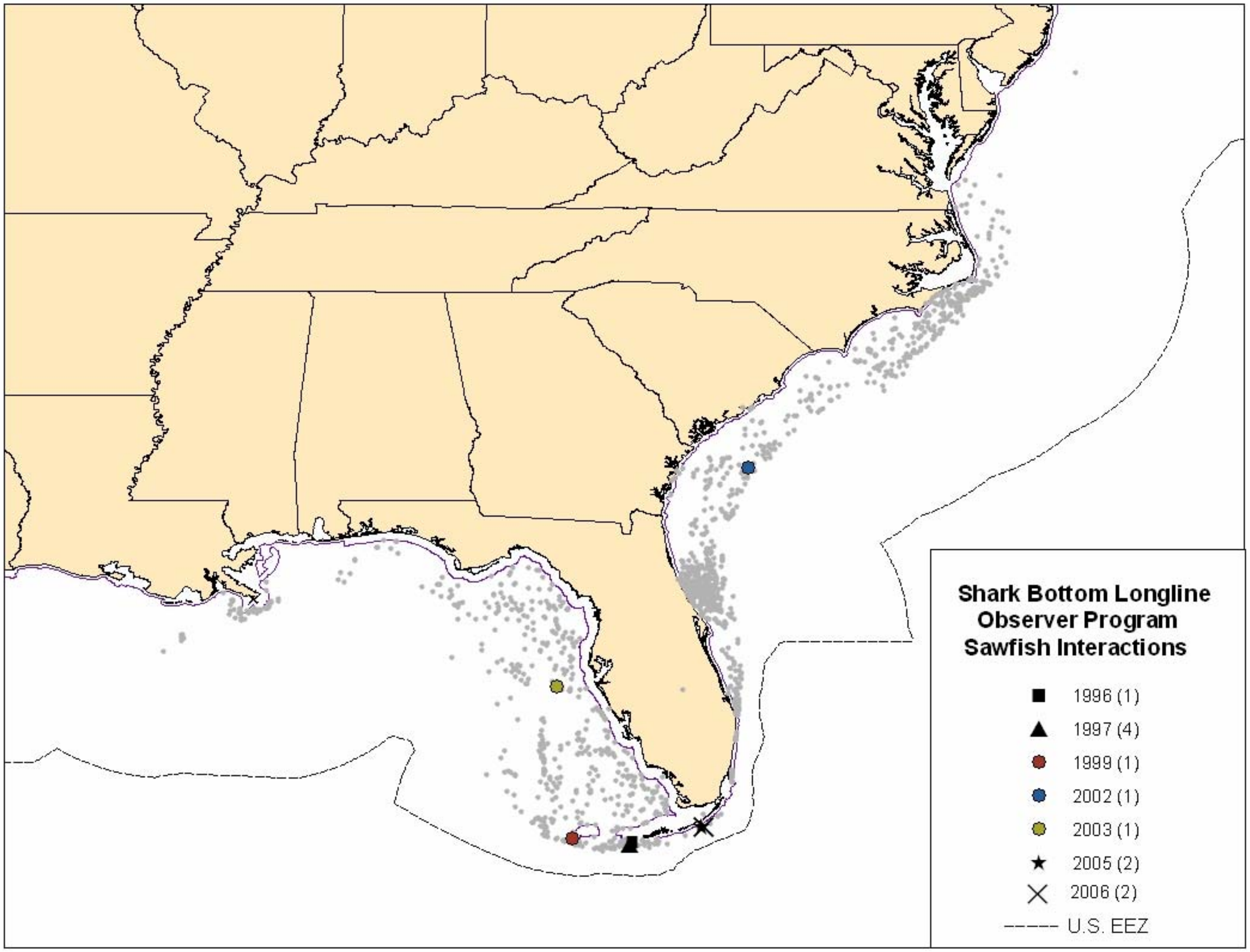



**Figure 4.17 Map showing smalltooth sawfish bycatch. Numbers in parentheses in the legend are the number of sawfish interactions. Gray dots indicate the location of each observed bottom longline set.** Source: CSFOP 1994-2006.

**Table 4.32 Landings by region from the PLL fishery for swordfish, bluefin tuna, yellowfin tuna and bigeye tuna. The 2004 gross fishing revenues was calculated by converting the 2003 total gross revenues into 2004 dollars (2003 value was multiplied by 1.0266).** Source: NMFS, 2004.

| Region | PLL Landings (mt) | 2003 Gross Fishing Revenues | 2004 Gross Fishing Revenues |
|---|---|---|---|
| SWORDFISH | | | |
| Northwest Atlantic | 1,347 | | |
| Gulf of Mexico | 515.8 | | |
| Caribbean | 276.4 | | |
| NC Area 94a | 632.9 | | |
| Southwest Atlantic | 20.9 | | |
| Total (mt) | 2,793 | | |
| Total (lb) | 6,157,448 | | |
| Total (lb dw) | 4,629,660 | | |
| Percent of all landings | **99.2%** | **14,481,889** | **14,867,107** |
| | | | |
| BLUEFIN TUNA | | | |
| Northwest Atlantic | 16.3 | | |
| Gulf of Mexico | 53.8 | | |
| Caribbean | 0 | | |
| NC Area 94a | 11.3 | | |
| Southwest Atlantic | 0 | | |
| Total | 81.4 | | |
| Total (lb) | 179,454 | | |
| Total (lb dw) | 143,564 | | |
| Percent of all landings | **5.7%** | **848,614** | **871,187** |
| | | | |
| YELLOWFIN TUNA | | | |
| Northwest Atlantic | 272 | | |
| Gulf of Mexico | 1828 | | |
| Caribbean | 7 | | |
| NC Area 94a | 5 | | |
| Southwest Atlantic | 42 | | |
| Total | 2154 | | |
| Total (lb) | 4,748,708 | | |
| Total (lb dw) | 3,795,775 | | |
| Percent of all landings | **28.0%** | **8,891,195** | **9,127,700** |
| | | | |
| BIGEYE TUNA | | | |
| Northwest Atlantic | 168.7 | | |
| Gulf of Mexico | 27.5 | | |
| Caribbean | 7.2 | | |
| NC Area 94a | 36.9 | | |
| Southwest Atlantic | 44.6 | | |
| Total | 284.9 | | |
| Total (lb) | 628,091 | | |
| Total (lb dw) | 502,637 | | |
| Percent of all landings | **59.4%** | **1,601,921** | **1,644,532** |
| **TOTAL** | | **25,823,620** | **26,510,526** |

**Table 4.33 Average annual change in gross revenues by species for each of the alternatives in comparison to landings from the Atlantic and Gulf of Mexico. Note: 2003 gross revenues are based on 2003 ex-vessel prices. 2004 gross revenues are based on 2004 ex-vessel prices. The total 2004 annual loss or gain to the fishery was calculated by converting the 2003 total gross revenues into 2004 dollars (2003 value was multiplied by 1.0266). - = decrease and + = increase.** Source: NMFS, 2005.

| Alternative | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards | 2003 Total | 2004 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WITHOUT REDISTRIBUTION OF EFFORT | | | | | | | | | | | |
| Alternative B2(a) (May-Nov) | -3.1% | -8.1% | -6.7% | -4.6% | -14.3% | -17.4% | -1.1% | -0.2% | -10.8% | -12.8% | | |
| Weight | -143,519 | | -9,619 | | -542,796 | | -5,529 | | | | | |
| 2003 Gross Revenues | -$423,382 | | -$60,791 | | -$1,796,654 | | -$18,190 | | | | -$2,299,018 | -$2,360,172 |
| 2004 Gross Revenues | -$475,048 | | -$44,632 | | -$2,035,485 | | -$25,102 | | | | | |
| | | | | | | | | | | | | |
| Alternative B2(b) (June only) | -1.5% | -0.7% | -1.8% | -22.6% | -0.3% | -0.2% | -1.5% | 0.0% | -0.6% | -0.2% | | |
| Weight | -69,445 | | -2,584 | | -11,387 | | -7,540 | | | | | |
| 2003 Gross Revenues | -$231,252 | | -$14,755 | | -$27,102 | | -$26,011 | | | | -$299,120 | -$307,077 |
| 2004 Gross Revenues | -$281,947 | | -$19,173 | | -$30,176 | | -$33,327 | | | | | |
| | | | | | | | | | | | | |
| Alternative B2(c) (Apr-June) | -2.8% | -9.9% | -29.0% | -21.5% | -19.8% | -27.0% | -0.2% | -0.2% | -14.7% | -18.7% | | |
| Weight | -130,502 | | -41,703 | | -750,356 | | -1,218 | | | | | |
| 2003 Gross Revenues | -$384,981 | | -$263,563 | | -$2,483,678 | | -$4,008 | | | | -$3,136,229 | -$3,219,653 |
| 2004 Gross Revenues | -$431,962 | | -$193,502 | | -$2,813,835 | | -$5,530 | | | | | |
| | | | | | | | | | | | | |
| Alternative B2(d) | -15.1% | -31.5% | -53.6% | -27.1% | -64.0% | -66.4% | -3.5% | -1.9% | -48.2% | -51.8% | | |
| Weight | -697,717 | | -76,935 | | -2,427,731 | | -17,583 | | | | | |
| 2003 Gross Revenues | -$2,058,265 | | -$486,227 | | -$8,035,791 | | -$57,849 | | | | -$10,638,133 | -$10,921,107 |
| 2004 Gross Revenues | -$2,309,443 | | -$356,978 | | -$9,103,991 | | -$79,827 | | | | | |
| | | | | | | | | | | | | |

| Alternative | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards | 2003 Total | 2004 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alternative B2(e) | -13.7% | -11.0% | -12.4% | -43.3% | -7.6% | -3.6% | -19.7% | -13.8% | -12.0% | -8.3% | | |
| Weight | -632,611 | | -17,736 | | -288,129 | | -98,854 | | | | | |
| 2003 Gross Revenues | -$2,106,596 | | -$101,271 | | -$685,746 | | -$341,047 | | | | -$3,234,660 | -$3,320,702 |
| 2004 Gross Revenues | -$2,568,401 | | -$131,601 | | -$763,542 | | -$436,935 | | | | | |
| | **COMBINATIONS WITH REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| Alternative B2(a) (May-Nov)/B2(b) (June) | -15.2% | -20.3% | -27.9% | -40.8% | -26.6% | -25.4% | -6.2% | -1.0% | -21.5% | -18.7% | | |
| Weight | -703,708 | | -40,054 | | -1,009,676 | | -31,163 | | | | | |
| 2003 Gross Revenues | -$2,209,644 | | -$240,926 | | -$2,872,529 | | -$105,021 | | | | -$5,428,120 | -$5,572,508 |
| 2004 Gross Revenues | -$2,593,164 | | -$241,526 | | -$3,230,963 | | -$139,610 | | | | | |
| | | | | | | | | | | | | |
| Alternative B2(d) /B2(e) (year-round) | -28.8% | -42.5% | -65.9% | -70.4% | -71.6% | -70.0% | -23.2% | -15.7% | -60.2% | 60.2% | | |
| Weight | -1,329,360 | | -94,990 | | -2,722,984 | | -118,935 | | | | | |
| 2003 Gross Revenues | -$4,174,190 | | -$571,840 | | -$7,760,504 | | -$400,811 | | | | -$12,907,345 | -$13,250,680 |
| 2004 Gross Revenues | -$4,905,338 | | -$572,790 | | -$8,713,549 | | -$532,829 | | | | | |
| | **WITH REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| Alternative B2(a) (May-Nov) | 9.1% | 4.4% | 3.4% | 10.3% | -1.1% | 3.0% | 2.6% | 11.6% | 2.6% | -0.04% | | |
| Weight | 421,299 | | 4,881 | | -41,754 | | 13,069 | | | | | |
| 2003 Gross Revenues | $1,242,832 | | $27,871 | | -$138,204 | | $42,997 | | | | $1,175,496 | $1,206,764 |
| 2004 Gross Revenues | $1,394,500 | | $22,648 | | -$156,578 | | $59,333 | | | | | |
| | | | | | | | | | | | | |
| Alternative B2(b) (June only) | -0.8% | -0.1% | -1.2% | -21.9% | 0.9% | 1.1% | -1.2% | 0.3% | 0.4% | 0.9% | | |
| Weight | -37,037 | | -1,723 | | 34,162 | | -6,032 | | | | | |

| Alternative | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards | 2003 Total | 2004 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 Gross Revenues | -$123,334 | | -$9,837 | | $81,306 | | -$20,809 | | | | -$72,675 | -$74,608 |
| 2004 Gross Revenues | -$150,370 | | -$12,785 | | $90,529 | | -$26,661 | | | | | |
| | | | | | | | | | | | | |
| Alternative B2(c) (Apr-June) | 21.1% | 6.0% | -18.3% | 9.8% | -11.0% | -18.3% | 11.4% | 1.7% | -5.4% | -11.8% | | |
| Weight | 976,858 | | -26,272 | | -417,535 | | 57,301 | | | | | |
| 2003 Gross Revenues | $2,881,732 | | -$166,040 | | -$1,382,042 | | $188,520 | | | | $1,522,170 | $1,562,660 |
| 2004 Gross Revenues | $3,233,400 | | -$121,902 | | -$1,565,756 | | $260,147 | | | | | |
| | | | | | | | | | | | | |
| Alternative B2(d) | 62.5% | 31.9% | -12.1% | 38.0% | -29.8% | -35.6% | 80.6% | 84.8% | -0.6% | -6.9% | | |
| Weight | 2,893,538 | | -17,371 | | -1,131,141 | | 405,125 | | | | | |
| 2003 Gross Revenues | $8,535,936 | | -$109,786 | | -$3,744,077 | | $1,332,861 | | | | $6,014,934 | $6,174,931 |
| 2004 Gross Revenues | $9,577,611 | | -$80,601 | | -$4,241,779 | | $1,839,268 | | | | | |
| | | | | | | | | | | | | |
| Alternative B2(e) | -6.8% | -2.9% | -7.6% | -40.7% | 5.5% | 8.3% | -11.9% | -2.5% | -0.3% | 4.1% | | |
| Weight | -314,817 | | -10,911 | | 208,768 | | -59,814 | | | | | |
| 2003 Gross Revenues | -$1,048,340 | | -$62,301 | | $496,867 | | -$206,358 | | | | -$820,132 | -$841,948 |
| 2004 Gross Revenues | -$1,278,157 | | -$80,960 | | $553,235 | | -$264,378 | | | | | |
| | | | | | | | | | | | | |
| | **COMBINATIONS WITH REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| Alternative B2(a) (May-Nov)/B2(b) (June) | 5.8% | 4.4% | 5.4% | -13.6% | 0.3% | 2.2% | 10.0% | 11.8% | 3.2% | 3.5% | | |
| Weight | 268,520 | | 7,752 | | 11,387 | | 50,264 | | | | | |
| 2003 Gross Revenues | $843,154 | | $46,631 | | $32,397 | | $169,389 | | | | $1,091,570 | $1,120,606 |
| 2004 Gross | $989,496 | | $46,745 | | $36,438 | | $225,183 | | | | | |

| Alternative | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards | 2003 Total | 2004 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenues | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Alternative B2(d) /B2(e) (year-round) | 63.1% | 36.1% | -22.0% | -35.2% | -25.1% | -21.6% | 78.4% | 117.4% | -0.4% | 5.6% | | |
| Weight | 2,921,315 | | -31,584 | | -952,740 | | 394,067 | | | | | |
| 2003 Gross Revenues | $9,172,931 | | -$190,136 | | -$2,710,544 | | $1,328,007 | | | | $7,600,258 | $7,802,425 |
| 2004 Gross Revenues | $10,779,652 | | -$190,452 | | -$3,048,768 | | $1,765,420 | | | | | |

**Table 4.34 Average annual change in gross revenues by species for each of the modifications to the existing time/area closures in comparison to landings from the Atlantic and Gulf of Mexico. Note: 2003 gross revenues are based on 2003 ex-vessel prices. 2004 gross revenues are based on 2004 ex-vessel prices. The total 2004 annual loss or gain to the fishery was calculated by converting the 2003 total gross revenues into 2004 dollars (2003 value was multiplied by 1.0266). - = decrease and + = increase; * excluding the NED.** Source: NMFS, 2005.

| | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards | 2003 Total | 2004 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B3(a) Charleston Bump (Feb-Apr) | 1.1% | 1.5% | 0.0% | 0.0% | 0.2% | 0.4% | 0.2% | 0.1% | 0.1% | 0.2% | | |
| Number | 1,371 | 548 | 0 | 0 | 275 | 19 | 8 | 1 | 297 | 21 | | |
| Weight | 67,732 | | 0 | | 7,598 | | 126 | | | | | |
| 2003 Gross Revenues | $220,806 | | $0 | | $13,372 | | $281 | | | | $234,460 | $241,025 |
| 2004 Gross Revenues | $238,417 | | $0 | | $11,625 | | $282 | | | | | |
| | | | | | | | | | | | | |
| B3(b) Northeastern U.S. (June) | 0.002% | 0.000% | 0.000% | 0.062% | 0.001% | 0.000% | 0.000% | 0.000% | 0.000% | 0.000% | | |
| Number | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | | |
| Weight | 145 | | 0 | | 28 | | 0 | | | | | |
| 2003 Gross Revenues | $482 | | $0 | | $68 | | $0 | | | | $550 | $565 |
| 2004 Gross Revenues | $588 | | $0 | | $74 | | $0 | | | | | |
| | | | | | | | | | | | | |
| All Other Areas* | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 | | |

**Table 4.35 Average annual change in gross revenues by species for the B2(a) time/area closures in comparison to landings from the Gulf of Mexico only. Note: 2003 gross revenues are based on 2003 ex-vessel prices. 2004 gross revenues are based on 2004 ex-vessel prices. The total 2004 annual loss or gain to the fishery was calculated by converting the 2003 total gross revenues into 2004 dollars (2003 value was multiplied by 1.0266). - = decrease and + = increase.** Source: NMFS, 2005.

| Alternative | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards | 2003 Total | 2004 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **WITHOUT REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| Alternative B2(a) (May-Nov) | | | | | | | | | | | | |
| Number caught in B2(a) | 3,959 | 2,988 | 40 | 75 | 23,846 | 952 | 400 | 2 | 24,420 | 1,152 | | |
| % Reduction vs. Overall | -3.1% | -8.1% | -6.7% | -4.6% | -14.3% | -17.4% | -1.1% | -0.2% | -10.8% | -12.8% | | |
| % Reduction vs. GOM only | -13.6% | -20.6% | -11.6% | -16.0% | -20.7% | -23.7% | -26.6% | -5.9% | -20.8% | -21.7% | | |
| Weight | -629,634 | | -16,653 | | -785,725 | | -133,701 | | | | | |
| 2003 Gross Revenues | -$1,857,420 | | -$105,249 | | -$2,600,751 | | -$439,878 | | | | -$5,003,298 | -$5,136,386 |
| 2004 Gross Revenues | -$2,084,089 | | -$77,270 | | -$2,946,469 | | -$60,700 | | | | | |
| | | | | | | | | | | | | |
| | **WITH REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| Alternative B2(a) (May-Nov) | | | | | | | | | | | | |
| Number caught in B2(a) | 11,590 | 1,635 | 20 | 166 | -1,881 | 166 | 4,393 | 117 | 5,897 | -4 | | |
| % Reduction vs. Overall | 9.1% | 4.4% | 3.4% | 10.3% | -1.1% | 3.0% | 2.6% | 11.6% | 2.6% | -0.04% | | |
| % Reduction vs. GOM only | 2.4% | 11.3% | -0.8% | -4.3% | 4.0% | 30.4% | -8.7% | 10.4% | 3.7% | 1.7% | | |
| Weight | 111,112 | | -1,149 | | 151,831 | | -43,729 | | | | | |
| 2003 Gross Revenues | $327,780 | | -$7,259 | | $502,561 | | -$143,870 | | | | $679,212 | $697,279 |
| 2004 Gross Revenues | $367,781 | | -$5,331 | | $569,366 | | -$198,530 | | | | | |

**Table 4.36 Total number of individual vessels and sets by year in some of the time/area closures. Alternative B4 was not included due to confidentiality concerns. Note: 2004 data is only from January through June 2004.** Source: HMS Logbook 2001-2003.

| Alternative | Number of Vessels | Number of Sets |
|---|---|---|
| Alternative B2(a) | | |
| 2001 | 47 | 1,092 |
| 2002 | 42 | 880 |
| 2003 | 50 | 946 |
| 2004 | 40 | 968 |
| Total No. Vessels 01-03 | 61 | 2,918 |
| Total No. Vessels 01-04 | 101 | 3,886 |
| | | |
| Alternative B2(b) | | |
| 2001 | 12 | 97 |
| 2002 | 10 | 78 |
| 2003 | 7 | 51 |
| 2004 | 5 | 39 |
| Total No. Vessels 01-03 | 20 | 226 |
| Total No. Vessels 01-04 | 25 | 265 |
| | | |
| Alternative B2(c) | | |
| 2001 | 62 | 3,946 |
| 2002 | 65 | 4,201 |
| 2003 | 63 | 4,476 |
| 2004 | 53 | 2,466 |
| Total No. Vessels 01-03 | 75 | 12,623 |
| Total No. Vessels 01-04 | 128 | 15,089 |
| | | |
| Alternative B2(d) | | |
| 2001 | 62 | 4,046 |
| 2002 | 66 | 4,312 |
| 2003 | 66 | 4,539 |
| 2004 | 54 | 2,470 |
| Total No. Vessels 01-03 | 78 | 12,897 |
| Total No. Vessels 01-04 | 132 | 15,367 |
| | | |
| Alternative B2(e) | | |
| 2001 | 41 | 1,156 |
| 2002 | 36 | 764 |
| 2003 | 28 | 667 |
| 2004 | 10 | 86 |
| Total No. Vessels 01-03 | 49 | 2,587 |
| Total No. Vessels 01-04 | 59 | 2,673 |
| | | |
| Alternative B7 | | |
| 2001 | 123 | 10,857 |
| 2002 | 145 | 9,847 |
| 2003 | 157 | 9,705 |
| 2004 | 109 | 4,968 |
| Total No. Vessels 01-03 | 177 | 30,409 |
| Total No. Vessels 01-04 | 286 | 35,377 |

**Table 4.37 Total number of vessels by state for some of the time/area closures from 2001 through 2003, and 2001 through June of 2004. Alternative B4 was not included due to confidentiality concerns.** Source: HMS Logbook 2001-2004 (first six months of 2004).

| State | Number of Vessels | | Number of Sets | |
|---|---|---|---|---|
| | *2001 - 2003* | *2001 - 2004* | *2001 - 2003* | *2001 - 2004* |
| Alternative B2(a) | | | | |
| FL | 14 | 19 | 262 | 277 |
| LA | 40 | 74 | 2,574 | 3,521 |
| TX | 7 | 8 | 88 | 94 |
| **Total** | 61 | 101 | 2,924 | 3,892 |
| Alternative B2(b) | | | | |
| DE | 1 | 1 | 3 | 3 |
| FL | 1 | 1 | 7 | 7 |
| MD | 1 | 1 | 18 | 18 |
| NC | 1 | 3 | 7 | 18 |
| NJ | 4 | 6 | 91 | 116 |
| NY | 7 | 8 | 66 | 69 |
| PA | 4 | 4 | 32 | 32 |
| RI | 1 | 1 | 2 | 2 |
| **Total** | 20 | 31 | 226 | 265 |
| Alternative B2(c) | | | | |
| AL | 1 | 1 | 46 | 46 |
| FL | 21 | 35 | 2,145 | 2,640 |
| LA | 44 | 79 | 9,214 | 11,111 |
| MA | 0 | 1 | 0 | 7 |
| TX | 9 | 12 | 1,218 | 1,285 |
| **Total** | 75 | 128 | 12,623 | 15,089 |
| Alternative B2(d) | | | | |
| AL | 1 | 1 | 50 | 50 |
| FL | 24 | 39 | 2,266 | 2,764 |
| LA | 44 | 79 | 9,258 | 11,156 |
| MA | 0 | 1 | 0 | 7 |
| TX | 9 | 12 | 1,323 | 1,390 |
| **Total** | 78 | 132 | 12,897 | 15,367 |
| Alternative B2(e) | | | | |
| CT | 1 | 1 | 15 | 15 |
| DE | 2 | 4 | 30 | 45 |
| FL | 6 | 7 | 309 | 324 |
| MA | 4 | 4 | 127 | 127 |
| MD | 1 | 2 | 62 | 70 |
| NC | 5 | 7 | 189 | 207 |
| NJ | 9 | 12 | 510 | 537 |
| NY | 11 | 12 | 1,014 | 1,017 |
| PA | 6 | 6 | 223 | 223 |
| RI | 1 | 1 | 70 | 70 |
| SC | 1 | 1 | 9 | 9 |
| TX | 1 | 1 | 18 | 18 |
| VA | 1 | 1 | 11 | 11 |
| **Total** | 49 | 59 | 2,587 | 2,673 |

**Table 4.38 Percent of total landings and discards in the Gulf of Mexico (GOM) in comparison to all areas. * excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook 2001-2003.

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 856,057 | 3,454 | 1,514 | 27 | 4 | 8,633 | 333 | 246 | 6 | 8,982 | 364 |
| 2 | 578,574 | 3,853 | 1,397 | 34 | 5 | 2,453 | 111 | 89 | 3 | 2,570 | 118 |
| 3 | 679,555 | 3,865 | 1,578 | 61 | 83 | 4,061 | 151 | 56 | 10 | 4,128 | 173 |
| 4 | 928,458 | 2,783 | 1,452 | 97 | 203 | 8,097 | 402 | 31 | 3 | 8,132 | 415 |
| 5 | 1,187,637 | 2,310 | 1,862 | 68 | 155 | 12,663 | 588 | 36 | 0 | 12,726 | 658 |
| 6 | 1,092,622 | 1,857 | 1,237 | 18 | 8 | 15,719 | 669 | 73 | 2 | 15,798 | 836 |
| 7 | 1,253,510 | 1,882 | 1,151 | 3 | 0 | 16,878 | 610 | 99 | 0 | 17,006 | 857 |
| 8 | 1,218,704 | 1,674 | 905 | 0 | 5 | 15,014 | 334 | 82 | 1 | 15,124 | 522 |
| 9 | 872,529 | 1,482 | 803 | 20 | 1 | 9,352 | 169 | 87 | 0 | 9,463 | 294 |
| 10 | 901,145 | 2,005 | 883 | 0 | 1 | 8,419 | 244 | 212 | 5 | 8,698 | 372 |
| 11 | 795,768 | 1,811 | 762 | 3 | 4 | 6,324 | 173 | 283 | 3 | 6,764 | 313 |
| 12 | 773,885 | 2,094 | 973 | 14 | 1 | 7,348 | 241 | 211 | 1 | 7,781 | 391 |
| Total in GOM | 11,138,444 | 29,070 | 14,517 | 345 | 470 | 114,961 | 4,025 | 1,505 | 34 | 117,172 | 5,313 |
| | | | | | | | | | | | |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| | | | | | | | | | | | |
| Percent of Total | 52.7% | 22.8% | 39.5% | 57.6% | 29.1% | 68.8% | 73.4% | 4.1% | 3.4% | 51.8% | 59.1% |

**Table 4.39 Percent of total discards in the Gulf of Mexico (GOM) in comparison to all areas (excluding the NED). * excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.** Source: HMS Logbook 2001-2003.

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Pelagic Shark discards | Large Coastal Shark discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 748,991 | 27 | 37 | 19 | 10 | 78 | 147 | 16 | 1 | 0 |
| 2 | 494,538 | 11 | 16 | 12 | 2 | 92 | 307 | 14 | 1 | 0 |
| 3 | 551,144 | 10 | 26 | 7 | 5 | 91 | 621 | 19 | 1 | 0 |
| 4 | 826,626 | 30 | 39 | 17 | 6 | 92 | 278 | 19 | 0 | 2 |
| 5 | 1,094,168 | 93 | 67 | 54 | 10 | 173 | 440 | 15 | 6 | 0 |
| 6 | 1,225,916 | 253 | 200 | 126 | 22 | 88 | 386 | 24 | 1 | 0 |
| 7 | 1,615,167 | 574 | 604 | 218 | 58 | 82 | 762 | 49 | 3 | 0 |
| 8 | 1,640,901 | 269 | 214 | 118 | 23 | 62 | 162 | 22 | 1 | 0 |
| 9 | 1,215,688 | 140 | 171 | 79 | 29 | 63 | 126 | 14 | 1 | 0 |
| 10 | 1,106,735 | 131 | 100 | 43 | 14 | 66 | 151 | 26 | 1 | 0 |
| 11 | 863,610 | 58 | 52 | 22 | 6 | 50 | 279 | 20 | 1 | 0 |
| 12 | 766,783 | 42 | 42 | 7 | 9 | 58 | 104 | 72 | 3 | 3 |
| Total | 12,150,267 | 1,638 | 1,568 | 722 | 194 | 995 | 3,763 | 310 | 20 | 5 |
| | | | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 34,020 | 16,573 | 494 | 179 | 11 |
| | | | | | | | | | | |
| Percent of Total | 57.5% | 52.1% | 64.0% | 70.2% | 45.8% | 2.9% | 22.7% | 62.8% | 11.2% | 45.5% |

## 4.2 Rebuilding and Preventing Overfishing

### 4.2.1 Northern Albacore Tuna

ICCAT assumes three Atlantic albacore stocks for assessment purposes: northern and southern Atlantic stocks, separated at 5° N latitude, and a Mediterranean stock (See Section 3.2.3.3). ICCAT's SCRS conducted a stock assessment for the northern stock in 2000, using data from 1975 through 1999. Based on the results of this stock assessment, at its November 2000 meeting, ICCAT recommended a total allowable catch (TAC) of 34,500 mt ww with an allocation to the United States of 607 mt ww. Subsequent ICCAT recommendations have extended both the 34,500 mt ww TAC, and the U.S. share of 607 mt ww, through 2006.

In 2004, SCRS advice was based on the 2000 assessment as updated with CPUE trends through 2003. SCRS concluded that the northern stock is probably about 30 percent below $B_{MSY}$, but the possibility of a lower $B_{MSY}$ could not be dismissed. It was further concluded that northern albacore was not being growth overfished[1] and that spawning stock biomass could be increased if catches do not exceed 31,000 mt (ww) (SCRS, 2004). SCRS plans to conduct the next stock assessment in 2007. ICCAT does not currently have a rebuilding plan for this species.

U.S. harvest of Atlantic Northern albacore tuna has historically been less than two percent of the recorded total international landings, based on 1997 through 2004 data. Approximately 98 percent of total U.S. landings are harvested primarily by rod and reel and pelagic longline fisheries in the Northwest Atlantic (See Table 3.60). Since the 2000 ICCAT recommendation of a 607 mt TAC was implemented, U.S. fishing year landings have been well below the annual TAC of 607 mt (ww) until 2004. In 2004, U.S. calendar year landings of 645.9 mt remained 16 percent below the adjusted annual quota of 765.2 mt. The United States had a domestic adjusted quota in the 2005 fishing year of 728.8 metric tons.

As described in Chapter 2, the alternatives considered for a rebuilding plan are:

C1 Maintain compliance with the current ICCAT recommendation (No Action)

C2 Unilateral proportional reduction of United States northern albacore fishing mortality

C3 *Establish the foundation with ICCAT for developing an international rebuilding program – Preferred Alternative*

*Ecological Impacts*

The SCRS has determined that, under the current exploitation limits, the total catch has remained below the 34,500 metric ton TAC for 2001-2003, although they have not been able to assess the effect of this limit on the stock. However in 2004, a northern albacore tuna stock

[1] Growth overfishing occurs when animals are harvested at an average size that is smaller than the size required to produce the maximum yield per recruit. The total yield from the fishery is therefore less than it would be if the fishing mortality rate was lower. In such a case, less fishing would produce higher landings. This is true even when the resource is abundant. Stock depletion and stock collapse are caused by recruitment overfishing. This means that the adult population was fished so heavily that the number and size of the adult population (spawning biomass) was reduced to the point that it did not have the reproductive capacity to replenish itself.

update using CPUE trends through 2003 indicated the stock was probably about 30 percent below MSY.

Alternative C1, the No Action alternative, would not be expected to result in any ecological impacts, as no changes in the stock status, bycatch, or catch rates are expected. This alternative would not establish a foundation to develop an international rebuilding plan for overfished northern albacore tuna and would be inconsistent with Magnuson-Stevens Act, which requires rebuilding plans for overfished stocks.

Alternative C2, which would implement unilateral U.S. restrictions in albacore landings, would not be expected to result in any changes in the stock status. The U.S. harvest is so low relative to the international 34,500 mt TAC that any positive ecological impacts resulting from decreased albacore landings would be expected to be negligible. NMFS received comment supporting unilateral action and the implementation of bag limits and seasonal limits on albacore landings. It is likely that a unilateral rebuilding plan would require reductions in landings from both the commercial and recreational sectors. Such an action could potentially change fishing behavior and/or increase dead discards because albacore are an incidental catch when directing for other species. NMFS also received a comment opposing unilateral action because such restrictions would only create unnecessary waste and discards, and that such actions would weaken the U.S. negotiating position at ICCAT. The agency agrees that implementation of an ineffective unilateral rebuilding plan may weaken the U.S. negotiation position at ICCAT to implement an effective international rebuilding plan, potentially resulting in continued international fishing on a stock biomass below MSY. Furthermore, setting the U.S. quota above or below current ICCAT recommendations would not be consistent with Magnuson-Stevens Act §304(g) (1) (d) and ATCA.

Alternative C3, a preferred alternative to establish a foundation for an international rebuilding plan, would have no immediate ecological impacts, as ICCAT would probably develop an international rebuilding plan following the next scheduled stock assessment in 2007. This alternative would allow for international discussions and the creation of a comprehensive rebuilding plan for all three Atlantic stocks of albacore. Following implementation of rebuilding plan recommendation(s), some negative impacts would be possible as changes in fishing practices may be necessary to reduce fishing mortality, which may result in an increase in dead discards in U.S. fisheries due to quotas, size limits, or other restrictions. However, engaging all concerned ICCAT parties in the rebuilding would be expected to generate long term positive ecological impacts. As the stock rebuilds and more resource becomes available to the fleet, U.S. quotas would likely increase and dead discards may decline.

Under the preferred alternative C3, the United States would work through ICCAT to establish a foundation for an international rebuilding program for northern albacore tuna. Implementation of this alternative would include a thorough analysis of the ICCAT Rebuilding Program to ensure that it contains a specified recovery period, biomass targets, fishing mortality rate limits, and explicit interim milestones expressed in terms of measurable improvements of the stock. Each of these components would comply with the objectives of this FMP and the intent of the Magnuson-Stevens Act. If successful, an Atlantic-wide TAC for northern albacore tuna, along with other conservation and management measures, would be adopted by ICCAT to rebuild the stock. The United States would then implement the ICCAT Rebuilding Program for northern albacore tuna through appropriate management measures such as quotas and/or increased minimum sizes and retention limits in domestic fisheries. Such a rebuilding plan would be expected to reduce harvest levels, which could increase discards of northern albacore tuna because the pelagic longline fishery primarily targets other species. Fishermen may increase fishing effort to compensate for lost revenues from northern albacore that would have to be discarded. Therefore, reduction in landings of northern albacore tuna could also cause a shift in both commercial and recreational fishing effort, and perhaps mortality, towards other species. Overall, however, alternative C3 would likely result in long term positive ecological impacts on the stock because current international catch rates exceed the levels needed to produce MSY.

*Social and Economic Impacts*

There would essentially be no impact from alternative C1, the No Action alternative, as the U.S. fleets are currently fishing below their ICCAT allocation. For commercial fisheries, alternative C2, implementation of a unilateral rebuilding plan, would likely result in a reduction in income, as incidental catches of northern albacore tuna would have to be discarded rather than landed. However, expected reductions in income would be small since the level of landings for northern albacore is two orders of magnitude smaller than pelagic longline target species (e.g., swordfish, other tunas). For the recreational fishery, alternative C2 would likely result in shifts for other opportunistic target species and catch and release of northern albacore tuna. Economic impacts would be difficult to evaluate for the recreational fishery since there is high variation in the catch from year to year. As ICCAT has not yet adopted a rebuilding program for northern albacore tuna, a complete analysis of the social and economic impacts of alternative C3 cannot be conducted at this time. If the ICCAT Rebuilding Program involves a substantial reduction in allowable catch, minimum size restrictions, or effort restrictions, there would likely be a short-term reduction in economic benefits to the pelagic longline fishery until the stock recovers. Since northern albacore tuna are targeted by recreational fishermen in certain times of the year and in certain areas, it is difficult to estimate the effect that a reduction in allowable landings of northern albacore would have on angler consumer surplus. It might be reduced, but to an unknown extent, because many recreational trips targeting northern albacore tuna often target other tuna species. Overall, however, ICCAT recommendations for stock rebuilding tend to be long term and so any negative social and economic impacts may be mitigated in the short term.

*Conclusion*

The preferred alternative for northern albacore tuna is C3, which would establish a foundation with ICCAT for developing an international rebuilding plan. This alternative appears to be an effective plan for meeting the objectives of the Magnuson-Stevens Act, ATCA, and this FMP. NMFS will continue to work with ICCAT member nations to develop and adopt an appropriate international rebuilding plan for northern albacore tuna with a specified recovery period, biomass targets, fishing mortality rate limits, and explicit interim milestones. The U.S. harvest of the North Atlantic stock is proportionally so low that the socio-economic impacts to the United States would likely be minimal but would depend upon the specifics of the rebuilding plan adopted by ICCAT. The other alternatives of no action or unilateral action would not be consistent with the Magnuson-Stevens Act or ATCA. Also, alternative C2 would not be consistent with Magnuson-Stevens Act §304(g)(1)(d) and ATCA because it would set the U.S.

quota above or below the current ICCAT recommendation. Furthermore, implementation of an ineffective unilateral rebuilding plan may weaken the U.S. negotiation position at ICCAT to implement an international rebuilding plan, potentially resulting in continued international fishing on a stock biomass below MSY.

### 4.2.2 Finetooth Sharks

NMFS determined that overfishing of finetooth sharks is occurring based on the 2002 stock assessment for SCS (Cortes, 2002). More detailed information on the stock assessment can be found in the Status of the Stocks section (Section 3.2.5) of this document. National Standard 1 of the Magnuson-Stevens Act requires NMFS to prevent overfishing. As described in Chapter 2, the alternatives considered to address overfishing of finetooth sharks are:

D1 Maintain current regulations for recreational and commercial fisheries. (No Action),

D2 Implement commercial management measures to reduce fishing mortality of finetooth sharks,

D3 Implement recreational management measures to reduce fishing mortality of finetooth sharks, and

*D4 Identify sources of finetooth fishing mortality to target appropriate management actions. (Preferred Alternative).*

*Ecological Impacts*

None of the alternatives analyzed for preventing overfishing of finetooth sharks would have any additional negative impacts on protected resources or EFH. The alternatives considered are not expected to modify fishing techniques, fishing effort, or fishing gears in any way that has not already been considered in relevant BiOp's. Furthermore, the measures are not expected to have "more than minimal and not temporary" impacts on areas that have designated as EFH for finetooth sharks.

Alternative D1 is the No Action alternative and would maintain the existing regulations. This alternative would likely maintain fishing mortality of finetooth sharks at current levels, and therefore, may have negative ecological impacts. Over 80 percent of finetooth sharks harvested commercially are landed with either drift gillnets, strikenets, encircling nets, or sinknets. Finetooth sharks are susceptible to these net gears as they have a tendency to "roll" upon contact with gillnets. This rolling behavior means that they become entangled by a wide range of gillnet mesh sizes and are often brought to the vessel dead (Carlson and Cortes, 2003). Currently, commercial gillnets are banned in most states' waters throughout the finetooth sharks' range, including: Georgia, Florida, Texas, and Louisiana. South Carolina allows the use of gillnets less than 100' long (30.4 m) in state waters. South Carolina's gillnet fishery is primarily a recreational fishery. Between 1997 and 2003, 95 and 99 percent of the finetooth landings reported to the General Canvass and Coastal Fisheries logbooks, respectively, were from the South Atlantic region (Table 4.40). Finetooth sharks are generally found in shallow coastal waters (Castro, 1993) in predominantly state, but also in Federal waters. For more information on finetooth shark life history, please see Section 3.2.5.

The ecological impacts of the alternatives are difficult to quantify because it is difficult to determine exactly which fisheries are contributing to commercial and recreational landings of finetooth sharks because Federal dealer logbooks (General Canvass) are not linked to a specific vessel; rather, they are an aggregation of shark purchases from various fishermen and submitted every 14 days. Recreational landings of finetooth sharks in state and Federal waters do not have to be reported, therefore, it is difficult to quantify these landings. Vessel logbooks submitted by shark and other Federal permit holders indicate which vessels are landing finetooth sharks, however, these landings only represent a fraction of the total dealer landings (General Canvas landings) for finetooth sharks (Table 4.40 and Table 4.41). This discrepancy may be a result of landings in state waters by non-Federally permitted fishermen, landings by Federally permitted fishermen who are not reporting all their catch in logbooks, misidentification of finetooth sharks by the dealers, or landings of finetooth sharks by vessels that are targeting unmanaged species and therefore are not required to report landings in logbooks.

Based on observer reports, the directed shark fishery landed an average of 685 finetooth sharks (approximately 2.9 mt dw) per year between 1999 and 2004 (Table 4.41). The range of annual landings varied widely from 65 to 1,615 individual finetooth sharks per year. The average number of finetooth observed landed per year equates to approximately 3.6 percent of the average number of finetooth landings reported by dealers to the General Canvass system during the same time period (1999-2004). There are several reasons why there is a discrepancy between observed landings and landings reported by dealers. One reason could be because historically there were more directed (*i.e.*, Federally permitted) shark gillnet vessels (11) subject to observer coverage. Overtime, the number of gillnet vessels specifically targeting sharks has decreased. Currently, there are between 5 and 6 vessels targeting sharks with gillnet gear that are subject to extensive observer coverage. However, there are other vessels that use gillnet gear, target other species, and land sharks. In 2003, there were approximately 15 gillnet vessels with directed shark permits that reported landing finetooth sharks. These vessels also possessed permits for, and targeted, Spanish mackerel. Because these vessels were not specifically targeting sharks, observer coverage may not have been required if fishermen claimed they were targeting non-HMS (Spanish mackerel or unmanaged species) or not using shark gillnet gear. These vessels may be using gillnets that have stretched mesh smaller than 5 inches. Under the regulations for the Atlantic Large Whale Take Reduction Plan (ALWTRP), gillnets with stretched mess smaller than 5 inches are not considered shark gillnet vessels. Thus, while these vessels are able to land finetooth sharks opportunistically under their directed shark permit, they were not previously observed as part of the shark gillnet fishery.

In 2005, NMFS modified the criteria for selection of gillnet vessels for observer coverage requirement outside of the right whale calving season (Nov. 15 – March 31) when 100 percent coverage in the Southeast U.S. Restricted Area is required. New criteria outside of the calving season included all vessels with a directed shark permit that reported fishing for sharks with gillnet gear and reported greater than 25 percent of their total landings from sharks during the previous year. This modification does not include those vessels selected for 100 percent observer coverage based on the ALWTRP. The 100 percent observer coverage under that plan only includes vessels that have stretched mesh gillnets five inches or greater. While observer coverage is extensive during the right whale calving season (100 percent from November 15 –

March 31), it does not include all of the vessels that can land sharks with gillnet gear. Additionally, observer coverage outside the Atlantic Right whale calving season (April 1 – November 14) is reduced to approximately 30 percent. Figure 4.18 indicates that the majority of trips landing finetooth occur between October and March every year. Increasing the pool of vessels that are subject to observer coverage has led, and would continue to lead, to improved understanding of finetooth shark landings outside of the current 5-6 boats that comprise the directed shark gillnet fishery universe.

As described in Section 3.4. and in the 2005 Directed Shark Gillnet Fishery Observer Program Report, the gear and soak time deployed by drift gillnet, strike gillnet, and sink gillnet fishermen are varied. Set duration was generally 0.3 hours and haulback averaged 2.9 hours. The average time from setting the net through completion of haulback was 10.2 hours. The most frequently used mesh size for drift gillnets was 12.7 cm. Strikenetters use the largest mesh size (22.9 cm) and the set times were 2.7 hours. The primary difference between sink gillnets and other gillnets (drift gillnets and strikenets) is the species being targeted. Sink gillnets can be used to target sharks, Spanish mackerel, and kingfish. These sink gillnets are generally weighted with a lead line in 10-20 m (33-65 ft.) of water, with the net being checked every 15-20 minutes. Sink gillnet gear is fished slightly differently depending the target species (sharks vs. non-sharks). If targeting Spanish mackerel or southern kingfish, vessels deploy a 68-912 m long net that is 1-9 m deep. Mesh sizes range from 6.4-12.7 cm with 7.6 cm being the most common. Vessels targeting sharks deployed sink gillnets between 137 and 1,824 m in length and 2-8 m deep with mesh sizes ranging from 7.3-20.3 cm (17.8 cm most common) and set at an average depth of 18.9 m (Carlson and Bethea, 2006). The No Action alternative would not affect or modify any of the gillnet gear that currently being deployed for finetooth sharks, other HMS and non-HMS species.

The No Action alternative (D1) may not result in the acquisition of additional landings data or information about fisheries that may be landing finetooth sharks. By taking no action, the Agency may not be able to obtain the additional information on fisheries that may be harvesting finetooth sharks. This could prevent the Agency from identifying further management measures to prevent overfishing of finetooth sharks, and may reduce the certainty associated with the stock status of finetooth sharks and other SCS in the upcoming stock assessment. Furthermore, the No Action alternative would not result in the development of collaborative efforts between management entities, which may be the most effective means of preventing overfishing of finetooth sharks.

While the No Action alternative is not expected to have positive ecological benefits, NMFS recently published a temporary rule under the authority of the ALWTRP and the Endangered Species Act (February, 16, 2006, 71 FR 8223) that prohibited, through March 31, 2006, any vessel from fishing with any gillnet gear in the Atlantic Ocean between 32º N and 27º 51' N and extended the Southeast U.S. Restricted Area out to 80º W. This action was based on NMFS' determination that a right whale mortality, documented on January 22, 2006, was the result of an entanglement by gillnet gear within the Southeast U.S. Restricted Area. The action was necessary to protect north Atlantic right whales from further serious injury or mortality from entanglement in gillnet gear. Because this six-week gillnet closure occurred at a time when finetooth sharks are generally present in the Southeast U.S. Restricted Area, it is expected that the closure would result in positive ecological impacts for finetooth sharks. The actual impact will likely not be known until dealer and logbook data are analyzed. In addition to this temporary rule, the Atlantic Large Whale Take Reduction Team (ALWTRT) is likely to initiate further rulemaking prior to re-opening the Southeast U.S. Restricted Area next year during this six-week time period (Feb. 14 – March 31) to address this take. NMFS would expect that any recommendations that reduce the use of gillnet gear during that time period would have positive ecological benefits for fineooth sharks. The actual benefit is not quantifiable at this time.

Alternative D2 would implement commercial fishery management measures (directed trip limits for SCS, gillnet gear restrictions, prohibiting the use of gillnet gear for targeting sharks, and/or reducing the SCS quota) to reduce fishing mortality of finetooth sharks. As described above, the majority of finetooth sharks are landed by commercial fishermen deploying gillnet gear in the South Atlantic region. This alternative might potentially affect all participants in possession of a commercial shark permit who are involved in gillnet fisheries in the south Atlantic or Gulf of Mexico regions.

A directed shark gillnet vessel is defined as a vessel that possesses directed shark permits and fishes with gillnets greater than 5 inch (12.7 cm) stretched mesh. These vessels are prohibited from deploying shark drift gillnet gear in the Southeast U.S. Restricted Area (roughly between Sebastian Inlet, FL, and Savannah, GA) during the right whale calving season between November 15 and March 31, unless they are fishing with strikenets and maintain 100 percent observer coverage. Also, during right whale calving season, directed shark gillnet vessels fishing outside the restricted area are subject to 100 percent observer coverage. Any vessel that has been issued a directed shark permit and that has gillnet gear onboard, regardless of location or mesh size, must have an operating VMS unit onboard during right whale calving season.

Currently, there are five directed shark gillnet vessels targeting sharks with drift gillnets, strikenets, and sinknets in Federal waters. These five gillnet vessels are responsible for less than 10 percent of the commercial finetooth shark landings based on observer reports (Table 4.41). The remaining finetooth sharks are likely being landed in state waters or by fishermen pursuing other species in Federal waters, such as those managed by the Gulf of Mexico or South Atlantic Fishery Management Councils (*e.g.*, Spanish and king mackerel) or species that are not currently managed (*e.g.*, kingfish). Since some of these fishermen may also possess directed shark permits, they can keep all finetooth sharks. However, because their harvest of finetooth sharks is incidental to landing of other non-HMS species or they are deploying gillnet gear with stretched mesh sizes less than five inches, these vessels are not subject to the stringent regulations implemented for the Southeastern U.S. Restricted Area, which are only applicable for vessels targeting sharks using shark gillnets (>5" stretched mesh) or strikenets. Vessels in the directed shark gillnet fishery also possess other permits and may modify gillnets to target other non-HMS. Thus, the measures under alternative D2 may have positive ecological impacts in general, but because they would not impact fishermen who do not *target* finetooth sharks, may not have an impact on the commercial fisheries that are the largest source(s) of finetooth shark fishing mortality. In fact, it is likely that some of the measures under alternative D2 would increase dead discards of finetooth sharks by preventing fishermen targeting other fish from landing finetooth sharks, thereby increasing the effort they expend in order to land enough permissible species to cover fishing costs.

One of the management measures considered under alternative D2 is a trip limit for directed shark permit holders. Currently, there is no directed trip limit for SCS. A directed trip limit for SCS or one specific to finetooth sharks could potentially reduce the number of finetooth sharks landed per trip. However, since the overall SCS quota has never been taken in any single year, fishermen would likely compensate for missed income as a result of the trip limit by increasing the number of trips taken and discarding any sharks fish harvested in excess of the trip limit. Given that gillnets are the predominant gear type used to harvest finetooth sharks and finetooth sharks tend to roll and die in gillnets, this alternative may result in an increased number of finetooth sharks dying by increasing the number of finetooth sharks that are discarded dead, by increasing the number of gillnet trips by vessels to maintain economic viability, or both. Additionally, gillnet gear is generally non-selective, and it is difficult for fishermen to deploy sets that would not also catch finetooth sharks. Thus, the net effect of this measure may increase, rather than prevent, overfishing on finetooth sharks which would result in negative ecological impacts.

Other management measures possible under alternative D2 are gear restrictions, specifically those that would modify mesh size and/or limit gillnet soak times. Soak times and mesh sizes deployed in this fishery are described above and in Section 3.4. Currently, for directed shark fisheries, the 50 CFR Part 635 regulations do not define a minimum or maximum mesh size requirement. Vessels targeting king and Spanish mackerel already have minimum mesh size restrictions of 4.75 and 3.5 inches (12.1 and 8.9 cm), respectively. The ALWTRP regulations define shark gillnet as having a minimum of 5 inches mesh size. For many species, limiting the mesh size is effective at reducing interactions because the fish swim through the net (the mesh is too big), are "gilled" by the net (if the mesh size is appropriate for that fish), or the fish swims into the net and swims away (the mesh size is too small). However, as noted under alternative D1, finetooth sharks are highly susceptible to entanglement in gillnet gear regardless of mesh size. Thus regulating the mesh size used in directed shark fisheries may have little impact on reducing finetooth shark fishing mortality. Similarly, while limiting the soak time (*i.e.*, the time the gillnet gear is in the water) may reduce the number of finetooth sharks harvested per trip as well as the catch of other SCS and LCS, fishermen may simply increase the number of sets made per trip to compensate for reduced catches which could potentially negate any benefit gained by reduced soak times. Thus, NMFS does not believe that modifying gillnet mesh size and/or limiting gillnet soak times would reduce finetooth shark fishing mortality or result in any significant ecological benefits.

Another management measure possible under alternative D2 would be a reduction in the overall SCS quota. Since it was established in 1999, the SCS annual quota has not been caught and finetooth sharks are the only species in the SCS complex that are experiencing overfishing. Between 1999 and 2002**,** total commercial landings of all SCS ranged from 263-330 mt dw per year. This was well below the 1,760 mt dw quotas established for SCS during this time period. In 2003, the quota was reduced to 326 mt dw, a reduction of 1,434 mt dw. The current quota of 454 mt dw was established in 2004. From 1999 – 2004, commercial landings of finetooth sharks averaged 34 percent of the SCS landings (Table 4.41). Given that the existing quota for SCS has never been reached and that finetooth sharks represent approximately a third of the SCS that are landed, a reduction in the overall quota may have minimal beneficial impacts on reducing the mortality of finetooth sharks. Furthermore, even if the quota were reduced, it may not necessarily mean that landings of finetooth sharks would decrease because the quota includes all SCS.

Lastly, under alternative D2, NMFS could close the shark gillnet fishery and remove gillnet gear from the list of authorized gears. The Agency received numerous comments during this rulemaking, including one from the State of Georgia, indicating support for closing the directed shark gillnet fishery. A similar alternative was analyzed in Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks. As was determined at that time, banning gillnets in HMS fisheries would likely have positive ecological impacts on finetooth sharks and other species (including HMS and non-HMS species) by reducing bycatch and bycatch mortality, and may reduce gillnet fishing effort in areas that are designated as right whale critical habitat. However, because very few vessels use drift gillnets, strikenets, and sinknets to target sharks and may only be responsible for a small portion of the finetooth shark fishing mortality, closing this fishery would not likely prevent overfishing because other vessels would continue to land (or discard dead) finetooth sharks while targeting other non-HMS. Most of the directed shark gillnet vessels also possess Spanish mackerel permits and would continue deploying gillnet gear in that fishery. Regarding gillnet fishing effort in the Southeastern U.S. restricted area, unauthorized gillnets would continue to be deployed in this area in other fisheries and the potential for interactions with right whales would continue to exist despite removal of gillnet gear from the authorized gear for sharks. Moreover, a permanent closure of the shark gillnet fishery may displace fishing effort to other fisheries, resulting in unknown ecological impacts. Vessels may shift to BLL gear, which is the primary gear used to target LCS but also can be used to harvest finetooth sharks. Therefore, these species might be subject to additional fishing pressure from the vessels that used to fish primarily with gillnet gear.

NMFS also received a comment indicating support for initiating a cap on the number of vessels that can use gillnet gear to target sharks. NMFS does not currently issue gear-based permits for shark fisheries. Rather, permit holders possess either directed or incidental permits and both permits are valid for use with any authorized gear for sharks (gillnet, bottom and pelagic longlines, handline, rod and reel, or bandit gear). Additionally, logbook and permit data does not indicate that there has not been a significant increase in recent years in the number of vessels targeting sharks with gillnet gear. The majority of shark fishermen employ bottom longline gear. NMFS did not consider gear based permitting endorsements in this rulemaking but may consider gear-based permits in another rulemaking (see Chapter 1). Such a rulemaking could consider limiting vessel participation in the shark gillnet fishery.

The Agency received several comments in support of seasonal commercial gillnet fishing restrictions to reduce finetooth shark fishing mortality, including one from the South Atlantic Fishery Management Council. Seasonal closures of commercial gillnet fisheries landing finetooth shark were not analyzed as part of alternative D2, however, these closures may be considered in the future, as necessary, to reduce fishing mortality of finetooth sharks. Trips that landed finetooth sharks, by gear and month, between 1999 - 2004 were analyzed from the Coastal Fisheries Logbook data. This data indicates that there is an increase in the number of trips landing finetooth sharks in October and November. This could be due to finetooth sharks moving southward from the Carolinas to warmer waters off of Florida in these months. Furthermore, the expansion of effort targeting Spanish mackerel as they are also moving south to Florida in October and November each year might also be a factor behind elevated finetooth shark landings. Finetooth sharks tend to move in schools north and south along the coast, depending on water temperatures and forage availability. Initiating annual geographic closures based on these paramaters would be confounding as oceanographic conditions are difficult to predict. Furthermore, initiating seasonal closures based on logbook data indicating where finetooth sharks have historically been landed (Table 4.44 and Figure 4.18) may not reduce fishing mortality because gillnet gear would likely continue to be deployed in these same areas for fisheries that are pursuing other species (*i.e.*, Spanish mackerel)**.** Since most of the fishing pressure on finetooth sharks occurs on finetooth sharks after they have pupped in the coastal waters (2-7 m ( water depth) surrounding Bulls Bay, SC in May it is difficult to use protection during pupping as a justification for seasonal closures as most states in the region have already banned gillnet gear for commercial fisheries. Seasonal commercial gillnet fishing restrictions were not considered in this rulemaking but may result in positive ecological impacts and may be considered in a future rulemaking. These closures would have to be for all gillnets as fishermen are not able to exclude finetooth sharks from being caught in this gear.

Alternative D3 would implement recreational management measures (*e.g*., mandatory use of circle hooks and/or increasing the minimum size) to reduce fishing mortality of finetooth sharks. The current Federal minimum size is already approximately 15-20 cm (six to eight inches) greater than the size at maturity. Some states have smaller minimum size requirements, more liberal bag limits, and do not require compliance with Federal regulations when fishing in state waters. Babcock and Pikitch (2002) claim that the majority of sharks (LCS, SCS, and Pelagic sharks) sampled by the MRFSS survey were below the existing minimum size limits. Ecological impacts of increasing the minimum size would be contingent upon compliance with existing and or future regulations. Since finetooth sharks are predominantly found in inshore waters under states' jurisdiction, where additional Federal regulations traditionally may have limited impact, the positive ecological impacts of increasing the minimum size further might be minimized.

A preferred measure (alternative I11 (b)) included in this action would require all recreational anglers with an HMS Angling, CHB, or General Category permit to abide by Federal regulations regardless of where they are fishing, unless a particular state has more stringent regulations. This measure could have positive ecological impacts because it would compel recreational fishermen to abide by the more stringent Federal minimum sizes and bag limits for recreational shark harvest. If more stringent Federal measures, regardless of where one were fishing, were implemented as a result of alternative I11 (b), improved consistency between Federal and state regulations might occur as a result. Improved compliance with existing and future regulations is necessary to prevent overfishing of finetooth sharks. Similar analyses related to increasing the minimum size were conducted in Amendment 1 to the 1999 HMS FMP. Additional consideration of increasing the minimum size has produced no new information/data on which to base a change in the current minimum size because most landings of finetooth sharks are likely in state waters, finetooth sharks only comprise a small portion of recreational SCS landings (1.4 percent), and the minimum size is already well above the size at first maturity for finetooth sharks. The results from the next SCS stock assessment should be available in 2007 and further information regarding the status of finetooth shark stocks may warrant reconsideration of this alternative at that time.

Although NMFS received several comments supporting more aggressive conservation measures to protect finetooth sharks in recreational fisheries, measures affecting the minimum size in Federal waters may have negligible ecological impacts since recreational fisheries are already regulated under a conservative bag limit and minimum size well under size at first maturity. Furthermore, since finetooth sharks only comprised 1.4 percent of recreational SCS landings between 1999 and 2004, it does not seem that there are many participants targeting finetooth sharks.

Another management measure under alternative D3 is a requirement to use circle hooks when targeting SCS in the recreational fishery. Currently, there are no other recreational HMS fisheries that have a circle hook requirement. However, a preferred alternative in this action (alternative E3) would restrict all billfish tournament participants issued an HMS permit to using circle hooks when using natural baits. Requiring circle hooks when targeting SCS may have some ecological benefits by reducing the post-release mortality of finetooth sharks, assuming that similar decreases in post-release mortality may be achieved for finetooth sharks as for other HMS that have been studied. Cooke and Suski (2004) suggest that overall post-release mortality rates are often lower when using circle hooks compared to J-hooks because of the reduced likelihood of fish ingesting the hook. However, they also recommend that management agencies implement circle hook requirements only in instances in which appropriate scientific data for similar species exists. While there have been numerous studies evaluating ecological benefits of circle hook usage in recreational fisheries, including several HMS, these studies have not been conducted in recreational fisheries that specifically target sharks to demonstrate decreases in post- release mortality compared to J-hooks for these fishes. In general, sharks caught in recreational fisheries are thought to have low post-release mortalities if they are kept in the water, handled properly, not deeply hooked, and not fought for extensive periods of time because many species of sharks are considered relatively hardy based on tag recaptures. Gurshin and Szedlmayer (2004) recently documented high post-release survival (nine out of ten hooked fish) of Atlantic sharpnose sharks on 9/0 J-hooks. The absence of similar research on circle hooks, coupled with reports of low post-release mortality for similar species caught with J-hooks, precludes a quantitative estimate of the ecological benefits to finetooth sharks that may occur as a result of requiring circle hooks.

Alternative D4, the preferred alternative, is expected to result in positive long-term ecological impacts. This alternative, while it does not prevent overfishing immediately, would implement a plan to prevent overfishing of finetooth sharks, through determining which fisheries catch finetooth sharks, and to what extent, those fisheries are responsible for mortality of finetooth sharks. NMFS believes that the measures contained in alternative D4 comprise an appropriate plan to implement at this time for the following reasons: information regarding finetooth shark landings is currently incomplete; landings or dead discards of finetooth sharks would continue to occur or could increase in other fisheries if stringent measures directed at commercial shark permit holders were implemented; the lack of catch series and bycatch data included in the 2002 SCS stock assessment (Section 3.2.5) impacted the results and conclusions drawn from that assessment; and that collaborative management measures among fisheries management entities may be the most effective means of preventing overfishing of finetooth sharks. A better understanding of where finetooth sharks are being landed, by whom, and which management entities are responsible for the fisheries in which they participate, could direct future management initiatives.

Table 2.1 lists activities, anticipated outcomes, and a timeline that constitute the plan to prevent overfishing of finetooth sharks as a result of alternative D4. This table and the actions it describes were produced in response to public and HMS Advisory Panel dissatisfaction related to the activities that had been undertaken to prevent overfishing of finetooth sharks and serves as a road map detailing how the Agency is engaged in current and future activities related to this end. Some of the activities described have already been initiated to attain a better understanding of how NMFS should proceed to prevent overfishing of finetooth sharks. The activities described in this table are not an exhaustive list and the Agency intends to explore other viable alternatives that would prevent overfishing if necessary. NMFS received several comments stating that the Agency needs to work harder to find sources of finetooth shark mortality in state-managed, Federally managed, and/or unmanaged fisheries. The following paragraphs provide a summary of NMFS' findings since the publication of the Draft Consolidated HMS FMP. In order to attempt to understand which fisheries may be interacting with finetooth sharks it is necessary to understand which permits (if any) that vessels maintain; what other species were being landed simultaneously or on the same trip as finetooth sharks based on Federal logbook data; the seasonality and geography of finetooth shark landings; and, to establish contacts with individual states, Councils, and Commissions to get more information on fisheries nder their jurisdiction that may be interacting with finetooth sharks, among other activities. Acquiring this information could focus future management initiatives which may result in positive ecological impacts if they can be employed to prevent further overfishing of finetooth sharks.

A recent analysis of landings data submitted via the Fishing Vessel Logbook Record for Gulf of Mexico Reef Fish, South Atlantic Snapper-Grouper, King and Spanish Mackerel, and Shark (Coastal Fisheries Logbook) between 1999-2004 indicate that a total of 46 vessels reported landings of finetooth sharks. Of these, 17 vessels only had a shark limited access permit, 17 vessels had both a directed shark permit and a Spanish mackerel permit (managed under the Coastal Pelagics FMP and its amendments by the South Atlantic Fishery Management Council), and 12 vessels had neither permit. In 2003, 15 vessels reported landings of finetooth sharks, all of which had both a shark directed permit and a Spanish mackerel permit. Management measures for shark fishing under commercial Federal shark permits would effectively only address finetooth shark fishing mortality by the 34 (17 vessels with a shark permit only + 17 vessels with a shark permit in addition to a Spanish mackerel permit) vessels that have a shark limited access permit. Preventing overfishing of finetooth sharks will be facilitated by understanding what permits that participants currently possess because that provides insight as to what regulations might be most effective at modifying current practices. Since the South Atlantic Fishery Management Council manages Spanish mackerel under the Coastal Pelagics FMP, and many participants possess this permit, the Agency is engaging in collaborative efforts with the South Atlantic Fishery Management Council, and may propose specific management measures in the future as new information warrants. Collaborative management measures may be the most viable option to ensure sustained long-term positive ecological impacts and prevent overfising of finetooth sharks.

Observed finetooth shark landings in 2005 included 1,556 finetooth sharks landed by strike gillnet gear, 413 finetooth sharks landed by drift gillnet gear, and 37 finetooth sharks landed by sink gillnet gear. On trips deploying sinknet gear and not targeting sharks, southern kingfish and Spanish mackerel were the most commonly encountered species. However, these trips interacted with 13 finetooth sharks, all of which were landed. The average size of finetooth sharks landed in 2005 was 123 cm, based on measurements attained from 38 individuals (Carlson and Bethea, 2006). As mentioned previously, many of the Federally managed gillnet vessels in the South Atlantic that were observed possess both Spanish mackerel and directed or incidental shark permits, thereby limiting the effectiveness of regulations directed at only one of these fisheries, and suggesting the need for collaborative strategies between management entities.

Expansion of this program was initiated in 2005 and will continue in the future, yielding valuable fisheries dependent data on finetooth shark landings, distribution, and interactions with vessels outside of the vessels traditionally covered by this observer program resulting in positive ecological impacts. Furthermore, data from observers on protected species interactions and other bycatch has utility for fisheries managers, scientists, and law enforcement officials. Vessels strictly targeting unmanaged species (and not in possession of a directed shark permit) such as kingfish are not subject to observer coverage under the regulations at 50 CFR Part 635 and are not required to submit logbooks, but may still be harvesting finetooth sharks. These vessels could be selected for observer coverage under the ALWTRP regulations which could further enhance efforts to document landings of finetooth sharks in non-HMS or unregulated fisheries, resulting in positive ecological impacts. The ALWTRP is currently engaged in efforts to better address gillnet vessels that are participating in unmanaged fisheries in the Southeast U.S. Restricted Area.

The Agency has been actively involved in gathering more information about fisheries that may be interacting with finetooth sharks, especially off the coast of Florida where most finetooth sharks are landed. NMFS collected some anecdotal information describing gillnet fisheries for Spanish mackerel and kingfish at a recent meeting of the Atlantic Large Whale Take Reduction Team in St. Augustine, FL, April 10-12, 2006, to better understand the fisheries that may be harvesting finetooth sharks. The intent of this meeting was to determine if additional management measures may be necessary to further regulate gillnet fisheries in the Southeast U.S. Restricted Area because of the right whale calf mortality that occurred on January 22, 2006. The fisheries information that was gathered is critical to understanding the potential for interactions with finetooth sharks in fisheries where finetooth sharks are not being targeted. The Spanish mackerel gillnet fishery deploys gillnets that are a minimum of 3.5 inch stretched mesh and the fishery occurs predominantly between September and December, until the water temperature drops below 69ºF. Fishermen fish one net at a time, at one hour intervals, and the soak ends when the nets are hauled onboard. Buoys are marked with permit numbers every 100 yards, and fishermen are allowed to possess two, 800 yard nets, per vessel. These participants may also target Spanish mackerel at night (fire fishing) when conditions are such that phosphorescence in the water is activated by schools of Spanish mackerel. Gillnet sets for Spanish mackerel that also harvest sharks, including finetooth sharks, are not uncommon. Spanish mackerel fishermen report their harvests in the same logbooks that shark fishermen use to report their landings (Coastal Fisheries Logbook). The Agency will be participating in the Spanish mackerel species working group at an upcoming South Atlantic Fishery Management council meeting in June, 2006, to gain additional information about this fishery and to determine how future collaborative regulations might address finetooth shark fishing mortality, resulting in positive ecological impacts.

NMFS also obtained anecdotal information on the kingfish (whiting) fishery that is occurring off the northeast coast of Florida at the St. Augustine meeting of the ALWTRT. The Agency learned about this fishery from staff at the Southeast Fisheries Science Center and from HMS fishermen in 2004, however, the meeting in St. Augustine provided additional substantive information about how the fishery is conducted, gear deployed, set duration, etc. This fishery started in 2004 and includes approximately 15 vessels, three of which possess directed shark permits. This fishery deploys sinknets in 60-70 feet of water (in Federal waters) as the kingfish prefer cooler water temperatures. Fishing methods are essentially the same for most vessels, however, there is some variation in how nets are retrieved. Soak times vary; however, nets are generally set at dawn for 4-6 hours. Gear may be left overnight and retrieved the next morning. Fishermen may deploy 2-3 nets at a time. The majority of gillnets are less than 3 inch stretched mesh, approximately 1.22 m (4 feet) high, with variable gillnet lengths. Since only three of these vessels possess directed shark permits, NMFS does not have complete information on landings of finetooth sharks in this fishery. Vessels participating in this fishery can't be selected for observer coverage under HMS regulations if they do not possess a limited access HMS permit. Participants in this fishery do not currently need to possess Federal permits for kingfish, therefore, there is no requirement for them to report any of their landings in logbooks. Gillnets deployed for kingfish are in areas that finetooth sharks likely inhabit, however, these fishermen would not be able to possess or land sharks legally without a limited access shark permit. Including the kingfish fishery within some type of management regime would result in positive ecological impacts for finetooth sharks and other species of incidental catch or bycatch that this fishery may be interacting with. The Agency will continue to stay engaged in the deliberations of the ALWTRT and any potential management measures they may implement to regulate gillnet fishing in the Southeast U.S. Restricted Area and minimize interactions between gillnet gear and right whales.

NMFS has learned more about other fisheries that may be landing finetooth sharks by analyzing the Coastal Fisheries Logbook data which describes the non-HMS species that were landed with finetooth sharks by Federally permitted vessels between 1999 - 2004 (Table 4.42 and Table 4.43). These data indicate that the majority of finetooth sharks are landed with gillnet gear (81 percent) or bottom longline gear (19 percent). Trips landing finetooth sharks generally included 21.5 and 8.3 percent non-HMS, in gillnet and bottom longline trips, respectively. Non-HMS species landed on gillnet trips included (in descending order): Spanish mackerel (13.6 percent), bluefish (2.73 percent), blue runner (1.51 percent), little tunny (0.59 percent), king whiting (kingfish) (0.42 percent), and cobia (0.32 percent). These data may be somewhat misleading, however, since they indicate the percent of total landings by *weight*, on trips that also landed finetooth sharks. Generally speaking, the HMS listed in these tables may have a greater whole weight on average than the non-HMS species and may not be representative of the number of individuals (HMS or non-HMS) landed. Furthermore, the Coastal Fisheries Logbook is a trip report (versus a set report) that fishermen complete upon returning to port and therefore does not provide set-specific information that would indicate whether or not fishermen are able to "target" HMS or non-HMS on individual sets, or simply opportunistically land whatever species they are permitted to keep. Understanding the catch composition of trips that are landing finetooth sharks may assist the Agency in determining potential management measures that prevent overfishing of finetooth sharks and reduce incidental or non-target catch. NMFS has, and will continue to place observers on vessels targeting non-HMS and in possession of a commercial shark permit to get more information on this fishery via the DSGFOP. Since gillnets are generally a non-selective gear, it is important to understand other species that fishermen may be landing when they harvest finetooth sharks so that potential future regulations are not circumvented by participants claiming they are targeting species other than finetooth sharks (or other HMS).

Coastal Fisheries Logbook data also indicated the geographic location of where the majority of finetooth sharks were landed between 1999 and 2004. Gillnets are banned, or restricted in many states' waters in the southeast region and the majority of finetooth shark landings are reported in Statistical Reporting areas immediately adjacent to Florida and South Carolina's state waters. Table 4.44 describes the number of trips landing finetooth sharks by NMFS statistical reporting area. A map of the statistical reporting areas is also provided (Figure 4.18). The majority of the trips landing finetooth sharks take place off Florida and South Carolina where gillnet gear is banned or limited to 100' total length, respectively.

Finetooth shark trips by gear and month for the years 1999 - 2004 (total) from the Coastal Fisheries Logbook are provided in Figure 4.18. This figure depicts the seasonality of when finetooth sharks are being landed with various gear types. It is interesting to note that the finetooth sharks landings with gillnet gear seem to spike in the month of November. This could be attributed to finetooth sharks moving southward from the Carolinas to warmer waters off of Florida (Castro, 1993) leading to an increase in finetooth shark abundance at this time. Spanish mackerel also generally move south to Florida in October –November each year. During the months of April through November, the trip limit for Spanish mackerel is 3,500 lbs/vessel/trip, whereas between December and March, it is unlimited in Florida's Atlantic EEZ. The fact that finetooth shark and Spanish mackerel fisheries may be spatially and/or temporally linked reiterates the importance of collaborative management measures to address overfishing of finetooth sharks because finetooth sharks may still be landed by gillnet vessels participating in other fisheries, despite measures implemented for commercial shark fishing.

NMFS contacted individual states between Texas and North Carolina (the presumed range of finetooth sharks) and created a table describing applicable fisheries regulations, whether or not the state allows gillnets to be deployed in state waters, commercial fisheries that may landing finetooth sharks, and the species code for finetooth sharks (if applicable) (Table 4.45). Contacts were also made with states responsible for monitoring of trip ticket or general dealer data to determine whether there were finetooth sharks being landed and reported in state waters that may not be included in General Canvass (Federal) dealer reports. Some of these state landings data are more comprehensive in that they can be traced to an individual vessel's identification number. NMFS is also awaiting additional trip ticket landings data from other states who participate in the Gulf of Mexico's Fisheries Identification Network (FIN) program, administered by the Gulf States Marine Fisheries Commission, which will provide more detailed landings information for finetooth sharks by state. While NMFS does not have jurisdiction over state waters, understanding the extent to which state fisheries may be interacting with finetooth sharks, and how these landings are accounted for, is essential to foster collaborative relationships between the Federal government and individual states to prevent overfishing of finetooth sharks. The Agency is interested in having finetooth sharks included in any fisheries observer programs operating in state waters to attain additional catch series data for stock assessments and explore collaborative management strategies. Attaining more data on state landings of finetooth sharks and inclusion of finetooth sharks for bycatch sampling in observer programs in state waters would result in additional landings data; in turn, resulting in positive ecological impacts.

Table 4.46 describes landings data from Florida's Trip Ticket program which include all dealers with a state Saltwater Products License. These landings would include all finetooth sharks landed and sold in the state of Florida between 1999 - 2004 and would include landings in state waters and/or landings that were not offloaded by a Federally permitted vessel or to a Federally permitted dealer. The advantage of these landings data compared to the General Canvass data submitted by Federally permitted shark dealers is that they include landings in state waters by vessels that may not have a Federal permit and, since 2000, provide the vessel ID of the vessel that reported landing the fish.

The Florida Trip Ticket landings include a higher proportion of finetooth sharks being landed in gillnet gears (92.8 percent) compared to the Coastal Fisheries Logbook (81 percent). Furthermore, they also indicate that finetooth sharks are being landed by several types of gillnet (runaround, generic, drift) starting in 2003. The majority of the landings occur within Federal waters (EEZ), however, 44,142 lbs dw (20 mt dw) of finetooth shark were listed as being landed in Florida, South Carolina, or Georgia's state waters. Landings included in the Florida Trip Ticket data may include landings of finetooth sharks that were caught by vessels using gillnet gear in Federal waters to target kingfish, however, it is difficult to differentiate because these trip tickets are not set-specific, rather, reflect the total landings sold to individual dealers. Of the vessels that were associated with these landings, six vessels had only a shark permit, three vessels had no permit, and eight vessels had both a shark and a Spanish mackerel permit reiterating the need for potential collaborative management efforts between HMS and the South Atlantic Fishery Management Council. Since the majority of commercially harvested finetooth sharks are landed and sold at dealers in Florida, it is critical that the Agency maintain close relations with personnel at the Florida Fish and Wildlife Commission and continue to receive updates on landings of finetooth sharks in order to determine the extent of finetooth shark mortality.

Alternative D4 would also expand data collection efforts by listing finetooth sharks as a select species with the Shrimp Trawl Fishery Observer Program, meaning that finetooth sharks will be included in observer sampling of bycatch in this fishery. Shrimp trawl vessels operate in shallow, inshore waters that are habitat for finetooth sharks. Including finetooth sharks as a select species would result in subsamples of bycatch, including identification, measurement, and estimates of interactions in this fishery which may facilitate future management actions to minimize bycatch of finetooth sharks in this fishery. Furthermore, since there was a lack of bycatch catch series data for finetooth sharks available for review during the 2002 SCS assessment, including this data in the future could improve precision of the model outputs for the next stock assessment and thereby the management recommendations. Increased attention to finetooth sharks on the behalf of the observers may result in inclusion of other HMS as select species in this observer program in the future, thereby, potentially improving estimates of interactions between HMS and trawl fisheries in the Gulf of Mexico and resulting in positive ecological impacts.

The United States Coast Guard (USCG) and Texas Parks and Wildlife Department (TXPWD) have informed NMFS that another source of undocumented finetooth shark fishing mortality occurs as a result of illegal fishing by Mexican gillnet vessels in the U.S. EEZ in the Gulf of Mexico. Seized catches have included finetooth sharks and NMFS would like to increase collaborative efforts to reduce this mortality as it may be impacting other species (HMS and non-HMS) as well.

De Silva *et al*. (2001) conducted a profile of shark bycatch in the U.S. Gulf of Mexico menhaden fishery in 1994 and 1995. Their findings indicate that finetooth sharks were landed in this fishery. They sampled 30 percent of the sets and found ten species of sharks, including six finetooth sharks. The authors indicate that small slender sharks (SCS and juvenile LCS) were less likely to be detected and identified in their sampling protocols. Since menhaden are a primary forage species of finetooth shark (Bethea *et al*., 2004), it is likely that some proportion of the small, unidentified bycatch in this fishery are finetooth sharks. This fishery is predominately located in state waters between Texas and Alabama and is not subject to observer coverage at this time. If observer coverage or some other means of monitoring bycatch were implemented in this fishery, it would be helpful to understand the extent to which finetooth sharks are being landed. However, NMFS does not have jurisdiction over state waters and can not implement these monitoring programs.

Finetooth sharks are difficult to properly identify; therefore, the shark dealer workshops preferred in this action (alternative A9) that focus on species identification may facilitate improved quota monitoring and ensure that data received from shark dealers are more accurate. Furthermore, since the SCS fishery is generally open year-round, and rarely approaches its allotted quota, there may be an incentive for shark dealers to intentionally misidentify LCS as finetooth sharks or other SCS to avoid exceeding regional trimester quotas for LCS. The Agency anticipates that outreach on the positive identification of sharks would provide shark dealers with the necessary tools and skills to be able to properly identify what they are purchasing from vessels, resulting in positive ecological impacts.

Alternative D4 would likely have long-term positive ecological impacts as it would implement a plan to prevent overfishing of finetooth sharks. Short-term ecological impacts would likely be neutral. Improved coordination between NMFS and Regional Fishery Management Councils, Interstate Marine Fisheries Commissions, states, and other management bodies would result in better collaborative efforts to manage fish that move between jurisdictional boundaries. Furthermore, since there may be fisheries that are lacking an FMP or other management measures and incidentally catching finetooth sharks (*i.e*., the fishery for kingfish), increased collaboration with other management entities may result in the inclusion of these fisheries into existing management initiatives, thereby, improving management and conservation efforts. Without knowing all of the sources of finetooth shark mortality, any action taken by NMFS may be misdirected and could result in negative ecological impacts if fishing effort were shifted to other fisheries. The activities detailed within the preferred alternative would implement an effective plan for preventing overfishing by first identifying sources of fishing mortality before implementing additional collaborative management measures, as appropriate, to avoid initiating actions that may be easily circumvented or may simply result in additional dead discards of finetooth sharks.

*Social and Economic Impacts*

Alternative D1 would likely not result in any adverse economic or social impacts as the status quo would not substantially modify or alter commercial or recreational fishing practices for finetooth sharks or other shark species.

Alternative D2 would implement trip limits, reduce quotas, and/or modify gear and gear deployment, all of which could have negative social and economic impacts. Implementing trip limits on directed SCS trips under alternative D2 may impose negative economic and social impacts on a gillnet vessels that target sharks or land them incidentally when targeting non-HMS. Vessels that possess directed shark permits but are targeting other finfish species may also experience negative economic and social impacts. However, because they are not targeting sharks, NMFS assumes that finetooth shark landings would comprise a small proportion of their landings and their economic and social impacts would be less those of fishermen targeting sharks. Both fishermen targeting sharks and those targeting other species may need to conduct additional trips in order to maintain current profits. Thus, these fishermen may have increased costs such as travel time and fuel. If fishermen do spend more time fishing as a result of the trip limit, this could have negative social impacts.

Modifying gillnet mesh size may result in negative economic impacts to a small number of gillnet vessels that target sharks. These vessels would have to replace existing gear in order to comply with any new mesh size requirements, as there is not currently a mesh size requirement in place outside of the Southeast U.S. Restricted Area. The Agency estimates that shark gillnet gear may range in cost from $8,000 to $20,000 (2004 dollars). Gillnet vessels not targeting sharks may be unaffected by new mesh size requirements and might experience a positive economic effect at the expense of the directed shark vessels, however, this would depend on whether gear restrictions were linked to possession of a shark permit. Vessels targeting king and Spanish mackerel already have minimum mesh size restrictions of 4.75 and 3.5 inches (12.1 and 8.9 cm), respectively. ALWTRT regulations define shark gillnet as being a minimum of 5 inches mesh size. Specifying maximum soak times for gillnet vessels targeting sharks may impose a negative economic effect as vessels would have to work longer hours and make more sets in order to maintain their current catch levels. Furthermore, a maximum soak time would also encourage fishermen to simply re-deploy gear after it has been hauled back if they had not yet caught enough fish. Fisheries targeting king and Spanish mackerel in Federal waters already have a one-hour maximum soak time for gillnets. Additional restrictions, coupled with increased fuel prices, would have negative economic impacts on the fishery.

Finally, alternative D2 would reduce the SCS quota. This may have a negative economic impact on the fishery depending on the amount of the quota reduction. A small reduction in the overall SCS quota may have no effect since the SCS quota has never been reached in a single year. Landings of SCS were 76.4 percent of the SCS quota of 326 mt dw in 2003 and, prior to that, SCS landings were less than 20 percent of the quota. The current SCS quota is 454 mt dw. The highest landings of SCS occurred in 1999 at 330 mt dw, or approximately 73 percent of the current quota. Therefore, the SCS quota would have to be reduced by more than 25 percent to have economic impacts on the shark gillnet fishery, or future landings would have to increase before a reduced quota would actually inhibit landings of SCS based on historical data. Furthermore, catch rates and restrictions implemented in other fisheries may also have economic impacts on the shark gillnet fishery. Reductions in the SCS quota of less than 25 percent would appear to have no negative impact on the fishery based on the current level of landings. However, since most finetooth sharks are observed dead or in poor condition at haulback, increasing the number of dead discards as a result of reducing the quota may have negative economic and social impacts.

Closing the shark gillnet fishery and removing gillnet gear from the list of authorized gear types would likely have significant negative economic impacts on the vessels currently engaged in this fishery but minimal impacts on the shark fishery as a whole. It would likely cause economic dislocation of at least five individuals or small entities and may put them out of business if there are not other fisheries from which they can substitute lost revenues as a result of this closure. However, as mentioned previously, there were 15 vessels that reported landing finetooth sharks in Federal logbooks in 2003. Furthermore, if gillnet were no longer an authorized gear for sharks, than presumably vessels that possess a commercial shark permit would not be able to possess sharks when gillnet gear is on board, even when targeting another species such as Spanish mackerel. Conversely, participants may sell their shark permits, target non-HMS, and discard any finetooth sharks that are landed. The economic impacts of closing the shark gillnet fishery are difficult to estimate as most of the vessels engaged in the directed shark gillnet fishery possess other permits. Furthermore, they would still be able to harvest sharks with other authorized gear types. The costs of refitting vessels to fish with BLL or other authorized gears would be extensive.

The five vessels participating in the directed shark drift gillnet (and/or strikenet) fishery are concentrated in the Ft. Pierce/Cape Canaveral region of southeast Florida. Therefore, there might be proportionately greater negative social or economic impacts on these vessels because a significant portion of their income comes from the harvest of sharks. Furthermore, these vessels may incur significant costs as they shift to other fisheries in order to maintain financial viability. Also, regulations in other fisheries may prohibit an increase in fishing effort.

Alternative D3 considers implementing recreational management measures such as a requirement to use circle hooks when targeting SCS in the recreational fishery. A circle hook requirement may result in negative economic impacts to the shark recreational fishery and related industries because a proportion of the fishery would have to switch to circle hooks from J-hooks. The Agency is not aware of the proportion of the recreational fishery that actually targets sharks in Federal waters since an HMS Angling permit allows participants to land tunas, certain species of sharks, swordfish, and billfish. A limited survey of hook prices indicated that J-hooks of the sizes and styles used by HMS recreational fishermen ranged in price from a low of $0.50 to a high of $7.50 each, with an average price of $2.70 (2004 dollars). Similarly, circle hooks of the sizes and styles used by HMS recreational fishermen ranged in price from a low of $0.30 to a high of $7.00 each, with an average price of $2.24 (2004 dollars). The Agency does not have information regarding the proportion of the recreational shark fishing community that is currently using circle hooks. It is assumed that fishing effort for sharks would remain relatively constant, as mandating circle hook use would not result in prohibitively high costs to remain in the fishery. Generally, the purchase of hooks represents only a minor capital expenditure relative to other costs associated with participating in marine fisheries, including the purchasing, equipping, maintaining, and running of vessels, which can cost thousands of dollars.

Under alternative D3, the Agency would increase the existing recreational size limit for finetooth sharks, which may have some negative social and economic impacts on near shore anglers and the supporting recreational industry. The social and economic impacts may vary depending on the willingness of anglers to release finetooth sharks caught and/or substitute harvested fish with other similar species. Angler expenditure data attained from MRFSS during 1998 – 2000 indicate that expenditures on excursions targeting small coastal sharks averaged $83.47/person/day (2004 dollars). NMFS does not believe that a minimum size increase would have an adverse impact on angler consumer surplus or satisfaction in recreational fisheries because finetooth sharks only comprise approximately 1.5 percent of the overall SCS recreational harvest. Encounters are relatively rare and few fishermen would target finetooth sharks. This alternative would not affect revenues to charterboat owners, captains, and others who rely on the recreational shark fishery. Tournaments would still be able to offer prize categories for finetooth sharks provided they are above the minimum size. In the long-term, as overfishing of finetooth sharks is eliminated, revenues may increase as less time would be required to catch finetooth sharks and as larger sharks increase in abundance. This alternative would not jeopardize participant safety, as recreational fishermen already have to determine the length of finetooth sharks relative to the existing minimum size.

Alternative D4 would not likely have significant social and economic impacts in the short-term as it primarily expands Agency efforts to discern sources of finetooth fishing mortality and would not enact additional management measures on fishing activities in recreational or commercial sectors at this time. The expansion of DSGFOP in 2005 resulted in an additional 88 sets on 30 trips from eight vessels. As per 50 CFR § Part 635.7, NMFS may select, for at sea observer coverage, any vessel that has an Atlantic HMS, tunas, shark or swordfish permit under §§ 635.4 or 635.32. Therefore, a stipulation of maintaining a commercial HMS shark permit requires that permit holders could be subject to observer coverage at any time. Selecting additional vessels for this coverage would not impart additional economic burden that has not already been analyzed. Furthermore, most gillnet trips targeting sharks or other non-HMS are in smaller vessels that generally do not stay out for extended periods of time, reducing the costs to individual vessel owners of providing food and accommodation comparable to their crew members. The number of additional vessels that fish with gillnet gear, possess a directed shark permit, and are not currently subject to observer coverage is estimated to be approximately ten vessels. It is difficult to estimate future numbers of vessels that might be subject to observer coverage as directed or incidental shark permit holders could deploy gillnet gear and become subject to observer coverage at any time. Vessels would be expected to attain the proper safety certification decals from the United States Coast Guard and ensure that there are adequate accommodations on board for observers prior to taking an observer; however, these requirements are already in place for the commercial shark fishery.

Efforts to record data on finetooth shark landings on shrimp trawl vessels would not result in any social or economic impacts because observer coverage would not be expanded. This observer program already exists and adding finetooth sharks to the select species list would not significantly impact the time required for observers to complete their sampling of bycatch in the trawl fishery. Furthermore, coordination with Regional Fishery Management Council, Interstate Marine Fisheries Commissions, and state agency staff regarding fisheries that may be contributing to finetooth shark fishing mortality would not result in any negative social or economic impacts to the public in the short term, and would likely result in long term social and economic benefits by determining where management measures should be enacted to reduce finetooth fishing mortality. Furthermore, collaboration with these entities may increase future collaborative efforts and result in additional landings information for other HMS species and protected resources that may be harvested in other fisheries.

*Conclusion*

The preferred alternative implements an effective plan to prevent overfishing by collecting data and identifying all sources of finetooth shark fishing mortality, expanding observer coverage in non-HMS fisheries, and creating a foundation for management measures that will effectively prevent overfishing of finetooth sharks. The majority of finetooth shark landings occur in commercial fisheries deploying a non-selective gear (gillnets) in a region (south Atlantic) where other non-HMS fisheries also deploy gillnets. Thus, measures that prohibit the use of gillnets for landing sharks (alternative D2), if aimed exclusively at the commercial shark gillnet fishery, would not prevent overfishing of finetooth sharks. Most of the five vessels that comprise the commercial shark gillnet fishery also possess Spanish mackerel permits. If gillnets were not allowed for the harvest of sharks the vessels could continue to deploy gillnets to catch other species, including Spanish mackerel, catch finetooth sharks incidentally, and then discard dead finetooth sharks. Without cooperative measures vessels may be able to circumvent any additional regulations that would be enacted for the commercial shark fishery when pursuing Spanish mackerel. Finetooth sharks are caught in a wide range of gillnet mesh sizes and are often dead at haulback, rendering trip limits and/or gear modifications (alternative D2) ineffective at preventing overfishing because dead sharks would continue to be discarded. Mortality of finetooth sharks in fisheries outside the jurisdiction of HMS (state waters) or in unregulated fisheries in Federal waters (*i.e*, kingfish) would also be unaffected. The preferred alternative will provide additional information on finetooth shark landings to allow enactment of comprehensive, collaborative measures that effectively reduce finetooth shark fishing mortality.

NMFS continues to explore which vessels may be engaged in fisheries that may harvest finetooth sharks and intends to conduct a new SCS stock assessment following the Southeast Assessment, Data, and Review process starting in 2007. Reducing finetooth shark fishing mortality via regulations targeting commercial shark permit holders is further confounded by the fact that finetooth sharks are one of the species in the SCS complex, which is not currently overfished or experiencing overfishing, and commercial fishermen have only caught, on average, 28.5 percent of the SCS quota between 1999 – 2003. Measures aimed at the recreational fishery (alternative D3) would only impact a small portion of the overall finetooth shark landings and, until comparative research on the merits of circle hooks versus J-hooks for reducing post-release mortality exists for sharks, implementing a circle hook requirement may be ineffective.

Furthermore, a conservative bag limit of one shark (including finetooth shark) and a minimum size above the age at first maturity for males and females is already in place.

As described in Table 2.1. and in this section, the plan for preventing overfishing of finetooth sharks detailed in the preferred alternative would first continue to identify fisheries contributing to finetooth shark mortality. This information may result in long-term positive ecological impacts not only on finetooth sharks but also other species. Information gathering and research have, and will continue to, provide valuable contacts, landings information, and improved understanding of fisheries that are being conducted in other management jurisdictions and may be beneficial for future collaborative measures between states, Regional Fishery Management Councils, Interstate Marine Fisheries Commissions, and NMFS. This plan also includes expanding observer coverage in the South Atlantic gillnet fisheries that are landing sharks incidentally and in the Gulf of Mexico shrimp trawl fishery which would provide substantive information on which fisheries are currently contributing to the majority of finetooth shark landings and would also provide bycatch data. Furthermore, working directly with the Regional Fishery Management Councils, Interstate Marine Fisheries Commissions, and states to identify all fisheries that may be interacting with finetooth sharks is a critical step to discern appropriate management options. Lastly, since finetooth shark carcasses can be difficult for shark dealers to positively identify, the workshops on shark identification, which would be implemented in alternative A9, would provide indirect benefits by improving the ability of shark dealers to positively identify finetooth sharks to species, and thus improve the accuracy of General Canvass logbooks received from dealers.

By first identifying sources of finetooth shark fishing mortality, the plan outlined in alternative D4 would facilitate potential collaborative, informed management measures that can best meet conservation and management goals while avoiding significant, and potentially unnecessary, economic and social impacts. Alternatives D2 and/or D3 (commercial and recreational management measures) may be considered in the future depending on any new information collected regarding finetooth shark landings, changes in the finetooth sharks status per the upcoming SCS stock assessment, new data on post-release mortality benefits of using circle hooks in recreational shark fisheries, or other relevant information that becomes available or is collected as a result of alternative D4.

As summarized in Appendix D, NMFS received a wide-range of comments from the public both supporting and opposing the preferred management measures. NMFS believes that the preferred alternative is a prudent means of developing comprehensive and collaborative regulations to prevent finetooth shark fishing mortality. NMFS received a range of public comments indicating support and opposition to alternatives D2-D4, and additional comments, including, but not limited to: comments on gillnet fisheries in general, the use of VMS, the results of the 2002 SCS stock assessment, reporting of HMS by dealers, identification of finetooth sharks, and the accuracy of data attained from MRFSS. All of these comments were considered prior to selection of the final preferred alternatives for preventing overfishing of finetooth sharks. Additional measures, possibly the commercial and recreational measures analyzed in this document, or others, may be necessary to prevent overfishing of finetooth sharks in the future.

**Table 4.40 Finetooth shark landings in lb dw (mt dw) by gear type in the Gulf of Mexico (GOM) and South Atlantic (SA), 1999-2003, as reported in the General Canvass (CN) and Coastal Fisheries (CL) Logbooks.** Source: Enric Cortes, pers. comm.

| Year | Gillnet Gear | | | | Longline Gear | | | | Other | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GOM | | SA | | GOM | | SA | | GOM | | SA | |
| | CN | CL | CN | CL | CN | CL | CN | CL | CN | CL | CN | CL |
| **1999** | 2,560 (1.2) | 0 | 269,685 (122.3) | 17,837 (8.1) | 671 (0.3) | 0 | 12,897 (5.9) | 7,435 (3.4) | 565 (0.3) | 0 | 3,250 (1.5) | 0 |
| **2000** | 0 | 0 | 185,907 (84.3) | 29,241 (13.2) | 11 | 2,820 (1.27) | 17,678 (8.0) | 5,847 (2.7) | 0 | 0 | 633 (0.3) | 0 |
| **2001** | 0 | 0 | 296,897 (134.6) | 50,389 (22.9) | 600 (0.27) | 0 | 4,919 (2.2) | 6,392 (2.9) | 83 | 0 | 889 (0.4) | 0 |
| **2002** | 0 | 0 | 152,507 (69.2) | 70,388 (31.9) | 894 (0.4) | 1,704 (0.8) | 7,708 (3.5) | 6,780 (3.1) | 0 | 0 | 732 (0.3) | 129 |
| **2003** | 0 | 0 | 123,791 (56.1) | 28,717 (13.0) | 2,654 (1.20) | 6,994 (3.2) | 7,449 (3.4) | 5,437 (2.5) | 0 | 14 | 4,181 (1.9) | 14 |
| **Total (%)** | 2,560 (100%) | 0 | 1,028,787 (83%) | 196,572 (17%) | 4,830 (29%) | 11,518 (71%) | 50,651 (61%) | 31,891 (59%) | 648 (98%) | 14 (2%) | 9,685 (98.5%) | 143 (1.5%) |

**Table 4.41 Summary of Small Coastal Shark quotas and landings in commercial and recreational fisheries between 1999-2005.** Sources: Data from 1998-2000,Cortés, pers. comm., data from 2001-2004, Cortés, 2005; Carlson and Baremore, 2001; Carlson and Baremore, 2002; Carlson and Baremore, 2003; Carlson ***et al***., 2004; NMFS, 2005; Cortés and Neer, 2005; Carlson and Bethea, 2006.

| | **SCS quota, mt dw** | | **Commercial Finetooth Landings, mt dw (General Canvass)** ***General Canvass*** | **Recreational Finetooth Landings, mt dw; (numbers of fish)** ***MRFSS and TX Parks and Wildlife*** | **Finetooth Observed Landings, mt dw*; (numbers of fish)** [a] |
|---|---|---|---|---|---|
| 1999 | 1760 | 330 | 129.4 | 0.38 (78) | 1.69** (340) |
| 2000 | 1760 | 269 | 92.6 | 7.2 (1438) | 0.83 (168) |
| 2001 | 1760 | 329 | 137.6 | 33.4 (6701) | 6.5 (1302) |
| 2002 | 1760 | 263 | 73.4 | 14.7 (2952) | 8.05 (1615) |
| 2003 | 326 | 241 | 74.1 | 8.85 (1774) | 3.09 (621) |
| 2004 | 454 | 204 | 54.9 | 2.68 (38) | 0.32 (65) |
| 2005 | 454 | N/A | N/A | 9.1 [c] (1830) | 9.94[b] (1995) |

* Numbers of fish multiplied by 11 lb (4.3 kg) (mean weight of finetooth sharks used in 2002 SCS assessment) then divided by 2204.6 to attain mt dw

** 1998 and 1999 combined

[a] Obtained from 100% observer coverage (November 15-April 1) and approximately 30% observer coverage April 2 – November 14, values not extrapolated. Includes observed strikenet and drift gillnet trips from DSGFOP[b] 2005 data includes landings observed from vessels using sink net gear to target other non-HMS species (*Menticirrhus spp*. and Spanish mackerel)

[c] Estimates from MRFSS January-October 2005, are preliminary and subject to change

**Table 4.42 Total pounds (lb ww) and percent of total landings by weight of species landed on gillnet trips that landed finetooth sharks, 1999-2004. Species and landings in bold are those currently managed by the HMS Management Division. Species with landings under 10 lbs ww were omitted.** Source: Coastal Fisheries Logbook (CFL).

| Species | Total Landings (1999 - 2004) | Percent of Total Landings by Weight |
|---|---|---|
| Barracuda | 4,293 | 0.40 |
| Blue Runner | 16,201 | 1.51 |
| Bluefish | 29,292 | 2.73 |
| Bonito, Atlantic | 298 | 0.03 |
| Butterfish, unclassified | 148 | 0.01 |
| Cero | 1,733 | 0.16 |
| Cobia | 3,459 | 0.32 |
| Crevalle | 362 | 0.03 |
| Croaker, Atlantic, unclassified | 394 | 0.04 |
| Dolphinfish | 32 | 0.00 |
| Finfish, unclassified | 675 | 0.06 |
| Flounder, unclassified | 651 | 0.06 |
| Grunt, white | 2,620 | 0.24 |
| Jacks, unclassified | 313 | 0.03 |
| King Mackerel and Cero | 5,393 | 0.50 |
| King Whiting/Kingfish | 4,551 | 0.42 |
| Moonfish, Atlantic | 174 | 0.02 |
| Pompano | 145 | 0.01 |
| Seatrout, Grey, unclassified | 146 | 0.01 |
| Seatrout, spotted | 3,557 | 0.33 |
| Seatrout, white | 63 | 0.01 |
| **Shark, Atlantic Sharpnose** | **57,776** | **5.39** |
| **Shark, Bignose** | **797** | **0.07** |
| **Shark, Blacknose** | **187,186** | **17.45** |
| **Shark, Blacktip** | **183,853** | **17.14** |
| **Shark, Bonnethead** | **50,137** | **4.67** |
| **Shark, Bull** | **56** | **0.01** |
| **Shark, Finetooth** | **345,210** | **32.18** |
| **Shark, Hammerhead** | **10,828** | **1.01** |
| **Shark, Sandbar** | **2,089** | **0.19** |
| **Shark, unclassified** | **3,098** | **0.29** |
| **Shark Fins, unclassified** | **5** | **0.00** |
| **Shark, Bignose** | **64** | **0.01** |
| Snapper, Blackfin | 447 | 0.04 |
| Snapper, Mangrove | 12 | 0.00 |

| Species | Total Landings | Percent of Total Landings |
|---|---|---|
| | (1999 - 2004) | by Weight |
| Spanish Mackerel | 146,211 | 13.63 |
| Tenpounder | 637 | 0.06 |
| Tripletail | 15 | 0.00 |
| Tuna, Blackfin | 536 | 0.05 |
| Tuna, Little Tunny | 6,280 | 0.59 |
| Wahoo | 84 | 0.01 |
| **Total** | **1,072,551** | **100.0** |
| **Total HMS** | **841,546** | **78.5** |
| **Total Non-HMS** | **231,005** | **21.5** |

**Table 4.43 Total pounds (lb ww) and percent of total landings by weight of species landed on bottom longline trips that landed finetooth sharks, 1999-2004. Species and landings in bold are those currently managed by the HMS Management Division. Species with landings under 10 lbs ww were omitted.** Source: CFL**.**

| Species | Total Landings | Percent of Total Landings |
|---|---|---|
| | (1999-2004) | by Weight |
| Amberjack, Greater | 1,059.40 | 0.14 |
| Cobia | 2,714.20 | 0.35 |
| Dolphinfish | 120.00 | 0.02 |
| Grouper, Black | 552.30 | 0.07 |
| Grpouper, Gag | 7,588.40 | 0.97 |
| Grouper, Red | 30,036.00 | 3.84 |
| Grouper, Snowy | 510.90 | 0.07 |
| Grouper, Warsaw | 534.50 | 0.07 |
| Grouper, Yellowedge | 3,317.00 | 0.42 |
| Hind, Speckled | 1,942.20 | 0.25 |
| Margate | 282.90 | 0.04 |
| Scamp | 572.40 | 0.07 |
| Shark, Atlantic Sharpnose | 11,579.70 | 1.48 |
| Shark, Bignose | 93.20 | 0.01 |
| Shark, Blacknose | 81,964.70 | 10.47 |
| Shark, Blacktip | 256,071.80 | 32.70 |
| Shark, Bonnethead | 7,574.30 | 0.97 |
| Shark, Bull | 24,597.70 | 3.14 |
| Shark, Dusky | 4,068.70 | 0.52 |
| Shark, Finetooth | 81,281.70 | 10.38 |
| Shark, Hammerhead | 8,233.10 | 1.05 |
| Shark, Lemon | 41,030.20 | 5.24 |

| Species | Total Landings | Percent of Total Landings |
|---|---|---|
| | (1999-2004) | by Weight |
| Shark, Mako | 2,649.30 | 0.34 |
| Shark, Sandbar | 194,996.50 | 24.90 |
| Shark, Sandtiger | 517.10 | 0.07 |
| Shark, Scalloped Hammerhead | 47.00 | 0.01 |
| Shark, Silky | 442.10 | 0.06 |
| Shark, Tiger | 1,091.20 | 0.14 |
| Shark, Fins | 901.00 | 0.12 |
| Snapper, Blackfin | 900.20 | 0.11 |
| Snapper, Mutton | 769.20 | 0.10 |
| Snapper, Silk | 103.20 | 0.01 |
| Tilefish | 13,695.50 | 1.75 |
| Tilefish, Bluefin | 198.20 | 0.03 |
| Tuna, Blackfin | 208.80 | 0.03 |
| | | |
| Total | 782,244.60 | 100.0 |
| Total HMS | 717,139.30 | 91.7 |
| Total Non-HMS | 65,105.30 | 8.3 |

**Table 4.44 Number of trips with finetooth shark landings (all gears) by NMFS Statistical Reporting reas, 1999 - 2004. A copy of the map indicating the NMFS Statistical Reporting Areas can be found in Figure 4.18. Bolded areas had more than 20 trips with landings of finetooth sharks.** Source: Coastal Fisheries Logbook.

| Area | Number of Trips Landing Finetooth Sharks, 1999-2004 |
|---|---|
| 1 | 3 |
| 2 | 5 |
| **3** | **23** |
| 4 | 5 |
| 5 | 8 |
| 6 | 2 |
| 7 | 2 |
| 9 | 2 |
| 11 | 8 |
| 18 | 1 |
| 2480 | 2 |
| 2679 | 4 |
| 2680 | 6 |
| 2778 | 1 |
| **2779** | **23** |
| **2780** | **127** |
| 2879 | 6 |

| | |
|---|---|
| **2880** | **213** |
| 2979 | 6 |
| **2980** | **37** |
| **3079** | **64** |
| 3080 | 8 |
| 3179 | 14 |
| 3180 | 11 |
| 3279 | 1 |
| **3379** | **50** |
| 3476 | 3 |
| Total | 635 |

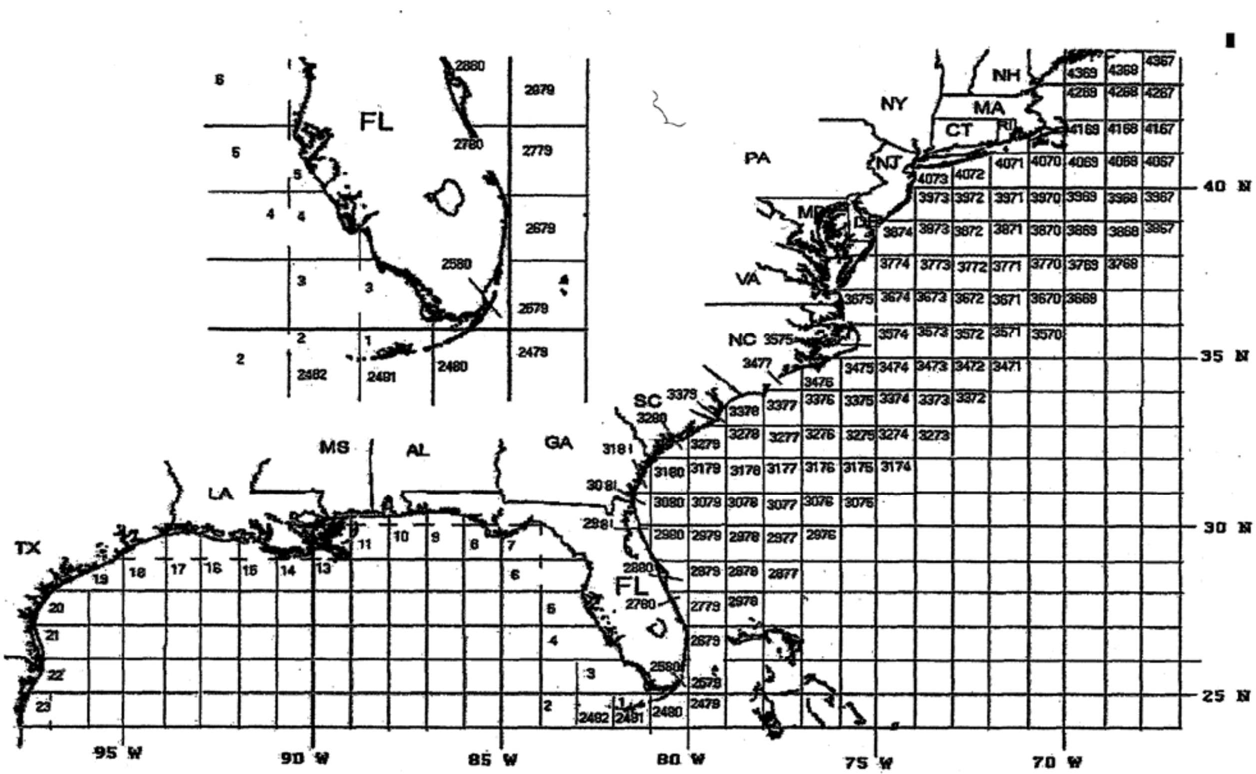



**Figure 4.18 NMFS Statistical Reporting Areas. Areas 3, 23, 2780, 2880, 2980, 3079, and 3379 all had greater than 20 trips that reported finetooth shark landings in the Coastal Fisheries Logbook between 1999-2004 as indicated in Table 4.44** Number of trips with **finetooth shark landings (all gears) by NMFS Statistical Reporting reas, 1999 - 2004. A copy of the map indicating the NMFS Statistical Reporting Areas can be found in 423HFigure 4.18. Bolded areas had more than 20 trips with landings of finetooth sharks.** Source: Coastal Fisheries Logbook.

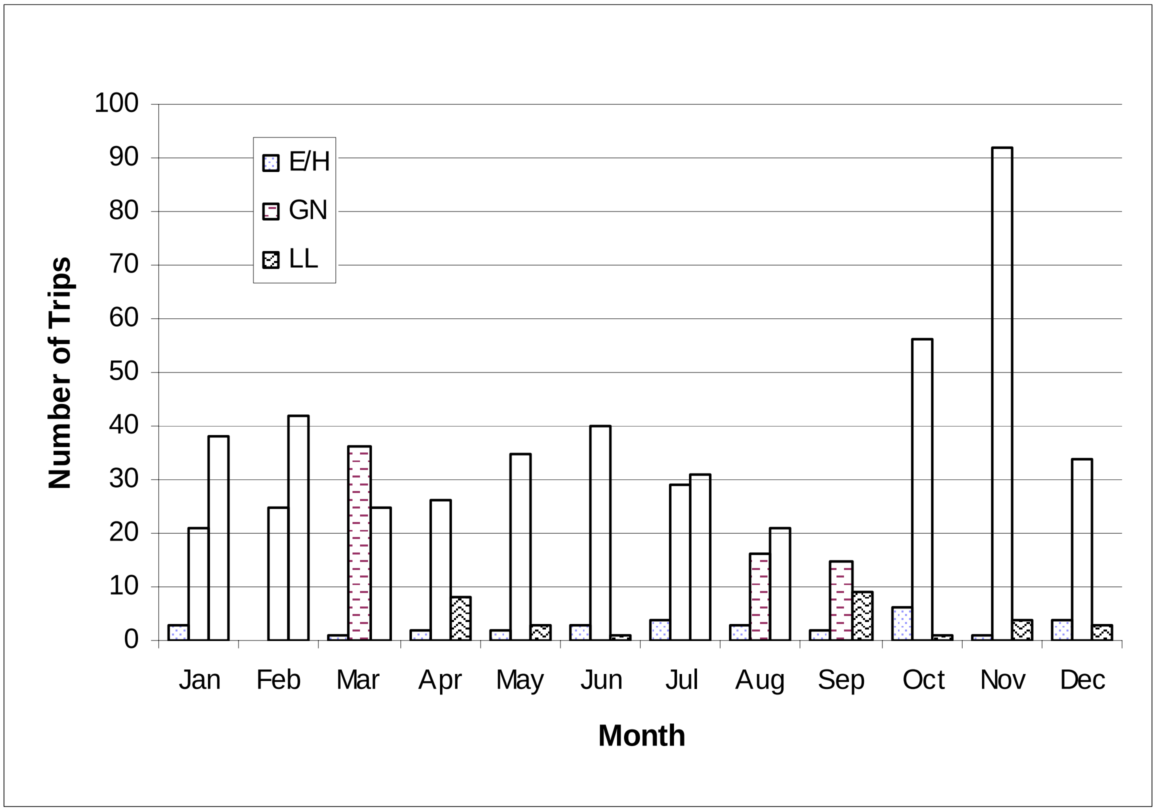



**Figure 4.19** **Finetooth shark trips by month and gear type between 1999-2004. E/H = Electric Reel, Bandit Gear, Handline; GN = Gillnet; and LL = Longline.** Source: Coastal Fisheries Logbook.

**Table 4.45** **State information on commercial fisheries that may be landing finetooth sharks.**

| State (Limit) | Gillnets Allowed in State Waters? | Commercial Fisheries/Gear | General Species Specific Information? | Finetooth Shark Specific Information? |
|---|---|---|---|---|
| NC | Yes, 2-6" stretched mesh depending on target spp. and time of year | Hook and Line; trap; trawls; Gillnet | Yes | No |
| SC | Yes, up to 100 ft. in length, recreational only, shark retention with gillnet gear prohibited | Shrimp trawls; shark Fishery (hook and line) | Yes | Yes |
| GA | No | Shrimp trawls | Yes | Yes |
| FL (3 nm – Atlantic, 9 nm Gulf of Mexico) | No | Traps; hook and line | Yes | Yes |
| AL | Yes | Gillnet; shrimp trawls | Yes | Yes |
| LA | No | Trot line; commercial shrimp trawls | Yes | Yes |
| MS | No contact | N/A | No | No |
| TX (9 nm) | No | Shrimp trawls | No | Yes |

**Table 4.46 Finetooth landings reported from the Florida Trip Ticket program 1999-2004 by area and gear type. All landings in the Exclusive Economic Zone are denoted as EEZ.** Source: Steve Brown, Florida Fish and Wildlife Commission Trip Ticket Program.

| Year | Area | Gear | Pounds (dw) | Gear Sum | Gear Percentage |
|---|---|---|---|---|---|
| **1999** | East Florida EEZ | Longline | 1,1437 | | |
| | Northwest Florida EEZ | Longline | 671 | 12,108 | 4.2 |
| | East Florida EEZ | Hook and Line | 3,868 | | |
| | | | 565 | 4,433 | 1.5 |
| | Northeast Florida EEZ | Trawl | 38 | 38 | 0.0 |
| | East Florida EEZ | Gillnet | 189,944 | | |
| | Georgia EEZ | Gillnet | 25,024 | | |
| | Northeast Florida | Gillnet | 15,813 | | |
| | Northeast Florida EEZ | Gillnet | 15,554 | | |
| | Northwest Florida EEZ | Gillnet | 2,561 | | |
| | South Carolina/Georgia | Gillnet | 18,810 | 267,706 | 92.4 |
| | East Florida EEZ | Mixed | 5,298 | 5,298 | 1.8 |
| | East Florida EEZ | Castnet | 8 | 8 | 0.0 |
| **Total** | | | | **289,591** | |
| **2000** | East Florida EEZ | Longline | 10,644 | | |
| | Northeast Florida EEZ | Longline | 1,114 | | |
| | South Carolina/Georgia | Longline | 6,432 | | |
| | Southwest Florida EEZ | Longline | 11 | 18,201 | 8.9 |
| | East Florida | Hook and Line | | | |
| | East Florida EEZ | Hook and Line | 595 | 598 | 0.3 |
| | East Florida EEZ | Gillnet | 169,563 | | |
| | Northeast Florida EEZ | Gillnet | 14,911 | | |
| | South Carolina/Georgia | Gillnet | 631 | 185,105 | 90.6 |
| | East Florida EEZ | Mixed | 57 | | |
| | Northeast Florida EEZ | Mixed | 75 | 132 | 0.1 |
| | East Florida | Castnet | 11 | | |
| | East Florida EEZ | Castnet | 182 | 193 | |
| **Total** | | | | **204,229** | |
| **2001** | East Florida EEZ | Longline | 4,618 | | |
| | Georgia EEZ | Longline | 204 | | |
| | Northeast Florida EEZ | Longline | 77 | | |
| | Southwest Florida EEZ | Longline | 600 | 5,499 | 1.8 |
| | East Florida EEZ | Hook and Line | 799 | | |
| | Northwest Florida | Hook and Line | 42 | | |
| | West Florida EEZ | Hook and Line | 18 | 859 | 0.3 |
| | East Florida EEZ | Gillnet | 264,609 | | |
| | Northeast Florida EEZ | Gillnet | 32,282 | 296,891 | 97.9 |
| | East Florida EEZ | Mixed | 19 | 19 | 0.0 |
| | Northwest Florida EEZ | Lampara Net | 23 | 23 | 0.0 |
| | East Florida | Castnet | 90 | 90 | 0.0 |
| **Total** | | | | **303,381** | |

| Year | Area | Gear | Pounds (dw) | Gear Sum | Gear Percentage |
|---|---|---|---|---|---|
| **2002** | East Florida EEZ | Longline | 7,079 | | |
| | Northeast Florida EEZ | Longline | 228 | | |
| | Southwest Florida EEZ | Longline | 893 | 8,200 | 5.1 |
| | East Florida EEZ | Hook and Line | 649 | 649 | 0.4 |
| | East Florida EEZ | Gillnet | 111,810 | | |
| | Northeast Florida | Gillnet | 2,301 | | |
| | Northeast Florida EEZ | Gillnet | 38,724 | 152,835 | 94.4 |
| | East Florida | Mixed | 21 | | |
| | East Florida EEZ | Mixed | 72 | 93 | 0.1 |
| | East Florida | Castnet | 47 | | |
| | East Florida | Castnet | 8 | 55 | 0.0 |
| **Total** | | | | **161,832** | |
| 2003 | East Florida EEZ | Longline | 3,796 | | |
| | Southwest Florida EEZ | Longline | 474 | 4,270 | 3.1 |
| | East Florida EEZ | Hook and Line | 21 | 21 | 0.0 |
| | East Florida EEZ | Gillnet | 12,424 | | |
| | East Florida EEZ | Gillnet | 2,922 | | |
| | Northeast Florida EEZ | Gillnet, generic | 105,025 | | |
| | East Florida EEZ | Gillnet, generic | 1,962 | | |
| | Northeast Florida EEZ | Gillnet, runaraound | 48 | | |
| | East Florida EEZ | Gillnet, drift | 5,200 | 127,581 | 92.4 |
| | East Florida EEZ | Hook and Line | 212 | 212 | 0.2 |
| | East Florida EEZ | Longline, sfc | 237 | | |
| | East Florida EEZ | Longline, bottom | 3,416 | | |
| | Southwest Florida EEZ | Longline, bottom | 2,179 | 5,832 | 4.2 |
| | East Florida | Castnet | 65 | | |
| | East Florida EEZ | Castnet | 85 | 150 | 0.1 |
| **Total** | | | | **138,066** | |
| **2004** | East Florida EEZ | Gillnet | 1,202 | | |
| | Northeast Florida EEZ | Gillnet | 42,089 | | |
| | Southeast Florida EEZ | Gillnet | 21 | | |
| | East Florida EEZ | Gillnet, generic | 21,417 | | |
| | East Florida EEZ | Gillnet, runaround | 287 | 65,016 | 89.0 |
| | East Florida EEZ | Hook and Line | 149 | | |
| | East Florida EEZ | Charterboat | 1,658 | 1,807 | 2.5 |
| | East Florida EEZ | Longline | 4,117 | | |
| | East Florida EEZ | Longline, bottom | 1,026 | | |
| | Southwest Florida EEZ | Longline, bottom | 604 | | |
| | West Florida EEZ | Longline, | 469 | 6,216 | 8.5 |

| Year | Area | Gear | Pounds (dw) | Gear Sum | Gear Percentage |
|---|---|---|---|---|---|
| | | bottom | | | |
| | East Florida EEZ | Castnet | 22 | 22 | 0.0 |
| **Total** | | | | **73,061** | |
| | | | | | |
| **Total Finetooth Landings 1999-2004** | | | | **1,170,160 lbs dw 530.8 mt dw** | |

### 4.2.3 Atlantic Billfish

As described in Chapter 2, the alternatives considered for the management of the directed Atlantic billfish fishery are:

E1 Retain existing regulations regarding recreational billfish fishing, including permit requirements, minimum size limits, prohibited species, landing form, allowable gear, and reporting requirements (No Action)

E2 Effective January 1, 2007, limit all participants in Atlantic HMS recreational fisheries to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations

*E3 Effective January 1, 2007, limit all HMS permitted vessels participating in Atlantic billfish tournaments to deploying only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations – Preferred Alternative*

E4(a) Increase the minimum legal size for Atlantic white marlin to a specific size between 68 and 71 inches LJFL (172 - 180 cm)

E4(b) Increase the minimum size for blue marlin to a specific size between 103 and 106 inches LJFL (261 – 269 cm)

E5 Implement a recreational bag limit of one Atlantic billfish per vessel per trip

*E6 Effective January 1, 2007, Implement ICCAT Recommendations on Recreational Marlin Landings Limits – Preferred Alternative*

E7 Effective January 1, 2007 – December 31, 2011, allow only catch and release fishing for Atlantic white marlin

E8 Effective January 1, 2007 – December 31, 2011, allow only catch and release fishing for Atlantic blue marlin

*Ecological Impacts*

Alternative E1 would maintain the *status quo* in the domestic recreational billfish fishery. This alternative would retain all existing regulations regarding recreational billfish fishing in the Atlantic Ocean, including permit requirements, minimum size limits, prohibited species, catch and release fishery management program, landing form, allowable gear, and reporting requirements, unless otherwise modified during this rulemaking. As discussed in additional detail below, alternative E1 would likely continue to provide minor ecological benefits for Atlantic billfish populations stemming from mandatory permitting requirements and minimum legal size limits. However, the No Action alternative would allow for the continued use of J-hooks in all segments in the fishery, which, as discussed in detail below, have been shown to have higher post-release mortality rates than previously estimated.

The two primary domestic sources of Atlantic billfish mortality include the Atlantic pelagic longline fishery and the directed recreational billfish fishery. Bycatch and discards of blue marlin, white marlin, and sailfish in the pelagic longline fishery show an overall decrease from 1999 to 2004, as seen in Table 3.20. There is no discernable trend for Atlantic spearfish. As seen in Figure 4.20 and Table 4.47, data reported to ICCAT for the period 1999 – 2004 shows a noticeable overall decrease in dead discarded Atlantic blue and white marlin and sailfish in the domestic pelagic longline fishery, with noticeable inter-year fluctuation for the marlins.

Trends in recreational landings of Atlantic billfish also show an overall decrease for the period 1999 - 2004, with substantial inter-year fluctuations, as shown in Figure 4.20 and Table 4.47. Landings of blue marlin clearly show an initial downward trend from 1999 - 2001 and a steady increasing trend from 2001 - 2004. Recreational landings of Atlantic blue marlin decreased from 1999 – 2001 from 36.9 mt to 16.4 mt. However, while the 2004 landings of Atlantic blue marlin were still below 1999 landings levels, landings of blue marlin increased steadily from 16.4 mt in 2001 to 24 mt in 2004.

As shown in Figure 4.20 and Table 4.47, during the period 1999 – 2004, mortality of Atlantic blue marlin resulting from pelagic longline dead discards exceeded recreational mortality attributable to recreational landings, in most years. The exception was in 2003 when pelagic longline dead discards and recreational landings were equivalent. Dead discards of Atlantic white marlin from pelagic longline fishing substantially exceeded recreational landings of white marlin each year during this period. Conversely, recreational landings of Atlantic sailfish substantially exceeded pelagic longline dead discards each year during this period. From 1999 to 2004, the difference between pelagic longline dead discards and recreational landings has narrowed.

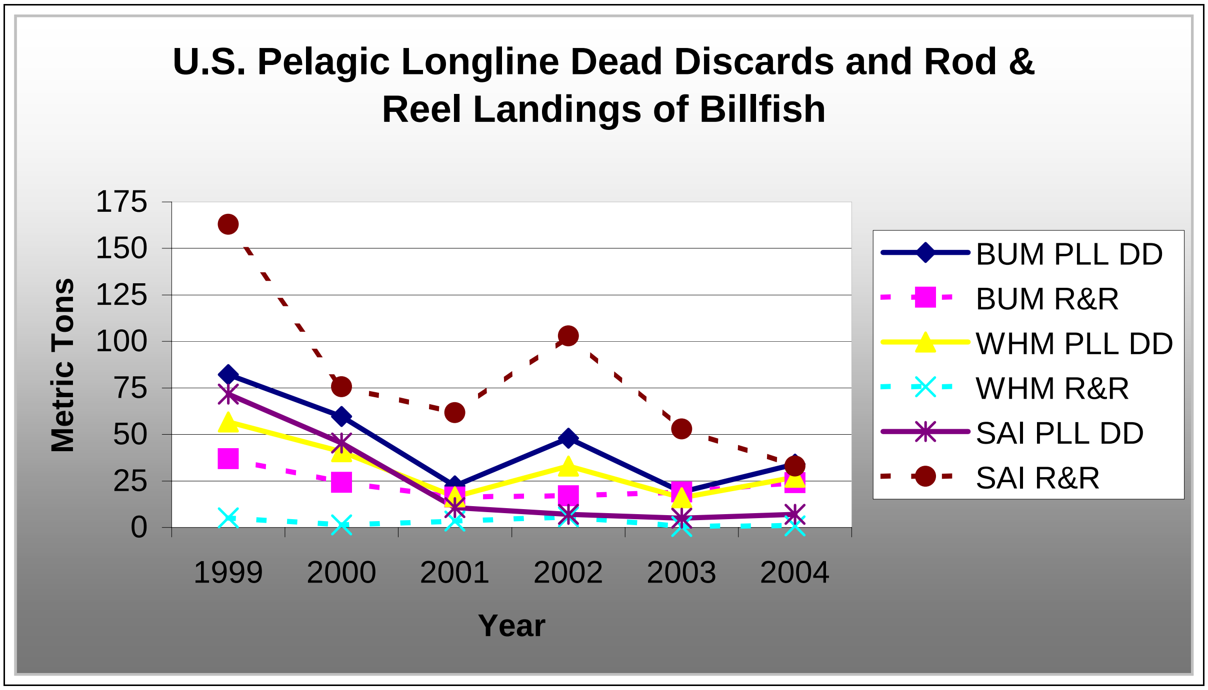



**Figure 4.20** **U.S. Pelagic Longline Dead Discards and Rod & Reel Landings of Atlantic Billfish.** Source: U.S. National Reports to ICCAT 2003; 2004; 2005.

**Table 4.47** **U.S. Pelagic Longline Dead Discards and Rod & Reel Landings of Atlantic Billfish (MT).** ***Source: Pelagic U.S. National Reports to ICCAT 2003; 2004; 2005***

| | BUM | | WHM | | SAI | |
|---|---|---|---|---|---|---|
| **Year** | **PLL DD** | **R&R** | **PLL DD** | **R&R** | **PLL DD** | **R&R** |
| **1999** | 82.1 | 36.9 | 56.7 | 5.2 | 71.6 | 163.0 |
| **2000** | 59.6 | 24.2 | 40.8 | 1.3 | 45.4 | 75.7 |
| **2001** | 22.4 | 16.4 | 16.5 | 3.4 | 10.7 | 61.7 |
| **2002** | 48.0 | 17.1 | 33.0 | 5.6 | 7.0 | 103.0 |
| **2003** | 19.0 | 19.0 | 17.0 | 0.6 | 5.0 | 53.0 |
| **2004** | 34.0 | 24.0 | 27.0 | 0.8 | 7.0 | 33.0 |

Domestic recreational Atlantic billfish catch (landing and release) statistics are less robust than commercial catch statistics. This is due to a number of factors including the sheer number of recreational vessels (*e.g.*, 25,238 Angling category permits; 4,173 CHB permits), the widespread and diffuse nature of the fishery, less stringent reporting requirements in the recreational HMS fishing sector than the commercial sector, a lack of observer coverage on recreational vessels, and significant non-compliance with recreational non-tournament reporting requirements. Identifiable gaps in self-reported non-tournament landings data include, but are not limited to, blue marlin landings in Puerto Rico and swordfish landings in the mid-Atlantic region. An examination of the Atlantic recreational billfish and swordfish reporting database shows that non-compliance or limited compliance with reporting requirements is occurring throughout the recreational swordfish and billfish fishery. For example, in 2004, swordfish landings were reported in only Florida, Alabama, and Rhode Island. A review of sportfishing magazines, local newspapers, and internet fishing websites indicates non-reported landings in many states. Further, NMFS staff are regularly informed by participants in the sportfishing community that compliance with non-tournament HMS reporting requirements is low. Similar comments were also received during the public comment period on the Draft Consolidated HMS FMP. As a result, non-tournament recreational billfish statistics are considered minimum estimates and actual landings may, in fact, be higher. NMFS is working to improve compliance with reporting requirements through various outreach efforts, including distribution of outreach materials, participating in national, regional, and local meetings with constituents, and increasing enforcement of reporting violations.

Minimum size limits are the primary management measure currently in effect to limit landings and potentially limit total fishing mortality in the directed fishery for Atlantic billfish. The current minimum size limits can reduce the number of fish that qualify for landing. Current minimum size limits were implemented to decrease domestic landings in an effort to comply with ICCAT Recommendation 97-09. In addition to limiting fishing mortality by potentially reducing the number of fish landed, if set appropriately, minimum sizes can also ensure some level of reproductive potential remains in the fishery by allowing fish to reach the size at sexual maturity before recruiting into the fishery, where they are eligible for landing. Current domestic minimum sizes are set above the size at maturity for Atlantic blue marlin, white marlin, and sailfish, and, as such, assure that some level of reproductive potential is maintained in the fishery. Additional increases in minimum sizes or a shift to catch and release fishing, as per preferred alternative E6, while potentially increasing the number of released fish would further assure that some level of reproductive potential is maintained in the fishery. Minimum size limits do not, in and of themselves, guarantee that landings will remain at any given level or have a direct impact on post-release mortality of billfish. Billfish that are released in the recreational fishery are not considered as bycatch because of the catch-and-release fishery management program that was established in Amendment 1 to the Atlantic Billfish FMP (NMFS, 1999).

Known recreational landings of Atlantic billfish have remained at relatively low levels since 1999 due to minimum sizes requirements and a strong voluntary adherence to the practice of catch and release fishing. Recent recreational landings, as reported to ICCAT in metric tons, can be seen in Table 4.47 above, and as previously noted, reflect a steady increase in estimated landings of Atlantic blue marlin from 2001 - 2004. The number of recreationally landed Atlantic blue and white marlin, as reported to ICCAT, since adoption of the annual 250 recreationally caught marlin landing limit (Recommendation 00-13), can be seen in Table 4.48. In 2002, the United States exceeded its combined annual limit of 250 recreationally landed blue and white marlin, but carried forward underharvest from 2001, per ICCAT Recommendation 00-14. ICCAT Recommendation 00-14 allows for the carryover of underharvest and mandates carryover of overharvest from a previous fishing year to a subsequent fishing year for any species under quota or catch limit management. It should be noted that the accounting methodology upon which the 2003 numbers reported to ICCAT were based differs from the methodology used to generate the 2002 and 2001 numbers that were reported to ICCAT. The methodology used to generate the 2001 and 2002 landings shown in Table 4.48 resulted in higher landings being reported to ICCAT for those years than would have been reported if the 2003 methodology had been applied. For additional information on this methodological issue, please see Van Voorhees *et al*., 2004.

**Table 4.48 U.S. Landings of Atlantic Blue and White Marlin as Reported to ICCAT in Numbers of Fish.** Source: U.S. National Reports to ICCAT 2003; 2004; 2005; and Erika Carlsen, NMFS Office of International Affairs, pers. comm.

| Year | BUM | WHM | Total | Annual Over/Underharvest |
|---|---|---|---|---|
| **2001** | 77 | 116 | 193 | 57 |
| **2002** | 191 | 88 | 279 | -29 |
| **2003** | 113 | 23 | 136 | 114 |
| **2004** | 118 | 31 | 149 | 101 |
| Total | 499 | 258 | 757 | |

**Table 4.49 Tournament Landings and Releases 1999 - 2004 in Number of Fish.** Source: NMFS Recreational Billfish Survey (RBS) Database

| | BUM | | | WHM | | | SAI | | |
|---|---|---|---|---|---|---|---|---|---|
| **Year** | **Retained** | **Released** | **Live Release Rate** | **Retained** | **Released** | **Live Release Rate** | **Retained** | **Released** | **Live Release Rate** |
| **1999** | 172 | 1,527 | 0.899 | 36 | 1,456 | 0.976 | 30 | 1,907 | 0.985 |
| **2000** | 117 | 1,467 | 0.926 | 8 | 975 | 0.992 | 18 | 2,198 | 0.992 |
| **2001** | 75 | 1,038 | 0.933 | 22 | 1,306 | 0.983 | 11 | 3,073 | 0.996 |
| **2002** | 84 | 1,132 | 0.931 | 33 | 2,207 | 0.985 | 14 | 3,117 | 0.996 |
| **2003** | 96 | 1,133 | 0.922 | 20 | 614 | 0.968 | 24 | 4,171 | 0.994 |
| **2004** | 110 | 1,538 | 0.931 | 25 | 1,349 | 0.982 | 9 | 4,467 | 0.998 |

As previously discussed, recreational billfish data are less robust than commercial data. There are several sources of recreational data with overlapping samples. Each data source provides a unique view of billfish fisheries, including both landed and released fish. Recreational Billfish Survey (RBS) data represent the majority of verifiable domestic Atlantic billfish landings and can be seen in Table 4.49. The RBS was designed to provide a complete census of tournament landings, and as such, it is considered to be both accurate and precise in this regard. However, it is important to note that the RBS represents a subset of total billfish landings and, as such, includes certain biases. Because the RBS captures only tournament landings it is, by design, a subset of aggregate U.S. landings. Further, given that tournament fishermen do not, as a general rule, land a fish that is smaller than one that has already been landed in a tournament, both the size of tournament reported fish and the release percentages that can be calculated from RBS data are likely biased high relative to the fishery as a whole.

Another source of recreational billfish data is the Marine Recreational Fishery Statistics Survey (MRFSS). MRFSS includes Atlantic HMS, but was not specifically designed for HMS fisheries, which are considered rare event fisheries in comparison to inshore fisheries such as red drum. Further, MRFSS does not cover the State of Texas. For these reasons, the MRFSS data are not considered to be highly accurate in determining the exact number of landings or releases of Atlantic HMS, but it does provide useful additional data for purposes of comparison with other data sets. The Large Pelagics Survey (LPS) is another statistical sampling survey that includes Atlantic HMS. This survey was designed to intercept BFT and operates only from Virginia to Maine on the Eastern seaboard from June through October. As such, LPS landings data are known to be a subset of aggregate U.S. Atlantic landings. Both the MRFSS and LPS can overlap with the RBS data, which must be accounted for when attempting to quantify aggregate landings. Finally, the HMS Management Division operates the Atlantic HMS non-tournament billfish and swordfish reporting line which is intended to capture non-tournament landings of all billfish and swordfish. With the exception of billfish or swordfish landed in the States of North Carolina and Maryland, anglers landing Atlantic billfish or swordfish outside of tournaments are required to report those landings to NMFS with 24 hours of landing. The States of North Carolina and Maryland have landing card programs in place and provide their landings data to NMFS.

The directed billfish fishery is primarily catch and release in nature. Fisher and Ditton (1992) estimate that between 74 and 99 percent of all billfish are released by billfish anglers in general. RBS data, as presented in Table 4.49, indicate Atlantic HMS tournament release rates of 89.9 to 93.3 percent for blue marlin, 96.8 to 99.2 percent for white marlin, and 98.5 to 99.6 percent for sailfish for the period 1999 - 2004. MRFSS data, as presented in Table 4.50, indicate release rates of 75.8 to 100 percent for blue marlin, 99.6 to 100 percent for white marlin, and 93.5 to 99 percent for sailfish, for this same period. LPS data, as presented in Table 4.51 indicate release rates of 87 to 100 percent for blue marlin, 89.4 to 99.4 percent for white marlin, and zero to 100 percent for sailfish, for the same period. Obviously, the estimates pertaining to sailfish (0 to 100 percent) indicate the wide variability in some data sets. Nevertheless, the preponderance of available data indicate a strong adherence by Atlantic billfish anglers, whose activities are captured by these data collection systems, to catch and release fishing, both within and outside of tournaments.

**Table 4.50 MRFSS Estimated Aggregate Landings and Releases of Atlantic Billfish 1999-2004 in Number of Fish (includes Puerto Rico, excludes Texas).** Source: NMFS MRFSS Database.

| Year | BUM | | | | WHM | | | | SAI | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Landings | Releases | Dead Discards | Live Release Rate | Landings | Releases | Dead Discards | Live Release Rate | Landings | Releases | Dead Discards | Live Release Rate |
| **1999** | N/A | 3,265* | 0* | N/A | N/A | 3,475* | 58* | 0.984 | 5,238* | 75,752* | 90* | 0.935 |
| **2000** | 0 | 2,492 | 0 | 1.0 | 26 | 7,069 | 0 | 0.996 | 1,000 | 41,905 | 171 | 0.977 |
| **2001** | 0 | 6,525 | 0 | 1.0 | 0 | 11,255 | 0 | 1.0 | 981* | 35,509* | 0* | 0.973 |
| **2002** | 556 | 6,956 | 0 | 0.926 | N/A | 4,633* | N/A | N/A | 541 | 53,474 | 625 | 0.99 |
| **2003** | 0 | 4,344 | 0 | 1.0 | N/A | 339* | N/A | N/A | 2,821 | 46,105 | 18 | 0.942 |
| **2004** | 1,101 | 3,447 | 0 | 0.758 | N/A | 7,060* | N/A | N/A | N/A | 42,638* | 0* | N/A |

* Incomplete data available for these fields

**Table 4.51 Large Pelagics Survey Estimated Aggregate Landings and Releases of Atlantic Billfish (Virginia to Maine) 1999-2004 in Number of Fish.** Source: NMFS LPS Database.

| Year | BUM | | | | WHM | | | | SAI | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Retained | Released | Dead Discard | Live Release Rate | Retained | Released | Dead Discard | Live Release Rate | Retained | Released | Dead Discard | Live Release Rate |
| **1999** | 3 | 28 | 0 | 0.903 | 6 | 156 | 0 | 0.963 | 0 | 3 | 0 | 1 |
| **2000** | 0 | 1,886 | 0 | 1.000 | 4 | 705 | 0 | 0.994 | 6 | 0 | 0 | 0 |
| **2001** | 0 | 302 | 0 | 1.000 | 4 | 703 | 0 | 0.994 | N/A | N/A | N/A | N/A |
| **2002** | 0 | 568 | 0 | 1.000 | 218 | 5,616 | 0 | 0.963 | 0 | 60 | 0 | 1 |
| **2003** | 101 | 673 | 84 | 0.870 | 365 | 3,069 | 0 | 0.894 | 0 | 68 | 0 | 1 |
| **2004** | 45 | 1,112 | 0 | 0.961 | 78 | 5,573 | 0 | 0.986 | 0 | 27 | 0 | 1 |

Despite the widespread practice of catch and release fishing in the Atlantic billfish fishery, as discussed above, recent data on post-release mortality rates of recreationally caught billfish indicate that the adverse ecological impacts of recreational activities on billfish resources may be greater than previously recognized. Post-release survival of recreationally caught and released Atlantic billfish was previously estimated to be 90 percent or greater (NMFS, 1999). Conversely, this means that post-release mortality of recreationally caught and released billfish was previously estimated to be ten percent or lower. This estimate was derived from a review of the relevant literature at the time, which consisted primarily of studies examining catch and release mortality of bluefin tuna and sharks and Gulf of Mexico longline post-release survivorship. Since that time, there have been a number of pertinent studies examining both J-hook and circle performance and effects on billfishes.

A recent study by Horodysky and Graves (2005) examining the post-release mortality in the recreational fishery for Atlantic white marlin strongly suggests that mortality levels using traditional J-hooks may be higher than previously assumed. Horodysky and Graves found that the mortality rate of white marlin associated with J-hooks was 35 percent. This number was higher than post-release mortality rates for other billfish species. Horodysky and Graves (2005) noted post-release mortality rates (from other studies)of 11 percent for blue marlin and 29 percent for striped marlin caught with this hook type. Given sample sizes of the studies examined, there is no statistical difference between the Horodsyky and Graves 35 percent post-release mortality rate for Atlantic white marlin and the 29 percent estimate identified for Pacific striped marlin. As discussed above, previous post-release survival estimates for billfish were thought to be in excess of 90 percent. The recent white marlin post-release mortality statistics, when combined with estimates for the number of Atlantic blue and white marlin released by U.S. anglers, form the basis for NMFS' conclusion that the mortality contribution of the recreational billfish fishery is higher than previously estimated.

Table 4.52 presents the estimated number of white marlin mortalities resulting from catch and release fishing activities based on NMFS' RBS, MRFSS, and LPS databases. In deriving these estimates, an assumption was made that all billfish anglers use J-hooks. NMFS acknowledges that some unquantified portion of billfish anglers currently use circle hooks, and, as such, this assumption could bias the estimates to higher than actual levels. NMFS currently does not have an estimate of the proportion of billfish anglers that regularly use circle hooks. However, uncertainty in billfish landings stemming from under-reporting, as well as additional uncertainty stemming from landings estimates in the Commonwealth of Puerto Rico and the U.S.V.I., may result in underestimates of recreational mortality. Mortality estimates were derived by applying a post-release mortality rate of 0.35 (Horodysky and Graves, 2005) to the reported number of releases (*e.g.*, 100 $_{\text{releases}}$ * 0.35 $_{\text{post-release mortality rate}}$ = 35 $_{\text{mortalities}}$). Using this methodology, estimated release mortalities of Atlantic white marlin range from 215 to 773 based on RBS data (1999 – 2004), 119 to 3,939 based on MRFSS data (1999 – 2004), and 55 to 1,966 for LPS data (1999 – 2004). For the reasons discussed above, actual post-release mortalities of white marlin likely fall somewhere between these estimates. As previously discussed, each of these databases has particular limitations, however, taken in combination, the data provide some indication of the magnitude of U.S. induced recreational white marlin mortalities.

**Table 4.52 Estimated Post-Release Mortality of White Marlin in Numbers of Fish Based on J-hooks and 35 Percent Post-Release Mortality Rate as derived from Data from the RBS, MRFSS, and LPS.** Source: Recreational Billfish Survey; Marine Recreational Fisheries Statistics Survey; and Large Pelagic Survey.

| | RBS | | MRFSS | | LPS | |
|---|---|---|---|---|---|---|
| **Year** | **Live Releases** | **Estimated Post-Release Mortalities** | **Live Releases** | **Estimated Post-Release Mortalities** | **Live Releases** | **Estimated Post-Release Mortalities** |
| **1999** | 1,456 | 510 | 3,475* | 1,216 | 156 | 55 |
| **2000** | 975 | 341 | 7,069 | 2,474 | 705 | 247 |
| **2001** | 1,306 | 457 | 11,255 | 3,939 | 703 | 246 |
| **2002** | 2,207 | 773 | 4,633* | 1,622 | 5,616 | 1,966 |
| **2003** | 614 | 215 | 339* | 119 | 3,069 | 1,074 |
| **2004** | 1,349 | 472 | 7,060 | 2,471 | 5,573 | 1,951 |

*Incomplete data available for these years for this data set.

Table 4.53 presents the estimated number of Atlantic blue marlin mortalities resulting from catch and release fishing activities based on the RBS, MRFSS, and LPS databases. Estimates were derived by applying a post-release mortality rate of 0.11 (Graves 2002) to the reported number of releases (*e.g.*, 100 $_{\text{releases}}$ * 0.11 $_{\text{post-release mortality rate}}$ = 11 $_{\text{mortalities}}$). Consistent with the calculations for white marlin above, NMFS assumed that all billfish anglers use J-hooks. NMFS acknowledges that some billfish anglers currently use circle hooks, and, as such, this assumption could bias the estimates to higher than actual levels. NMFS currently does not have an estimate of the proportion of billfish anglers that regularly use circle hooks. However, uncertainty in billfish landings stemming from under-reporting, as well as additional uncertainty stemming from landings estimates in the Commonwealth of Puerto Rico and the U.S.V.I., may result in underestimates of recreational mortality. Between 1999 and 2004, estimated post-release mortalities of Atlantic blue marlin range from 114 to 169 fish based on RBS data, and 274 to 765 fish based on MRFSS data. Between 1999 and 2004, estimated post-release mortalities of Atlantic blue marlin ranged from 3 to 207 fish for LPS data. It is likely that the true post-release mortalities of blue marlin fall somewhere between these estimates. As previously discussed, each of these databases has particular limitations, however, taken in combination, the data indicate that U.S. induced mortalities of Atlantic blue and white marlin are likely higher than previously assumed in Amendment 1 to the Billfish FMP (NMFS, 1999).

**Table 4.53 Estimated Post-Release Mortality of Blue Marlin in Numbers of Fish Based on J-hooks and 11 Percent Post-Release Mortality Rate as derived from Data from the RBS, the MRFSS, and LPS.** Source: Recreational Billfish Survey; Marine Recreational Fisheries Statistics Survey; and Large Pelagic Survey.

| | RBS | | MRFSS | | LPS | |
|---|---|---|---|---|---|---|
| **Year** | **Live Releases** | **Estimated Post-Release Mortalities** | **Live Releases** | **Estimated Post-Release Mortalities** | **Live Releases** | **Estimated Post-Release Mortalities** |
| **1999** | 1,527 | 168 | 3265* | 359* | 28 | 3 |
| **2000** | 1,467 | 161 | 2,492 | 274 | 1,886 | 207 |
| **2001** | 1,038 | 114 | 6,525 | 718 | 302 | 33 |
| **2002** | 1,132 | 125 | 6,956 | 765 | 568 | 62 |
| **2003** | 1,133 | 125 | 4,344 | 478 | 673 | 74 |
| **2004** | 1,538 | 169 | 3,447 | 379 | 1,112 | 122 |

*Incomplete data available for these years for this data set.

As previously stated, alternative E1 would likely continue to provide only minor ecological benefits, given the limited measures (permit requirements and minimum size limits) currently in place to limit fishing mortality by limiting landings. Nevertheless, the ecological benefits of alternative E1 would be substantially below those of other billfish alternatives presented in this document. Minimum sizes alone cannot directly limit landings or mortalities, but can indirectly limit landings by limiting the available pool of legal sized fish. Continuation of existing management measures would likely provide a low level of positive ecological impacts for Atlantic billfish by constraining increases in billfish landings and thereby limiting mortality to some extent. However, new data on the post-release mortality of white marlin, as discussed above, indicate a larger contribution by U.S. recreational anglers to Atlantic-wide white marlin mortality rates than assumed in Amendment 1 to the Atlantic Billfish FMP (NMFS, 1999). Alternative E1 would not likely result in any substantial change in the number of Atlantic billfish landed, released, or discarded dead, or result in any significant change in the current levels of post-release mortality in the near future. Under the No Action alternative, landings, dead discards, and post-release mortality attributable to the directed billfish fishery could increase or decrease depending on angler behavior, with negative or positive ecological impacts given that there are no management measures currently in place to directly control landings or effort. However, no shifts in angler behavior are anticipated under the No Action alternative. NMFS received limited public comment in support of the No Action alternative, which generally cited existing domestic regulations as being appropriate and suggested the additional regulation would be inappropriate. Commenters further suggested that voluntary use of circle hooks could increase. However, as previously, discussed the No Action alternative would allow for the continued and restricted use of J-hooks in the recreational fishery, which are associated with significantly higher post-release mortality rates than previously estimated. Alternative E1 would likely not reduce or reverse the current United States' or Atlantic-wide fishing mortality rates for either blue or white marlin. Further, the No Action alternative cannot, in and of itself, ensure compliance with the ICCAT marlin landing limit. For these reasons, despite limited public support for it, NMFS is not preferring the No Action alternative. Alternative E1 is not anticipated to increase or decrease interactions with protected resources including sea turtles, seabirds, or marine mammals, or impact non-target species because no changes in fishing effort or practices would be expected.

Alternative E2 would require the use of non-offset circle hooks in all segments of HMS recreational fisheries, for all species, whenever natural baits or natural bait/artificial lure combinations are used, beginning on January 1, 2007. This includes HMS Angling category permitted vessels, Charter/Headboat permitted vessels when on a for-hire trip or fishing recreationally, and all General category permitted vessels participating in registered HMS tournaments. Circle hooks are defined in 50 CFR §635.2 as "a fishing hook originally designed and manufactured so that the point is turned perpendicularly back to the shank to form a generally circular, or oval, shape." Natural bait/artificial lure combinations would include, but would not be limited to, rigs such as natural baits used in combination with artificial hoods, heads, and/or skirts. This alternative could reduce the overall mortality rates of Atlantic white marlin, blue marlin, sailfish, and other species with which HMS fishermen interact by reducing post-release mortality rates. Alternative E2 would allow the use of J-hooks with artificial lures. NMFS received public comment during scoping, on the pre-draft document, and on the Draft Consolidated HMS FMP, that fishermen tend to target white marlin and sailfish with natural baits while either drifting or slow trolling and target blue marlin by trolling at a higher rate of speed with the fish striking at the lure. Because of these fishing practices and feeding habits, it is believed that blue marlin have less opportunity to deeply ingest baits, therefore resulting in a higher proportion of hook-ups in the mouth with less damage to vital tissues and lower rates of post-release mortality. In a study evaluating pop-up satellite tags for estimating post-release survival of blue marlin from a recreational fishery, Graves *et al.*, (2001) mouth hooked seven of nine blue marlin tagged by trolling at high speed using high speed lures or skirted dead baits with J-hooks. The remaining two fish were foul hooked. Commenters also strongly suggested that given the feeding habits of blue marlin, mandating circle hooks on artificial lures would significantly reduce the viability of trolling for blue marlin. Given the relatively low post-release mortality rate of recreationally released Atlantic blue marlin (approximately 11 percent) and substantial public comment requesting continued use of J-hooks for targeting Atlantic blue marlin, NMFS developed alternatives to allow the continued use of J-hooks with artificial lures.

Alternative E2 would likely provide positive ecological benefits for most, if not all HMS species with which recreational fishermen interact. This alternative would be expected to reduce mortality in the directed billfish fishery by reducing post-release mortality. There is mounting evidence that hook choice can significantly impact fishing mortality rates. In a review and analysis of 43 previous post-release circle hook studies, Cooke and Suski (2004) found that circle hooks resulted in lower fishing mortality than other types of hooks and that mortality was consistently higher for J-hook caught fish. Factors identified as affecting mortality of released fish included hooking depth, anatomical hooking location, bleeding, and ease of hook removal. Cooke and Suski (2004), Prince *et al.* (2002), and Horodsky and Graves (2005) found that J-hook caught fish were more likely to be deep hooked than circle hook caught fish, circle hooks were more likely to result in jaw hooking than J-hooks, and J-hooks were more likely to cause tissue trauma resulting in bleeding. The reduced occurrence of deep hooking associated with circle hooks as compared to J-hooks reduces the opportunity for damage to vital organs and excessive bleeding. Cooke and Suski (2004) found that, in general, hooking mortality rates were reduced by approximately 50 percent by using circle hooks relative to J-hooks. The authors attributed the mortality reduction associated with the use of circle hooks to the tendency of circle hooks to jaw-hook fish, resulting in shallow hooking depths. Cooke and Suski (2004) also recommend that management agencies implement circle hook requirements only in instances in which appropriate scientific data for similar species exists. Nevertheless, taken in aggregate, the available science indicates that hook type can have a significant effect on survival of released fish.

In another recently released study on circle hooks, J-hooks, and drop-back time, Prince *et al.*, (2006), evaluated the performance of non-offset circle hooks and a similarly sized J-hook used in the south Florida recreational live bait fishery for Atlantic sailfish. Sampling a total of 766 sailfish (392 caught on circle hooks; 374 caught on J-hooks), Prince *et al.* (2006) found that in terms of catch, hook locations, bleeding, and release condition, the traditionally-shaped circle hooks had the best performance with respect to conservation benefit for promotion of live release. Further, Prince *et al.* (2006) found that traditional circle hooks, those with curvature of the shank which allows for a generally circular or oval shape, as opposed to J-hooks that simply have the point of the hook turned back toward the shank and labeled circle hooks, performed well with drop back times of varying intervals. While the Prince *et al.* (2006) did not examine post-release mortality data, the findings of the study reinforce the findings of other studies that traditionally shaped circle hooks may contribute to reductions in post-release mortality rates of Atlantic billfish by improving hooking locations, reducing bleeding, and improving release condition. As stated in Prince *et al.*(2006); "The general conclusion to be drawn from both studies [Horodysky and Graves 2005 and Prince *et al.* 2006] is that non-offset circle hooks promote live release in dead bait troll fisheries targeting white marlin and sailfish and that J-hooks do not." The study further found comparable catch rates between circle and J-hooks, which is key to acceptance of circle hooks among anglers.

Also as previously discussed, Horodysky and Graves (2005) identified a post-release mortality rate of 35 percent (range 15 – 59 percent) for recreationally caught Atlantic white marlin when J-hooks were used. During this study, 7 of 20 white marlin caught on J-hooks died, while none of the 20 white marlin caught on circle hooks died. It is not a reasonable assumption that all circle hook caught white marlin will survive the catch and release experience, in every instance. Based on data from the same study, Dr. John Graves (pers. comm.) indicated that the research team identified a post-release mortality rate of 0 - 12 percent for Atlantic white marlin caught on circle hooks based on use of a statistical model and 10,000 runs of the data. This provides an estimated post-release survival rate of 88 - 100 percent. Assuming a worst case scenario where 12 percent of all Atlantic white marlin caught on circle hooks die, this provides an overall net mortality benefit to the fishery of approximately 23 percent (35 percent J-hook post-release mortality estimate - 12 percent circle hook post-release mortality benefit) for circle hook caught white marlin over J-hook caught marlin. In a relative sense, J-hook mortality versus circle hook mortality, it provides a 65.7 percent reduction ($12_{\text{percent circle hook post-release mortality estimate}}/35_{\text{percent J-hook post release mortality estimate}}$ = .343 percent). NMFS received public comments concerned that the Agency had drawn conclusion regarding the impacts of circle hooks on billfish based on the limited sample size in some studies, however, the research utilized in this document represents the best available science, including sample size and accurate replication of standard billfish angling methods.

Table 4.54 provides a retroactive estimate of the net mortality benefit for Atlantic white marlin of switching the entire recreational Atlantic white marlin fishery to circle hooks from J-hooks. In developing these estimates, NMFS applied the median post-release mortality rate of 35 percent (range 15 – 59 percent) for Atlantic white marlin caught recreationally on J-hooks against the upper bound post-release mortality estimate for Atlantic white marlin caught on circle hooks of 12 percent, as identified by Horodysky and Graves through modeling. NMFS received comment that a more statistically appropriate comparison would be to compare "central tendencies" of the post-release mortality estimates derived for J-hook and circle hook post-release mortality, *e.g.* the 35 percent estimate for J-hook mortality and 0 percent for circle hook mortality. However, for purposes of analysis in this Final Consolidated HMS FMP, NMFS believes that comparison of the median or central tendency, 35 percent value and the upper bounds of the circle hook post-release mortality estimates are appropriate for the reasons discussed below. NMFS agrees that the median 35 percent estimate developed for J-hook caught fish is most appropriate to use in developing estimates of post-release mortality of Atlantic white marlin in the fishery. For circle hooks, the observed rate mortality rate was 0. However, it is not realistic to assume that every fish will survive the catch and release experience when circle hooks are used, despite the observed rate of 0 during the study. Through statistical modeling, the researchers developed an upper estimate of 12 percent post-release mortality. The "central tendency" estimate generated from the modeling was zero. Given the fact that some fish caught and released on circle hooks will die, NMFS believes that, for purposes of analysis, it is appropriate to use the more biologically precautionary 12 percent estimate figure in combination with the 35 percent estimate for J-hook caught fish. NMFS will continue to refine its mortality estimates as new data become available.

In applying the circle hook mortality benefit to previous release estimates, the estimated mortality benefit (fish conserved) for white marlin ranged from 141 to 508 fish using RBS data, 78 to 2,589 fish using MRFSS data, and 36 to 1,292 fish using LPS data. Under alternative E2, NMFS estimates that approximately 88 percent of future released white marlin would survive as a result of being caught on circle hooks. Averaging the annual mortality reduction benefits identified in Table 4.54, NMFS estimates that alternative E2 could result in the annual savings of approximately 303 (range: 141 – 508) Atlantic white marlin according to RBS data, 1,297 (range: 78 – 2,589) white marlin based on MRFSS data, and 607 (range: 36 – 1,292) white marlin using LPS data, when compared to continuing use of J-hooks throughout the fishery (alternative E1). Again, estimates are based on the assumption that all or nearly all white marlin are currently caught on J-hooks. Presently, NMFS cannot accurately estimate the proportion of anglers using J-hooks or circle hooks. Given that some unquantified subset of Atlantic white marlin is currently captured on circle hooks, the actual ecological benefits may be somewhat below these estimates. However, unquantified non-compliance with landings reporting requirements may have the opposite effect and the actual ecological benefits may be somewhat above these estimates. Some limited but unquantified proportion of white marlin may become tail-wrapped and suffocate, suffer predation from sharks, or be caught on J-hook rigged artificial lures, which could also reduce post-release benefits. Tail-wrapping and predation occur in association with J-hook caught fish also.

The ecological benefits ultimately derived from circle hooks are somewhat dependent upon angler behavior and fishing techniques. Variables include decisions by the angler to retain a fish caught on a circle hook, off-setting hooks, or allowing circle hooks to be deeply ingested, all of which can influence mortality benefits associated with circle hooks. The use of offset hooks appears to be a key variable influencing mortality levels associated with circle hooks. Prince *et al.* (2002) found that highly offset (15 degrees or greater) hooks were associated with deep hooking, whereas minor (four degrees or less) and non-offset hooks were typically associated with jaw hooking. Overall, Prince *et al*. (2006) found highly offset hooks were approximately three times more likely to result in deep hooking for sailfish. Another variable that likely impacts survival is drop-back time, depending on hook type. When "dropping back", an angler free spools the bait, allowing the fish to deeply ingest the hook prior to setting it. As previously discussed, Prince et al. (2006) found that traditionally shaped circle hooks performed well (meaning they had a low rate of hooking in undesirable locations) under drop-backs of differing periods of time. The study showed that J-hooks and non-traditional circle hooks had elevated rates of undesirable hooking locations associated with drop-back relative to traditionally shaped circle hooks. Drop-back practice may result in higher rates of deep hooking and likely to higher rates of damage to internal organs when used with J-hooks and non-traditional circle hooks.

**Table 4.54 White Marlin Estimated Net Circle Hook Mortality Benefit in Numbers of Fish.** Source: RBS, MRFSS, LPS

| | RBS | | | | MRFSS | | | | LPS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | Live Releases | Estimated J-Hook Post-Release Mortalities | Estimated Circle Hook Post-Release Mortalities | Estimated Net Circle Hook Benefit | Live Releases | Estimated J-Hook Post-Release Mortalities | Estimated Circle Hook Post-Release Mortalities | Estimated Net Circle Hook Benefit | Live Releases | Estimated J-Hook Post-Release Mortalities | Estimated Circle Hook Post-Release Mortalities | Estimated Net Circle Hook Benefit |
| **1999** | 1,456 | 510 | 175 | 335 | 3,475* | 1,216 | 417* | 799 | 156 | 55 | 19 | 36 |
| **2000** | 975 | 341 | 117 | 224 | 7,069 | 2,474 | 848 | 1,626 | 705 | 247 | 85 | 162 |
| **2001** | 1,306 | 457 | 157 | 300 | 11,255 | 3,939 | 1,351 | 2,589 | 703 | 246 | 84 | 162 |
| **2002** | 2,207 | 773 | 265 | 508 | 4,633* | 1,622 | 556* | 1,066 | 5,616 | 1,966 | 674 | 1,292 |
| **2003** | 614 | 215 | 74 | 141 | 339* | 119 | 41* | 78 | 3,069 | 1,074 | 368 | 706 |
| **2004** | 1,349 | 472 | 162 | 310 | 7,060* | 2,471 | 847 | 1,624 | 5,573 | 1,951 | 669 | 1,282 |

* Partial data available this data field.

As mentioned above, alternative E2 would likely result in positive ecological benefits for most, if not all, HMS species with which recreational fishermen interact. Cooke and Suski (2004) found circle hooks to be broadly beneficial in reducing mortality and/or improving hooking location when compared to J-hooks. As discussed, hooking location is a key variable in post-release mortality. Additional studies examined during this analysis reinforce these conclusions, specifically for HMS, including Atlantic white marlin (Horodysky and Graves, 2005), sailfish (Prince *et. al*., 2002), and bluefin tuna (Skomal *et*. *al*., 2002).

NMFS received substantial public comment opposing and supporting circle hook requirements, as proposed under draft alternatives E2 and E3, for a number of reasons. A prevalent theme contained in comments opposing mandatory circle hook use, in all or portions of the HMS and billfish recreational fisheries, was that the recreational sector has a minor impact on Atlantic billfish populations relative to the commercial pelagic longline fleet. From an international perspective, data reported to ICCAT indicate that commercial fishing activities are responsible for the majority of Atlantic billfish mortality (Kerstetter, 2006). However, given the relatively small size of the U.S. domestic pelagic longline fleet and the considerable size of the recreational fishing fleet (discussed in detail below), NMFS determined that it was appropriate to examine the issue of pelagic longline versus recreational mortality contributions from the domestic perspective.

To further explore this issue, NMFS examined data from the pelagic longline logbook program and the RBS, MRFSS, and LPS databases. Utilizing new information on recreational and commercial post-release mortality rates (Horodysky, 2005, and Kerstetter, 2006, respectively), an examination of the data by NMFS indicates that, in some years, the total mortality contribution of the domestic recreational billfish fishery may equal or exceed the total mortality contribution of the domestic pelagic longline fleet with regard to Atlantic white marlin. As seen in Appendix C, estimates of total annual recreational white marlin mortality, which combines landings, dead discarded fish, and estimated post-release mortalities of white marlin released alive, vary greatly by data set and year. MRFSS and LPS databases indicate that for the period 2001 – 2004, inclusive, the aggregate level of recreational mortality was approximately three and two times higher, respectively, than the aggregate mortality contribution (dead discards and estimated post-release mortality) of the domestic pelagic longline fleet with regard to Atlantic white marlin. Using RBS data, a known subset of recreational effort and landings, estimated aggregate recreational white marlin mortality appears to be about 71 percent of estimated total domestic pelagic longline white marlin mortality (based on logbook data) for the same period. When taken in combination, and allowing for the limitations and uncertainty associated with each database involved, two conclusions can be drawn; 1) the aggregate recreational fishing mortality contribution is higher than previously thought with regard to Atlantic white marlin and 2) there is more parity between the mortality contributions of the domestic recreational and domestic pelagic longline fleet than previously thought. Cramer (2005) and Kerstetter (2006) examined this same issue to varying degrees. Both papers support the same basic finding drawn in this Final Consolidated HMS FMP, that in some years the domestic recreational billfish fishery may impose equivalent or even greater levels of mortality on Atlantic white marlin populations than the domestic pelagic longline fishery.

Under initial examination, it appears that this may primarily be the result of the size differential between the two fisheries. As of February 1, 2006, there were 25,238 HMS Angling category permit holders and 4,173 HMS Charter/Headboat category permit holders able to legally pursue Atlantic billfish. An additional 4,824 General category permit holders can legally pursue Atlantic marlin while participating in registered HMS tournaments. Further, NMFS believes that the number of HMS Angling category permit holders, and perhaps CHB category permit holders, are lower than the actual number of vessels participating in the fishery *(i.e.* some unpermitted vessel may be illegally participating in the fishery). In contrast, as of February 1, 2006, the total number of vessels that could potentially participate in the pelagic longline fishery for HMS was 277, given the limited access permit system in place. The number of active pelagic longline vessels participating in HMS fisheries in 2004 was just 116, and fell to 110 in 2005. NMFS will continue to examine this issue as additional data become available. This data reinforces NMFS preferred alternative that it is appropriate to implement circle hook requirements in some segments of the recreational fishery, at this time, to reduce post-release mortality associated with the directed billfish fishery.

A second important theme in comments opposing mandatory circle hook use under alternatives E2 and E3 was the need for NMFS to promulgate more detailed specifications for circle hooks. Current regulations provide a definition of a circle hook: A circle hook means a fishing hook originally designed and manufactured so that the point of the hook is turned perpendicularly back toward the shank to form a generally circular or oval shape. Currently, there are no industry standards with regard to circle hook specifications, including size, degree of circularity, gap width, wire gauge, or other measurements. As such, NMFS is unable to provide an index of detailed hook specifications for each size circle hook that could be used in the recreational billfish fishery, at this time. NMFS is continuing to work on a more refined hook definition for the future. However, as per preferred alternative E3, NMFS finds that it is appropriate to require the use of circle hooks in portions of the recreational billfish fishery at this time in an effort to reduce post-release mortalities in the recreational billfish fishery.

Declines in post-release mortality of any overfished HMS stock would result in positive ecological benefits. Positive ecological gains (*i.e.*, reducing fishing mortality rates) would be relevant to considerations in the anticipated 2007 ESA Status Listing Review for Atlantic white marlin. As shown in Table 4.54, alternative E2 could decrease Atlantic white marlin mortalities by between 303 to 1,297 fish annually, on average, assuming no significant changes in effort or angler behavior, and exclusive use of natural bait/circle hook combinations. NMFS does not expect any significant changes in effort or angler behavior, but acknowledges that not all anglers will always use circle hooks and natural baits when J-hooks with artificial lures remain an option. Given these assumptions, the potential ecological benefits could be somewhat below the numbers stated above. However, given data limitations on recreational catches and releases, the actual number of releases may be higher than those that are presented in the tables above, thereby resulting in a larger ecological benefit than identified above. The overall ecological impact of alternative E2 would be positive, but limited, given the relatively small contribution of U.S. anglers to total Atlantic-wide mortality. As such, alternative E2 would likely reduce the current Atlantic-wide fishing mortality rates for both blue or white marlin to some degree, but would not be capable of decreasing the Atlantic-wide fishing mortality rate to $F_{msy}$. While the benefits of requiring circle hooks are loosely quantifiable for Atlantic white marlin, the benefits remain unquantifiable at this time for other species. As mentioned, Skomal *et al.* (2002) noted improved hooking location associated with circle hooks, which as discussed, may contribute to a reduced post-release mortality of bluefin tuna as compared to J-hooks. Still, there are relatively few data available on the efficacy and impacts of using circle or J-hooks on sharks, other tunas, and swordfish, which could be used to quantify impacts on these species.

Alterative E2 would likely have limited positive ecological benefits for blue marlin given fishing techniques for, and feeding behavior of, this species. As previously discussed, blue marlin are typically targeted by trolling lures or rigged natural baits at high speed. As a result, blue marlin are often mouth or foul hooked, as they aggressively strike and bat at the lures. As a result, many anglers would likely make use of an artificial lure rigged with a J-hook when fishing for blue marlin to improve the odds of success. This would be allowable under alternative E2. Potential ecological benefits derived from the use of circle hooks stemming from improved hooking location and reduced tissue damage may be undermined by angler actions including offsetting hooks, or using non-traditional circle hooks which may lead to higher rates of deep hooking and internal injury. Furthermore, as previously discussed, while Cooke and Suski (2004) suggest that overall post-release mortality rates are often lower when using circle hooks compared to J-hooks they also recommend that management agencies implement circle hook requirements only in instances in which appropriate scientific data exists for similar species.

Alternative E2 would not be expected to increase interactions with protected resources. NMFS has little or no data showing interactions between the directed Atlantic billfish fishery and protected species. NMFS' HMS Management Division has received one anecdotal report of such an interaction since late 2002. Thus, interactions between the directed Atlantic billfish fishery and protected species appear to be extremely rare. However, this alternative may contribute to a reduction of interactions as well as the mortality rates associated with any such interactions that may occur based on the hooking mechanics, improved hooking location, and decreased damage of vital tissues generally associated with the use of circle hooks.

Alternative E3, a preferred alternative, would require the use of non-offset circle hooks by anglers fishing from HMS permitted vessels and participating in an Atlantic billfish tournament whenever natural baits or natural bait/artificial lure combinations are deployed, effective January 1, 2007. Any tournament as defined under 50 CFR §635.2 that has an award category, or awards points or prizes for Atlantic billfish is considered a billfish tournament. Natural bait/artificial lure combinations would include, but are not limited to, rigs such as natural baits used in combination with artificial hoods, heads, and/or skirts. This alternative would allow the use of J-hooks with artificial lures in tournaments for the reasons discussed under alternative E2.

As noted in Chapter 2, NMFS has made a slight technical adjustment to the phrasing of alternative E3 in this Final Consolidated HMS FMP. NMFS received public comment expressing concern that HMS circle hook requirements may apply to all tournament participants, even non-HMS fishermen participating in large tournaments that may have award categories for species other than HMS. NMFS appreciates this concern and has refined the phrasing of the alternative to more accurately reflect the intent of this alternative. NMFS did not intend, nor mean to imply, that regulations governing 50 CFR part 635 would apply to fisheries under the jurisdiction of the Regional Councils. It should be noted that NMFS analyzed this alternative from the perspective of applying circle hook requirements to HMS-permitted vessels in billfish tournaments, and as such, the change in phrasing of the alternative has no impact on the analyses conducted herein. To reiterate, circle hook requirements implemented via this rulemaking would apply to Atlantic HMS permitted vessels, and vessels that should possess HMS permits, participating in Atlantic billfish tournaments and deploying natural baits or natural bait/artificial lure combinations.

The ecological impacts of alternative E3 would be similar to those identified under alternative E2, but would be somewhat reduced in scope. This alternative would reduce mortality in the directed billfish fishery by reducing post-release mortality. Under alternative E3, post-release mortality benefits would be primarily realized in the billfish tournament segment of the recreational fishery, but may also be realized outside of tournaments as anglers become comfortable and proficient with circle hooks and potentially increase their use voluntarily outside of tournaments. Voluntary use of circle hooks outside of tournaments may increase as a result of anglers wanting to maximize fishing experience with circle hooks to increase their expertise with the type of hooks that would be mandated in tournaments where they can win money. Further, many tournament anglers are viewed as leaders in the billfishing community and as they increase their use of circle hooks, non-tournament anglers may follow suit and increase their use as well. As such, based on RBS release data, this alternative would likely result in a decrease of white marlin post-release mortalities by approximately 23 percent over all, resulting in an estimated 303 (range: 141 – 508) fish released alive that would otherwise be expected to die, on average. There would likely be unquantified positive mortality benefits (decreased post-release mortality) for sailfish, blue marlin, tunas, sharks, and, to a lesser extent, swordfish as well other non-HMS species with which billfish tournament anglers interact (blackfin tuna, mahi-mahi, wahoo, etc.), resulting from improved hooking location and decreased damage to vital tissues. See alternative E1 and E2 for more complete discussions of the impacts of J-hooks and circle hooks on target and non-target species. The overall ecological impact of alternative E3 would be positive, but limited, given the relatively small contribution of U.S. anglers to total Atlantic-wide mortality. As such, alternative E3 would likely reduce, but not reverse current trends in Atlantic-wide fishing mortality rates for both blue or white marlin and possibly other species with which billfish tournament anglers interact. The United States will continue to encourage other ICCAT nations to implement circle hooks in their commercial and recreational fleets to reduce post-release mortality of billfish and other HMS. Based on the expectation that some anglers will continue to use J-hooks when targeting Atlantic blue marlin while participating in billfish tournaments, for the reasons described under alternative E2, the positive ecological benefits for blue marlin would likely be less than those anticipated for white marlin under alternative E3. As discussed under alternative E2, potential ecological benefits derived from the use of circle hooks may be undermined by angler actions including offsetting hooks, using non-traditionally shaped circle hooks (*i.e.* circle hooks in name only), and possibly increasing drop-back time.

NMFS received substantial comment supporting and opposing implementation of this preferred alternative. A prevalent theme contained in comments opposing mandatory circle hook use, in all or portions of the HMS and billfish recreational fisheries, was that the recreational sector has a minor impact on billfish populations relative to the commercial pelagic longline fleet. As discussed more fully in the analysis for alternative E2, data reported to ICCAT indicate that commercial fishing activities are responsible for the majority of Atlantic billfish mortality, from an international perspective (Kerstetter, 2006). However, from a domestic perspective a review of the data and two recent studies indicate that, in some years, the total mortality contribution of the domestic recreational billfish fishery may equal or exceed the total mortality contribution of the domestic pelagic longline fishery with regard to Atlantic white marlin. Please see the discussion of this issue under alternative E2 for additional details. These conclusions reinforce the appropriateness of implementing the preferred alternative to implement certain circle hook requirements in billfish tournaments to reduce recreationally induced fishing mortality.

Other comments opposing alternative E3 included suggestions that circle hook use should remain voluntary, that NMFS should allow J-hooks to be used for pursuing Atlantic blue marlin, that mandatory circle hook use in tournaments is not enforceable, and that mandatory circle hook use in tournaments may have large adverse economic impacts. Circle hook use has always been voluntary, and yet significant portions of the fishery continue to use J-hooks. Further, NMFS has actively been encouraging the use of circle hooks in HMS Fisheries since 1999. While there has been some progress in sectors of the fishery, anecdotal evidence suggests that substantial portions of the recreational fishery continue using J-hooks as the standard hook. Based on public comment from scoping and the Draft Consolidated HMS FMP, as well as an examination of post-release mortality data of blue marlin caught on J-hooks, this preferred alternative would allow anglers on HMS permitted vessels in billfish tournaments to continue to use J-hooks with artificial lures. This was clearly stated in the Draft Consolidated HMS FMP. NMFS believes that circle hook requirements in tournaments are enforceable, and public comment received during this rulemaking supports this. In addition to future agency efforts to enforce circle hooks, and the increasing use of tournament observers, NMFS believes that the conservation ethic of billfish anglers and the vested financial interests of billfish tournament participants in ensuring that all tournament participants compete fairly under the same rules and conditions, would result in significant self-enforcement of tournament circle hook requirements. NMFS has not seen evidence that participation in the fishery would decrease as a result of circle hook use or result in economic losses given that all tournaments would operate under the same set of regulations. Importantly, circle hooks have been shown to increase catch rates of some billfish species (Prince *et al.*, 2002), and are, on average, slightly less expensive than J-hooks. Many comments from both sides of the debate stated that circle hooks are effective at reducing mortality of Atlantic billfish. With the substantial conservation benefit associated with the use of circle hooks, recent information suggesting that the post-release mortality rate of Atlantic white marlin caught recreationally on J-hooks is substantially higher than previous estimates, data indicating that the mortality contribution of the recreational community toward Atlantic marlin may equal or exceed that of the domestic pelagic longline fishery in some years (see the discussion of alternative E2 for additional information), and the fact that circle hook requirements are already in place in the pelagic longline fishery, NMFS believes that mandatory circle use is an appropriate management action to implement at this time. Further, this alternative would strike an appropriate balance between achieving conservation goals and allowing the fishery to continue with a minimum of impacts or disruption.

Alternative E3 would not be expected to increase interactions with protected resources. NMFS has little or no data showing interactions between the directed Atlantic billfish fishery and protected species. NMFS' HMS Management Division has received one anecdotal report of such an interaction since late 2002**.** However, this alternative may contribute to a reduction of interactions as well potential mortalities associated with any such interactions based on the hooking mechanics, improved hooking location, and decreased damage of vital tissues generally associated with the use of circle hooks.

Alternative E4(a) would increase the minimum legal size for Atlantic white marlin to a specific size between 68 and 71 inches LJFL (172 – 180 cm) to reduce white marlin landings and the mortalities resulting from such landings. The current minimum size for white marlin is 66 inches LJFL (167 cm) and has been in place since 1998 (63 FR 14030). The aforementioned range was selected for analysis because, within a relatively small range of minimum sizes, potentially significant reductions in landings (25 – 82 percent) may be attained (Table 4.55). The minimum sizes analyzed represent the upper and lower limits of the sizes analyzed and do not represent a “slot limit” for white marlin. If E4(a) were preferred, a new specific minimum size would be implemented from within the range analyzed based on public comment, potential reductions in landings, the need to comply with ICCAT landing limitations, and other relevant factors. This alternative may also improve the likelihood of consistency with the ICCAT recreational marlin landings limit. In addition, management measures implemented prior to the 2007 ESA status review for white marlin, such as increasing the minimum size to reduce landings, would be relevant considerations during the deliberations of the status review team when they convene.

Alternative E4(b) would increase the minimum size for blue marlin to a specific size between 103 and 106 inches LJFL (261 – 269 cm) to reduce blue marlin landings and mortalities resulting from landings. The current minimum size for blue marlin is 99 inches LJFL (251 cm) and has been in place since 1998 (63 FR 14030). This range was selected for analysis because within this relatively small range of minimum sizes, significant reductions in landings (16-36 percent) could potentially be achieved (Table 4.55). The minimum sizes analyzed represent the upper and lower limits of the sizes analyzed and do not represent a “slot limit” for blue marlin. If E4(b) were to be implemented, a new specific minimum size would be implemented from within the range analyzed based on public comment, the potential reductions in fishing mortality given the overfished status of this species, the need to comply with ICCAT landing limitations, and other relevant factors. This alternative may improve the likelihood of consistency with the ICCAT recreational marlin landings limit.

Alternatives E4(a) and E4(b) would both likely have limited positive ecological impacts because increasing the minimum size would be expected to decrease landings by decreasing the pool of legal sized fish available for landing. The extent of these benefits would be dependent on fishing effort remaining relatively constant relative to current levels, as well as a continuation of the widespread practice of catch and release fishing for Atlantic billfish. In addition to potentially limiting known mortalities via reducing the number of fish landed, increasing the minimum sizes would also ensure that a larger proportion of the billfish population attain sexual maturity and that larger, more fecund, individuals retain the opportunity to spawn.

NMFS received public comments indicating both support and opposition to increasing the minimum size for blue and white marlin based on the rationale of allowing more white and blue marlin to reach sexual maturity, including, increasing the minimum size will force fishermen to target larger, more fecund females and that the Agency should consider a slot limit to protect these larger, more fecund, marlin. Generally speaking, the likelihood of landing a larger, more fecund female may increase by increasing the minimum size for blue marlin. For white marlin, however, there does not seem to be as strong of a correlation between length and age or fecundity as white marlin will first put on length, and then weight. Weight is generally an indicator of fecundity. However, most billfish fishermen tend to be opportunistic because the fisheries for blue and white marlin are characterized by extremely low catch per unit effort (CPUE) rates. These range from between 1.03 and 1.05 fish caught per hundred angler hours for white and blue marlin, respectively. Furthermore, most billfish caught are released. Tournament data between 1999 - 2004 indicate that, on average, only 8.1 and 1.8 percent of blue and white marlin, respectively, were landed. Increasing the minimum size would not likely result in fishermen targeting larger, more fecund females because of the opportunistic nature of this fishery and the fact that fishermen do not necessarily apply different techniques or attempt to "target" large versus small billfish.

NMFS received a comment asking what data were used to determine billfish size limits. These minimum sizes were selected to reduce the number of billfish that could be landed and to allow for female billfish to be protected from exploitation until after they have spawned. Furthermore, for blue and white marlin these minimum sizes were selected to achieve compliance with an ICCAT recommendation (97-09) adopted in 1997, requiring contracting parties to reduce billfish landings by at least 25 percent by 1999. Size distributions from Atlantic billfish tournaments held from 1995-1997 were used to analyze minimum size alternatives contained in the 1999 HMS FMP and to determine which minimum size corresponded with a 25 percent reduction in landings. NMFS wanted to implement a minimum size that allowed blue and white marlin to achieve the size and first maturity before potentially being removed from the population. It is estimated that the sizes at first maturity are approximately 89–90" LJFL for blue marlin and approximately 52" LJFL for white marlin, which are well below the current minimum sizes. RBS landings data for the period 1999 – 2004 was used for the size analysis contained in this document. Increasing the minimum size is not anticipated to have an effect on post- hooking mortality of released fish because the relationship between the size of a released fish and mortality is not known.

Table 4.55 shows the number of fish landed and cumulative proportion of total landings, providing potential landings reductions for each size with the corresponding ranges for blue and white marlin. Each minimum size within the range would provide unique reductions in landings and conservation benefits. Positive ecological impacts resulting from decreased landings of blue and white marlin increase as the minimum size is increased within the range analyzed. The actual reduction in landings and known mortalities would be dependent on the specific minimum size selected, and future fishing effort. Figure 4.21 and Figure 4.22 show the overall number of tournament landings, by size (inches, LJFL), for blue and white marlin for the years 1999 - 2004 combined.

Between 1999 and 2004, RBS data indicate that there were an average of 92 and 21 blue and white marlin that were landed above the current minimum sizes each year in tournaments, respectively. Under this alternative, the proposed minimum size increases of 68 - 71" LJFL and 103 - 106" for white and blue marlin, respectively, could potentially reduce landings by 25 - 67 percent for white marlin and 16 - 27 percent for blue marlin relative to current minimum sizes, based on historical data. This equates to approximately 15 - 25 blue marlin per year, on average, that might not be landed, should the Agency implement a legal minimum size between 103 - 106" LJFL. Further, under this alternative, a minimum size of 68 - 71" LJFL for white marlin could reduce landings by 6 - 14 fish during an average year. Landings in tournaments make up the majority of landings that are reported to ICCAT in compliance with Recommendation 00-13. In 2004, all but 3 of the 149 billfish reported to ICCAT were landed in tournaments. Some tournaments have a minimum size that is greater than the minimum size required by NMFS and do not allow the landing of billfish under a certain size that has already been landed in that tournament.

**Table 4.55 Cumulative number of white and blue marlin landed below each minimum size in tournaments from 1999-2004 between the current minimum size for blue (99") and white (66") marlin and the potential increased minimum sizes indicated. A minimum size would be selected between 68-71 inches for WHM and 103-106 for BUM.** Source: NMFS RBS Database.

| **Blue Marlin** | | | **White Marlin** | | |
|---|---|---|---|---|---|
| Length (inches, LJFL) | Number of Fish < LJFL (cumulative total greater) | Cumulative % of Landings < or = LJFL | Length (Inches, LJFL) | Number of Fish < LJFL (cumulative total number greater) | Cumulative % of Landings < or = LJFL |
| 103 | 88 | 16 | 68 | 31 | 25 |
| 104 | 124 | 22.5 | 69 | 75 | 61 |
| 105 | 149 | 27 | 70 | 82 | 67 |
| 106 | 203 | 36 | 71 | 100 | 82 |

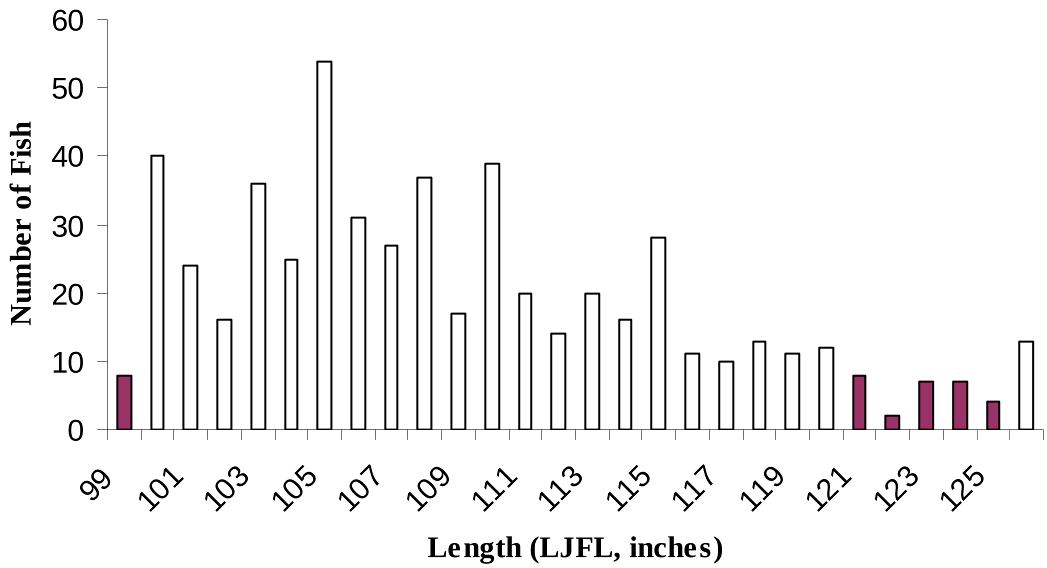



**Figure 4.21 Number of blue marlin landed in tournaments between 1999-2004 by size (inches, LJFL).** Source: NMFS RBS database.

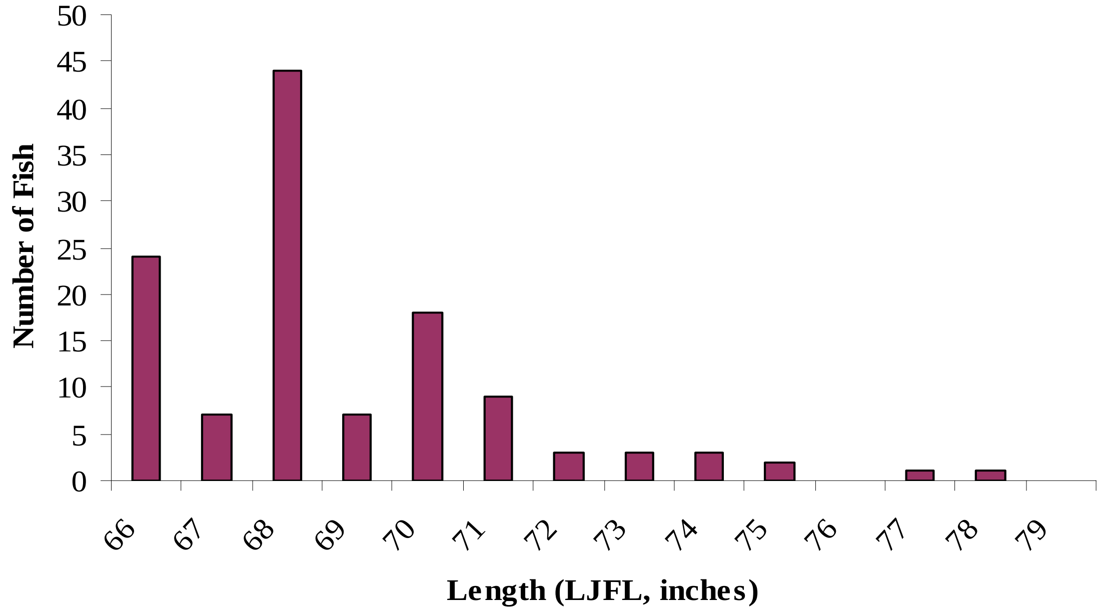



**Figure 4.22 Number of white marlin landed in tournaments between 1999-2004 by length (inches, LJFL).** Source: NMFS RBS Database.

Catch per unit effort (CPUE) data for blue and white marlin indicate that interactions with these species are a relatively rare event, ranging from 0.5 - 1.7 interactions per 100 hours of fishing between 1999 and 2004, as shown in Table 4.56. Mean CPUE per 100 hours for blue and white marlin during this time period were 1.05 and 1.03, respectively. The conservation benefits of a larger minimum size would be dependent, in part, on fishing effort and practices remaining relatively constant. If fishing effort were to increase significantly, the number of landings could also increase, despite increases to the minimum size. Interactions would likely also increase with increased effort, which would likely increase the number of post-release mortalities of billfish and other species.

**Table 4.56 Catch per unit effort and numbers of blue and white marlin kept and released 1999-2004.** Source: Billfish Tournament Database, Southeast Fisheries Science Center.

| Year | Blue Marlin | | | White Marlin | | | Sailfish | | |
|---|---|---|---|---|---|---|---|---|---|
| | Kept | Released Alive | CPUE/ 100 hours | Kept | Released Alive | CPUE/ 100 hours | Kept | Released Alive | CPUE/ 100 hours |
| **1999** | 172 | 1527 | 1.4 | 36 | 1456 | 1.3 | 30 | 1907 | 1.6 |
| **2000** | 117 | 1467 | 1.1 | 8 | 975 | 0.7 | 18 | 2198 | 1.5 |
| **2001** | 75 | 1038 | 0.9 | 22 | 1306 | 1.0 | 11 | 3073 | 2.4 |
| **2002** | 84 | 1132 | 0.9 | 33 | 2207 | 1.7 | 14 | 3117 | 2.3 |
| **2003** | 96 | 1133 | 0.9 | 20 | 614 | 0.5 | 24 | 4171 | 3.0 |
| **2004** | 110 | 1538 | 1.1 | 25 | 1349 | 1.0 | 9 | 4467 | 3.2 |

Alternatives E4a and E4b are aimed at reducing landings and mortalities that result from landings for billfish, however, fishing mortality of released fish would continue to occur as a result of physical stress and fatigue, hook induced trauma, and physical damage to the gills, esophagus, and/or stomach even if a fish is not landed. Mortality reductions associated with these alternatives would likely be limited, based on the relatively small decrease in the number of fish landed as a result of an increased minimum size as well as the continuation of post-release mortalities. As discussed under alternative E1, minimum sizes do not directly impact the level of post-release mortality. Given the post-release mortality benefits of circle hooks, circle hook requirements (alternative E2 or E3) in combination with this alternative could increase the ecological benefits by reducing post-release mortalities and landings. In an attempt to reduce post hooking mortality of all billfish, NMFS is selecting alternative E3, limiting all HMS permitted anglers to the use of circle hooks when using live bait and participating in tournaments that have a prize category for billfish, as a preferred alternative. For a more detailed discussion of the merits of circle hook use compared to J hooks, see alternatives E1 through E3 above.

While NMFS cannot predict angler behavior, under alternatives E4a and E4b, anglers may choose to reduce effort if they believe that they would be unable to land a marlin given increased minimum sizes. This could result in unquantified positive ecological impacts for Atlantic billfish, other HMS, and non-HMS species with which recreational billfish fishermen interact. These potential impacts would be dependent upon significant shifts in fishing effort to other non-billfish species. If billfish effort were shifted to other species, this reaction could have negative ecological impacts on tunas, swordfish, sailfish, spearfish, sharks, and other species typically interacted with, or targeted by Atlantic billfish fishermen if effort shifts to other fisheries. As mentioned, it is not possible to predict angler response to increased minimum sizes, so the effects are uncertain. This alternative is not anticipated to increase interactions with protected species.

NMFS received several comments in support of increasing the minimum size for blue and white marlin for a variety of reasons, including: compliance with the ICCAT 250 fish limit; reducing the number of billfish that are landed on an annual basis to minimize fishing mortality on these overfished stocks; and, allowing larger more fecund billfish to spawn again by having a larger minimum size in place. NMFS acknowledges that, based on the number of marlin reported as landed to the Agency, the United States is regularly and substantially below the annual ICCAT marlin landings limit and that allowing more fecund fish (generally older, larger, and heavier fish) to spawn may benefit the populations. Nevertheless, there is a limited conservation benefit associated with this alternative given the current small number of landings that are reported on an annual basis. Furthermore, alternative E6, a preferred alternative, would implement an increase in the minimum size and possibly implement catch and release marlin fishing, as necessary, to maintain compliance with the ICCAT landings limit.

NMFS also received numerous comments opposing an increase in the minimum size for blue and white marlin. General themes contained within these comments included: many tournaments already have minimum sizes larger than the current legal minimum size; white marlin weight and length are not closely correlated for fish above 62" LJFL; circle hook requirements will provide equal or greater ecological benefit than an increased minimum size, and the fact that the United States is substantially below the ICCAT marlin landings limit on a regular basis.

These alternatives were not preferred in the Draft Consolidated HMS FMP, and no new information has been received to alter the Agency's previous decision. As such, the Agency does not prefer alternatives E4(a) and E4(b) in the Final Consolidated HMS FMP, at this time. Other alternatives analyzed in this Final Consolidated HMS FMP would likely achieve the objectives of the rulemaking, however, the Agency may consider minimum size increases in future rulemakings, as necessary and appropriate.

Alternative E5 would implement a recreational bag limit of one Atlantic billfish per vessel per trip. No more than one Atlantic billfish would be allowed to be possessed, retained, or landed on, or by, a vessel regardless of the length of the trip. Alternative E5 would likely have minimal positive ecological impacts. As discussed in the analysis for alternative E4, billfish fisheries have some of the lowest CPUE estimates of any recreational fishery. In 2003, there were 149,412 tournament hours of fishing resulting in 7,926 billfish being caught, or 0.024 billfish caught per angling hour. Fisher and Ditton (1992) found that billfish anglers reported an average of 13 trips/year, ranging from 8.7 - 17.3 depending on the region. On average, each angler landed less than one (0.7) billfish per year, or approximately 1 billfish every 1.4 years. Data collected during the same survey found that only 11 percent of billfish caught during respondents' last tournament were landed (Fisher and Ditton, 1992). NMFS is aware that some anglers continue to land multiple billfish on a single trip, however the Agency has little data on how frequently this occurs. Anecdotal information suggests that this is a rarity for marlins, and may occur more frequently with sailfish. In the 2005 calendar year, there were four fishing trips, as reported to NMFS, that were known to have landed more than a single sailfish. Based on the overall rarity of catching an Atlantic billfish that meets the minimum size requirements, implementing a bag limit of one fish per vessel per trip would have minimal ecological benefits. However, alternative E5 would provide additional protection to these species, which are considered overfished with overfishing still occurring. As with alternative E4, efforts to reduce billfish landings should be considered concurrently with other alternatives that may reduce the post-hooking mortality of billfish via the use of alternatives to J-hooks that reduce the risk of hooks becoming deeply ingested by billfish (alternatives E2 and E3). If anglers shifted effort to other non-billfish species as a result of the implementation of a bag limit, it could adversely impact these species to some unquantifiable extent.

Sailfish are often found closer to shore and travel in schools during winter months. Therefore, the likelihood of anglers catching multiple fish during excursions, especially in areas off the Florida Keys and Southeastern Florida, is increased. Trips landing multiple sailfish were reported to NMFS in 2005, as noted above, however, there are no reports outside of tournaments of vessels landing multiple Atlantic white or blue marlin during a single trip. Nevertheless, information obtained from a brief survey of internet websites (2005) indicates that billfish anglers have retained as many as nine billfish (sailfish) in a single trip. The CPUE for sailfish landed in tournaments between 1999 - 2004 ranged from 1.5 - 3.2 fish per 100 hours fishing, significantly greater than for blue or white marlin. Sailfish were determined to be overfished in 1998. The 2001 stock assessment for sailfish did not estimate MSY or the fishing mortality rate, so it is difficult to discern the exact status of sailfish at this time. Multiple ICCAT resolutions and recommendations advise that Contracting Parties should consider methods to reduce fishing mortality rates for Atlantic billfish. Implementation of a bag limit of one billfish per vessel per trip would be consistent with this objective by potentially reducing landings and mortalities of Atlantic billfish with attendant positive ecological impacts.

NMFS received comments in support of alternative E5 (bag limit of one billfish/vessel/day) stating that with strict landing limit under which the United States is operating (250 Atlantic blue and white marlin combined), that it would be inappropriate to let one boat come back with more than a single fish on any given day. Given that recent landings of Atlantic blue and white marlin have been substantially below the 250 marlin limit, this issue has not been identified as a major problem to date. However, should it become an issue, the Agency may revisit the issue of bag limits for this or any other appropriate reason. The Agency also received several comments opposing this alternative for various reasons, including that (in the words of commenters): it would encourage the culling of fish [thereby possibly increasing dead discards]; landing a few fish is not the issue; and, a bag limit will not reduce post-release mortality of billfish unless careful handling and release guidelines are followed.

Overall, implementing a bag limit of one Atlantic billfish per vessel per trip is not expected to have substantial positive ecological impacts because multi-billfish excursions, especially for blue and white marlin, are rare events. However, if a multi-fish trip did occur, a bag limit may prevent excessive landings on these exceptional excursions. Data suggest that because of the extremely low catch rates that characterize the billfish fishery, implementing a bag limit may have limited positive ecological impacts. Alternative E5, was not a preferred alternative in the Draft Consolidated HMS FMP, and no new information has been received to alter the Agency's previous decision. As such, NMFS does not prefer alternative E5 in the Final Consolidated HMS FMP, at this time. Other alternatives analyzed in the Consolidated HMS FMP would likely achieve the objectives of the rulemaking, however, the Agency may consider bag limits in future rulemakings, as necessary and appropriate.

Alternative E6, a preferred alternative, would allow NMFS to implement ICCAT recommendations pertaining to recreational marlin landing limits. Alternative E6 would establish an in-season adjustment framework to implement ICCAT marlin landing limits, allow for in-season changes to minimum sizes, and provide the Agency with the ability to shift the billfish fishery to catch and release only for Atlantic marlin, if necessary, to ensure compliance with ICCAT recommended landing limits. As noted earlier, the United States is currently limited to landing 250 recreationally caught Atlantic blue and white marlin, combined. This landing limit may change in the future as a result of future ICCAT recommendations.

As a contracting party to ICCAT, the United States negotiates with other contracting parties to agree upon binding, conservation and management recommendations. Domestically, the Atlantic Tunas Convention Act authorizes the promulgation of regulations as may be necessary and appropriate to implement binding recommendations adopted by ICCAT. This preferred alternative would directly implement ICCAT recommendation 00-13 and subsequent recommendations modifying 00-13.

To provide for maximum utilization of the U.S. recreational Atlantic marlin landing limit without exceeding it, this alternative would allow NMFS to increase the legal minimum size of blue and/or white marlin, as appropriate. The anticipated effect of an in-season minimum size increase would be to slow landings, if necessary, and thereby reduce the probability of having to shift to catch and release fishing only for Atlantic marlins. The ability to increase minimum size limits in-season is intended to minimize potential disruptions in the fishery, by avoiding more dramatic regulatory action requiring catch and release only fishing. Under this alternative, the size range that would be made available to NMFS for in-season management actions is from 117 to 138 inches for Atlantic blue marlin and 70 to 79 inches for Atlantic white marlin. These size ranges differ substantially from those analyzed under alternatives E4(a) and (b). The size ranges selected for analysis under this alternative were intended to ensure compliance with the ICCAT landing limit and would only be implemented if necessary, and once certain thresholds for action (discussed below) were reached. They were selected to minimize the potential for further in-season disruptions to the fishery, such as a requirement to shift to catch and release only fishing. The potential legal minimum size ranges under alternatives E4(a) and (b) were analyzed for general year round implementation as a means to reduce overall landings and mortalities.

The need for action and the specific minimum size temporarily implemented would be based upon a review of landings, time remaining until conclusion of the current fishing year, current and historical landings trends, and any other relevant factors. As a backstop to ensure that U.S. actions remain consistent with the ICCAT landing limit, the fishery would become catch and release only for the remainder of a fishing year if the landing limit was achieved. If marlin minimum sizes were increased to slow landings during a given fishing year, they would revert back to the previous minimum size at the start of the next fishing season.

Consistent with ICCAT recommendations, NMFS would automatically subtract any overharvest from the subsequent fishing year's landing limit, and may carry forward underharvest to the subsequent fishing year. To increase or decrease the annual 250 marlin landings limit as a result of carrying forward future over or underharvest of Atlantic marlins the Agency will publish a notice in the Federal Register. To increase or decrease the 250 marlin recreational landing limit as a result of a new ICCAT recommendation, would require rulemaking under this preferred alternative. NMFS received comment recommending that the Agency automatically carry forward any underharvest to the following management period. As noted above, this alternative allows for carry-forward of underharvest to occur. However, given the uncertainty surrounding landings of Atlantic marlin in the Commonwealth of Puerto Rico and the U.S. Caribbean, the United States has made a commitment not to carry forward underharvest until such time as this uncertainty is resolved.

Alternative E6 would likely have minor positive ecological benefits if implemented on its own. This conclusion holds true whether examined under the existing June 1 – May 31 fishing year management scenario or under the preferred alterative (alternative G2) to shift billfish management to a calendar year management cycle (January 1 – December 31) management cycle. This alternative could reduce mortalities of Atlantic billfish by reducing the mortality associated with landings. The U.S. landings (inclusive of dead discards) of Atlantic blue and white marlin averaged 2.4 percent and 4.5 percent (respectively) of aggregate Atlantic-wide landings for these species, as reported to ICCAT for the period 1999 - 2004. The total contribution of the U.S. recreational fleet to aggregate Atlantic-wide marlin mortality has not been definitively quantified, but may be larger than previously estimated based on new post-release mortality estimates for white marlin, as discussed under the analyses for alternatives E2 and E3. Since ICCAT adopted the recommendation containing the U.S. recreational limit in 2001, reported U.S. recreational marlin landings have ranged from a high of 279 in 2002 to a low of 136 in 2003, averaging 189 fish per annum. Details can be seen in Table 4.48.

Based on known landings, the ecological benefits of this alternative are likely limited given that during the period 2001 through 2004, the United States has averaged 189 recreationally landed marlins, or approximately 75 percent of the landing limit each year, and that in two of those four years, the United States was more than 100 marlin, or the equivalent of 40 percent, below the U.S. landing limit. However, the relative benefits of this alternative could increase if recreational landings increased substantially. NMFS received comment on the limited ecological impact of this alternative that was categorized into two opposing views and which suggested two different courses of action. Some commenters suggested that the limited ecological impact was not worth any potential adverse economic impact, even a very limited one, while other commenters suggested that the United States must implement the 250 marlin limit to live up to U.S. international obligations and as part of a strategy to implement appropriate measures to help limit billfish mortality. Implementation of this preferred alternative is anticipated to allow the United States to continue to successfully pursue international marlin conservation measures by fully implementing U.S. international obligations and potentially provide minor ecological impacts.

Alternative E6 may prevent future landings in excess of the ICCAT landing limit, and therefore may prevent future increases in mortalities associated with known landings. Again, this statement holds true for either the Fishing Year or Calendar Year management cycle. However, because a landing limit cannot directly control effort or post-release mortality, this alternative cannot directly control fishing mortality, which may increase or decrease with changing effort and fishing practices despite domestic implementation of the ICCAT landing limit. This alternative is not anticipated to have any impact on interactions with protected resources or impact other non-billfish species, but cannot prevent such changes if fishing effort changes to other species. Alternative E6 may result in limited impacts on the landings, discards, and interactions with other HMS, and other finfish species such as dolphin fish, king mackerel, and wahoo that are frequently encountered by HMS fishermen. Positive or negative ecological impacts may occur for these species, and would depend on whether or not the threshold for management action is achieved and subsequent angler response. However, no impacts are anticipated in the near future because, based on the current marlin accounting methodology used for compliance purposes and the widespread practice of catch and release fishing for billfish (75 to 99 percent), it seems unlikely that the threshold for action would be reached. Nevertheless, as noted above, the likelihood of achieving the threshold for action could change with changes in effort, compliance with reporting requirements, or improved accuracy of accounting methodologies.

Under both the Calendar Year or Fishing Year management cycles, alternative E6 may provide minor positive ecological benefits if minimum size increases or catch and release only fishing requirements were implemented for Atlantic blue and white marlin as a result of the threshold for management action being achieved under this alternative. Impacts on non-billfish species, in terms of landings and post-release mortality may remain the same, increase, or decrease depending on angler response to increased minimum sizes and/or a shift to catch and release only fishing. Given the widespread practice of catch and release fishing for billfish, as discussed in detail under alternative E1, it is likely that most billfish anglers would continue to expend effort fishing for Atlantic marlins, which would result in some level of landings and continuing post-release mortalities under increased minimum sizes or a shift to a catch and release only fishery. Assuming no change in effort or angler behavior given current catch and release rates in the fishery, there would likely be little change in the ecological impacts from the status quo. Alternatively, anglers may reduce effort if they believe that they would be unable to land a billfish given a minimum size increase, or would be prohibited from landing a marlin given a landings prohibition. This could result in unquantifiable ecological benefits for Atlantic billfish, other HMS, and non-HMS species with which recreational billfish fishermen interact. Further, it is also possible that anglers may shift effort to other non-marlin species. This response could increase negative ecological impacts on tunas, swordfish, sailfish, spearfish, sharks, and other species with which Atlantic billfish fishermen typically interact. In conjunction with alternative E3, alternative E6 could expand ecological benefits to Atlantic billfish by reducing post-release mortality and limiting mortalities associated with landings to levels consistent with ICCAT landing limits. Further, the United States may benefit from increased negotiating leverage at ICCAT, and thus allow for more rapid development and implementation of additional international management measures, as deemed appropriate by ICCAT. Positive ecological benefits, specifically reducing fishing mortality, would be relevant considerations in the anticipated 2007 ESA Status Listing Review for white marlin.

Alternative E7 was a preferred alternative in the Draft Consolidated HMS FMP; however, it is not preferred in the Final Consolidated HMS FMP. This alternative would allow only catch and release fishing for Atlantic white marlin effective January 1, 2007 through December 31, 2011. Possession and retention of Atlantic white marlin would be prohibited at all times and under all circumstances by all U.S. flagged vessels. This provision would expire five years from the effective date unless specifically extended by NMFS.

The ecological impacts of eliminating recreational landings of white marlin can be estimated from U.S. landings reported to ICCAT, as well as other domestic fisheries surveys. Alternative E7 would reduce mortalities of white marlin by eliminating mortalities associated with landings. The reported U.S. white marlin landings for 2001 - 2004 can be seen in Table 4.48. In 2001, 2002, 2003, and 2004, there were 116, 88, 23, and 31, respectively, white marlin reported landed in the U.S. Atlantic billfish fishery. The 2004 billfish landings reported to ICCAT were based on tournament reports and MRFSS intercepts. Because non-compliance with many reporting requirements is known to be occuring, NMFS considers all billfish self-reported statistics to be minimum estimates with an unquantified bias toward low estimates. Fishing surveys, such as MRFSS and the LPS, discussed above, provide additional data useful for estimating landings of Atlantic billfish (Table 4.50 and Table 4.51). The MRFSS survey includes HMS, however, it was not designed for these species, which are considered “rare event” species as compared to other recreationally caught species. The LPS survey was designed to intercept HMS fisheries, but because it does not operate in all Atlantic coastal states and operates for only a portion of the year, it is only a subset of aggregate U.S Atlantic landings. The recent

LPS white marlin landings estimates are in some instances substantially lower, and in other instances substantially higher, than those tabulated directly from observed landings. This is a result of extrapolating landings from survey intercepts. A more complete discussion of landings databases is provided in the analysis of alternative E1. For the years 1999 through 2004, the LPS estimated landings of white marlin were six, four, four, 218, 365, and 78, respectively. Additionally, as discussed above, the United States is currently limited to 250 blue and white marlin landings (combined) annually by ICCAT. This recommendation was adopted in 2000 and entered into force in 2001.

Alternative E7 would likely provide limited ecological benefits to Atlantic-wide white marlin stocks by itself, given the limited number of landings. Under this alternative, a large portion of the fish currently landed would likely be conserved, however estimates vary. Table 4.48 through Table 4.50 provides the potential range of mortality reductions that could be achieved if alternative E7 was implemented. Impacts on other species with which HMS fishermen typically interact would depend on angler response to a catch and release fishery for white marlin. Anglers are likely to respond in three ways: 1) no change in effort or target species; 2) decreased effort; and, 3) shift target species. If angler behavior does not change to any appreciable extent, NMFS anticipates that the impacts would be similar to those as discussed under alternative E1. If anglers respond by decreasing effort, alternative E7 could result in positive ecological impacts for HMS and other species by potentially reducing landings and interactions, which could reduce post-release mortality. If anglers respond by shifting effort to other target species, such as sailfish, blue marlin, dolphin, and wahoo, this alternative may result in increased landings and interactions with these and other species. NMFS received public comment indicating that if white marlin landings were prohibited, tournaments and fishermen would likely increase fishing effort on blue marlin. Data are unavailable to allow quantification of these impacts, nevertheless, any one or any combination of the aforementioned responses and their attendant impacts are possible. However, as stated above, the impacts are likely to be limited given current angler ethics as demonstrated by high levels of participation in catch and release fishing, as shown in Table 4.49, Table 4.50, and Table 4.51, which range from 75.8 to 99.4 percent.

Alternative E7 cannot, by itself, reduce post-release mortalities of white marlin. As such, all mortality gains would be expected to occur through the reduction in landings. However, as discussed in the Draft Consolidated HMS FMP, alternative E7, if used in conjunction with alternative E3 (mandatory use of circle hooks in billfish tournaments), could substantially expand possible ecological benefits by reducing landings to zero and considerably reducing the post-release mortality of recreationally captured white marlin. If alternatives E7 and E3 were selected and proven effective, the United States may also benefit from an improved negotiating position at ICCAT. Positive ecological gains, specifically reducing fishing mortality, would also be relevant considerations during the anticipated 2007 ESA Status Listing Review for white marlin.

NMFS received strong public comment opposed to the Atlantic white marlin catch and release alternative. Based on public comment that indicated more significant concerns over potential adverse economic impacts to the fishery if catch and release only fishing for Atlantic white marlin were required, as well as a number of other factors, including but not limited to, the impending receipt of a new stock assessment for Atlantic white marlin and upcoming international negotiations on Atlantic marlin, NMFS is not preferring to prohibit landings of Atlantic white marlin at this time. Additionally, the Agency received substantial comment in support of this measure. The commenters supporting the landings prohibition stated concerns over white marlin stock status, the ESA listing review, and an interest in maintaining leadership at the international level. The implementation of circle hook requirements (alternative E3) would be an important first step in reducing mortality in the directed billfish fishery. NMFS will consider catch and release only fishing options for Atlantic white marlin as well as other billfish conservation measures in future rulemakings, as necessary and appropriate.

Alternative E8 would allow catch and release only fishing for Atlantic blue marlin effective January 1, 2007. This provision would sunset five years from date of implementation unless specifically extended by NMFS. This alternative would prohibit the possession, retention, and landing of Atlantic blue marlin at all times and under all circumstances by all U.S.-flagged vessels. The ecological benefits of eliminating recreational landings of blue marlin can be estimated from U.S. landings reported to ICCAT, as well as other domestic fisheries surveys. The reported U.S. blue marlin landings for 2001 - 2004 can be seen in Table 4.48. In 2001, 2002, 2003, and 2004, there were 77, 191, 113, and 118 respectively, blue marlin reported landed in the U.S. Atlantic billfish fishery. As discussed above, in 2004, billfish landings reported to ICCAT were based on tournament reports and MRFSS intercepts. Because non-compliance with many reporting requirements is known to occur, NMFS considers all billfish self-reported statistics to be minimum estimates with an unquantified bias toward low estimates. Fishing surveys, such as MRFSS and the LPS, discussed above, provide additional data useful for estimating landings of Atlantic billfish (Table 4.50 and Table 4.51). The recent LPS blue marlin landings estimates are lower than those calculated directly from observed landings. For the years 1999 through 2004, the LPS estimated landings of blue marlin were three, zero, zero, zero, 101, and 45, respectively. Additionally, as discussed above, the United States is currently limited to 250 blue and white marlin landings (combined) annually by ICCAT.

Alternative E8 would likely provide some ecological benefits to blue marlin stocks, however, with the ICCAT marlin landings limit and the currently low recreational landings rate for the species, NMFS believes this alternative would likely provide limited ecological benefits. Alternative E8 would reduce mortalities of blue marlin by eliminating mortalities associated with landings. Under this alternative, a large portion of the fish currently landed would likely be conserved, however estimates vary. Alternative E8 cannot, by itself, reduce post-release mortalities of Atlantic blue marlin. As such, all mortality gains would likely occur through the reduction in landings.

As with alternative E7, impacts on other species with which HMS fishermen typically interact would depend on angler response to a catch and release fishery for blue marlin. Anglers are likely to respond in three ways: (1) no change in effort or target species; (2) decreased effort; and, (3) shift target species. If angler behavior does not change to any appreciable extent, NMFS anticipates that the impacts would be similar to those as discussed under alternative E1. If anglers respond by decreasing effort, alternative E8 could result in positive ecological impacts for HMS and other species by potentially reducing landings and interactions, which could reduce post-release mortality. If anglers respond by shifting effort to other target species, such as sailfish, white marlin, dolphin, and wahoo, this alternative may result in increased landings and interactions with these and other species. Data are unavailable to allow quantification of these impacts, however, any one or any combination of the aforementioned responses and their attendant impacts are likely. However, as stated above, the impacts are likely to be limited given current angler ethics as demonstrated by high levels of participation in catch and release fishing, as shown in Table 4.49, Table 4.50, and Table 4.51, which range from 75.8 to 99.4 percent.

Additionally, as discussed in the Draft Consolidated HMS FMP, this alternative, if used in conjunction with alternative E3 (mandatory use of circle hooks in billfish tournaments), could maximize the ecological benefits by reducing landings to zero and substantially reducing the post-release mortality of recreationally captured blue marlin. If alternatives E8 and E3 were selected and proven effective, the United States may benefit from an improved negotiating position at ICCAT.

This alternative was analyzed but not preferred in the Draft Consolidated HMS FMP or Final Consolidated HMS FMP due to potentially substantial negative social and economic impacts, public comment, and other reasons. Nevertheless, the Agency may consider catch and release only options for Atlantic blue marlin as well as other billfish conservation measures in future rulemakings, as necessary and appropriate. The United States will continue its efforts to reduce billfish mortality both domestically and at the international level. NMFS has preferred an alternative that would fully implement U.S. international obligations as per ICCAT Recommendation 00-13 and subsequent amendments to it. Additionally, the Agency has alternative E3, which would require the use of non-offset circle hooks in Atlantic billfish tournaments by HMS permitted vessels when deploying natural bait or natural bait/artificial lure combinations, to reduce post release mortality of billfish stocks.

*Social and Economic Impacts*

Alternative E1, the No Action alternative would likely have no adverse short-term economic impacts. Ditton and Stoll (2003) conservatively estimate the aggregate economic impact of billfish fishing trips in the U.S. Atlantic to be $22.7 million annually, not including Puerto Rico. Please see Section 3.5.2 for additional discussion of the economic status of the directed billfish fishery.

As of February 1, 2006, there were 25,238 HMS Angling category permits, 4,173 CHB category permit holders, and 4,824 General category permits which represent the number of vessels that are legally authorized to participate in the Atlantic billfish fishery. General category permit holders are eligible to fish for, retain, or posses, Atlantic billfish only when participating in a registered HMS tournament. The number of Angling category permit holders, and possibly the number of CHB category permit holders, is thought to be considerably below the number of vessels that should be permitted. See Section 3.9 of this document for additional detail regarding permitting issues. Further, because HMS Angling, CHB, and General category permits are vessel permits and any given vessel could have multiple anglers on board, the number of vessel permits underestimates the actual number of fishery participants. Given the multi-species nature of HMS Angling and CHB permits, and the fact that vessels are permitted rather than individual anglers, NMFS does not have the ability to identify what subset of these permitted vessels, or how many anglers, engage in billfishing based on the best scientific information available.

Ditton and Stoll (2003) estimated that there are 7,915 billfish anglers in the U.S. Atlantic and 1,627 billfish anglers in Puerto Rico.

Alternative E1 would likely result in a continuation of the fishery consistent with current operating patterns. It would not be expected to alter participation rates of private anglers, demand for CHB trips, or to impact participation in billfish tournaments. Alternative E1 would not likely result in any change or redistribution of fishing effort in the short-term or impact hook manufactures, retailers, or other small businesses associated with the recreational billfish fishery.

Alternative E2 would likely have limited adverse social and economic impacts. As discussed in Section 3.9.4, there were 25,238 HMS Angling category permits, 4,173 CHB category permit holders, and 4,824 General category permits as of February 1, 2006. This represents the universe of vessels that could be impacted by circle hook requirements under alternative E2. However, given that these are vessel permits, it is not possible to quantify the number of individual fishermen participating in HMS Fisheries who may be impacted by circle hook requirements.

Hooks employed by recreational anglers while pursuing HMS typically range in size from 5/0 to 14/0 for J-hooks and 7/0 to 20/0 for circle hooks. A limited survey of hook prices (Summer 2005) indicated that J-hooks of the sizes and styles used by HMS recreational fishermen ranged in price from a low of $0.50 to a high of $7.50 each, with an average price of $2.70. Similarly, circle hooks of the sizes and styles used by HMS recreational fishermen ranged in price from a low of $0.30 to a high of $7.00 each, with an average price of $2.24. A comparison of the two indicates that anglers could, on average, save approximately $0.46 for every circle hook purchased for use in place of a J-hook, if mandatory circle hook requirements were implemented in HMS fisheries. As such, initial purchases of circle hooks to comply with circle hook requirements would represent a minor economic cost, however, over the long-term, circle hook requirements associated with this alternative may result in a minor economic benefits, assuming the price differential between circle and J-hooks remains stable. Nevertheless, the purchase of hooks represents only a minor capital expenditure relative to other costs associated with participating in this fishery, including purchasing, equipping, maintaining, and running of vessels, which can run into the hundreds of thousands of dollars or more. As such, any potential economic impacts, either positive or negative, stemming from the purchase hooks are likely to be *de minimus* in nature. As previously discussed, NMFS cannot quantify the number of impacted anglers. Further, the quantity of hooks purchased by individual anglers varies widely from the occasional angler to those who fish regularly, and as a result of these factors, NMFS cannot estimate an aggregate economic cost. The delay in implementation of circle hook requirements, specifically requested by HMS and Billfish Advisory Panel members and the public, would be anticipated to allow hook manufacturers, retailers, and anglers adequate time to utilize current inventories and alter production rates of J-hooks, thereby minimizing any potential adverse economic impacts associated with alternative E2.

Alternative E2 may result in a temporary decrease in angler consumer surplus given anticipated or real loss of fish as fishermen adjust to and become more proficient with the use of circle hooks. However, Prince *et al*. (2002) found that circle hooks were actually 1.83 times more likely to hook a sailfish than a J-hook, and that once hooked, the catch percentage was virtually identical for each type of terminal gear. Skomal *et al*. (2002) reported similar findings with bluefin tuna, stating that catching success was similar for the two hook types. Skomal *et al*. found that 68 percent of recorded J-hook bites and 74 percent of circle hook bites resulted in landed tuna. Taken in combination, data from these studies suggest that there could potentially be an increase in angler consumer surplus as a result of increased catches, and that any loss of angler consumer surplus may be due to a perceived loss of fish, as opposed to a real loss of fish. However, the true effect of circle hooks on catch rates is not known for other HMS species. Any reduction of angler consumer surplus could be mitigated to an extent by the ability of anglers to continue to utilize J-hooks with artificial lures under alternative E2. In addition, the phase-in period associated with this alternative would allow anglers time to become comfortable and proficient with circle hook use prior to mandatory implementation, further mitigating any potential loss of angler consumer surplus. NMFS received public comment voicing concern that circle hooks may decrease catches of some HMS or non-highly migratory species. The Northeast Distant Statistical Area (NED) Circle Hooks study shows that deployment of circle hooks in the commercial pelagic longline fishery can result in a decrease in the number of swordfish caught under some oceanographic conditions, however, NMFS has only limited data on the impact of circle hooks in the recreational swordfish fishery or other recreationally caught non-HMS species and potential socio-economic effects. NMFS is aware of these concerns and will examine this issue as data becomes available.

Impacts on tournaments would likely be minimal, given the increase in the number of tournaments that provide special award categories or additional points for billfish captured and released on circle hooks. However, it is possible that there could be a decrease in tournament participation and demand for CHB trips, as well as trips taken by individual anglers based on real or perceived declines in catch under this alternative. NMFS cannot predict angler behavior with regard to participation in tournaments, demand for CHB trips, or trips taken by individual anglers in reaction to potential circle hook requirements. As such, if any tournaments are cancelled, demand for CHB trips decreases, or trips taken by individual anglers decline as a result of circle hook requirements, there could be some unquantified economic costs depending on the size of the tournament or the number of CHB trips or individual angling trips that are not taken.

While there may be an initial decrease in angler consumer surplus, alternative E2 may provide long-term positive benefits with regard to increased angler consumer surplus and willingness to pay if circle hooks contribute to rebuilding efforts and result in increased encounter rates. However, given the limited contribution of U.S. fishermen to aggregate Atlantic-wide catches of billfish, the Atlantic-wide benefits to billfish populations of alternative E2 may be limited. This alternative may enhance the United States' negotiating position at ICCAT by demonstrating the United States' commitment to the conservation of recreationally caught HMS at a time when other ICCAT nations are beginning to determine the extent of their domestic recreational fisheries. Improved negotiating position at ICCAT may allow for the more rapid implementation of recreational circle hook requirements Atlantic-wide. Alternative E2 may be difficult to enforce given the ability of anglers to possess both circle and J-hooks onboard at the same time.

The economic and social costs and benefits of alternative E3, a preferred alternative, are anticipated to be similar to, but reduced from the estimated impacts discussed under alternative

E2. As discussed more fully under the ecological analysis for this alternative, NMFS has made a slight technical adjustment in the phrasing of alternative E3 in this Final Consolidated HMS FMP to clarify the universe of affected anglers. NMFS analyzed this alternative from the perspective of applying non-offset circle hook requirements to HMS-permitted vessels in billfish tournaments in the Draft and Final Consolidated HMS FMP, and as such the change in phrasing of the alternative has no impact on the analyses conducted herein.

NMFS also received comment during scoping and the public comment period for the Draft Consolidated HMS FMP that tournament operators would need advance notice of impending circle hook regulations to allow for changes in the production of rules and advertising, and to inform tournament participants of potential circle hook requirements. Given the severe impacts of the 2005 hurricane season, NMFS substantially extended the public comment period and delayed the anticipated publication date of the Final Consolidated HMS FMP. In the meantime, NMFS surveyed a number of tournament operators in the Atlantic, Gulf of Mexico and Caribbean to better understand various aspects of tournament operations. NMFS determined that a delayed date of effectiveness of between four and six months would likely provide adequate time for tournament operators and participants to adjust tournament rules, formats, and advertising, as necessary, as well as to notify anglers of changes, and allow anglers to adjust fishing practices and take other steps appropriate to minimize any potential costs created by a shift to non-offset circle hooks in billfish tournaments. As such, given the anticipated publication date for the Final Consolidated HMS FMP of July 2006, and the anticipated publication date for the Final Rule of August 2006, NMFS prefers to maintain the effective date of January 1, 2007, for preferred alternative E3. This effective date is consistent with the effective date for preferred alternative E3 as contained in the Draft Consolidated HMS FMP.

Vessels with HMS Angling, CHB, or General category permits that participate in Atlantic billfish tournaments represent the universe of potentially affected vessels of alternative E3. However, given the multi-species nature of the HMS permits and the fishery itself, it is not possible to accurately quantify the subpopulation of billfish anglers. Further, NMFS is not able to quantify the exact number of anglers or vessels participating in tournaments that may be impacted. On average, for the period 1999 – 2004, 47 vessels participated per tournament, however the average varies by month and state from 14 to 131. In 2003 and 2004, there were 244 and 214 registered HMS tournaments, respectively. These figures include all HMS tournaments, including billfish and non-billfish tournaments. On average for the period 1999 - 2004, there were approximately 149 U.S. billfish tournaments annually, ranging from a low of 118 to a high of 179, in any given year, based on RBS data. However, combining the number of tournaments with the average number of vessels per tournaments is not a reliable indicator of how many individual vessels participated in tournaments because many vessels participate in multiple tournaments each year. It is possible, but unlikely, that alternative E3 could result in decreased tournament participation based on real or perceived declines in catches. Tournament participation would not be expected to decrease given the high rates of participation in catch and release fishing and the continued availability of fish for landing under this alternative. Further, as discussed under the analysis of alternative E2, circle hooks have been found to actually improve the likelihood of catching some HMS, including some species of billfish. Economic costs to tournaments would likely be minimal, given the increase in the number of all release tournaments, and tournaments that provide special award categories or additional points for billfish captured and released on circle hooks. As previously discussed, NMFS cannot predict angler behavior with regard to participation in tournaments, demand for CHB trips, or trips taken by individual anglers in reaction to potential circle hook requirements. As such, if any tournaments are cancelled, demand for CHB trips decreases, or trips taken by individual anglers decline as a result of circle hook requirements, there could be some unquantified adverse impacts depending on the size of the tournament or the number of CHB trips that may not be taken.

NMFS received public comment voicing concern that proposed billfish tournament circle hook requirements may decrease catches of some HMS or other species that are landed for prize money. The NED circle hook study shows that deployment of circle hooks in the commercial pelagic longline fishery can result in a decrease in the number of swordfish caught under some oceanographic conditions, however, NMFS has little data on the impact of circle hooks in the recreational swordfish fishery or on other recreationally caught non-HMS species and associated potential socio-economic costs or effects. Importantly, it should be realized that all permitted billfish tournament anglers would be operating under the same Federal regulations, and thus, contrary to concerns expressed by some anglers, there should be no competitive disadvantage relative to one another. Furthermore, the preferred alternative would specifically allow for the deployment of J-hooks with artificial lures in billfish tournaments, which should mitigate some concerns regarding a decrease in catches.

The minor initial economic costs associated with compliance costs of circle hook requirements, and the potential minor long-term positive economic benefit (savings) of approximately $0.46 per hook purchased by anglers for use in HMS fisheries, as discussed under the analysis for alternative E2, would only apply to billfish tournament participants under alternative E3. Billfish tournament participants may be impacted to a slightly greater degree by this requirement, as tournament participants tend to be regular participants in the billfish fishery, and are likely to purchase more hooks than the occasional billfish fisher. Again, however, the purchase of hooks represents only a minor capital expenditure relative to other capital costs in the fishery, including the purchase, equipping, and maintenance of vessels, and tournament registration fees, and thus, the costs are considered *de minimus*.

Impacts of alternative E3 on hook manufactures, retailers, and anglers would likely be limited given that J-hooks would continue to be permitted outside of tournaments, and when using artificial lures in tournaments. As discussed under alternative E2, the delay in implementation of circle hook requirements, specifically requested by HMS and Billfish Advisory panel members and the public during public comment, should allow hook manufacturers, retailers, tournament operators, and anglers adequate time to adjust business practices, become proficient in the use of circle hooks, and utilize current inventories of J-hooks, thereby reducing any economic costs associated with alternative E2. Alternative E3, consistent with the analysis of alternative E2, may result in a temporary decrease or increase in angler consumer surplus, and may result in a long-term increase in angler consumer surplus should this alternative assist in the recovery of Atlantic marlin. Also similar to alternative E2, alternative E3 may result in improved negotiating position at ICCAT, potentially speeding the implementation of recreational circle hooks requirements through ICCAT. As with alternative E2, alternative E3 could present enforcement problems, however, NMFS is confident that between Agency efforts to enforce circle hooks, the increasing use of tournament observers, the conservation ethic of billfish anglers, and the vested financial self-interests of billfish tournament participants in ensuring that all tournament participants compete fairly under the same rules and conditions, high levels of compliance would be expected.

Alternatives E4a and E4b would increase the minimum size for blue and white marlin, likely reducing the number of legally landed blue and white marlin, respectively. NMFS cannot predict angler behavior, and so cannot be sure if these measures would or would not affect angler participation rates. As previously discussed, catch and release rates are already quite high in the billfish fishery, with anglers often keeping only trophy-sized fish. As such, an increase in minimum sizes is not anticipated to dissuade any substantial portion of billfish anglers from pursuing Atlantic marlins. Furthermore, since many tournament organizers already stipulate higher minimum sizes than current Federal regulations, any potential decrease in angler participation, and resultant economic impacts, would likely be minor. Further, increased minimum sizes do not reduce the number of fish available for landing, simply the odds of landing a fish. As such, anglers could continue to pursue and land marlins, should they choose to, given that the ICCAT landing limit would not be impacted by alternative E4. Table 4.49 indicates that between 1999 and 2004, 92, 98, and 99.4 percent of blue marlin, white marlin, and sailfish were released in tournaments, respectively. Fisher and Ditton (1992) conducted a survey of 1,984 billfish anglers and found that these anglers, on average, released 89 percent of billfish depending on the region (range = 74-95 percent). Further, Ditton and Oh (2004) found that some anglers were willing to pay an additional $71 (2004 dollars) to participate in catch and release fisheries. This reinforces NMFS' belief that there would not likely be any substantial adverse socio-economic impacts stemming from an increased minimum legal size limit of the ranges analyzed under alternatives E4(a) and (b).

High catch and release rates coupled with low CPUE for billfish indicate that an increase in the minimum size of four to seven inches for blue marlin and three to seven inches for white marlin would have negligible impacts on angler participation. Fisher and Ditton (1992) also found that 60 percent of respondents either agree or strongly agree with increased minimum sizes. Eighty-one percent of anglers interviewed stated that that the minimum size limits implemented in 1988 had no effect on their billfishing activity. The Agency received comments during the formulation of Amendment 1 to the Billfish FMP (NMFS, 1999) indicating that increasing the minimum size limits would be preferable to implementing bag limits if additional management action is necessary. If angler participation remains consistent, negative social and economic effects or costs would likely be minor as a result of increasing the minimum size for blue or white marlin.

Alternative E5, establishing a bag limit of one Atlantic billfish per vessel per trip, would likely have minor economic costs. Recreational billfish fisheries have very low CPUE rates, however, it is believed that participation in these fisheries continues to expand. Because of the rarity of catching a billfish and the conservative minimum sizes in place, the chances of landing more than one white or blue marlin on a single trip are low. Sailfish are somewhat of an exception, in that during certain times of the year at several locales off the coast of Florida, anglers may have the opportunity to catch and land several sailfish that meet the minimum size requirements in one trip.

Fisher and Ditton (1992) indicate that 77 percent of anglers would not change their fishing behaviour if a bag limit of one billfish were implemented. Based on this and the high levels of catch and release fishing in the recreational billfish fishery, as the fishery continues to expand it is reasonable to assume that anglers would maintain current levels of participation based on the opportunity of catching and possibly landing one trophy billfish. A bag limit of zero billfish, or implementing catch and release only might affect angler behavior more because anglers would no longer have that opportunity to catch an exceptionally large billfish, which is afforded by a one billfish bag limit.

Furthermore, since this is largely a catch and release fishery, both within and outside of tournaments, NMFS assumes that implementing a bag limit would not deter anglers from participating in billfish excursions, likely minimizing the negative impacts to CHB operators. However, it is possible that there would be an unquantifiable decrease in demand for CHB trips if not all individual anglers on a given trip would have the opportunity to land a billfish. As such, multi-angler, multi-day trips could be impacted to a greater extent than day trips if alternative E5 were selected as a preferred alternative.

Tournament participation would not be expected to decrease in a substantial manner as tournament rules often prohibit participants from entering more than one marlin per day, which would also likely prevent participants from possessing multiple fish. The high catch and release ratio indicates that the majority of billfish anglers are more interested in the experience of "hooking" a billfish rather than landing a billfish. If anglers continue to take marlin trips, as anticipated, then many of the economic costs associated with the landing limit would be minimal or non-existent.

Alternative E5 would be anticipated to assist the United States in maintaining compliance with the 250 fish limit adopted by ICCAT. Eliminating the opportunity for vessels to land several blue and/or white marlin would decrease the likelihood of overages, closures, or increases in the minimum size that may occur as a result of achieving the threshold for action described in alternative E6. However, since multiple landings of blue marlin and white marlin are rare, a bag limit in and of itself may not guarantee compliance.

Alternative E6, which would implement ICCAT recreational marlin landing limits, is anticipated to potentially result in minimal to moderate economic costs depending on catch rates, angler response, and which of the available in-season management actions (no action, minimum size increase, or catch and release only) become necessary. As discussed under the analysis of the ecological impacts of this preferred alternative, and consistent with ICCAT recommendations, NMFS would automatically subtract any overharvest from the subsequent fishing year's landing limit, and may carry forward underharvest to the subsequent fishing year. To increase or decrease the annual 250 marlin landings limit as a result of carrying forward future over or underharvest of Atlantic marlins the Agency will publish a notice in the Federal Register. To increase or decrease the 250 marlin recreational landing limit as a result of a new ICCAT recommendation, would require rulemaking under this preferred alternative.

Available historical data suggest it is unlikely that the United States will achieve the 250 marlin landing limit in the near future. (See Table 4.48 for historical landings data, as reported to ICCAT.) As noted under alternative E1, between 2001 and 2004 (inclusive), the United States remained substantially below the ICCAT landing limit with the exception of 2002, when a post-fishing year adjustment to accounting methodologies indicated a small one-time exceedance of the landing limit. At the 2004 ICCAT meeting, the United States reported landing 131 marlin (108 blue marlin, 23 white marlin) based on data from the RBS, landings cards from the States of North Carolina and Maryland, and self-reported non-tournament landed fish. RBS data represented roughly 88 percent of marlin landings reported to ICCAT in 2004. At the 2005 ICCAT meeting the United States reported 149 blue and white marlin combined (118 blue marlin; 31 white marlin). However, the likelihood of achieving the 250 fish limit may change with improved accuracy in quantifying domestic recreational billfish landings. Further, given the open access nature of the fishery, and relatively low compliance with self-reporting requirements, it is possible for documented landings to increase if effort increases and/or if compliance improves with reporting requirements.

There are several unknowns that currently make an assessment of the socio-economic impacts of alternatives E6 difficult to quantify. These include uncertainty regarding total marlin landings, uncertainty regarding the number of marlin fishermen and absolute effort, uncertainty regarding changes in angler behavior when faced with increased minimum sizes or a catch and release only fishery, and limited socio-economic data. As such, the analysis presented in this Consolidated Final HMS FMP is based on the best available data, and makes use of proxies in the discussions of scenarios two and three below, to assist in evaluating the impacts of this alternative. Socio-economic impacts are discussed for CHBs, tournaments, anglers, and associated businesses under three potential management action scenarios for both the June 1 – May 31 fishing year management cycle and the calendar year management cycle: Scenario (1) no in-season adjustments; Scenario (2) implementation of minimum sizes; and, Scenario (3) shift to catch and release only fishery for Atlantic marlins. Socio-economic effects and costs of alternative E6 under scenarios 2 and 3 would vary depending upon the management cycle finalized for the directed billfish fishery.

Scenario 1: Threshold For In-Season Management Action Not Achieved

Alternative E6 would not be expected to result in impacts to the recreational marlin fishery, under either the June 1 – May 31 fishing year or the calendar year management cycle, if the threshold for action is not reached or projected to be reached. Alternative E6 is intended to slow landings by increasing the minimum size of Atlantic blue and/or white marlin, if necessary, thereby allowing landings to continue for the entire duration of the fishing year, in an effort to prevent a shift to catch and release fishing. If the threshold for action is not achieved or expected to be achieved, NMFS anticipates no impact on demand for CHB trips, tournament participation, or participation in the fishery by non-tournament anglers. Under this scenario, NMFS would not anticipate any adverse socio-economic effects on dependant shoreside businesses, such as tackle shops or marinas. Thus, under the no in-season action scenario of alternative E6 (where the threshold for action is not achieved or anticipated to be achieved), NMFS anticipates few or no positive or negative socio-economic effects, while remaining consistent with ICCAT recommendations. As stated above, this conclusion applies regardless of whether the fishery is operating under the June 1 – May 31 fishing year or the calendar year management cycle. As such, the impacts would be similar to those discussed under alternative E1

Scenario 2: Threshold For an In-Season Minimum Size Increase Achieved

Alternative E6 would provide NMFS the option of increasing the minimum sizes of Atlantic blue and white marlin to between 117 and 138 inches and 70 and 79 inches, respectively, if in-season evaluation of the action criteria indicate that additional management measures are necessary to ensure consistency with the ICCAT landing limit. As discussed under the ecological evaluation of alternative E6, the action criteria would include a review of landings, time remaining until conclusion of the current fishing year, current and historical landings trends, and any other relevant factors. Based on RBS landings data (1999 - 2004), approximately 14 percent and 18 percent of BUM and WHM landings, respectively, have occurred at or above the low end of size range available to the Agency for in-season action (117 inches for blue marlin and 70 inches for white marlin).

For purposes of analysis only, this document assumes that the threshold for action is reached in a given year when 85 percent of the ICCAT landings limit (213 fish under the current ICCAT landing limit) has been landed. This threshold for action is for purposes of discussion only and is in no way intended to indicate that that 85 percent is the actual threshold for action. The threshold for action would vary by year based on the action criteria identified above. To determine an approximate date at which the 85 percent threshold might be achieved, the Agency increased the historical RBS landings distribution of marlins evenly by month for the period 1999 – 2004 until the threshold for action was achieved. The assumptions involved in determining the action date would include the following, and are made for only purposes of analysis: (1) the temporal distribution of landings will remain roughly similar to the 1999 – 2004 pattern, as identified from RBS data; (2) landings will increase evenly until at least 85 percent of the ICCAT landings limit is achieved; (3) the 85 percent threshold will be achieved when approximately 85 percent of historical landings have occurred; and, (4) that the Agency benchmark for action is 85 percent of the ICCAT landings limit.

Based on the assumptions identified above, NMFS estimates that the threshold for implementing an increased minimum size could occur on approximately May 3$^{rd}$ under the June 1 to May 31 fishing year, or approximately August 22$^{nd}$, under a calendar year management cycle. This potential action date under the calendar-year management cycle is two days later in the fishing season from the estimated date identified in the Draft Consolidated HMS FMP. The change in date is the result of incorporating 2004 tournament data. Incorporation of the date did not change the estimated action date under the June 1 – May 31 fishing year management cycle. The obvious difference in the length of time from the start of the management period until the action threshold is projected to be achieved (~11 months under the June 1- May 31 fishing year management cycle vs. ~ eight months under the calendar year management cycle) between the two management cycles stems from the dearth of marlin landings during the winter months. As such, because those months with few landings occur during the midst of the June 1 – May 31 fishing year, the time it takes to achieve the threshold for action is lengthened.

In the withdrawn proposed rule (68 FR 54410 September 17, 2003) to implement the ICCAT 250 marlin limit, the date at which 80 percent of landings were projected to occur was identified as October 15. The difference in the projected dates at which point management actions *may* be required as per this document, under the assumptions identified above and under the Fishing Year management cycle, as compared to the withdrawn 2003 proposed rule (May 3 vs. Oct 15) is due to three factors: (1) use of six years of landings data (1999 - 2004) in this analysis versus use of a single year (2002) of landings data in the September 2003 proposed rule; (2) selection, for purposes of analysis, of the action trigger at 85 percent of the ICCAT landing limit in this analysis versus an 80 percent action trigger in the September 2003 proposed rule, given the generally slow pace of landings; and, (3) a dearth of landings during the late fall and winter. Under the June 1 – May 31 fishing year management cycle, May 3 is later in the fishing year than October 15. The difference in the projected dates under the assumptions identified above and under the Calendar Year management cycle, as compared to the withdrawn 2003 (August 22 vs. Oct 15) is due to use of a calendar year fishing year in this document rather than a June 1 – May 31 fishing year, as well as factors one and two, discussed above.

During the period 1999 - 2004, RBS data indicate that a total of 87 blue marlin 117 inches or larger have been landed in tournaments and 40 white marlin 70 inches or larger have been reported landed in tournaments. These sizes equate to an average of approximately 15 blue marlin (14.5) and seven (6.7) white marlin of their respective size classes being landed annually during this period. Thus, it is anticipated that during an average year the minimum size increase scenario under alternative E6 action would likely have the effect of maintaining compliance with the current ICCAT landing limit ($213_{\text{fish prior to minimum size increase}} + 15_{\text{blue marlin 117 inches or larger}} + 7_{\text{white marlin 70 inches or larger}} = 236_{\text{landed fish}}$), while allowing the fishery to continuously operate. This measure would allow for a "buffer" of roughly 14 marlin during an average year, if an in-season minimum size increase were triggered. Such a buffer would be necessary and appropriate given that the analysis is based on an average year, and because of this, anglers can be expected to exceed estimated landings rates in fifty percent of years, and anglers can be expected to fall below estimated landings estimates in fifty percent of years. The buffer is anticipated to allow compliance with the ICCAT landings limit even in those years when landings exceed an average year. The 14 fish would still be available to anglers for landing, however the buffer allows NMFS a reasonable margin of error in the timing of in-season management actions.

The large minimum size range available to NMFS under alternative E6 would provide NMFS the flexibility to respond to multiple in-season scenarios with a minimum of disruption to the fishery. NMFS would have the ability to slow landings and keep the fishery open by choosing a minimum size limit appropriate to allow maximum utilization of the U.S. landing limit, but not exceed it. While the proposed temporary minimum size increases for Atlantic blue and white marlin that could be imposed under alternative E6 would be substantially larger than current minimum sizes (99" BUM, 66" WHM), NMFS believes that, in most cases, anglers would continue to pursue Atlantic marlin. In a review of the public comment submitted to NMFS on this alternative, Agency staff did not find comment on the appropriateness of the proposed minimum size range. The Agency interprets this lack of comment to mean that there were no strong objections by the public to the proposed range of minimum sizes available to the NMFS for in-season action. NMFS did receive a number of comments indicating concern over the size of potential adverse economic impacts that may stem from implementation of the 250 Atlantic marlin landing limit. NMFS does not believe such minimum size increases would substantially decrease demand for charter/headboat trips, trips by individual anglers, or participation in billfish tournaments given the catch and release ethic of billfish anglers (87 to 99.2 percent release rate, see alternative E1) as well as the significant number of fish that would still likely be available for landing under the above scenario. However, as discussed in more detail under the ecological benefits of this alternative, there is no way to predict angler behavior. Angler response may be to maintain current effort for marlin, reduce fishing effort, or shift fishing effort to other species. Should effort be maintained or shifted to other species, adverse socio-economic impacts to the fishing community, including CHB operators, tournament operators, tackle shops, marinas, and others would likely be very limited as anglers would continue to make expenditures to pursue fish recreationally. If effort were switched to other species, billfish tournament operators may see a disproportionate adverse impact of the stakeholders identified above, unless points or prizes were awarded for released billfish or non-billfish species. To this point, some billfish tournaments already operate under a catch and release format with most having award categories for non-billfish species. Taken together, these facts reinforce conclusions that impacts would be limited because anglers would likely continue to participate in tournaments. If effort were reduced as a result of marlin minimum size increases, alternative E6 would likely result in small adverse economic impacts for all stakeholders for the reasons previously identified.

The potential impacts of a minimum size increase for Atlantic marlins under alternative E6 could be noticeably affected, either constrained or increased, by the date at which a minimum size increase may occur in a given fishing year. Given the estimated date (May 3) at which a minimum size increase could occur under the June 1 – May 31 fishing year management cycle and the assumptions made in this analysis, some sense of regional impacts can be outlined. An annual average of 25 billfish tournaments occur in the month of May (Table 4.58), and could potentially be impacted, should the ICCAT limit or threshold be reached during a fishing year. The majority of these tournaments occur in Florida (5), South Carolina (4), and North Carolina (4). On average, Louisiana holds three, with Alabama, Georgia, Texas, and the U.S.V.I. each holding two billfish tournaments in May. Not unexpectedly, the South Atlantic and Gulf of Mexico regions have the highest probabilities of being impacted at this time of year. In addition, the relative size of billfish tournaments (as estimated by the number of participating vessels, Table 4.57) in South Carolina, and North Carolina is large, with both averaging greater than the average size of a billfish tournament (47 vessels). However, as previously stated, the impacts to tournaments from minimum size increases are anticipated to be minimal for the reasons discussed above.

Previously stated conclusions that impacts would likely be limited are reinforced by the facts that only 28 days remain in the fishing year after May 3, a minimum size increase would still allow fishermen to continue to land marlins, and there would still likely be approximately 15 percent of the ICCAT landing limit available for landing. Late season tournaments occurring in May, specifically on the Memorial Day weekend, would likely still operate under this scenario for the reasons discussed above, and given reports suggesting that an increasing percentage of tournaments are adopting a catch and release format. As such, NMFS estimates that there would likely be very limited adverse economic impacts for the CHB fleet, individual anglers, or tournaments resulting from an in-season minimum size increase.

In general, under the calendar year management cycle (preferred alternative G2), if landings of Atlantic marlin increase, recreational billfishing effort and tournaments that occur early in the calendar year should have sufficient catch available. However, billfishing effort and tournaments that occur later in the calendar year could be negatively impacted if the management threshold for action is reached in a given year, in-season restrictions are implemented, and anglers exhibit a negative behavioral response. As discussed above, NMFS estimates that, under calendar year management cycle and the previously stated assumptions, in-season action to increase minimum sizes could be required by August 22 to ensure compliance with the 250 fish limit. To reiterate, this would only occur if the rate of recreational marlin landings increases substantially. On average, August has the greatest number of billfish tournaments of any single month (37). Table 4.58, provides a breakdown of the average number of tournaments by state and month for the period 1999 – 2004, inclusive. The higher number of tournaments in the summer months, as identified in Table 4.58, is reflective of the increased in availability of these fish in more temperate regions such as New England and the Mid-Atlantic bight. Under the calendar year management cycle scenario, the months remaining in the fishing year have significantly fewer tournaments, on average: September (14); October (5); November (5); and, December (5). However, not all of these tournaments would necessarily be adversely impacted as some may be sailfish specific tournaments. Sailfish specific tournaments could experience increases in participation, and thus provide limited positive economic impacts to those communities, if in-season management action for marlin became necessary.

Given the estimated date of August 22nd when a minimum size increase could occur, under the calendar year management cycle and the assumptions made in this analysis, some sense of regional impacts can be outlined. Out of these months, impacts in August appear to be of the most regional concern. This is because during an average year the three billfish tournaments that may occur in the state of Massachusetts and two of three billfish tournaments that may occur in the state of Rhode Island occur in August. However, based on 2004 Atlantic HMS Tournament Registration data, there were a total of 34 tournaments that awarded points or prizes for Atlantic marlin that could be impacted if marlin minimum sizes were increased on August 22nd, under the Calendar year management cycle scenario. This includes marlin tournaments operating during the period August 22 – December 31, inclusive. The majority of these tournaments occurred in Florida (10). Puerto Rico held six, Louisiana and Maryland each held four, New Jersey held three, Texas held two, with Alabama, Massachusetts, North Carolina, Virginia and the U.S. Virgin Islands each holding one marlin tournament. This indicates that Florida has the largest probability of being impacted by any potential shift in minimum sizes, although the impacts may be less acute to the state and/or region given the higher number of tournaments that occur in this area.

Prior discussions that impacts of an in-season minimum size increase would likely be limited, under the calendar year management cycle, are reinforced by the facts that a minimum size increase would allow fishermen to continue to land marlins, and that there would still likely be approximately 15 percent of the ICCAT landing limit available for landing. Late season tournaments would likely still operate under this scenario for the reasons previously discussed (high catch and release rate, fish available for landing, etc.) and because anecdotal reports suggest that an increasing percentage of tournaments are adopting a catch and release format. As such, NMFS estimates that there would likely be limited adverse economic impacts for the CHB fleet, individual anglers, or tournaments.

Tournament data presented in this document are historical and averaged, except where explicitly noted, and do not necessarily reflect the exact time periods of past tournaments or potential future tournaments. Its use as a proxy for interpretation of regional impacts is extremely limited. In some cases, tournament dates could be adjusted to mitigate or avoid potential negative impacts of occurring late in the season with an increased risk for management actions. If, as expected, the potential negative impacts of increasing the size limit is perceived as minor by tournament participants, then tournaments may not be affected at all.

**Table 4.57 Average Number of Boats per Tournament by Month and State, 1999-2004.** Source: Recreational Billfish Survey

| State | Month | | | | | | | | | | | | State Ave* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | |
| AL | -- | -- | -- | -- | 88 | 29 | 31 | 136 | 130 | -- | -- | -- | 52 |
| FL | 34 | 44 | 34 | 77 | 66 | 54 | 67 | 28 | 26 | 38 | 39 | 40 | 45 |
| GA | -- | -- | -- | 14 | 16 | 15 | 7 | 9 | 4 | -- | -- | -- | 14 |
| LA | 39 | -- | -- | 62 | 26 | 56 | 31 | 21 | 14 | -- | -- | -- | 32 |
| MA | -- | -- | -- | -- | -- | -- | 34 | 34 | -- | -- | -- | -- | 34 |
| MD | -- | -- | -- | 72 | -- | 23 | 64 | 274 | 17 | -- | -- | -- | 136 |
| MS | -- | -- | -- | -- | -- | 51 | 18 | 21 | -- | -- | -- | -- | 29 |
| NC | -- | -- | -- | -- | 48 | 99 | 30 | 71 | 10 | -- | -- | -- | 61 |
| NJ | -- | -- | -- | -- | -- | 18 | 47 | 104 | 27 | -- | -- | -- | 56 |
| NY | -- | -- | -- | -- | -- | -- | 63 | -- | -- | -- | -- | -- | 63 |
| PR | 46 | 13 | 33 | 30 | 38 | 21 | 52 | 84 | 49 | 51 | 22 | 28 | 49 |
| RI | -- | -- | -- | -- | -- | -- | 14 | 16 | -- | -- | -- | -- | 16 |
| SC | -- | -- | -- | 41 | 60 | 61 | 85 | 53 | -- | -- | -- | -- | 64 |
| TX | 10 | -- | -- | -- | 11 | 18 | 51 | 52 | 17 | 15 | -- | -- | 34 |
| VA | -- | -- | -- | -- | -- | 37 | 35 | 25 | -- | -- | -- | -- | 31 |
| VI | 6 | 11 | 13 | -- | 11 | 10 | 11 | 28 | 10 | 8 | 11 | -- | 14 |
| Monthly Ave* | 34 | 38 | 28 | 59 | 46 | 45 | 47 | 67 | 27 | 41 | 28 | 38 | 47 |

*Monthly and State averages may not match individual cell totals because of rounding and averaging effects.

**Table 4.58 Average Number of Billfish Tournaments by Month and State 1999-2004*.** Source: Recreational Billfish Survey

| State | Month | | | | | | | | | | | | Avg. No. of Tournaments by State** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC | |
| AL | -- | -- | -- | -- | 2 | 2 | 2 | 2 | 1 | -- | -- | -- | 8 |
| FL | 12 | 4 | 1 | 2 | 5 | 5 | 5 | 5 | 3 | 3 | 2 | 4 | 53 |
| GA | -- | -- | -- | 0 | 2 | 1 | 0 | 0 | 0 | -- | -- | -- | 4 |
| LA | 1 | -- | -- | 0 | 3 | 4 | 5 | 3 | 3 | -- | -- | 0 | 18 |
| MA | -- | -- | -- | -- | -- | -- | 0 | 3 | -- | -- | -- | -- | 3 |
| MD | -- | -- | -- | 0 | -- | 1 | 3 | 3 | 1 | -- | -- | -- | 9 |
| MS | -- | -- | -- | -- | -- | 1 | 1 | 1 | -- | -- | -- | -- | 2 |
| NC | -- | -- | -- | -- | 4 | 3 | 2 | 4 | 0 | -- | -- | -- | 14 |

| State | Month | | | | | | | | | | | | Avg. No. of Tournaments by State** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC | |
| **NJ** | -- | -- | -- | -- | -- | 0 | 5 | 2 | 1 | -- | -- | -- | 8 |
| **NY** | -- | -- | -- | -- | -- | -- | 1 | -- | -- | -- | -- | -- | 1 |
| **PR** | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 1 | 15 |
| **RI** | -- | -- | -- | -- | -- | -- | 0 | 2 | -- | -- | -- | -- | 3 |
| **SC** | -- | -- | -- | 1 | 4 | 3 | 2 | 0 | -- | -- | -- | -- | 9 |
| **TX** | 0 | -- | -- | -- | 2 | 4 | 5 | 4 | 2 | 0 | -- | -- | 19 |
| **VA** | -- | -- | -- | -- | -- | 1 | 1 | 2 | -- | -- | -- | -- | 5 |
| **VI** | 0 | 0 | 1 | -- | 2 | 1 | 1 | 2 | 0 | 0 | 1 | -- | 9 |
| **Avg. # of Tournaments By Month**** | 14 | 5 | 2 | 4 | 25 | 28 | 34 | 37 | 14 | 5 | 5 | 5 | 179 |

**Cells with a zero had a tournament in at least one year during that month, but the average was less than 0.5.**
**Cells with a -- had no tournaments in that month at all.**
****Totals may not match individual cell totals because of rounding and averaging errors.**

Scenario 3: Threshold for Implementing Catch and Release Only Fishing is Achieved

Under alternative E6, NMFS would be required to shift the entire Atlantic recreational marlin fishery to catch and release if the ICCAT landing limit for any given year is achieved. Under these circumstances, NMFS believes that, in a worst-case scenario, marlin anglers may reduce their demand for charter fishing trips by between 0.4 and 24.2 percent of the available trips remaining during a given season. The range of 0.4 and 24.2 percent is derived from an examination of landings and release data (RBS, MRFSS, LPS) which indicate that between 1999 and 2004, anglers released between 75.8 and 100 percent of blue marlin and between 89.4 and 100 percent of white marlin. Clearly, it is not logical to assume that 100 percent of blue or white marlin are released, given that there have been observed and reported landings during this period. As such, the release estimate of 99.6 percent is used for purposes of analysis as an upper limit of the marlin release rate. This was the highest marlin release rate identified below 100 percent. As such, retention rates of 0.4 percent to 24.2 percent are used as proxies to represent the range of worst-case scenarios of fishermen who do not practice catch and release marlin fishing and completely exit the fishery. The low-end release rate estimate of 75.8 percent used in the Final Consolidated HMS FMP is substantially lower than the 89.4 release rate used in the Draft Consolidated HMS FMP. This is the result of a noticeable drop in the estimated release rate of blue marlin based on updated 2004 MFRSS data. The high-end release rate of 99.6 percent used in this Final Consolidated HMS FMP is slightly higher than the 99.4 percent release rate used in the Draft Consolidated HMS FMP. This is the result of a slighter higher estimate of the white marlin release rate based on updated 2004 MRFSS data.

If the landing limit were achieved earlier in the season, then more trips would logically be impacted as compared with achieving the landing limit later in the season. The average value of a CHB trip was $1,053 (2004 dollars). Data are not available to determine the number of CHB trips targeting marlin in any given month, and, as such, NMFS cannot quantify the impacts of the estimated decrease in participation on CHB operators. While the number of Angling category permits is known, as previously mentioned, it is not possible to determine what proportion of permitted anglers participate in the billfish fishery. As such, it is not possible to quantify an impact on non-CHB billfish anglers. Based on the rationale stated above, NMFS assumes participation in the directed billfish fishery by individual anglers would also decline by 0.4 to 24.2 percent if the marlin fishery is shifted to catch and release only under alternative E6.

Under preferred alternative E6, NMFS estimates that between 0.8 and 10.1 percent of tournaments may cease to operate in a worst-case scenario. This range was derived from the low and high end billfish tournament release rates (RBS data) of 89.9 and 99.2 percent for use as a proxy, and represents a worst case scenario. Approximately 150 billfish tournaments operated annually, on average, for the period 1999 - 2004. If catch and release fishing for Atlantic marlins was implemented for an entire season, this could equate to between 1 and 15 billfish tournaments ($150_{\text{annual billfish tournaments}}$ * $0.008$ to $0.101_{\text{estimated reduction in participation}}$ = $1.2$ to $15.15_{\text{tournaments potentially not operating}}$) not operating, with a potentially minor to substantial direct local and/or regional adverse economic impact. This figure represents an increase of approximately one tournament that may not operate over figures presented in the Draft Consolidated HMS FMP. This change stems from incorporation of 2004 data which had the highest number of billfish tournaments since 1999, and which increased the average number of tournaments per year. The estimated socio-economic impact of one to 15 tournaments ceasing operations ranges from $1,375,439 to $20,631,585 ($1_{\text{tournament stopping operations}}$ * \$1,375,339$_{\text{estimated value of a tournament}}$ = $1,375,439; $15_{\text{tournaments stopping operations}}$ * \$1,375,339$_{\text{estimated value of a tournament}}$ = $20,631,585. Nevertheless, this scenario is highly unlikely, given that the ICCAT landing limit must be achieved prior to the fishery becoming catch and release. The only way this scenario could occur would be if the previous year's overage was of sufficient magnitude to completely fill the next season's landing allocation (e.g., 500 or more marlin were landed in a single year). Only in 2002 did reported U.S. marlin landings exceed the 250 fish limit, and, as previously discussed, by only 29 fish. Additional information regarding the potential impacts to tournaments of achieving the threshold for implementing catch and release only fishing under alternative E6 are discussed below.

To estimate socio-economic impacts given a scenario where the ICCAT landing limit is achieved, NMFS has used the 2002 reported landings (279 marlin) as a proxy for determining when a future switch to catch and release only fishing may occur in the future. The 2002 reported landings are the only available proxy for estimating impacts of achieving the ICCAT landing limit, as this is the only year the ICCAT limit has been achieved. As such, by examining the historical distribution of RBS marlin landings by month (1999 - 2004) and distributing 2002 landings proportionally across the fishing year according to the historical landings pattern, NMFS estimates that, if landings increase evenly during all months to levels that would match 2002 landings, the ICCAT landings limit could be achieved on May 12 based on the current June 1 to May 31 fishing year, and August 25 based on a potential switch to a calendar year management cycle. Again, based on current landings patterns this is unlikely to occur, but it is possible for recorded landings to increase as per previously discussed factors. For purposes of clarity, it should be noted that the close proximity of the dates at which a minimum size increase could occur (May 3rd under a June – May 31 management cycle; August 22nd under a calendar year management cycle), under scenario two, and the date at which a shift to catch and release could occur (May 12th under a June 1 – May 31 management cycle; August 25th under a calendar year management cycle), under scenario three, is a reflection of the different assumptions made for purposes of analysis. They also do not include the anticipated impacts of an in-season minimum size increase that would occur under scenario two. As such, readers should not draw the conclusion that a minimum size increase would be followed just days later by a shift to catch and release fishing (under either the June 1 – May 31 management cycle or the calendar year management cycle).

The economic impacts of switching to a catch and release marlin fishery on May 12 (under the June 1 to May 31 fishing year), under the assumptions made for purposes of this analysis, would likely be minor. There are only 19 days left in the June 1 - May 31 fishing year at that point. Using 2004 tournament data for purposes of analysis, there were 16 registered marlin tournaments in May. Of these, three operated prior to May 12th; the point at which catch and release only fishing could be required under this analysis. Of the 13 billfish tournaments occurring after the May 12 "closure" date, it is anticipated that 0.8 to 10.1 percent may cease operations based on the previously discussed assumptions, which equates to between zero and one tournaments based on standard rounding practices, ($13_{\text{tournaments}} * 0.008 \text{ to } 0.101_{\text{estimated decrease in participation}} = 0.1 \text{ to } 1.3_{\text{tournaments stopping operations}}$). However, even these low numbers may be an over estimate as Ditton and Stoll (2004) suggest that at least some anglers would be willing to pay as much as $71 (2004 dollars) over current entry fees to participate in catch and release tournaments (Ditton, 2004). The estimated date for a shift to catch and release fishing under the June 1 – May 31 management cycle provides a limited ability to identify potential regional impacts. The 13 marlin tournaments occurring late in the 2004 fishing year were held in North Carolina, South Carolina, Louisiana, Texas, Alabama, Florida, Puerto Rico, and Georgia. Four occurred in North Carolina, three in Louisiana, and one each in South Carolina, Texas, Alabama, Puerto Rico, Georgia, and Florida. Most were clustered around the Memorial Day weekend. Depending on which tournaments may potentially cease operating, the impacts could occur in different regions. Given the locations of the tournaments, North Carolina would have the highest probability of being adversely impacted of any single state, followed by Louisiana. The South Atlantic region would have the greatest probability of being adversely impacted with seven of the 13 tournaments that could be among those affected. The Gulf region would have a slightly lower probability of being impacted with five of the 13 tournaments, and Puerto Rico would be least likely to be adversely impacted. While states with the smallest number of tournaments would be less likely to be impacted, they would be expected to realize heightened localized adverse impacts if a tournament were canceled. However, there is no way to accurately predict exactly which tournaments may continue to operate or cease operating. Using an average value of $1,339,800 for an average HMS tournament (Ditton and Clark, 1994, converted to 2003 dollars), should one tournament cease operations as a result of alternative E6, this could result in an estimated adverse economic impact of $1,339,800 dollars to the local community, including tournament operators, CHB operators, marinas, and others. Loss of a single tournament would likely result in some small decrease in angler consumer surplus to the vessels participating in that tournament. Data indicate that on average, approximately 47 vessels participate in Atlantic billfish tournaments (Table 4.57). Impacts on shoreside businesses would likely be minor, but could be increased or decreased depending on angler response and when in the season a shift to catch and release only fishing might occur.

The economic impacts of switching to a catch and release marlin fishery on August 25th, under the calendar year management cycle and the assumptions made for purposes of this analysis, would likely be limited. There are, on average, 66 billfish tournaments that occur between August and December, inclusive. However, for the period 2001 – 2004 (inclusive), 27 of these billfish tournaments, on average, were either sailfish or swordfish tournaments that did not award points or prizes for Atlantic marlin, or concluded prior to the estimated action date of August $25^{th}$. This leaves a universe of approximately 39 tournaments that award points or prizes for Atlantic marlin during an average year that could be impacted by a shift to catch and release fishing on August $25^{th}$, if necessary for ICCAT compliance purposes. Of the 39 billfish tournaments occurring after the August 25th "closure" date, it is anticipated that 0.8 to 10.1 percent may cease operations based on the previously discussed assumptions. This equates to between zero and four tournaments being impacted based on standard rounding practices (39 $_{\text{tournaments}}$ * 0.008 to 0.101 $_{\text{estimated decrease in participation}}$ = 0.312 to 3.9 $_{\text{tournaments stopping operations}}$). The estimated universe of tournaments that may be impacted is smaller in this Final Consolidated HMS FMP than was estimated than under the calendar year scenario in the Draft Consolidated HMS FMP. This is the result of further refining the data used in the assessment. In this document, sailfish or swordfish specific tournaments (billfish tournaments that awarded points or prizes only for sailfish or swordfish and thus would not be adversely impacted by a shift to catch and release fishing for marlins) were removed from the universe of potentially affected billfish tournaments. The result is a more accurate accounting of "marlin" tournaments that may possibly be impacted by a shift to catch and release only marlin fishing. As such, the number of tournaments potentially impacted by an inseason shift to catch and release is considered more accurate.

The distribution of potential regional impacts would be similar to those discussed above under Calendar year management cycle scenario two (an in-season minimum size increase) given the proximity of the estimated dates at which a minimum size increase or shift to catch and release only fishing could occur. While states with the smallest number of tournaments would be less likely to be impacted, they would be expected to realize heightened localized adverse impacts if a tournament were canceled. However, there is no way to accurately predict exactly which tournaments may continue to operate or cease operations. Using an average value of $1,375,439 for an average HMS tournament (Ditton and Clark, 1994, converted to 2004 dollars), should zero to four tournaments cease operations as a result of alternative E6, under a worst case scenario this could result in an estimated adverse economic impact of $0 to $5,501,756 dollars to the local community, including tournament operators, CHB operators, marinas, and others (0 $_{\text{tournaments stopping operations}}$ * \$1,375,339 $_{\text{estimated value of a tournament}}$ = \$0; 4 $_{\text{tournaments stopping operations}}$ * \$1,375,339 $_{\text{estimated value of a tournament}}$ = \$5,501,756). Loss of up to four tournaments would likely result in some small decrease in angler consumer surplus to the vessels participating in those tournaments. However, even these low numbers may be an over estimate as Ditton and Stoll (2004) suggest that at least some anglers would be willing to pay as much as $71 (2003 dollars converted to 2004 dollars) over current entry fees to participate in catch and release tournaments (Ditton, 2004). Data indicate that on average, approximately 47 vessels participate in Atlantic billfish tournaments (see Table 4.57). Impacts on shoreside businesses would likely be minor, but could be increased or decreased depending on angler response and when in the season a shift to catch and release only fishing might occur. Further, should a marlin fishery "closure" occur as a result of alternative E6, this could result in positive economic impacts for operators of sailfish or swordfish specific tournaments and CHB operators who specifically target these species, if anglers shift effort to these other billfish species. NMFS is unable to quantify these impacts, as angler behavior cannot be predicted.

Under either the June 1 – May 31 management cycle or the calendar year management cycle, Alternative E6 could have smaller long-term adverse socio-economic impacts than Alterative E1, the No Action alternative, if landings increase in the future. Alternative E6 would allow NMFS significant flexibility in determining if and when action should be taken to remain consistent with international obligations. Alternative E6, would allow the response to be tailored to the peculiarities of a given fishing year to ensure maximum utilization of the ICCAT landing limit. This response would likely allow the Agency to avoid disproportionately impacting CHB operators, tournaments, and anglers who fish for marlin late in the fishing year by providing anglers the greatest opportunity to land marlin over the entire length of the fishing year. Alternative E1 would simply result in the shutdown (catch and release fishing only) of the fishery on an emergency basis if the ICCAT landing limit were achieved. The shift to catch and release only fishing under the no action alternative would likely occur at an earlier point in the season than under alternative E6, where landings would first be slowed by increasing the minimum size, and then prohibited if the landings reached the ICCAT landing limit. Alternative E6 is anticipated to allow a shutdown of the marlin fishery to be avoided, and at a minimum, significantly extend the open period of the fishing year prior to a closure, thereby minimizing negative socio-economic impacts. Alternative E6 may result in a temporary decrease in angler consumer surplus if increased minimum sizes or catch and release requirements were implemented for the remainder of a fishing year. The loss of angler consumer surplus should be mitigated to an extent by the ability of anglers to continue to land fish if the minimum size is increased, the availability of other billfish species for landing, and given that existing minimum sizes and the ability to land fish would be restored at the start of the next fishing year.

A number of commenters expressed concern that potential impacts of a shift to catch and release fishing would have dramatic and substantial adverse economic impacts. NMFS fully appreciates these concerns, and recognizes that some areas may have heightened localized impacts. However, this alternative was specifically constructed, in part, to minimize the potential adverse impacts of implementing a non-discretionary international obligation by allowing NMFS substantial flexibility in determining when to respond, and how to respond, should marlin landings approach the international limit. The alternative is designed to allow the fishing season to continue with a minimum of disruption as long as possible, and then when action may be required, implementing management measures that would still allow for the fishery to continue. Between angler's conservation ethic, as witnessed by the high rate of catch and release, the current low rate of marlin landings, the availability of other billfish species for landing, and the flexibility built into this alternative, NMFS anticipates that impacts would be limited, and any unavoidable impacts would be substantially mitigated.

Alternative E7, a shift to catch and release only fishing for Atlantic white marlin for five years, could potentially lead to negative social and economic effects, although the magnitude is difficult to assess. As discussed under alternative E1, the majority of data indicate a strong adherence by Atlantic billfish anglers to catch and release fishing for white marlin. Based on RBS, LPS, and MRFSS data, NMFS estimates that between 0.4 percent and 10.6 percent of all white marlin catches are landed (Table 4.49, Table 4.50, and Table 4.51).

As of February 1, 2006, there were 25,238 Angling, 4,173 CHB, and 4,824 General category permit holders. See Chapter 3 for additional permit information. Given the multi-species nature of HMS permits, and the fact that vessels are permitted rather than individual anglers, NMFS does not have the ability to identify what subset of these permitted vessels, or how many anglers, participate in the recreational billfish fishery.

It is difficult to estimate the percentage of Angling category fishing trips that would not be taken if catch and release fishing for white marlin was mandatory, however the Agency acknowledges that some percentage of total Angling category trips would likely be canceled due to the inability to land a white marlin. Ditton and Stoll (2003) estimate that there are 7,915 billfish anglers in the U.S. Atlantic and 1,627 billfish anglers in Puerto Rico. Angler expenditures for marlin targeted trips are estimated to be $704.00 per angler (in 2004 dollars), based on a limited sample size. In contrast, angler expenditures for other HMS targeted trips are estimated at $125.00 per angler (in 2004 dollars), based on 621 observations (NMFS, 2001). Ditton and Stoll (2003) report that a 1990 study estimated average expenditures of $2,105.00 ($3,042.00 in 2004 dollars) for Atlantic billfish trips and that a 1994 study estimated a mean expenditures of $1,052.00 ($1,341.00 in 2004 dollars) for Puerto Rico billfish trips. As reported by Ditton and Stoll (2003) the aggregate economic impact of billfish fishing trips in the U.S. Atlantic is conservatively estimated to be $22.7 million annually, not including Puerto Rico. These data indicate that billfish anglers place a high value on billfish fishing. Under alternative E7, Angling category fishermen may reduce the number of trips targeting white marlin. Reduced participation in the billfish fishery would likely result in negative social and economic impacts for this sector. Considering the overwhelming catch and release ethic of billfish anglers (31 white marlin reported landed in 2004), however, NMFS anticipates that any negative social and economic impacts under this alternative would be small. The short-term social impacts of not being able to land trophy or record category fish is difficult to assess, however NMFS anticipates that this alternative could lead to a decrease in angler consumer surplus. The long-term impacts of alternative E7 may result in an increase in net benefits as stocks rebuild and recreational encounters with white marlin become more frequent.

Sutton *et al.* 1999, estimate that CHB operators each take 109 for-hire trips per year on average, with approximately 2.6 percent of those trips targeting billfish. Multiplying the average number of CHB trips by the number of CHB permits ($109_{\text{avg. CHB trips per year}} * 4{,}173_{\text{CHB permits}} = 454{,}857$) and multiplying the product by 0.026 ($454{,}857_{\text{total CHB trips}} * 0.026_{\text{percentage of CHB billfish trips}} = 11{,}826$) provides a rough estimate of the annual number of billfish trips taken by CHB operators. Of the 11,826 CHB trips targeting billfish, between 47 and 1,254 trips may be canceled given the inability to retain white marlin ($454{,}857_{\text{CHB trips}} * 0.026_{\text{percent of CHB trips BLF directed}} * .004_{\text{WHM low retention rate}} = 47.3$) ($454{,}857_{\text{CHB trips}} * 0.026_{\text{percent of CHB trips BLF directed}} * 0.106_{\text{WHM high retention rate}} = 1{,}253.5$). NMFS estimates that the cost of a CHB trip currently averages $1,053.00 (in 2004 dollars). Given this figure, the Agency estimates that alternative E7 could result in between $49,491 and $1,320,462 in lost revenues to CHB vessels ($47_{\text{estimated lost trips}} * \$1{,}053.00_{\text{avg. cost per trip}} = \$49{,}491$) ($1{,}254_{\text{estimated lost trips}} * \$1{,}053.00_{\text{avg. cost per trip}} = \$1{,}320{,}462$). The loss of revenues of this magnitude would likely result in minor to moderate negative social and economic impacts to the CHB sector. While NMFS cannot definitively forecast angler behavior, given the previously discussed catch and release ethic of billfish anglers (31 white marlin reported landed in 2004), NMFS anticipates that most anglers would continue to fish for Atlantic white marlin under catch and release restrictions. As such, NMFS anticipates that negative impacts under this alternative would be less severe than those estimated above. Further, the continued ability of anglers to pursue and land other Atlantic billfish species, and other non-HMS may further mitigate potential adverse impacts, which may result from this alternative.

General category permit holders are only allowed to fish for, retain, or possess white marlin in registered HMS tournaments; however the Agency does not possess information regarding how many General category permit holders participate and land white marlin in tournaments. Under alternative E7, negative social and economic impacts could occur if General category vessels that normally participate in HMS tournaments cease operations. Potential negative impacts would not likely be realized by those General category vessels that already practice catch and release fishing for white marlin or participate in catch and release tournaments, because NMFS anticipates that these anglers would continue to pursue Atlantic white marlin under a catch and release only fishery.

In 2004, there were 129 registered tournaments that awarded points or prizes for white marlin captures (see Chapter 3). Based on RBS data from 1999 – 2004 (Table 4.49), the retention rates of white marlin in tournaments range from 0.8 percent to 3.2 percent. For purposes of analysis only, NMFS assumes that under a worst-case scenario, that this same percentage (0.8 to 3.2 percent) of tournaments may stop operating. Under these assumptions, NMFS estimates that alternative E7 may result in between one and four tournaments would not continue to operate in a catch and release only fishery for white marlin. As previously discussed, NMFS estimates the average value of an HMS tournament to be $1,375,439 (in 2004 dollars). Assuming that one to four tournaments cease operations, the Agency estimates that alternative E7 could result in negative economic impacts ranging from $1,375,439 to $5,501,756. The loss of revenues of this magnitude would likely result in moderate social and economic impacts for tournaments, tournament participants, and associated businesses. While NMFS cannot definitively forecast angler behavior, given the previously discussed catch and release ethic of billfish anglers, NMFS anticipates that most anglers would likely continue to pursue white marlin under a catch and release only fishery and most tournaments would continue to operate under a revised format. As such, adverse impacts under this alternative would likely be of a lesser magnitude than those estimated above. Additionally, a recent survey based on tournament anglers in Texas, determined that angler willingness to pay is $71.00 (in 2004 dollars) higher for participation in catch and release tournaments than it is for participation kill tournaments (Ditton and Oh, 2004).

Negative social and economic impacts resulting from alternative E7 may be mitigated by a delayed effective date for implementing a catch and release only requirement for Atlantic white marlin of January 1, 2007. A delayed effective date would be anticipated to allow tournament operators limited time to alter tournament rules to provide for a catch and release format and allow anglers to adjust to new requirements.

Angler consumer surplus would likely remain high, given the currently high release rate of white marlin, which is reinforced by the low number of verified landings that occurred in recent years. However, it is possible that angler consumer surplus may decrease given the inability to land white marlin. Further, under alternative E7, anglers would still have the ability to land other billfish, including trophy-sized sailfish and blue marlin. To mitigate negative socio-economic impacts, alternative E7 would delay implementation of catch and release only fishing requirements to allow the fishery time to adjust to new measures, and would include a sunset provision five years from implementation of catch and release requirements. Alternative E7 would likely provide limited benefit for the species and likely result in lesser socio-economic impacts to the billfish community than alternative E8.

During the public comment period, NMFS received strong comment opposed to the Atlantic white marlin catch and release alternative. Based on public comment that indicated more significant concerns over potential adverse economic impacts to the fishery if catch and release only fishing for Atlantic white marlin were required, as well as a number of other factors, including but not limited to, the impending receipt of a new stock assessment for Atlantic white marlin and upcoming international negotiations on Atlantic marlin, the Agency does not prefer to prohibit landings of Atlantic white marlin, at this time. Additionally, NMFS received substantial comment in support of this measure. The commenters supporting the white marlin landings prohibition stated concerns over stock status, the ESA listing review, and an interest in maintaining leadership at the international level. The implementation of circle hook requirements would be an important first step in reducing mortality in the directed billfish fishery. NMFS will consider catch and release only fishing options for white marlin as well as other billfish conservation measures in future rulemakings, as necessary and appropriate.

Similar to alternative E7, alternative E8 could potentially lead to negative social and economic impacts, although the magnitude is difficult to assess. As discussed under alternative E1, the majority of data indicate a strong adherence by Atlantic billfish anglers to catch and release fishing for blue marlin. Based on RBS, MRFSS, and LPS data, NMFS estimates that between 3.9 percent and 24.2 percent of all blue marlin catches are landed (Table 4.49, Table 4.50, and Table 4.51).

As of February 1, 2006, there were 25,238 Angling, 4,173 CHB, and 4,824 General category permit holders. Given the multi-species nature of HMS permits, and the fact that vessels are permitted rather than individual anglers, NMFS does not have the ability to identify what subset of these permitted vessels, or how many anglers, participate in the recreational billfish fishery. It is difficult to estimate the percentage of Angling category fishing trips that would not be taken if catch and release fishing for blue marlin was mandatory, however the Agency acknowledges that some percentage of total Angling category trips would likely be canceled due to the inability to land a blue marlin.

Under alternative E8, Angling category fishermen may reduce the number of trips targeting blue marlin. Reduced participation in the billfish fishery would likely result in negative social and economic effects and costs for this sector, however, considering the catch and release ethic of billfish anglers (118 blue marlin reported landed in 2004), NMFS anticipates that the economic costs under this alternative would not be large. The short-term social impacts of not being able to land trophy or record category fish is difficult to assess, however NMFS anticipates that this alternative could lead to a decrease in angler consumer surplus. The long-term impacts of alternative E8 may result in an increase in net benefits as stocks rebuild and recreational encounters with blue marlin become more frequent.

Using the same assumptions discussed above, the Agency estimates that of the 454,857 CHB trips occurring yearly, 11,826 of those are billfish directed CHB trips (454,857 * 0.026 Percent of BLF directed CHB trips = 11,826). Of the 11,826 CHB trips targeting billfish, between 461 and 2,862 trips may be canceled given the inability to retain blue marlin (454,857 CHB trips * 0.026 percent of CHB trips BLF directed * 0.039 BUM low retention rate = 461.2) (454,857 CHB trips * 0.026 percent of CHB trips BLF directed * 0.242 BUM high retention rate = 2,862.0). NMFS estimates that the cost of a CHB trip currently averages $1,053.00 (in 2004 dollars). Given this figure, the Agency estimates that alternative E8 would have greater economic costs than alternative E7 and could result in between $485,433 and $3,013,686 in lost revenues to CHB vessels annually. The loss of revenues of this magnitude would likely result in moderate negative social and economic impacts to the CHB sector, however considering the catch and release ethic of billfish anglers, NMFS anticipates that negative impacts under this alternative would be of a lesser magnitude than those calculated above.

General category permit holders are only allowed to fish for, retain, or possess blue marlin in registered HMS tournaments; however the Agency does not possess any information regarding how many General category permit holders participate and land blue marlin in tournaments. Under alternative E8, negative social and economic impacts could occur if General category vessels that normally participate in HMS tournaments cease operations. Potential negative impacts would not likely be realized by those General category vessels that already practice catch and release fishing for blue marlin or participate in catch and release tournaments, because NMFS anticipates that these anglers would continue to pursue blue marlin under a catch and release only fishery. As such, adverse impacts under this alternative would likely be of a lesser magnitude than those estimated above.

In 2004, there were 142 registered tournaments that awarded points or prizes for blue marlin captures (see Chapter 3). Based on RBS data from 1999 – 2004 (Table 4.49), the retention rates of blue marlin in tournaments range from 6.7 percent to 10.1 percent. For purposes of analysis only, NMFS assumes that under a worst-case scenario, that this same percentage (6.7 to 10.1 percent) of tournaments may stop operating. Under these assumptions, NMFS estimates that under alternative E8 between ten and 14 tournaments would not continue to operate in a catch and release only fishery for blue marlin. As discussed above, NMFS estimates the average value of an HMS tournament to be $1,375,439 (in 2004 dollars). Assuming that ten to 14 (142 tournaments * 0.067 to 0.101 decrease in tournament participation = 9.5 to 14.3 tournaments that may cease operations) tournaments cease operations, the Agency estimates that alternative E8 could result in negative economic impacts ranging from $13,754,390 to $19,256,146. The loss of revenues of this magnitude would likely result in sizeable local negative social and economic impacts for tournaments, tournament participants, and associated businesses, however, considering the catch and release ethic of billfish anglers, NMFS anticipates that negative impacts under this alternative would be of a lesser magnitude than those calculated above. Relative to the fishery as a whole, these impacts would be minor, however, as stated; the localized impacts may be felt more acutely. Additionally, a recent survey based on tournament anglers in Texas, determined that angler willingness to pay is $71.00 (2004 dollars) higher for participation in catch and release tournaments than it is for participation kill tournaments (Ditton and Oh, 2004).

Negative social and economic impacts resulting from this alternative may be mitigated by a delayed effective date of implementing a catch and release only requirement for Atlantic blue marlin. A delayed effective date is anticipated to allow tournament operators sufficient time to alter tournament rules to provide for a catch and release format and allow anglers to adjust to new requirements.

Under alternative E8, angler consumer surplus would likely remain high, given the currently high release rate of blue marlin, which is reinforced by the low number of verified landings that occurred in recent year. However, it is possible that angler consumer surplus may decrease given the inability to land blue marlin. Further, under alternative E8 anglers would still have the ability to land other billfish, including trophy-sized sailfish and white marlin. To mitigate negative socio-economic effects and cost, alternative E8 would delay implementation of catch and release only fishing requirements to allow the fishery time to adjust to new measures, and would include a sunset provision five years from implementation of catch and release requirements.

As discussed above, it is appropriate for the Agency to investigate potential options to reduce domestic mortality rates for blue marlin. This alternative was analyzed but not preferred in the Draft Consolidated HMS FMP or in this Final Consolidated HMS FMP due to potentially severe negative social and economic impacts, limited conservation benefits, the anticipated receipt of a new stock assessment in the near future which may provide significant new information on the fishery, and other reasons. The United States will continue its efforts to reduce billfish mortality both domestically and at the international level. Additionally, the Agency may consider catch and release only options for Atlantic blue marlin as well as other billfish conservation measures in future rulemakings, as necessary and appropriate.

*Conclusion*

As described in Chapter 1, the objectives of this document are multifaceted and include, *inter alia*, reducing mortalities of Atlantic billfish in directed and non-directed fisheries. This can be achieved, in part, by addressing known sources of mortality (including landings and post-release mortalities) in the directed recreational marlin fishery. Preferred alternatives E3 and E6 would strike an appropriate balance between conserving living marine resources and maintaining robust recreational fisheries while achieving the objectives of Consolidated HMS FMP. The preferred alternatives would be anticipated to substantially reduce the post-release mortality of Atlantic white marlin and are likely to provide positive ecological benefits for other species, including blue marlin, sailfish, tunas, and others with which recreational billfish fishermen interact, while maintaining consistency with United States' international obligations. The delayed date of effectiveness for preferred alternative E3 would be anticipated to mitigate, to the extent practicable, adverse economic impacts and losses in angler consumer surplus by allowing: tournament operators adequate time to adjust advertising, rules, business practices, and tournament formats; existing stockpiles of J-hooks to be used; and, anglers time to become comfortable and proficient with newly required gear. High levels of adherence to the practice of catch and release fishing, as well as the ability of anglers to continue to use J-hooks outside of tournaments, or in tournaments when deploying artificial lures, should also further substantially mitigate socio-economic impacts. The suite of preferred alternatives would achieve the purpose and scope of this rulemaking by providing comprehensive and meaningful protection to Atlantic billfish, maintaining a robust directed fishery for billfish, and achieving legal and policy obligations. Importantly, by providing a successful roadmap for billfish conservation, NMFS may provide the impetus for other nations to adopt similar management measures, thereby improving conservation of Atlantic billfish throughout their entire range.

## 4.3 Management Program Structure

### 4.3.1 Atlantic Bluefin Tuna Quota Management

#### *4.3.1.1 BFT Quota Management in the General and Angling Categories*

As described in Chapter 2, the alternatives considered for BFT time-period subquotas in the General and Angling categories are:

F1 Maintain the time-periods, subquota allocations, and geographic set-asides for the General and Angling categories as established in the 1999 FMP (No Action)

F2 Establish General category time-periods, subquotas, and geographic set-asides annually via framework actions

*F3 Amend the management procedures regarding General category time-periods, subquota, as well as geographic set-asides to allow for future adjustments to take place via a regulatory framework action – Preferred Alternative*

F3(a) Establish monthly General category time-periods and subquotas (June-Jan; 12.5 percent each)

F3(b) Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 54 percent; Sept, 26.5 percent; Oct-Nov, 9 percent; Dec, 5.2 percent; and Jan, 5.3 percent)

*F3(c) Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 50 percent; Sept, 26.5 percent; Oct-Nov, 13 percent; Dec, 5.2 percent; and Jan, 5.3 percent) – Preferred Alternative*

F3(d) Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 38.7 percent; Sept, 26.6 percent; Oct-Nov, 13 percent; Dec, 10.8 percent; and Jan, 10.9 percent)

*F4 Clarify the procedures for calculating the Angling category school size-class BFT subquota allocation and maintain the Angling category North/South dividing line – Preferred Alternative*

*Ecological Impacts*

Minimal, if any, ecological impacts would be expected as a result of adjusting the General category time-periods and/or associated subquotas and/or amending the school size-class tolerance calculation because the overall quotas and size-classes of BFT being targeted by each domestic quota category would not change. In the case of the General category, only the proportion of the coastwide General category quota assigned to each time-period would be altered. For example, even though the time-period subquota percentage for December and January would be increased, the time-period subquota for June through August would be decreased. As a result, there might be increased harvest in the later portions of the General category BFT season, but there would also be a corresponding decrease in harvest in the earlier portions of the season. These small orders of change, quantified in either numbers of fish or in weight (mt), or time and/or location of harvest, compared to overall U.S. harvest levels as recommended by ICCAT under the 20-year rebuilding program, equate to ecological impacts that are unlikely to be measurable given the variability in the data used to conduct BFT stock assessments. Additionally, the numbers of BFT harvested from each different size-class would remain consistent with the levels of BFT mortality used in the stock assessment. Therefore, only negligible ecological impacts would be expected from the following alternatives, as they relate to the ICCAT-recommended rebuilding plan for BFT.

Alternative F1 (No Action), would maintain the General category time-period subquota allocation scheme and the Angling category size-class subquota allocation procedures, as stated in the 1999 FMP. The BFT fishery has been managed via these allocations and procedures since the implementation of the 1999 FMP. These allocations and procedures are consistent with the ICCAT recommendations; therefore, NMFS does not expect this alternative to result in any negative ecological impacts beyond those accounted for in the 20-year BFT rebuilding plan.

Alternative F2 would establish General category time-periods, subquotas, and geographic set-asides annually via a framework action, and may have slightly different ecological impacts from alternative F1, as the time-periods, subquotas, and/or geographic set-asides may shift temporally and geographically from one year to the next. These ecological impacts would be expected to be negligible as well. These shifts could decrease or increase protected resource interactions, discards, and incidental catch of other finfish and would likely need to be analyzed each year depending on the changes proposed. However, as compared with other commercial gear types, commercial handgear typically produce relatively low levels of bycatch and bycatch mortality. Bycatch in the commercial handgear fishery can be monitored via the Large Pelagics Survey (LPS), but may be unaccounted for if the fishery is prosecuted in those areas outside LPS coverage or after the LPS sampling season is concluded. The LPS samples private and for-hire vessels and their landings from offshore fishing trips that target HMS in Virginia through Maine from June through October. A separate source of bycatch information can be derived from vessel logbook programs associated with other non-HMS fisheries in which HMS permitted vessel owner/operators may participate. At this time, there is little information on commercial handgear bycatch. Anecdotal reports suggest that there may be low level of tuna discards due to minimum size restrictions. This process of establishing General category time-periods and associated subquotas annually via a regulatory framework action would not noticeably alter current fishing methods or effort. Therefore, no noticeable adverse or positive ecological impacts would be expected from this alternative. For further information/analyses regarding commercial handgear interactions with protected resources, see Section 3.4.3.

Alternative F3, a preferred alternative, would remove specific General category time-period, subquota, and geographic set-aside language from the consolidated HMS FMP. This alternative would also codify the time-periods and the associated subquota allocations, including allocation percentages and the corresponding quota tonnage, in the regulatory text implementing the consolidated FMP and would remove the New York Bight set-aside. The sub-alternatives F3(a) through F3(d) appear to have similar ecological impacts as those presented in alternatives

F1 and F2, in the sense that the BFT baseline quotas would be consistent from one year to the next, provided the ICCAT-recommended U.S. BFT TAC remains consistent. There may be a slight shift in BFT landings, both temporally (to later in the season) and geographically to the South. However, the number of BFT harvested from each different size-class would remain consistent with the levels of BFT mortality used in the stock assessment. These temporal and spatial shifts in landings may present decreases or increases regarding protected resource interactions, discards, and incidental catch of other finfish. However, for the same reasons mentioned in alternative F2, NMFS does not expect any adverse ecological impacts associated with this alternative. For further information/analyses regarding commercial handgear interactions with protected resources, see Section 3.4.3.

Alternative F4, a preferred alternative, would clarify the procedures for calculating the Angling category school size-class BFT subquota allocation. Specifically, the eight percent school BFT tolerance for the Angling category would be determined prior to removing the NED Statistical set-aside allocation, resulting in a slight increase (*i.e.*, 0.02 percent) in the school BFT baseline quota allocation. Public comment supported the procedural change to calculating the school size subquota. Effort on the school size-class BFT would not be expected to increase as a result of this alternative, due to the very minor increase in available quota. Therefore, substantial changes in either current fishing methods or interaction rates with protected resources or other finfish would not be expected. This alternative has been slightly modified from that proposed in the draft HMS FMP. This preferred alternative modifies the proposed alternative in the draft FMP by retaining the North/South Angling category dividing line located at 39º 18 minutes N. latitude (Great Egg Inlet, NJ) (Table 2.1). As this modification to the alternative would not alter the Angling category quota or the overall U.S. BFT TAC, nor the effort expended by recreational participants, NMFS would not expect any adverse ecological impacts associated with this alternative.

NMFS, based on the best scientific information available, is unaware of any definitive ecological impacts on protected resources that would be associated with implementation of any of the alternatives discussed in this section. Limited data are available on the interactions of commercial and recreational handgear with protected resources, marine mammals, and other finfish. NMFS will continue to monitor HMS handgear fishery interactions with protected resources, marine mammals, and non-targeted finfish and will work to resolve any issues that may arise.

*Social and Economic Impacts*

Alternative F1 would maintain the historical General category time-period and subquota allocation scheme as well as the process used to establish it, *i.e.*, specific details would remain in the 1999 FMP itself. This alternative would require an FMP amendment to adjust these time-periods, subquota percentages, and/or geographic set-asides. This alternative may have both positive and negative social and economic impacts. The positive impacts would be attributed to the General category time-periods and associated subquota allocation percentages remaining consistent with those of prior years (Table 4.59), as well as maintaining the General category New York Bight set-aside allocation for those participants operating in that designated area. The adverse impacts associated with the General category would consist of hindering NMFS' ability to adapt BFT management measures to account for variations inherent to the fishery from one year to the next due to the timeframes associated with conducting an FMP amendment. The positive impacts, in regards to the Angling category would entail maintaining the North/South dividing line; thereby providing a more equitable geographic and temporal distribution of recreational fishing opportunities by separating each BFT size-class subquota into two geographical regions and ensuring reasonable recreational fishing opportunities in all geographic areas without risking overharvest of the Angling category quota. The adverse impacts associated with maintaining the North/South dividing line would be the continued perception that the Agency has the appropriate recreational data in a timely fashion to use this management tool to adjust daily retention limits thus providing fair and equitable recreational fishing opportunities in real-time.

This alternative would also have some adverse social and economic impacts on fishermen, dealers, and the support industries located in the South Atlantic region. Under the No Action alternative, the General quota allocation is heavily frontloaded in the season and if high catch rates were to occur, the quota could be harvested in full prior to the BFT arriving off the coast of South Atlantic states. This uncertainty regarding the amount of BFT quota available late in the season does not allow for businesses to plan accordingly. For instance it is vital for fishermen to obtain the appropriate gear and outfit the vessel properly; or as a dealer, to maintain the appropriate staff and shipping/packing material as well as maintain leases, etc; or in the case of a support industry like a bait/tackle supplier, to have the appropriate gear pre-ordered so it is available for purchase. These adverse impacts could be mitigated if South Atlantic General category participants were to travel north in the early portion of the season. Overall, the adverse social and economic impacts associated with this alternative would be expected to outweigh the positive impacts.

The potential gross revenues generated under the No Action alternative were calculated for each specific time-period by using the status quo time-period subquota allocation percentages, the whole weight equivalent (in metric tons and pounds), and the average ex-vessel prices (whole weight) for 1999 through 2004, inclusive.

**Table 4.59 Alternative F1: Gross revenues associated with the No Action alternative regarding the General Category time-period subquota allocation.***

| Time-Period | Percentage | Equivalent in mt* | Approx. Equivalent in lb* | Average Ex-Vessel $ ('99-'04) | Gross Revenues |
|---|---|---|---|---|---|
| JUNE - AUG | 60.0 | 413.9 | 912,483.9 | 7.71 | 7,035,250.80 |
| SEPTEMBER | 30.0 | 206.9 | 456,131.7 | 7.10 | 3,238,535.00 |
| OCT - JAN | 10.0 | 69.0 | 152,117.4 | 6.85 | 1,042,004.10 |
| TOTAL | 100.0 | 689.8 | 1,520,733.0 | | 11,315,789.90 |

Note: For comparison purposes, this table assumes the New York Bight set-aside is distributed evenly throughout the fishing year.
*Time-period allocations may differ slightly due to rounding.

Alternative F2 would provide NMFS with more flexibility, in comparison to the other alternatives, by establishing the General category time-periods, subquotas, and geographic set-asides annually via a regulatory framework action (*i.e.*, not an FMP amendment). The administrative burden would increase because the annual BFT specifications, plus the analytical documents, would be conducted annually. Plus, there would be a heightened importance to finalize the specifications prior to January 1 of each year, assuming the preferred CY/FY alternatives contained in Section 2.3.2 are implemented. Under this alternative, the industry would not have the necessary information to devise a business plan for the upcoming year prior to the start of the fishery because the time-periods and associated subquotas would be established each year. For example, each year, permit applicants may choose a quota category in which to permit their vessel, and this decision is usually based on the amount of quota and the rules and regulations that pertain to each individual permit category. As the time-periods, associated subquota allocations, and potential geographic set-asides would be established just prior to the start of the fishing season, fishermen would only have the overall General category quota allocation on which to base their decisions. There may also be positive social and economic impacts attributed to increases in a domestic quota category, time-period subquota, or geographic set-aside quota in a given year. However, the likelihood of experiencing negative social or economic impacts due to a decrease in any of these areas is equally the same.

Alternative F3, a preferred alternative, would blend aspects of alternatives F1 and F2 together to optimize the positive social and economic impacts by enhancing NMFS' flexibility to adapt to the BFT fisheries' inherent variability. This alternative would provide consistent General category time-periods and subquotas, from one year to the next, as the quota tonnage derived from the domestic quota allocations percentages and the ICCAT recommended BFT TAC would be codified in the regulatory text implementing the consolidated HMS FMP. These baseline quota amounts would change when ICCAT modifies or amends the BFT TAC recommendation. This alternative would also authorize adjustments to the General category time-periods, associated subquotas, and geographical set-asides via a regulatory framework action versus an FMP amendment, if warranted, based on changes to the ICCAT BFT quota recommendations. This balance between providing consistent baseline quota allocations and having the flexibility and ability to amend them, if warranted, in a relatively timely fashion would provide positive social and economic impacts because fishermen would be able to plan their business activities in advance while the Agency would have the flexibility to adapt to changing fishery conditions.

This alternative would also adjust the actual General category time-periods and the associated subquotas to reflect historical General category BFT allocations while incorporating recent trends in the fishery, both temporally and geographically. For instance, historically, the General category BFT fishery has been prosecuted in the summer and early fall months primarily in the waters off of New England. However, in recent years, BFT have been available in large numbers during the winter months in waters off the South Atlantic states. Therefore, this alternative would have positive social and economic impacts on the General category as a whole by providing reasonable fishing opportunities to General category BFT fishery participants over a broader geographic and temporal range when BFT are available to them, as well as providing some level of certainty as to the amount of quota that would be available for a given time-period. Any adverse social and economic impacts that may be associated with this alternative would be minor and primarily linked to the slight shifts in General category quota allocation as discussed in further detail under each subalternative.

Under these sub-alternatives, the potential gross revenues are calculated using 1999 through 2004 average monthly ex-vessel prices per pound (whole weight), the quota tonnage for each time-period (based on the preferred allocation percentages), the assumption that catch rates are consistent across time, and that each time-period subquota allocation is harvested in its designated time frame. NMFS is aware that these assumptions may not account for the variability inherent in the fishery (*i.e.*, availability of BFT, skill level of fishermen, weather conditions, etc.); the analyses, however, show the relative impacts of the various alternatives.

All of the following sub-alternatives would allow for the carryover of unharvested General category quota to the subsequent time-period allocation as stated in the No Action alternative (F1) or as stated in alternative F4. Under the alternatives, the break in fishing years would fall in the middle of the current winter fishery, *i.e.*, between December and January. NMFS discusses how this may affect quota rolling over from one time-period to another in more detail in Section 2.3.2. These alternatives also formally respond the Petition for Rulemaking submitted by the NCDMF. The Petition claims that the current General category BFT quota allocation scheme does not provide a reasonable opportunity to harvest BFT with commercial handgear off the South Atlantic coast during the winter months, thereby not ensuring fair and equitable treatment of all General category permit holders.

Subalternative F3(a) would distribute the coastwide General category quota equally, in 12.5 percent shares (Table 4.60), among the eight months that make up the General category BFT season (June-January). This subalternative would have both positive and negative social and economic impacts as it would provide some stability to the constituency by establishing a known amount of quota that would be available at the first of each month. However, if catch rates are high in the early portion of the month, these quotas could be harvested rapidly and may lead to derby style fisheries on the first of each month, which is contrary to NMFS' intent. This subalternative would formalize the General category winter BFT fishery, but would do little to recognize historical General category BFT allocations, thereby potentially excluding a group of long-time participants. This subalternative would result in positive social and economic impacts for those General category participants located in the South Atlantic region due to a 40 percent increase in available quota, compared to the No Action alternative, during the time frame of October through January. This increase in quota would equate to approximately $5.5 million in additional gross revenues for those individuals that participate in the later part of the General category season. However, those General category participants in the New England area, or those participants that pursue BFT in the summer months, might experience some adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance, under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately 22.5 percent and the September time-period subquota by approximately 17.5 percent. These reductions in allocation would result in decreased gross revenues of approximately $2.8 and $1.8 million, respectively. This totals $4.6 million in losses whereas the gain above is $5.5 million. The difference of $0.9 million is derived from the different average ex-vessel prices at different times of the fishing year. This subalternative would also reduce the need for specific geographic set-asides because quota allocations would be made on a monthly basis. This subalternative would assist in distributing the General category BFT catch, temporally and geographically, which is beneficial for the collection of CPUE data and may assist in avoiding large scale landings in a constrained time frame, thus reducing market gluts.

**Table 4.60 Alternative F3(a): Gross revenues associated with the even sub-allocation of the General Category quota between the 8-month fishing season.**

| Time-Period | Percentage | Approx. Equivalent in mt* | Approx Equivalent in lb* | Average Ex-Vessel $ ('99-'04) | Approx. Gross Revenues |
|---|---|---|---|---|---|
| JUNE | 12.5 | 86.23 | 190,102.65 | 6.42 | $ 1,220,459.01 |
| JULY | 12.5 | 86.23 | 190,102.65 | 8.19 | $ 1,556,940.70 |
| AUGUST | 12.5 | 86.23 | 190,102.65 | 7.56 | $ 1,437,176.03 |
| SEPTEMBER | 12.5 | 86.23 | 190,102.65 | 7.10 | $ 1,349,728.82 |
| OCTOBER | 12.5 | 86.23 | 190,102.65 | 6.66 | $ 1,266,083.65 |
| NOVEMBER | 12.5 | 86.23 | 190,102.65 | 7.01 | $ 1,332,619.58 |
| DECEMBER | 12.5 | 86.23 | 190,102.65 | 7.70 | $ 1,463,790.41 |
| JANUARY | 12.5 | 86.23 | 190,102.65 | 7.76 | $ 1,475,196.56 |
| TOTAL | 100.0 | 689.8 | 1,521,174.0 | | $11,101,994.76 |

*Time-period allocations may differ slightly due to rounding.

Subalternative F3(b) would implement General category time-periods, and associated subquota allocation percentages similar to those contained in the 1999 FMP, but would separate the October through January time-period into three distinct time-periods of October through November, December, and January. This would establish a formal General category winter BFT fishery on which fishermen, dealers, and supporting industries could depend and plan. The General category time-period subquota allocation percentages would be adjusted slightly to incorporate the allocations in the winter months, but would still recognize the historical General category allocations during the summer and fall months (Table 4.61).

This subalternative would have positive social and economic impacts to those General category participants located in the South Atlantic region due to a 9.5 percent increase in available quota, compared to the No Action alternative, during the time frame of October through January. This increase in quota would equate to approximately $1.1 million in additional gross revenue for the later part of the General category season. However, those General category participants in the New England area, or those participants which pursue BFT in the summer months, may experience roughly equivalent adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance, under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately six percent and the September time-period allocation by approximately 3.5 percent. These reductions in allocation would result in decreased early season gross revenues of approximately $0.7 and $0.4 million, respectively. These negative impacts may be mitigated by individuals traveling to where the BFT are located at any time of the season. However, NMFS has little specific information at this time regarding the costs that would be incurred due to this travel.

**Table 4.61 Alternative F3(b): Gross revenues associated with the proposed sub-allocation of the General Category quota, providing a BFT winter fishery in the South Atlantic**

| Time-Period | Percentage | Approx Equivalent in mt* | Approx Equivalent in lb* | Average Ex-Vessel $ ('99-'04) | Approx. Gross Revenues |
|---|---|---|---|---|---|
| JUNE - AUG | 54.0 | 372.5 | 821,213.5 | 7.71 | $6,331,556.09 |
| SEPTEMBER | 26.5 | 182.8 | 403,000.9 | 7.10 | $2,861,306.39 |
| OCT - NOV | 9.0 | 62.2 | 137,126.1 | 6.68 | $ 916,002.35 |
| DECEMBER | 5.2 | 35.9 | 79,145.1 | 7.70 | $ 609,417.27 |
| JANUARY | 5.3 | 36.5 | 80,467.9 | 7.76 | $ 624,430.90 |
| TOTAL | 100.0 | 689.8 | 1,520,953.5 | | $11,342,713.00 |

*Time-period allocations may differ slightly due to rounding.

Subalternative F3(c) (preferred) would implement the same time-periods as mentioned in subalternative F3(b), but would implement slightly different subquota allocation percentages for the June through August and October through November time-periods (Table 4.62). This subalternative was designed to redistribute the quota from the early time-periods to provide a winter General category BFT fishery during the months of December and January. This subalternative would reduce the allocation to the June through August time-period to a higher degree than subalternative F3(b) and increase the suballocation to the October through November time period, thus shifting more of the potentially adverse social and economic impacts to the earliest portion of the season.

This subalternative would enhance equity among regional General category participants, given that access to fish can vary considerably both temporally and geographically. Because this alternative would allocate General category quota based on a balance between historical General category BFT allocations, recent BFT landing trends, and the NCDMF Petition for Rulemaking, there would be no significant social or economic impacts to the fishery as a whole, however, there may be heighten regional or local impacts. Public comments generally support the preferred alternative to modify the General category time-periods and percentages because it ensures that fishermen in all the South Atlantic states (North Carolina, South Carolina, Georgia, and Florida’s East coast) have an opportunity to participate in this fishery. However, this subalternative would have similar positive and adverse social and economic impacts as outlined in subalternative F3(b). The adverse social and economic impacts would be shifted to the earliest portion of the fishery, where the General category subquota allocations have traditionally been the highest. This subalternative would have positive social and economic impacts to those General category participants fishing in the later portion of the season due to a 13.5 percent increase in available quota, compared to the No Action alternative, during the time frame of October through January. This increase in quota would equate to approximately $1.5 million in additional gross revenue for the later part of the General category season. However, those General category participants who pursue BFT in the summer months may experience roughly equivalent adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance, under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately ten percent and the September time-period by approximately 3.5 percent. These reductions in allocation would result in decreased gross revenues of approximately $1.2 and $0.3 million, respectively, for each of these time periods.

Reallocating more quota from the June through August time-period to the later time-periods would mitigate some of these adverse social and economic impacts because the June through August subquota has the largest allocation under the status quo and the amount of quota that would be reallocated would equate to a smaller percentage of the June through August subquota in comparison to the same amount of quota being reallocated from the other time-period subquotas. This subalternative is preferred due to the balance it strikes between providing all General category BFT fishery participants an equitable opportunity to harvest a portion of the coastwide General category quota, while still recognizing the historical participation in this fishery. Any adverse social or economic impacts associated with this alternative would be minimized and may even be mitigated as fishermen may travel to the geographical location of where the BFT are located at any give time. However, as stated previously, NMFS has little specific information at this time regarding the costs that would be incurred due to this travel.

**Table 4.62 Alternative F3(c) (preferred): Gross revenues associated with the proposed sub-allocation of the General Category quota, providing a BFT winter fishery in the South Atlantic.**

| Time-Period | Percentage | Approx. Equivalent in mt* | Approx. Equivalent in lb* | Average Ex-Vessel $ ('99-'04) | Approx. Gross Revenues |
|---|---|---|---|---|---|
| JUNE - AUG | 50.0 | 345.0 | 760,587.0 | 7.71 | $ 5,864,125.77 |
| SEPTEMBER | 26.5 | 182.8 | 403,000.9 | 7.10 | $ 2,861,306.39 |
| OCT - NOV | 13.0 | 89.7 | 197,752.6 | 6.68 | $ 1,320,987.37 |
| DECEMBER | 5.2 | 35.9 | 79,145.1 | 7.70 | $ 609,417.27 |
| JANUARY | 5.3 | 36.5 | 80,467.9 | 7.76 | $ 624,430.90 |
| TOTAL | 100.0 | 689.8 | 1,520,953.5 | | $11,280,267.70 |

*Time-period allocations may differ slightly due to rounding.

Subalternative F3(d) would implement the same time-periods as described in sub-alternatives F3(b) and F3(c), but would allocate the General category time-period subquota in accordance with the NCDMF's Petition for Rulemaking (*i.e.*, 150 mt total for the months of December and January or approximately 21.7 percent of the coastwide General category quota (Table 4.63). This alternative would have a greater positive social and economic impact to General category participants in the South Atlantic region due to a 24.7 percent increase in available quota, compared to the No Action alternative, during the time frame of October through January. This increase in quota would equate to approximately $2.8 million in additional gross revenue for the later part of the General category season. However, those General category participants in the New England area, or those participants that pursue BFT in the summer months, may experience roughly equivalent adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance, under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately 21.3 percent and the September time-period allocation by approximately 3.4 percent. These reductions in allocation would result in decreased gross revenues of approximately $2.5 and $0.3 million, respectively. These negative impacts may be mitigated by individuals traveling to where the BFT are located at any time of the season.

**Table 4.63 Alternative F3(d): Gross revenues associated with the proposed sub-allocation of the General Category quota, providing a BFT winter fishery in the South Atlantic.**

| Time-Period | Percentage | Equivalent in mt* | Equivalent in lb* | Average Ex-Vessel $ ('99-'04) | Gross Revenues |
|---|---|---|---|---|---|
| JUNE - AUG | 38.7 | 267 | 588,628.2 | 7.71 | $4,538,323.42 |
| SEPTEMBER | 26.6 | 183.5 | 404,544.1 | 7.10 | $2,872,263.11 |
| OCT - NOV | 13 | 89.7 | 197,752.6 | 6.68 | $1,320,987.37 |
| DECEMBER | 10.8 | 74.5 | 164,252.7 | 7.70 | $1,264,745.79 |
| JANUARY | 10.9 | 75.2 | 165,785.9 | 7.76 | $1,286,498.58 |
| TOTAL | 100 | 689.9 | 1,520,953.5 | | $11,282,818.27 |

*Time-period allocations may differ slightly due to rounding.

Alternative F4 (preferred) would clarify the procedures NMFS uses to calculate the ICCAT recommendation regarding the eight percent tolerance for BFT under 115 cm (young school and school BFT). This alternative would have slightly more positive social and economic impacts than the No Action alternative, as it would slightly increase the school size-class BFT quota by approximately 2 mt from the status quota allocation. This alternative would implement the ICCAT recommendation more accurately based on the specific language contained in the recommendation.

In response to public comment, this alternative has been slightly modified from that proposed in the draft HMS FMP. This preferred alternative would maintain, rather than remove, the North/South Angling category dividing line. This alternative may have some positive social and economic impacts attributed to more finite quota management of the recreational BFT fishery, such as NMFS being able to implement different BFT recreational retention limits by geographic area. However, NMFS would require timely BFT landings data from the recreational sector to use this management tool in real-time. If compliance with the current recreational catch monitoring programs improves, the effectiveness of this management tool would increase. Also as recreational catch monitoring programs are improved over time, the effectiveness of this management tool would also likely increase. In the meantime, public comment indicated that maintaining the North/South line would preserve the original intent to ensure reasonable recreational fishing opportunities in all geographic areas without risking overharvest of the Angling category quota.

*Conclusion*

Alternative F3, sub-alternative F3(c), and alternative F4 are the preferred alternatives under the BFT Quota Management issue. Alternative F3, would amend the management procedures used to establish and adjust the General category time-periods, associated subquotas, as well as geographic set-asides. More specifically, the detailed information regarding the management of the General category, as contained in the 1999 FMP, would be crafted to be more general in nature. The specific details pertaining to management of the General category would be relocated into the regulatory text implementing the consolidated HMS FMP. By moving the specific language from the FMP to the implementing regulations, NMFS would be able to provide consistent time-periods and subquotas, as they would be codified in the regulations, while also gaining the ability to amend these General category time-periods, subquotas, if deemed necessary, in a relative shorter time-frame.

Because ICCAT recommended annual U.S. BFT TACs tend to remain consistent for a multiple year time frame and as the General category baseline quota (calculated from the ICCAT TAC), time-periods, and associated subquotas would be codified in the implementing regulations, the annual BFT specification process would be streamlined as a result of this alternative. The General category subquota allocation percentages would be codified in whole weight, as well as in percentages, the regulatory, environmental, social, and economic analyses conducted for the consolidated HMS FMP would remain relatively consistent and would constitute the supporting documentation for future annual regulatory framework actions specifying the upcoming years BFT quotas, provided the ICCAT BFT TAC recommendation remains consistent. However, if the specific management measures contained in the regulatory text need to be changed, for instance if ICCAT amends the BFT TAC recommendation, then an appropriate analytical document (*i.e.*, EA or EIS, RIR, IRFA, etc.) would need to accompany the proposed and final rule in the regulatory amendment. These analytical documents would replace those that constitute the supporting documentation for future annual regulatory framework actions regarding BFT quota allocations. This alternative is preferred due to the balance it strikes between providing consistent baseline quota allocations and having the flexibility and ability to amend them, if warranted, in a relatively timely fashion. This alternative would also provide positive social and economic impacts to fishermen as they would be able to plan their business activities in advance while the Agency would have the flexibility to adapt to changing fishery conditions.

Sub-alternative F3(c) would remove the New York Bight set-aside allocation and divide the coastwide General category season into five distinct time-periods, June through August, September, October through November, December, and January. The time-periods, and associated subquotas, of this sub-alternative would allocate fishing privileges to further achieve optimum yield without excluding traditional participants in the fishery. Thus, this sub-alternative would establish time-period subquota allocation percentages as follows: 50 percent (June through August), 26.5 percent (September), 13 percent (October through November), 5.2 percent (December), and 5.3 percent (January). This sub-alternative is preferred because it would enhance equity among regional General category participants, given that access to fish varies considerably both temporally and geographically. This sub-alternative is also preferred because it would allocate General category quota based on striking a balance between historical General category BFT allocations, recent BFT landing trends, and the requests contained in the NCDMF Petition for Rulemaking, and there would be no significant social or economic impacts to the fishery as a whole expected as a result of this sub-alternative.

Alternative F4 would clarify the procedure for calculating the ICCAT-recommended eight percent tolerance limit on school size-class BFT for the Angling category quota to be more consistent with the actual language from the ICCAT recommendation and would result in a slight increase of the school size class BFT quota. This alternative would also maintain the North/South Angling category dividing line located at 39º 18 minutes N. latitude (Great Egg Inlet, NJ). This alternative is preferred because it would implement the ICCAT recommendation more accurately based on the specific language contained in the recommendation and it would preserve the original intent of the North/South dividing line as it would provide more equitable geographic and temporal distribution of recreational fishing opportunities by separating each

BFT size-class subquota into two geographical regions, the northern area (allocated 47.2 percent of the size-class subquotas) and the southern area (52.8 percent of the size-class subquotas).

#### *4.3.1.2 Annual BFT Management Measures*

As described in Chapter 2, the alternatives considered for amending annual BFT quota adjustment procedures are:

F5 Maintain the annual BFT quota specification process and the under/overharvest procedures within individual domestic quota categories and individual vessels in the Purse seine category (No Action)

*F6 Revise the annual BFT quota specification process to refer back to the supporting analytical documents of the consolidated HMS FMP and include seasonal management measures in annual framework actions – Preferred Alternative*

F7 Eliminate unharvested quota carryover provisions and return unharvested quota to the resource, while maintaining status quo overharvest provisions

*F8 Establish an individual quota category carryover limit of 100 percent of the baseline allocation (i.e., no more than the annual baseline allocation may be carried forward), except for the Reserve category, and authorize the transfer of quota exceeding the 100 percent limit to the Reserve or another domestic quota category, while maintaining status quo overharvest provisions – Preferred Alternative*

*Ecological Impacts*

One of the conservation and management tools recommended by ICCAT is the use of TAC quotas for a particular species. When the United States accepts an ICCAT recommendation, ATCA provides the Secretary with the necessary authority to implement these binding recommendations. However, no regulation promulgated under ATCA may have the effect of increasing or decreasing any allocation or quota of fish or fishing mortality level to which the United States agreed pursuant to a recommendation of ICCAT.

Alternative F5 (No Action) would implement regulations as outlined in the 1999 FMP. NMFS would conduct an annual rulemaking to allocate ICCAT-recommended baseline BFT quotas, adjust those baseline quotas to account for each domestic quota category’s under/overharvests that occurred in the previous fishing year, and establish the General category effort controls for the upcoming fishing year (*e.g.*, an RFD schedule). Under this alternative, NMFS would also be authorized to allocate any remaining quota from the Reserve to cover potential overharvests, consistent with the criteria described in Section 4.3.1.3. The total of the adjusted quotas and the Reserve would need to be consistent with the 20-year ICCAT Rebuilding Program for BFT. These small orders of change, quantified in either numbers of fish or in weight (mt), or time and/or location of harvest, compared to overall U.S. harvest levels as recommended by ICCAT under the 20-year rebuilding program would equate to ecological impacts that would be unlikely to be measurable given the variability in the data used to conduct BFT stock assessments. Additionally, the numbers of BFT harvested from each different size-class would remain consistent with the levels of BFT mortality used in the stock assessment. The under/overharvest accounting procedures contained in this alternative may have some minor adverse ecological impacts. Specifically, under this alternative, a domestic category could experience excessively slow catch rates in a given fishing year resulting in large amounts of unharvested quota being carried forward from one fishing year to the next, especially if this were to occur in multiple successive years. These rollovers could lead to a quota 'stockpiling' situation in one particular domestic quota category. Stockpiling quota could have implications for the 20-year ICCAT Rebuilding Plan for BFT, as that could allow for excessive pressure or harvest on a particularly sensitive year class.

Alternative F6 (preferred) would codify the ICCAT-recommended U.S. BFT TAC, as well as the domestic allocation percentages and quota equivalents of that TAC, in the regulations implementing the consolidated HMS FMP. The ICCAT BFT quota recommendation is based on the most recent stock assessment of western Atlantic BFT, which in turn incorporates the most up-to-date scientific information submitted annually by its member nations, and typically covers multiple years. This alternative would eliminate the need to allocate the baseline quota to each domestic category every year as the allocation percentages and quota equivalents (in mt) would be codified in the regulations implementing the consolidated HMS FMP, at least until ICCAT alters the U.S. BFT TAC recommendation. NMFS would conduct under/overharvest adjustments annually and may transfer quota among the categories, so long as the results of these actions are consistent with all pertinent ICCAT recommendations, especially the 20-year ICCAT Rebuilding Program for BFT. As the ICCAT-recommended U.S. BFT TAC is based on the most recent scientific data, as incorporated in the western Atlantic BFT stock assessment, and the quota allocations are TACs, NMFS does not anticipate any adverse ecological impacts from this alternative.

This alternative would maintain the default General and Angling category BFT retention limits (described in alternative F1) and would make adjustments to those limits in the annual BFT quota specifications, allowing the public an opportunity to comment on such actions. To provide maximum utilization of the General category quota, NMFS may increase or decrease the daily retention limit of large medium or giant BFT over a range of zero to a maximum of three BFT per vessel. To provide maximum utilization of the Angling category quota, NMFS may increase or decrease the retention limit for any size class BFT or change a vessel trip limit to an angler trip limit and vice versa. NMFS would base any proposed adjustments on the determination criteria discussed in Section 4.3.1.3. NMFS would also maintain the ability to alter the retention limits via an inseason action, if warranted. For further details regarding inseason actions, please see Section 4.3.1.3. These adjustments would be inextricably linked to the available BFT quota and would be consistent with all pertinent ICCAT recommendations, especially the 20-year ICCAT Rebuilding Program for BFT. As the ICCAT-recommended U.S. BFT TAC is based on the most recent scientific data, as incorporated in the western Atlantic BFT stock assessment, and the quota allocations are TACs, NMFS does not anticipate any adverse ecological impacts from adjusting daily retention limits adjustments within the scope outlined above.

Under alternative F6, NMFS may also propose a schedule of RFDs for the upcoming fishing season. Such a schedule would accompany the annual BFT specifications and provide notice of and an opportunity for the public to comment on this type of General category effort control. The number of RFDs proposed could range from zero RFDs to a large number of consecutive RFDs, blocking out weeks at a time. RFDs, in general, are designed to have positive economic and social impacts, and have neither positive nor negative ecological impacts since they only impact when and where BFT mortality occurs, and not the magnitude. The magnitude of mortality has been dictated by finite quotas established under a 20-year rebuilding plan for BFT and other recommendations by ICCAT. Regulating effort helps achieve optimum yield while considering the social and economic interests of the participants. The limited nature of these effort controls is unlikely to have any differential impacts on the life history or overall biological distribution of the western Atlantic BFT stock. However, it is possible that if too many effort controls are implemented, effort may shift to other species or the pace of the fishery could be slowed to such an extent that the full quota is not attained. This would be contrary to the consolidated HMS FMP and ATCA and any quota underage would be applied to the following year so mortality would only be deferred. Alternatively, if too few effort controls are implemented, it is possible the BFT fisheries would attain their quota rapidly and close prematurely. Fishermen may then turn to other stocks to target, particularly other HMS species, with corresponding impacts to other elements of the ecosystem. However, neither of these scenarios is expected to result from this alternative.

Alternative F7 would have more positive ecological effects, in comparison to the other alternatives, because any underharvests from one fishing year would not carry forward to the subsequent fishing year, thus eliminating the ability for any domestic quota category to ‘stockpile’ quota. Therefore, this alternative may accelerate the rebuilding plan for western Atlantic BFT, but could ultimately result in adverse ecological impacts if the United States does not fully utilize its ICCAT-allocated TAC. Because the BFT quotas are TACs recommended by ICCAT, it is possible that any unused portion of the U.S. TAC could be reallocated to another member nation. Therefore, this alternative could have some potential adverse ecological impacts in the long-term that would be associated with a reallocation of unutilized U.S. BFT quota to an ICCAT member nation that does not have comparable conservation measures to those of the United States. For instance, a portion of the U.S. BFT TAC could be reallocated to a member nation that has a higher level of interaction with protected resources or has not taken equivalent steps to minimize bycatch.

Alternative F8 (preferred) may reduce potential adverse ecological impacts as it would allow the Agency to limit the amount of unharvested quota a category could carry from one fishing year to the next. This alternative would allow NMFS to curtail excessive amounts of BFT quota from accumulating in any particular domestic quota category due to multiple successive years of underharvest and therefore, may curb the likelihood of a ‘stockpiling’ situation. This alternative would authorize NMFS to redistribute quota exceeding the 100 percent rollover cap to the Reserve or to other domestic quota categories, if deemed necessary, provided the redistributions are consistent with ICCAT recommendations and the criteria in Section 4.3.1.3. NMFS received public comment concerned about transferring quota from one category to the Reserve, which eventually may be transferred to yet another category that harvests BFT within a different size range than the original category. One metric ton of BFT equals many more fish within the school size range than one metric ton in the giant size class. Therefore, to avoid any potential adverse ecological impacts that may occur, quota origin may need to be tracked to ensure the level of mortality is consistent with those accounted for in the stock assessment. This alternative would provide reasonable fishing opportunities to harvest the

ICCAT-recommended U.S. BFT TAC as close to the timeframe it was originally intended to be harvested and may reduce the likelihood of reallocating U.S. BFT quota to another member nation that does not have comparable conservation measures (see discussion under alternative F7).

*Social and Economic Impacts*

Alterative F5 (No Action) would maintain the status quo process used to allocate the ICCAT-recommended U.S. BFT TAC domestically, accounting for annual under/overharvest, and establishing General category effort controls. This alternative is unlikely to have any substantial immediate social or economic impacts given that these processes have been in place since prior to the implementation of the 1999 FMP. However, NMFS received public comment in the past regarding the timing of annual BFT specification publication and that administrative or other delays in publishing the annual BFT specifications can have adverse social and economic impacts due to constituents inability to make informed business decisions. Under this alternative, the annual BFT quota specifications would establish baseline domestic quota category allocations, as well as adjust those allocations based on the previous years under/overharvest. Any delay in publishing the annual BFT quota specifications would prolong the establishment of a baseline quota in any of the domestic categories.

Alternative F6, a preferred alternative, would have slightly more positive social and economic impacts, in comparison to alternative F5, as each baseline domestic quota category allocation, quantified in metric tons (not just the percentage of the U.S. BFT TAC) would be codified in the regulatory text implementing the consolidated HMS FMP. Therefore, each established domestic user group would have a quantifiable amount of quota available for harvest at the start of each fishing year (Table 4.64) and the filing and publication of the final annual BFT specifications would not be required to establish the baseline quotas. These baseline quotas would remain consistent from one year to the next, until ICCAT amends the recommendation regarding western Atlantic BFT TACs. If and when ICCAT amends its recommendation regarding western Atlantic BFT TACs, NMFS may need to undertake rulemaking to analyze the impacts associated with the revised recommendation and would codify the results, as they apply to each domestic quota category allocation, in the regulations. This alternative would still require NMFS to conduct an annual rulemaking to account for the previous years under/overharvest, but would provide some level of stability regarding baseline quota availability for each fishing year. This alternative would also establish General category effort controls and establish daily retention limits for the Angling and General categories and any associated time frames in the annual framework action.

This alternative would maintain the default General and Angling category BFT retention limits and would propose adjustments to those limits in the annual BFT quota specifications to provide notice of, and an opportunity for the public to comment, on these sort of actions. To provide maximum utilization of the General category quota, NMFS may increase or decrease the daily retention limit of large medium or giant BFT over a range of zero to a maximum of three BFT per vessel. To provide maximum utilization of the Angling category quota, NMFS may increase or decrease the retention limit for any size class BFT or change a vessel trip limit to an angler trip limit and vice versa. NMFS would base the proposed adjustments on the determination criteria discussed under Section 4.3.1.3 and would maintain the ability to alter the retention limits via an inseason action, if warranted. For further details regarding inseason actions, please see Section 4.3.1.3.

Under this alternative, NMFS may propose a schedule of RFDs that may be implemented for the upcoming fishing season. Such a schedule would accompany the annual BFT specifications and provide notice of, and an opportunity for the public to comment on, this type of General category effort control. The proposed RFD schedule could range from zero RFDs to a large number of consecutive RFDs, blocking out weeks at a time. In the past, when catch rates have been high, implementing more RFDs has had positive economic impacts by avoiding market gluts and providing access to higher quality fish later in the season. Positive social impacts have also occurred as fishermen have commented that knowing the exact schedule of RFDs prior to the season facilitates planning and scheduling of trips. However, if catch rates are slow and a large amount of RFDs hinder the ability to harvest a time-period subquota, waiving RFDs in mid-season can cause confusion and disrupt fishermen's activity and, although information regarding the canceling is widespread over various electronic and paper media, there may be some negative social impacts as a result. Under this alternative, NMFS would maintain the authority to add or waive RFDs if deemed necessary.

To streamline the annual rulemaking, NMFS would analyze baseline allocations and the range of possible under/overharvests that could occur from the previous years fishing activity (see alternative F8) in the analytical supporting documents of the consolidated HMS FMP. This alternative would have positive social and economic impacts to the domestic BFT fishery as a whole by allowing commercial and recreational BFT fishery participants to make informed decisions on how best to establish a business plan for the upcoming season as well as helping to achieve optimum yield from the BFT fishery.

Alternative F7 would have the most adverse social and economic impacts of all the alternatives considered for this issue. Under this alternative, NMFS would not carry forward unharvested quota from one fishing year to the next. This could result in a perception that domestic quota categories are being penalized for not harvesting their allocated quota in the time provided and may lead to derby style fishing, causing vessels to operate in less than optimal conditions. This alternative could also result in a domestic quota category not receiving a quota transfer from another domestic quota category with large amounts of underharvest to assist in covering an overharvest situation, which could result in quota deducted from that category in the following year. This could result in reduced fishing opportunities, income, and angler consumer surplus for the commercial and/or recreational fleet, as well as the businesses that support those BFT fisheries. This alternative would have adverse social and economic impacts attributed to potential BFT quota reallocations at the ICCAT level, as discussed in the ecological impacts section of this issue.

Alternative F8, a preferred alternative, would have both slightly positive and negative social and economic impacts on BFT fishery participants. Under this alternative, each domestic quota category would be limited in the amount of unharvested quota carried forward from one fishing year to the next. This limit, or cap, would in turn limit the amount of revenue each domestic quota category could generate to no more than the value associated with double the baseline allocation (Table 4.64). These potential adverse economic impacts may be mitigated, overall, by reallocating the tonnage that exceeds the 100 percent cap to the Reserve or to another domestic quota category using the criteria stipulated in Section 4.3.1.3. In addition, this alternative would not preclude the NMFS from transferring additional quota from the Reserve back to a category that has reached the rollover limit via an inseason action, if warranted.

**Table 4.64 Alternative F8: Gross revenues associated with the proposed rollover cap of 100 percent of the baseline quota allocation.**

| Category | Baseline quota allocation * | Roll-over allotment | Total Potential Annual Quota (mt) | Total Potential Annual Quota (lb) | Average Ex-vessel price (99-04) | Total Potential Gross Revenues |
|---|---|---|---|---|---|---|
| General | 689.8 | 689.8 | 1,379.6 | 3,041,466 | 7.17 | $21,807,311.22 |
| Harpoon | 57.1 | 57.1 | 114.2 | 251,765 | 7.17 | $1,805,155.05 |
| Purse Seine | 272.4 | 272.4 | 544.8 | 1,201,066 | 4.99 | $5,993,319.34 |
| Longline | 118.6** | 118.6** | 237.2 | 522,931 | 6.18 | $3,231,713.58 |
| Trap | 1.5 | 1.5 | 3.0 | 6,614 | N/A | N/A |
| Angling | 288.6 | 288.6 | 577.2 | 1,272,495 | N/A | N/A |

*Based on current ICCAT-recommended U.S. BFT TAC
** Does not include the NED Statistical set-aside annual allocation of 25 mt.
N/A = Not Available

*Conclusion*

Alternatives F6 and F8, are the preferred alternatives because F6 would revise the annual BFT quota specification process so the supporting analytical documents of the consolidated HMS FMP would be referred back while F8 would establish the authority to implement an individual quota category carryover limit of 100 percent of the baseline allocation, except for the Reserve category, and authorize the transfer of quota exceeding the 100 percent limit to the Reserve or another domestic quota category, while maintaining status quo overharvest provision. Under alternative F6, each baseline domestic quota category allocation, quantified in metric tons (not just the percentage of the U.S. BFT TAC) would be codified in the regulatory text implementing the consolidated HMS FMP. Therefore, each established domestic user group would have a quantifiable amount of quota available for harvest at the start of each fishing year and the filing and publication of the final annual BFT specifications would not be required to establish the baseline quotas. These baseline quotas would remain consistent from one year to the next, until ICCAT amends the recommendation regarding western Atlantic BFT TACs, at which time the impacts to the new recommendation would need to be analyzed. Alternative F8 would allow NMFS to curtail excessive amounts of BFT quota from accumulating in any particular domestic quota category due to multiple successive years of underharvest and therefore, may curb the likelihood of a 'stockpiling' situation.

These alternatives were preferred because they would provide participants in the BFT fishery a timely and stable baseline quota allocation from one year to the next, the Agency the ability to address under/overharvests from the previous year, the ability to establish the General category effort controls as well as recreational and commercial handgear daily retention limits for the upcoming season, and streamline the annual rulemaking process. Additionally, they would provide NMFS the authority to implement a cap on the amount of quota that a category may carry forward from one fishing year to the next would allow NMFS to manage the harvest of BFT with more finite precision and minimize the occurrence of 'stockpiling' in any one quota category.

#### *4.3.1.3 Inseason Actions*

As described in Chapter 2, the alternatives considered for amending inseason action procedures are:

F9 Maintain inseason action procedures (No Action)

*F10 Revise and consolidate criteria considered prior to performing inseason and some annual BFT management actions – Preferred Alternative*

F11 Eliminate BFT inseason actions

*Ecological Impacts*

Alternatives F9 and F10 would both authorize NMFS to perform inseason adjustments which may include, but would not be limited to, quota transfers between categories, adjustments to daily retention limits, and interim closures of a fishery when deemed necessary. Under these alternatives, NMFS would consider numerous criteria in making a determination, consistent with the objectives of the ICCAT recommended 20-year rebuilding plan, Magnuson-Stevens, ATCA, and the consolidated HMS FMP. As the criteria outlined in this section encompass the objectives of the consolidated HMS FMP, NMFS anticipates neutral ecological impacts from these two alternatives. The consolidation of the criteria considered prior to implementing an inseason adjustment was generally supported by the public comments on the Draft Consolidated HMS FMP.

Under alternative F11, NMFS would not perform any inseason actions, which could result in some negative ecological impacts. For instance, NMFS would not curtail daily retention limits or impose interim closures if BFT catch rates were high, which could lead to premature closures or overharvests in a particular domestic quota category, thus leading to negative ecological impacts. Conversely, catch rates may be slow, which could lead to unharvested quota and excessive quota rollovers from one year to the next, or in the case of General category subquotas, from one time-period to the next, which could lead to a ‘stockpiling situation and therefore potential adverse ecological impacts.

*Social and Economic Impacts*

Under alternatives F9 and F10, NMFS would conduct inseason management actions, consistent with the determination criteria described in Section 4.3.1.3, which would allow for the flexibility to better meet the objectives of the consolidated HMS FMP, ICCAT recommendations, Magnuson-Stevens Act, and ATCA in a more responsive fashion. Both of these alternatives would allow the Agency to adapt management measures to the inherent variability in the BFT fishery, and thus provide for maximum utilization of the BFT quota. NMFS would have the ability to adjust the daily retention limits in the domestic quota categories with the highest participation rates, namely the Angling and General categories, and to provide fishery participants an opportunity to harvest a portion of their respective quotas while those fish are available, thereby providing reasonable fishing opportunities to those participants. These alternatives would also allow the Agency to curtail effort, if warranted, either by restricting retention limits or imposing an interim closure to help facilitate reasonable fishing opportunities for all participants across temporal and geographic differences.

For instance, NMFS may adjust the General category daily retention limit between a range of zero and three BFT per vessel per day/trip. When catch rates are low, as they have been in the early portion of the season over the last few years, a liberalized retention limit of two or three fish may have positive social and economic impacts on a vessel that is able to harvest multiple fish, due to the limited supply of U.S. fish on the market at that time. Some of the highest ex-vessel prices have occurred during this time-period when catch rates were slow. Providing a multiple fish retention limit may also assist in offsetting operating costs when there is a long steam time to and from the fishing grounds. Fishermen are able to remain on the fishing grounds longer, and in some cases overnight, instead of running long distances on a daily basis if they are allowed to retain multiple fish. Having the ability to liberalize the daily retention limit also has some potential adverse social and economic impacts as well. For example, if catch rates were to increase dramatically over a short period of time while the retention limits were set at the upper end of the allowable range, large numbers of BFT could be landed in a short time period, thus flooding the market and depressing ex-vessel prices, and harvesting the quota at an accelerated rate. Another potential adverse impact linked to having the ability to adjust these retention limits is the inability to accurately forecast when and for how long the adjustments should be effective. Therefore, NMFS must remain diligent in monitoring the BFT fishery as close to real time as possible.

In regard to the Angling category retention limits, both positive and negative social and economic impacts could be associated with having the flexibility to adjust them inseason, similar to the General category. There may be positive impacts associated with liberalizing the daily retention limits, either by angler, by vessel, or vessel type, due to the enhanced fishing opportunities that would be associated with the increase in retention limits. In past years, NMFS has received comments from the HMS CHB sector that increased retention limits provide additional incentives for individuals to book charters, because the charter party would have the opportunity to retain more fish for the same amount money spent on the charter itself. For those privately owned and operated recreational vessels, a liberalized retention limit also provides some additional incentive to target BFT, due to an increase in Angler Consumer Surplus (ACS) by increasing the amount of BFT that could be retained in relation to the costs incurred running offshore (*i.e.*, in terms of fuel, bait, food, etc.). Potential adverse impacts may be associated with lowering/constraining retention limits or imposing an interim closure to ensure anglers in different temporal or geographical areas are not precluded from a reasonable opportunity to harvest a portion of the Angling category quota. Another potential adverse impact related to having the ability to adjust these retention limits is the inability to accurately predict catch rates and in turn forecast when and for how long the adjustments should be effective. This is especially true when charter trips are booked at a time when more liberal retention limits are in place but are restricted prior to the actual date the trip is taking place. Therefore, NMFS must remain diligent in monitoring the BFT fishery as close to real time as possible.

Therefore, both alternatives F9 and F10 could have both positive and negative economic and social impacts on BFT fishery participants due to the ability to adapt regulations inseason to meet the objectives of the consolidated HMS FMP and the inherent inability to foresee when a change should take place. Alternative F10 would have slightly more positive economic and social impacts as the criteria NMFS would consider when making an inseason action would be consolidated and consistent, regardless of what type of inseason action is under consideration. This consolidation would minimize confusion regarding how NMFS came to a decision, and thereby provide additional transparency to the management process.

Alternative F11 would constrain NMFS' ability to adjust management actions affecting the BFT fishery and could impact the ability to fully meet the objectives of the consolidated HMS FMP, one of which is providing reasonable fishing opportunities. Fishery participants would experience positive social and economic benefits by knowing that quota allocations and daily retention limits were to remain stable throughout the entire season, which would aid in planning fishing activities. However, participants would also experience adverse social and economic impacts attributed to the limitations imposed on NMFS in providing for maximum utilization of the BFT quota spread over the longest period of time (*i.e.*, limits would need to be more restrictive than under alternatives F9 and F10 to ensure quotas were not exceeded).

*Conclusion*

Western Atlantic BFT are overfished, and one of the main objectives of the consolidated HMS FMP is to end overfishing and rebuild overfished stocks, while providing reasonable fishing opportunities to harvest the limited quota that is available under the BFT rebuilding plan. Consolidating and refining the criteria that NMFS would consider prior to conducting any inseason, and some annual, actions would assist in meeting the consolidated HMS FMP's objectives in a consistent manner, providing reasonable fishing opportunities, increasing the transparency in the decision making process, and balancing the resource's needs with users' needs. Therefore, alternative F10 is the preferred alternative for this issue.

### 4.3.2 Timeframe for Annual Management of HMS Fisheries

As described in Chapter 2, the alternatives considered to change the annual management timeframe for HMS fisheries are listed below, and depicted in Table 4.65:

G1 Maintain the current fishing year for all HMS (No Action)
G2 *Shift the fishing year to January 1 – December 31 for all HMS - Preferred Alternative*
G3 Shift the fishing year to June 1 – May 31 for all HMS

**Table 4.65 Fishing years by HMS proposed for Alternatives G1-G3.**

| **HMS** | **Fishing Year** | | |
|---|---|---|---|
| | **Alternative G1 (No Action)** | **Alternative G2 (Preferred)** | **Alternative G3** |
| **Tuna** | June 1 – May 31 | January 1 – December 31 | June 1 – May 31 |
| **Sharks** | January 1 – December 31 | January 1 – December 31 | June 1 – May 31 |
| **Swordfish** | June 1 – May 31 | January 1 – December 31 | June 1 – May 31 |
| **Billfish** | June 1 – May 31 | January 1 – December 31 | June 1 – May 31 |

*Ecological Impacts*

The three alternatives for changing the annual management timeframe for HMS fisheries are given in Table 1. This action would be largely administrative and each alternative considered would have a minimal ecological impact. From a long-term perspective, the amount of fish harvested and resultant fishing effort would not be expected to change overall. However, there could be some short-term, minor ecological impacts.

The migratory nature of HMS stocks results in seasonal availability in different geographic regions. If a quota is harvested before the end of a fishing year, the geographic area where the fish would normally be located at the end of the fishing year would be expected to experience less fishing effort. Thus, if sensitive life stages such as spawning adults or limited year classes are concentrated in geographic areas that are not fished because a quota is harvested, in general, the stock could experience a positive impact. The converse could also hold true – if a sensitive year class or life history stage were concentrated in a geographic area open to fishing at the beginning of a fishing year, in general, negative impacts to the stock could occur.

HMS stocks that are limited by quotas (BFT, albacore tuna, swordfish, sharks) or subject to catch limits (white and blue marlin) could potentially be impacted in this way. However, for each of these fisheries, there are mitigating circumstances that minimize the potential for these impacts. Neither the albacore tuna nor the swordfish fisheries have been harvesting the entire available quota, so these fisheries have remained open throughout the season. A change in the fishing year should have no impact unless there are changes in these fisheries that would increase landings. BFT, swordfish and sharks are highly regulated with temporal and/or geographic subquotas, intended in part to spread these fisheries out over the entire fishing year and range of the fishery. In addition, the sensitive life stage of spawning BFT in the Gulf of Mexico is already highly regulated.

For blue and white marlin, the ICCAT 250 marlin catch limit proposed to be codified under preferred Alternative E6 has rarely been reached historically. Thus, barring unanticipated and significant changes in recreational fishing effort or practices, these fisheries are expected to continue throughout the year without the need for inseason management actions to increase the minimum size limit, and/or implement catch-and-release restrictions, as per preferred alternative E6. In the unlikely event that a threshold for implementation of these management measures is reached, there is little information available to show that sensitive life stages or year classes of these species are more or less available in different geographic regions. Thus, NMFS does not expect any negative or positive impacts to target species from this perspective as a result of any of the alternatives (G1-G3) considered for this action.

In addition, since this action is largely administrative, few impacts are expected to non-target species, including finfish and protected species, and no impacts would occur to EFH. There is a limited potential for some minimal reduction in fishing effort or minimal shift in fishing effort from targeting marlin to targeting some other species as a result of any of the Alternatives (G1-G3) in combination with implementing a management measure under Alternative E6. If an overall reduction in fishing effort occurred, a small positive ecological impact to non-target species could result under Alternatives G1-G3. This potential minimal positive ecological impact would be expected to be slightly higher under Alternative G2 (preferred alternative) since the number of days that management measures under Alternative E6 are projected to be in place, and thus the number of days that effort could be reduced, would be greater (*e.g.* August 22- December 31 under Scenario 2 or August 25 – December 31 under Scenario 3) than for Alternatives G1 and G3 (*e.g.*, May 3-31 under Scenario 2 or May 12-31 under Scenario 3). See the discussion of social and economic impacts under Alternative E6 in Section 4.2.3 for a description of the scenarios and analyses.

Some small negative impacts could result for non-target species from a shift in fishing effort under each of the Alternatives (G1-G3) in combination with Alternative E6; however, the species and amount of impacts are currently not quantifiable. Contrary to the previous discussion, impacts could be slightly higher to non-target species if a shift in effort to non-HMS species occurred under Alternative G2, since the management measures are expected to be in effect for a longer duration. However, for both these discussions, it is important to remember that it is impossible to predetermine fisherman behavior and that overall impacts are not quantifiable at this time, but are expected to be small.

Alternative G2 would also include implementation of an abbreviated fishing year for BFT and swordfish, which would provide the entire 2007 quotas for harvest from June-December of 2007 (Table 4.67). This compressed fishing year differs from the compressed fishing year described in the Draft HMS FMP by the year in which it would occur. Because the comment period was extended, the compressed fishing year would occur in 2007 rather than 2006 as described in the Draft HMS FMP. The compressed fishing year would allow the ability to harvest quota that is usually harvested from January through May during the period June through December. As noted above, this would be in addition to what is usually harvested from June through December. Although it may appear that fishing effort would be elevated during this compressed six month fishing year as compared to a twelve month fishing year, NMFS expects that this will not be the case. This is illustrated by the average cumulative percentage of BFT that is usually commercially harvested from January through May, which is only 4.3 percent of the overall annual commercial landings (in number of fish, Table 4.66). In addition, the annual quota specification process for both swordfish and BFT allow a roll-over of any unharvested quota from year to year. There could be some small increase in adverse ecological impacts to non-target species from the small increase in fishing effort that could accompany the additional 4.3 percent of BFT quota harvested during the last six months of a calendar year, but it is unlikely that these impacts would vary perceptibly from those that would occur during a twelve month fishing year. Since swordfish fisheries are currently not harvesting the entire annual swordfish quota, the availability of additional quota during a certain time-period would only have minimal effects.

**Table 4.66 Average number of commercially harvested BFT by month for 1999-2004. Data source: NERO BFT landings database.**

| | MONTH (1999-2004) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** | **Total** |
| **No. of Fish** | 66 | 26 | 39 | 50 | 41 | 222 | 547 | 1014 | 1579 | 1214 | 126 | 311 | 5235 |
| **% by Month** | 1.3 | 0.5 | 0.7 | 1.0 | 0.8 | 4.2 | 10.4 | 19.4 | 30.2 | 23.2 | 2.4 | 5.9 | 100 |
| **% Cum.** | 1.3 | 1.8 | 2.5 | 3.5 | 4.3 | 8.5 | 18.9 | 38.3 | 68.5 | 91.7 | 94.1 | 100 | 100 |

Similarly, Alternative G3 would require a bridge period from January 1, 2008 through May 31, 2008 for sharks, as the shark management cycle would change to a fishing year under this non-preferred alternative. The bridge period would require that the 2007 quota for sharks be stretched to cover an additional six months. This could result in small positive ecological impacts for sharks on a short-term basis, since the overall harvested quota during calendar year 2007 would be slightly reduced. In addition, Alternative G3 would include consideration of shark pupping seasons during development of new quota trimesters in order to avoid negative ecological impacts. A small reduction in directed shark fishing effort could also result in a small reduction in adverse ecological impacts to non-target species in the form of bycatch, but some impacts to finfish could increase if fishing effort were shifted to other species.

*Social and Economic Impacts*

The "No Action" alternative (G1) would maintain the fishing years for all HMS species that are currently in place (Table 4.65). This alternative is expected to maintain the current level of compliance with regulations and minimize short-term constituent confusion since nothing would change. In addition, Alternative G1 would not result in any anticipated disruption to any of the HMS markets.

Alternative G1 would maintain the current annual shark management cycle, as established in the first shark FMP (1993). If ICCAT should become more involved in shark management, Alternative G1 would provide consistent timing for U.S. domestic and international shark management programs since ICCAT manages on a calendar year cycle. However, this current management regime may be slightly more arduous for fishermen targeting more than one HMS in the long term since sharks are managed on a different timeframe than other HMS, and fishermen would have to be familiar with several administrative calendars including more than one management cycle.

Alternative G1 would continue to allow approximately six months between the annual adoption of ICCAT recommendations (typically in November) and initiation of the fishing year for tuna, swordfish, and billfish on June 1. This six month window was intended to provide time to implement necessary changes to domestic management measures to comply with international obligations. It also allowed time for the affected fisheries to anticipate changes to the management program and adjust fishing activities as needed. However, under this "No Action" alternative, U.S. domestic fishery reporting occurs on a June 1 – May 31 fishing year basis for tunas, swordfish, and billfish, while most ICCAT nations report on a calendar year basis. This situation results in complex U.S. reports to ICCAT, with a confusing structure of analyses in the U.S. National Report. Due to the complexity in reports to ICCAT, the United States' negotiating position during international compliance reviews may be weakened.

As described previously under the ecological impacts section, when a fishery has a finite quota or catch limit, its start date (as well as other factors) can impact quota availability during periods of peak market demand and effort, and the availability of quota for fisheries that occur later in the season. For example, maintaining swordfish management with a June 1 start date would ensure the availability of ample quota for harvest during the summer market. However, since the U.S. fishery is not currently harvesting its full quota, ample swordfish quota is expected to be available year-round. BFT and sharks are highly regulated with subperiods and subquotas which greatly reduce the potential for negative impacts to fisheries at the tail end of the season.

As described previously, the only quota/catch-limited fishery that could potentially be impacted by harvesting the quota/reaching a catch limit is the fishery for white and blue marlin under the ICCAT 250 limit (Alternative E6). Socio-economic impacts to Atlantic billfish fisheries as a result of moving to a calendar year management cycle (Alternatives G1 and G3) would vary slightly depending upon the management measures chosen for the directed billfish fishery (Section 4.2.3). Specifically, each option under Alternative E6, which would codify an ICCAT-recommended recreational landings limit for white and blue marlin, could result in minor to moderate negative impacts to billfish fisheries that occur at the tail-end of the management cycle. Fisheries and tournaments for billfish that occur early in the fishing year should have sufficient quota available, but tournaments scheduled for later in the fishing year could be negatively impacted if a management threshold is reached and restrictions are implemented before the tournaments occur. As discussed under Alternative E6, once activity within the fishery indicates that more restrictive management measures are necessary (*i.e.*, a management threshold for action is achieved), a restrictive measure would be triggered which would impact marlin fishing for the rest of the year (management period). Discussion in Section 4.2.3 under Alternative E6 explains potential impacts to billfish fisheries managed under a fishing year (*i.e.*, Alternatives G1 and G3) for three scenarios, briefly summarized below. Please see Section 4.2.3 for the full discussion of this analysis. As discussed in Section 4.2.3, historical marlin landings rates show that it is unlikely that the 250 marlin limit will be reached, or that any inseason management actions will be necessary.

Under Scenario 1, when the threshold for inseason management action is not achieved, there would be no management action and, as a result, no impact. In Scenario 2, the threshold for an inseason minimum size increase is achieved. During a fishing year management cycle, inseason size limit increases were projected to potentially occur on May 3. This would leave 28 days of fishing that would operate under an increased size limit for blue and/or white marlin, as determined by NMFS, and could impact approximately 25 tournaments (see Section 4.2.3 for more detail). Under Scenario 3 for a fishing year management cycle, a catch and release fishery was projected to be implemented on May 12, leaving 19 days left in the season and the potential closure of approximately one tournament (see Section 4.2.3 for more detail).

The preferred alternative (G2) would manage all HMS species on a fishing year cycle from January 1-December 31 (calendar year). This would maintain the status quo in the shark management year cycle established in the first shark FMP (1993). Thus, Alternative G2 would not be anticipated to have any social or economic impact on the shark fishery because it currently operates on a calendar year basis.

Use of a consistent calendar year across HMS fisheries would create a less complex management regime for all constituents, and as a result, could potentially increase compliance. In particular, this alternative would reduce confusion overall for constituents participating in a combination of HMS fisheries, although initially there could be some short-term confusion as tuna, swordfish, and billfish quotas and annual Atlantic tunas, HMS CHB, and HMS Angling vessel permits are adjusted to a calendar year basis.

ICCAT recommendations become effective six months after they are adopted. In most cases, this would be in May of the year following the November ICCAT meeting. Thus, Alternative G2 may result in some negative social and economic impacts if ICCAT-related regulations are not in place prior to the start of the fishing year. Since swordfish and billfish landings are relatively low for the first few months of the calendar year, these fisheries would not be impacted, but the January BFT fishery may be over before any changes to the regulations as a result of ICCAT recommendation are implemented. This could negatively impact constituents participating in the January fishery because any ICCAT recommendations with positive impacts may not be in place yet. Conversely, ICCAT recommendations with negative impacts may not be in place, either. Setting annual quotas and other fishery specifications on a multi-year basis, as preferred for the BFT fishery in Section 2.3.1.2, and re-allocating the BFT subquota time-periods (Section 2.3.1.1) could mitigate the potential negative impacts.

Alternative G2 would establish consistent management year cycles for U.S. domestic and international (ICCAT) management programs, which would reduce the complexity of U.S. reports to ICCAT and create more transparent analyses in the U.S. National Report. Reducing complexity in reporting to ICCAT would strengthen the United States' negotiating position during international compliance review.

An abbreviated 2007 fishing year, from June 1, 2007 through December 31, 2007, would be necessary to transition BFT and swordfish from the current fishing year to a calendar year. A transition fishing year is not necessary for marlin since a quota/catch limit is not currently codified, and the calendar year management cycle for marlin would be codified for the first time on January 1, 2007. The Draft Consolidated HMS FMP stated that the abbreviated fishing year for BFT and swordfish would occur in 2006; however, since the initial comment period for this action was substantially extended, it is necessary to shift the abbreviated fishing year from 2006 to 2007 in the final action.

The 1999 FMP switched management of Atlantic tunas and billfish from a calendar year to a fishing year by stretching the 1998 BFT quota through the entire calendar year of 1998 and on through to May 31 of 1999 (Table 4.67). Likewise, a 1996 action shifted swordfish from a calendar year to a fishing year by stretching the 1995 swordfish quota through to May 31, 1996 (61 FR 27304). Thus, NMFS believes it is appropriate to use the full ICCAT 2007 BFT and swordfish quotas during the 2007 abbreviated fishing year. The quotas for these fisheries would be established by the specification process in a separate rulemaking action.

Since BFT and swordfish fisheries are already strictly managed with seasons, size limits, and subquotas, any general impacts as a result of the abbreviated fishing year are expected to be minor. NMFS anticipates minor positive socio-economic impacts to BFT fisheries specifically from the abbreviated fishing year. Having access to the full 2007 quota within a seven month time period could provide a small economic benefit to all BFT fisheries, and may offset any negative socio-economic impacts that occurred when these fisheries were previously shifted from a calendar year to a fishing year and annual quotas were stretched to last 18 months (Table 4.67). In addition, as mentioned under the ecological impacts section, the vast majority of the BFT quota is harvested during June through December (Table 4.66), and any quota that is not harvested during the abbreviated fishing year can be rolled over into the following year. Impacts to swordfish fisheries are expected to be less since swordfish fisheries have not been fully harvesting the entire annual quota in recent years.

**Table 4.67 Graphic representation of the distribution of U.S. domestic BFT quota by year.**

| ICCAT Quota Yr* | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1997 | | | | | | | | | | | | |
| 1998 | | | | | | | | | | | | |
| 1999 | | | | | | | | | | | | |
| 2000 | | | | | | | | | | | | |
| 2001 | | | | | | | | | | | | |
| 2002 | | | | | | | | | | | | |
| 2003 | | | | | | | | | | | | |
| 2004 | | | | | | | | | | | | |
| 2005 | | | | | | | | | | | | |
| 2006 | | | | | | | | | | | | |
| 2007 | | | | | | | | | | | | |
| 2008 | | | | | | | | | | | | |
| 2009 | | | | | | | | | | | | |

*ICCAT Quota yr. = the year following the annual special meeting of ICCAT (usually held in November).

Overall socio-economic impacts to BFT fisheries from Alternative G2 are anticipated to be minimal. As discussed earlier, sectors of the BFT fishery are highly regulated, and time-period subquota allocations and inseason management measures are used to distribute the quota throughout the fishing year, based on guidelines established at 50 CFR 635.27 and 635.28. These guidelines include consideration of the ability of fishery participants in all geographic areas to participate in the fishery; thus, these regulations minimize any potential negative impacts to fisheries at the tail-end of the management cycle. Under the current regulations, the sub-allocation for the winter General category fishery extends between two calendar years from October to January (see Section 2.3.1.1, Alternative F1), and thus an adjusted time-period subquota is necessary to work with this alternative. The subalternatives under Alternative F3 (Section 2.3.1.1) for the BFT fishery address this concern by providing separate time period subquotas for December and January.

During the public comment period, several commentors expressed concern about the effect of a calendar year management cycle on the availability of General category quota rollover from the previous calendar year during the January portion of the south Atlantic fishery. Under changes to the BFT management program included in this Consolidated HMS FMP, the January subperiod would be provided with a quota of 5.3 percent of the annual ICCAT allocation. The HMS regulations at 50 CFR 635.27 state that NMFS will adjust General category subperiod quotas based on under- or overharvest during the previous subperiod. However, the concern relates to the rollover of under- or overharvest from one subperiod to the next between fishing years. The situation of having an active fishery occurring across the change of quota years did not occur prior to the 1999 FMP, which originally adjusted the BFT fishery to a fishing year management cycle. There are several potential scenarios that could occur regarding the disposition of carryover of any under or overharvest that accrues during the December subperiod. In the first scenario, any under or overharvest could be fully rolled over into January of the following fishing year in addition to the baseline 5.3 percent. Under this scenario, the entire underharvest would be added to the January subperiod quota, or the entire overharvest would be subtracted from the subperiod quota. In another potential scenario, 5.3 percent of the under- or overharvest would be applied to the January subperiod in addition to the baseline 5.3 percent. In a third scenario, no under- or overharvest would be applied in addition to the January subperiod 5.3 percent allocation. NMFS will work with the affected constituents through the annual BFT specification process to determine the most appropriate approach based on constituent needs and Federal requirements.

Socio-economic impacts to Atlantic billfish fisheries as a result of moving to a calendar year management cycle (Alternative G2) would vary slightly depending upon the management measures chosen for the directed billfish fishery, similar to the discussion regarding socio-economic impacts from the fishing year management cycle addressed previously. These impacts are addressed in detail in Section 4.2.3, and a brief summary is included here. Each option under preferred Alternative E6, which would codify an ICCAT-recommended recreational landings limit for white and blue marlin, could result in minor to moderate negative impacts to billfish fisheries that occur at the tail-end of the calendar year management cycle, if recreational landings substantially increase from current levels. Fisheries and tournaments for billfish that occur early in the calendar year should have sufficient catch available, but tournaments scheduled for later in the calendar year could be negatively impacted if a management threshold is reached and restrictions are implemented before the tournaments occur. As indicated in Section 4.2.3, available historical data indicate that it is unlikely that the United States will achieve the 250 limit, and thus unlikely that any of the potential impacts would occur.

The same three scenarios discussed previously under the fishing year management cycle were analyzed to estimate impacts during a calendar year management cycle (see Section 4.2.3 for detailed information). Under Scenario 1, when the threshold for inseason management action is not achieved, no impacts are anticipated. Under Scenario 2, the threshold for an inseason minimum size increase is projected to occur on August 22 and would be expected to be in place for the remainder of the calendar year. Since the inseason action would be in place for a longer period of time under a calendar year management cycle than under a fishing year management cycle, any adverse impacts would be expected to be larger for a calendar year. Under Scenario 3, catch and release fishing was projected to be reached on August 25. Under the assumptions of the analysis, this could potentially result in cancellation of a maximum of four tournaments. See Section 4.2.3 for a full discussion of this analysis.

Alternative G3 would establish a June 1 – May 31 fishing year management cycle for all HMS species (Table 4.65). As with Alternative G2, Alternative G3 would establish a consistent management cycle for all HMS fisheries, resulting in a less complex management regime for all constituents. In particular, this alternative would reduce confusion for constituents participating in a combination of HMS fisheries. While initially there could potentially be short-term confusion as the shark quotas, trimesters, and permits are adjusted to a fishing year basis, overall the HMS management regime would be less complex. A bridge period, from January 1, 2007, through May 31, 2007, would be established to transition the Atlantic shark fishery from a calendar year to a fishing year. Establishing consistent management cycles for all HMS fisheries would simplify the regulations, making them easier to understand and potentially increasing compliance.

In general, Alternative G3 would have the same impact to the seasonal availability of quota for tunas, swordfish, or billfish fisheries and tournaments as the No Action alternative, since there would be no change to the management cycle for these species. In addition, maintaining the current start dates for the tunas, swordfish, or billfish fisheries would not result in any anticipated disruption in any of these current markets or fishing activities. Alternative G3 could result in some short-term negative economic impacts as shark wholesale and retail markets adjust to the potential disruption in catch rates resulting from the shift to a fishing year and new trimesters.

Under Alternative G3, U.S. domestic fisheries data would be managed on a fishing year basis while most ICCAT nations report on a calendar year basis. ICCAT may become more involved in shark management in the future, at which time, if Alternative G3 is selected, the HMS management cycle for all fisheries would be inconsistent with ICCAT's calendar year reporting. The inconsistent management timeframe would make the structure of analyses in the U.S. National Report confusing and less transparent. The basis for taking assertive action during the international compliance review may be compromised by the inability to interpret the United States' compliance from its own report.

On a fishing year management cycle, approximately six months are available between the adoption of ICCAT recommendations and initiation of the fishing year. Thus, it is more likely that NMFS could complete the regulatory implementation process before the start of the fisheries. As in the current tuna, swordfish and billfish fisheries, NMFS would have six months to implement necessary changes to domestic management measures to comply with international obligations, and the fishery would be able to anticipate changes to the management program and adjust fishing activities as needed.

*Conclusion*

The preferred alternative is Alternative G2, transferring all HMS fisheries to a calendar year management cycle. The calendar year would be effective for billfish fisheries on January 1, 2007 and for all species other than sharks on January 1, 2008. This alternative is preferred because it would simplify the regulatory process for constituents in the long term by managing all HMS fisheries on a calendar year, and would improve the United States' basis for negotiation at international forums. The primary concern regarding this alternative would be potential impacts to the billfish fishery when examined in combination with the potential implementation of the ICCAT 250 landings limit (Alternative E6). However, since the ICCAT 250 marlin landing limit has only been attained once in the last several years, the likelihood of any impact is low. Although economic estimates of impacts on billfish tournaments appear to be larger and of greater regional concern under preferred Alternative G2 than other alternatives, the discussion in Section 4.2.3 notes that the analysis of historical tournament data is fairly limited as an indicator of potential future impacts. The flexibility provided for implementation of a size limit increase is anticipated to mitigate impacts since the status of the fishery, and any pending tournaments, could be taken into account as appropriate. In some instances, tournaments could modify tournament rules or formats, or potentially be re-scheduled to mitigate or avoid the potential of a tournament occurring after the threshold for a management action may be reached, which could be more important to more affected regions. However, if several tournaments were rescheduled, the threshold might be reached earlier.

#### 4.3.3 Authorized Fishing Gear

As described in more detail in Chapter 2, the alternatives considered for authorized fishing gear are:

H1 Maintain current authorized gears in Atlantic HMS fisheries (No Action)

*H2 Authorize speargun fishing gear as a permissible gear type in the recreational Atlantic BAYS tuna fishery - Preferred Alternative*

H3 Authorize speargun fishing gear as a permissible gear type in the commercial tuna handgear and recreational Atlantic tuna fisheries

H4 Authorize green-stick fishing gear for the commercial harvest of Atlantic BAYS tunas

*H5 Authorize buoy gear as a permissible gear type in the commercial swordfish handgear fishery; limit vessels employing buoy gear to possessing and deploying no more than 35 floatation devices, with each individual gear having no more than two hooks or gangions attached – Preferred Alternative*

H6 Authorize buoy gear as a permissible gear type in the commercial swordfish handgear fishery; limit vessels employing buoy gear to possessing and deploying no more than 50 floatation devices, with each individual gear having no more than 15 hooks or gangions attached

*H7 Clarify the allowance of hand-held cockpit gears used at boat side for subduing HMS captured on authorized gears - Preferred Alternative*

*Ecological Impacts*

Alternative H1 would maintain the status quo for authorized gear in all Atlantic HMS fisheries. The ecological impacts of this alternative can be found in the Description of the Fisheries section of this document (see Chapter 3). Fishing effort and fishing mortality (F) would likely not increase as there would be no new authorized gears and/or participants. Bycatch and discard levels would also not likely increase because there would be no new authorized gears or changes to existing gears. This alternative is not anticipated to result in additional interactions with protected resources. However, this alternative could allow for potential increases in effort in the swordfish handgear fishery, because unlimited numbers of unattached handlines are currently allowed, and may result in additional bycatch of HMS and other bycatch species. Should such increases in effort occur, this alternative may allow for increased interactions with protected resources.

Alternative H2, a preferred alternative, would define and authorize speargun fishing gear in the recreational Atlantic BAYS tuna fishery *(i.e.*, all regulated HMS tuna species except BFT). This preferred alternative would slightly modify the alternative proposed in the Draft Consolidated HMS FMP by not allowing BFT to be fished for, landed, or retained by fishermen using speargun gear. In addition, this revised alternative would not allow the sale of any BAYS tuna harvested with speargun gear, under any circumstances, including those landed by fishermen aboard HMS CHB permitted vessels. Fishermen using speargun fishing gear would be allowed to freedive, use SCUBA, or other underwater breathing devices, and would be required to be physically in the water when they fire or discharge their speargun. Only free-swimming fish, not those restricted by fishing lines or other means, could be taken. The use of powerheads, or other explosive devices, would not be allowed to harvest or subdue BAYS tunas.

As of February 1, 2006, there were 25,238 permitted vessels participating in the HMS Angling category and 4,173 in the HMS CHB category. Based on public comment and anecdotal information, NMFS anticipates that between 50 and 1,000 individual U.S fishermen may have an interest in using speargun fishing gear to target BAYS tunas. Relative to the current number of participants in the recreational Atlantic tuna fishery, and taking into account the estimated low encounter rates for target species, the additional anticipated effort from spearfishermen would likely result in minimal negative ecological impacts on Atlantic BAYS tunas.

Under this alternative, only Atlantic BAYS tunas would be allowed to be taken by speargun fishing gear. This means that other HMS, such as Atlantic BFT, BLF, LCS, and SWO, could not be taken using speargun fishing gear. Atlantic BFT continue to be overfished and overfishing is occurring despite seven years of strict management under an international rebuilding plan with limited annual quotas. The rate of overfishing is not declining and the number of participants in the recreational HMS fishery continues to increase. Interest and activity in the small, recreational sized BFT fishery continues to grow. Since the publication of the Draft Consolidated HMS FMP in August 2005, NMFS received data on the performance of both the recreational and commercial BFT fishery, which exacerbated concerns over the ecological health and management of this stock. In the case of the commercial fishery, landings were low throughout the 2005 fishing season. The 2005 season was also marked by a noticeable lack of availability of commercial sized BFT throughout their traditional fishing range and, in particular, BFT were largely absent off southern states during the winter of 2005/2006. Although there is a high magnitude of available quota in the commercial size classes, scientists continue to be concerned over the status of this stock, especially the abundance of these larger fish that represent the potential spawners for future recruitment, particularly in the Gulf of Mexico. In the recreational fishery on smaller school size class BFT, data were available at the end of 2005 showing that, due to high landings rates in prior seasons, minimal quota would be available for a 2006 recreational school fishery. A recent publication providing a comprehensive and historical summary of BFT population dynamics, ecology, fisheries, and management concludes that the "current exploitation of BFT has many biological and economic traits that have led several fish stocks to extreme depletion in the past" (Fromentin and Powers, 2005). An international stock assessment on the current status, and future prognosis, of BFT is scheduled this year by the SCRS and new recommendations, if any, by ICCAT would not be available until November 2006. In light of the above and the uncertainty in the status and recovery of the stock, the Agency determined that the use of speargun gear for BFT is not appropriate at this time. BLF, SWO, and LCS are also considered overfished with overfishing occurring. As stock status improves and other factors change, NMFS may reconsider the use of speargun fishing gear in these fisheries, if appropriate.

The potential increase in landings for Atlantic BAYS tunas would be minimal compared with the landings by current participants and would likely result in minimal negative ecological impacts. Public comment supports the Agency's assessment that there are a limited number of additional individual fishermen expected to use this gear type. Further, public comment suggested that few spearfishermen would actually encounter the target species, and that spearfishermen could go months or years without having an opportunity to spear a BAYS tuna in the Atlantic.

In the past, there have been concerns that allowing speargun fishing gear in the Atlantic tunas fisheries could increase discards (fish speared and lost). During scoping, NMFS received comments indicating that spearfishermen often use detachable spear tips called "slip-tips," which are designed to retain speared fish, and use shooting lines, float lines, and floats that are designed to reduce fish loss. Further, the regulatory discards would likely be non-existent as spearfishermen can actively select the species and sizes of the targeted fish. Under alternative H2, NMFS does not anticipate any additional interactions with protected resources or other HMS due to the selectivity of this gear type.

Alternative H3 would authorize the use of speargun fishing gear in the recreational and commercial Atlantic tunas handgear fisheries. As stated in alternative H2 above, fishermen using speargun fishing gear would be allowed to freedive, use SCUBA, or other underwater breathing devices, and would be required to be physically in the water when they fire their speargun. Only free-swimming fish, not those restricted by fishing lines or other means, could be taken. The use of powerheads, or other explosive devices, would not be allowed to harvest or subdue tunas. Under this alternative, no HMS would be allowed to be taken by speargun fishing gear, other than Atlantic tunas. The ecological impacts of alternative H3 would likely be similar to those discussed under alternative H2 above, with the potential for some additional effort from commercial handgear tuna fishing vessels, as well as the inclusion of BFT as an allowable target species. Under this alternative, approximately 25,238 Angling, 214 Tunas Longline, 4,824 General, and 4,173 HMS CHB category vessels would be allowed to use this gear type. However, according to feedback received from HMS AP members, and because of the estimated low encounter rates, the Agency would not anticipate any substantive changes in effort or landings by the commercial handgear sector under this alternative.

Alternative H4 would define green-stick gear and authorize its use in the commercial tuna handgear fishery. This alternative was preferred in the Draft Consolidated HMS FMP but is not preferred in the Final Consolidated HMS FMP. This alternative would define green-stick under the HMS regulations and would authorize commercial tuna permit holders to sell BAYS tunas but prohibit them from possessing or retaining BFT. The definition of green-stick, and introduction of the gear to the fishery, would provide for some increase in effort. The gear is known to increase efficiency beyond that of a standard handline and rod-and-reel gear limited to two hooks per line as it would allow a green-stick line to have up to ten hooks or gangions.

Until publication of the Draft Consolidated HMS FMP, available information indicated that green-stick gear is primarily used to target YFT and other BAYS tunas. However, during public comment on the Draft Consolidated HMS FMP, considerable comment was received expressing interest in using the gear to target other species, including BFT. Green-stick gear, or variations of the gear, has been used and documented in the PLL fishery for several years. Green-stick gear catches reported in the PLL Logbook Program for 1999 – 2003 can be seen in Table 4.68. Of the 45,712 sets reported between 1999 and 2003, 54 of these sets were reported as green-stick gear. Of the 54 green-stick sets reported, 53 of those were reported from the MAB reporting area and one set was reported from the NEC. Green-stick gear was removed from the PLL Logbook Program in 2003 and has not been replaced.

On the 54 green-stick sets reported between 1999 and 2003, a total of 4 BFT, 4 BET, 678 YFT, and 54 other BAYS tunas were reported captured. Additionally, 9 swordfish, 11 pelagic sharks, and 3 LCS were also reported captured. No blue marlin, white marlin, sailfish, or spearfish were reported captured on any of these sets (Table 4.68).

**Table 4.68 Reported Atlantic Commercial Green-stick Gear Catch for 1999-2003*, in Numbers of Fish.**
Source: PLL Logbook Data

| Species | 1999 | 2000 | 2001 | 2002 | 2003* | Total |
|---|---|---|---|---|---|---|
| Swordfish | 0 | 9 | 0 | 0 | N/A | 9 |
| Bluefin tuna | 0 | 2 | 0 | 2 | N/A | 4 |
| Yellowfin tuna | 0 | 344 | 232 | 102 | N/A | 678 |
| Bigeye tuna | 0 | 2 | 2 | 0 | N/A | 4 |
| Other BAYS tunas | 0 | 26 | 28 | 0 | N/A | 54 |
| Blue marlin | 0 | 0 | 0 | 0 | N/A | 0 |
| White marlin | 0 | 0 | 0 | 0 | N/A | 0 |
| Sailfish | 0 | 0 | 0 | 0 | N/A | 0 |
| Spearfish | 0 | 0 | 0 | 0 | N/A | 0 |
| Pelagic sharks | 0 | 1 | 8 | 2 | N/A | 11 |
| Large coastal sharks | 0 | 0 | 3 | 0 | N/A | 3 |
| Dolphin | 0 | 8 | 2 | 47 | N/A | 57 |
| Wahoo | 0 | 0 | 0 | 8 | N/A | 8 |
| Sea turtles | 0 | 0 | 0 | 0 | N/A | 0 |

* Modified logbook format eliminated green-stick gear data field.

In addition to the above data there is some anecdotal information and record of public comment on prior HMS rulemaking and HMS AP meetings regarding the pros and cons of green-stick but little substantial information. There is also no data available for sectors other than the PLL.

Due to the limited amount of data associated with the use of commercially configured green-stick gear in the Atlantic HMS fisheries, NMFS expanded its analysis to look at other available U.S. data regarding the use of commercial green-stick gear, including catch data from the U.S. Pacific (Table 4.69). NMFS is aware that the following information may not have a direct correlation to the use of commercially configured green-stick gear in the Atlantic tuna fisheries; however, to better understand the implications of authorizing this gear, NMFS took this information into consideration.

**Table 4.69 Reported U.S. Pacific Commercial Green-stick Gear Catch for 2002-2004, in Numbers of Fish and Weight in Pounds.** Source: State of Hawaii, 2006

| Species | 2002* | | 2003 | | 2004 | | Total | |
|---|---|---|---|---|---|---|---|---|
| | No. | Lb. | No | Lb. | No. | Lb. | No. | Lb. |
| Yellowfin tuna | 224 | 5,285.5 | 708 | 48,161.5 | 453 | 16,674.5 | 1385 | 70,121.50 |
| Skipjack tuna | 183 | 1,503.0 | 147 | 873.0 | 104 | 906.0 | 434 | 3,282.00 |
| Wahoo | 13 | 160.0 | 13 | 211.5 | 4 | 110.0 | 30 | 481.50 |
| Dolphin | 7 | 121.0 | 26 | 428.5 | 3 | 42.0 | 36 | 591.50 |
| Barracuda | 1 | 52.5 | 0 | 0.0 | 0 | 0.0 | 1 | 52.50 |
| Blue marlin | 0 | 0.0 | 8 | 1,217.0 | 1 | 500.0 | 9 | 1,717.00 |
| Albacore | 0 | 0.0 | 1 | 40.0 | 0 | 0.0 | 1 | 40.00 |
| Striped marlin | 0 | 0.0 | 2 | 67.0 | 0 | 0.0 | 2 | 67.00 |
| Short-nosed spearfish | 0 | 0.0 | 1 | 20.0 | 0 | 0.0 | 1 | 20.00 |
| Bigeye tuna | 0 | 0.0 | 12 | 184.0 | 2 | 24.0 | 14 | 208.00 |
| Misc. tuna | 0 | 0.0 | 4 | 60.0 | 1 | 129.0 | 5 | 189.00 |
| Mako | 0 | 0.0 | 1 | 70.0 | 0 | 0.0 | 1 | 70.00 |
| Black skipjack | 0 | 0.0 | 0 | 0.0 | 1 | 20.0 | 1 | 20.00 |
| TOTAL | 428 | 7,122.0 | 923 | 51,332.5 | 569 | 18,405.5 | 1920 | 76,860.00 |

* October - December only

The amount of effort deployed in the U.S. Pacific commercial green-stick fishery to harvest the catches above is as follows: Calendar Year (CY) 2002 (Oct – Dec only), eight licensees conducted 59 total trips (367.0 hrs), of which 34 were at fish aggregation devices (FADs) (176.0 hours). Six of the total trips were "did not catch" trips. In CY 2003, 19 licensees conducted 188 total trips (1,504.0 hours), of which 35 were at FADs (258.0 hours). Sixteen of the total trips were "did not catch" trips. In CY 2004, 19 licensees conducted 116 total trips (801.5 hours), of which 24 were at FADs (151.5 hours). Twenty of the total trips were "did not catch" trips (Table 4.69).

Data from the Pacific Ocean show that, in addition to tunas, dolphin, and wahoo, the Pacific green-stick fishery has interacted with blue marlin, striped marlin, and short-nosed spearfish (Table 4.69). This indicates that, although no billfish have been reported captured on green-stick gear in the Atlantic commercial HMS fisheries in recent years, interactions with Atlantic blue marlin, white marlin, sailfish, and spearfish could be possible under this alternative. Public comment and historical logbook data illustrate that this gear type has been used in the HMS fisheries for several years and classified by fishermen as either longline or handgear. What is less clear is whether in fact the green-stick gear was configured in conformance with the regulations appropriate to the HMS regulatory vessel permit regime and definition of longline and handgear, (*e.g.*, number hooks, type of hooks, etc.). Also, since these data were collected, regulatory circumstances have changed regarding longline gear. Vessels with pelagic longline gear onboard are now required to use specific circle hooks rather than previously used J hooks, and as the fishing performance of these two hook types varies considerably, it is not possible to project future effectiveness of green-stick gear equipped with circle hooks based on past data when the gear was deployed with J hooks. During the public comment period, numerous comments were received expressing confusion over the current regulatory regime, unease over the potential impacts and intent of the preferred alternative in the Draft Consolidated HMS FMP, and concern over potential negative impacts of the green-stick gear.

As there is considerable uncertainty in the quality of the data available, a lack of overall data from established monitoring programs, confusion among the public over what is currently allowed, and a potential for increases in fishing effort and landings of YFT and other HMS, NMFS cannot make a determination regarding the ecological impacts of formally introducing this gear type at this time. Thus, alternative H4 is no longer the preferred alternative; rather, the preferred course of action is to clarify the current allowable use of this gear-type. Clarification of the currently authorized configuration of green-stick gear is not expected to have any ecological consequences beyond those already described generally in Chapter 3, specifically under sections describing handgear and longline fisheries. Vessels fishing under the General category (*i.e.*, General category tuna and HMS CHB permit holders) would continue to be subject to all current General category regulations (*e.g.*, size limits), and vessels with PLL gear onboard would continue to be subject to all current PLL regulations, including gear restrictions (*e.g.*, circle hooks) and closed areas. Disseminating information on the various authorized technical configurations of this gear could result in a modest increase in effort, due to an increased understanding of the authorized gear and a limited number of fishermen entering the fishery to use it. However, a minor increase in effort could be offset by a decrease in effort from fishermen who can no longer use this gear as they either had the incorrect vessel permit or were using it in an unauthorized configuration. Available data from historical use of this gear show no reports of sea turtle interactions. Accordingly, the use of this gear in the Atlantic tuna fishery would not be expected to increase interactions with sea turtles or other protected resources. Overall, no major changes in effort are expected with corresponding minimal ecological impacts.

Under alternative H5, a preferred alternative, some positive ecological impacts are anticipated. Current handline restrictions – including requirements that there be no more than two hooks attached to each gear and that the gear be released and retrieved by hand – would be included in the definition of buoy gear. In addition, this alternative would limit the number of floatation devices that would be allowed to be possessed or deployed to 35, thus limiting the maximum number of buoy gears fishermen may deploy. The Agency received public comment requesting that commercial vessels be limited to deploying fewer than 35 individual buoy gears. Additionally, commercial fishermen familiar with this gear type requested that they be allowed to attach multiple floatation devices to buoy gears to aid in monitoring and retrieval, as well as allow them to use "bite indicator" floats that will alert them to gears with fish attached. In response to public comment, NMFS has modified alternative H5 to allow fishermen to attach more than one floatation device to each buoy gear; however, the alternative maintains the maximum limit of 35 floatation devices possessed or deployed. For example, under the modified alternative, fishermen who opt to fish three floatation devices per gear would be limited to deploying approximately 11 buoy gears and fishermen using four floatation devices per gear would be limited to deploying approximately eight buoy gears. This modification would increase the flexibility fishermen have in configuring buoy gear with as many or as few floatation devices as they prefer, as long as it does not exceed 35. Depending on how the gear is configured, this flexibility may reduce the number of gears deployed. If the gear is configured with a bite indicator, this modification could allow fishermen to easily identify which gears have captured fish and may allow fishermen to release any undersized swordfish or non-target species more quickly and with a greater probability of survival. Additionally, the modification to allow multiple floatation devices per gear may minimize lost gear and potential negative ecologic impacts by making the gears more buoyant and visible.

There are no data indicating how many commercial vessels are currently fishing with unattached handlines, or how many unattached handlines are deployed. Nevertheless, this alternative is not expected to significantly restrict commercial handline fishing effort from current levels, but it does prevent future expansion of effort beyond the maximum of 35 buoy gears. A limit of 35 floatation devices was selected based on support from public comment, and because the Agency identified this number as the manageable upper limit for the commercial sector that would prevent excessive amounts of unattended floating gear from being lost while allowing vessels to possess spare gear onboard.

If vessels currently possess or deploy more than 35 unattached handlines with more than two hooks attached, minor ecological benefits may be realized as effort and deployed gear are curtailed. Relative to the No Action alternative, this modified alternative may provide positive ecological benefits by limiting the future expansion of this gear sector and allowing fishermen flexibility in gear configuration, which may result in additional monitoring methods per gear (bite indicator floats), and reducing bycatch and lost fishing gear. Lost fishing gear may be reduced by the requirement to affix each individual buoy gear with monitoring equipment, the flexibility to use more than one floatation device per gear, and by limiting the overall number of gears a vessel may deploy. If future expansion is limited and the amount of lost gear is reduced, there may be an unquantifiable future reduction in the bycatch of undersized swordfish, other HMS species, protected species, and target and non-target catches. However, with regards to commercial swordfish target catches, the United States has consistently landed less than its ICCAT quota in recent years, and overfishing is not occurring on North Atlantic swordfish. Under this alternative, a maximum of 279 limited access permit holders (88 swordfish handgear and 191 swordfish directed) would be authorized to utilize this gear type to target swordfish.

As mentioned above, there are no data indicating exactly how many commercial vessels are currently fishing with unattached handlines because the HMS logbook currently does not differentiate between “attached” and “unattached.” The handline data presented in this document differs from those published in the Draft Consolidated HMS FMP. A reexamination of the HMS logbook database has resulted in modifications to the handline data for 2000 – 2004 and all handline data from 2000 – 2003 being considered confidential. The refined data are presented in Table 4.70. Although all HMS handline trip data before 2004 are confidential because few vessels participated in the fishery, the data indicate that the number of commercial HMS handline fishing trips has increased approximately 10-fold since 2003. According to 2004 logbook data, 64 commercial handline trips were reported from seven vessels, with 404 swordfish reported caught. Of those 404 swordfish captured, 274 fish (67.8 percent) were retained, 98 fish (24.3 percent) were released alive, and 32 fish (7.9 percent) were discarded dead. Of the 130 swordfish released by this fishery in 2004, 98 fish (75.4 percent) were reported as released alive and 32 fish (24.6 percent) were reported as released dead. No Atlantic marlins were reported captured on this gear from 2000 through 2004. In 2004, one sailfish was reported caught and released alive. Additionally, no sea turtle interactions were reported for 2000 – 2004.

**Table 4.70 Handline catches, in Numbers of Fish, for 2000 – 2004. Source: HMS Logbook. Note that confidential data cannot be released and are marked by an *.**

| | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|
| Number of trips | * | 0 | * | * | 64 |
| Swordfish kept | 0 | 0 | 0 | * | 274 |
| YFT kept | * | 0 | * | 0 | 4 |
| BET kept | 0 | 0 | * | 0 | 1 |
| Other BAYS Kept | * | 0 | 0 | 0 | 0 |
| LCS kept | 0 | 0 | 0 | 0 | 1 |
| Pelagic shark kept | * | 0 | 0 | 0 | 1 |
| Dolphin kept | 0 | 0 | * | 0 | 69 |
| Wahoo kept | 0 | 0 | * | 0 | 1 |
| Swordfish discarded alive | 0 | 0 | 0 | * | 98 |
| YFT discarded alive | 0 | 0 | 0 | 0 | 3 |
| BET discarded alive | 0 | 0 | 0 | 0 | 0 |
| Other BAYS discarded alive | 0 | 0 | 0 | 0 | 0 |
| LCS discarded alive | 0 | 0 | 0 | * | 18 |
| Pelagic shark discarded alive | 0 | 0 | 0 | 0 | 1 |
| Dolphin discarded alive | 0 | 0 | 0 | 0 | 0 |
| Wahoo discarded alive | 0 | 0 | 0 | 0 | 0 |
| BUM discarded alive | 0 | 0 | 0 | 0 | 0 |
| WHM discarded alive | 0 | 0 | 0 | 0 | 0 |
| SAI discarded alive | 0 | 0 | 0 | 0 | 1 |
| SPX discarded alive | 0 | 0 | 0 | 0 | 0 |
| Sea Turtles discarded alive | 0 | 0 | 0 | 0 | 0 |
| Swordfish discarded dead | 0 | 0 | 0 | * | 32 |
| YFT discarded dead | 0 | 0 | 0 | 0 | 0 |
| BET discarded dead | 0 | 0 | 0 | 0 | 0 |
| Other BAYS discarded dead | 0 | 0 | 0 | 0 | 0 |
| LCS discarded dead | 0 | 0 | 0 | 0 | 3 |
| Pelagic shark discarded dead | 0 | 0 | 0 | 0 | 0 |
| Dolphin discarded dead | 0 | 0 | 0 | 0 | 0 |
| Wahoo discarded dead | 0 | 0 | 0 | 0 | 0 |
| BUM discarded dead | 0 | 0 | 0 | 0 | 0 |
| WHM discarded dead | 0 | 0 | 0 | 0 | 0 |
| SAI discarded dead | 0 | 0 | 0 | 0 | 0 |
| SPX discarded dead | 0 | 0 | 0 | 0 | 0 |
| Sea Turtles discarded dead | 0 | 0 | 0 | 0 | 0 |

* Confidential data

Under alternative H6, vessels employing buoy gear would be limited to possessing and deploying up to 50 floatation devices, and attaching up to 15 hooks and/or gangions to each buoy gear. This alternative has been modified slightly to allow the use of one or more floatation devices per buoy gear, as discussed above. This alternative would have ecological impacts similar to alternative H5, with some potential for additional negative ecological impacts as compared to alternative H5 stemming from an increase in the allowable number of floatation devices and hooks, and potentially increased soak times. NMFS received substantial public comment opposed to this alternative. At this time, it is not possible to quantify the impacts this alternative could have on handline/buoy gear effort or bycatch. If it is assumed that handline fishermen currently deploy no more than two hooks per gear, then this alternative could increase effort in the fishery. This could lead to increased catches of target and non-target species, and has the potential to increase the probability for interactions with protected resources. Alternative H6 may not increase fishing effort substantially as only seven vessels reported fishing handline trips in 2004. Further, impacts resulting from potential increases in effort may be limited if some commercial handline fishermen currently fish with up to 50 gears and utilize more than the allowed two hooks per gear.

Under alternative H7, the continued use of secondary hand-held cockpit gears may reduce the loss of fish at boat side and aid anglers in subduing large HMS captured on authorized primary gear types. However, the use of these gears may also increase bycatch mortality/dead discards if undersized or non-target species are gaffed or darted and subsequently discarded. NMFS regulations at 50 CFR § 635.21(a) clearly state that any HMS harvested that is not retained must be released in a manner to ensure maximum probability of survival. Under this alternative, NMFS would encourage restraint prior to using a secondary hand-held cockpit gear on fish that may need to be released. This alternative should not increase bycatch mortality as HMS fisheries currently utilize secondary hand-held cockpit gears; however, specifying that secondary gears are allowable may increase their use. The Agency does not expect the use of secondary handheld cockpit gears in the Atlantic HMS fisheries to increase interactions with protected resources. The Agency received public comment in support of this measure.

With regards to impacts on EFH, the 1999 FMP and Amendment 1 to the Atlantic Billfish FMP state that Atlantic HMS occupies pelagic oceanic environments. The use of speargun fishing gear, buoy gear, and handheld cockpit gears will not likely impact bottom structures or otherwise damage habitat. Under all of the above alternatives, NMFS does not anticipate any adverse impacts to EFH.

*Social and Economic Impacts*

Alternative H1 (No Action) would not be expected to have any additional social or economic impacts because fishermen are already operating under these measures. Similarly, there are no additional significant safety implications anticipated with this alternative. This alternative would, however, not allow the use of speargun fishing gear in the recreational Atlantic BAYS tuna fishery, not allow CHB and General category permit holders to use a defined configuration of green-stick gear for commercial fishing of BAYS tunas, or allow swordfish handgear fishermen to use buoy gear. This alternative would also not address confusion over the allowable use of cockpit gears (*e.g.*, dart harpoon, flying gaff).

Alternative H2 would have positive social and economic impacts for spearfishermen, and may result in negative social and economic impacts for rod and reel fishermen. At the 1993 public hearings on the proposed list of authorized gears in the Atlantic tuna fisheries, no comments were received from spearfishermen and the regulations were finalized without listing speargun fishing gear as an authorized gear. Since implementation of the final rule, NMFS has received written requests, comment at public hearings, and has heard presentations at AP meetings requesting that NMFS authorize the use of speargun fishing gear in the Atlantic tuna fishery. NMFS has received comment that recreational spearfishermen place a high value on spearfishing for tunas and are currently traveling outside of the United States for the opportunity to participate in tuna speargun fisheries.

A range of potential costs for spearfishing gear was estimated by an informal internet search of spearfishing gear distributor sites. These costs may be incurred by individuals who wish to participate in this fishery, but obtaining this gear is not required by this action. The internet search found that new spearguns could be purchased for as little as $65.00 and ranged upward to approximately $1,600.00. Terminal gear, such as shooting lines and floats, could cost an additional $50.00 to $500.00. However, most inexpensive spearguns would not be adequate for targeting large tunas. Anecdotal information suggests that some spearfishermen may fabricate their own spearguns and equipment, and may not purchase this equipment from distributors. Additionally, recreational spearfishermen would only be allowed to fish from vessels having HMS Angling and HMS CHB category permits, currently costing $22.00 per year.

Allowing speargun fishing gear as an authorized gear type in the recreational Atlantic BAYS tuna fishery would likely result in minor positive social impacts to new entrants to the recreational BAYS fishery who wish to have the opportunity to use spearguns to harvest tuna other than BFT. Not allowing BFT to be taken with speargun fishing gear avoids the possibility of further exacerbating quota limited situations in the school size fishery and might avoid gear conflict with other members of the BFT recreational fleet. However, as this activity is not currently allowed under existing regulations, no additional adverse social or economic impacts are anticipated for the recreational HMS CHB or Angling sectors from not allowing retention of BFT.

Prohibiting the sale of tunas harvested with spearfishing gear under an HMS Angling category permit would have no economic impact, as the sale of tunas is currently not authorized for this sector of the fleet. Prohibiting the sale of BAYS tuna landed by HMS CHB fishermen using speargun gear may result in some perceived negative social and economic impacts. However, this activity is not currently allowed under existing regulations, therefore, no additional adverse social or economic impacts are anticipated for the HMS CHB sector.

Rod and reel fishermen may experience a decrease in angler consumer surplus if competition for fishing grounds causes them to travel further and extend their fishing trips. Spearfishermen would likely experience positive social impacts and an increase in angler consumer surplus, as they are currently prohibited from taking BAYS tunas with speargun gear in the Atlantic. Spearfishermen have commented that they currently must travel to the West coast or out of the United States to target tunas with speargun fishing gear. The HMS CHB sector may experience positive economic impacts as spearfishermen may increase their use of for-hire vessels, increasing revenues to those vessels. Additionally, alternative H2 could increase the club-nature or camaraderie associated with speargun fishing and may result in positive social impacts. Currently, there are many spearfishing clubs along the Atlantic and Gulf of Mexico coasts, as well as in the Caribbean.

The use of speargun fishing gear was discussed at the March 2005 HMS AP meeting as well as during past AP meetings. At the 2005 AP meeting, the Predraft alternative to allow the use of speargun gear in the recreational Atlantic tunas fishery was largely supported. During this meeting, as well as at past AP meetings, AP panel members expressed concerns about the safety of divers and rod and reel fishermen fishing together in the same areas on “hot spots” of fish or over shipwreck sites. There was concern expressed regarding the possibility, in these situations, that an Angling or HMS CHB permitted vessel with spearfishermen aboard might enter a fleet of rod and reel vessels and drop a dive-flag in their midst causing the other recreational vessels to have to leave the area. NMFS has received public comment stating that spearfishermen will likely not attempt to fish near trolling vessels or vessels actively rod and reel fishing for tunas, but instead prefer to raise their own fish using submersible flashers (reflective fish decoys) or other means. Additionally, each spearfisherman tows a series of floats with a dive flag and is closely monitored by people aboard support vessels that also display dive flags. NMFS has also received comment that some spearfishermen and rod and reel fishermen have recently fished together, in close proximity, without incident. This particular commenter also added that spearfishermen were participating in recreational offshore fisheries for dolphin and wahoo in many of the same areas that they would be fishing for tunas, as well as chartering vessels which also cater to the rod and reel sector. This information indicates that gear conflicts are not likely to be problematic.

The social and economic impacts of alternative H3 would likely be similar to those discussed under alternative H2, with additional social and economic benefits associated with the inclusion of BFT as a recreational target species and allowing for the sale of commercially speared tunas by HMS CHB and General category permitted vessels. Allowing BFT to be taken with speargun gear under the Angling category quota could marginally reduce the amount of quota available for rod and reel anglers, which could result in minor negative social impacts for the recreational rod and reel sector, yet would provide positive social impacts for those participants using speargun gear. If BFT are taken with speargun gear, the BFT Angling category season could be shortened with slight potential adverse economic impacts for all Angling category participants. The HMS CHB sector may experience positive economic impacts as spearfishermen may increase their use of for-hire vessels, increasing revenues to those vessels, if BFT were allowed to be targeted recreationally.

Under alternative H3, BAYS tunas taken on HMS CHB vessels with speargun fishing gear, regardless of whether the vessel is operating in a for-hire or non-for-hire manner, may be sold provided the applicable retention limits are abided by. General category vessels would also be allowed to target, land, and sell BAYS commercially with this gear type. In regards to the sale of BFT harvested with speargun gear, HMS CHB and General category vessels would be allowed to target, land, and sell BFT of commercial size classes provided the fishery was open and all applicable size and retention limits were adhered to. This ability may provide for some negative social impacts attributed to potential gear conflicts that could occur on the water; however, it is not known if commercial tuna handgear fishermen would participate in a commercial speargun fishery for tunas. According to feedback received from HMS AP members, and because of the estimated low encounter rates, the Agency does not anticipate that many tuna handgear fishermen would participate. NMFS does not anticipate any substantive changes in impacts for this sector under this alternative.

Positive economic impacts associated with the sale of Atlantic tunas harvested with speargun gear may also apply to fish houses, gear supply houses, and other associated businesses. Alternative H3 may also increase administrative burden due to additional monitoring and enforcement activities stemming from the retention and sale of commercially speared tunas.

Alternative H4 could have positive social and economic benefits for those fishermen who wish to employ green-stick gear to target Atlantic BAYS tunas commercially in a manner not currently authorized (*i.e.*, deploy with more than two hooks per line on handgear). This alternative was preferred in the Draft Consolidated HMS FMP but is not preferred in the Final Consolidated HMS FMP. It is difficult to quantify the actual increase in the number of commercial vessels that would deploy green-stick gear as a result of this alternative. The vessels that would be authorized to use green-stick gear under alternative H4 would include all permitted Atlantic Tunas Longline, General, and HMS CHB (on non for-hire trips) category vessels, approximately 214, 4,824, and 4,173 vessels, respectively. Based on anecdotal information, some unknown total number of vessels is believed to be already using this gear in some fashion in the HMS fisheries. According to the PLL Logbook data, six longline vessels have recently reported landings under this gear type. These vessels primarily appear to be operating in the MAB area. However, NMFS is aware from public comment that the number of vessels that use this gear type likely exceeds those reporting in the PLL Logbook. Other commercial vessels using this gear type (*i.e.*, General and HMS CHB permit category vessels) likely report landings under the handgear designation.

A range of potential costs associated with rigging a vessel with green-stick gear was estimated by an informal inquiry of gear distributors. These costs may be incurred by individuals who wish to participate in this fishery, but obtaining this gear would not be required by this action. The inquiry found that new green-sticks, the sticks themselves, could be purchased for as little as $1,300.00 and ranged upward to approximately $3,300.00. Complete rigs with a hydraulic spool could cost between $4,000.00 and $6,000.00 depending on the size of the rig and the need for a hydraulic system on the vessel. Anecdotal information suggests that some fishermen may fabricate their own setups by running lines from the fly bridge or from the tuna towers on their vessels. Fishermen would only be allowed to use this type of gear if they were operating from properly permitted vessels. The current cost of a required Federal vessel permit is $22.00 per year.

According to Wescott (1996), vessels using green-stick gear have reported tuna landings of ten to one over traditional fishing techniques. The use of green-stick gear, and a potential increase in BAYS tuna landings, could provide positive economic benefits to commercial fishermen as well as positive economic impacts to fish houses, gear supply houses, and other associated businesses. Additionally, commercial fishermen have found that tuna caught on green-stick gear offer little resistance, as they are subjected to the pull of the mainline in one direction, the pull of the decoy in the other, as well as the pull from other hooked fish. Because tunas caught on green-stick gear may be landed quickly and with minimal fight, the fish may be less stressed and the meat may be of better quality (Wescott, 1996). Landings of higher quality tunas could lead to higher prices, and therefore increased revenues for those commercial vessels deploying this gear type. The magnitude of this benefit, as a result of this alternative and changes to the regulatory regime, is difficult to determine as it is unclear how this gear has been configured in the past and how catch harvested by this gear has been reported, as well as how many new users would deploy the newly defined and authorized gear type (*i.e.*, quantify the incremental economic increase from an unknown potential new universe of users versus existing users currently deploying the gear under the status quo).

Clarifying the use of green-stick gear without preferring this alternative or modifying the regulations would have modest positive social benefits on those fishermen who are confused about the current regulatory regime. It may also result in minor positive economic benefits to those fishermen who now enter the fishery using this gear type in a manner allowed under current regulations but may not have done so previously as they were concerned it may have been illegal. These positive benefits may be offset by those fishermen who realize that they were using green-stick gear in the configurations that are not authorized under HMS regulations. HMS CHB and General category permit holders would be allowed to use various configurations of green-stick gear (see Section 2.3.3) although limited to two hooks per line under current handgear definitions. PLL vessels may use either configuration with unlimited hooks but need to comply to all other existing PLL regulatory requirements, including the use of circle hooks and avoiding closed areas.

Alternative H5 would allow the commercial swordfish handgear fishery to continue utilizing unattached handlines, redefined as buoy gear, and would likely continue affording positive social and economic benefits to current fishery participants. Under this alternative, a maximum of 279 limited access permit holders (88 swordfish handgear and 191 swordfish directed) would be authorized to utilize this gear type to target swordfish. HMS logbook data indicate that HMS handline trips have increased 10-fold since 2003 (Table 4.70). Based on public comment, the swordfish handgear fishery does not appear to be widespread but instead appears to operate primarily off the East Coast of Florida. While this alternative would limit the maximum number of floatation devices possessed or deployed, the Agency selected an upper limit based on information obtained about the fishery through public comment, and based on what NMFS has identified as the manageable upper limit for the commercial sector. This alternative would require that fishermen using this gear type affix gear monitoring equipment to each individual buoy gear to aid in recovery. NMFS expects that most swordfish handgear fishermen using unattached handlines already possess and utilize some or all of this gear monitoring equipment. If not, minimal compliance costs for the least expensive equipment (*e.*g., reflective tape and spotlight) could be incurred. Alternative H5 would also allow fishermen some flexibility in configuring buoy gear. In response to public comment, NMFS has modified the preferred alternative to allow fishermen to use more than one floatation device per gear and configure the gear differently depending on vessel and crew capabilities, or weather and sea conditions. This increased flexibility may result in improved efficiency in complying with the float restriction preferred in the Draft Consolidated HMS FMP and may increase safety at sea.

If vessels are currently fishing with more than 35 free-floating buoyed handlines, there could be some unquantifiable adverse economic impacts for these vessels. NMFS expects that swordfish catches under this alternative would remain large enough for trips to be profitable. Because this alternative may limit or reduce fishing effort, it could potentially produce adverse social and economic impacts, including an unpredictable reduction in catches of swordfish. Based on the limited number of current handline fishery participants, NMFS does not anticipate that this alternative will substantially reduce U.S. swordfish fishing effort; however, if fishing effort is reduced, opportunities for the United States to utilize fully its ICCAT swordfish quota could be slightly reduced.

Alternative I5b, a preferred alternative discussed in the Regulatory Housekeeping Section 4.3.4, would require that all handlines used in HMS fisheries be attached to a vessel. Alternative H5 would allow commercial swordfish handgear fishermen to continue utilizing unattached handlines, redefined as buoy gear. Under alternative H5, the ability to utilize buoy gear represents a positive social and economic opportunity for commercial swordfish handgear and directed swordfish limited access permit holders. Conversely, this alternative could result in perceived negative social impacts by recreational fishermen by continuing to allow commercial swordfishing in areas closed to HMS pelagic longline gear. The Agency received public comment opposed to allowing fishermen deploying this gear type to continue fishing in areas closed to pelagic longline fishing. The pelagic longline closed areas were specifically designed to reduce bycatch and discards attributed to the characteristics of the pelagic longline fishery. Buoy gear is not pelagic longline gear, as it has no more than two hooks or gangions attached, and therefore the same impacts cannot be assumed for this gear type in those closed areas. NMFS believes that the limited scope of this fishery (seven vessels fishing in 2004) does not warrant prohibiting the use of buoy gear in these closed areas, especially considering that this management action places significant restrictions on an activity that is currently unrestricted (*i.e.*, restricts the allowable number of gears deployed). Additionally, NMFS believes the preferred alternative strikes an appropriate balance between allowing a limited harvest of swordfish and preserving the conservation benefits of the pelagic longline closed areas.

Alternative H6 would likely have social and economic benefits similar to those discussed under alternative H5, with some possible additional positive social and economic benefits stemming from the ability to increase the number of floatation devices possessed or deployed, as well as increase the number of hooks attached to each buoy gear. Allowing vessels to possess or deploy up to 50 individual gears and utilize up to 15 hooks per gear could potentially increase catch rates of swordfish, resulting in increased revenues for those vessels deploying this gear type. Due to limited logbook data, NMFS cannot quantify any potential increases in landings at this time. Similarly to alternative H5, and as discussed above, alternative H6 could result in perceived negative social impacts by recreational fishermen by continuing to allow commercial swordfishing in areas closed to HMS pelagic longline gear.

Alternative H7 would likely have positive social benefits for those fishermen who target HMS and wish to employ these secondary gears to aid in the landing or subduing of HMS at boat side. This alternative would also likely reduce confusion over their allowable use. The use of these gears may also promote safety at sea for HMS fishermen, by allowing fishermen to utilize gears specifically designed to gain control of and subdue large fish from safer distances. Conversely, the use of these gears can be dangerous and may create additional safety hazards for fishermen. Many of these gears have sharp edges or points that may be hazardous to those employing them or to others on board a vessel. Some cockpit gears also incorporate trailing lines that may entangle fishermen and may result in fishermen being pulled overboard, drowning, or suffering other injuries.

Under alternative H7, fishermen who are permitted to sell HMS may experience positive economic benefits stemming from anticipated increased retention rates. Anecdotal information suggests that these gears are currently being used in both recreational and commercial fisheries for HMS. If these gears are being utilized, the resulting benefits from this alternative would likely be less than those discussed above. The Agency received public comment in support of this measure.

*Conclusion*

Alternative H2 is preferred because it would allow spearfishermen to participate in the Atlantic BAYS tuna fishery and would likely result in positive social and economic benefits. This alternative is responsive to specific public comment and requests from constituents. Although some minimal negative ecological impact is expected on these stocks from authorizing recreational use of speargun gear, the negative impact would be outweighed by the positive social and economic benefits of allowing speargun fishermen the opportunity to participate in this fishery. Alternative H5 is preferred because it would allow the swordfish handgear fishery to continue to utilize individual unattached buoyed gears, and would limit the maximum number of gears deployed by a vessel. Alternative H5 would likely result in positive social benefits and maintain current economic benefits to this sector. This alternative may provide some positive ecological benefits by limiting future expansion of this gear sector and possibly by reducing the amount of lost fishing gear. Additionally, the United States has consistently landed less than its ICCAT swordfish quota in recent years, and although the North Atlantic swordfish stock is currently overfished, overfishing is not occurring. Alternative H5 could aid in the rebuilding of North Atlantic swordfish by limiting an unrestricted fishery and is anticipated to maintain current economic benefits to this sector. Alternative H7 is preferred because it would clarify the allowable use of secondary cockpit gears and would likely result in positive social benefits. This alternative should not result in an increase in bycatch mortality, over current levels, as secondary gears are currently utilized in HMS fisheries. Alternative H7 is also responsive to requests from fishery participants.

Although NMFS preferred alternative H4 in the Draft Consolidated HMS FMP, it is not preferred in the Final Consolidated HMS FMP. The Agency chose to proceed with No Action regarding green-stick gear, and instead chose to clarify the existing regulatory regime and allowable configurations of green-stick gear in an effort to reduce confusion regarding the authorized use of green-stick gear, which may result in positive social impacts. As this action only clarifies the status quo, this alternative would likely not increase landings or landings rates, or has significant adverse ecological impacts.

### 4.3.4 Regulatory Housekeeping

As described in Section 2.3.4.2, eleven issues are analyzed within this section. These include: (Issue 1) Definitions of pelagic longline (PLL) and bottom longline (BLL) gear; (Issue 2) Shark identification; (Issue 3) HMS retention limits; (Issue 4) Definition of East Florida Coast Closed Area; (Issue 5) Definition of handline; (Issue 6) Possession of billfish on vessels issued commercial permits; (Issue 7) BFT dealer reporting; (Issue 8) "No-fishing", "cost-earnings", and "annual expenditures" reporting forms; (Issue 9) Non-tournament recreational landings reporting; (Issue 10) Pelagic longline 25 mt incidental BFT allocation; and, (Issue 11) Permit condition for recreational trips.

<u>Issue 1: Definitions of Pelagic and Bottom Longlines</u>

As described in Chapter 2, the alternatives considered to better differentiate between PLL and BLL gear include:

I1(a) Retain current definitions for PLL and BLL gear (No Action)

I1(b) Establish additional restrictions on longline gear in HMS time/area closures by specifying a maximum and minimum allowable number of commercial fishing floats to qualify as a BLL and PLL vessel, respectively

*I1(c) Differentiate between PLL and BLL gear based upon the species composition of the catch onboard or landed – Preferred Alternative*

I1(d) Require time/depth recorders (TDRs) on all HMS longlines

I1(e) Base HMS time/area closures on all longlines (PLL and BLL)

*Ecological Impacts*

Alternative I1(a) would retain the current definitions for PLL and BLL gear (No Action). In the existing regulations, the longline definitions are based upon the presence of weights/floats capable of anchoring/supporting the mainline on/in the seafloor/water column. There is no threshold regarding how many weights or floats are allowed, or which species may be possessed. Problems have arisen with these definitions because some BLL vessels may possess and utilize floats on bottom longlines, and some PLL vessels may possess and utilize weights on pelagic longlines. Therefore, in some instances, it may be difficult to precisely determine compliance with HMS closed area and VMS regulations, which are specific to either HMS-permitted PLL or BLL vessels. This may compromise the effectiveness of HMS time/area closures. In the absence of full compliance with current closed area restrictions, adverse ecological impacts may occur including increased discards of undersized swordfish, bluefin tuna, dusky sharks, sandbar sharks, other HMS, other finfish, and protected species.

Alternative I1(b), a preferred alternative in the Draft HMS FMP, would establish additional restrictions on longline gear in HMS time/area closures. Specifically, under this alternative, to be considered a BLL vessel in a PLL closed area, the vessel could possess no more than 70 commercial fishing floats onboard or deployed, combined. To be considered a PLL vessel in a BLL closed area, the vessel would have to possess at least 71 commercial fishing floats onboard or deployed, combined. Examples of commercial fishing floats include bullet floats, poly balls, high flyers, and lobster pot buoys. In the Draft HMS FMP, NMFS specifically requested public comment on this list to determine if it was accurate and/or complete. Also, NMFS requested public comment regarding whether or not to include a definition of "fishing floats" in the regulations, and on potential language for a “float” definition. Several commenters indicated that the number of floats is not an appropriate gauge to determine the type of fishing gear that is being deployed, and that the presence of “bullet floats,” anchors, or the type of mainline would be better indicators. Other commenters stated that a float requirement would be an unnecessary burden that could diminish the flexibility of vessel operators to participate in different fishing activities, depending upon the circumstances. Additionally, consultations with NMFS Law Enforcement indicated that the float requirement in alternative I1(b) would not be practical. Based on these comments, NMFS has chosen not to prefer alternative I1(b) in the Final HMS FMP. Although alternative I1(b) was preferred in conjunction with alternative I1(c) in the Draft HMS FMP, NMFS believes that the objective of this alternative can be effectively achieved by implementing alternative I1(c) alone, species composition of catch. Nevertheless, the establishment of quantifiable gear-based criteria to differentiate between PLL and BLL gear could still help to eliminate ambiguity between gear types, if necessary. NMFS will continue to assess the need for, and potential effectiveness of, gear-based criteria. If needed, such criteria could further improve the monitoring of, and compliance with, HMS closed areas. As a result, the ecological benefits associated with HMS closed areas would remain intact, including reductions in discards of undersized swordfish, bluefin tuna, dusky sharks, sandbar sharks, other HMS, and protected species. However, if the number of allowable floats in this alternative were not sufficient for the gear to operate as intended, it could possibly result in broken sets or lost fishing gear. The unintended consequence could potentially be an unquantifiable increase in bycatch and species entanglements. Also, establishing a threshold based solely on the allowable number of floats onboard or deployed could create an incentive for vessel operators to carry just enough floats to comply with one of the two definitions, but actually fish in an opposite manner (pelagic or demersal). This practice could compromise the effectiveness of the closed area restrictions.

Alternative I1(c), the preferred alternative, would establish a five-percent limit (by weight) on the allowable amount of pelagic “indicator” species that BLL vessels may possess or land from PLL closed areas, and establish a five-percent limit (by weight) on the allowable amount of “indicator” demersal species that PLL vessels may possess or land from BLL closed areas (as measured relative to the total weight of all “indicator” species). The “indicator” species are listed in Table 4.71**.** In the Draft HMS FMP, NMFS specifically requested public comment regarding the adequacy of the list of pelagic and demersal “indicator” species. On the basis of public comment, the list of demersal “indicator” species has been modified from the Draft HMS FMP by removing silky, great hammerhead, scalloped hammerhead, and smooth hammerhead sharks from the list, and by adding tilefish, blueline tilefish, and sand tilefish to the list. NMFS believes that these changes are appropriate because those shark species can be caught on both pelagic and bottom longlines, and because the tilefish species are representative of demersal fishing activity. The establishment of quantifiable species-based criteria to differentiate between PLL and BLL fishing gear in closed areas should help to eliminate ambiguities, because PLL gear would logically be expected to capture pelagic species and vice-versa. This alternative should improve the monitoring and effectiveness of, and compliance with, HMS closed areas.

With improved monitoring and compliance, the ecological benefits associated with HMS closed areas would remain intact, including reductions in discards of undersized swordfish, bluefin tuna, dusky sharks, sandbar sharks, other HMS, and protected species. However, establishing a threshold based on the species composition of the catch could potentially result in an increase in regulatory discards if vessel operators discard species because the threshold is exceeded, either intentionally or accidentally. Excessive discards could compromise the effectiveness of the closed area restrictions. NMFS does not expect that significant regulatory discards will occur as a result of this alternative. A five-percent threshold has been established to account for any unanticipated bycatch.

Table 4.72 and Table 4.73, respectively, indicate that this threshold (five percent) is slightly above the average weight of pelagic species that have been reported in the Coastal logbook in recent years (4.45 percent), and slightly above the average weight of demersal species that have been reported in recent years in the HMS logbook (4.52 percent). In 2004, however, on a fishery-wide basis, the five-percent threshold would have been exceeded. NMFS believes that, if longline vessels are fishing in an appropriate manner, either demersally in the PLL closed areas or pelagically in the BLL closed area, this threshold should adequately account for any unintentional bycatch in the closed areas. If necessary, the five-percent threshold and the list of indicator species could be modified in the future based upon a review of historic and current landings and the effectiveness of the regulation. Although alternative I1(c) was preferred in conjunction with alternative I1(b) in the Draft HMS FMP, the objective of providing a quantifiable method to differentiate between pelagic and bottom longline fishing activity can effectively be achieved by implementing alternative I1(c) alone, species composition of catch.

Alternative I1(d) would require time/depth recorders (TDRs), or data loggers, at pre-specified intervals on all HMS longlines. The TDRs must be operational, and able to accurately record the maximum and minimum fishing depths of HMS longline gear using an onboard TDR reader. Pelagic longline gear would be required to remain within the upper two-thirds of the water column while fishing, and bottom longline gear would be required to remain within the bottom third of the water column while fishing. This alternative, in combination with information indicating a vessel’s fishing location and water depth information from charts or sounders, could indicate how deep the longline gear was fishing and whether it was fishing pelagically or demersally. This would improve the monitoring and effectiveness of, and compliance with, HMS closed areas. With improved monitoring and compliance, the ecological benefits associated with HMS closed areas would remain intact, including reductions in discards of undersized swordfish, bluefin tuna, dusky sharks, sandbar sharks, other HMS, and protected species. Conversely, depending upon the amount of time that it takes to remove TDRs from the mainline or gangions, and any other reduced efficiencies associated with using them, this alternative could cause an increase in the mortality of discarded fish.

Alternative I1(e) would implement longline time/area closures that would be effective for both HMS-permitted PLL and BLL vessels. As mentioned above, the existing time/area closures are specific to either HMS-permitted PLL or BLL vessels, but not both. This alternative would effectively eliminate any uncertainties in differentiating between the two gear types by prohibiting both in all of the closed areas. This would improve the monitoring and effectiveness of, and compliance with, time/area closures. With improved monitoring and compliance, the ecological benefits associated with HMS closed areas would remain intact, including reductions in discards of undersized swordfish, bluefin tuna, dusky sharks, sandbar sharks, other HMS, and protected species. By implementing non-gear-specific closed areas, alternative I1(e) could also provide additional conservation benefits for many other species. Because HMS-permitted BLL vessels would be prohibited from fishing year-round in the Desoto Canyon and East Florida Coast closed areas, and seasonally in the Charleston Bump and Northeastern U.S. closed areas, additional conservation benefits for many species of sharks and other demersal finfish could occur. These are areas of significant BLL fishing activity. For the three-year period (2001 – 2003), 140 BLL sets were reported in these areas in the HMS logbook compared to 363 BLL sets in open areas. Similarly, because HMS-permitted PLL vessels would be prohibited from fishing seasonally in the Mid-Atlantic Shark closed area, pelagic species and some sharks that are caught as bycatch on PLL gear could potentially be conserved. This alternative could also provide additional conservation of protected species, including threatened and endangered sea turtles and marine mammals.

None of the alternatives considered above are likely to have any adverse impacts on protected species or essential fish habitat.

*Social and Economic Impacts*

Alternative I1(a) (No Action) would likely produce the fewest additional adverse social and economic impacts on commercial fishing vessels. However, the No Action alternative does have some associated negative socio-economic costs. Because it may be difficult to precisely differentiate between PLL and BLL gear, commercial fishing activities on vessels boarded at sea may be interrupted for longer periods of time while compliance with closed area regulations is determined. Valuable economic and administrative resources might be required on behalf of both industry and government to resolve these gear definition issues. Also, negative social impacts could occur under the No Action alternative for law-abiding vessels if the protective benefits of the closed areas are compromised because other commercial fishing vessels are deploying gear that is allegedly BLL gear but catching pelagic species in PLL closed areas, or deploying gear that is allegedly PLL gear but catching demersal species in BLL closed areas.

Alternative I1(b), a preferred alternative in the Draft Consolidated HMS FMP, would establish additional restrictions on longline gear in HMS time/area closures by requiring that BLL vessels in PLL closed areas possess no more than 70 commercial fishing floats, and that PLL vessels in BLL closed areas possess at least 71 commercial fishing floats. A threshold of 70 floats was chosen to differentiate between PLL and BLL gear based upon data obtained from the HMS logbook. In 2002 and 2003, a total of 233 sets were reported as using BLL gear. Of these, 23 BLL sets (10 percent) deployed 40 or more floats. Only 12 BLL sets (5 percent) reportedly deployed 180 or more floats. The reported median was 15 floats on BLL gear. For the same time period, a total of 19,441 sets were reported as using PLL gear. Of these, 17,496 sets (90 percent) deployed 87 or more floats, and 18,469 sets (95 percent) deployed 72 floats or more. Thus, at least 90 percent of all reported BLL sets in 2002 and 2003 possessed less than 70 floats, and approximately 95 percent of all reported PLL sets in 2002 and 2003 possessed more than 70 floats. In terms of vessels, five vessels reported using more than 70 floats on bottom longline gear for at least one set in either year. Most of these vessels reported homeports in North Carolina and northward. Eighty-seven vessels reported using less than 70 floats on pelagic longline gear for at least one set in either year. Most of these vessels reported homeports in Florida, although some reported homeports in North Carolina, South Carolina, and Louisiana.

Overall, alternative I1(b) would not be expected to produce significant adverse social or economic effects. Based on the data presented above, this alternative would potentially impact less than five percent of all PLL sets, and less than ten percent of all BLL sets. The actual percent is likely to be smaller than this, because the alternative would only apply to the few vessels that are actually fishing with PLL gear in BLL closed areas, or fishing with BLL gear in PLL closed areas. Based on the homeports of the vessels that reported using BLL gear and more than 70 floats for at least one set, few of those vessels are based next to a PLL closed area. They are generally based next to a BLL closed area. Similarly, based on the homeports of the vessels that reported using PLL gear and fewer than 70 floats, few of those vessels are based next to a BLL closed area and are actually based next to several PLL closed areas. Thus, this alternative would not be expected have large impacts on fishermen fishing with BLL gear in PLL closed areas, or fishing with PLL gear in BLL closed areas. However, it could, appropriately, impact a small number of PLL vessels fishing near PLL closed areas, and a small number of BLL vessels fishing near BLL closed areas. To comply with this alternative, BLL vessel operators fishing in a PLL closed area could choose to reduce the overall length of their BLL gear or change the configuration of their gear. This could potentially increase the number of sets that would need to be deployed to maintain the same catch level, and could increase some associated variable costs including fuel, ice and food. Also, if the number of allowable floats were not sufficient for the gear to operate as intended, it could potentially result in broken sets or lost fishing gear. Positive social and economic benefits are anticipated for both industry and government with this alternative if it is successful at providing a quick method to reliably differentiate between PLL and BLL gear. This alternative would not be expected to compromise safety at sea, as it should not significantly alter current fishing practices.

As mentioned above, NMFS did receive public comment on alternative I1(b). Some commenters indicated that a float requirement would be an unnecessary burden that could diminish the flexibility of vessel operators to participate in different fishing activities, depending upon the circumstances. Based upon these comments, and on consultations with NMFS Law Enforcement indicating that this alternative was not practical, alternative I1(b) is no longer preferred. NMFS believes that the objective of this alternative can be effectively achieved by implementing alternative I1(c) alone, species composition of catch. By not preferring alternative I1(b), any potential adverse economic impacts associated with restricting the allowable number of floats, such as reduced operational flexibility, should be mitigated.

Alternative I1(c), the preferred alternative, would differentiate between PLL and BLL gear based upon the species composition of the catch onboard or landed. It would establish a five-percent limit (by weight) on the allowable amount of "indicator" pelagic species that BLL vessels may possess or land when fishing in PLL closed areas, and establish a five-percent limit (by weight) on the allowable amount of "indicator" demersal species that PLL vessels may possess or land when fishing in BLL closed areas (as measured relative to the total weight of all "indicator" species). The "indicator" species are listed in Table 4.71. As mentioned above, NMFS specifically sought and received comment on the lists of "indicator" species. The demersal "indicator" species list has been slightly modified by removing silky and hammerhead sharks, and by adding tilefish, blueline tilefish, and sand tilefish. These modifications were made because the aforementioned shark species can be caught on both pelagic and bottom longlines, and because the tilefish species are indicative of demersal fishing activity. The "indicator" species were chosen because they constitute the primary target species in the pelagic and bottom longline fisheries. If necessary, the list of "indicator" species could be changed in the future based upon a review of historic and current landings and the effectiveness of the regulation. The percent of pelagic and demersal "indicator" species is measured relative to the total weight of all "indicator" species onboard or landed. The five-percent incidental allowance was established based upon historical landings of species, as reported from 2000 – 2004 in the Coastal logbook (Table 4.72) and the HMS logbook (Table 4.73).

Table 4.42 indicates that the percent of "indicator" pelagic species landed by vessels reporting in the Coastal logbook ranged from 3.33 percent in 2003 to 6.74 percent in 2004, with a five-year average of 4.45 percent. Table 4.73 shows that the percent of "indicator" demersal species landed by vessels reporting in the HMS logbook ranged from 1.17 percent in 2002 to 10.95 percent in 2004, with a five-year average of 4.52 percent. Although the five-percent threshold would have been exceeded in 2004 on a fishery-wide basis, NMFS believes that longline vessels fishing in HMS protected areas and using due diligence should be able to remain within the five-percent threshold that has been established to account for unintentional bycatch. If necessary, the five-percent threshold and the list of indicator species could be changed in the future based upon a review of historic and current landings, and the effectiveness of the regulation.

NMFS received comments indicating that alternative I1(c) could adversely impact longline vessels that fish, at least part of a trip, in HMS closed areas and catch both demersal and pelagic species on those trips. Similar to the comments received regarding alternative I1(b), there were concerns that, by establishing a species threshold when fishing in HMS closed areas, this alternative would restrict the flexibility of longline vessel operators to participate in different fishing activities depending upon the circumstances. Also, economic costs could result if vessel operators are unable to retain a portion of their catch that otherwise would have been retained on mixed fishing trips in the closed areas, or if they must necessarily choose to fish outside of the closed areas. NMFS received other comments indicating that there could be additional costs on vessels if they are boarded at sea by enforcement, and it was necessary to retrieve or observe fish in the hold in order to calculate the percentages of demersal and pelagic species possessed onboard. The time required to do this could create an economic burden in terms of opportunity costs associated with lost time and, possibly, reduced net revenues associated with re-icing the fish and reduced quality of the catch.

NMFS acknowledges that this alternative would likely require vessel operators to decide, prior to the start of a fishing trip, whether to target demersal or pelagic species if they are fishing, at least part of that trip, in an HMS closed area. However, alternative I1(c) should not significantly restrict operational flexibility or cause other significant adverse social or economic impacts. The HMS longline closed areas were implemented to provide important protection for a variety of HMS and other protected species. It is not unreasonable, or unduly burdensome, for longline vessels to adhere to the intent of the closed areas and to actively avoid pelagic or demersal species when legally fishing in those areas with BLL or PLL gear, respectively. The five-percent “indicator” species threshold was specifically selected because it is higher than the five-year average percent of pelagic species caught when fishing for demersal species, based on Coastal logbook data, and higher than the five-year average percent of demersal species caught when fishing for pelagic species, based on HMS logbook data. This threshold should accommodate the majority of fishing trips, even those outside of closed areas. However, NMFS recognizes that the five-percent threshold would have been exceeded in 2004, based on this same data. If necessary, both the list of “indicator” species and the five-percent threshold could be changed in the future based upon a review of historic and current landings and the effectiveness of the regulation. The actual number of vessels impacted by this alternative is likely to be small, as it would only affect vessels that otherwise would exceed the threshold when fishing with PLL gear in BLL closed areas, or when fishing with BLL gear in PLL closed areas.

While NMFS did not receive any comments on the subject, the Agency is aware that several vessels have attempted to fish with PLL for sharks in the BLL closed area. Under this alternative, the practice would likely be eliminated because the species being caught are species found on the demersal “indicator” list. These are also the species that were intended to be protected by the closed area. To the extent that some of these vessels do not have the permits that allow them to land pelagic species such as swordfish or tunas, stopping this practice could have positive ecological benefits. However, stopping this practice may also have negative economic impacts on fishermen who were trying to find methods of adjusting their fishing practice to the BLL closed area. Alternative I1(c) would not prevent PLL fishermen with the appropriate permits from fishing for swordfish, tunas, and other pelagic species in the BLL closed area.

Additional costs could occur if a vessel was boarded at sea and it was necessary to retrieve or observe fish in the hold to calculate the percent of demersal and pelagic species. If difficulties arise in determining whether a vessel is fishing with PLL or BLL gear in a closed area, using the existing definitions in the regulations, the species composition of catch methodology described in this alternative provides a quantifiable method to verify fishing technique. The potential costs would be reduced if this alternative were enforced dockside, as offloaded fish would only need to be identified and weighed before being sold to the dealer. Positive social and economic benefits would be realized with this alternative if the species composition of the catch can quickly be determined with minimal disruption to commercial fishing and law enforcement activities. This alternative is not expected to compromise safety at sea, as it should not significantly alter current fishing practices.

**Table 4.71 List of "Indicator" Species to Determine Composition of Catch.**

| PELAGIC SPECIES | DEMERSAL SPECIES |
|---|---|
| DOLPHINFISH | GROUPER, BLACK |
| SHARK, BLUE | GROUPER, GAG |
| SHARK, OCEANIC WHITETIP | GROUPER, MARBLED |
| SHARK, PORBEAGLE | GROUPER, MISTY |
| SHARK, SHORTFIN MAKO | GROUPER, RED |
| SHARK, THRESHER | GROUPER, SNOWY |
| SWORDFISH | GROUPER, WARSAW |
| TUNA, ALBACORE | GROUPER, YELLOWEDGE |
| TUNA, BLUEFIN | GROUPER, YELLOWFIN |
| TUNA, BIGEYE | HIND, RED |
| TUNA, SKIPJACK | HIND, ROCK |
| TUNA, YELLOWFIN | HIND, SPECKLED |
| WAHOO | SHARK, ATLANTIC SHARPNOSE |
| | SHARK, BLACKNOSE |
| | SHARK, BLACKTIP |
| | SHARK, BONNETHEAD |
| | SHARK, BULL |
| | SHARK, FINETOOTH |
| | SHARK, LEMON |
| | SHARK, NURSE |
| | SHARK, SANDBAR |
| | SHARK, SPINNER |
| | SHARK, TIGER |
| | SNAPPER, BLACKFIN |
| | SNAPPER, CUBERA |
| | SNAPPER, DOG |
| | SNAPPER, LANE |
| | SNAPPER, MANGROVE |
| | SNAPPER, MUTTON |
| | SNAPPER, QUEEN |
| | SNAPPER, RED |
| | SNAPPER, SCHOOLMASTER |
| | SNAPPER, SILK |
| | SNAPPER, VERMILION |
| | SNAPPER, YELLOWTAIL |
| | TILEFISH |
| | TILEFISH, BLUELINE |
| | TILEFISH, SAND |

**Table 4.72 Historical Per Trip Average Catch Composition of "Indicator" Species.** Source: NMFS Coastal Logbook

| | Pelagic (lb) | Demersal (lb) | Pelagic (%) | Demersal (%) |
|---|---|---|---|---|
| 2000 | 507 lb | 14,560 lb | 3.36 % | 96.64 % |
| 2001 | 636 lb | 13,347 lb | 4.55 % | 95.45 % |
| 2002[1] | 457 lb | 13,177 lb | 3.35 % | 96.65 % |
| 2003[1] | 485 lb | 14,092 lb | 3.33 % | 96.67 % |
| 2004 | 1,354 lb | 18,743 lb | 6.74 % | 93.26 % |
| Average | 688 lb | 14,784 lb | 4.45 % | 95.55 % |

[1]Data for years 2002 and 2003 were inadvertently reversed in the Draft HMS FMP.

**Table 4.73 Historical Per Trip Average Catch Composition of "Indicator" Species.** Source: Pelagic Longline Logbook

| | Pelagic (lb) [1] | Demersal (lb) [1] | Pelagic (%) | Demersal (%) |
|---|---|---|---|---|
| 2000 | 5,803 lb | 78 lb | 98.67 % | 1.33 % |
| 2001 | 5,220 lb | 99 lb | 98.14 % | 1.86 % |
| 2002 | 5,926 lb | 70 lb | 98.83 % | 1.17 % |
| 2003 | 5,708 lb | 88 lb | 98.48 % | 1.52 % |
| 2004 | 9,767 lb | 1,201 lb | 89.05 % | 10.95 % |
| Average | 6,485 lb | 307 lb | 95.48 % | 4.52 % |

[1]Data from HMS logbook was converted from numbers of fish to lbs. using average weight of species.

Alternative I1(d) would require time/depth recorders (TDRs), or data depth loggers, at pre-specified intervals on all HMS longlines. PLL gear would be required to remain within the upper two-thirds of the water column while fishing, and BLL gear would be required to remain within the bottom third of the water column while fishing. This alternative would result in direct economic costs associated with the purchase of TDRs and data readers (communications hardware). Relatively few companies currently manufacture these devices for commercial use, and prices vary widely. Most current applications involve academic research projects, so prices would be expected to decrease if their use became more widespread as a result of implementing this alternative on the commercial fishery. Based upon telephone inquiries to two manufacturers conducted in the summer of 2005, the costs for one TDR and a reader range from approximately $680.00 – $1,300.00. Individual TDRs (without a reader) are available from one manufacturer for approximately $180.00. Therefore, assuming that a minimum of five TDRs and one reader per vessel would be required, the direct costs would range from $1400.00 ($180.00 X 5 + $500.00) to $6,500.00 ($1,300.00 X 5). These costs may be higher if vessel operators purchase extra TDRs to replace lost or damaged equipment. The lead-time for processing orders currently ranges from six to ten weeks. Aside from these direct costs, there could be some indirect costs associated with a loss in efficiency due to attaching TDRs to longlines, and downloading and recording the information. Conversely, positive social and economic benefits could be realized with this alternative if the TDR data could be quickly downloaded and interpreted by law enforcement with minimal disruption to normal commercial fishing and law enforcement activities. This alternative would not be expected to compromise safety at sea, but there is a possibility that attaching and detaching TDRs could alter some current fishing practices.

Alternative I1(e) would implement HMS longline time/area closures that are effective for both pelagic and bottom longline HMS-permitted vessels. If selected, this alternative would prohibit HMS-permitted BLL vessels from fishing year-round in the DeSoto Canyon and East Florida Coast closed areas, seasonally in the Charleston Bump closed area from February 1 through April 30 each year, and seasonally in the Northeastern U.S. closed area from June 1 through June 30 each year. It would also prohibit HMS-permitted PLL vessels from fishing seasonally in the Mid-Atlantic shark closed area from January 1 through July 31 each year. Of all the alternatives analyzed for this issue, alternative I1(e) would likely produce the most significant adverse economic impacts, primarily upon HMS-permitted BLL vessels that would be prohibited from fishing year-round in the DeSoto Canyon and East Florida Coast closed areas, seasonally in the Charleston Bump closed area from February 1 through April 30 each year, and seasonally in the Northeastern U.S. closed area from June 1 through June 30 each year. For HMS-permitted BLL vessels, the DeSoto Canyon area would eliminate approximately 32,860 $nm^2$ miles of ocean; the East Florida Coast closed area would eliminate approximately 50,720 $nm^2$ of ocean; the Charleston Bump closed area would seasonally eliminate approximately 49,090 $nm^2$ of ocean; and, the Northeastern U.S. closed area would seasonally eliminate approximately 21,600 $nm^2$ of ocean. These are areas of intensive bottom longline fishing activity and, especially in the case of the East Florida Coast closed area, comprise major fishing areas for BLL vessels. For the three-year period (2001 – 2003), 140 BLL sets were reported in these PLL closed areas in the HMS logbook as compared to 363 BLL sets in the open areas. Also, some former BLL vessels may recently have switched to PLL fishing in BLL closed areas to mitigate adverse impacts. This alternative would prohibit both types of HMS longline fishing activity in the closed areas. This alternative would also impact PLL vessels, as an area off of Cape Hatteras that is frequently fished by PLL vessels would be closed from January through July under this alternative.

NMFS received contrasting comments regarding alternative I1(e). Comments in opposition to this alternative confirmed the conclusion presented in the Draft HMS FMP that this alternative would produce the most significant adverse economic impacts upon vessels, and that it was unnecessary because PLL and BLL gears can be effectively differentiated. Comments in support of this alternative stated that it would be the easiest to enforce, and was the only way to achieve a meaningful reduction in bycatch because billfish and other HMS are found throughout the water column. NMFS agrees that this alternative would be the easiest to enforce, but believes that preferred alternative I1(c), which implements limits on bycatch, can be effective at preserving the conservation benefits associated with the closed areas while simultaneously mitigating adverse economic impacts on longline vessels fishing in the areas.

*Conclusion*

Alternative I1(c), which would differentiate between gears based upon the species composition of the catch onboard or offloaded, is preferred because it is expected to accommodate the majority of commercial fishing operations, yet still provide a quantifiable method to differentiate between PLL and BLL vessels. The 5-percent species threshold to determine the composition of catch in alternative I1(c) is higher than the five-year average percent of pelagic species caught when fishing for demersal species based on Coastal logbook data, and higher than the five-year average percent of demersal species caught when fishing for pelagic species, based on HMS logbook data. Moreover, the actual percent of affected vessels is likely to be small, as this alternative would apply only to the few vessels that are actually fishing with PLL gear in BLL closed areas, or fishing with BLL gear in PLL closed areas. Vessels that were fishing mixed trips outside the closed areas could still transit the closed area provided the signals from their VMS unit indicate that the vessel is transiting and not fishing. If necessary, both the list of "indicator" species and the five-percent threshold could be modified in the future, based upon a review of historic and current landings and the effectiveness of the regulation. This alternative is not expected to create significant adverse economic and social impacts. There may, however, be some minor adverse economic costs on vessels that fish for both pelagic and demersal species on the same trip in closed areas. Those situations (*i.e.*, "mixed" trips in the HMS longline closed areas) are expected to be rare occurrences, based upon HMS logbook information. Alternative I1(c) effectively addresses the crux of this issue, in that it should further discourage catches of pelagic species in PLL closed areas (and vice verse) without imposing additional gear restrictions which would be impractical to enforce and could reduce the flexibility of fishermen from pursuing different fishing activities, depending upon the circumstances. NMFS anticipates that HMS longline vessels will continue to be prudent, especially when fishing in the HMS closed areas by catching predominantly pelagic species in BLL closed areas, and demersal species in PLL closed areas.

Overall, preferred alternative I1(c) is expected to improve the monitoring of, and compliance with, HMS closed area regulations. As a result, the ecological benefits associated with HMS closed areas are expected to remain intact, including reductions in discards of undersized swordfish, bluefin tuna, dusky sharks, sandbar sharks, other HMS, other finfish, and protected species. Alternative I1(b) is no longer preferred based upon public comment regarding impacts to vessel's operational flexibility, difficulties with terminology, and impracticalities in enforcing the alternative. Alternative I1(d) would impose a much larger negative social and economic burden than the preferred alternative on HMS longline vessels, because of the requirement to purchase TDRs, and the need to provide precise documentation regarding fishing location and water depth in order to determine compliance. Alternative I1(e) would provide the largest ecological benefits, but would also impose the most significant adverse social and economic costs on HMS longline vessels.

<u>Issue 2: Shark Identification</u>

As described in Chapter 2, the alternatives considered to aid in shark identification include:

I2(a) Retain current regulations regarding shark landing requirements (No Action)

*I2(b) Require that the 2nd dorsal fin and the anal fin remain on all sharks through landing – Preferred Alternative*

I2(c) Require that the 2nd dorsal fin and the anal fin remain on all sharks through landing, except for lemon and nurse sharks

I2(d) Require that all fins remain on all sharks through landing

*Ecological Impacts*

Under alternative I2(a), current regulations would remain in place, which allow fishermen to remove all shark fins from carcass, as long as the total weight of the shark fins does not exceed five percent of the total weight of the dressed carcasses. Additionally, all fins must be offloaded at the first point of landing. These regulations were first put in place in the 1993 Atlantic Shark FMP (April 26, 1993, 58 FR 21931) and were later implemented nationally through the Shark Finning Prohibition Act (February 11, 2002, 67 FR 6194). The 1993 Shark Fishery Management Plan noted that prohibiting the finning of sharks (removing the fins and throwing the rest of the shark overboard) would reduce fishing mortality of sharks by reducing the incentive to target sharks, as fishermen would want to save freezer space for more valuable carcasses, such as swordfish and tuna. While this statement is generally correct, NMFS has found that by allowing all the fins to be removed from the carcass, the ability to identify sharks at the dock has been hampered. This could affect the accuracy of dealer reporting of sharks landed by species, and consequently have implications for stock assessments and quota monitoring. Additionally, NMFS has found that while many fishermen follow the regulations, some fishermen illegally keep fins from species that are different from those they land and, correspondingly, discard a number of unwanted shark carcasses and lower value fins overboard in order to maintain the five percent ratio. In other words, some fishermen mix and match fins and carcasses in order to maintain the highest profit while still complying with the five percent ratio. Thus, while the current regulations have ultimately reduced shark fishing mortality from the level it was at in 1993, it may not have reduced shark fishing mortality to the extent anticipated.

Under the preferred alternative I2(b), shark fishermen could still remove the more valuable fins from a shark while at sea (*e.g.,* the dorsal, caudal, and/or pectoral), but the smaller second dorsal and anal fins would need to remain attached to the shark while the vessel was at sea. Once landed, those fins could be removed either by the fisherman or the dealer. While shark "logs"- carcasses with fins removed- retaining only the second dorsal and anal fin could still be misidentified by the dealer, requiring these fins to remain on the shark until the first point of landing would likely improve dock-side identification of the shark "log." While this alternative would not help in identifying fins separated from the carcass, landings with many high-grade fins from species that normally produce lower grade fins may be more obvious, resulting in increased enforcement and DNA analyses of the fins and carcasses. NMFS received various comments supporting the preferred alternative, as well as comments confirming that retention of second dorsal and anal fins through landing could improve shark identification and species-specific landing data. NMFS also received comments indicating that this alternative would do little to improve shark identification. Additionally, under alternative A8 (see Section 2.1.1), NMFS would require shark dealers to attend identification workshops. Those workshops, in combination with this alternative, should help to improve the accuracy of dealer reports as well as quota monitoring and stock assessments.

Alternative I2(c) is similar to I2 (b), however, fishermen would be allowed to remove all the fins from lemon and nurse sharks. This alternative was considered due to the larger size of the second dorsal on these species, and the possible economic impacts resulting from requiring that these large fins remain on the shark. NMFS received comment that although these species have valuable fins, retaining them until landing was acceptable. Furthermore, in recent years, lemon and nurse shark landings have accounted for one percent or less of the total large coastal shark commercial landings (see Section 3.4.5.2). If the identification of sharks is improved by requiring that some of the fins remain on the shark, then allowing all the fins to be removed from lemon and nurse sharks should not hinder quota monitoring. Enforcing this alternative, however, may prove to be more difficult. It is possible that under this alternative, fishermen may decide to remove the second dorsal and anal fin of sharks other than lemon or nurse sharks in order to receive as high an ex-vessel price as possible for the shark. This type of action would be in violation of this alternative, and could increase the reported landings of lemon and nurse sharks. Depending upon the species actually being landed, such an activity could have impacts on quota monitoring (*e.g.*, if small coastal sharks are being landed, they would be counted as a lemon or nurse shark both of which are large coastal sharks), would compromise data collection for use in stock assessments, and would not actively prevent illegal discards and mixing of shark fins.

Under alternative I2(d), all shark fins would be required to remain on the shark until the first port of landing. The fins could then be removed either by the fisherman or the dealer. The shark could still be headed, gutted, and bled. To ensure the sharks are stored in a manner that would maximize the value and quality of the sharks, the fins could be sliced as long as they are not removed completely from the shark (*i.e.*, they could remain attached to the shark via a small amount of uncut skin). Under this alternative, there would be less of a chance of misidentifying the shark or the fin, particularly if the person were trained to identify shark species (see Section 2.1.1). Thus, species-specific reporting should improve and, correspondingly, stock assessments should be more accurate. Additionally, because fishermen would no longer be able to bypass the regulations by keeping the fins of sharks that are not landed, fishing mortality of sharks overall could be reduced. This would improve the status of sharks, particularly large coastal sharks, and improve the chances of rebuilding sharks according to the rebuilding plan.

None of the alternatives considered above are likely to have any impacts on protected species or essential fish habitat.

*Social and Economic Impacts*

Shark fins are the most valuable part of the shark. While fishermen can also sell the meat, teeth, and skin, shark fins comprises the majority of the profit due to the large demand for shark fin soup from Asian countries. While the ex-vessel price of shark meat ranges from $0.25 per pound in 1996 for small coastal sharks to $1.11 per pound in 2001 for pelagic sharks, the ex-vessel price of shark fins range from $6.01 per pound in 1996 to $16.25 per pound in 2004 (see Table 3.65 in Section 3.5.1.2). Fin price depends on the length of the cartilage and the quality of the fin. Large, dry fins are worth more than small, wet fins. Fins are generally bought and sold in three "grades" or quality levels. Through anecdotal information, NMFS knows that the dorsal fin of a large sandbar shark or hammerhead shark can bring top price. According to a discussion on the Elasmo-L listserve, primary fins from a sandbar shark have a larger ex-vessel price than primary fins from a bull shark, while fins from a small shark, such as Atlantic sharpnose, bring in a much lower price.

Under alternative I2(a), there would be no short-term economic or social effects. Fishermen and communities would continue operating as they have since implementation of the regulations in 1993. To the extent that some fishermen are finning sharks illegally, there may be fishing mortality that is not being accounted for in the quota monitoring or the stock assessment. In the long-term, this additional fishing mortality could extend the amount of time required to rebuild large coastal sharks and could increase the chances of pelagic or small coastal sharks becoming overfished. Illegal finning, coupled with errors in landing data could reduce the quota available for fishermen and, thus, reduce the overall potential revenues for the fishery.

Under alternative I2(b), fishermen could experience, in the short-term, some adverse economic costs associated with keeping the second dorsal and anal fins on the sharks. Due to their small size and fiber content, the second dorsal and anal fins of a shark are usually sold at the lowest quality grade and are often referred to as "chips." Thus, even under the current regulations, these fins are not going to result in a large percentage of the value of the shark. Under this alternative, these fins will remain frozen and will not begin to dry, unlike the other fins. At the dock, the owner/operator of the vessel will need to determine if the value of these small, wet fins offsets the cost of having crew remove them after the fish have been offloaded from the vessel. This decision will likely rely, in part, on the decision of the dealer regarding (a) whether or not to pay for the fins attached to the shark carcass and (b) whether or not to process the fins while completing the processing of the shark itself. Thus, it is possible that the fishermen will not experience any significant adverse economic costs from this alternative and may experience some benefits if the crew can spend less time processing and packing the sharks at sea and the dealers continue to give them full price for the smaller fins on the carcass. It is equally possible that the fishermen may lose a small portion of their revenue by failing to remove the fins and that the dealers gain by processing the fins after buying the carcass. The Agency received a comment opposing this alternative due to additional time and revenue losses that may result from removing the smaller/secondary fins after docking. While initial adjustments may have to be made to the offloading and processing procedures, in the long-term, improved quota monitoring and stock assessment data as a result of this alternative could result in a larger quota and therefore larger net revenues for both the fishermen and the dealer.

Under alternative I2(c), shark fishermen would be allowed to remove all the fins of lemon and nurse sharks only. This would allow the second dorsal and anal fins of these species, which are larger and likely worth more than those of other sharks, to begin to dry, thus allowing fishermen to maintain their current profit margins. However, because currently fishermen land so few lemon and nurse sharks (approximately one percent in total; all nurse sharks are currently released although they can be landed (Burgess and Morgan, 2005)), NMFS believes that any economic benefit gained would be marginal.

Alternative I2(d) would have the largest economic burden of any of the alternatives. In the short-term, this alternative could change the foundation of the U.S. Atlantic shark fin market. At this time and since the fishery began in the 1980s, most shark fins sold in the United States are landed separately from the shark. In 1993, shark fins were required to be removed from the vessel at the first port of landing. This prevented fishermen from drying shark fins onboard their vessel over time in order to increase the value of the fin. Under this alternative, shark fishermen would not be allowed to remove the fins from the shark until the sharks are landed. Costa Rica has implemented a similar regulation that allows fishermen to cut the fins mostly off the shark, as long as a small piece of skin keeps the fin attached to the shark until landing. According to a discussion on the Elasmo-L listserve, this practice has allowed fishermen to receive the expected revenues for both the fin and the meat because the fin can be fully removed from the shark at the dock without thawing the shark. As with the preferred alternative I2(b), the vessel owner/operator would need to decide whether the benefit of selling the fins separate from the shark outweighs the cost of having the crew remove the fins during offloading. While the fin would likely still be of high quality once dry, it is unlikely that the ex-vessel price of fins packed in ice with the rest of the shark would be as high as fins that had begun drying. Additionally, if the shark cannot be packed in ice properly due to maintaining the fins on the shark, the quality of the meat, and therefore its value, could also decrease.

The overall social impact of any of these alternatives, with the possible exception of alternative I2(d), is likely to be minimal in the long-term. In all cases, shark fins would still be entering the market. For alternatives I2(b) and (c), the economic cost on the fishermen, even if they do not receive as high an ex-vessel price for the wet small fins as they do currently, should be minimal. Therefore, NMFS would not expect any social impacts. However, under alternative I2(d), it is possible that there could be numerous social impacts, particularly in the short-term, as the market adjusts itself to accepting all wet fins. This could be significant for the fishery and its related communities and support system that has had numerous reductions in quotas and profits since 1993.

*Conclusion*

NMFS prefers alternative I2(b), requiring the second dorsal and anal fins to remain on all sharks through the first port of landing. While this alternative could have some minor economic and social impacts, this alterative is expected to generate ecological benefits by enhancing and improving species identification and data collection, thereby leading to improved management and increased shark populations. Alternative I2(c) would have similar economic and social impacts but could confuse the issue of identification and might have adverse ecological impacts compared to either the No Action or the preferred alternative. Alternative I2(d) would have the largest ecological benefits but could also have fairly large adverse economic and social impacts.

Issue 3: HMS Retention Limits

Currently, compliance with many of the HMS retention limits is less effective than intended because the regulations are specific to "persons aboard a vessel" (*i.e*., vessel owners and operators). As described in Chapter 2, NMFS is considering the following alternatives to address the purchase and sale of HMS by dealers in excess of the retention limits:

I3(a) Retain current regulations regarding retention limits, with no new prohibitions (No Action)

*I3(b) Add new prohibition at § 635.71(a)(48) making it illegal for any person to, "Purchase any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24" – Preferred Alternative*

*I3(c) Add new prohibition at § 635.71(a)(49) making it illegal for any person to, "Sell any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24" – Preferred Alternative*

*Ecological Impacts*

Under alternative I3(a), the No Action alternative, there may be slight negative ecological impacts on vessel operators that may be illegally landing and selling HMS in excess of the commercial retention limits, thus circumventing the conservation benefits derived from those limits. Also under this alternative, dealers have not been prohibited from purchasing more than the commercial daily or trip-based HMS retention limits from one particular vessel. As the possession of HMS in excess of the commercial retention limit is already illegal under other sections of the regulation implementing the 1999 FMP, there is little data available to accurately assess the magnitude of this issue.

Under alternatives I3(b) and I3(c), the preferred alternatives, the addition of clear prohibitions regarding the purchase (by dealers) and sale (by vessels) of illegal landings in excess of the retention limits could provide an additional deterrent, and therefore have slightly more positive ecological benefits than the No Action alternative.

None of the alternatives considered above are likely to have any impacts on protected species or essential fish habitat.

*Social and Economic Impacts*

Under alternative I3(a), individual vessel owner/operators, and/or dealers, may be experiencing some positive economic benefits from the sale, or purchase, of HMS exceeding the current commercial retention limits. However, there may also be negative social and economic impacts associated with those activities attributed to violating the vessel trip limits and potential enforcement actions. There could also be negative social impacts associated with the perception of circumventing the intent of the current rules and regulations by law-abiding vessels, owner/operators, and dealers.

Under alternative I3(b), the overall net social and economic benefit would be slightly more positive than under the No Action alternative, because it would explicitly hold HMS dealers accountable for knowing and not purchasing any more fish from an individual vessel than the commercial retention limits specified for a particular species. Thus, this alternative may further deter illegal activities of this nature.

Under alternative I3(c), the net social and economic benefits would be very similar to alternative I3(b) because it would explicitly prohibit sales from an individual vessel in excess of commercial retention limits, thereby strengthening existing regulations regarding the possession, retention or landing of HMS. Both alternatives I3(b) and I3(c) would aid in the enforcement of HMS regulations.

*Conclusion*

NMFS prefers alternatives I3(b) and I3(c). The addition of clear prohibitions regarding the purchase and sale of illegal landings in excess of commercial retention limits may act as an additional deterrent to discourage this practice. Therefore, these alternatives will have slightly more positive ecological benefits than the No Action alternative. Although some fishery participants may benefit economically from the illegal sale, or purchase, of HMS exceeding the current commercial retention limits, social benefits will be obtained as a result of strengthening the regulations on behalf of law-abiding vessel operators and dealers. NMFS believes that these social benefits will outweigh any short-term economic benefit gained as a result of illegally selling catches in excess of the commercial retention limits.

Issue 4: Definition of East Florida Coast Closed Area

As described in Chapter 2, the alternatives that are being considered to better define the East Florida Coast closed area are:

I4(a) Retain current coordinates for the East Florida Coast closed area (No Action)

*I4(b) Amend the second coordinate of the East Florida Coast closed area to 28° 17' 10" N. lat., 79° 11' 24" W. long., so that it corresponds with the EEZ – Preferred Alternative*

*Ecological Impacts*

Alternative I4(a) would retain the current coordinates for the East Florida Coast PLL closed area (No Action). As such, there would be no additional ecological impacts, either positive or negative. However, because a current coordinate of the closed area inadvertently does not extend seaward to the outer boundary of the U.S. EEZ, as originally described in the FSEIS prepared pursuant to the closure (NMFS, June 14, 2000), the No Action alternative is not defined as originally intended in the June 14, 2000, action. Therefore, the definition of the closed area is confusing.

Alternative I4(b) would amend the second coordinate of the East Florida Coast closed area by extending it seaward 1.02 km (0.55 nmi), so that it corresponds with the EEZ. Because the closed area would be enlarged, it could provide a greater reduction in the bycatch of undersized swordfish, sailfish, and other HMS than the No Action alternative. However, this reduction in bycatch and discards is not likely to be substantial, as the outer coordinate being considered in this alternative is only 1.02 km (0.55 nmi) seaward (eastward) of the current coordinate. Neither alternative is likely to have any impacts on protected species or essential fish habitat.

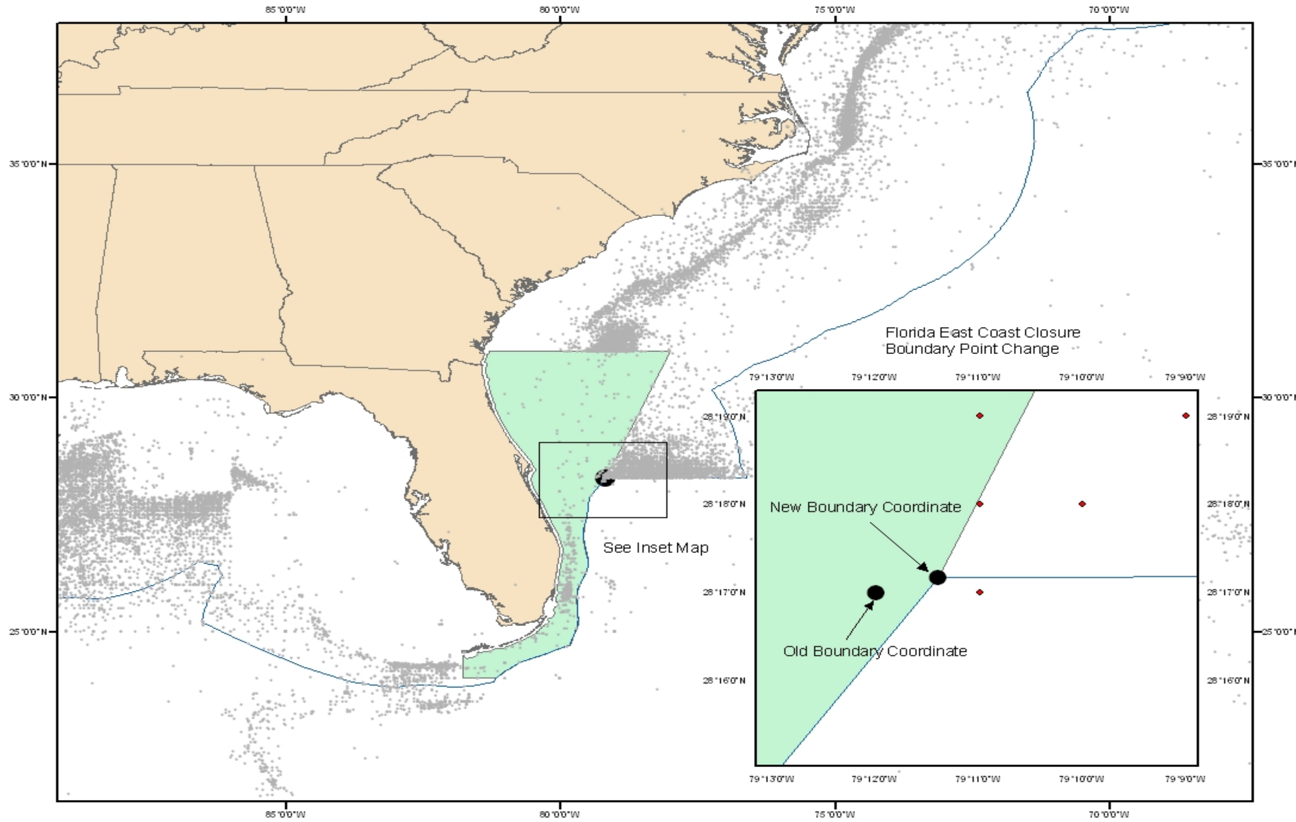



**Figure 4.23** **Map of the East Florida Coast closed area (solid shaded area) and the boundary of the U.S. EEZ (thin line wrapping around the coast). The inset is a close-up of the closed area depicting both the old and proposed (new) boundary coordinates. The small grey dots represent locations of longline sets from the year 2000 through the first half of 2004.**

*Social and Economic Impacts*

Alternative I4(a) would retain the current coordinates for the East Florida Coast PLL closed area (No Action). As such, there would be no additional social or economic costs or benefits.

Alternative I4(b) would amend the second coordinate of the East Florida Coast closed area by extending it seaward 1.02 km (0.55 nmi) to 28° 17' 10" N. Lat., 79° 11' 24" W. Long. NMFS received a comment against this alternative. Because the PLL closed area would be enlarged, there would be less area available for PLL fishing activity. This alternative could, therefore, potentially reduce HMS catches and associated landings revenues. However, NMFS does not expect a reduction in HMS catches associated with alternative because the geographic size increase is very small and, according to the HMS logbook data, there have not been any recent catches or PLL sets in this area (Figure 4.23). This could indicate that fishing vessels have already been following the EEZ as a boundary for the East Florida Coast closed area, because the rest of the closed area corresponds with the EEZ. Nevertheless, fishing effort that would have occurred in this area would likely relocate to nearby open areas with similar catch rates. Therefore, overall fishing effort is not expected to significantly change under this alternative, and any potential reduction in catches or revenues would be minimal or nonexistent.

A potential benefit to this alternative is less confusion over the definition because the coordinates would correspond to the U.S. EEZ, as originally intended. This alternative is not expected to compromise safety at sea, as it is not likely to significantly alter current fishing practices.

*Conclusion*

NMFS prefers alternative I4(b). This alternative would amend the area of the East Florida Coast closed area by extending one of its coordinates 1.02 km (0.55 nmi) seaward so that it corresponds with the outer boundary of the EEZ. This alternative is not expected to create significant adverse economic costs or adverse social impacts. Any fishing effort that would have occurred in this area will likely relocate to nearby open areas with similar catch rates. Because the East Florida Coast closed area would be enlarged under this alternative, it could provide a greater reduction in the bycatch of undersized swordfish, sailfish, and other HMS as compared with the No Action alternative, but this reduction is expected to be very minimal.

Issue 5: Definition of Handline

As described in Chapter 2, the alternatives for defining handline are:

I5(a) Retain the current definition of "handline" at § 635.2 (No Action)

*I5(b) Amend the definition of "handline" at § 635.2 by requiring that they be attached to, or in contact with, a vessel – Preferred Alternative*

I5(c) Require that handlines remain attached to a vessel when fishing recreationally and allow unattached handlines when fishing commercially

*Ecological Impacts*

Alternative I5(a) would retain the current definition of "handline" at § 635.2 (No Action). This definition does not specify that handlines must remain attached to a vessel, and there is no limit on the amount of unattached handlines that could be deployed. There would be no additional ecological impacts, either positive or negative, associated with this alternative. However, it has been brought to the Agency's attention through public comment that some vessel operators, both commercial and recreational, may be deploying numerous handlines that are not attached to their vessel in areas that are closed to pelagic longlines and elsewhere. While these vessel operators may be technically compliant with current regulations, the No Action alternative may be inconsistent with the traditional concept that handline gear is relatively benign with minimal ecological impacts. Uncontrolled expansion of this gear sector, especially in areas that are closed to pelagic longlines to reduce bycatch, could potentially diminish NMFS' ability to accomplish this objective.

Under the current handline definition, most HMS commercial permit holders may legally deploy an unrestricted number of unattached handlines. As of February 1, 2006, the number of permit holders that could potentially participate in this activity include: Atlantic Tunas General (4,824 permittees); Shark Directed (240 permittees); Shark Incidental (312 permittees); Swordfish Directed (191 permittees); Swordfish Incidental (86 permittees); Swordfish Handgear (88 permittees); and Charter/Headboat (except when fishing for billfish where rod and reel is the only authorized gear) (4,173 permittees). Also, except when fishing for billfish, all HMS Angling category permit holders (25,238 permittees) could deploy an unlimited number of unattached handlines. Because vessel owners may possess more than one permit, the actual number of affected entities is less than the sum of the permittees enumerated above. Nevertheless, a large proportion of HMS permit holders could potentially deploy unattached handlines. Based upon public comment, this practice does not appear to be widespread, but it may be growing among a small number of vessel operators, principally those targeting swordfish in the East Florida Coast closed area.

There are no data indicating exactly how many vessels are fishing with unattached handlines because the HMS logbook does not differentiate between "attached" and "unattached" handlines, and recreational data are limited. Table 4.74 indicates that the number of commercial fishing trips that reported using handline gear decreased quite significantly in 2003, but returned to more historical levels in 2004. Notably, however, those trips that were reported as using "handline-only" (*i.e*., no other gears reported) showed a very large increase from 2003 to 2004. The primary target species in 2004 for commercial "handline-only" trips was swordfish, with lesser amounts of YFT and BET kept. This is probably due to greater swordfish abundance, but could also indicate more effective handline fishing techniques, including the use of unattached handlines. It is likely a combination of both of these factors. Although it is not possible to conclusively state that the commercial HMS handline fishery is becoming more efficient through the use of unattached handlines, the increased number of commercial "handline-only" trips in 2004, and the higher numbers of swordfish landed, suggests that this may be occurring. The No Action alternative could continue the trend of increased numbers of "handline-only" trips and swordfish handline landings. Historically the HMS commercial handline fishery has had relatively few discards, although there was an increase in both dead and live discards in 2004, which could be the result of an increased number of "handline-only" trips. It is possible that discards of undersized swordfish, billfish, tunas, sharks, and other species could increase if overall effort in the commercial and recreational handline fishery were to increase. Also, if more unattached handlines were deployed, there is a greater likelihood that more gear could get lost with unknown consequences on fish mortality. NMFS received a comment in reference to alternative I5(a), asking whether floating handlines were being used to catch undersized swordfish in the East Florida Coast closed area. As mentioned above, the HMS logbook does not differentiate between "attached" and "unattached" handlines, and recreational data are limited. Given these limitations, it is not possible to determine conclusively if floating handlines are being used to catch juvenile swordfish in the East Florida Coast closed area. However, given that the legal minimum size is below the size of maturity, the average size of swordfish caught across all fisheries is below the size of maturity, and because the area off the east coast of Florida is a known nursery ground for swordfish, it is likely that any fishing gear, including rod and reel or handlines, used to catch swordfish off the east coast of Florida catches juvenile swordfish. The data provided in Table 4.70 in the Authorized Fishing Gear section indicate that the "handline-only" fishery grew significantly in 2004, and provides information on catches and discards of swordfish.

**Table 4.74 Numbers of Trips Reported as Using Handline Gear in the HMS Logbook and Numbers of Those Trips that were "Handline-Only."** Source: HMS Logbook. Note that confidential data cannot be released and are marked by an *.

| | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|
| Number of trips using handline | 115 | 83 | 81 | 19 | 73 |
| Number of "handline-only" trips | * | 0 | * | * | 64 |

* Confidential data

Alternative I5(b), a preferred alternative, would amend the definition of "handline" by requiring that handlines remain attached to all vessels. However, preferred alternative H5 would define unattached handlines as "buoy gear," and authorize their use only in the commercial swordfish handgear fishery with a more refined definition and additional restrictions. Therefore, in conjunction with preferred alternative H5, this alternative (I5(b)) would primarily impact recreational HMS fishery participants, and those commercial permittees that do not possess a swordfish handgear permit. By itself (*i.e.*, not in conjunction with alternative H5), this alternative could restrict or limit fishing effort, although there are no data indicating exactly how many vessel operators are fishing with unattached handlines, or how many handlines they are deploying. Depending upon the size of the vessel and the number of passengers onboard, the number of attached handlines that could be fished could range from one to, possibly, as many as fifty. In contrast, under the No Action alternative, a vessel could potentially fish with more than fifty unattached handlines and cover a much larger geographic area. Public comment suggests that, among active fishery participants, a requirement for handlines to remain attached to all vessels would reduce the number of handlines that could be fished or deployed. Operationally, it may also be less efficient to fish with several attached handlines as they may be more prone to entanglement. Because this alternative could restrict or limit fishing effort, it is projected to produce unquantifiable positive ecological impacts, including a reduction in the bycatch of undersized swordfish, other undersized species, protected species, and target species catches. However, catches of target species are not expected to significantly decrease, as they are largely governed by possession limits, quotas, and minimum size limits. Positive ecological benefits could also be realized by a reduction in the amount of gear that could get lost.

Alternative I5(c) would require that handlines remain attached to all vessels possessing an HMS Angling category permit, an HMS Charter/headboat permit when fishing on a for-hire trip, or an Atlantic Tunas General category permit when fishing in a registered HMS tournament. Under alternative I5(c), commercial permit holders that are currently authorized to fish with handlines would be allowed to fish with unattached handlines. The effect of this alternative could be to restrict or limit recreational fishing effort, although there are no data indicating exactly how many recreational vessels are fishing with unattached handlines, or how many unattached handlines these vessels are deploying. As of February 1, 2006, there were 25,238 HMS Angling category permit holders. If few recreational vessels are currently fishing with unattached handlines, then any ecological benefits associated with this alternative, including a reduction in discards or target species catch, would be minimal. Conversely, if fishing with unattached handlines is a common recreational practice, the ecological benefits associated with this alternative would be greater. Because this alternative could restrict or limit recreational fishing effort, it is projected to produce unquantifiable positive ecological impacts, including a reduction in the bycatch of undersized swordfish, other undersized species, and protected species. Catches of target species are not expected to significantly decrease however, as they are largely governed by bag limits and minimum size limits. Positive ecological benefits could also be realized by a reduction in amount of gear that could get lost.

None of the alternatives considered above are likely to have any adverse impact on protected species or essential fish habitat.

*Social and Economic Impacts*

Alternative I5(a) would retain the current definition of "handline" at § 635.2 (No Action). This definition does not require that handlines remain attached to a vessel, and there is no upper limit on the number that may be deployed. There would be no additional social or economic benefits or costs associated with this alternative. Under the current definition, most HMS commercial permit holders may legally deploy unattached handlines, as described under the ecological impacts section above. Based upon public comment the practice does not appear to be widespread, but it may be growing among a small number of vessel operators primarily targeting swordfish in the East Florida Coast closed area. Under the No Action alternative, the ability to deploy numerous unattached handlines represents a positive social and/or economic opportunity for commercial and recreational fishery participants who choose to, or may want to, fish in this manner. Conversely, commercial and recreational fishery participants who do not participate in this activity may feel that the No Action alternative diminishes the quality of fishing by increasing the amount of deployed gear, particularly in areas that are closed to pelagic longlines.

As noted above, preferred alternative I5(b) (requiring attached handlines), if implemented in conjunction with preferred alternative H5 (authorize buoy gear in the swordfish handgear fishery), could impact all recreational HMS permit holders and those HMS commercial permittees that do not possess a swordfish handgear permit. By itself (*i.e.*, not in conjunction with alternative H5), alternative I5(b) could impact all HMS recreational permit holders and all commercial permit holders that are currently authorized to fish with handline gear. However, based upon public comment, this practice does not appear to be widespread, but may be growing among a small number of vessel operators. The effect of this alternative could be to restrict or limit such fishing effort. Depending upon the size of the vessel and the number of passengers onboard, under alternative I5(b), the approximate number of attached handlines that could be fished from a vessel could range from one to as many as fifty. In contrast, under the No Action alternative, a vessel could potentially fish with over fifty unattached handlines and cover a much larger geographic area. Operationally, it may also be less efficient to fish with attached handlines as they may be more prone to entanglement. Therefore, this alternative could result in an unquantifiable reduction in the number of handlines that could be fished. Because this alternative could restrict or limit fishing effort, it could potentially produce adverse social and economic costs, including an unquantifiable reduction in catches of target species for vessels that participate in this fishery. During the scoping process, some commenters indicated that a requirement to attach handlines to vessels would render the commercial handline fishery unprofitable. This could reduce opportunities for the United States to fully utilize its ICCAT swordfish quota, which has had consistent underharvests in recent years. Authorizing buoy gear in the swordfish handgear fishery under alternative H5 would mitigate this impact, however. Recreational catches of target species could be impacted, but are not expected to significantly decrease as the recreational sector is largely governed by bag limits, quotas, and minimum size limits. If few recreational vessels currently fish with unattached handlines, then any social or economic impacts associated with this alternative would be minimal. Conversely, if fishing with unattached handlines is a common recreational practice, any social and economic burden associated with this alternative, including impacts on charter/headboat operators and gear suppliers, would be greater. Commercial and recreational fishery participants who do not participate in this activity, and do not intend to, may feel that the alternative I5(b) would improve the quality of fishing by reducing the amount of deployed gear. NMFS received a comment indicating that if a fishing line is attached to a vessel it is a handline, if it is not it is a longline. In general, by preferring alternative I5(b), NMFS concurs with this comment. Only a very narrow exception would be created by preferring Alternative H5, whereby commercial swordfish handgear permit holders would be permitted to deploy a limited amount of specially marked buoy gear. These measures will prevent the uncontrolled future expansion of the buoy gear sector, while simultaneously providing a reasonable opportunity for the U.S. to harvest its ICCAT swordfish quota.

Alternative I5(c) would require that handlines remain attached to all vessels that possess an HMS Angling category permit, an HMS Charter/headboat permit when fishing on a for-hire trip, or an Atlantic Tunas General category permit when fishing in a registered HMS tournament. Commercial HMS permit holders who are currently authorized to fish with handlines would continue to be allowed to fish with unattached handlines. The effect of this alternative could be to restrict or limit recreational fishing effort, although there are no data indicating exactly how many recreational vessels are fishing with unattached handlines, or how many they are deploying. Because this alternative could restrict or limit recreational fishing effort, it is projected to produce unquantifiable adverse social and economic impacts on affected recreational HMS fishing vessels, including a potential reduction in target species catches if operational efficiency is reduced. However, recreational catches of target species would not be expected to significantly decrease under this alternative, as the recreational sector is largely governed by bag limits, quotas, and minimum size limits. According to public comment, recreational swordfish catches would most likely be affected, as that is the primary target species. If few recreational vessels are currently fishing with unattached handlines, then any social or economic impacts associated with this alternative would be minimal. Conversely, if fishing with unattached handlines is a common recreational practice, any social and economic costs associated with this alternative would be greater for those vessel operators who participate in this activity. Similar to alternative I5(b), commercial and recreational fishery participants who do not participate in this activity, and do not intend to, may feel that the alternative I5(c) would improve the quality of fishing by reducing the amount of deployed gear.

*Conclusion*

NMFS prefers alternative I5(b). This alternative would require that handlines remain attached to all vessels. However, preferred alternative H5 would define unattached handlines as "buoy gear" and authorize their use only in the commercial swordfish handgear fishery with additional restrictions. Therefore, in conjunction with preferred alternative H5, alternative I5(b) would primarily impact recreational fishery participants and commercial permittees that do not possess a swordfish handgear permit. This alternative is not expected to create a significant adverse social or economic burden on fishery participants. Catches of target species could be impacted, but they are not expected to significantly decrease as catches are largely governed by bag limits, trip limits, closed areas, gear restrictions, quotas, and minimum size limits. Relative to the No Action alternative, alternative I5(b) is expected to provide some minor positive ecological benefits by limiting the potential future expansion of the handline sector, and possibly reducing the amount of lost gear. If this were to occur, there may be an unquantifiable future reduction in the bycatch of undersized swordfish, other HMS species, protected species, and target catches. Alternative I5(c) would impose similar social, economic, and ecological impacts as the combination of preferred alternatives H5 and I5(b).

Issue 6: Possession of Billfish on Vessels Issued Commercial Permits

As described in Chapter 2, the alternatives considered to improve consistency in HMS regulations and to clarify the recreational nature of the billfish fishery are:

I6(a) Retain current regulations regarding the possession of Atlantic billfish (No Action)

*I6(b) Prohibit vessels issued commercial permits and operating outside of a tournament from possessing, retaining, or taking Atlantic billfish from the management unit – Preferred Alternative*

*Ecological Impacts*

Under alternative I6(a), HMS fishermen on a commercial vessel with pelagic longline gear onboard may not retain billfish, regardless of the gear used, but other commercial fishermen may retain billfish caught on rod and reel. Thus, General Category fishermen, who are commercial fishermen that use rod and reel to catch BFT, could keep Atlantic billfish. Similarly, fishermen using bottom longline gear, who happen to catch a billfish on rod and reel, could potentially keep the Atlantic billfish. These billfish could not be sold. Both white and blue marlin are overfished, and white marlin is a candidate for listing under ESA. Under an ICCAT recommendation, as noted by preferred alternative E6 in Section 2.2.3, the United States is limited to 250 recreational billfish landings per year. Additionally, the billfish fishery is considered to be a recreational fishery, and no fish may be sold. NMFS is not aware of any billfish that have been retained by commercial fishermen for personal or other use. However, allowing some HMS commercial fishermen to keep billfish but not other HMS commercial fishermen is internally inconsistent, and gives the impression that billfish are more than a recreational-only fishery. Depending upon how many fish are harvested by HMS commercial fishermen, this could have an adverse impact on the number of billfish that could be landed by recreational fishermen under the ICCAT-recommended 250-fish limit.

Under the preferred alternative, I6(b), only fishermen issued either an angling or charter/headboat permit could take or possess Atlantic billfish. Additionally, General category fishermen fishing in a registered tournament could take and possess Atlantic billfish. Other HMS permit holders, and General category fishermen outside of a registered tournament, could not take or possess a billfish. Fishermen who have both the recreational and commercial permits (*e.g.*, a commercial shark limited access permit and an HMS Charter/Headboat permit) could take or possess billfish if the other HMS onboard do not exceed the HMS recreational retention limits. This alternative is consistent with current regulations in regard to PLL gear. To the extent that this regulation may reduce Atlantic billfish mortality by requiring HMS commercial permit holders to release any billfish caught, this alternative could have slight positive ecological benefits.

The HMS Charter/Headboat permit is both a recreational and commercial permit. Such permit holders are allowed to sell their tunas. However, such permit holders cannot sell their swordfish or sharks unless they also hold the appropriate commercial permit. When on a for-hire trip, HMS Charter/Headboat permit holders can still take and retain large coastal sharks under the recreational trip limit even when the fishing season is closed. NMFS did not limit the take of billfish to HMS Charter/Headboat permit holders on a for-hire trip because NMFS felt these permit holders were more likely to engage in recreational-type activities when on a non-for hire trip than typical HMS commercial permit holders. For instance, HMS Charter/Headboat permit holders often participate in tournaments for themselves, rather than for paying customers. As such, under the preferred alternative, HMS Charter/Headboat permit holders have the same benefits as an HMS Angling permit holder. Depending upon public comment and other actions, NMFS may reconsider this decision in the future.

Neither alternative would have any impact on fishermen who hold non-HMS commercial permits. Those permit holders would still need to hold the appropriate HMS permits in order to possess or take billfish. Additionally, neither alternative would be likely to have impacts on protected species or essential fish habitat.

*Social and Economic Impacts*

Neither alternative should have a significant economic or social burden. These alternatives could affect approximately 5,000 commercial permit holders and most of those are General Category fishermen who would be able to land billfish if they are fishing in a registered HMS tournament. Currently, Atlantic billfish cannot be bought or sold by any permit holder. Thus, limiting the number of billfish landed by commercial fishermen should not reduce profits and should not result in any impacts on communities. To some extent, because this alternative clarifies the recreational nature of the billfish fishery, the preferred alternative could have some positive economic and/or social impacts to the recreational fishing community if it results in enhanced fishing opportunities for recreational fishermen. There could, however, also be some very minor social impacts, as would be expected from any additional limitations on commercial fishermen. For example, commercial fishermen would not be able to retain any billfish for personal use unless they also hold either an HMS Angling or HMS Charter/Heatboat permit, and do not exceed any of the HMS recreational retention limits.

*Conclusion*

Alternative I6(b) is the preferred alternative because it may have minimal ecological benefits, would have no adverse economic impacts, and would clarify the regulations regarding the retention of billfish by HMS permit holders.

Issue 7: BFT Dealer Reporting

To provide additional flexibility for electronic BFT dealer reporting, it would be necessary to amend the HMS regulations to specify that BFT dealers may submit these reports over the Internet. NMFS is considering the following alternatives:

I7(a) Retain the current regulations regarding BFT dealer reporting (No Action)

*I7(b) Amend the HMS regulations to provide an option for Atlantic tunas dealers to submit required BFT reports using the Internet – Preferred Alternative*

I7(c) Amend the HMS BFT dealer reporting regulations to require that Atlantic tuna dealers submit BFT reports electronically, with specific exceptions

*Ecological Impacts*

All of the alternatives for BFT dealer reporting are administrative in nature. Therefore, none of them have any significant ecological impacts. Some minor positive ecological impacts however, are anticipated with improved data collection under alternatives I7(b) and I7(c). If using the Internet improves the quality or timeliness of dealer reporting, this could improve quota monitoring, stock assessments, and compliance with ICCAT requirements. None of the alternatives are likely to have any impacts on protected species or essential fish habitat.

*Social and Economic Impacts*

Under alternative I7(a), the No Action alternative, dealers are required to submit the reports in the mail or via fax, the Agency personnel enter the data into a database. In some cases dealers are required to enter the same or similar data on several different forms, and the data are then re-entered by agency staff, imposing time costs on both industry and government.

Alternative I7(b), the preferred alternative, may reduce the amount of paperwork for the dealers by providing them with an option to submit required reports via the Internet once a data entry system is developed. This alternative may also reduce the dealer burden by reducing the number of times the same data is submitted; however, there may be some initial burden associated with learning the new software. The government's burden may also change from data entry to quality control and oversight of the provided data. This alternative would provide dealers with the flexibility to use electronic reporting, but would not require them to do so. As such, it is not possible to accurately quantify specific changes in paperwork burdens without knowing which dealers may choose to use this option.

Alternative I7(c) may further reduce burdens in the long-term by requiring most dealers, with some limited exceptions, to use electronic reporting. However, this alternative may impose initial economic costs to dealers who do not already have electronic access to the Internet, although some of the exceptions being considered may alleviate these costs (*i.e.* dealers of limited size and/or magnitude of reporting). Some social costs may be incurred by dealers who would have to learn and adapt to electronic reporting under alternative I7(c), although most dealers are expected to have already transitioned to similar electronic data systems as a part of modern business practice.

*Conclusion*

NMFS prefers alternative I7(b), and has received public comment supporting this alternative. The preferred alternative would provide an option for BFT dealers to submit certain reports electronically over the Internet once such a system is developed, but would not require it. Although unquantifiable, this alternative is expected to produce positive social and economic impacts for both industry and government, as a result of timesavings incurred when such a system is developed. None of the alternatives are expected to have any significant adverse ecological impacts, as reporting is primarily administrative in nature.

*Issue 8: "No Fishing", "Cost-Earnings", and "Annual Expenditures" Reporting Forms*

I8(a) Maintain the existing regulations regarding submission of logbooks (No Action)

*I8(b) Require submission of "No Fishing" reporting forms for selected vessels if no fishing trips occurred during the preceding month, postmarked no later than seven days after the end of the month – Preferred Alternative*

*I8(c) Require submission of the trip "Cost-Earnings" reporting form for selected vessels 30 days after a trip and the "Annual Expenditures" report form by the date specified on the form – Preferred Alternative*

*Ecological Impacts*

Under all of the alternatives, fishermen would continue to submit logbooks consistent with the current regulations. None of the alternatives would have any ecological impact, unless the fishermen submitted false reports. Therefore, none of the alternatives are likely to have any impacts on protected species or essential fish habitat.

*Social and Economic Impacts*

Under all of the alternatives, fishermen would continue to submit logbooks consistent with the current regulations. None of the alternatives would have any economic costs, unless the fishermen submitted false reports and were subject to penalties.

There could be some social impacts as a result of all the alternatives. Under the No Action alternative I8(a), numerous fishermen have been confused regarding the deadlines for submitting certain reports, which has caused delays in permit renewal. Under preferred alternative I8(b), the timeframe for submitting "no fishing" reports would be clarified in the regulations, resulting in fewer permit renewal delays. There could be an increased reporting burden for some fishermen who currently submit all of their "no fishing" reports only once a year, when renewing their permits. However, the Agency received comment supporting monthly submission of "no fishing" reports under alternative I8 (b). Preferred alternative I8(c) would specify that the trip "cost-earnings" reporting form for selected vessels would be due 30 days after a trip, and the "annual expenditures" report form would be due by the date specified on the form (presently January 31st). Under both of the preferred alternatives, failure to report or falsifying reports could result in penalties, fines, and/or permit sanctions including the loss of a permit.

*Conclusion*

Alternatives I8(b) and I8(c) are preferred because they would clarify HMS logbook reporting regulations and would have no ecological or economic impacts.

*Issue 9: Non-Tournament Recreational Landings Reporting*

As described in Chapter 2, the alternatives to remove regulatory inconsistencies and to clarify NMFS' intent that the vessel owner, rather than the angler, be responsible for reporting non-tournament recreational landings of Atlantic billfish and swordfish are:

I9(a) Retain existing regulations at § 635.5(c)(2) requiring anglers to report non-tournament recreational landings of North Atlantic swordfish and Atlantic billfish (No Action)

*I9(b) Require vessel owners (or their designee) to report non-tournament recreational landings of North Atlantic swordfish and Atlantic billfish – Preferred Alternative*

*Ecological Impacts*

Alternative I9(a) (No Action) would retain the current regulatory language at § 635.5(c)(2), which specifies that anglers, rather than vessel owners, are required to report all non-tournament landings of Atlantic blue marlin, Atlantic white marlin, Atlantic sailfish, and North Atlantic swordfish by calling NMFS. There are no direct ecological impacts associated with this alternative, because HMS recreational reporting is primarily an enforcement and administrative function involving a toll-free call to NMFS when a billfish or swordfish is landed. Thus, there would be no change in fishing effort as a result of retaining the *status quo*. However, compliance with non-tournament recreational reporting requirements and data collection could be compromised under the No Action alternative, because individual anglers, especially on charter boats, may be less familiar with the regulations and less inclined to report. Furthermore, punitive permit sanctions issued on behalf of NMFS for a failure to report non-tournament landings are more difficult to impose because HMS fishing permits are issued to vessel owners, not to individual anglers. For this reason, the collection of non-tournament recreational HMS landings data may be less complete under the No Action alternative. This information is vital for HMS stock assessments, quota monitoring, and determining compliance with ICCAT recommendations.

Alternative I9(b) would amend the current regulatory language at § 635.5(c)(2), by specifying that vessel owners (or designee) must report all non-tournament landings of Atlantic blue marlin, Atlantic white marlin, Atlantic sailfish, and North Atlantic swordfish by calling NMFS. The vessel owner would be responsible for reporting, but the owner's designee could fulfill the requirement. For the same reasons discussed above, there would be no direct ecological impacts or change in fishing effort associated with this alternative. There would, however, be some positive ecological impacts associated with increased compliance and improved non-tournament recreational data collection by linking non-reporting to permit sanctions. Compliance and recreational HMS data collection could be further enhanced because permitted vessel owners, or their designee, are more likely to be familiar with the regulations governing their fishery than non-permitted anglers are. Improved non-tournament recreational

HMS reporting information is vital for stock assessments, quota monitoring, and determining compliance with ICCAT recommendations.

Neither alternative is likely to have any impacts on protected species or essential fish habitat.

*Social and Economic Impacts*

Under alternative I9(a), the current reporting process involves anglers placing a toll-free call to NMFS and a follow-up telephone call from NMFS to issue a confirmation number. As such, there are no significant social or economic costs associated with this alternative. However, there are some minor adverse social effects and compliance issues associated with the current regulations because they are inconsistent with regulations for BFT, which specify that vessel owners are required to report recreational landings regulated under the HMS Angling category. This inconsistency may cause confusion regarding reporting responsibilities for both vessel owners and anglers. Furthermore, since vessel owners are the permit holders, they are more likely to be familiar with the regulations governing their fishery than non-permitted anglers who may be onboard, possibly for just a day on a charter trip. Because permits are issued to vessel owners, not anglers, the recreational non-tournament reporting requirement should logically, and for compliance purposes, be the responsibility of vessel owners. Also, if several fish were landed on a vessel by different anglers, the current regulations require each angler to report their fish, as opposed to only the vessel owner reporting all of the fish. Finally, the current regulations are inconsistent with the original intent of the requirement. Previously, in response to a comment on the proposed rule implementing the original requirement (January 7, 2003, 68 FR 711), NMFS stated that, "Owners of HMS Angling permitted vessels and Charter/Headboat operators are responsible for reporting all non-tournament billfish/swordfish landings because not all CHB vessels are selected to submit logbooks as specified under 50 CFR 635(a)."

Alternative I9(b), the preferred alternative, would amend the current regulations at § 635.5(c)(2) by specifying that vessel owners (or their designees) must report all non-tournament landings of Atlantic blue marlin, Atlantic white marlin, Atlantic sailfish, and North Atlantic swordfish by calling NMFS at a toll-free number. Based upon public comment, this preferred alternative has been modified slightly from the Draft HMS FMP by specifying that a vessel owner's designee may also report landings, in lieu of the owner. The vessel owner would be responsible for reporting, but the owner's designee could fulfill the requirement. As of February 1, 2006, 25,238 HMS Angling category permits and 4,173 HMS CHB permits were issued**.** All of these permit holders could potentially be affected by this alternative if they land HMS. However, there would be no significant adverse social or economic costs or burden associated with this alternative, because non-tournament HMS recreational reporting simply involves placing a toll-free call to NMFS when a billfish or swordfish is landed and a follow-up call from NMFS. Requiring vessel owners (or their designees) to report would only minimally increase administrative costs. For the 2004 fishing year (the last complete year), 363 non-tournament recreational landings of HMS were reported, of which 302 came from Florida. Approximately 95 percent of these were from the vessel operator, based on an informal analysis of the call-in line, so this alternative is not expected to dramatically alter current reporting practices. NMFS received comment indicating that this alternative could potentially disadvantage, or impose an additional burden on, absentee vessel owners. In consideration of this comment, NMFS has modified the preferred alternative to allow an owner's designee to report. The vessel owner would be responsible for reporting, but the owner's designee could fulfill the requirement. There could be some minor positive social impacts because recreational reporting responsibilities would be more consistent. Also, because permits are issued to vessel owners, linking non-reporting to permit sanctions would enhance enforcement and compliance. Compliance could be further enhanced because permitted vessel owners, or their designees, are much more likely to be familiar with the regulations governing their fishery than occasional anglers are. Enhanced compliance resulting from this alternative is expected to improve recreational non-tournament data collection, which would improve the analysis and development of recreational HMS management measures. It is possible that this alternative could also reduce the number of reporting calls to be made if, for example, several fish are landed on a vessel by several different anglers.

*Conclusion*

NMFS prefers alternative I9(b). This alternative would amend the current regulations at § 635.5(c)(2) by specifying that vessel owners (or their designees), rather than anglers, must report all non-tournament recreational landings of Atlantic billfish and North Atlantic swordfish. The vessel owner would be responsible for reporting, but the owner's designee could fulfill the requirement. This alternative is not expected to create significant adverse social or economic impacts. Compared to the No Action alternative, alternative I9(b) would achieve better consistency among HMS recreational reporting requirements, improve compliance with the non-tournament recreational HMS reporting requirements, and improve non-tournament recreational HMS data collection. This could enhance HMS stock assessments, quota monitoring, and the determination of compliance with ICCAT recommendations. Any negative social or economic impacts associated with the preferred alternative are expected to be minimal, primarily because vessel owners already submit the majority of non-tournament HMS landing reports, and because this alternative would allow the designee of a vessel owner to report.

<u>Issue 10: Pelagic Longline 25 mt NED Incidental BFT Allocation</u>

As described in Chapter 2, the alternatives being considered to clarify the amount of available incidental BFT quota for PLL fishing activity in the vicinity of the NED are:

I10(a) Retain the current regulations specifically referring to 25 mt (ww) (No Action)

I10(b) Modify the HMS regulations to state that "In addition, each year, 25 mt (ww) will be allocated for incidental catch by pelagic longline vessels fishing in the NED"

*I10(c) Conduct additional discussions at ICCAT regarding quota rollovers and adjust quotas allocated to account for bycatch related to pelagic longline fisheries in the vicinity of the management area boundary accordingly (Preferred Alternative)*

*Ecological Impacts*

Consistent with the 2002 ICCAT BFT quota recommendation, alternative I10(a) would continue to allocate a 25 mt (ww) set-aside quota of BFT to account for the incidental catch of BFT by longline fisheries directed on other species "in the vicinity of the management boundary area” for the eastern and western BFT stocks (*i.e.*, the NED). Under this alternative, NMFS would allocate 25 mt (ww) on an annual basis and would apply carry-over provisions to this set-aside. Therefore, if the previous year’s longline activity has not resulted in harvesting this set-aside in full, NMFS would carry forward the un-utilized quota and add it to the subsequent fishing year’s 25 mt (ww) allocation. Conversely, if the previous year’s longline activity has exceeded the incidental set-aside quota, NMFS would deduct the overharvest from the subsequent fishing year’s 25 mt (ww) allocation. As the mortality of BFT caught and landed under this set-aside is accounted for in BFT stock assessments under the ICCAT-recommended 20-year rebuilding program, NMFS anticipates there would be no additional mortality that has not already been analyzed pursuant to the BFT stock from any of the alternatives. However, I10(a) may have some potentially adverse ecological impacts. Specifically, if the NED set-aside is not attained in multiple successive years, this set-aside quota could increase quite dramatically and, as the wording in the ICCAT recommendation specifically allocates this quota to the longline sector of the U.S. fleet, NMFS would not have the flexibility to transfer this quota to the Reserve or to another domestic user group to avoid a 'stockpiling' situation from occurring. An unconstrained build-up of the incidental NED set-aside quota may eventually undermine the intent of the set-aside itself by leading to additional effort being deployed in the NED, and could potentially provide incentives to direct effort on BFT. For example, this set-aside could increase to a level that makes it more attractive for pelagic longline vessels to target BFT, versus encountering them incidentally, which could possibly result in negative impacts to BFT stocks.

Alternative I10(b) would revise the regulatory text to read that "each year" 25 mt (ww) would be allocated for the incidental harvest of BFT in the NED, thus interpreting the ICCAT recommendation as if it was intended to establish a baseline allocation of 25 mt (ww) each year, and establish that the overall allotment of this set-aside quota could differ from the baseline 25 mt (ww) amount. Under this alternative, incidental BFT landings from the NED Statistical area would be accounted for by deducting landings from this specific set-aside quota and any under/overharvest of the set-aside quota would be carried forward into, or deducted from, the following year’s baseline quota allocation of 25 mt (ww). This alternative would have similar potentially adverse ecological impacts as alternative I10(a) associated with applying carry-over provisions to this specific set-aside allocation. This alternative was originally preferred in the Draft HMS FMP, but after subsequent analysis of the recommendation and in response to comments seeking clarification, the Agency has determined the ICCAT recommendation provides the flexibility to avoid these potential negative consequences.

The preferred alternative I10(c) would conduct additional discussions at the annual ICCAT meeting regarding the long-term implications of allowing unused BFT quota from the previous year being added to the subsequent year’s allocation that can be retained. Depending on the results of any additional discussions at ICCAT, the regulations and operational procedures that account for BFT bycatch related to directed longline fisheries in the vicinity of the management area boundary would be further amended. In the interim, NMFS would maintain the current regulatory text implementing this ICCAT recommendation, but would amend the current practice of allowing carryover provisions from applying to this set-aside allocation. Positive ecological impacts would be expected from this alternative, as it would support further discussion to take place at ICCAT regarding the long-term implications of carrying unharvested BFT quota forward, as well as limit this specific set-aside to 25 mt (ww). Not allowing set-aside quota to be carried forward to the subsequent fishing year, in the interim, would maintain PLL fishing effort at current levels and would still allow for incidentally caught BFT in the NED to be accounted for. It is anticipated that there would be no additional impacts to other species, as this alternative would not be expected to alter existing fishing patterns or effort of PLL vessels.

None of the alternatives considered above are likely to have any impacts on protected species or essential fish habitat.

*Social and Economic Impacts*

Under alternative I10(a), the current regulatory text would remain in place and the current practice of applying carryover provisions to this set-aside would also be maintained. The NED set-aside quota would be allocated 25 mt (ww) annually. Therefore, any unharvested NED set-aside quota from the prior fishing year would be carried forward to the subsequent one. If incidental landings of BFT by PLL vessels operating in the NED exceed the 25 mt (ww) annual set-aside, the necessary quota adjustments would be accounted for in the subsequent year's set-aside allocation. This alternative may have some positive economic impacts, as the potential economic gain attributed to quota being carried forward from the preceding fishing year would remain be available. However, there may be some positive and negative social impacts associated with this alternative. The positive social impacts would be associated with the positive economic impacts discussed above, yet the negative social impacts would be attributed to this alternative not specifically clarifying the applicability of quota carry-over provisions to this set-aside quota and would potentially allow for implementing practices to not fully reflect the original intent of the recommendation.

Under alternative I10(b), the regulatory text would be adjusted to clarify the practice of applying carryover procedures to this set-aside and, therefore, unharvested quota from the NED set-aside would be rolled over into, or overharvests deducted from, the subsequent fishing year's baseline allocation. This alternative would provide similar positive economic impacts as described in alternative I10(a). However, excessive rollovers may also provide an incentive for PLL vessel operators to increase effort in this area, or to possibly target BFT in the NED, even though the intent of the recommendation and the regulations have been developed to avoid such a scenario. Slight positive social and economic benefits may result from this alternative as well for those PLL vessels and their homeports, or offloading ports, as a result of allowing quota from the previous year to be carried forward and landed in a subsequent year. Finally, under alternative I10(b), the NED set-aside and any rollover from this set-aside could not be transferred to other domestic quota categories as per the wording of the ICCAT recommendation. Thus, there may be a perceived negative social and economic impact among other fishery sectors if they were closed after achieving their allocated quota and were unable to access available quota from the NED set-aside via an inseason transfers.

The preferred alternative I10(c), would promote additional discussions at the annual ICCAT meeting regarding the long-term implications of allowing unused BFT quota from the previous year being added to the subsequent year's allocation that can be retained, and the how these discussions may affect this specific recommendation. This alternative would maintain the current regulatory text implementing this ICCAT recommendation, and amend the current practice of allowing carryover provisions from applying to this set-aside allocation. This alternative would be expected to have some negative economic impacts as it would not allow for the potential economic gain attributed to quota being carried forward from the preceding fishing year. There would be both negative and positive social impacts associated with this alternative. The negative social impacts would be associated with PLL vessels and their homeports, or offloading ports, not being allowed to profit from unharvested quota carried over from the previous year. The positive social impacts would be associated with preventing excessive rollovers from occurring, thereby eliminating an incentive for PLL vessel operators to increase effort, or even possibly directing their effort, on BFT in this area. Accumulation of incidental quota, and possibly providing an incentive to target BFT with longline gear would not fully reflect the intent of the recommendation.

*Conclusion*

NMFS prefers alternative I10(c), which would support the United States conducting additional discussions at the annual ICCAT meeting regarding the long-term implications of allowing unused BFT quota from the previous year being added to the subsequent year's allocation that can be retained. Depending on the results of any additional discussions at ICCAT, the specific regulations and practices that account for BFT bycatch related to pelagic longline fisheries in the vicinity of the management area boundary may need to be further amended in the future. In the interim, NMFS would maintain the current regulatory text implementing the ICCAT recommendation indicating that 25 mt (ww) shall be allocated for incidental catch of BFT by pelagic longline vessels fishing in the NED, but would amend the current practice of allowing under/overharvest of this set-aside allocation to be rolled into, or deducted from, the subsequent fishing year's set-aside allocation. Therefore, regardless of the amount of the set-aside harvested or unused in a given year, the balance would return to 25 mt (ww) at the start of each fishing year. If landings were to exceed the 25 mt (ww) allotment, they would be accounted for via Longline category quota that applies to the entire Western Atlantic management area. This alternative is preferred because it would meet the objective of clarifying the applicability of carry-over provisions to this incidental set-aside quota, would still provide 25 mt (ww) to account for incidental BFT catch in the NED, would prevent the 'stockpiling' of incidental quota which may provide an incentive to target BFT in the NED, and would support the discussion of long-term implications of BFT quota roll-overs, in general, as the outcome from these discussions would directly affect the implementation of this specific ICCAT recommendation.

<u>Issue 11: Permit Condition for Recreational Trips</u>

As described in Chapter 2, the alternatives considered to reduce confusion regarding state and Federal recreational regulations include:

I11(a) No permit condition for recreational trips (No Action)

*I11(b) Require recreational vessels with a Federal permit to abide by Federal regulations, regardless of where they are fishing, unless a state has more restrictive regulations - Preferred Alternative*

*Ecological Impacts*

Under the status quo**,** recreational anglers fishing for HMS must comply with state regulations when fishing in state waters, or comply with Federal regulations when fishing in Federal waters. This has caused some confusion on behalf of anglers when there are differences between state and Federal regulations (*e.g.*, Florida and Georgia). Additionally, some state regulations are consistent with Federal regulations for some HMS, but different for other HMS (*e.g.*, Alabama and South Carolina). In other instances, states do not have regulations for Atlantic HMS (*e.g.*, Connecticut and Rhode Island), so under the status quo Federal fishermen could fish without bag or size limits in these state's waters. The regulations for each state are outlined in Table 3.1 (Section 3.1).

These differences between state and Federal regulations also raise concerns regarding enforcement. If the state bag or size limit is higher than the Federal bag or size limit, maintaining the status quo could have negative ecological impacts because more fish, or smaller fish, could be landed than what is allowed for under Federal regulations, including those negotiated internationally. Additionally, if fishermen land HMS caught in Federal waters in a state with less restrictive regulations, they may be able to illegally land fish above the Federal bag or size limit due to ambiguities between state and Federal regulations. In some cases, enforcement officers may elect not to take action if it is unclear where the fish was caught (state or Federal waters) and which regulations apply.

In cases where the state regulations are more restrictive than Federal regulations, the *status quo*, and the preferred alternative, could have positive ecological benefits. In cases where the state regulations are less restrictive than Federal regulations, the status quo could have negative ecological benefits. For example, the State of Georgia has a number of regulations regarding shark bag and size limits that are different from the one shark per vessel per day and 54 inch minimum size for Federal waters. This inconsistency (and inconsistencies in other states) could hinder the rebuilding of large coastal sharks and could hinder enforcement efforts regarding shark regulations. However, the State of Georgia also bans the possession of billfish, except for catch-and-release. Thus, under the status quo, the rebuilding of billfish is aided.

Under the preferred alternative, anglers fishing for HMS with an HMS permit would need to abide by Federal regulations even if they were fishing in state waters, unless the state had more restrictive regulations. This alternative would have positive ecological benefits. For instance, under this alternative, in Georgia state waters, anglers fishing for sharks who have a Federal HMS permit would need to abide by Federal regulations and could be prosecuted if they are caught with the Georgia state limit onboard. This would enhance the rebuilding plan for large coastal sharks. Similarly, fishermen possessing a Federal HMS permit and fishing in Georgia state waters for billfish would need to catch-and-release any billfish. While this goes beyond the Federal regulations, it would enhance the rebuilding of Atlantic billfish. If a Federal permit holder caught a billfish in Federal waters, it would be necessary to document that it was caught in Federal waters if they intended to land that fish in a state with more restrictive regulations. Depending on the state regulations, it is possible that they would not be allowed to land the billfish. For states that do not have regulations for HMS, such as Connecticut, the preferred alternative would have positive ecological benefits by limiting fishermen with an HMS permit to the Federal regulations.

The preferred alternative would also have positive enforcement benefits because enforcement could decide to take action based on the more restrictive regulations. Which regulation applies would be decided on a case-by-case basis. However, it is likely that the regulations would be enforced individually rather than comprehensively as a suite. For instance, if a state has a larger bag limit and larger minimum size than the Federal regulations, the fishermen could be limited by both the Federal bag limit and the state minimum size.

Neither alternative would affect fishermen who do not hold a Federal HMS permit. Such fishermen are limited to fishing in state waters under state regulations and may not fish in Federal waters for HMS. Similarly, neither alternative restricts states from setting their own regulations. During the comment period, NMFS received comments from several states that felt that NMFS was exceeding their authority with the permit condition. NMFS believes that the Magnuson-Stevens Act does provide the authority to manage HMS species throughout their range (16 U.S.C. 1812 Section 102). NMFS could opt to pre-empt state's authority either through the Magnuson-Stevens Act or through ATCA. However, NMFS prefers to work with states and the Atlantic and Gulf States Marine Fisheries Commissions towards consistent regulations that meet both international and domestic goals because each state is different and the fishermen in each state prefer to fish for different HMS (*e.g.,* fishermen in the Gulf of Mexico may fish for Atlantic sharpnose sharks while fishermen in New Jersey would not) and use different gears. Additionally, the preferred alternative only applies to those fishermen who obtain a Federal permit and who, presumably, fish in Federal waters at least some of the time. The permit condition does not change state regulations. Thus, states still have the opportunity to establish their own regulations for fishermen who fish in their waters and not in Federal waters. Fishermen still have the opportunity not to obtain a Federal permit and to abide only by state regulations.

NMFS also received comments stating that the preferred alternative would mean that different regulations could apply to Federally permitted fisherman fishing in state waters next to a state-only permitted fisherman. NMFS does not believe that this should be an issue since the more restrictive regulation would apply. It may appear to be unfair to the Federally permitted fisherman if the Federal regulations for that species are more restrictive than the state regulations for that species. However, Federally permitted fishermen also have the opportunity to fish for HMS outside of state waters. If Federally permitted fishermen decide that the opportunity is not worth the additional restrictions, then they could decide not to obtain the permit. If the state regulations were more restrictive, then both fishermen would be limited by the state regulations.

Neither alternative is expected to have any impact on EFH or protected species.

*Social and Economic Impacts*

The social and economic burden associated with both the No Action and the preferred alternative would be minimal. In either case, recreational fishermen would be able to continue fishing and would continue to use the existing infrastructure (*e.g.*, hotels, supply shops) to do so. Additionally, states would be able to continue to implement their own regulations and regulate fishermen who fish in state waters only. Under the status quo, states would continue to regulate Federally permitted fishermen who are fishing for HMS in their waters at that time. Under the preferred alternative, states would lose their ability to regulate Federally permitted fishermen, unless their state regulations are more restrictive. This may be problematic for states that require fishermen to have a Federal recreational permit, but have regulations that are different from Federal regulations. However, at this time, NMFS is not aware of any state that fits this situation.

Both the State of Georgia and the South Atlantic Fishery Management Council have requested that NMFS implement this type of regulation to facilitate enforcement of Georgia's billfish catch-and-release only regulation; however, they requested different language that would allow more restrictive state regulations to apply in adjacent Federal waters. However, in many cases, the regulations are established based on ICCAT recommendations (*e.g.*, the billfish size limits) and, under ATCA, the United States is bound to implement the ICCAT recommendation. Extending a more restrictive state regulation into Federal waters in those cases would be inconsistent with ATCA. Similarly, if the more restrictive regulation is not part of or consistent with the HMS FMP, the regulations may also be inconsistent with the Magnuson-Stevens Act.

To the extent that the preferred alternative clarifies regulations for Federally permitted vessels, there may be some social and economic benefits because fishermen would be at less risk in determining which regulation to follow, and when.

*Conclusion*

Alternative I11(b) is the preferred alternative. This alternative is expected to achieve increased consistency between state and Federal regulations for Federally permitted HMS recreational fishermen, and result in less confusion on behalf of fishermen and improved compliance. Compared with the No Action alternative, the preferred alternative would produce greater ecological benefits with few resulting adverse social and economic impacts.

## 4.4 Impacts on Essential Fish Habitat

The Magnuson-Stevens Act requires NMFS to evaluate the potential adverse effects of fishing activities on EFH. If NMFS determines that fishing gears are having an adverse affect on HMS EFH, or other species' EFH, then NMFS must include management measures that minimize adverse effects to the extent practicable. At this time, there is no evidence to suggest that any of the preferred alternatives or proposed management measures in this FMP is adversely affecting EFH to the extent that detrimental effects can be identified on the habitat or fisheries. As described in detail in Chapter 10, no HMS gear other than potentially bottom longline gear is considered to have an adverse affect on EFH. New information presented in the Gulf of Mexico and Caribbean Fishery Management Council EFH FEIS's (2004) suggest that bottom longline gear may have an adverse affect on coral reef habitat, which serves as EFH for certain reef fishes. As a result, NMFS has made a preliminary determination that bottom longline gear may have an adverse affect on EFH for other Federally-managed species. An assessment of whether HMS bottom longline gear used primarily to target LCS is fished in coral reef areas, and if so, the intensity, extent, and frequency of such impacts, including any measures to minimize potential impacts, will be addressed in a subsequent rulemaking.

The following measures considered in this FMP are not expected to adversely impact HMS EFH, or EFH from other Federal or non-Federally managed species, for the reasons described below.

#### 4.4.1 Workshops

The preferred alternatives to implement workshops on safe release, disentanglement, and identification of protected resources are not expected to have any impacts on EFH. Furthermore, workshops on shark identification are also not expected to have any impacts on EFH. These workshops do not modify or expand the authorized gears permitted for harvest of HMS. In addition, these workshops will not result in an increase, or a redistribution of fishing effort. These workshops are being held to maintain compliance with the October 2003 and June 2004 Biological Opinions and to improve identification skills and shark dealer reporting.

#### 4.4.2 Time/Area Closures

The preferred alternatives to establish complementary HMS regulations in the Madison-Swanson, Steamboat Lumps Marine Reserve, and criteria and a framework mechanism for implementation or modification of future time/area closures are not expected to have any negative impacts on EFH. Analysis of HMS observer and logbook data indicate that there has been minimal HMS fishing effort in the reserve in recent years, and closing the area to HMS gears should result in very little redistribution of fishing effort, and minimal or no associated impacts to EFH. From 1997 to 2003, only one pelagic longline set and two bottom longline sets were reported in the HMS logbook in these areas. Criteria for establishing new or modifying existing closures are designed to improve transparency in the decision-making process and allow fishermen more ability to plan for future changes. The criteria themselves would not be expected to have any impact on EFH.

#### 4.4.3 Northern Atlantic Albacore Tuna

The preferred alternative to establish the foundation for development of an international rebuilding plan for Northern Atlantic albacore tuna is not expected to have any adverse effect on EFH as it does not modify or expand the authorized gears already permitted for harvest of albacore. Furthermore, this measure should not result in an increase or a redistribution of fishing effort. A rebuilding plan would not be implemented until after the next ICCAT stock assessment in 2007.

#### 4.4.4 Finetooth Sharks

The preferred alternative to reduce fishing mortality of finetooth sharks is not expected to have any impacts on EFH as it does not modify or expand the authorized gears already permitted for harvest of finetooth sharks. Furthermore, this measure should not result in an increase or a redistribution of fishing effort. Eighty percent of finetooth shark landed in the commercial fishery are harvested with gillnet gear that does not touch the bottom. Recreational fisheries (*i.e.*, rod and reel gear) for finetooth sharks also do not have any deleterious effects on EFH for HMS or non-HMS fish species.

### 4.4.5 Atlantic Billfish Management Measures

The preferred alternatives for billfish management measures consider additional restrictions on recreational fishing gears, including tournaments, to reduce bycatch of blue and white marlin. The primary gear used in recreational billfish fishing is rod and reel, which is not considered to have a negative impact on EFH. As such, none of the preferred management measures are expected to have an adverse effect on EFH.

### 4.4.6 Bluefin Tuna Management Measures

Management measures that consider modification to bluefin tuna seasonal allocations of quota among user groups are not expected to adversely affect EFH to the extent that detrimental effects can be identified on the habitat or fisheries. The preferred alternatives would not alter fishing gears or practices and it is anticipated that this action would not have any adverse impacts on EFH.

### 4.4.7 Calendar Year/ Fishing Year

The preferred alternative to adjust the annual management year for HMS to a calendar year from the current fishing year is designed to provide consistency in timing of domestic and international management programs which would help to reduce complexity of U.S. reports to ICCAT, and is not expected to alter fishing practices or result in redistribution of fishing effort. Thus, this change is not expected to have any impact on EFH.

### 4.4.8 Authorized Fishing Gears

The preferred alternatives to authorize certain fishing gears are not expected to have negative impacts on EFH. With regard to impacts on EFH, the 1999 FMP and Amendment 1 to the Atlantic Billfish FMP state that Atlantic HMS occupies pelagic oceanic environments. The use of speargun fishing gear, buoy gear, and handheld cockpit gears are not expected to impact bottom structures or otherwise damage habitat. Under all of the above alternatives, NMFS does not anticipate any adverse impacts to EFH.

### 4.4.9 Regulatory Housekeeping

A number of regulatory housekeeping measures are being considered to clarify and improve the enforcement of HMS regulations. The preferred alternatives in Section 4.3.4 Regulatory Housekeeping) would have no direct impact on EFH. Most of the preferred alternatives are administrative in nature, including corrections, clarifications, and technical changes. Other preferred alternatives would strengthen or reinforce existing regulations. The remaining preferred alternatives that would implement new regulations are expected to have only minor ecological impacts.

## 4.5 Impacts on Protected Resources

NMFS does not believe that any of the preferred alternatives would trigger reinitiation of consultation under 50 C.F.R. 402.16. The preferred alternatives to implement workshops on the safe release, disentanglement, and identification of protected resources, and shark identification are not expected to increase interactions with protected resources. In fact, the protected species workshops are being held to maintain compliance with October 2003 and June 2004 BiOps. These workshops are intended to help further reduce the mortality of sea turtles, smalltooth sawfish, and other protected resources captured incidentally in the HMS PLL, BLL, and gillnet fisheries. The purpose of HMS identification workshops is to train Federally permitted shark dealers to improve their species specific shark identification skills. Accurate species identification is important for compliance with HMS fishery regulations, including the avoidance of prohibited species and maintaining quota limits, and for accurate data collection. These workshops are not expected to alter existing fishing effort or practices, and therefore, should not result in increased interactions with protected resources. To the extent that interactions cannot be avoided, the safe handling and release workshops should result in increased survival rates of protected resources hooked or entangled by HMS fishing gears.

The primary goal of establishing complementary HMS regulations for the Madison-Swanson and Steamboat Lumps marine reserves is to provide consistency between the Gulf of Mexico Fishery Management Council and HMS regulations. Thus, prohibiting all HMS gears, other than trolling gear from May through October, in the existing reserve should not result in increased interactions with protected resources. Analysis of HMS observer and logbook data indicate that there has been minimal HMS fishing effort in the reserve in recent years, and closing the area to HMS gears should not have a major impact on redistribution of fishing effort, increased effort in other areas, or additional impacts on protected resources. Trolling gear is not anticipated to increase interactions with protected resources.

Regarding northern albacore tuna, the preferred alternative would not cause an increase in interactions with protected species. Any impact on protected species would be in the future and would depend upon any shift in fishing practices as a result of ICCAT's conservation and management measures developed under an international rebuilding plan. Because of low albacore tuna catch and landings in both of the current U.S. commercial and recreational fisheries, it is unlikely that any recommendations by ICCAT would result in a change in domestic fishing practices.

Regarding the finetooth shark preferred management measures, protected resources, such as marine mammals, sea turtles, and smalltooth sawfish, can be of concern in gillnet fisheries, which is the primary gear for finetooth sharks. However, the preferred management measure would not modify or increase existing fishing effort. Expanded observer coverage would improve the accuracy of extrapolated take estimates and increase knowledge of interactions between protected resources and gillnet fisheries that target both HMS and non-HMS. Adding finetooth sharks to the select species list for bycatch sampling would improve information collected on the interactions between HMS, protected resources, and the Shrimp Trawl Fishery in the Gulf of Mexico. Contacting the relevant Regional Fishery Management Councils, the Gulf and Atlantic States Marine Fisheries Commissions, and states regarding potential collaborative management measures affecting gillnet fishermen that possess multiple permits, or initiating management of species that are currently not regulated under any management scheme, may lead to increased understanding of protected resource interactions in gillnet fisheries. Any future rulemaking implementing additional measures to prevent overfishing of finetooth sharks would include analyses of the impacts on protected species.

Some of the preferred alternatives pertaining to Atlantic billfish, including mandatory use of circle hooks with natural baits in recreational billfish tournaments, may have a minor positive ecological impact on protected resources, such as Atlantic sea turtles, by potentially reducing interactions and possibly decreasing post-release mortality of any interactions that may occur. Further, implementation of the ICCAT recreationally caught marlin landing limit may have a minor positive impact on protected resources in the future. If in-season billfish management measures become necessary in the future, as a result of increased marlin landings, implementation of such management measures could lead to a decrease in recreational effort targeting Atlantic billfish, thereby potentially reducing the number of interactions between recreational fishermen and protected resources.

The preferred alternatives pertaining to BFT inseason management and annual specifications processes are procedural and administrative in nature and are expected to have negligible ecological impacts. The specific preferred alternatives that would adjust the General category allocation scheme to provide for a formal winter BFT fishery would not alter current impacts on threatened or endangered species, as they conform to current BFT quota recommendations and the gear used in the General category generally has a low interaction rate with protected species.

There may be slight positive impacts to protected species under the preferred alternative for changing the fishing year back to a calendar year when considered in combination with the preferred alternative for directed billfish regarding the 250-marlin landings. In combination, there is a small potential that if a management threshold was reached to reduce or halt marlin landings, it would occur earlier in the season than under the other alternatives considered for fishing year. This could slightly reduce fishing effort and any resultant bycatch. These potential positive impacts are expected to be small because the likelihood of a management action under the 250-marlin landings limit is projected to be low based on prior year’s landings data, and the interaction rates of protected species with rod and reel are minimal.

The alternatives to authorize speargun, buoy gear, and secondary cockpit gears are not anticipated to result in increased interactions with protected resources. It is unlikely that a speargun fisherman would mistake a sea turtle or other protected species for a BAYS tuna. Thus, NMFS does not expect that gear type to increase protected species or marine mammal interactions. Further, buoy gear has been in use in HMS fisheries. In the case of buoy gear, this action would essentially rename an existing gear type (handline) for the commercial swordfish fishery and would limit the number of floatation devices that are allowed to be possessed or deployed by a vessel. Buoy gear, as it is currently used, is not likely to have many interactions with protected species. Limiting its use, as is preferred, would further reduce any interactions. Furthermore, as described in the regulatory housekeeping sections, NMFS is preferring to require handlines to be attached to the vessel. While this may not reduce interactions with protected species (interactions in the handline fishery currently are minimal), it would reduce any mortality because the fishermen would know immediately if an animal were caught on the gear.

Some of the preferred regulatory housekeeping actions, including a requirement that handlines remain attached to vessels, may have a minor positive ecological impact on protected resources by potentially limiting interactions and reducing the amount of gear that could get lost. Other actions would strengthen, reinforce, or clarify existing regulations, including prohibitions on the sale or purchase of HMS in excess of retention limits, a minor modification of the East Florida Coast closed area, a prohibition on all commercial vessels (except HMS CHB permit holders or General Category permit holders during a registered HMS tournament) from possessing billfish, facilitation of electronic submittal of BFT dealer reports, clarification of reporting requirements, clarification of procedures for annual allocation of a 25 mt BFT incidental allowance for PLL vessels in the vicinity of the NED, and a requirement for HMS-permitted recreational vessels to abide by Federal regulations, regardless of where fishing, unless a state has more restrictive regulations. The remaining issues are either administrative or would not appreciably change fishing effort.

In addition to the impacts of the preferred alternatives in this document, NMFS continues to monitor impacts to protected species from the ongoing operation of HMS fisheries through various logbook and observer programs as described in Sections 3.4 and 3.8. For example, extrapolated annual take estimates of sea turtles and marine mammals for 2005 recently became available for the pelagic longline fishery in addition to data on observed interactions for the first quarter of 2006 (January through March). NMFS monitors observed interactions with marine mammals and sea turtles in the pelagic longline fishery on a quarterly basis and reviews the data in conjunction with extrapolated annual take estimates for appropriate action, if any, as necessary. Should additional management measures be deemed necessary to reduce bycatch or bycatch mortality of protected species in the pelagic longline or other HMS fisheries, NMFS would take appropriate action in a separate rulemaking.

## 4.6 Environmental Justice

Executive Order 12898 requires agencies to identify and address disproportionately high and adverse environmental effects of its regulations on the activities of minority and low-income populations. To determine whether environmental justice concerns exist, the demographics of the affected area should be examined to ascertain whether minority populations and low-income populations are present. If so, a determination must be made as to whether implementation of the alternatives may cause disproportionately high and adverse human health or environmental effects on these populations.

The communities of Dulac, Louisiana and Fort Pierce, Florida have significant populations of Native Americans and Black-Americans, respectively. The 2000 Census data indicates that Native Americans made up 39 percent of the Dulac population, specifically the Houma Indians, which is not Federally recognized tribe. About 30 percent of the Dulac population was living below poverty level in 2000. In 2000, Black-Americans were about 41 percent of the Fort Pierce, Florida population with about 30 percent of the entire Fort Pierce population living below the poverty line. These two communities also have significant populations of low-income residents. In addition to Dulac and Fort Pierce, there is a diffuse Vietnamese-American population in Louisiana, actively participating in the pelagic longline fishery, and commuting to fishing ports, but not living in “fishing communities” as defined by the Magnuson-Stevens Act and identified in Chapter 9 of this document. In reviewing the social impacts of the preferred alternatives of the Consolidated HMS FMP, none are expected to have a disproportionate impact on these minority and low-income populations. Greater information about potential social impacts of each preferred alternative is briefly described below with detailed information provided in earlier this Chapter. Demographic data indicate that coastal counties with fishing communities are variable in terms of social indicators like income, employment, and race and ethnic composition.

The preferred alternatives for Finetooth Sharks, Authorized Gear, Northern Albacore Tuna, and Regulatory Housekeeping are not anticipated to have any significant negative social or economic impacts on HMS-related communities and are not anticipated to have an impact on minority or low-income populations because they are largely administrative in nature or the impact a small diffuse group of people. The following alternatives could have negative social or economic impacts on various communities involved with HMS fisheries, but none of the preferred alternatives in this document are anticipated to have high or adverse human health or environmental effects on any of the HMS-related communities. In addition, most of the potential negative impacts can be mitigated or are not likely to occur.

The preferred alternatives for workshops (see Section 2.1.1) are not expected to negatively impact the HMS-related communities identified as having a significant minority and low-income population; Dulac, Louisiana and Fort Pierce, Florida. The preferred workshop alternatives would apply to longline and shark gillnet permit holders and the operators of these vessels, as well as shark dealer permit holders. There are a relatively low number of longline, gillnet, and HMS dealer permit holders residing in Dulac and Fort Pierce. NMFS does not maintain information about the residence of vessel operators if they do not possess an HMS permit, so it is difficult to evaluate the impact of the workshop alternatives on the vessel operators. The workshops would be held in areas where there is a high concentration of permit holders according to the addresses provided when applying for an HMS permit. NMFS intends to provide the workshop schedules in advance so that fishermen can attend the most convenient workshop. The workshop alternatives are not anticipated to have a negative socio-economic impact on any HMS-related community.

The preferred alternatives to establish complementary HMS regulations in the Madison-Swanson, Steamboat Lumps marine reserve, and to establish criteria for a regulatory framework adjustments to implement new or modify an existing time/area closures are not expected to have a disproportionate impact on minority or low-income populations. Analyses of HMS observer and logbook data indicate that there has been minimal HMS fishing effort in the Madison-Swanson and Steamboat Lumps marine reserve in recent years, and closing the area to HMS gears, other than trolling gear from May through October, should not have a major impact on fishing effort or gross revenues for the fishery. In particular, it is not expected to have a negative impact on minority or low-income populations. Establishing criteria to implement or modify future time/area closures is intended to provide greater transparency in the decision-making process for implementing new or modifying existing time/area closures. As such, the criteria are not expected to have any social or economic impacts.

The BFT tuna permit holders in Venice, Louisiana; Dulac, Louisiana; and Fort Pierce, Florida possess less than one percent of the commercial tuna, angling, CHB, and tuna dealer permits; therefore, the selected BFT alternatives are not anticipated to have a high or adverse environmental or social impact on these communities. The redistribution of the BFT General category time period subquota allocation could result in a slight adverse economic and social impact on the northern BFT fisheries; however, NMFS does not anticipate that these effects will fall disproportionately on minority or low-income populations. Some of the negative impacts may be minimized if fishermen are willing and able to fish during the winter quota periods where the tuna are available.

Shifting all HMS species to a calendar year management cycle is not anticipated to have a disproportionate impact on minority or low-income populations. The calendar year preferred alternative would not change the management cycle for the shark fishery, but would shift the management cycle for tunas, billfish, and swordfish from a fishing year to a calendar year. No impact on the swordfish and tuna fisheries is expected to result from this alternative because the tuna fishery is managed on a finite scale, whereas the swordfish fishery has not harvested the entire annual quota for several years. The recreational billfish fishery is not anticipated to be impacted by a shift to a calendar year management cycle in the foreseeable future because the threshold for in-season management action is unlikely to be reached without substantial changes in angler effort or practices. There is the potential for some billfish tournaments to be negatively impacted by the calendar year management cycle when taken in combination with the preferred in-season management triggers and ICCAT billfish landing limits, if substantial changes in angler effort or practices do occur in the future. The impacts associated with these management measures are anticipated to be substantially mitigated by allowing for in-season adjustment of the minimum legal size which is expected to slow marlin landings and thereby allow the fishery to continue uninterrupted for the entire duration of the fishing year. Impacts could be further mitigated by, in some instances, changing tournament dates to occur earlier in the fishing year when the billfish landing limit has not been caught, shifting tournament formats to catch and release, if necessary, and by a shifting effort to other available billfish species, such as sailfish. In addition to mitigating any potential negative impacts, billfish tournaments are typically not held in low-income or minority communities.

Generally, the preferred alternatives are intended to improve compliance with ICCAT recommendations, data quality and collection, information dissemination, and NMFS' efficiency in enforcing and implementing specifications and management measures. See Chapter 2 for a more detailed description of the alternatives, Chapter 4 for additional discussion of the impacts related to the alternatives, and Chapter 9 for further description of communities involved in HMS fisheries.

## 4.7 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA, 1972, reauthorized 1996) requires that Federal actions be consistent, to the extent practicable, with the enforceable policies of all state coastal zone management programs. NMFS has determined that the suite of preferred alternatives for all issues would be implemented in a manner consistent to the maximum extent practicable with the enforceable policies of the coastal states in the Atlantic, Gulf of Mexico, and Caribbean that have Federally approved coastal zone management programs. In August 2005, NMFS provided all states, Puerto Rico, and the U.S. Virgin Islands copies of the proposed rule and draft HMS FMP. Under 15 C.F.R. § 930.41, states have 60 days to respond after receipt of the consistency determination and supporting materials. States can request an extension of 15 days. If a response is not received within those time limits, NMFS can presume concurrence (15

C.F.R. § 930.41(a)). Eleven states replied, within the 60–day response period, that the proposed regulations were consistent, to the extent practicable, with the enforceable policies of their coastal zone management programs. The State of Georgia replied on March 1, 2006, that the proposed rule was not consistent with the enforceable policies of GA's coastal zone management program. NMFS notified the State of Georgia that because their response was after the 60-day response period, NMFS presumed concurrence after the end of the CZMA review period and would consider their comment as part of the public comments received on the proposed rule and draft HMS FMP. NMFS has presumed concurrence with the states that did not respond. NMFS will continue to work with the states to ensure consistency between state and Federal regulations.

## 4.8 Cumulative Impacts

Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7). A cumulative impact includes the total effect on a natural resource, ecosystem, or human community due to past, present, and future activities or actions of Federal, non–Federal, public, and private entities. Cumulative impacts may also include the effects of natural processes and events, depending on the specific resource in question. Cumulative impacts include the total of all impacts to a particular resource that have occurred, are occurring, and will likely occur as a result of any action or influence, including the direct and reasonably foreseeable indirect impacts of a Federal activity. The goal of this section is to describe the cumulative ecological, economic and social impacts of past, present and reasonably foreseeable future actions with regard to the management measures presented in this document. Table 4.75 describes the overall impacts anticipated from each of the alternatives considered.

### 4.8.1 Past, Present, and Reasonably Foreseeable Actions

As discussed in Section 3.1, NMFS has taken a number of actions in the past in order to, among other things, rebuild overfished and prevent overfishing of HMS. These actions have included FMPs, FMP amendments, and framework actions. The goals and objectives of these past rules are summarized in Section 3.1. NMFS is preferring to take similar actions in this document, and can reasonably expect to implement additional regulations in the future to address the management and conservation of Atlantic HMS. The need and objectives of this document are described in earlier sections, particularly Chapter 1, and are not repeated here.

In general, the preferred alternatives for workshops would implement a series of protected species and shark identification workshops to be held at various locations along the Atlantic and Gulf coasts. PLL, BLL, and gillnet vessel owners and operators, as well as Federally permitted shark dealers, would be required to recertify every three years prior to renewing their HMS permit. Recertification would allow the Agency to incorporate new information and technology into its training curriculum and allow fishery participants to stay apprised of the techniques for enhanced protected species safe handling and release as well as species identification over time. The preferred alternatives for time/area closures, finetooth sharks, and northern albacore tuna should help NMFS prevent overfishing and reduce bycatch. The preferred alternatives for billfish are intended to decrease recreational mortalities of Atlantic billfish, given their current stock status, and limit landings, as appropriate, to ensure consistency with international obligations. The preferred alternatives for BFT are intended primarily to streamline and simplify the administrative process governing BFT annual and inseason management and ensure consistency with international obligations. The preferred alternative for fishing year management cycle is administrative in nature and should aid NMFS in meeting international reporting obligations and clarifying how they were met. The preferred alternatives for authorized fishing gear are designed to meet the changing needs of the fisheries. The regulatory housekeeping actions would facilitate and improve the HMS management regime. The public, law enforcement, port agents, and others often bring these types of management measures to the Agency's attention. As such, it is difficult to accurately predict reasonably foreseeable regulatory housekeeping measures that NMFS may consider in the future improving HMS administration, facilitating enforcement, or clarifying regulations.

In Chapter 1, NMFS describes some actions that could happen in the reasonable future including: changes to BFT size limits and tolerances; modifications to the current shark, swordfish, and tunas quotas; changes to the ICCAT recommended billfish landings limit; HMS permit reform; changes to time/area closures; modifications to EFH descriptions; and modifications to recordkeeping, monitoring, and reporting regulations (*e.g.*, VMS). Additional future actions could include annual specifications for all fisheries with quotas; establishing shark fishing season opening and closing dates; actions taken to improve coordination with Caribbean fisheries; and actions taken to reduce protected species interactions in HMS fisheries, particularly the pelagic longline fishery (*e.g.*, implementation of the PLTRP).

### 4.8.2 Cumulative Ecological Impacts

The cumulative long–term ecological impacts of the preferred alternatives for workshops (A2, A3, A5, A6, A9, and A16) are anticipated to be positive. Workshops for PLL, BLL, and gillnet vessel owners and operators could result in positive ecological impacts by reducing the mortality of protected resources. These workshops are essential for complying with BiOps and should reduce the post–hooking mortality of sea turtles and other protected resources. PLL, BLL, and gillnet vessel owners would be required to attend the Protected Species Workshops to link the requirement to the owner's ability to renew the vessels' permit, ensuring that workshops are well attended. Operators would be required to attend the workshops to ensure that at least one person on board the vessel during fishing activities is adept at the safe handling and release protocols, thereby increasing the likelihood of post–release survival. Mandatory HMS identification workshops, required for all Federally permitted shark dealers, would likely improve the accuracy of dealer reports and reduce the number of sharks listed as unclassified, which would likely improve stock assessments, quota monitoring, and stock rebuilding efforts.

In general, the cumulative impact of implementing a number of time/area closures since 1999, in addition to other measures to reduce bycatch and bycatch mortality, has been positive ecologically, but negative socially and economically, particularly for the pelagic longline industry. As described under the ecological impacts of the time/area closure no–action alternative to maintain existing closures, when comparing pre– and post–time/area closure data from the pelagic longline logbook, the existing time/area closures have resulted in a substantial reduction in the bycatch of all non–target HMS and protected species. In addition to time/area closures, other actions have been taken to reduce the bycatch of protected species in HMS fisheries including requirements to post safe handling and release guidelines for incidentally captured sea turtles and marine mammals, new gear requirements to reduce sea turtle bycatch and bycatch mortality (*e.g.*, circle hooks and bait), requiring non–stainless steel corrodible hooks, line cutters, dipnets, and dehooking devices to mitigate impacts on incidentally caught sea turtles. Measures have also been taken to reduce interactions with endangered right whales during calving season by requiring 100 percent observer coverage for boats with gillnet gear. However, with all of the new regulations designed to reduce bycatch, there has also been a substantial decline in the landings of targeted HMS. A number of potential causes for the decline in landings were discussed in the preceding section on economic impacts of time/area closures. In general, additional restrictions have caused an overall decline in fishing effort (number of hooks set) across nearly every region except the Gulf of Mexico.

With regards to future closures, and especially closures in the Gulf of Mexico, NMFS may consider potential closures in the future to reduce bycatch and discards of target non–HMS and protected resources. In particular, NMFS is considering alternatives to reduce bycatch in the Gulf of Mexico, especially for BFT. For instance, more research is needed to further understand the complex BFT life history, particularly with regards to age structure and determining sustainable fishing pressure associated with different age classes. In addition, NMFS is considering developing incentives that would dissuade fishermen from keeping incidentally caught BFT, particularly spawning BFT in the Gulf of Mexico. This could involve an experimental fishery to research how changes in fishing practices may help reduce bycatch of non–target species as well as the tracking of discards (dead and alive) by all gear types or better understanding the oceanographic factors that influence their distribution of BFT in the Gulf of Mexico.

While time/area closures play an important part in resource management, a number of time/area closures have been implemented since 2000. NMFS is beginning to see the benefits of those closures; however, NMFS is still assessing the effect of additional management measures that have been implemented since 2000, such as circle hooks. Because circle hooks likely have a significantly different catch rate than J–hooks, further investigations are required to determine the potential impact of any new time/area closures. Thus, NMFS does not prefer to implement new closures as this time, except for Madison–Swanson and Steamboat Lumps, until the effect of current management measures (and potential unanticipated consequences of those management measures can be better understood). NMFS anticipates that 2005 PLL final data will become available in the summer of 2006. The Agency will continue to monitor and analyze the effect of circle hooks on catch rates and bycatch reduction as well as assess the cumulative affect of current time/area closures and circle hooks. In addition, NMFS is awaiting additional information regarding the status of the PLL fleet after the devastating hurricanes in the Gulf of Mexico during the fall of 2005. A majority of the PLL fleet was thought to be severely damaged or destroyed during the 2005 hurricane season. The amount of PLL fishing effort, especially within the Gulf of Mexico, will be assessed in the summer of 2006 when 2005 PLL final data becomes available. Until NMFS can better estimate the current fishing effort and potential recovery of the PLL fleet, it may be premature to implement any new time/area closures specific to that gear type at the present time. Finally, a number of stock assessments will be conducted during 2006 (LCS, blue marlin, white marlin, north and south swordfish, and eastern and western BFT). NMFS is waiting on the results of these stock assessments to determine domestic measures with regard to management of these species, especially for LCS, north swordfish, white marlin, and western BFT.

Given that the preferred alternative to establish complementary HMS regulations in the Madison–Swanson, Steamboat Lumps Marine Reserve would impact a small area and a very small proportion of the total number of vessels permitted to fish for HMS that have actually fished in the area, NMFS considers the cumulative impact of adding this new closure to the existing closures to be minor. Furthermore, trolling would still be allowed from May through October for HMS and other species managed by the GOMFMC. The other preferred alternative to establish criteria for regulatory framework adjustments to implement new closures or modify existing time/area closures is not expected to have any ecological or economic impacts, even when considered in the context of other closures implemented in recent years. This is because the criteria are designed to enhance the transparency of the decision–making process with regard to new or modifications to existing time/area closures. If, in the future, NMFS decides to implement new closures or modify existing closures, NMFS would need to evaluate the ecological, economic, and cumulative impacts of the specific action being considered at that time.

For northern albacore tuna, past actions that NMFS has taken include maintaining compliance with U.S. TAC allocations and limiting vessel capacity, consistent with ICCAT recommendations, advocating international TAC levels less than current replacement yield at ICCAT meetings, and working to establish the foundation with ICCAT for developing an international rebuilding program. Due to the fact that the United States has not taken its entire adjusted quotas and that U.S. landings are minor compared to other ICCAT countries, cumulative actions to date have had little ecological impact. However, if ICCAT implements a rebuilding plan with target stock levels, a time table, and reference points, the long–term cumulative impacts should be positive as northern albacore tuna stocks rebuild. If NMFS took unilateral action, there could be adverse economic impact on U.S. fishermen without any noticeable ecological benefit for northern albacore tuna.

The cumulative long–term impacts of the selected measures for finetooth sharks are expected to be positive. In 2002, it was determined that finetooth sharks were experiencing overfishing, however, the biomass was still above the level at which it would be considered overfished. Since that time, NMFS has launched efforts to determine what Federal and state fisheries may be interacting with finetooth sharks by informal and formal consultations with other management bodies. NMFS has also started a pilot program to expand the DSGFOP coverage to include vessels fishing with gillnets who may be catching finetooth sharks incidentally or deploying a slightly different gillnet. The preferred measure would continue to gather information on other sources of finetooth shark fishing mortality via expanded observer coverage. These data can be employed to increase the catch series available for the upcoming SCS assessment and concurrently implement effective management measures targeting those fisheries responsible for the majority of finetooth shark fishing mortality. Contacting the relevant Regional Fishery Management Councils, the Atlantic and Gulf States Marine Fisheries Commissions, and states regarding finetooth shark landings and potential collaborative management measures affecting gillnet fishermen that possess multiple permits, or initiating management of species that are currently not regulated under any management scheme, may lead to increased understanding of the ecological impacts of gillnet fisheries. The next SCS stock assessment is anticipated to begin in 2007, by which time NMFS will have a better understanding as to what measures would effectively reduce fishing mortality, if it is determined that overfishing continues to occur on finetooth sharks and/or they are deemed overfished.

Past management actions pertaining to Atlantic billfish, as described above and in Chapter 3 of this document, have had some positive ecological benefits for Atlantic billfish by limiting mortalities attributable to U.S. fishermen. However, given overall U.S. catches and landings of billfish relative to aggregate international catches, the impacts of these benefits on Atlantic–wide populations are likely limited. The preferred alternatives identified in this document are anticipated to provide additional positive ecological benefits for overfished Atlantic billfish populations by reducing mortalities associated with live releases in the U.S. recreational billfish fishery; however, for the same reasons noted above, their effect on the status of Atlantic–wide populations would likely be limited. Actions NMFS may consider in the future for both the recreational and commercial sectors include additional measures to reduce or mitigate billfish landings and mortalities, such as additional changes in legal minimum sizes, landings prohibitions, landing limits, possession limits, tagging and landing requirements, gear and/or bait restrictions, time/area closures, handling and release requirements, effort restrictions, seasonal closures, regional or seasonal allocations, or others as appropriate. These measures, if considered, would be designed to address specific needs of the fishery, and, as such, would be intended to have positive ecological impacts. Presently, there are no known third party actions that may affect target species, however, ICCAT is scheduled to meet and take action, if necessary, on Atlantic billfish in November 2006. Further, NMFS anticipates initiating and completing an ESA Listing Status review for Atlantic white marlin by the close of 2007. Pending the outcome of the ICCAT stock assessment and meeting as well as the ESA Listing review, additional management measures may be warranted.

Since 1999, management actions pertaining to Atlantic BFT have had minor positive ecological impacts by continuing to limit BFT mortality by U.S. fishermen in accordance with the strict quota limits set by ICCAT and established under the approved 20–year rebuilding plan. Currently, BFT are overfished. ICCAT is conducting a stock assessment in June 2006 that should provide additional information regarding the status of BFT and the current rebuilding plan. It is likely that later this year, ICCAT will finalize the stock assessment and recommend management actions for BFT. Depending on ICCAT recommendation(s) and the status of BFT, it is possible that NMFS could include additional issues within an ICCAT implementation rule. However, NMFS will need to prioritize issues to ensure that international obligations are met and the rebuilding plan is progressing. The preferred BFT alternatives are primarily administrative in nature and are anticipated to provide negligible or minor additional positive ecological benefits for overfished Atlantic BFT. Actions NMFS may consider in the future for both the recreational and commercial sectors include additional measures to rationalize BFT fishing effort, adjustment of size tolerance limits, discard reduction, landing limits, possession limits, tagging requirements, gear and/or bait restrictions, time/area closures, handling and release requirements, effort restrictions, seasonal closures, regional or seasonal allocations, or others as appropriate. Additionally, the time/area closure preferred alternative to implement criteria for the consideration of additional or modified closures for any gear type may be used to protect BFT, if needed. For example, NMFS could consider closing an area of the Gulf of Mexico and opening it as an experimental fishery to test for ways of reducing bycatch of spawning bluefin tuna through such things as hook and bait combinations, environmental conditions, and/or temporal and spatial associations among different species. These measures, if considered, would be designed to address specific needs of the resource, and as such, would be intended to have positive ecological impacts.

When considering this action in the context of past actions, most of the impacts of the preferred alternative for fishing year, both positive and negative, would be fully mitigated. Since both the swordfish and BFT fisheries and quotas were initially managed on a calendar year and were switched to a fishing year within the last decade, any ecological impacts as a result of this preferred alternative should be mitigated by the impacts that occurred when they were switched to a fishing year (*e.g.,* the impacts of a compressed 6 month fishing year under this preferred alternative would be mitigated by the impacts of a fishing year that was stretched to cover 18 months during the previous action). For billfish, the cumulative ecological impacts attributed to the implementation of a calendar year management program in combination with a 250–marlin landings limit preferred alternative would be neutral to slightly positive. Marlin landings will be monitored and appropriate actions taken as necessary to maintain compliance with the ICCAT–recommended landings limit regardless of whether the fishery is managed on a fishing year or a calendar year. However, there is a small potential, that if a management threshold was reached to reduce or halt marlin landings, it would occur earlier in the season than under the other alternatives considered for fishing year, which could slightly reduce fishing effort and potentially have positive ecological impacts. The cumulative impacts of these two alternatives in combination are discussed in detail in Sections 4.2.3 and 4.3.2. Cumulative impacts of the calendar year preferred alternative in combination with the specifications processes for BFT and swordfish are also expected to be neutral because BFT fisheries are tightly monitored and controlled under quotas and current regulations afford protections for sensitive size classes and swordfish fisheries have not landed the full quota in recent years.

The revised list of authorized fisheries (LOF) and associated fishing gears became effective December 1, 1999 (64 FR 67511). The LOF is updated periodically and can be found at 50 CFR § 600.725. Amendment 1 to the 1999 FMP specified that only rod and reel and handline gears be allowed in the recreational shark fishery. In this document, the preferred alternatives for authorized fishing gear are not anticipated to dramatically increase effort and therefore would likely not result in significant increases in landings or landings rates of HMS or other finfish, protected, or threatened species with which HMS fishermen interact. NMFS does not expect the use of these gears to increase interactions with protected resources. As described in Section 4.3.3, other alternatives analyzed could have had potentially fewer or greater ecological impacts because authorizing different gears in different segments of the HMS fisheries could result in varying degrees of increases in target catches, as well as interactions with other HMS and other species. Authorizing speargun fishing gear would allow spearfishermen to target BAYS tunas; the number of spearfishermen in this fishery is not expected to be high. Due to stock status concerns, these fishermen would not be allowed to fish for other HMS at this time. The preferred alternative to authorize buoy gear would have positive ecological impacts because it would limit the amount of gear that is in the water and would only allow commercial swordfish fishermen to target swordfish. Current regulations do not limit the gear or the fishermen. The preferred alternative to authorize secondary fishing gear is not expected to have minimal, if any, ecological impacts.

The suite of preferred alternatives in Section 4.3.4, entitled Regulatory Housekeeping, include alternatives I1(c), I2(b), I3(b), I3(c), I4(b), I5(b), I6(b), I7(b), I8(b), I8(c), I9(b), I10(c), and I11(b). All of these alternatives are projected to have minor positive conservation benefits for HMS, bycatch species, and protected resources consistent with the Magnuson–Stevens Act, ESA, and other applicable law. Several of these alternatives, including I7(b), I8(b), I8(c), and I9(b) are predominantly administrative in nature. As such, any positive ecological benefits derived from these preferred alternatives would be realized primarily through improvements in data collection. Many other alternatives, including I1(c), I2(b), I3(b), I3(c), I6(b), and I11(b) are intended to facilitate enforcement. Therefore, any positive ecological benefits derived from these preferred alternatives would be realized through improved compliance with HMS regulations. Alternative I4(b), which would modify the East Florida Coast closed area, would likely relocate effort; however, the cumulative impacts are expected to be negligible because the area affected is so small and catches and catch rates in adjacent areas are similar. Alternative I5(b), which would require that handlines remain attached to vessels, could reduce fishing effort, but that is not expected to be likely. Rather, alternative I5(b) would prevent the potential future expansion of effort. Alternative I10(c) is in regard to the ICCAT 25 mt NED BFT allocation. As such, it would support additional discussion at ICCAT regarding quota rollovers and would clarify how this set–aside would be allocated, and is expected to limit fishing effort to current levels. Actions that NMFS may consider in the future that would improve administration of the existing HMS management regime, facilitate enforcement, and/or clarify regulations would similarly be expected to produce minor positive ecological impacts.

Besides this rulemaking, NMFS is currently accepting comments on a proposed rule that would require vessel operators with HMS permits and BLL gear onboard to possess, maintain, and utilize additional equipment, protocols, and or guidelines for the safe handling, release, and disentanglement of sea turtles, smalltooth sawfish, and other non–target species (March 29, 2006, 71 FR 15680). These requirements are consistent, and are based upon, requirements for the PLL fishery that were implemented on July 6, 2004 (69 FR 40734), and effective on August 5, 2004. These requirements represent the most current, and best available information available for maximizing gear removal efficiency and reducing post–hooking mortality of sea turtles, smalltooth sawfish, or other non–target species. It is expected that the preferred workshop alternatives in the Final HMS FMP would enhance participants' ability to use the additional equipment and follow required protocols implemented in the proposed rule on handling and release equipment. Additionally, NMFS expects to conduct rulemaking in the near future as a result of the dusky shark assessment (May 25, 2006, 71 FR 30123) and the ongoing LCS stock assessment. Any action based on those stock assessments would be expected to have positive ecological benefits.

The cumulative ecological impacts on HMS stocks and fisheries due to potential actions under consideration by Regional Fishery Management Councils, Interstate Marine Fisheries Commissions, or other management bodies may be slightly positive. The Caribbean Fishery Management Council recently implemented area closures that could have minor positive benefits for Atlantic HMS. NMFS is currently proposing, in the same rule that proposes handling and release equipment in the shark bottom longline fishery, an alternative to implement complementary closures (March 29, 2006, 71 FR 15680). The South Atlantic Fishery Management Council is considering management measures including time/area closures for bottom longline gear to protect grouper species that may have some impacts on HMS fisheries, particularly the shark fishery. Under this rule, charter/headboat fishermen would also need to comply with the dehooking requirements. The Gulf of Mexico Fishery Management Council recently proposed regulations that would implement similar dehooking requirements to those required in the HMS pelagic longline fishery and to those proposed for the HMS bottom longline fishery. HMS Advisory Panel members have raised concerns about the impacts of herring management on BFT stocks and the New England Fishery Management Council is considering a ban on midwater and pair trawling for herring in upcoming rulemaking to address concerns about impacts on BFT, cod, and whales. To the extent that herring trawl fisheries may be impacting BFT stocks, such a ban would likely have positive ecological impacts. Regarding shark management, the Atlantic States Marine Fisheries Commission is developing an interstate shark fishery management plan, which would likely have positive ecological impacts because many shark nursery areas are located in state waters.

For a discussion of non–fishing impacts to HMS EFH, see Section 10.5.

### 4.8.3 Cumulative Economic and Social Impacts

The cumulative long–term economic and social impacts of the preferred alternatives for workshops are not expected to be excessive as these workshops would be held in areas where be held in areas were they are high concentrations of HMS permit holders. The workshop training would be valuable to fishermen and could offset some unquantifiable portion of the estimated opportunity costs associated with attending the workshops and not fishing. Most trades and professions require practitioners to obtain licenses demonstrating competence; however, there is still an economic opportunity cost associated with any required activity that would not otherwise be taken voluntarily. To minimize those costs, the workshops would be held in areas where there is a high concentration of permit holders according to the addresses provided when applying for an HMS permit. NMFS intends to provide the workshop schedule in advance so that fishermen can attend the most convenient workshop, minimizing travel, lost fishing time, and time spent away from their place of business and family. The requirement to attend the workshops has been delayed until December 31, 2007, for shark dealers, and until the PLL, BLL, and gillnet vessel permit expires in 2007 for owners and operators. The delayed effectiveness allows individuals to plan ahead for the workshop and work around peak fishing times. Over the long–term, alternatives to in–person workshops (*i.e.*, internet–based, web–cast, DVD–based) may be considered to mitigate or reduce some of the anticipated social and economic impacts associated with the preferred alternatives for workshops.

As described above, the implementation of time/area closures has had cumulative economic and social impacts including putting fishermen out of business and causing some vessels to change fishing areas. The swordfish fishery, which is primarily a pelagic longline fishery, is no longer taking the full U.S. quota allocated by ICCAT. NMFS recently adjusted the 2005 North Atlantic fishing quota by adding 3,398.5 mt dw underharvests to the base quota of 2,937.6 mt dw. If the fishery were to catch the entire adjusted quota, it would be worth approximately $23.5 M. The large underharvests in this fishery could have an impact on negotiations at the 2006 ICCAT meeting, depending on the status of swordfish. The current preferred alternatives in this action are not expected to have large economic or social impacts, and, to the extent that the criteria give NMFS the flexibility to do so, could, in the future, help relieve some of the economic stress by reopening or modifying existing closures.

The preferred alternatives for northern albacore tuna and finetooth sharks are not expected to have any significant economic or social impacts in the near future. The measures that may be needed when ICCAT implements a rebuilding plan for northern albacore tuna or when NMFS has collected additional data to target appropriate management measures to prevent overfishing of finetooth sharks could have economic or social impacts, and would be analyzed at that time.

For billfish, the cumulative economic and social impacts of actions taken since 1978 have been to eliminate domestic commercial fisheries for those species, resulting in negative economic and social impacts for the commercial sector. In eliminating commercial retention and sale of Atlantic billfish, the domestic pelagic longline fishery was forced to adapt to the loss of an increasing portion of their income in the late 1980s. However, it is likely that in doing so, previous billfish regulations have allowed for larger overall social and economic benefits to the nation given the substantial number of recreational fishermen who participate in Atlantic billfish fisheries. Thousands of recreational billfish trips are taken each year, each worth hundreds of dollars, as discussed in more detail in Section 3.5.2 and Chapter 4 of this document.

As discussed in Chapter 4 of this document, the preferred alternatives for billfish are anticipated to have generally minor adverse socio–economic impacts in the short–term as a result of a potential decrease in the availability of fish for landing, should the ICCAT recreational marlin landing limit be achieved, and as a result of the costs associated with purchasing new hooks. Adverse socio–economic impacts associated with the preferred alternatives are anticipated to be greatly constrained given high participation rates in catch and release fishing for Atlantic marlin, the fact that recent landings have rarely reached the ICCAT recommended 250–fish limit, and other factors discussed in Section 4.2.3. Localized impacts on communities where individual tournaments may cease operating as a result of potential in–season management action could be heightened; however, the aggregate impacts on the fishery as a whole are anticipated to be limited and may be slightly higher under a calendar year management cycle. Hooks represent a minor capital cost in relation to other expenditures related to recreational billfish fishing, including the purchase, outfitting, maintenance, and running of vessels. Healthy Atlantic billfish populations could lead to increased angler satisfaction, participation, and expenditures if the possibility of interacting with a billfish improves as a result of the measures identified in this rulemaking. As a result, the preferred alternatives pertaining to directed Atlantic billfish fishing could result in positive long–term cumulative socio–economic benefits if they assist in reversing declines in billfish populations.

Since the 1999 FMP, the majority of regulatory actions regarding BFT have been designed to improve BFT management and provide positive social and economic impacts to the fishery. For example, past adjustments to the target catch tolerance limits in both the harpoon and purse seine BFT fisheries and changes to the pelagic longline BFT incidental catch allowance provided marginal increases in social and economic impacts and responded to changing conditions in the environment and market place. Annual management measures and inseason actions are analyzed and implemented to fully maximize the utilization of available quota and fishing opportunities for all fishery sectors.

As discussed in Chapter 4 of this document, the preferred alternatives are anticipated to continue to improve domestic BFT management by streamlining and simplifying the administrative processes governing BFT rulemaking and inseason actions. The preferred alternatives are expected to have positive socio–economic impacts in the short and long–term by responding to changed fishery conditions and needs within the BFT General category and increasing the ability of the Agency to affect timely annual rulemaking and respond to inseason management issues. In the future, it is expected that the Agency will continue to explore ways to improve domestic management including, for example, further streamlining and rationalization of the commercial permit program.

As described above, the change to a calendar year is mainly administrative and is not expected to have significant economic or social impacts. Any short–term confusion on the part of fishery participants due to the change to a calendar year would be offset by increased transparency in monitoring and compliance with international obligations. To the extent that switching back to a calendar year would offset any impacts from the original switch to a fishing year, this alternative could also provide some positive benefits.

The preferred alternatives for authorized fishing gear (H2, H5, and H7) could potentially increase the number of fishery participants. As discussed in Section 4.3.3, the preferred alternatives may have both positive and negative socio–economic impacts, with impacts varying by sector. This preferred action is expected to result in positive social and economic impacts for spearfishermen (ability to fish with a previously unauthorized gear type), commercial swordfish handgear fishermen (clarification on use of gear type), and all HMS fishermen choosing to utilize handheld cockpit gears (clarification on allowable use of secondary gears and reduced confusion on regulations). Some negative social and economic impacts may occur if competition for fishing grounds causes gear conflicts, however, public comments indicate that this is unlikely due to recent experiences where spearfishermen have fished in close proximity to rod and reel fishermen without incident. The preferred alternative not to modify the definition of green–stick gear but rather to clarify its current use could have some social and economic impacts. Clarifying the use of green–stick gear without preferring this alternative or modifying the regulations would have modest positive social benefits on those fishermen who are confused about the current regulatory regime. It may also result in minor positive economic benefits to those fishermen who now enter the fishery using this gear type in a manner allowed under current regulations but may not have done so previously as they were concerned it may have been illegal. These positive benefits may be offset by those fishermen who realize that they were using green–stick gear in the configurations that are not authorized under HMS regulations. HMS CHB and General category permit holders would be allowed to use various configurations of green–stick gear (see Section 2.3.3) although limited to two hooks per line under current handgear definitions. PLL vessels may use either configuration with unlimited hooks but need to comply with all other existing PLL regulatory requirements, including the use of circle hooks and avoiding closed areas.

The suite of preferred regulatory housekeeping alternatives in Section 4.3.4 is projected to have minimal social or economic impacts on HMS fishery participants. Several of the alternatives are predominantly administrative in nature. As such, any additional costs would be minor. Other alternatives to facilitate enforcement would impose no additional costs on vessels that are currently compliant with HMS regulations. Alternative I1(c), which would limit species composition of the catch, could potentially increase short–term social and economic impacts for those bottom or pelagic longline fishermen that fish in pelagic or bottom longline closed areas. However, NMFS expects that any cumulative impacts would be minor because the preferred alternatives accommodate the vast majority of commercial fishing operations, based on logbook data, and would only affect a small proportion of longline fishermen. Alternative I4(b), which would modify the East Florida Coast closed area, and alternatives I5(b), which would require that handlines remain attached to vessels, could reduce fishing effort, but that is not expected to be likely. Rather, fishery participants are expected to either move to nearby areas with similar catch rates (I4(b)), or to fish with attached handlines (I5(b)). AlternativeI10(c) clarifies how the NED BFT set–aside would be allocated, and is not expected to alter fishing effort. Actions of this nature that NMFS may consider in the future that would improve the administration of the existing HMS management regime, facilitate enforcement, or clarify regulations would similarly be expected to have minimal economic impacts.

As described previously, besides this rulemaking, NMFS is currently accepting comments on a proposed rule that would require vessel operators with HMS permits and BLL gear onboard to purchase and/or construct additional equipment for the safe handling, release, and disentanglement of sea turtles, smalltooth sawfish, and other non–target species. To the extent possible, the Agency has attempted to minimize initial costs to fishery participants by enabling them to construct equipment themselves. Furthermore, it is assumed that some participants are already in possession of the required equipment as vessels often fish with BLL and PLL gear; PLL participants are already required to possess the full suite of equipment. Attendance at workshops that are described above, and may be a requirement of the draft Consolidated HMS FMP, would result in some lost fishing and travel time, which would result in increased cumulative economic impacts. These economic and social impacts were fully analyzed in that document. While this action may result in minor negative socio–economic impacts, it is expected to ensure the long–term sustainability and continued economic viability of the BLL fishery by maintaining compliance with the October 2003 BiOp. NMFS also expects to issue proposed rules that would adjust the shark management measures based on recent or ongoing stock assessments. These upcoming rulemakings could have social economic impacts.

The cumulative social and economic impacts on HMS stocks and fisheries due to potential actions under consideration by Regional Fishery Management Councils, Interstate Marine Fisheries Commissions, or other management bodies may be slightly positive. The Caribbean Fishery Management Council recently implemented some area closures that could have minor positive benefits for Atlantic HMS. The HMS Management Division is currently proposing to implement complementary closures, and expects that any social or economic impacts would be minor due to the small size and amount of HMS fishing effort in the areas under consideration. The South Atlantic Fishery Management Council is considering management measures including time/area closures for bottom longline gear to protect grouper species that may have some impacts on HMS fisheries, particularly the shark fishery. Depending on the size, these closures could have economic and/or social impacts on HMS fishermen. The Gulf of Mexico Fishery Management Council recently proposed regulations that would implement similar dehooking requirements to those required in the HMS pelagic longline fishery and to those proposed for the HMS bottom longline fishery. Because of the similarities, this proposed rule should not have any additional economic impact on HMS fishermen except for charter/headboat fishermen who also hold permits for fisheries managed by the Gulf of Mexico Fishery Management Council. HMS Advisory Panel members have raised concerns about the impacts of herring management on BFT stocks and the New England Fishery Management Council is considering a ban on midwater and pair trawling for herring in upcoming rulemaking to address concerns about impacts on BFT, cod, and whales. To the extent that herring trawl fisheries may be impacting BFT stocks, such a ban would likely have positive social and economic impacts for HMS fishermen, especially in New England areas where herring trawl fisheries operate. Regarding shark management, the Atlantic States Marine Fisheries Commission is also developing an interstate shark fishery management plan, which may have positive social and economic impacts if state measures aid in achieving OY for the shark fishery.

**Table 4.75 Impacts of alternatives considered. The symbols +, –, and 0 refer to positive, negative, and zero impacts respectively. The expected impacts should be compared to other alternatives within that issue, not to the impacts between issues. See preceding section for details of impacts of each alternative.**

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| **Workshops** | | | | |
| Alternative A1 | Voluntary protected species safe handling, release, and identification workshops for HMS longline fishermen (No Action) | – | 0 | 0 |
| Alternative A2 | *Mandatory protected species safe handling, release, and identification workshops and certification for all HMS pelagic or bottom longline vessel owners – Preferred Alternative* | + | – / + | – |
| Alternative A3 | *Mandatory protected species safe handling, release, and identification workshops and certification for vessel operators actively participating in HMS pelagic and bottom longline fisheries – Preferred Alternative* | + + | – / + | – – |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| Alternative A4 | Mandatory protected species safe handling, release, and identification workshops and certification for all HMS longline vessel owners, operators, and crew | + + + | – / + | – – – |
| Alternative A5 | *Mandatory protected species safe handling, release, and identification workshops and certification for shark gillnet vessel owners and operators – Preferred Alternative* | + + | – / + | – – |
| Alternative A6 | *Protected species safe handling, release, and identification certification renewal every 3-years – Preferred Alternative* | + + | – / + | – |
| Alternative A7 | No HMS identification workshops (No Action) | 0 | 0 | 0 |
| Alternative A8 | Voluntary HMS identification workshops for dealers, all commercial vessel owners and operators, and recreational fishermen | + | 0 | 0 |
| Alternative A9 | *Mandatory shark identification workshops for all shark dealers – Preferred Alternative* | + + | – / + | – |
| Alternative A10 | Mandatory HMS identification workshops for all swordfish, shark, and/or tuna dealers | + + + | – / + | – – |
| Alternative A11 | Mandatory HMS identification workshops for all commercial longline vessel owners | + + | – / + | – |
| Alternative A12 | Mandatory HMS identification workshops for all commercial longline vessel operators | + + | – / + | – |
| Alternative A13 | Mandatory HMS identification workshops for all commercial vessel owners (longline, CHB, General category, and handgear/harpoon) | + + | – / + | – – |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| Alternative A14 | Mandatory HMS identification workshops for all commercial vessel operators (longline, CHB, General category, and handgear/harpoon) | + + | – / + | – – |
| Alternative A15 | Mandatory HMS identification workshops for all HMS Angling permit holders | + + | – / + | – – – |
| Alternative A16 | *HMS identification certification renewal every 3–years – Preferred Alternative* | + + | – / + | – |
| **Time/Area Closures** | | | | |
| Alternative B1 | Maintain existing closures; no new closures (No Action) | + | 0 | 0 |
| Alternative B2(a) | Prohibit the use of pelagic longline gear in HMS fisheries in the central portion of the Gulf of Mexico year–round | +/– | – | – |
| Alternative B2(b) | Prohibit the use of pelagic longline gear in HMS fisheries in an area of the Northeast during the month of June (1 month) | +/– | – | – |
| Alternative B2(c) | Prohibit the use of pelagic longline gear in HMS fisheries in the Gulf of Mexico from April through June (3 months) | +/– | – | – |
| Alternative B2(d) | Prohibit the use of pelagic longline gear in HMS fisheries in the Gulf of Mexico west of 86 degrees west longitude year–round | +/– | – – | – – |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| Alternative B2(e) | Prohibit the use of pelagic longline gear in HMS fisheries in an area of the Northeast to reduce sea turtle interactions | +/– | – | – |
| Alternative B3(a) | Modify the existing Charleston Bump time/area closure to allow the use of pelagic longline gear in all areas seaward of the axis of the Gulf Stream | 0/– | +/– | + |
| Alternative B3(b) | Modify the existing Northeastern U.S. time/area closure to allow the use of pelagic longline gear in areas west of 72º 47’ west longitude during the month of June | 0 | +/– | + |
| Alternative B4 | *Implement complementary HMS management measures in Madison–Swanson and Steamboat Lumps Marine Reserves from November through April (6 months) – Preferred Alternative* | + | 0 | 0/– |
| Alternative B5 | *Establish criteria to consider when implementing new time/area closures or making modifications to existing time/area closures – Preferred Alternative* | 0 | 0 | 0 |
| Alternative B6 | Prohibit the use of bottom longline gear in an area southwest of Key West to protect endangered smalltooth sawfish | + | 0 | – |
| Alternative B7 | Prohibit the use of pelagic longline gear in HMS fisheries in all areas | ++ | – – – | – – – |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| **Northern Albacore Tuna** | | | | |
| Alternative C1 | Maintain compliance with the current ICCAT recommendation (No Action) | 0 | 0 | 0 |
| Alternative C2 | Unilateral proportional reduction of United States northern albacore fishing mortality | + | – | – – |
| Alternative C3 | *Establish the foundation with ICCAT for developing an international rebuilding program – Preferred Alternative* | 0/+ | 0 | 0 |
| **Finetooth Sharks** | | | | |
| Alternative D1 | Maintain current regulations for recreational and commercial fisheries (No Action) | – | 0 | 0 |
| Alternative D2 | Implement commercial management measures to reduce fishing mortality of finetooth sharks | –/+ | – | – |
| Alternative D3 | Implement recreational management measures to reduce fishing mortality of finetooth sharks | –/+ | – | – |
| Alternative D4 | *Identify sources of finetooth shark fishing mortality to target appropriate management actions – Preferred Alternative* | 0/+ | 0 | 0 |
| **Directed Billfish Fishery** | | | | |
| Alternative E1 | Retain existing regulations regarding recreational billfish fishing, including permit requirements, minimum size limits, prohibited species, landing form, allowable gear, and reporting requirements (No Action) | + | 0 | 0 |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| Alternative E2 | Effective January 1, 2007, limit all participants in Atlantic HMS recreational fisheries to using only non–offset circle hooks when using natural baits or natural bait/artificial lure combinations | ++ | – | – |
| Alternative E3 | *Effective January 1, 2007, limit all HMS permitted vessels participating in Atlantic billfish tournaments to deploying only non–offset circle hooks when using natural baits or natural bait/artificial lure combinations – Preferred Alternative* | + | – | – |
| Alternative E4 (a) | Increase the minimum size limit for Atlantic white marlin to a specific size between 68 and 71'' LJFL | + | – | – |
| Alternative E4 (b) | Increase the minimum size limit for Atlantic blue marlin to a specific size between 103 and 106'' LJFL | + | – | – |
| Alternative E5 | Implement a recreational bag limit of one Atlantic billfish per vessel per trip | + | – | – |
| Alternative E6 | *Effective January 1, 2007, implement ICCAT Recommendations on Recreational Marlin Landings Limits – Preferred Alternative* | + | – | – |
| Alternative E7 | Effective January 1, 2007 – December 31, 2011, allow only catch and release fishing for Atlantic white marlin | + | – – | – – |
| Alternative E8 | Effective January 1, 2007 – December 31, 2011, allow only catch and release fishing for Atlantic blue marlin | ++ | – – | – – |
| **Atlantic BFT** | | | | |
| BFT Subquota Management in the General and Angling Categories | | | | |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| Alternative F1 | Maintain the time–periods, subquota allocations, and geographic set asides for the General and Angling categories as established in the 1999 FMP (No Action) | 0 | +/– | +/– |
| Alternative F2 | Establish General category time–periods, subquotas, and geographic set asides annually via framework actions | 0 | +/– | +/– |
| Alternative *F3* | *Amend the management procedures regarding General category time–periods, subquota, as well as geographic set–asides to allow for future adjustments to take place via a regulatory framework action – Preferred Alternative* | 0 | ++ | ++ |
| Alternative F3 (a) | Establish monthly General category time–periods and subquotas (June–Jan, 12.5% each) | 0 | +/– | +/– |
| Alternative F3 (b) | Revise General category time–periods and subquotas to allow for a formalized winter fishery (June–Aug, 54%; Sept, 26.5%; Oct–Nov, 9%; Dec, 5.2%; and Jan, 5.3%) | 0 | +/– | +/– |
| Alternative *F3 (c)* | *Revise General category time–periods and subquotas to allow for a formalized winter fishery (June–Aug, 50%; Sept, 26.5%; Oct–Nov, 13%; Dec, 5.2% and Jan, 5.3%)* | 0 | +/– | +/– |

| **Alternative Number** | **Alternative Description** | **Ecological Impacts** | **Social Impacts** | **Economic Impacts** |
|---|---|---|---|---|
| Alternative F3 (d) | Revise General category time–periods and subquotas to allow for a formalized winter fishery (June–Aug, 38.7%; Sept, 26.6%; Oct –Nov, 13%; Dec, 10.8%; and Jan, 10.9%) | 0 | +/– | +/– |
| Alternative *F4* | *Clarify the procedures for calculating the Angling category school size–class BFT subquota allocation and maintain the Angling category north/south dividing line – Preferred Alternative* | 0 | + | + |
| Annual BFT Quota Adjustments | | | | |
| Alternative F5 | Maintain full annual BFT specification process regardless of change in the U.S. BFT TAC and maintain under/overharvest procedures within individual domestic quota categories and individual vessels in the Purse seine category (No Action) | – | 0/– | 0/– |
| Alternative *F6* | *Revise the annual BFT specification process, to refer back to the analyses conducted in the DEIS of the consolidated HMS FMP and include seasonal management measures – Preferred Alternative* | 0 | + | + |
| Alternative F7 | Eliminate unharvested quota carryover provisions and return unharvested quota to the resource, while maintaining status quo overharvest provisions | +/– | – – – | – – – |

| **Alternative Number** | **Alternative Description** | **Ecological Impacts** | **Social Impacts** | **Economic Impacts** |
|---|---|---|---|---|
| Alternative *F8* | *Establish an individual quota category carry–over limit of 100 percent of the baseline allocation (i.e., no more than the annual baseline allocation may be carried forward), except for the Reserve category, and authorize the transfer of quota exceeding the 100 percent limit to the Reserve or another domestic quota category, while maintaining status quo overharvest provisions – Preferred Alternative* | + | +/– | +/– |
| BFT Inseason Actions | | | | |
| Alternative F9 | Maintain inseason action procedures (No Action) | 0 | +/– | +/– |
| Alternative *F10* | *Revise and consolidate criteria considered prior to performing inseason and some annual BFT management actions – Preferred Alternative* | 0 | +/– | +/– |
| Alternative F11 | Eliminate BFT inseason actions | – – | +/– – | +/– – |
| **Timeframe for Annual Management of HMS Fisheries** | | | | |
| Alternative G1 | Maintain the current fishing year for all HMS (No Action) | 0 | – | – |
| Alternative G2 | *Shift the fishing year to January 1 – December 31 for all HMS – Preferred Alternative* | 0 | ++ | +/– |
| Alternative G3 | Shift the fishing year to June 1–May 31 for all HMS | 0 | + | – |
| **Authorized Fishing Gear** | | | | |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| Alternative H1 | Maintain current authorized gears in Atlantic HMS fisheries (No Action) | 0 | – | 0 |
| Alternative H2 | *Authorize speargun fishing gear as a permissible gear type in the recreational Atlantic BAYS tuna fishery – Preferred Alternative* | – | + | + |
| Alternative H3 | Authorize speargun fishing gear as a permissible gear type in the commercial tuna handgear and recreational tuna fisheries | – – | ++ | + |
| Alternative H4 | Authorize green–stick fishing gear for the commercial harvest of Atlantic BAYS tunas | – | + | + |
| Alternative H5 | *Authorize buoy gear as a permissible gear type in the commercial swordfish handgear fishery; limit vessels employing buoy gear to possessing and deploying no more than 35 floatation devices, with each individual gear having no more than two hooks or gangions attached – Preferred Alternative* | + | + | + |
| Alternative H6 | Authorize buoy gear as a permissible gear type in the commercial swordfish handgear fishery; limit vessels employing buoy gear to possessing and deploying no more than 50 floatation devices, with each individual gear having no more than 15 hooks or gangions attached | – | – | + |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| Alternative H7 | *Clarify the allowance of hand–held cockpit gears used at boat side for subduing HMS captured on authorized gears – Preferred Alternative* | 0 | + | + |
| **Regulatory Housekeeping** | | | | |
| Issue 1 – Definitions of Pelagic and Bottom Longlines | | | | |
| Alternative I1(a) | Retain current definitions for PLL and BLL gear (No Action) | – | – | 0 |
| Alternative I1(b) | Establish additional restrictions on longline gear in HMS time/area closures by specifying a maximum and minimum allowable number of commercial fishing floats to qualify as a BLL and PLL vessel, respectively | + | 0 | 0 |
| Alternative I1(c) | *Differentiate between PLL and BLL gear based upon the species composition of the catch onboard or landed – Preferred Alternative* | + | 0 | 0 |
| Alternative I1(d) | Require time/depth recorders (TDRs) on all HMS longlines | + | – | – |
| Alternative I1(e) | Base HMS time/area closures on all longlines (PLL & BLL) | + + | – – | – – |
| Issue 2 – Shark Identification | | | | |
| Alternative I2(a) | Retain current regulations regarding shark landing requirements (No Action) | – | 0 | 0 |
| Alternative I2(b) | *Require that the 2nd dorsal fin and the anal fin remain on all sharks through landing – Preferred Alternative* | + | – | – |
| Alternative I2(c) | Require that the 2nd dorsal fin and the anal fin remain on all sharks through landing, except for lemon and nurse sharks | + | – | – |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| Alternative I2(d) | Require all fins remain on all sharks through landing | + + | – – | – – |
| Issue 3 – HMS Retention Limits | | | | |
| Alternative I3(a) | Retain current regulations regarding retention limits, with no new prohibitions (No Action) | – | 0 | 0 |
| Alternative I3(b) | *Add new prohibition at § 635.71(a)(48) making it illegal for any person to, "Purchase any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24" – Preferred Alternative* | + | + | 0/– |
| Alternative I3(c) | *Add new prohibition at § 635.71(a)(49) making it illegal for any person to, "Sell any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24" – Preferred Alternative* | + | + | 0/– |
| Issue 4 – Definition of East Florida Coast Closed Area | | | | |
| Alternative I4(a) | Retain current coordinates for the East Florida Coast closed area (No Action) | – | 0 | 0 |
| Alternative I4(b) | *Amend the second coordinate of the East Florida Coast closed area to 28° 17' 10" N. lat., 79° 11' 24" W. long., so that it corresponds with the EEZ – Preferred Alternative* | + | – | – |
| Issue 5 – Definition of Handline | | | | |
| Alternative I5(a) | Retain the current definition of "handline" at § 635.2 (No Action) | – | 0 | 0 |

| Alternative Number | Alternative Description | Ecological Impacts | Social Impacts | Economic Impacts |
|---|---|---|---|---|
| Alternative I5(b) | *Amend the definition of "handline" at § 635.2 by requiring that they be attached to, or in contact with, all vessels – Preferred Alternative* | + | – | – |
| Alternative I5(c) | Require that handlines remain attached to all vessels when fishing recreationally and allow unattached handlines when fishing commercially | + | – | – |
| Issue 6 – Possession of Billfish on Vessels Issued Commercial Permits | | | | |
| Alternative I6(a) | Retain current regulations regarding the possession of Atlantic billfish (No Action) | – | 0 | 0 |
| Alternative I6(b) | *Prohibit vessels issued HMS commercial permits and operating outside of a tournament from possessing, retaining, or taking Atlantic billfish from the management unit – Preferred Alternative* | + | – | 0 |
| Issue 7 – BFT Dealer Reporting | | | | |
| Alternative I7(a) | Retain the current regulations regarding BFT dealer reporting (No Action) | 0/– | – | – |
| Alternative I7(b) | *Amend the HMS regulations to provide an option for Atlantic tunas dealers to submit required BFT reports using the Internet – Preferred Alternative* | +/0 | + | + |
| Alternative I7(c) | Amend the HMS BFT dealer reporting regulations to require that Atlantic tunas dealers submit BFT reports electronically, with specific exceptions | +/0 | + | + |
| Issue 8 – "No–Fishing" and Cost–Earnings" Reporting Forms | | | | |
| Alternative I8(a) | Maintain the existing regulations regarding submission of logbooks (No Action) | 0 | – | 0 |

| **Alternative Number** | **Alternative Description** | **Ecological Impacts** | **Social Impacts** | **Economic Impacts** |
|---|---|---|---|---|
| Alternative I8(b) | *Require submission of "No Fishing" reporting forms for selected vessels if no fishing trips occurred during the preceding month, postmarked no later than seven days after the end of the month – Preferred Alternative* | 0 | +/– | 0 |
| Alternative I8(c) | *Require submission of the trip "cost-earnings" reporting form for selected vessels 30 days after a trip, and the "annual expenditures" report form by the date specified on the form – Preferred Alternative* | 0 | +/– | 0 |
| Issue 9 – Non–Tournament Recreational Landings Reporting | | | | |
| Alternative I9(a) | Retain existing regulations at § 635.5(c)(2) requiring anglers to report non–tournament recreational landings of North Atlantic swordfish and Atlantic billfish (No Action) | – | – | 0 |
| Alternative I9(b) | *Require vessel owners (or their designees) to report non–tournament recreational landings of North Atlantic swordfish and Atlantic billfish – Preferred Alternative* | + | + | 0 |
| Issue 10 – Pelagic Longline 25 mt NED Incidental BFT Allocation | | | | |
| Alternative I10(a) | Retain the current regulations specifically referring to 25 mt (ww) (No Action) | 0 | + | + |
| Alternative I10(b) | Modify the HMS regulations to state that "In addition, each year, 25 mt (ww) will be allocated for incidental catch by pelagic longlines" in the NED | 0 | + | + |

| **Alternative Number** | **Alternative Description** | **Ecological Impacts** | **Social Impacts** | **Economic Impacts** |
|---|---|---|---|---|
| Alternative I10(c) | *Conduct additional discussions at ICCAT regarding quota rollovers and adjust quotas allocated to account for bycatch related to pelagic longline fisheries in the vicinity of the management area boundary accordingly – Preferred Alternative* | + | –/+ | – |
| Issue 11 – Permit Condition for Recreational Trips | | | | |
| Alternative I11(a) | No permit condition for recreational trips (No Action) | – | – | 0 |
| Alternative I11(b) | *Require recreational vessels with a Federal permit to abide by Federal regulations, regardless of where they are fishing, unless a state has more restrictive regulations – Preferred Alternative* | + | +/– | 0 |

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# 5.0 MITIGATION AND UNAVOIDABLE IMPACTS

None of the preferred alternatives in this final HMS FMP are likely to have significant adverse ecological impacts. The alternatives for workshops were designed to reduce mortality of sea turtles and other protected species. The alternatives for time/area closures were chosen to help protect spawning aggregations of gag grouper and to provide greater transparency to the affected public regarding the use of time/area closures to reduce bycatch.

The preferred alternative for northern albacore tuna would not have any ecological impact until ICCAT implements a rebuilding plan. To reduce mortality of northern albacore tuna, such a plan could include size limits, bag limits, or reductions in overall quotas. If such a plan were implemented, it could result in some regulatory discards because fishermen may continue to target other species and have to discard albacore bycatch. The current fishery averages about 25 percent below the existing allocation. Thus, the reduction in allocation as part of the rebuilding program would have to be greater than 25 percent per year on average before U.S. fishermen would begin to discard northern albacore.

The preferred alternative for finetooth sharks, which would implement a plan to identify sources of finetooth shark fishing mortality to target appropriate management actions, may not reduce fishing mortality on finetooth sharks in the short-term. Nevertheless, it is necessary to understand fully the extent and contribution that all fisheries may be contributing to finetooth shark fishing mortality. At that point, NMFS will consider initiating effective management measures to prevent overfishing. The majority of commercially landed finetooth sharks are harvested with gillnet gear by vessels that possess both HMS and non-HMS permits, or participate in fisheries that are not currently managed. Expanded observer coverage has shown that fisheries targeting non-HMS using sinknets and under the jurisdiction of other management entities are also responsible for finetooth landings. Management measures aimed solely at gillnet vessels targeting sharks might not be effective at preventing overfishing of finetooth sharks as these measures could be circumvented or may result in additional dead discards of finetooth sharks because these fishermen would continue to target non-HMS with gillnets and land finetooth sharks incidentally. A number of sources of finetooth shark mortality remain unclear. The Agency remains committed to obtaining more comprehensive information on finetooth shark landings from observers and other management entities. This information will be used to implement effective management measures that prevent overfishing for finetooth shark stocks, while minimizing dead discards and mitigating any associated economic and social impacts.

None of the preferred alternatives for reducing Atlantic billfish mortality from directed fishing are anticipated to have adverse ecological impacts. No significant changes in angler behavior are expected given the current high levels of participation in catch-and-release activities by Atlantic billfish fishermen. However, NMFS cannot predict angler behavior. Adverse ecological impacts to other species could occur if: 1) anglers shift their effort to other species, or 2) change their behavior significantly in reaction to the required use of circle hooks in billfish tournaments (on HMS permitted vessels when deploying natural bait or natural/artificial bait combinations) or potential in-season changes to minimum sizes or retention limits that could be enacted should the 250 marlin landing limit be approached or achieved. These shifts or changes could potentially result in increasing discards and retention of those species.

The preferred BFT management measures are not expected to have significant adverse ecological impacts. The General category time-period subquotas would not alter overall levels of mortality, but could likely shift where and when it occurs. Effort may increase in some areas and decrease in others, but overall effort should remain consistent because the amount of harvestable BFT quota is finite, and is not being changed. Interaction rates with protected species and other marine life may shift with localized effort shifts, but these interactions are difficult to quantify due to data limitations. The General category is only allowed to use handgear (rod and reel, handline, and harpoon) to harvest BFT and handgears typically have low interactions rates with protected resources in comparison to other gears, therefore any increases in interaction rates are expected to be minimal. Clarifying the procedures for calculating the Angling category school size-class BFT subquota allocation would result in a slight increase (0.02 percent or 2 mt) in the school BFT baseline quota allocation; however, any increase in effort or changes in fishing practices attributed to this slight quota increase are anticipated to be small. The slight increase in mortality is covered under ICCAT quota recommendations as well as the 20-year rebuilding plan established for BFT. The small orders of change associated with the preferred alternatives, quantified in either numbers of fish or in weight (mt), or time and/or location of harvest, compared to overall U.S. harvest levels, as recommended by ICCAT, equate to ecological impacts that are unlikely to be measurable in terms of variability in the data used to conduct stock assessments. Changes in inseason actions and specifying the season are administrative in nature and should not have any adverse ecological impacts.

Changing to a calendar-based fishing year is administrative in nature and should have no adverse ecological impacts. As described earlier, there is a small potential for negative economic and social impacts to billfish fisheries/tournaments at the end of a calendar year if the ICCAT 250-marlin limit threshold for catch-and-release fishing is reached.

The preferred alternatives for authorized fishing gear are not anticipated to dramatically increase effort, and therefore would likely not result in significant increases in landings or landings rates of HMS or other species with which HMS fishermen interact. The Agency does not expect the use of these gears to increase interactions with protected resources but will monitor the use of these gears, as appropriate.

The preferred alternatives in the regulatory housekeeping section, as a suite of management measures, are projected to have minor positive conservation benefits for HMS, bycatch species, and protected resources with minimal social or economic impacts on HMS fishery participants.

## 5.1 Mitigation Measures

Mitigation measures are measures that avoid, reduce, or minimize the effects of the preferred alternatives. According to the Council for Environmental Quality regulations at 40 CFR § 1508.20, mitigation measures may include the following types of actions: (a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and, (e) compensating for the impact by replacing or providing substitute resources or environments.

No mitigation measures were considered for the preferred alternatives of the time/area closures, northern albacore tuna, finetooth sharks, or authorized gear sections. NMFS would monitor the impacts of the preferred alternatives for these issues and would consider mitigation measures in the future as necessary.

The preferred workshop alternatives are likely to result in some negative economic impacts as a result of participants having to attend workshops, incurring travel costs and lost fishing time. To mitigate this potential impact, the Agency intends to host a number of workshops in regional fishing hubs and to provide a delay in effective date to give participants a chance to attend the workshop most convenient for them. Additionally, the Agency would strive to coordinate these workshops in order to reduce the time required to be away from fishing, work, and family responsibilities. The Agency is also allowing shark dealers to designate proxies for the mandatory HMS identification workshops. In the future, NMFS may consider ways to reduce travel time by expanding workshops to include Internet or video-based training opportunities.

As described in Chapter 4, the adverse socio-economic impacts of the preferred alternatives for Atlantic billfish would likely be minor, with possibly heightened local impacts in some instances. Consistent with public comment, to mitigate potential adverse impacts, NMFS is preferring to delay the effective date of new management measures. The delayed effective dates should allow anglers, tournament operators, tackle dealers, and hook manufacturers to adjust for new regulations prior to implementation. Anglers and charter headboat operators would have the opportunity to become comfortable and proficient in the use of new gears, as well as adjust fishing or business practices to prepare for the possibility of in-season changes to size limits and or retention limits, if triggered under the 250-marlin limit. Tournament operators would have time to adjust tournament rules and formats to accommodate new regulations in ways that could minimize confusion over gear requirements and mitigate potential decreases in participation. Shoreside businesses would also have time to reduce existing stockpiles of J-hooks. Further, allowing continued use of J-hooks outside of tournaments, and within tournaments on artificial lures, minimizes and substantially mitigates any potential minor adverse impacts from tournament circle hook requirements by allowing anglers to continue using existing quantities of J-hooks; tackle dealers to reduce existing inventories and adjust purchasing patterns, if necessary; and, hook manufacturers to adjust production, as appropriate. The preferred circle hook alternative may create short-term decreases in angler consumer surplus resulting from a perceived or real loss of fish as anglers adapt and become proficient with circle hooks. However, available studies on circle hooks show that catch rates on circle hooks are equal to or greater than for with J-hooks for some HMS. Therefore, as anglers become proficient in the use of circle hooks, the alternative may increase angler consumer surplus in the long-term. Further, this alternative should assist in rebuilding Atlantic billfish populations and could result in increased angler consumer surplus through elevated interactions. Also, while anglers will have initial capital expenditures to acquire circle hooks, they are generally somewhat less expense than J-hooks. Thus, the preferred alternative may result in negligible long-term economic benefits. It is also important to note that participation in billfish tournaments is voluntary on the part of HMS anglers. As such, any costs associated with circle hook requirements under the preferred alternative would be incurred by choice and could be avoided by choosing not to fish in billfish tournaments. The alternative implementing the ICCAT landing limit was specifically crafted to minimize disruption and adverse impacts in the billfish fishery by allowing the Agency to slow landings (via an in-season minimum size increase) and thereby potentially preventing a more disruptive closure of the directed marlin fishery.

No specific mitigating measures were considered for any of the preferred alternatives for BFT management. While shifting the General category time-periods may result in less quota during some months, the regulations do not constrain fishermen to fishing in any one particular month. Provided they have the capability and the fishery remains open, fishermen may travel to where the fish are available regardless of the time of the year.

Changing to a calendar-based fishing year would require a transition period. Currently, NMFS prefers allowing for a seven-month transition where vessels participating in the tuna and swordfish fisheries could catch an entire year's worth of quota in seven months. The actual impacts of such a transition would be analyzed in a future rulemaking.

As described earlier in this document, many of the changes contained in the Regulatory Housekeeping section would have no effect either individually or cumulatively upon the human environment, and are consistent with the intent of previously analyzed and approved management actions. Therefore, alternatives have not been developed or analyzed for these measures. For the 11 more substantive measures, alternatives have been developed and analyzed. However, several of these would not implement new regulatory requirements. The preferred alternatives would either clarify or reinforce existing regulations, or facilitate modernized reporting procedures. For six issues, the preferred alternatives are expected to produce minor ecological benefits with few social or economic costs, and no mitigating measures are necessary. Similarly, the impacts associated with the preferred alternatives for the five, more substantive, issues in the Regulatory Housekeeping section are expected to be minor.

The preferred alternative to differentiate between pelagic and bottom longline gear in HMS closed areas, I1(c), would retain the existing definitions for these gears, but limit the amount of pelagic species that bottom longline vessels may possess or land when fishing in pelagic longline closed areas, and limit the amount of demersal species that pelagic longline vessels may possess or land when fishing in bottom longline closed areas. A five-percent threshold for the species composition of catch was chosen because it is consistent with the vast majority of commercial fishing operations, which have, on average, remained below the threshold. However, logbook data indicates that the threshold would have been exceeded on a fishery-wide basis in 2004. It is, therefore, possible that implementing a five-percent threshold to account for unavoidable bycatch in HMS closed areas could potentially lead to regulatory discards. NMFS is aware of this possibility and will continue to monitor the PLL and BLL fisheries to determine if the 2004 exceedance was anomalous, or part of a continuing trend. A preferred alternative in the Draft HMS FMP to restrict the number of floats is no longer preferred, based on public comment concerning difficulties with defining floats and concerns with enforceability of the measure. The list of demersal "indicator" species was modified from the proposed rule due to public comment by removing silky sharks and three species of hammerhead sharks, because these species could potentially be caught on both pelagic and bottom longlines. Also, three species of tilefish are added to the list of demersal "indicator" species, because these species are indicative of bottom longline fishing activity, and based on public comment. If necessary, both the five-percent threshold and the list of “indicator” species could be further revised in the future to mitigate any adverse impacts, based upon a review of historic and current landings, and the effectiveness of the regulation. NMFS intends to continue to assess the need for, and potential effectiveness of, gear-based criteria to differentiate between PLL and BLL gear. If needed, such criteria could be developed in consultation with the fishing industry to further improve the monitoring of, and compliance with, HMS closed areas. NMFS anticipates that HMS longline vessels will continue to be prudent, especially when fishing in the HMS closed areas by catching predominantly pelagic species in BLL closed areas, and demersal species in PLL closed areas.

The preferred alternative, I2(b), that would require the second dorsal and anal fins to remain on all sharks through landing, is expected to produce ecological benefits and, in the long-term, aid in rebuilding large coastal sharks. Any adverse ecological impacts associated this alternative, in comparison to the alternative that would require all fins to remain on all sharks through landing, should be mitigated by other requirements in the final rule that would require shark dealers to attend species identification workshops. These workshops, in combination with the preferred alternative, should help to improve the accuracy of dealer reports as well as quota monitoring and stock assessments. Fishermen could experience, in the short-term, some adverse economic costs associated with the preferred alternative. While initial adjustments may have to be made to the offloading and processing procedures, in the long-term, improved quota monitoring and stock assessment data as a result of this alternative could result in an increased quota and, therefore, mitigate any short-term economic costs for both fishermen and dealers.

Prohibiting the sale and purchase of HMS in excess of retention limits (Issue 3 in the regulatory housekeeping section) should reinforce existing possession limits and prohibitions, thus further discouraging this illegal activity. Extending the East Florida Coast closed area to the EEZ (Issue 4 in the regulatory housekeeping section) is not expected to reduce fishing effort, as vessels would likely relocate to nearby areas with similar catch rates, but would better comply with the original intent of the closure.

Preferred alternative I5(b), which would require that all handlines remain attached to, or in contact with, all vessels is expected to produce minor positive ecological benefits by preventing future uncontrolled expansion of this gear sector. Positive ecological benefits could also be realized by a reduction in the amount of gear that could get lost at sea. However, because this alternative could restrict or limit fishing effort, it could potentially produce social and economic costs, including an unquantifiable reduction in catches of target species for vessels that participate in this fishery. This could reduce opportunities for the United States to fully utilize its ICCAT swordfish quota, which has had consistent underharvests in recent years. Authorizing buoy gear in the swordfish handgear fishery under alternative H5 should mitigate this impact.

A prohibition on the possession of billfish on HMS–permitted commercial vessels (Issue 6 in the regulatory housekeeping section) provides clarity and consistency with other HMS regulations, but is not expected to impose any economic costs as the sale of billfish is already prohibited.

The alternatives to facilitate reporting and improve administration would provide clarity and eliminate ambiguities in current regulations and practices (Issues 7, 8, and 9 in the regulatory housekeeping section). In the case of regulatory housekeeping Issue 7, NMFS would facilitate the electronic submittal of BFT dealer reports, while still maintaining current methodologies. Requiring the submission of negative reports (Issue 8 in the regulatory housekeeping section) would eliminate ambiguities by implementing a standard practice in most regions and a requirement that is already approved under the current PRA submission. Based upon public comment to provide additional flexibility for absentee vessel owners, NMFS has modified the preferred alternative in Issue 9 to allow vessel owners or their designee to report non-tournament recreational landings of swordfish and billfish.

Under preferred alternative I10(c), NMFS would conduct additional discussions during the annual ICCAT meeting regarding the long-term implications of allowing unused BFT quota from the previous year to be added to the subsequent year's allocation. This alternative is not expected to produce adverse ecological impacts. Depending upon the results of the ICCAT discussions, the regulations and operational procedures that account for BFT bycatch related to pelagic longline fisheries in the vicinity of the management area boundary may need to be further amended in the future. In the interim, NMFS would maintain the current regulatory text implementing the ICCAT recommendation, but would amend the practice of allowing under/overharvest of this set-aside allocation to be rolled into, or deducted from, the subsequent fishing year's set-aside allocation. Not allowing set-aside quota to be carried forward to the subsequent fishing year will maintain PLL fishing effort at current levels and still allow for incidentally caught BFT in the NED to be accounted for. However, this alternative may have some negative economic impacts, as it will not allow for the potential economic gain attributed to quota being carried forward from the preceding fishing year. This alternative is preferred because it meets the objective of clarifying the applicability of carry-over provisions to this incidental set-aside quota, still provides 25 mt (ww) to account for incidental BFT catch in the NED, prevents the 'stockpiling' of incidental quota which may provide an incentive to target BFT in the NED, and supports the discussion of long-term implications of BFT quota roll-overs. The outcome of these discussions will directly affect, and possibly mitigate, the implementation of this specific ICCAT recommendation.

Preferred alternative I11(b) would implement a permit condition requiring recreational vessels with a Federal permit to abide by Federal regulations, regardless of where they are fishing, unless a state has more restrictive regulations. This alternative is expected to achieve increased consistency between state and Federal regulations for Federally permitted HMS recreational fishermen, result in less confusion on behalf of fishermen, and improve enforcement and compliance. Compared with the no action alternative, the preferred alternative is expected to produce greater ecological benefits with few resulting social and economic s costs. This could mean, however, that different regulations will apply to Federally permitted fisherman fishing in state waters next to a state-only permitted fisherman. While it may appear to be unfair to the Federally permitted fisherman if the Federal regulations for that species are more restrictive than the state regulations for that species, Federally permitted fishermen also have the opportunity to fish for HMS outside of state waters. If Federally permitted fishermen decide that the opportunity is not worth the additional restrictions, they could decide not to obtain a Federal permit in order to mitigate any adverse impacts.

## 5.2 Unavoidable Adverse Impacts

In general, there are no unavoidable adverse impacts as a result of the preferred alternatives for the finetooth shark, northern albacore, BFT management, and fishing year issues. NMFS would continue to monitor the impact of the preferred alternatives of all issues and would propose additional management measures, as necessary, to avoid any unanticipated adverse impacts.

The preferred alternatives identified for workshops are necessary to meet the requirements of the October 2003 and June 2004 BiOps, thereby minimizing the impacts on protected resources, consistent with the Magnuson-Stevens Act, ESA, and MMPA. The preferred workshop alternatives are expected to have positive conservation benefits for sharks and protected resources with minimal social and economic impacts on longline and gillnet vessel owners and operators, as well as Federal shark dealer permit holders. The resulting economic or social costs of attending the workshops are unavoidable.

The preferred alternatives for time/area closures would not, at this time, implement any additional closures to reduce bycatch, including bycatch of Atlantic billfish, BFT, or sea turtles, except for establishing complementary measures for the Madison-Swanson and Steamboat Lumps Marine Reserves. Existing closures would remain unchanged. Part of the reason that NMFS is not adding new closures (other than the Madison-Swanson and Steamboat Lumps Marine Reserves) or modifying existing closures is because none of the alternatives considered would reduce bycatch of all of the species considered and many of the closures would result in only minimal impacts on one or more of those species while also having large social and economic impacts. In addition, all of the analyses on bycatch were based on J-hook data. NMFS currently has only analyzed six months of data with circle hooks (required in the pelagic longline fishery since July 2004). NMFS is also unsure of the current fishing effort as a result of Hurricanes Katrina and Rita in Fall 2005. NMFS expects that 2005 logbook data will be fully quality controlled and available for use in late Spring/Summer 2006. Once these data are available, NMFS should be better able to analyze circle hook data and the impacts of the hurricanes on the fleet. NMFS would continue to monitor bycatch and fishing effort and would consider these and other closures to reduce bycatch, to the extent practicable, as necessary.

As previously discussed, the preferred alternatives for billfish are not anticipated to have adverse ecological impacts on target species, non-target species, or protected resources, but some may have minor socio-economic impacts, which could be heightened at a local level in some instances. Furthermore, while the preferred alternatives are not anticipated to have adverse ecological impacts, NMFS cannot predict angler behavior. If implementation of the preferred alternatives results in substantial changes in angler effort or behavior, then there could be minor adverse ecological impacts for species with which billfish anglers interact by possibly increasing discards and/or retention of those species. In considering the alternatives, NMFS preferred alternatives that would minimize the adverse impacts while maximizing the positive impacts. Thus, any resulting economic or social impacts are unavoidable.

Under the preferred alternatives for authorized fishing gear, the potential exists for increased landings of BAYS tunas and swordfish. Alternatives H2 and H7, respectively, authorize the use of spearguns to target BAYS tunas recreationally and buoy gear to target swordfish commercially.  Any potential increase in landings would likely be minor.  In the case of swordfish, U.S. fishermen are not fully harvesting the current ICCAT recommended quota.

As described above, in aggregate, the preferred alternatives in the regulatory housekeeping section are expected to have minor positive conservation benefits for HMS, bycatch species, and protected resources with minimal social or economic impacts on HMS fishery participants.  This is because the preferred alternatives were specifically selected to mitigate any potential adverse impacts, yet still accomplish the objectives of this rulemaking.  Any resulting economic or social impacts, beyond those described above, are unavoidable.

## 5.3 Irreversible and Irretrievable Commitment of Resources

The preferred alternatives identified for all the issues in this final HMS FMP are not expected to result in any irreversible and irretrievable commitment of resources.

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# 6.0 ECONOMIC EVALUATION

This section assesses the economic impacts of the alternatives presented in this document. Additional economic and social considerations and information are discussed in Chapters 3, 4, 7, 8, and 9 of this document.

## 6.1 Number of Fishing and Dealer Permit Holders

In order to examine the baseline universe of entities potentially affected by the preferred alternatives, NMFS analyzed the number of permits that were issued as of February 2006 in conjunction with HMS fishing activities. This analysis of the permits issued is detailed further in Section 3.9 and summarized here.

### 6.1.1 HMS Commercial Fishing Permits

The program implemented in the 1999 Tunas, Swordfish, and Shark FMP set up six different limited access permit types: 1) directed swordfish, 2) incidental swordfish, 3) swordfish handgear, 4) directed shark, 5) incidental shark, and 6) tuna longline. These permits were designed so that the swordfish directed and incidental permits are valid only if the permit holder also holds both a tuna longline and a shark permit. Similarly, the tuna longline permit is valid only if the permit holder also holds both a limited access swordfish (directed or incidental, not handgear) and a shark permit. Swordfish handgear and shark permits are valid without another limited access permit. As of February 2006, there were 1,131 total HMS commercial fishing permits (191 directed swordfish, 86 incidental swordfish, 88 handgear, 240 directed shark, 312 incidental shark, and 214 tuna longline). However, there are only a total of 604 permit holders, since permit holders may have more than one type of permit. A detailed break down of the shark, swordfish, and tuna longline limited access permits by category and state is provided in Table 3.92. In addition to the 214 tuna longline permits, there are also 40 harpoon, seven trap, 4,824 general, and five purse seine Atlantic tuna permit holders as of February 2006. The HMS CHB permits, which are commercial permits for Atlantic tunas, are discussed below in the recreational permit section.

### 6.1.2 Dealer Permits

Dealer permits are required for any person that receives, purchases, trades for, or barters Atlantic tuna, swordfish, and sharks, from a fishing vessel of the United States or, in the case of tunas and swordfish, imports or exports regardless of ocean of origin. There were 285 Atlantic swordfish, 336 Atlantic shark, and 416 Atlantic tunas dealer permit holders as of February 2006. The geographic distribution of these dealer permit holders is detailed in Table 3.95.

### 6.1.3 HMS Recreational Permits

There are two types of permits issued with activities associated with HMS recreational fishing activity. The HMS Angling category permit is required for any angler that is fishing for Atlantic HMS; fish caught using this permit cannot be sold. As of February 2006, there were 25,238 HMS Angling category permit holders. The HMS CHB permit allows for the sale of Atlantic tunas and allows CHB vessels to catch and land sharks, swordfish, and billfish pursuant to the recreational regulations (*i.e.*, no sale of fish). The CHB permit holder may also holds a swordfish handgear and/or shark limited access permit that allows for the sale of those species under the regulations for those permits. As of February 2006, there were 4,173 HMS CHB permit holders.

Since 1999, Federal regulations have required that each HMS tournament operator register their tournaments with the NMFS at least four weeks prior to the commencement of tournament fishing activities. In 2005, 256 HMS tournaments registered where as in 2004 just 215 tournaments registered. Tournament operations are variable from year to year. Section 3.9 provides more detailed information on HMS tournaments including a detailed geographic breakdown of registered HMS tournaments.

## 6.2 Gross Revenues of Fishermen

Table 6.1 summarizes the 2004 average annual revenues of the Atlantic HMS fisheries based on average ex-vessel prices and the weight reported landed as per the United States National Report (NMFS, 2005), information given to ICCAT (Cortes, 2005), and price and weight information reported to the NMFS Northeast Regional Office by Atlantic bluefin tuna dealers. Section 3.5 provides further detail regarding annual revenues, including historical numbers. The overall gross revenues generated from the HMS fishery totaled $43.9 million in 2004. The largest portion came from swordfish, generating $15.4 million in gross revenues (35 percent).

The highest average ex-vessel price per lb dw across all regions in the Atlantic HMS fishery was $7.86 for bluefin tuna. In addition, average ex-vessel price for shark fins, all grades combined, was approximately $16.25 per lb in 2004.

**Table 6.1 Estimates of the total ex-vessel annual revenues of Atlantic HMS fisheries.** Sources: NMFS 2005a; Cortes, 2005; and bluefin tuna dealer reports from the Northeast Regional Office.

| **Species** | **2004** | | |
|---|---|---|---|
| | **Ex-Vessel Price ($/lb dw)** | **Weight (lb dw)** | **Revenue** |
| Bigeye tuna | $4.10 | 551,503 | $2,258,404 |
| Bluefin tuna | $7.86 | 885,720 | $6,961,760 |
| Yellowfin tuna | $2.48 | 4,832,483 | $11,972,477 |
| Other tunas* | $0.74 | 287,127 | $211,756 |
| Swordfish** | $3.57 | 4,317,369 | $15,391,422 |
| Large coastal sharks | $0.86 | 3,206,377 | $2,757,484 |
| Pelagic sharks | $1.12 | 450,833 | $504,933 |
| Small coastal sharks | $0.50 | 677,305 | $338,653 |
| Shark fins (weight = 5% of all sharks landed) | $16.25 | 216,726 | $3,521,793 |
| **Total HMS** | | **15,425,443** | **$43,918,682** |

Note: Average ex-vessel prices may have some weighting errors, except for bluefin tuna which is based on a fleet-wide average.
* Other tunas include skipjack and albacore.
** Swordfish weight estimates do not include dead discards.

## 6.3 Variable Costs and Net Revenues

In 2003, NMFS initiated mandatory cost-earnings reporting for selected vessels to improve the economic data available for all HMS fisheries. In the past, most of the studies regarding pelagic longline variable costs and net revenues available to NMFS analyzed dated data from 1996 and 1997. An analysis of the 2004 cost-earnings data is incorporated below. Where noted, NMFS has converted 1996 and 1997 dollars to 2004 dollars using the consumer price index provided by the Bureau of Labor Statistics.

Larkin *et al.* (2000) examined 1996 logbooks and the 1996 voluntary economic forms and found that net returns to a vessel owner varied substantially depending on the vessel size and the fishing behavior (*i.e.,* sets per trip, fishing location, season, target species). They found that out of 3,255 pelagic longline trips reported in 1996, 642 pelagic longline trips provided the voluntary economic information. Larkin *et al.* (2000) suggest using median values (half of the fleet is less than this value and half is above) instead of mean values (the average of all vessels) given the high degree of skewness to the data. For example, the mean owner's share of a trip is $4,412, while the median is $2,242. Larkin *et al.* (2000) suggest that the median values identify the characteristics of the majority of the fleet better than the mean, which can be influenced by outliers (a few vessels that may not be similar to the rest of the fleet). The mean supply costs per trip for the vessels sampled was $5,959 and median was $3,666. This changed depending on area fished, with the median ranging from $1,928 in the area between North Carolina and the east coast of Florida (FEC to MAB) and $10,100 in the Caribbean. Vessels in the NED area (Maine to Virginia region in Larkin *et al.* (2000)) had a median supply cost per trip of $2,831 or $3,408 in 2004 dollars. For the entire fleet, Larkin *et al.* (2000) found that the average net revenues per vessel per trip was $7,354 ($8,854 in 2004 dollars). Vessels fishing in the Caribbean and Maine to Virginia areas had the largest average net returns to the vessel owner per trip at $12,188 and $6,672, respectively ($14,674 and $8,033, respectively, in 2004 dollars). Generally, Larkin *et al.* (2000) found that vessels between 46 and 64 feet in length that had between 10 and 21 sets per trip, fished in the second quarter, fished in the Caribbean, or had more than 75 percent of their gross revenues from swordfish had the highest net return to the owner (ranging from $3,187 to $13,097 per trip) while vessels less than 45 feet in length that had between one and three sets per trip, fished in the first quarter, fished between North Carolina and Miami, Florida, or had between 25 and 50 percent of their gross revenues from swordfish had the lowest net return to the owner (ranging from $642 to $1,885 per trip).

Porter *et al.* (2001) conducted a survey of 147 vessels along the Atlantic and Gulf of Mexico (110 surveys were completed) in 1998 regarding 1997 operations. Survey information was combined with trip tickets and logbook data. They found that on average, vessels received approximately $250,000 annual gross revenues, annual variable costs were approximately $190,000, and annual fixed costs were approximately $50,000. Thus, vessels were left with approximately $8,000 to cover depreciation on the vessel and the vessel owner lost approximately $3,500 per year. On a per trip level, gross revenues averaged $22,000 and trip expenses, including labor, were $16,000. Labor cost the owner the most (43 percent), followed by gear. Generally, trip returns were divided so the vessel owner received 43 percent and the captain and crew 57 percent. Porter *et al.* (2001) noted that 1997 was probably a financially poor year due to a reduction in swordfish quota and a subsequent closure of the fishery (this fishery has not been closed since). Similar to Larkin *et al.* (2000), Porter *et al.* (2001) noted differences between region, vessel size, and target species. While all vessels had an average net return per trip of $5,556 ($6,539 in 2004 dollars), vessels that fished in the New England or Caribbean regions had much higher net returns per trip at $20,772 and $18,940, respectively ($24,448 and $22,291, respectively in 2004 dollars).

In general, both Larkin *et al*. (2000) and Porter *et al*. (2001) found that the average net return to a vessel is fairly low after all variable costs including labor were accounted for. This was true even of vessels fishing in the northeast region or Caribbean (*i.e.*, regions with relatively high gross revenues). This corresponds with the results of Ward and Hanson (1999) who found that fifty percent of the fleet earns $10,000 or less annually and that, each year, 20 percent of the fleet actually has a loss. Additionally, as suggested by Larkin *et al*. (2000) in their discussion of mean versus median values, Ward and Hanson (1999) found there were a number of vessels that earned much higher net revenues than the average vessel with 19 percent of the fleet earning $50,000 or more annually and seven percent earning more than $100,000 annually.

An analysis of the 2004 HMS logbook cost-earnings data provides updated information regarding the costs and revenue of a cross section of vessels operating in the HMS fisheries. The data contains a total of 579 trips taken by 51 different vessels. For reasons mentioned above, median values are reported. Median gross revenues per trip for 2004 were approximately $12,112. Median total costs per trip were $4,345 (compared to $3,320 in the Larkin *et al*. (2000) study), with fuel costs making up $567 (13 percent) of those costs. Median net revenue in this sample was $6,728 per trip (compared to $8,624 in the Larkin *et al*. (2000) study). The typical trip was nine days long and involved six sets. The median number of crew was three and the average share paid to crew was 11 percent of net revenue ($740 per trip). The captain share of net revenue was 20 percent ($1,346) and the owner share was reported to be 50 percent ($3,364). The 2004 cost earnings information is similar to the findings of the 1996 study, but gross revenues appear to be lower than the Porter *et al.* (2001) study of 1997 operations.

## 6.4 Expected Economic Impacts of the Alternatives

### 6.4.1 Bycatch Reduction

#### *6.4.1.1 Workshops*

NMFS considered six alternatives (A1-A6) for workshops focusing on protected species release, disentanglement, and identification workshops for pelagic longline, bottom longline, and gillnet fishermen. In addition, ten alternatives (A7-A16) were considered for HMS species identification workshops.

The economic impacts of the various workshop alternatives primarily focuses on the opportunity costs associated with fishermen attending workshops. Opportunity cost is the cost of passing up the next best choice when making a decision. In this document, NMFS assumes that for fishermen who may have to attend workshops, the next best choice of using their time in terms of a business activity would likely be fishing or fishing related activities (*e.g.*, ensuring vessel and equipment are in working order, completing logbook requirements, preparation for the next fishing trip, etc.). Other opportunities exist (*e.g.*, attending family events or other jobs); however, NMFS feels this assumption is reasonable given that fishing is often the most valuable activity engaged in by most fishermen. In order to estimate the value of their opportunity cost, NMFS assumed that fishermen would lose a day of fishing rather than a day of fishing related activities, and conducted an analysis of HMS logbook cost-earnings data to estimate daily earnings per day at sea for individual HMS fishery participants.

These estimates of opportunity cost per day at sea, along with additional estimates that follow, are likely to be high since they do not take into consideration the time the owners, operators (*i.e.*, captains), and crew spend on fishing related activities, such as preparing for a trip at the dock and the time it takes to offload and other activities that occur at the dock, that require labor time. Therefore, the estimates provided are likely to overestimate opportunity costs since crew share per day is estimated here by dividing a fisherman's share per trip by the number of days at sea, and not by the total number of days worked to earn their share since the Agency lacks this information. For example, if crew members earn $740 per trip and each trip is 9 days long at sea, the result would be an average of $82 per day in earnings. However, it is likely the crew actually worked for three days before the trip and one day after the trip preparing and offloading so their actual earnings per day worked would only be $62 per day.

Also, note that owners incur costs outside of costs directly associated with a trip, such as capital costs, that reduce their earnings/profit. The revenue share to owner per day at sea might not accurately reflect an owner's true opportunity cost and is likely to be overestimated. For example, insurance costs and capital equipment costs are not reflected in the estimated revenue share for owners, but if they were true earnings would be lower. This is even more evident when owners own multiple vessels. In addition, an owner's participation in a workshop may not disrupt their vessel's ability to go out fishing depending on the owner's roll in vessel operations.

Alternative A1 considers continuing voluntary workshops for longline fishermen. This alternative may result in some negative short-term economic impacts related to workshop travel costs and lost fishing time that may be incurred by fishery participants who choose to attend. Poor attendance at voluntary workshops due to competing demands for fishermen's time, however, may result in insufficient improvements in post-release mortality of threatened and endangered species. This may result in the fishery not achieving the post release mortality targets required under the June 2004 BiOp for the pelagic longline fishery, and thus, may result in future closures that would result in extensive long-term negative economic impacts to the pelagic longline fisheries.

Alternative A2, the preferred alternative, considers mandatory workshops and certification for all HMS pelagic and bottom longline *vessel owners*. This alternative will likely result in some short-term negative economic impacts, as a result of the cost of traveling to workshops and the opportunity cost of earnings foregone for the lost fishing and business time that may be incurred by participants that would be required to attend these mandatory workshops. It is estimated that 549 vessel owners permitted to fish for HMS with longline gear would participate in these workshops. Based on 2004 HMS logbook data, it is estimated that an owner's share of their vessel's revenue for bottom and pelagic longline vessel owners is approximately $281 and $448 per day, respectively. The total opportunity cost for this alternative is thus estimated to be between $154,269 and $258,048 in the first year for all vessel owners combined. After the first year, the subsequent costs will depend on how any people enter the fishery. In addition, travel costs would be incurred that would be specific for each workshop location and distance traveled.

Alternative A3, a preferred alternative, considers mandatory workshops and certification for *vessel operators* actively participating in the HMS pelagic and bottom longline fisheries. This alternative would have similar economic impacts to alternative A2, except this alternative would impact operators, not vessel owners. It is estimated that 1,098 operators, assuming two operators per vessel, would participate in workshops under this alternative. Based on 2004 HMS logbook data, it is estimated that an operator's share for bottom and pelagic longline vessel operators is $345 and $149 per day at sea, respectively. The total opportunity cost for this alternative is thus estimated to be between $163,602 and $378,810 in the first year for all vessel operators combined. In addition, travel costs would be incurred.

Alternative A4 considers mandatory workshops and certification for all HMS longline vessel owners, operators, and crew. NMFS estimates that this alternative would result in 3,843 participants attending the workshops. Of this amount, 2,196 participants are estimated to be crewmembers. Based on 2004 HMS logbook data, it is estimated that a crewmember's share for bottom and pelagic longline vessel crewmembers is $90 and $109 per day at sea, respectively. Combining the total crewmember opportunity cost with the total owner and operator opportunity costs discussed above for alternatives A2 and A3, the total opportunity cost for this alternative is estimated to be between $515,511 and $876,222 in the first year. In addition, travel costs would be incurred that would be specific for each workshop location and distance traveled.

Alternative A5, a preferred alternative, considers mandatory workshops and certification for shark gillnet vessel owners and operators in the safe handling and release of protected resources, including sea turtles, smalltooth sawfish, and marine mammals. Individual opportunity costs are not available for gillnet vessel owners and operators due to confidentiality concerns, however the median opportunity cost for vessel owners and operators of all gear types combined, including gillnets, to participate in a one-day workshop would be $578 ($424 owner's share plus $154 captain's share). The costs incurred by the vessel owners and operators would be related to travel and the opportunity costs of time to attend the workshop.

Alternative A6 prefers a renewal timeline for workshop certifications. NMFS considered three different recertification timelines: every two years, three years, and five years. Recertification every two years would likely have the greatest economic impacts on participants and five years would result in the least negative economic impacts to the fishing community, because it would result in the most infrequent recertification schedule. Using the range opportunity costs estimated for preferred alternatives A2 and A3, the estimated net present value (using the Office of Management and Budget's recommend seven percent discount rate) of the opportunity costs associated with recertification ten years after initial certification would be between $1.4 and $2.1 million for recertification every two years, $1.0 and $1.5 million for recertification every three years, and $0.6 and $0.9 million for recertification every five years. A recertification frequency of three years appears to be an appropriate compromise of ecological and economic impacts. This period would allow for sufficient retraining to maintain proficiency and update fishermen on new research and development related to the subject matter while not placing an excessive economic burden on the participants due to lost fishing time and travel resulting from attending a recertification workshop in person. The extent of the impacts would depend on the mechanism for recertification. In addition, the Agency is also considering alternative media for recertification in order to reduce costs. If an owner or operator is unable to attend a scheduled workshop, NMFS will consider granting one-on-one training at the expense of the permit holder. These one-on-one training sessions would accommodate the replacement of a captain whose employment was terminated on short notice or a change in ownership of a vessel, but, again, these sessions would be at the expense of the permit holder.

In addition to the workshops focusing on protected species release, disentanglement, and identification workshops for pelagic longline, bottom longline, and gillnet fishermen, NMFS considered several alternatives for HMS identification workshops. The No Action alternative (A7) is not anticipated to result in any change, either positive or negative, in economic impacts, primarily because current activities related to the dissemination of information to assist in identifying HMS would remain the same.

Voluntary workshops (A8) are not anticipated to result in any substantial economic changes, either positive or negative, primarily because attendance would be voluntary and at the discretion of the participants. Any associated travel costs may be considered a minimal economic impact, as it is not likely that participants would go to substantial expense and trouble for this type of voluntary training. In the long-term, misidentification could result in unquantifiable economic costs if sharks do not rebuild as a result of stock assessment data not being accurate.

Under alternatives A9 through A15, social and economic impacts on each individual would be similar in nature since each of the alternatives involve one day workshops that result in opportunity costs and travel costs. The main difference between alternatives is that the number of attendees and the associated overall total costs, taking all individuals into consideration, vary by alternative. Under alternative A9, the preferred alternative, mandatory workshops and certification for federally permitted shark dealers, it is estimated that there would be over 336 workshop participants. Under alternative A10, mandatory workshops for all shark, swordfish, and tuna dealers, it is estimated that there would be over 1,037 participants. Information regarding HMS dealer earnings is not available therefore the expected opportunity costs of alternatives A9 and A10 are unquantified at this time. Nevertheless, given the number of dealers involved, NMFS would expect alternative A9 to have less of an economic impact than alternative A10.

Under alternative A11, mandatory workshops and certification would include all commercial longline vessel owners, which currently total 549. Alternative A11 would result in opportunity costs equivalent to alternative A2 of between $154,269 and $245,952 for the first year. Under alternative A12, mandatory identification workshops would include all commercial longline vessel operators, which would include approximately 1,098 participants. Alternative A12 would result in opportunity costs equivalent to alternative A3 of between $154,269 and $378,810 for the first year. Under alternative A13, mandatory workshops and training certification for all commercial vessel owners (longline, CHB, General category, and handgear/harpoon), which includes approximately 9,636 participants. Under alternative A14, mandatory workshops and certification would be required for all commercial vessel operators (approximately 10,374). Under alternative A15, mandatory workshops and certifications would be required for all HMS angling permit holders, total approximately 25,238. Thus, alternative A15 would have the greatest economic impact of the alternatives considered for species identification workshops.

On an individual basis, the only costs anticipated to be incurred by fishermen or dealers would be those related to travel and time to attend the workshops. The opportunity cost to all commercial vessel owners is estimated to be $424 per day in net revenue for all gear types based on HMS logbook cost earnings data for 2004. The opportunity cost to all commercial operators is estimated to be $154 per day for all gear types and $97 per day for crewmembers. Using these estimates of opportunity cost, alternative A13 would result in a total of approximate $4,085,664 in opportunity costs in the first year. The total opportunity cost for alternative A14 is estimated to be $1,597,596 in the first year. Daily opportunity cost estimates for dealers, anglers, and CHB owners and operators are not currently known. The administrative costs to NMFS for the workshops is high, but may be exceeded by the benefits associated with the possible impacts from increased education, as well as, the benefit of avoiding future management actions if BiOp takes are exceeded.

Under alternative A16, social and economic impacts would vary depending on the frequency of recertification workshop attendance required – every two, three, or five years. Furthermore, economic impacts would be dependent on the type of recertification selected by the agency. Hands-on, in-person recertification workshops would result in additional travel costs and lost fishing time. However, the Agency may consider alternative media for recertification, including: DVDs, printed materials, and/or web-based recertification. Negative economic impacts would be greater for shorter recertification frequencies due to more frequent travel costs and potential down time from fishing, although NMFS intends to schedule recertification workshops so as to minimize these factors, to the extent possible. In an effort to reduce economic impacts to shark dealers, the schedule for HMS Identification Workshops would be available in advance to allow dealers to select workshops close to them and most convenient to their schedule. If a dealer and/or proxy is unable to attend a scheduled workshop, NMFS will consider granting one-on-one training at the expense of the dealer. These one-on-one training sessions would accommodate the replacement of a proxy whose employment was terminated on short notice, but, again, these sessions would be at the expense of the permit holder. If dealer employee turnover is high and the renewals are scheduled every five-years, a dealer may pay for a greater number of one-on-one training sessions than with a three-year timetable.

#### *6.4.1.2 Time/Area Closures*

Alternative B1, the no action alternative to maintain existing closures has, and would likely continue to have, negative economic impacts on the pelagic longline industry. Existing closures may have contributed to the reported 15 percent decline in fishing effort, a 10 percent decline in the number of directed and incidental permits, and a decline from 199 to 130 active pelagic longline permits from 2000 to 2004. Chapter 4 details the economic impacts and analyzes conducted to estimate the impacts of the various time/area closure alternatives.

Alternative B2(a) would potentially impact a total of 61 vessels and potentially result in an 11 percent decline in fishing effort, and reductions in landings of target species ranging from a minimum of one percent for bigeye tuna to a maximum of 14.3 percent for yellowfin tuna. The combined total loss in gross revenues for alternative B2(a) without redistribution of effort would be approximately $2,299,018 annually. With redistribution of effort, alternative B2(a) is predicted to result in an increase in all targeted species landings and gross revenues except yellowfin tuna, which are predicted to decrease by one percent for a loss of approximately $138,204 annually. The combined total gain in gross revenues for alternative B2(a) with redistribution of effort would be approximately $1,242,832 annually. If, on the other hand, effort is displaced into open areas of the Gulf of Mexico only, gross revenues are predicted to decrease by $5,003,298 (6.8 percent of total 2003 HMS fisheries revenues), or $108,767 per vessel annually with no redistribution of effort. With redistribution of effort into the open areas of Gulf, there would be a predicted increase in gross revenues of $679,212. The predicted economic impacts to gross revenues for the fleet could range from a loss of approximately $5.0 million to a gain of approximately $1.2 million (6.8 to 1.6 percent of total 2003 HMS fisheries revenues).

Alternative B2(b) would potentially impact a total of 20 vessels. The combined total loss in gross revenues for the alternative B2(b) closure without redistribution of effort would be approximately $299,120 annually. Specifically, swordfish landings would potentially decrease by $231,252 annually. However, with redistribution of effort, the combined total loss in gross revenues for alternative B2(b) would be approximately $72,675 annually.

Alternative B2(c) would potentially impact a total of 75 vessels. The combined total loss in gross revenues for the alternative B2(c) closure without redistribution of effort would be approximately $3,136,229 annually. Specifically, yellowfin tuna gross revenues, the most lucrative species affected by alternative B2(c) and also the most lucrative HMS species, could decrease by $2,483,678 annually. However, with redistribution of effort, the combined gain in gross revenues for alternative B2(c) would be approximately $1,651,023.

Alternative B2(d) would potentially impact a total 78 vessels. The combined total loss in gross revenues for the alternative B2(d) closure without redistribution of effort would be approximately $10,683,133 annually. Yellowfin tuna gross revenues would be the most impacted, with estimated loss of $8,035,791 annually. However, with redistribution of effort, it is predicted that an overall increase in gross revenues of approximately $6,014,934 annually primarily due to potential increases in swordfish and bigeye tuna landings as effort redistributes.

Alternative B2(e), a 46,956 $nm^2$ closure in the Northeast, would potentially impact a total of 49 vessels. The combined total loss in gross revenues for alternative B2(e) without redistribution of effort would be approximately $3,234,660 annually. However, with redistribution of effort, gross revenue losses are predicted to total only $820,132 annually (1.1 percent of total 2003 HMS fisheries revenues).

Combining closures of B2(d) and B2(e) year-round would potentially impact a total of 127 vessels that fished in that area and without redistribution of effort would result in decrease in landings valued at $12.9 million annually based on 2003 prices or $13.25 million based on 2004 prices. With redistribution of effort revenues could potentially increase by $7,802,425.

Modifications to two closed areas, alternatives B3(a) and B3(b), would potentially result in positive economic impacts. Re-opening areas of either closure would allow fishermen access to previously closed fishing grounds, resulting in increased landings of targeted species. However, this may create gear conflicts between recreational and commercial fishermen. Conversely, the modified area of B3(a) would be along the axis of the Gulf Stream, which would afford recreational fishermen closed portions inshore and allow pelagic longline vessels to fish in re-opened areas offshore.

Alternative B3(a), the Charleston Bump modification, would result in approximately a total increase in landings worth $234,460 annually with approximately $220,806 annually for swordfish alone. Alternative B3(b), the NEC modification, would potentially increase gross revenues by approximately $550 annually.

Alternative B4, the preferred alternative to implement complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserve, could potentially impact commercial and recreational HMS fishery participants. However, the impact is likely to be low considering that between 1997 and 2003 only one pelagic longline set and two bottom longline sets were reported in the HMS logbook in these areas. Because the preferred closure areas are relatively small, any HMS fishing activity that otherwise would have occurred in these areas would likely relocate to nearby open areas with similar catch rates. The impact of this alternative on HMS recreational and charter/headboat fishing is unknown. However, because this alternative includes the seasonal surface trolling allowance during prime fishing season, it is not expected to substantially impact the HMS recreational and charter/headboat sector.

Alternative B5, which establishes criteria for regulatory framework adjustments for implementing new or making modifications to existing time/area closures, would have no direct economic impacts. However, the ultimate implementation of new, or modification of existing closures could have variable economic impacts depending on whether time/area closures are modified, removed or added. Future modifications to time/area closures will be analyzed for their social and economic effects on fishermen, recreational anglers, businesses, and communities.

Alternative B6, the closure off the southwest tip of Key West to bottom longline gear to protect smalltooth sawfish, would be expected to have minimal negative economic impacts. It is estimated that this alternative could affect 1.3 percent of commercial bottom longline sets based on the number of sets in this area between 1994 and 2003. This alternative would help reduce the number of interactions with smalltooth sawfish, and thereby help the bottom longline industry stay below their Incidental Take Statement (ITS) for smalltooth sawfish. Staying below the ITS will have positive economic and social impacts by keeping the entire bottom longline fishery open and operating, allowing economic activity to continue for the bottom longline fishermen and associated shore side businesses.

Alternative B7, prohibiting longlining in all areas, would potentially impact a total of 177 active vessels reporting landings in the Pelagic Longline Logbook. This alternative would have significant economic impacts on the longline vessel owners, operators and crew that would need to re-rig their vessels to continue fishing for HMS, find alternative fisheries, or discontinue fishing. It would also negatively impact dealers that purchase fish from pelagic longliner vessels and also other onshore business that support the industry. The closure of the pelagic longline fishery would result in, at a minimum, a loss of $25.8 million in gross revenues (35 percent of total 2003 HMS fisheries revenues). This estimate does not include the potential loss in revenues from sharks, tunas, and other finfish landings. This alternative would also likely have adverse impacts on shoreside support businesses and dealers.

### 6.4.2 Rebuilding and Preventing Overfishing

#### *6.4.2.1 Northern Albacore*

None of the alternatives considered to address northern albacore would result in impacts different from alternative C1, no action, as the United States is currently fishing below its ICCAT allocation for northern albacore. The impact of alternative C2, unilateral action for the U.S. fleet to reduce landings, would be a reduction in income, but this reduction would be small on the U.S. fishery since the level of landings for albacore is two orders of magnitude smaller than swordfish and shark landings. For the recreational fishery, alternative C2 would result in target species shifts to other opportunistic target species as well as catch-and-release of albacore. Economic impacts would be difficult to evaluate for the recreational fishery since there is such a high variation in the catch from year to year. Alternative C3, which would establish the foundation for developing an international rebuilding program, itself has no economic impact. As ICCAT has not yet adopted a rebuilding program for northern albacore tuna, an analysis of the social and economic impacts from any international rebuilding program resulting from alternative C3 cannot be conducted at this time. If the ICCAT Rebuilding Program involves a substantial reduction in allowable catch, there would likely be a short-term reduction in economic benefits to the longline fishery until the stock recovers. Since recreational fishermen target northern albacore tuna at certain times of the year and in certain areas, it is difficult to estimate the effect that a reduction in allowable landings of northern albacore would have on angler consumer surplus. It might be reduced, but to an unknown extent, since many recreational trips targeting northern albacore tuna often target other tuna species.

#### *6.4.2.2 Finetooth Sharks*

Alternative D1, the no action alternative, would not likely result in any adverse economic or social impacts since this alternative would not substantially modify or alter commercial or recreational fishing practices for finetooth or other species of shark. In the long-term, if finetooth sharks become overfished, there could be larger economic impacts.

Alternative D2, commercial management measures, considers the use of trip limits, modifying gillnet size, specifying maximum soak times, prohibiting the use of gillnet for targeting sharks, and reducing the quota for small coastal sharks (SCS). These commercial management measures may impose negative economic impacts on a limited number of gillnet vessels that land sharks and potentially other operations.

Implementing a trip limit for finetooth sharks would increase the amount of travel to and from port resulting in lost fishing time and increased expenditures for fuel. The trip limit may also impact directed shark permit holders targeting other finfish species if they end up catching enough finetooth sharks during a trip to reach the limit, and thus reducing the number of sets that could be conducted per trip. However, the impact to directed shark permit holders targeting other finfish is likely to be to a lesser degree since it is assumed that finetooth sharks would comprise a smaller proportion of their landings. In addition, some fishermen targeting finfish species might discard some of the finetooth sharks that they catch to avoid having trips shortened as a result of reaching a trip limit.

Modifying gillnet mesh size requirements may impact a small number of gillnet vessels that direct on sharks, causing them to potentially replace existing gear in order to comply with any new requirements. Specifying maximum soak times for gillnet vessels targeting sharks may impose a negative economic effect as vessels would have to work longer hours and make more sets in order to maintain their current catch levels.

Alternatively, reducing the quota for SCS may have a negative impact depending on the amount of the reduction. The SCS quota reduction would have to be more than 25 percent to cause economic impacts on the shark gillnet fishery given historical landings.

Closing the directed the directed shark gillnet fishery would result in negative economic impacts for at least five vessels actively participating in the shark gillnet fishery, but minimal economic impacts on the shark fishery as a whole. Closing the shark gillnet fishery would likely cause economic dislocation of at least five individuals or small entities and possibly up to 15 vessels having reported landing finetooth sharks in Federal logbooks recently. These vessels would still be able to harvest sharks but only with other authorized gear types. The costs of refitting vessels to fish with other authorized gears could be substantial.

Alternative D3, considers management measures to reduce recreational fishing mortality of finetooth sharks including requiring circle hooks and increasing the existing size limit for finetooth sharks. The potential impacts that could result from requiring circle hooks are unknown. Requiring circle hooks when targeting SCS may result in negative impacts to the shark recreational anglers and related industries as a result of adjusting to this new gear, but those costs are not likely to be significant especially given the potentially lower cost of circle hooks (see discussion below regarding billfish and circle hooks). Increasing the existing size limit for finetooth may result in some negative economic impacts. However, the economic impact may be variable depending on the willingness of anglers to release finetooth sharks caught and/or substitute harvested fish with other similar species. In addition, finetooth sharks only comprise less than two percent of the overall SCS recreational harvest, so the economic impact to the recreational fishery is likely to be low. Tournaments would still be able to offer prize categories for finetooth sharks provided they are above the minimum size.

The preferred alternative (D4), identifying sources of finetooth shark fishing mortality to target appropriate management actions, would have minor economic impacts (*e.g.*, food costs for observer on board and potential safety compliance costs). The expansion of the shark gillnet observer program in 2005 to vessels targeting species other than sharks covered an additional 30 trips from eight vessels. The number of vessels fishing with gillnet gear for species other than shark, possessing a shark permit, and not currently subject to observer coverage is estimated at approximately ten vessels. These vessels would have to attain the proper safety certification decals from the United States Coast Guard and ensure that there are adequate accommodations on board for observers prior to taking an observer. Other efforts to expand data that is currently collected on shrimp trawl vessels would not result in any economic impacts as the percentage of observer coverage would not be expanded, only the selected species of bycatch that are sampled. In the long-term, gaining knowledge as a result this preferred alternative could minimize economic impacts while sustaining the population.

#### *6.4.2.3 Atlantic Billfish*

Eight alternatives are being considered for the management of the directed Atlantic billfish fishery. Alternative E1, the No Action alternative, would likely have no positive or negative short-term economic impacts. In the long-term, the No Action alternative could result in large adverse economic impacts if billfish are put on the endangered species list or if billfish populations do not recover and continue to decline.

Alternative E2, requiring the recreational fishery to use only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations, would likely have limited adverse social and economic impacts. There are an estimated 7,915 billfish anglers in the U.S. Atlantic and 1,627 billfish anglers in Puerto Rico (Ditton and Stoll, 2003). The universe of vessels that could be impacted by circle hook requirements are the 25,238 Angling, 4,173 CHB, and 4,824 valid General category permits. A comparison of current J-hooks and circle hook prices indicates that anglers would, on average, pay 46 cents less for circle hooks compared to J-hooks if a shift in demand for circle hooks does not significantly affect prices. The delay in implementation of this alternative is anticipated to allow hook manufacturers, retailers, and anglers adequate time to utilize current inventories of J-hooks, thereby minimizing adverse economic impacts associated with alternative E2. This alternative may result in a temporary decrease in angler consumer surplus given anticipated or real loss of fish as fishermen adjust to and become more proficient with the use of circle hooks, but some studies of circle hook effectiveness indicate that there could be increased catches, and therefore angler consumer surplus associated with circle hooks. While unlikely, it is possible that there could be a decrease in tournament participation and demand for CHB trips, as well as trips taken by individuals based on real or perceived declines in catch. Overall, alternative E2 may provide long-term positive benefits with regard to increased angler consumer surplus and willingness to pay if circle hooks contribute to rebuilding efforts and result in increased encounter rates.

Alternative E3, a preferred alternative limiting all Atlantic billfish tournament HMS permitted vessel participants to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations, is similar in economic impact to alternative E2, but reduced given the smaller universe of effected individuals. NMFS is not able to quantify the exact number of anglers or vessels participating in tournaments that may be impacted. However, it is known that in 2003 and 2004, there were 244 and 215 registered HMS tournaments, respectively, and that the average number of vessels participating in a tournament was 47 for the period 1999-2004. It is possible, but unlikely, that this alternative will result in decreased tournament participation. The impacts to hook manufacturers, retailers, and anglers would likely be limited given that J-hooks would continue to be permitted outside of tournaments, and in tournaments with artificial lures. Angler recreational consumer surplus impacts would be similar to that of alternative E2, but would impact a smaller universe.

Alternatives E4(a) and E4(b) would increase the minimum size for blue and white marlins. It is uncertain if these measures would or would not affect angler participation rates. High current catch-and-release rates, tournaments that establish minimum sizes greater than the current limit, and past surveys indicate that minimum sizes have not affected billfish fishing activity. As reported in Table 4.3, very high percentage of blue marlin, white marlin, and sailfish were released in tournaments. Thus, NMFS expects that any resultant negative economic impacts of these alternatives would be minor.

Alternative E5, recreational bag limit of one Atlantic billfish per vessel per trip, would likely have minor impacts. Given that the recreational billfish fishery has low CPUE rates and the chances of landing more than white or blue marlin on a single trip is low, it is reasonable to assume that anglers would maintain current levels of participation based on the opportunity of catching and possibly landing one trophy-sized fish. It is possible that there will be an unquantified decrease in demand for CHB trips if not all individual anglers on a given trip would have the opportunity to land a billfish. Furthermore, tournament participation would not be expected to decrease in a substantial manner as tournament rules often prohibit participants from entering more than one marlin per day.

Alternative E6, which would implement the ICCAT recommendation for a recreational marlin landings limits, is anticipated to result in minimal to moderate adverse economic impacts depending on catch rates, angler response, and which of the available management actions become necessary. Historical data suggest that it is unlikely that the United States will achieve the 250 marlin landing limit.

Three scenarios were analyzed regarding whether certain thresholds for in-season management action are achieved to estimate the potential impacts of this alternative. If the threshold for inseason management action is not achieved, then alternative E6 would not be expected to result in impacts to the recreational marlin fishery. If the threshold for an inseason minimum size increase is achieved, NMFS believes it is unlikely that there would be a substantial decrease in demand for charter/headboat trips, trips by individual anglers, or participation in billfish tournaments given the catch-and-release ethic of billfish anglers. On the other hand, if the threshold for implementing catch-and-release only fishing is achieved, there could be some economic impacts. In a worst case scenario, marlin anglers may reduce their demand for charter fishing trips by between 0.4 and 24.2 percent of the available trips remaining during a given season, and the average cost of a CHB trip was $1,053 in 2004. Private vessel owners who fish for marlin may also reduce participation by between 0.4 and 24.2 percent; however, the economic impact for this is unquantifiable at this time.

In addition, NMFS estimates that between 0.8 and 10.1 percent of tournaments may cease to operate in a worse case scenario during a catch-and-release only time period based on RBS data on billfish tournament release rates. If the threshold were reached in May under a fishing year schedule, 16 tournaments, between 6.5 and 7.5 percent of registered tournaments, could be impacted and between zero and four tournaments (less than two percent of registered tournaments) may cease to operate. However, even these low numbers may be an overestimate given the recent evidence that anglers may be willing to pay more for catch-and-release tournaments. A reduction in one to four tournaments could result in an estimated adverse direct economic impact of $1,375,439 to $5,501,756 and result in some small decrease in consumer surplus for anglers participating in those tournaments. Impacts on shoreside businesses would likely be minor, but could be increased or decreased depending on angler response and when in the season a shift to catch-and-release only fishing might occur. Alternative E6 could have smaller long-term adverse economic impacts than alternative E1, if landing rates increase in the future, since E6 allows NMFS more flexibility on when and if action should be taken to remain consistent with international standards.

Alternative E7, which would allow only catch-and-release fishing for Atlantic white marlin for a five-year period, could potentially lead to negative economic impacts, although the magnitude is difficult to assess. The short-term social impacts of not being able to land trophy or record category fish is difficult to assess, however NMFS anticipates that this alternative could lead to a decrease in angler willingness-to-pay and angler consumer surplus. The long-term impacts of alternative E7 may result in an increase in net benefits as stocks rebuild and recreational encounters with white marlin become more frequent. The Agency estimates that alternative E7 could result in between $49,491 and $1,320,462 in lost revenues to CHB vessels annually. The loss of revenues of this magnitude would likely result in minor to moderate negative social and economic impacts to the CHB sector; however, considering the catch-and-release ethic of billfish anglers (31 white marlin reported landed in 2004), NMFS anticipates that negative impacts under this alternative would be less severe than those calculated above. Under alternative E7, negative social and economic impacts could occur if General category vessels that normally participate in HMS tournaments cease participating in tournaments. Any negative impacts would likely be reduced if these vessels already practice catch-and-release fishing for white marlin and participate in catch-and-release tournaments. In 2004, there were 129 registered tournaments that awarded points or prizes for white marlin (see Chapter 3). Assuming that one to four tournaments cease operations, the Agency estimates that alternative E7 could result in negative economic impacts ranging from $1,375,439 to $5,501,756. However, considering the catch-and-release ethic of billfish anglers, NMFS anticipates that negative impacts under this alternative would be of a lesser magnitude than those calculated above. The delayed effective date is anticipated to allow tournament operators sufficient time to alter tournament rules to provide for a catch-and-release format and allow anglers to adjust to new requirements. Angler willingness-to-pay and consumer surplus would likely remain high, given the currently high release rate of white marlin, which is reinforced by the low number of verified landings that occurred in recent years. However, it is possible that angler consumer surplus may decrease given the inability to land white marlin. Further, under alternative E7, anglers would still have the ability to land other billfish, including trophy-sized sailfish and blue marlin.

Alternative E8, which would allow only catch and release fishing for Atlantic blue marlin, is similar to E7 and could potentially lead to negative economic impacts, although the magnitude is difficult to assess. Alternative E8 is likely to have a greater economic impact than the white marlin catch and release only alternative since more blue marlin are landed than white marlin and since there are more blue marlin tournaments than white marlin tournaments. Angling category fishermen may reduce the number of trips targeting blue martin under this alternative. Estimating that between 461 and 2,862 trips may be canceled given the inability to retain blue marlin, this alternative could result in between $485,433 and $3,013,686 in lost revenues to CHB vessels annually. The loss of revenues of this magnitude would likely result in moderate negative social and economic impacts to the CHB sector. However, considering the catch-and-release ethic of billfish anglers, NMFS anticipates that negative impacts under this alternative would be of a lesser magnitude than those calculated above. Negative economic impacts could occur if General category vessels that normally participate in HMS tournaments cease operations. In 2004, there were 142 registered tournaments that awarded points or prizes for blue marlin captures (see Chapter 3). NMFS estimates that 10 to 14 tournaments could cease operations, and therefore alternative E8 could result in negative economic impacts ranging from $13,754,390 to $19,256,146. The loss of revenues of this magnitude would likely result in sizable local economic impacts for tournaments, tournament participants, and associated businesses. Angler consumer surplus would likely remain high, given the currently high release rate of blue marlin, which is reinforced by the low number of verified landings that occurred in recent year. However, it is possible that angler willingness-to-pay, and thus angler consumer surplus, may decrease given the inability to land blue marlin. Further, under alternative E8 anglers would still have the ability to land other billfish, including trophy-sized sailfish and white marlin. To mitigate negative socio-economic impacts, alternative E8 would delay implementation of catch-and-release-only fishing requirements to allow the fishery time to adjust to new measures.

### 6.4.3 Management Program Structure

#### *6.4.3.1 Bluefin Tuna Quota Management*

Alternative F1, the no action alternative, may have both positive and adverse economic impacts. The positive impacts are associated with the General category time-periods and associated subquota allocation percentages remaining consistent with those of prior years, as well as maintaining the General category New York set-aside allocation for those participants operating in that designated area. The adverse impacts associated with this alternative result from the Agency's inability to adapt BFT management measures to account for variations inherent to the fishery from one year to the next. This alternative would also have some adverse economic impacts on fishermen, dealers, and the support industries located in the south Atlantic region, due to the fact that BFT quota tends to be harvested prior to BFT arriving later in the season (Nov. - Jan.) off the southern Atlantic cost and current allocations do not provide for a formal winter fishery.

Alternative F2, the establishment of General category time-periods, subquotas, and geographic set-asides annually via regulatory framework adjustments, would provide NMFS with more flexibility to establish management measures more expeditiously. However, constituents would not be provided long-term certainty in the General category quota allocation scheme around which they could devise a business plan. There may also be positive social and economic impacts attributed to increases experienced in a domestic quota category, time-period subquotas, or geographic set-aside quota in a given year; however, the likelihood of experienced negative social or economic impacts due to a decrease in any of these areas is equally the same.

Alternative F3, the preferred alternative, would blend aspects of alternatives F1 and F2 together to optimize the positive economic impacts associated with this alternative by enhancing NMFS' flexibility to adapt to the fisheries inherent variability by authorizing adjustments to the General category time-periods, associated subquotas, and geographic set-asides via a regulatory framework adjustment. This alternative would have positive economic impacts on the General category as a whole by providing reasonable fishing opportunities to General category BFT fishery participants throughout the range or the time of year that BFT are readily available to them.

There are four subalternatives associated with alternative F3. F3(a) would distribute the coastwide General category quota equally among the eight months that currently make up the General category BFT season (June-January), by allocating in 12.5 percent shares to each month. This subalternative would have both positive and negative social and economic impacts as it would provide some stability to the constituency by establishing a known amount of quota that would be available at the first of each month. However, if catch rates tend to be high, these quotas could be harvested rapidly and could lead to derby style fisheries on the first of each month, which is contrary to NMFS' intent. While this subalternative would formalize the recent General category winter BFT fishery, it would do little to recognize historical General category BFT allocations. Therefore, this subalternative would result in positive social and economic impacts for those General category participants located in the south Atlantic region attributed to a 40 percent increase in available quota, compared to the no action alternative, during the time frame of October through January. This increase in quota would equate to approximately four million dollars in additional gross revenue for the later part of the General category season. However, those General category participants in the New England area or those participants which pursue BFT in the summer months may experience some adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately 22.5 percent and the September time-period allocation would be reduced by approximately 17.5 percent. These reductions in allocation would result in decreased gross revenues of approximately $2.5 and $2 million , respectively. This subalternative would also reduce the need for specific geographic set-asides because quota allocation would be made on a monthly basis and would be evenly distributed. This subalternative would assist in distributing the General category BFT catch, temporally and geographically, which is beneficial for the collection of CPUE data and could assist in avoiding large scale landings in a constrained time frame, thus reducing market gluts.

Subalternative F3(b) would implement General category time-periods, and associated subquota allocation percentages similar to those contained in the 1999 FMP, but would separate the October through January time-period into three distinct time-periods of October through November, December, and January, and establish a formal General category winter BFT fishery on which fishermen, dealers, and supporting industries could depend and plan. The General category time-period subquota allocation percentages would be adjusted slightly to incorporate the allocations in the winter months, but would still recognize the historical General category allocations during the summer and fall months.

This subalternative would have positive social and economic impacts to those General category participants located in the south Atlantic region attributed to a 9.5 percent increase in available quota, compared to the no action alternative, during the time from of October through January. This increase in quota would equate to approximately $1.1 million in additional gross revenue for the later part of the General category season. However, those General category participants in the New England area or to those participants which pursue BFT in the summer months may experience some adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately 6 percent and the September time-period allocation would be reduced by approximately 3.5 percent. These reductions in allocation would result in a decrease of early season gross revenues of approximately $0.7 and $0.4 million, respectively. These negative impacts may be mitigated by individuals traveling to where the BFT are located at any time of the season. However, NMFS has little specific information at this time regarding the costs that would be incurred due to this travel.

Subalternative F3(c), the preferred alternative, would implement the same time-periods as mentioned in Subalternative F3(b), but would implement slightly different subquota allocation percentages for the June through August and October through November time-periods. This subalternative was designed to redistribute the quota from the early time-periods to provide a winter General category BFT fishery to during the months of December and January. This subalternative would reduce the allocation to the June through August time-period to a higher degree, than subalternative F3(b) and increase the suballocation to the October through November time period, thus shifting more of the potentially adverse social and economic impacts to the earliest portion of the season.

This subalternative would enhance equity among regional General category participants, given that access to fish available at different times of the year in different locations is likely to occur. Because this alternative would allocate General category quota based on a balance between historical General category BFT allocations, recent BFT landing trends, and the NCDMF Petition for Rulemaking, there would be no significant social or economic impacts to the fishery as a whole. However, this subalternative would have similar positive and adverse social and economic impacts as outlined in Subalternative F3(b). The adverse social and economic impacts would be slightly shifted to the earliest portion of the fishery, where the General category subquota allocations have traditionally been the highest. This subalternative would have positive social and economic impacts to those General category participants fishing in the later portion of the season due to a 13.5 percent increase in available quota, compared to the no action alternative, during the time from of October through January. This increase in quota would equate to approximately 1.5 million dollars in additional gross revenue for the later part of the General category season. However, those General category participants who pursue BFT in the summer months may experience some adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately 10 percent and the September time-period allocation would be reduced by approximately 3.5 percent. These reductions in allocation would result in a decrease of gross revenues of approximately $1.2 and $0.3 million, respectively for each of these time periods.

Reallocating more quota from the June through August time-period to the later time-periods would slightly mitigate some of these adverse social and economic impacts because the amount of quota being reallocated would equate to a smaller percentage of the June through August subquota relative to the other time-period subquotas. This subalternative is preferred due to the balance it strikes between providing all General category BFT fishery participants an equitable opportunity to harvest a portion of the coastwide General category quota, while still recognizing the historical participation in this fishery. Any adverse social or economic impacts associated with this alternative would be minimized and may even be mitigated as fishermen are allowed to travel to the geographical location of where the BFT are located at any give time. However, NMFS has little specific information at this time regarding the costs that would be incurred due to this travel.

Subalternative F3(d) would implement the same time-periods as described in Subalternatives F3(b) and F3(c), but would allocate the General category time-period subquota in accordance with the NCDMF's Petition for Rulemaking (*i.e.*, 150 mt total for the months of December and January or approximately 21.7 percent of the coastwide General category quota). This alternative would have a greater positive social and economic impact to General category participants in the south Atlantic region, region due to a 24.7 percent increase in available quota, compared to the no action alternative, during the time from of October through January. This increase in quota would equate to approximately $2.6 million in additional gross revenue for the later part of the General category season. However, those General category participants in the New England area or to those participants which pursue BFT in the summer months may experience greater adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately 21.3 percent and the September time-period allocation would be reduced by approximately 3.4 percent. These reductions in allocation would result in decrease gross revenues of approximately $2.5 and $0.3 million, respectively. These negative impacts may be mitigated by individuals traveling to where the BFT are located at any time of the season. However, NMFS has little specific information at this time regarding the costs that would be incurred due to this travel.

Alternative F4 would clarify the procedures NMFS uses in calculating the ICCAT recommendations regarding the eight percent tolerance for BFT under 115 cm. This alternative would have slightly more positive economic impacts as it would slightly increase the school size-class BFT quota by approximately two mt ( 0.02 percent) of the status quota allocation.

Alternative F5 would maintain the status quo process currently used in allocating the ICCAT-recommended U.S. BFT TAC domestically, the accounting for annual under/overharvest, and establishing General category effort controls. This alternative is not expected to have any substantial economic impacts.

Alternative F6 would have slightly more positive economic impacts, in comparison to F5, as each baseline domestic quota category allocation, quantified in metric tons, would be codified in the regulatory text implementing the consolidated HMS FMP. This alternative would have positive economic impacts to the domestic BFT fishery as a whole by allowing BFT fishery participants, either commercial or recreational in nature, to make better informed decisions on how to best establish a business plan for the upcoming season.

Alternative F7, which would not allow carry forward of unharvested quota from one fishing year to the next, would likely have the most adverse economic impact of all the annual BFT management measure alternatives. This alternative could lead to derby style fishing where vessels may operate in less than optimal conditions to harvest the quota before the season is closed. This alternative could also result in a domestic quota category not receiving a quota transfer from another domestic quota category with large amounts of underharvest to assist in covering an overharvest situation, which could result in that category having quota deducted from the following year. This could result in reduced fishing opportunities, income, and angler consumer surplus for the commercial and/or recreational fleet, as well as the businesses that support those BFT fisheries.

Alternative F8, which would limit the amount of unharvested BFT quota in each category that could be carried forward, would have both slightly positive and negative economic impacts on the BFT participants. This would limit the maximum amount of revenue each domestic quota category could generate to no more than double the value of the baseline allocation. These potential negative economic impacts would be mitigated, overall, by reallocation of tonnage that exceeds the cap to the Reserve or to another domestic quota category.

Alternative F9 maintains inseason action procedures. When catch rates are low, a liberalized retention limit of two or three BFT may have positive economic impacts on a vessel that is able to harvest multiple fish especially if ex-vessel prices are high during a low catch rate period. However, if catch rates were to increase dramatically over a short period while retention limits were set at the upper end of the allowable range, large numbers of BFT could be landed in a short time period, thus flooding the market and depressing ex-vessel prices.

Alternative F10 would have slightly more positive economic impacts, as the criteria NMFS must consider when making inseason action determinations would be consolidated and consistent, regardless of what type of inseason action is being considered. This consolidation will likely minimize confusion regarding how NMFS came to a decision, and thereby provide additional transparency to the management process.

Alternative F11, which would eliminate BFT inseason actions, would constrain NMFS' ability to adjust management actions that help spread the maximum utilization of BFT quota over the longest period of time to provide reasonable fishing opportunities. The positive economic aspect of this alternative would be that quota allocations and daily retention limits would remain stable throughout the entire season, which would aid in planning fishing activities.

#### 6.4.3.2 Timeframe for Annual Management of HMS Fisheries

Three alternatives were considered for changing the annual management timeframes for HMS fisheries. Alternative G1, maintaining the current fishing year for all HMS species, would not result in any anticipated disruptions to any of the HMS markets.

Alternative G2, which would manage all HMS species on a calendar year cycle, would not have any economic impacts on the shark fishery, since this is the status quo for that fishery. For the bluefin tuna fisheries, the economic impacts of alternative G2 are expected to be minimal given the current measures used to distribute quota throughout the year. The economic impacts to the Atlantic billfish fisheries could vary slightly depending upon whether thresholds for taking restrictive action are achieved and the management measures subsequently implemented. Minor to moderate impacts as a result of the ICCAT billfish landings limit (E6) could be shifted to the tail end of the calendar year, beginning in late summer, under this alternative. This temporal shift in impacts would result in some geographic shift to include New England and Mid-Atlantic regions. If the threshold for implementing catch-and-release-only fishing is achieved to comply with the ICCAT limit, it is estimated that an average of 39 tournaments awarding prizes for marlin occurring from August to December could be impacted, and up to four tournament cancellations could occur resulting in an annual economic impact of $5,501,756.

Alternative G3, which would establish a June 1 – May 31 fishing year management cycle for all HMS species, could result in some short-term negative economic impacts as shark wholesale and retail markets adjust to the potential disruption in catch rates resulting from the shift to a fishing year and new trimesters.

#### 6.4.3.3 Authorized Gears

Seven alternatives have been considered to address issues with authorized gear. Alternative H1, the No Action alternative, would not be expected to have any additional economic impacts because fishermen are already operating under these measures.

Alternative H2, which would authorize speargun fishing gear as a permissible gear-type in the recreational Atlantic BAYS tuna fishery, could have positive economic impacts for spearfishermen. Not allowing BFT to be taken with speargun fishing gear avoids the possibility of further exacerbating quota limited situations in the school size fishery and might avoid gear conflicts with other members of the BFT recreational fleet. It could also increase sales of speargun fishing gear. The charter/headboat sector may also experience positive economic impacts as spearfishermen may increase their use of for-hire vessels.

Alternative H3, which would authorize speargun fishing in both the commercial BAYS tuna handgear and recreational fisheries, would have similar economic impacts to alternative H2 except that there would be potential economic benefits for CHB and General category fishermen from the sale of commercially speared tunas. However, it is not anticipated that many commercial tuna fishermen would utilize this gear type.

Alternative H4 would authorize green-stick gear for the commercial harvest of Atlantic BAYS tunas. This alternative would likely have positive economic impacts for those fishermen who wish to employ green-stick gear to target Atlantic BAYS tunas commercially. The vessels that would be authorized to use green-stick gear under this alternative would include all permitted Atlantic Tunas Longline, General, and HMS CHB (on non for-hire trips) category vessels, approximately 214, 4,824, and 4,173 vessels, respectively. The higher landing rates and higher quality of meat landed using green-stick gear could provide positive economic impacts to commercial fishermen, as well as benefit fish houses, gear supply houses, and other associated business. The economic benefits of this alternative, however, would likely be small since some vessels are already utilizing this gear type. There could be negative economic impacts from the prohibition on the possession or retention of BFT when possessing commercial configurations of green-stick since this practice may already be occurring. Any increases in green-stock gear sales could produce positive economic benefits to onshore gear suppliers and other onshore businesses.

Alternative H5 would allow the commercial swordfish handgear fishery to continue utilizing unattached handlines, redefined as “buoy gear,” and would likely continue affording positive economic benefits to current fishery participants. If any vessels are currently fishing with buoy gear utilizes more than 35 flotation devices, this alternative could limit effort, and there could be some unquantified adverse economic impacts. This alternative would also require that fishermen using this gear type affix gear monitoring equipment to each buoy to aid in recovery. NMFS anticipates that most swordfish handgear fishermen using unattached handlines likely already possess and utilize some or all of this gear monitoring equipment. If not, minimum compliance costs for the least expensive equipment (*e.g.*, reflective tape and spotlight) could be incurred. Given the change in definition of handlines in alternative I5(b) requiring them to be attached to a vessel, alternative H5 represents a positive economic opportunity for commercial swordfish handgear and directed swordfish limited access permit holders. However, this alternative could result in perceived negative social impacts by recreational fishermen by continuing to allow commercial swordfishing in areas closed to HMS pelagic longline gear.

Alternative H6 is similar to H5, except under alternative H6, each buoy would be allowed to have no more than 15 hooks or gangions attached. This alternative could provide additional positive economic impacts stemming from the ability to increase the number of hooks attached to each buoy gear. Additionally, this alternative would allow vessels in the swordfish handgear fishery to possess and deploy up to 50 flotation devices.

Alternative H7, which would clarify the allowance of hand-held cockpit gears used at boat side for subduing HMS, would likely have positive economic impacts by reducing confusion over the allowance of these gears and increased retention rates for those fishermen who target large HMS and wish to use these secondary gears. The use of these hand-held cockpit gears can be dangerous and lead to costs if injuries occur, but they would help subdue fish and are already being used.

#### *6.4.3.4 Regulatory Housekeeping*

Eleven regulatory housekeeping issues were addressed with several alternatives for each issue. NMFS considered five different alternatives for the first issue, clarifying the definitions of pelagic and bottom longlines. Alternative I1(a), the No Action alternative, would likely produce the fewest additional adverse economic impacts on fishing vessels, though it could result in compliance issues and longer periods of interruption during compliance inspections at sea.

Alternative I1(b), would establish additional restrictions on longline gear in HMS time/area closures by requiring that BLL vessels in closed areas possess no more than 70 commercial fishing floats, and that PLL vessels in BLL closed areas possess at least 71 commercial fishing floats, would not be expected to produce adverse economic impacts.  This alternative would potentially impact less than 5 percent of all PLL sets and less than 10 percent of all BLL sets.  BLL fishermen would not need to buy more floats to comply with this alternative.  However, PLL fishermen who regularly use short lines may need to buy more floats to ensure that they have more than 71 floats.  This alternative would also likely improve inspections at sea.

Alternative I1(c), the preferred alternative, would differentiate between PLL and BLL gear based upon the species composition of the catch onboard or landed.  A five percent incidental allowance of "indicator" species is higher than the average across five years, and therefore this alternative would not be expected to produce adverse economic impacts.  This alternative, however, could adversely impact those longline vessels that regularly target both demersal and pelagic species on the same trip and that fish in closed areas.  The time required to conduct an enforcement inspection at sea under this alternative could create an adverse economic impact in terms of lost opportunity cost, and possibly reduce net revenues associated with re-icing the fish and reduced quality of the catch, but it could also have a positive economic impact if these inspections are quicker than under the No Action alternative.

Alternative I1(d), which would require time/depth recorders on all HMS longlines, would result in direct economic costs associated with the purchase of these devices.  It is estimated that equipment costs per vessel could be approximately $1,400 to $6,500, and there could be costs associated with a loss of efficiency due to attaching the devices to longlines, and downloading and recording the information.  Some positive economic benefits could be realized if this alternative would minimize the disruption of enforcement inspections.

Alternative I1(e) would implement HMS longline time/area closures for both pelagic and bottom longline HMS permitted vessels.  This alternative is expected to produce the most significant negative economic impacts, primarily on HMS-permitted BLL vessels that would be prohibited from fishing year-round in the DeSoto Canyon and Florida East Coast closed areas, in the Charleston Bump closed area from February 1 through April 30 each year, and in the Northeastern U.S. closed area from June 1 through June 30 each year.

NMFS considered four alternatives for enhancing shark identification.  Alternative I2(a), which retains the current regulations, is not expected to result in economic impacts in the short-term.  In the long-term, data issues resulting from poor shark identification could result in less than optimal fishery management.

Under alternative I2(b), fishermen could experience, in the short-term, some adverse economic impacts associated with keeping the second dorsal and anal fins on the shark.  In the long-term, the improved quota monitoring and stock assessment data as a result of this alternative could result in a larger quota, and therefore larger net revenues for both fishermen and dealers.  Alternative I2(c) is similar, but would allow fishermen to remove all the fins of lemon and nurse sharks while at sea. Since so few lemon and nurse sharks are landed, NMFS believes that any economic benefits gained would be marginal.

Alternative I2(d), which would require all fins to remain on all sharks through landing, would have the largest economic impact of any of the shark identification alternatives. It is unlikely that the ex-vessel price of the fins that were packed in ice with the rest of the shark would be as high as the fins that had begun to dry if they were removed. Additionally, if the shark cannot be packed in ice properly due to maintaining the fin on the shark, the quality of the meat, and therefore its value, could also decrease.

NMFS considered three alternatives for addressing compliance with HMS retention limits. Under alternative I3(a), the No Action alternative, individual vessel owner/operators, and/or dealers may experience some positive economic benefits from the sale or purchase of HMS exceeding the commercial retention limits; however, there would be economic impacts from noncompliance with retention limits. Under I3(b) and I3(c) it would be illegal to purchase or sell any HMS from an individual vessel in excess of the retention limits, and therefore there could be slightly less revenue by vessels exceeding the retention limits. However, there would be slightly positive economic impacts with enhanced compliance with the retention limits, but there may be increased dealer administrative/information costs with insuring that they are not purchasing more than the commercial retention limits from a particular vessel.

NMFS considered two alternatives for defining the Florida East Coast closed area. The No Action alternative I4(a) would not result in any additional economic impacts. Alternative I4(b) would extend the closed area and could potentially reduce HMS catches and associated landings revenues by a small amount. This is not expected to be significant given the limited number of vessels that fished in that area in recent years.

NMFS considered five alternatives for revising the definition of handline. Alternative I5(a), which would retain the current definition, would not add any additional economic impacts. Alternative I5(b), which would amend the definition of “handline” by requiring that they remain attached to all vessels, would potentially impact a large portion of HMS permit holders and result in negative economic impacts by potentially reducing operational efficiency. However, this practice does not appear to be widespread and is likely limited to recreational swordfish activity. Alternative I5(c), which would require handlines remain attached to all vessel when fishing recreationally, could impact recreational fishing activity but there is currently no data indicating how many recreational vessels are fishing this way.

Alternative I6(a) and I6(b) focus on clarifying the recreational nature of the billfish fishery. Neither the No Action alternative (I6(a)) nor the alternative to prohibit the possession of taking of billfish by commercial permit holders (I6(b)) would be expected to have any adverse economic impacts since Atlantic billfish cannot be bought or sold by commercial vessels. There could be some positive economic impacts to the recreational fishing community if alternative I6(b) results in enhanced fishing opportunities for recreational fishermen.

NMFS considered three alternatives for BFT dealer reporting. Alternative I7(a), the No Action alternative, would not change the current economic impacts of reporting, but it could continue to impose time costs associated with the entry of similar data on several different forms for reporting. Alternative I7(b) would allow the option to do one-stop data entry on the Internet, and thus provide flexibility that could reduce economic impacts associated with reporting. Alternative I7(c) would require most dealers to use electronic reporting, which might benefit some, but could also impose additional Internet access costs and training costs in learning the new system.

Alternatives to address no fishing and cost-earnings reporting forms (I8(a-c)) clarify the current practices in submitting these forms and are not likely to increase economic costs associated with these activities. However, the clarification of the timeframes involved for submitting reports may result in fewer permit renewal delays.

Maintaining the current non-tournament recreational landings reporting requirements for North Atlantic swordfish and Atlantic billfish under alternative I9(a) would not result in any significant economic impacts. Alternative I9(b), which would require vessel owners to report non-tournament recreational landing, would not cause any significant adverse economic impacts since 95 percent of past reports were reported by vessel owners. Linking non-reporting to permit sanctions would enhance enforcement and compliance that is expected to improve recreational data collection. In addition, the overall number of calls needed to report landings might be reduced if operators report landings for several anglers' landings.

Under the No Action alternative I10(a), status quo regulatory text would remain unchanged and the applicability of quota carry-over provisions to this set-aside quota would not be clarified. Under this alternative, unharvested quota from the set-aside would be rolled-over to subsequent fishing years, and thus would provide a potential positive economic impact. There may be a perceived negative economic impact among other fishery sectors if they were to close after achieving their allocated quota and were unable to access available quota, via in-season transfers, from the NED set-aside. Alternative I10(b) would amend the regulatory text to clarify that carry-over provisions apply to this specific set-aside and therefore would also allow unharvested quota from the set-aside to be rolled-over to subsequent fishing years, and thus provide a potential positive economic impact. Again, there may be a perceived negative economic impact among other fishery sectors if they are closed after achieving their allocated quota and are unable to access available quota, via in-season transfers, from the NED set-aside. Alternative I10(c) would conduct additional discussions at ICCAT regarding the long-term implications of allowing unused BFT quota from the previous year being added to the subsequent year's allocation. Depending on the results these discussions the regulations and operation procedures may need to be further amended in the future. In the interim, NMFS would maintain the current regulatory text, but would amend the practice of allowing under/overharvest of this set-aside allocation to be rolled into, or deducted from, the subsequent fishing year's set-aside allocation. Therefore, regardless of the amount of the set-aside harvested or unused in a given year, the balance would return to 25 mt (ww) at the start of each fishing year. This alternative would be expected to have some negative economic impacts as it would not allow for the potential economic gain attributed to quota being carried forward from the preceding fishing year.

Alternatives I11(a-b) examine whether or not recreational vessels with Federal permits should be required to abide by Federal regulations regardless of where they are fishing, unless a state has more restrictive regulations. If Federal regulations always apply unless state regulations are more restrictive, as in alternative I11(b), there could be some decreases in recreational satisfaction as a result of potentially increasing regulatory requirements to the Federal standards.

## CHAPTER 6 REFERENCES


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# 7.0 REGULATORY IMPACT REVIEW

The Regulatory Impact Review (RIR) is conducted to comply with Executive Order 12866 (E.O. 12866) and provides analyses of the economic benefits and costs of each alternative to the nation and the fishery as a whole. Certain elements required in an RIR are also required as part of an environmental impact statement (EIS). Thus, this section should be considered only part of the RIR, the rest of the RIR can be found throughout this document.

## 7.1 Description of the Management Objectives

Please see Chapter 1 for a description of the management objectives associated with these management actions.

## 7.2 Description of the Fishery

Please see Chapter 3 for a description of the fisheries that could be affected by these management actions.

## 7.3 Statement of the Problem

Please see Chapter 1 for a description of the problem and need for these management actions.

## 7.4 Description of Each Alternative

Please see Chapter 2 for a summary of each alternative and Chapter 4 for a complete description of each alternative and its expected ecological, social, and economic impacts. Chapters 6 and 8 provide additional information related to the economic impacts of the alternatives.

## 7.5 Economic Analysis of Expected Effects of Each Alternative Relative to the Baseline

In the preceding chapters, NMFS has analyzed the impacts of the alternatives for nine major issues. Table 7.1 indicates the possible net economic benefits and costs of each alternative for the nine major issues. It is likely that the implementation of the preferred alternatives could incur moderate economic costs. However, the benefits of these actions, in particular preventing closures of the fishery due to exceedance of authorized take of protected species and BiOp requirements, improving data for shark stock assessments, rebuilding HMS, maintaining compliance with ICCAT, increasing the flexibility of BFT management, adding more authorized fishing gears, and addressing a wide variety of regulatory issues, will likely outweigh the costs.

Several alternatives were considered for workshops for protected species handling and release and species identification. The preferred alternatives that would require owners and operators of vessels that use longline and gillnet gear to attend workshops and renew their certifications every three years addresses the BiOp recommendations while avoiding excessive costs associated with certifying crew (A4) or shorter renewal cycles. In addition, the preferred alternative for species identification workshops, alternative A9, would target training to shark dealers who are likely to face the greatest challenges in proper species identification since they are inspecting landed carcasses, rather than whole specimens. In combination with alternative I2(b), requiring that the second dorsal fin and anal fin remain on all sharks through landking, there could be significant improvements in proper shark species identification and therefore reporting.

The examination of additional time/area closures revealed that is difficult to target closures to prevent impacts on a particular species without impacting other species that are overfished, experiencing overfishing, threatened or endangered. Redistribution of effort, as a result of a closure alternative targeting a particular species interaction, often resulted in the potential for significant impacts on other species that are overfished, experiencing overfishing, threatened or endangered. The potential redistribution of effort with the analyzed time/area closure alternatives often revealed that the economic impact of time/area closures is very dependent on the extent of effort redistribution. Criteria for regulatory framework adjustments for closures, one of the preferred alternatives for this issue, would have minimal economic impacts and would likely lead to enhanced future fishery management planning. In addition, the implementation of complementary HMS management measures in the Madison-Swanson and Steamboats Lumps Marine Reserves (B4), the other preferred alternative for this issue, would result in minimal economic costs on commercial revenues and recreational activities.

The analysis of the northern albacore tuna alternatives reveals that economic costs could occur by unilateral restrictions on effort, however, the ecological and economic benefits from implementing management measures now are likely to be negligible without coordinated international management of this highly migratory species. Pursuing an international rebuilding plan at ICCAT would likely have the best economic return for the potential costs involved in managing northern albacore.

In a similar vein, the management of finetooth sharks within just the HMS fishery would not produce enough ecological benefits to warrant the potential high costs on a small number of HMS permit holders. The preferred alternative would lead to identification of mortality of finetooth sharks in other fisheries that should reveal lower marginal cost opportunities to reduce finetooth shark mortality and thus maximize net benefits.

Incremental management measures, such as those under alternative E3 which limits all HMS permitted vessels participating in Atlantic HMS tournaments to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations, would achieve many of their ecological benefits with the minimum amount of economic impacts. Requiring HMS permitted tournament participants to adopt circle hooks would likely encourage other recreational billfish fishery participants to also adopt circle hooks and result in a low regulatory cost and high ecological benefit outcome. Alternative E6 also would utilize an incremental approach to achieve compliance with ICCAT catch/landing limits while having the low impact on billfish tournaments and billfish recreational anglers.

The alternatives considered for bluefin tuna management focus on enhancing regulatory flexibility to address a constantly changing and dynamic resource. NMFS expects that maintaining flexibility and consistency should allow businesses to plan and should maximize the net benefits for this fishery. The preferred alternatives would allow for future adjustments to take place via regulatory framework actions (F3), formalize a winter fishery for BFT (F3(c)), clarify procedures for calculating school size-class BFT subquota allocations, streamline the annual BFT specification and associated seasonal management measures process (F6), and establish a quota carryover process that would allow for the reallocation of tonnage that exceeds the cap to the Reserve or to another domestic quota category that could result in economic benefits by increasing total allowable catch for those quota categories (F8).

Several regulatory issues have been addressed. The potential shift from a "fishing year" to a calendar year to manage the HMS fishery would impact several of the regulatory alternatives being considered. The largest impact of this potential shift would likely be on billfish fishery participants, however, the benefits of a consistent and easily understood management timeframe would likely have net benefits to the businesses associated with the fishery in the long term. Impacts would only occur if thresholds for implementation of in-season management action are achieved. Otherwise, no impacts would likely occur.

Authorizing recreational Atlantic BAYS spearfishing would also likely enhance the HMS recreational fishery by introducing a new dedicated user group into the Atlantic BAYS recreational fishing community. The benefits of this alternative to the recreational speargun fishing community and CHB sector would likely exceed any associated costs. In general, providing the flexibility to use various technologies allows opportunities to find greater efficiencies. This would likely also be the case with the buoy gear and hand-held cockpit gear alternatives. The buoy gear preferred alternative (H5) and the allowance of hand-held cockpit gears (H7) will continue to afford positive economic benefits to current fishing participants.

Other regulatory issues being considered address a variety of definitional issues and clarifications that are not likely to have much of an overall impact on net benefits and costs. The details of those regulatory adjustments are included in the table below.

## 7.6 Conclusion

Under E.O. 12866, a regulation is a "significant regulatory action" if it is likely to: (1) have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; and (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the legal mandates, the President's priorities, or the principles set forth in the Executive Order. The preferred alternatives described in this document do not meet the above criteria. Therefore, under E.O. 12866, the preferred alternatives described in this document have been determined to be not significant for the purposes of E.O. 12866. A summary of the expected net economic benefits and costs of each alternative, which are based on supporting text in Chapters 4 and 6, can be found in Table 7.1.

**Table 7.1 Summary of the Net Economic Benefits and Costs of Alternatives.**

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| | *Workshops* | |
| A1<br>Voluntary protected species safe handling, release, and identification workshops for HMS longline fishermen (No Action) | Minimal | Short-term cost of traveling for fishermen who attend voluntary workshops. In the long-term, if targets are not met, could result in closures and significant economic impacts to pelagic and bottom longline fisheries.<br>Cost for 12 workshops estimated $42,000 plus materials per year for the Agency. |
| *A2*<br>*Mandatory protected species safe handling, release, and identification workshops and certification for all HMS pelagic or bottom longline vessel owners –*<br>*Preferred Alternative* | Long-term benefit from preventing the fishery from being closed and, if fishery is perceived as being environmentally responsible, from increasing ex-vessel prices. | Travel costs for approximately 549 owners and an estimated $154,269 - $258,048 in annual opportunity costs. Costs associated with recertification (See A6).<br>Cost for 12 workshops estimated $42,000 plus materials per year for the Agency. |
| *A3*<br>*Mandatory protected species safe handling, release, and identification workshops and certification for vessel operators actively participating in HMS pelagic and bottom longline fisheries – Preferred Alternative* | Long-term benefit from preventing the fishery from being closed and, if fishery is perceived as being environmentally responsible, from increasing ex-vessel prices. | Travel costs for approximately 1,098 captains and an estimated $163,602 - $378,810 in annual opportunity costs. Costs associated with recertification (See A6).<br>Cost for 23 workshops estimated $80,500 plus materials per year for the Agency. |
| A4<br>Mandatory protected species safe handling, release, and identification workshops and certification for all HMS longline vessel owners, operators, and crew | Long-term benefit from preventing the fishery from being closed and, if fishery is perceived as being environmentally responsible, from increasing ex-vessel prices. | Travel costs for 3,843 participants and an estimated $515,511 - $876,222 in annual opportunity costs. Costs associated with recertification (See A6).<br>Cost for 81 workshops estimated $283,500 plus materials per year for the Agency. |
| *A5*<br>*Mandatory protected species safe handling, release, and identification workshops and certification for shark gillnet vessel owners and operators –*<br>*Preferred Alternative* | Long-term benefit from preventing the fishery from being closed and, if fishery is perceived as being environmentally responsible, from increasing ex-vessel prices. | Travel and the opportunity cost for approximately 20 participants. Costs associated with recertification (See A6).<br>Cost for 3 workshops estimated $10,500 plus materials per year for the Agency. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| *A6*<br>*Protected species safe handling, release, and identification certification renewal every 3-years – Preferred Alternative* | Long-term benefit from preventing the fishery from being closed and, if fishery is perceived as being environmentally responsible, from increasing ex-vessel prices. | Costs associated with renewing certification.<br>Minimum cost for workshops estimated $42,000 plus materials per year for the Agency. |
| A7<br>No HMS identification workshops (No Action) | No travel costs. If enough fishermen attend, then the LCS fishery could rebuild faster and quotas might be increased. | Inaccuracies in data could result in longer rebuilding timeframes and lower quotas for the fishery. |
| A8<br>Voluntary HMS identification workshops for dealers, all commercial vessel owners and operators, and recreational fishermen | Minimal. If enough fishermen attend, then the LCS fishery could rebuild faster and quotas might be increased. | Cost of travel for fishermen who attend voluntary workshops.<br>Cost for workshops estimated $25,200 plus materials per year for the Agency. |
| *A9*<br>*Mandatory shark identification workshops for all shark dealers – Preferred Alternative* | Long-term the LCS fishery could rebuild as a result of improved information. The LCS quota could then be increased and result in higher benefits. | Travel and the opportunity cost for approximately 336 participants. Costs associated with recertification (See A16).<br>Cost for 3 workshops estimated $25,200 per year for the Agency. |
| A10<br>Mandatory HMS identification workshops for all swordfish, shark, and/or tuna dealers | Long-term the HMS fisheries could rebuild as a result of improved information. Those HMS fisheries that are quota limited could then have quotas increased, resulting in higher benefits. | Travel and the opportunity cost for approximately 649 participants. Costs associated with recertification (See A16).<br>Cost for 24 workshops estimated $50,400 per year for the Agency. |
| A11<br>Mandatory HMS identification workshops for all commercial longline vessel owners | Long-term the HMS fisheries could rebuild as a result of improved information. Those HMS fisheries that are quota limited could then have quotas increased, resulting in higher benefits. | Travel costs for approximately 549 owners and an estimated $154,269 - $245,952 in annual opportunity costs. Costs associated with recertification (See A16).<br>Cost for 19 workshops estimated $39,900 per year for the Agency. |
| A12<br>Mandatory HMS identification workshops for all commercial longline vessel operators | Long-term the HMS fisheries could rebuild as a result of improved information. Those HMS fisheries that are quota limited could then have quotas increased, resulting in higher benefits | Travel costs for approximately 1,098 operators and an estimated $163,602 - $378,810 in annual opportunity costs. Cost associated with recertification (See A16).<br>Cost for 37 workshops estimated $77,700 per year for the Agency. |
| A13<br>Mandatory HMS identification workshops for all commercial vessel owners (longline, CHB, General category, and handgear/harpoon) | Long-term the HMS fisheries could rebuild as a result of improved information. Those HMS fisheries that are quota limited could then have quotas increased, resulting in higher benefits | Travel costs for approximately 9,636 vessel owners and an estimated $4,085,664 in annual opportunity costs. Costs associated with recertification (See A16).<br>Cost for 322 workshops estimated $676,200 per year for the Agency. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| A14<br>Mandatory HMS identification workshops for all commercial vessel operators (longline, CHB, General category, and handgear/harpoon) | Long-term the HMS fisheries could rebuild as a result of improved information. Those HMS fisheries that are quota limited could then have quotas increased, resulting in higher benefits | Travel costs for approximately 10,374 vessel operators and an estimated $1,597,596 in annual opportunity costs. Cost associated with recertification (See A16).<br>Costs for 346 workshops estimated $726,600 per year for the Agency. |
| A15<br>Mandatory HMS identification workshops for all HMS Angling permit holders | Long-term the HMS fisheries could rebuild as a result of improved information. Those HMS fisheries that are quota limited could then have quotas increased, resulting in higher benefits | Travel and the opportunity costs for approximately 25,238 participants. Costs associated with recertification (See A16).<br>Cost for workshops estimated $1,768,200 per year for the Agency. |
| *A16*<br>*HMS identification certification renewal every 3-years – Preferred Alternative* | Long-term the LCS fishery could rebuild as a result of improved information. The LCS quota could then be increased and result in higher benefits. | Cost associated with renewing certification.<br>Minimum estimated cost for workshops estimated $25,200 per year for the Agency. |
| | *Time/Area Closures* | |
| B1<br>Maintain existing closures; no new closures (No Action) | Current closures have reduced bycatch and should be aiding in rebuilding. In long-term, stock may rebuild leading to greater quotas. | Continued negative impacts on pelagic longline industry from existing closed areas, including loss of participants and supply infrastructure base. |
| B2(a)<br>Prohibit the use of pelagic longline gear in HMS fisheries in the central portion of the Gulf of Mexico from May through November (7 months)r | There could be benefits to protected species, and thus increase total existence value of these species. Additional reduction in bycatch of HMS and other fisheries should aid in rebuilding of stocks in general. If fishery is perceived as being environmentally responsible then additional benefits could be realized. | Estimated decrease in annual revenues potentially range from (-) $5.1 million to (+)$1.2 million. |
| B2(b)<br>Prohibit the use of pelagic longline gear in HMS fisheries in an area of the Northeast during the month of June (1 month) | There could be benefits to protected species, and thus increase total existence value of these species. Additional reduction in bycatch of HMS and other fisheries should aid in rebuilding. If fishery is perceived as being environmentally responsible then additional benefits could be realized. | Estimated decrease in annual revenues potentially range from (-) $307,077 to (-) $74,608. |
| B2(c)<br>Prohibit the use of pelagic longline gear in HMS fisheries in the Gulf of Mexico from April through June (3 months) | There could be benefits to protected species, and thus increase total existence value of these species. Additional reduction in bycatch of HMS and other fisheries should aid in rebuilding. If fishery is perceived as being environmentally responsible then additional benefits could be realized. | Estimated decrease in annual revenues potentially range from (-) $3.2million to (+) $1.6 million. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| B2(d)<br>Prohibit the use of pelagic longline gear in HMS fisheries in the Gulf of Mexico west of 86 degrees west longitude year-round | There could be benefits to protected species, and thus increase total existence value of these species. Additional reduction in bycatch of HMS and other fisheries should aid in rebuilding. If fishery is perceived as being environmentally responsible then additional benefits could be realized. | Estimated decrease in annual revenues potentially range from (-) $10.9 million to (+) $6.2 million. |
| B2(e)<br>Prohibit the use of pelagic longline gear in HMS fisheries in an area of the Northeast to reduce sea turtle interactions | There could be benefits to protected species, and thus increase total existence value of these species. Additional reduction in bycatch of HMS and other fisheries should aid in rebuilding. If fishery is perceived as being environmentally responsible then additional benefits could be realized. | Estimated decrease in annual revenues potentially range from (-) $3.3 million to (-) $841,948. |
| B3(a)<br>Modify the existing Northeastern U.S. time/area closure to allow the use of pelagic longline gear in areas west of 72º 47' west longitude during the month of June | Estimated increase in annual revenues of<br>$241,025. | Perceptions of gear conflict may result in loss of recreational fishery income in infrastructure base. |
| B3(b)<br>Modify the Northeastern U.S. closure | Estimated increase in annual revenues of $565. | Perceptions of gear conflict may result in loss of recreational fishery income in infrastructure base. |
| *B4*<br>*Implement complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves year-round – Preferred Alternative* | There could be benefits to protected species, and thus increase total existence value of these species. May result in increased revenue for gag grouper fishery. | Minimal impact on commercial revenues and recreational activity. |
| *B5*<br>*Establish criteria to consider when implementing new time/area closures or making modifications to existing time/area closures – Preferred Alternative* | Variable | Variable |
| B6<br>Prohibit the use of bottom longline gear in an area southwest of Key West to protect endangered smalltooth sawfish | Staying below smalltooth sawfish ITS may keep fishery open. If fishery is perceived as being environmentally responsible then additional benefits could be realized. | Minimal impacts on bottom longline fleet. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| B7<br>Prohibit the use of pelagic longline gear in HMS fisheries in all areas | There could be benefits to protected species, and thus increase total existence value of these species. | Minimum loss of revenue of $26.5 million in revenue annually. May shift fishing effort to other countries that are not as environmentally conscious regarding protected species, and thus increase ecological impacts. |
| *Northern Albacore Tuna* | | |
| C1<br>Maintain compliance with the current ICCAT recommendation (No Action) | None | None |
| C2<br>Unilateral proportional reduction of United States northern albacore fishing mortality | If the fishery is rebuilt, there could be an increase in ecological benefits and long-term increase in commercial and recreational benefits. | Possible reduction in income from northern albacore tuna depending on restrictions needed per rebuilding plan. |
| C3<br>*Establish the foundation with ICCAT for developing an international rebuilding program – Preferred Alternative* | If the fishery is rebuilt, there could be an increase in ecological benefits and long-term increase in commercial and recreational benefits. | None |
| *Finetooth Sharks* | | |
| D1<br>Maintain current regulations for recreational and commercial fisheries (No Action) | In short-term, business arrangements would remain the same. In long-term, none. | In the long-term, there could be a decrease in finetooth shark population and result in a decrease in commercial revenues from finetooth shark harvest. |
| D2<br>Implement commercial management measures to reduce fishing mortality of finetooth sharks | None | Negative impacts on limited number of gillnet vessels. Could also increase discards and increase ecological impacts. |
| D3<br>Implement recreational management measures to reduce fishing mortality of finetooth sharks | None | Potential negative economic impacts to shark recreational fishery and related industries. |
| *D4*<br>*Identify sources of finetooth shark fishing mortality to target appropriate management actions – Preferred Alternative* | Long-term, the alternative would have positive ecological impacts by addressing finetooth mortality in HMS and other fisheries and positive economic impacts if the fishery is sustained. | If action as result of information collection does not happen in time to prevent the stock from becoming overfished, then the alternative could reduce quotas and cause more restrictive management measures to be implemented. |
| *Atlantic Billfish* | | |

| Alternative | Net Economic Benefits | Net Economic Costs |
| --- | --- | --- |
| E1<br>Retain existing regulations regarding recreational billfish fishing, including permit requirements, minimum size limits, prohibited species, landing form, allowable gear, and reporting requirements (No Action) | None | Continued overfishing could potentially lead to ESA listing and the closure of the recreational fishery. |
| E2<br>Effective January 1, 2007, limit all participants in Atlantic HMS recreational fisheries to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations | Long-term benefits to angler consumer surplus from rebuilding efforts. Circle hooks cost less so there is some minor benefit associated with this alternative. | Temporary decrease in angler consumer surplus from adjustment to using circle hooks. |
| *E3*<br>*Effective January 1, 2007, limit all HMS permitted vessels participating in Atlantic billfish tournaments to deploying only non-offset circle hooks*<br>*when using natural baits or natural bait/artificial lure combinations – Preferred Alternative* | Long-term benefits to angler consumer surplus from rebuilding efforts. Circle hooks cost less so there is some minor benefit associated with this alternative. | Temporary decrease in angler consumer surplus from adjustment to using circle hooks.<br>Unlikely potential decrease in tournament participation. |
| E4(a)<br>Increase the minimum size limit for Atlantic white marlin to a specific size between 68 and 71’’ LJFL | Long-term potential benefits as Atlantic white marlin stocks rebuild and recreational encounters with white marlin increase. | Uncertain impact on angler participation rates. |
| E4(b)<br>Increase the minimum size limit for Atlantic blue marlin to a specific size between 103 and 106’’ LJFL | Long-term potential benefits as Atlantic blue marlin stocks rebuild and recreational encounters with blue marlin increase. | Uncertain impact on angler participation rates. |
| E5<br>Implement a recreational bag limit of one Atlantic billfish per vessel per trip | Long-term potential benefits as stocks rebuild and recreational encounters with marlin increase. | Minor reductions in billfish angler consumer surplus. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| *E6*<br>*Effective January 1, 2007, implement ICCAT Recommendations on Recreational Marlin Landings Limits – Preferred Alternative* | Long-term potential benefits as stocks rebuild and recreational encounters with marlin increase. | None to moderate adverse impacts to anglers depending on whether thresholds for action are met.<br>Potential reduction in CHB trips by 0.4 to 24.2 percent (from the point in the management cycle when catch and release only fishing may have to be implemented).<br>Potential loss of $1.3 to $5.5 million worth of tournament activity annually under a worst case scenario.<br>Potential impacts on shoreside businesses. |
| E7<br>Effective January 1, 2007, - December 31, 2011, allow only catch and release fishing for Atlantic white marlin | Long-term potential benefits as stocks rebuild and recreational encounters with marlin increase. | Potential decrease in angler consumer surplus.<br>Potential decrease in CHB revenue of $49,491 to $1.3 million annually.<br>Potential negative economic impact to tournaments from $1.4 to $5.5 million annually. |
| E8<br>Effective January 1, 2007, - December 31, 2011, allow only catch and release fishing for Atlantic blue marlin | Long-term potential benefits as stocks rebuild and recreational encounters with marlin increase. | Potential decrease in CHB revenue of $0.5 to $3.0 million annually.<br>Potential negative economic impacts to tournaments from $13.8 to $19.3 million annually.<br>Angler consumer surplus may decrease. |
| | *Bluefin Tuna Quota Management* | |
| F1<br>Maintain the time-periods, subquota allocations, and geographic set asides for the General and Angling categories as established in the 1999 FMP (No Action) | None | Economic impacts to fishermen, dealers, and support industries associated with timeliness of required FMP amendment. |
| F2<br>Establish General category time-periods, subquotas, and geographic set asides annually via framework actions | Framework actions would result in overall positive economic impacts to the General category by allow fishing in locations and times when BFT are most available. | Uncertainty regarding General category quota allocation, from one year to the next, could increase difficulty of business planning.<br>Potential short-term decreases in quota available. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| *F3*<br>*Amend the management procedures regarding General category time-periods, subquota, as well as geographic set-asides to allow for future adjustments to take place via a regulatory framework action – Preferred Alternative* | Framework actions would result in overall positive economic impacts to the General category by allowing fishing in locations and times when BFT are most available. Minor benefits to the South Atlantic region. | Minor impacts to New England General category due to reallocation of time period sub-quotas from the no action alternative. |
| F3(a)<br>Establish monthly General category time-periods and subquotas (June-Jan, 12.5% each) | By formalizing the winter fishery, there would be positive economic impacts for General category participants in the South Atlantic region. | Minor impacts to New England General category.<br>If catch rates tend to be high, these quotas could be harvested rapidly and could lead to derby style fisheries on the first of each month. |
| F3(b)<br>Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 54%; Sept, 26.5%; Oct-Nov, 9%; Dec, 5.2%; and Jan, 5.3%) | By formalizing the winter fishery, there would be positive economic impacts for General category participants in the South Atlantic region. | Minor impacts to New England General category.<br>Minor impacts to those who would pursue BFT in the summer months as other time-period subquotas would be reduced. |
| *F3(c)*<br>*Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 50%; Sept, 26.5%; Oct-Nov, 13%; Dec, 5.2% and Jan, 5.3%) – Preferred Alternative* | By formalizing the winter fishery, there would be positive economic impacts for General category participants in the South Atlantic region. | Minor impacts to New England General category.<br>Minor impacts to those who would pursue BFT in the summer months as other time-period subquotas would be reduced. |
| F3(d)<br>Revise General category time-periods and subquotas to allow for a formalized winter fishery (June-Aug, 38.7%; Sept, 26.6%; Oct - Nov, 13%; Dec, 10.8%; and Jan, 10.9%) | Greater positive economic impacts to General category participants in the South Atlantic region | Would have increased negative economic impacts to those General category participants in northern areas. |
| *F4*<br>*Clarify the procedures for calculating the Angling category school size-class BFT subquota allocation and maintain the Angling category north/south dividing line – Preferred Alternative* | Minimal positive impacts by slightly increasing school size-class quota (2 mt). | Minimal |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| F5<br>Maintain the annual BFT specification process and the under/overharvest procedures within individual domestic quota categories and individual vessels in the Purse seine category (No Action) | None | None |
| *F6*<br>*Revise the annual BFT specification process to refer back to the supporting analytical documents of the consolidated HMS FMP and include seasonal management measures in annual framework actions – Preferred Alternative* | Minor positive economic impacts by allowing for better planning. | None |
| F7<br>Eliminate unharvested quota carryover provisions and return unharvested quota to the resource, while maintaining status quo overharvest provisions | None | Could result in derby-style fishing where vessels may operate in less than optimal conditions to harvest the quota before the season is closed.<br>Could reduced fishing opportunities, income, and angler consumer surplus for the commercial and/or recreational fleet, as well as the businesses that support those BFT fisheries. |
| *F8*<br>*Establish an individual quota category carry-over limit of 100 percent of the baseline allocation (i.e., no more than the annual baseline allocation may be carried forward), except for the Reserve category, and authorize the transfer of quota exceeding the 100 percent limit to the Reserve or another domestic quota category, while maintaining status quo overharvest provisions – Preferred Alternative* | Reallocation of tonnage that exceeds the cap to the Reserve or to another domestic quota category could result in economic benefits by increasing total allowable catch for those quota categories. | Slight negative impacts as a result of limiting maximum amount of harvest available from carry forward for a category. |
| F9<br>Maintain inseason action procedures (No Action) | None | None |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| *F10*<br>*Revise and consolidate criteria considered prior to performing inseason and some annual BFT management actions – Preferred Alternative* | Consistent criteria for inseason actions could lead to positive economic benefits. | None |
| F11<br>Eliminate BFT inseason actions | Quota allocations and daily retention limits would remain stable and help facilitate planning. | Prevents maximum utilization of BFT quota over longest time period. |
| | *Timeframe for Annual Management of HMS Fisheries* | |
| G1<br>Maintain the current fishing year for all HMS (No Action) | Minimal | Minimal |
| *G2*<br>*Shift the fishing year to January 1 – December 31 for all HMS – Preferred Alternative* | Would establish consistent timing between U.S. domestic and international management programs.<br>Would improve international reporting and negotiations, and thus potentially improving international management of fisheries. | In conjunction with preferred Alt E6, could result in impacts to billfish tournaments (see E6 above), but this is unlikely. |
| G3<br>Shift the fishing year to June 1-May 31 for all HMS | None | Short-term negative economic impacts to shark wholesale and retail markets. |
| | *Authorized Gears* | |
| H1<br>Maintain current authorized gears in Atlantic HMS fisheries (No Action) | Minimal, if any | Minimal, if any |
| *H2*<br>*Authorize speargun fishing gear as a permissible gear type in the recreational Atlantic BAYS tuna fishery - Preferred Alternative* | Positive economic impacts to recreational speargun fishermen and CHB sector. | Competition for fishing grounds may result in negative economic impacts for rod and reel fishermen. |
| H3<br>Authorize speargun fishing gear as a permissible gear type in the commercial tuna handgear and recreational tuna fisheries | Positive economic impacts to recreational speargun fishermen and CHB sector.<br>Potential economic benefits for CHB and General category fishermen from the sale of commercially speared tunas. | Competition for fishing grounds and speargun fishing take under the BFT Angling and General categories may result in negative economic impacts for rod and reel fishermen. |
| H4<br>Authorize green-stick fishing gear for the commercial harvest of Atlantic BAYS tunas | Potentially higher landing rates and higher quality of meat landed using green-stick gear could provide positive economic impacts to commercial fishermen, as well as benefit fish houses, gear supply houses, and other associated business. | None |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| *H5*<br>*Authorize buoy gear as a permissible gear type in the commercial swordfish handgear fishery; limit vessels employing buoy gear to possessing and deploying no more than 35 floatation devices, with each individual gear having no more than two hooks or gangions attached - Preferred Alternative* | Positive economic benefits continued to be afforded to current fishery participants. | Negative economic impacts to vessels employing more than 35 free-floating buoyed handlines. |
| H6<br>Authorize buoy gear as a permissible gear type in the commercial swordfish handgear fishery; limit vessels employing buoy gear to possessing and deploying no more than 50 floatation devices, with each individual gear having no more than 15 hooks or gangions attached | Additional positive economic impacts from the ability to increase the number of hooks attached to each buoy gear. | None |
| H7<br>*Clarify the allowance of hand-held cockpit gears used at boat side for subduing HMS captured on authorized gears - Preferred Alternative* | Positive economic impacts by reducing confusion over the allowance of these gears. | None |
| | *Regulatory Housekeeping* | |
| I1(a)<br>Retain current definitions for PLL and BLL gear (No Action) | None | Could continue compliance issues and longer periods of interruption during compliance inspections at sea. |
| I1(b)<br>Establish additional restrictions on longline gear in HMS time/area closures by specifying a maximum and minimum allowable number of commercial fishing floats to qualify as a BLL and PLL vessel, respectively | Could reduce periods of interruption during compliance inspections at sea. | More restrictive gear definitions could potentially impact approximately 5 percent of all PLL and 10 percent of BLL sets. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| *I1(c)*<br>*Differentiate between PLL and BLL gear based upon the species composition of the catch onboard or landed – Preferred Alternative* | Provides quantifiable method to determine fishing technique without requiring additional gear restrictions. | Could adversely impact longline vessels that regularly target both demersal and pelagic species on the same trip.<br>Potentially longer enforcement inspections. |
| I1(d)<br>Require time/depth recorders (TDRs) on all HMS longlines | Could minimize disruption of enforcement inspections. | Could costs vessels $1,400 to $6,500 in equipment costs, efficiency losses having the devices on the line, and labor costs associated with recording the information. |
| I1(e)<br>Base HMS time/area closures on all longlines (PLL & BLL) | None | Primarily would impact BLL vessels by making some PLL time/area closures also apply to all longline vessels resulting in more significant economic impacts than other alternatives considered for this issue. |
| I2(a)<br>Retain current regulations regarding shark landing requirements (No Action) | None | None |
| *I2(b)*<br>*Require that the 2nd dorsal fin and the anal fin remain on all sharks through landing – Preferred Alternative* | Increased accuracy in identification could improve stock assessments and lead to faster rebuilding of shark stocks and therefore the fishery. | Potential small reduction in income from retaining second dorsal and anal fins on sharks. |
| I2(c)<br>Require that the 2nd dorsal fin and the anal fin remain on all sharks through landing, except for lemon and nurse sharks | Increased accuracy in identification could improve stock assessments and lead to faster rebuilding. | Potential small reduction in revenues from retaining second dorsal and anal fins on sharks, except lemon and nurse shark fins can be removed. |
| I2(d)<br>Require all fins remain on all sharks through landing | Increased accuracy in identification could improve stock assessments and lead to faster rebuilding of shark stocks and therefore the shark fishery. | Reduction in revenues from sale of removed shark fins.<br>Value of shark meat could decrease if retaining fins causes packing problems. |
| I3(a)<br>Retain current regulations regarding retention limits, with no new prohibitions (No Action) | None | Non-complying vessels may be landing and selling HMS in excess of the commercial retention limits, thus circumventing the conservation benefits derived from those limits. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| *I3(b)*<br>*Add new prohibition at § 635.71(a)(48) making it illegal for any person to, "Purchase any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24" – Preferred Alternative* | Increased compliance could lead to faster rebuilding of HMS stocks. | Increase dealer administrative/information costs with insuring that they are not purchasing more than the commercial daily retention limits from a particular vessel. |
| *I3(c)*<br>*Add new prohibition at § 635.71(a)(49) making it illegal for any person to, "Sell any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24" – Preferred Alternative* | Increased compliance could lead to faster rebuilding of HMS stocks. | None |
| I4(a)<br>Retain current coordinates for the East Florida Coast closed area (No Action) | None | None |
| *I4(b)*<br>*Amend the second coordinate of the East Florida Coast closed area to 28° 17' 10" N. lat., 79° 11' 24" W. long., so that it corresponds with the EEZ – Preferred Alternative* | None | Minor impact on landings revenue. |
| I5(a)<br>Retain the current definition of "handline" at § 635.2 (No Action) | None | None |
| *I5(b)*<br>*Amend the definition of "handline" at § 635.2 by requiring that they be attached to, or in contact with, all vessels – Preferred Alternative* | Decreased opportunity to lose gear may lead to ecological benefits. | Could impact large portion of HMS permit holders. Potentially reduce operational efficiency. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| I5(c)<br>Require that handlines remain attached to all vessels when fishing recreationally and allow unattached handlines when fishing commercially | None | Could impact recreational anglers by reducing operational efficiency. |
| I6(a)<br>Retain current regulations regarding the possession of Atlantic billfish (No Action) | None | None |
| *I6(b)*<br>*Prohibit vessels issued HMS commercial permits and operating outside of a tournament from possessing, retaining, or taking Atlantic billfish from the management unit – Preferred Alternative* | Minor potential enhancement of billfish recreational fishing. | None |
| I7(a)<br>Retain the current regulations regarding BFT dealer reporting (No Action) | None | Could continue extra time costs of entering similar data on multiple forms. |
| *I7(b)*<br>*Amend the HMS regulations to provide an option for Atlantic tunas dealers to submit required BFT reports using the Internet – Preferred Alternative* | Could increase data entry efficiency. | None |
| I7(c)<br>Amend the HMS BFT dealer reporting regulations to require<br>that Atlantic tunas dealers submit BFT reports electronically, with specific exceptions | Could increase data entry efficiency. | Could result in additional Internet access costs and training costs for some dealers. |
| I8(a)<br>Maintain the existing regulations regarding submission of logbooks (No Action) | None | None |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| *I8(b)*<br>*Require submission of "No Fishing" reporting forms for selected vessels if no fishing trips occurred during the preceding month, postmarked no later than seven days after the end of the month – Preferred Alternative* | Potentially decreases permit renewal delays and their associated costs. | None |
| *I8(c)*<br>*Require submission of the trip "Cost-Earnings" reporting form for selected vessels 30 days after a trip and the annual "Cost-Earning" report form by January 31 of each year – Preferred Alternative* | Potentially decreases permit renewal delays and their associated costs. | None |
| I9(a)<br>Retain existing regulations at § 635.5(c)(2) requiring anglers to report non-tournament recreational landings of North Atlantic swordfish and Atlantic billfish (No Action) | None | Would continue inconsistency with some other HMS recreational reporting requirements.<br>Anglers on CHB vessels may be unaware of reporting requirements. |
| *I9(b)*<br>*Require vessel owners(or their designees) to report non-tournament recreational landings of North Atlantic swordfish and Atlantic billfish – Preferred Alternative* | Minor – could reduce number of overall calls for reporting. | Minor - almost all owners (or designees) currently report. |
| I10(a)<br>Retain the current regulations specifically referring to 25 mt (ww) (No Action) | Potential increased revenue from unharvested quota from NED set-aside rolling from one year to the next. | May create an incentive for PLL vessel operators to increase effort, or even possibly directing their effort, on BFT in this area. Potential impacts to other fishery sectors if they are closed after reaching their quota and cannot access available quota from the NED set-aside. |
| I10(b)<br>Modify the HMS regulations to state that "In addition, each year, 25 mt (ww) will be allocated for incidental catch by pelagic longlines" in the NED | Potential increased revenue from unharvested quota from NED set-aside rolling from one year to the next. | May create an incentive for PLL vessel operators to increase effort, or even possibly directing their effort, on BFT in this area. Potential impacts to other fishery sectors if they are closed after reaching their quota and cannot access available quota from the NED set-aside. |

| Alternative | Net Economic Benefits | Net Economic Costs |
|---|---|---|
| I10(c)<br>*Conduct additional discussions at ICCAT regarding quota rollovers and adjust quotas allocated to account for bycatch related to pelagic longline fisheries in the vicinity of the management area boundary accordingly - Preferred Alternative* | Would eliminate additional incentives for PLL vessel operators to increase effort, or even possibly directing their effort, on BFT in this area. | Would not allow revenue from unharvested quota from NED set-aside rolling from one year to the next. Potential impacts to other fishery sectors if they are closed after reaching their quota and cannot access available quota from the NED set-aside. |
| I11(a)<br>No permit condition for recreational trips (No Action) | None | None |
| *I11(b)*<br>*Require recreational vessels with a Federal permit to abide by Federal regulations, regardless of where they are fishing, unless a state has more restrictive regulations - Preferred Alternative* | Reduced confusion may lead to greater fishery participant satisfaction. | Potential minor decrease in recreational fishing satisfaction. |

## CHAPTER 8 TABLE OF CONTENTS

# 8.0 FINAL REGULATORY FLEXIBILITY ANALYSIS

The Final Regulatory Flexibility Analysis (FRFA) is conducted to comply with the Regulatory Flexibility Act (5 USC 601 et. seq.) and provides a description of the economic impacts of the various alternatives on small entities. Certain elements required in an FRFA are also required as part of an environmental impact statement (EIS). Therefore, the FRFA incorporates the economic impacts identified in the EIS. The Initial Regulatory Flexibility Analysis was done in the draft EIS and is also contained in the proposed rule.

## 8.1 Statement of the Need for and Objectives of this Final Rule

Please see Chapter 1 for a description of the need for action.

## 8.2 A Summary of the Significant Issues Raised By the Public Comments in Response to the Initial Regulatory Flexibility Analysis, a Summary of the Assessment of the Agency of Such Issues, and a Statement of Any Changes Made in the Rule as a Result of Such Comments

NMFS received many comments on the proposed rule and the draft HMS FMP during the public comment period. A summary of these comments and the Agency's responses are included in Appendix D of this document and will be included in the final rule. NMFS did not receive any comments specific to the Initial Regulatory Flexibility Analysis (IRFA), but did receive a limited number of comments related to economic issues and concerns. These comments are responded to with the other comments in Appendix D. The specific economic concerns are also summarized here.

### 8.2.1 Workshops

The Agency received public comment both in support of and opposed to the protected species workshops. Some commenters were concerned about potential lost revenue on longline trips if bycatch were to be handled correctly, and recommended not limiting these workshops to longline fishermen. Some comments supported extending the workshop requirements to include all HMS fishermen, as well as expanding the release techniques to include additional species. NMFS received many comments suggesting that various combinations of owners, operators, and crew members be required to participate in the workshops. Commenters noted that if the crew members are not required to attend, then the operators should be responsible for training the crew. A few comments supported grandfathering in the industry certified individuals, so that they do not need to attend the first round of mandatory workshops (they would still need to be recertified). Additionally, the Agency received comment on the recertification timeframes, and provided recommendations for scheduling and selecting venues to mitigate any negative impacts to participants.

Public comment both supported and opposed alternative A2, stating that mandatory owner attendance may discourage them from hiring inexperienced operators who may not know how to properly handle sea turtles and other protected resources, handling protected resources wastes time on money making trips, and owners may not be operators.

The Agency received public comment in favor of owners/operators being required to train all crew members onboard. NMFS encourages all workshop participants to disseminate this information to all crew members involved with haul-back or fishing activities, however, is not requiring owners to train crew members at this time.

Alternative A3 was supported by public comment. Commenters suggested that vessel operators should be certified and that they should, in turn, train each individual crew member working aboard their vessel to ensure that the crew is informed and that proper procedures are followed. Operators are encouraged to transfer the knowledge and skills obtained from successfully completing the workshops to the crew members, potentially increasing the proper release, disentanglement, and identification of protected resources. While this alternative would not require crew members to attend the workshops, it is likely that knowledge transfer from operator and owners to crew would be able to disseminate this information in a cost effective manner. In addition, the Agency received several comments opposing the requirement to have crew certified because of their transient nature and the fact that some crew members are not U.S. citizens and may not be available to attend workshops.

The Agency received public comment supporting alternative A5. However, some commenters were concerned about requiring both owners and operators of vessels to be certified. The Agency realizes that many vessel owners may not operate or be present on the vessels during fishing trips; therefore, certifying vessel owners ensures that they are aware of the certification requirements and protocols. The owners are, then, accountable for preventing their vessel from engaging in fishing activities without a certified operator on board.

NMFS received several comments in support of alternative time periods for renewal of certification; however, the Agency prefers to maintain the original preferred alternative of recertification every three years. Recertification every three years would balance the ecological benefits of maintaining familiarity with the protocols and species identification, and the economic impacts of workshop attendance due to travel costs and lost fishing opportunities.

The Agency received comment regarding the need for proxies for dealers attending workshops under alternative A9, the flexibility required in certifying newly hired proxies, and the need for multiple proxies. Alternative A9 was modified to address these comments and allow for dealer proxies. Because not all shark dealer permit holders may be onsite where vessels unload their catches, a local proxy could attend the workshop to obtain the proper training in species-specific shark identification, while allowing the permit holder to meet the certification requirements. Furthermore, since the actual permit holders may not be involved in fish house activities, the workshops would be more effective at decreasing the reported unknown sharks if a proxy whom is directly involved with fish house activities attends and obtains the training in lieu of the permit holder. If a dealer opts to send a proxy, then the dealer would be required to designate a proxy from each place of business covered by the dealer's permit. A proxy would be a person who is employed by a place of business, covered by a dealer's permit, a primary participant in identification, weighing, or first receipt of fish as they are offloaded from a vessel, and involved in filling out dealer reports. According to public comment, NMFS should anticipate turnover in dealer proxies. To address this, the Agency is allowing one-on-one training sessions that would accommodate the replacement of a proxy whose employment was terminated on short notice. These sessions would be at the expense of the permit holder.

Public comment on the HMS Identification Workshops were supportive of mandatory workshops for Federally permitted shark dealers, but also suggested that these workshops be available to others, such as the recreational and commercial fishery, law enforcement, port agents, and state shark dealers. While these workshops would be mandatory for Federally permitted shark dealers, NMFS would try to accommodate other interested individuals when it is feasible. At well-attended workshops, those persons for whom the workshops are mandatory would be given priority in terms of hands-on instruction.

### 8.2.2 Time/Area Closures

NMFS also received comments on the time/area closure alternatives. A number of commenters expressed concern over the effort redistribution model used to analyze these alternatives. These commenters felt that pelagic longline vessels were not mobile enough to redistribute effort uniformly and that vessels in a certain area would move to adjacent areas (*e.g.*, vessels homeported in the Gulf of Mexico would stay in the Gulf of Mexico and would not move into the mid-Atlantic bight). NMFS received comments that different approaches to effort redistribution should be considered, particularly for closures of bluefin tuna in spawning areas in the Gulf of Mexico. As a result, NMFS considered redistribution of effort based on an analysis of the mobility of the PLL fleet and known effort displacement currently taking place out of the Gulf of Mexico (see Appendix A). Based on this revised approach, NMFS has determined that the closures in the Gulf of Mexico could still result in an increase in bycatch for some of the species being considered. As a result, NMFS has decided not to move forward with any new time/area closures other than complementary closures for Madison-Swanson and Steamboat Lumps.

During the comment period, NMFS heard from commenters and the peer reviewers that the Agency should design a “decision matrix” that could help to guide the choices that NMFS would have to make between different closures and different species. NMFS interpreted this request to mean that NMFS should decide whether, for example, it is more important to protect spawning BFT during particular times and areas than leatherback sea turtles. If NMFS decided that were the case, then an area would be closed to protect spawning BFT even though it could potentially increase takes of leatherback sea turtles. Related to this idea of a decision matrix, some commenters noted that NMFS should set bycatch reduction goals. For example, NMFS would need to reduce BFT discards by some set percent; under this concept, NMFS would need to find ways to reduce BFT discards by the appropriate percent, possibly to the detriment of other species. Once that percent reduction was made, NMFS would no longer need to reduce BFT discards. Similarly, if NMFS implements measures that reduce BFT discards by more than the decided amount, NMFS could potentially relax some of the measures to bring the reduction down to the pre-decided level. Finally, NMFS received comments from commercial interests indicating that the bycatch reduction goals of the existing closures have already been met and, therefore, the Agency should reopen at least portions of the current closures.

### 8.2.3 Finetooth Sharks

NMFS received a range of public comments regarding finetooth shark alternatives indicating support and opposition to Alternatives D2-D4, and additional comments, including, but not limited to: comments on gillnet fisheries in general, the use of VMS, the results of the 2002 SCS stock assessment, reporting of HMS by dealers, identification of finetooth sharks, and the accuracy of data attained from MRFSS. All of these comments were considered prior to selection of the preferred course of action for preventing overfishing of finetooth sharks. Additional measures, possibly those analyzed in this document, and/or others, may be necessary to prevent overfishing of finetooth sharks in the future.

### 8.2.4 Atlantic Billfish

NMFS also received many comments regarding Atlantic billfish alternatives. Commenters strongly suggested that given the feeding habits of blue marlin, mandating circle hooks on artificial lures would significantly reduce the viability of trolling for blue marlin. Based on public comment from scoping and the draft HMS FMP, as well as an examination of post-release mortality data of blue marlin caught on J-hooks, NMFS is allowing anglers on HMS permitted vessels in billfish tournaments to continue to use J-hooks with artificial lures.

NMFS received substantial public comment opposing and supporting circle hook requirements proposed under draft alternatives E2 and E3. A prevalent theme contained in comments opposing mandatory circle hook use, in all or portions of the HMS and billfish recreational fisheries, was that the recreational sector has a minor impact on Atlantic billfish populations relative to the commercial pelagic longline fleet. However, given the relatively small size of the U.S. domestic pelagic longline fleet and the considerable size of the recreational fishing fleet, NMFS determined that it was appropriate to examine this issue from the domestic perspective.

A second important theme in comments opposing mandatory circle hook use under alternatives E2 and E3 was the need for NMFS to promulgate more detailed specifications for circle hooks. NMFS is unable to provide an index of detailed hook specifications for each size circle hook that could be used in the recreational billfish fishery. NMFS is continuing to work on various formulaic definitions of circle hooks that may lead to a more refined hook definition in the future. However, NMFS finds that it is appropriate to require the use of circle hooks in portions of the recreational billfish fishery at this time in an effort to reduce post-release mortalities in the recreational billfish fishery.

NMFS received public comment expressing concern that HMS circle hook requirements may apply to all tournament participants, even non-HMS fishermen participating in large tournaments that may have award categories for species other than HMS. NMFS has refined the phrasing of the alternative to more accurately reflect the intent of this alternative.

NMFS also received comment that tournament operators would need advance notice of impending circle hook regulations to allow for production of rules, advertising, and informing tournament participant of potential circle hook requirements. NMFS surveyed a number of tournament operators in the Atlantic, Gulf of Mexico and Caribbean to better understand various aspects of tournament operations, and determined that a delayed date of effectiveness of no less than six months would be necessary to minimize adverse impacts to tournament operators and participants. NMFS is preferring an effective date of January 1, 2007 for Atlantic billfish tournament circle hook requirements. This additional six month delay in effectiveness will provide billfish tournament anglers additional time to familiarize themselves and become proficient in the use of circle hooks, while allowing tournament operators to adjust tournament rules, formats, and materials production, as appropriate, thereby minimizing any potential adverse socio-economic impacts.

NMFS received comment recommending that the Agency automatically carry forward any underharvest to the following management period. As noted above, this alternative allows for underharvests to be carried forward. However, given the uncertainty surrounding landings of Atlantic marlin in the Commonwealth of Puerto Rico and the U.S. Caribbean, the United States has made a commitment to ICCAT not to carry forward underharvest until such time as this uncertainty is resolved.

Given that the known level of U.S. recreational marlin landings have been within the 250 fish limit for three of the four reported years, and that the 2002 overharvest was offset by the 2001 underharvest, the ecological benefits of this alternative are likely limited. NMFS received comment on the limited ecological impact that could be categorized into two opposing views and which suggested two different courses of action as a result of the anticipated limited ecological impact. Some commenters suggested that the limited ecological impact was not worth any potential adverse economic impact, even a very limited one, while other commenters suggested that the United States must implement the 250 marlin limit to live up to U.S. international obligations and as part of a strategy to implement appropriate measures to help limit billfish mortality. Implementation of this preferred alternative is anticipated to allow the United States to continue to successfully pursue international marlin conservation measures by fully implementing U.S. international obligations and potentially provide a minor ecological impact with, at most, minor adverse economic impacts.

NMFS received strong public comment opposed to the Atlantic white marlin catch and release alternative. Based on public comment that indicated more significant concerns over potential adverse economic impacts to the fishery if catch and release only fishing for Atlantic white marlin were required, as well as a number of other factors, including but not limited to, the impending receipt of a new stock assessment for Atlantic white marlin and upcoming international negotiations on Atlantic marlin, NMFS has chosen not to prohibit landings of Atlantic white marlin. Additionally, the Agency received substantial comment in support of this measure. The commenters supporting the landings prohibition stated concerns over white marlin stock status, the ESA listing review, and an interest in maintaining leadership at the international level. The implementation of circle hook requirements (alternative E3) is an important first step in reducing mortality in the directed billfish fishery. NMFS will consider catch and release only fishing options for Atlantic white marlin as well as other billfish conservation measures in future rulemakings, as necessary and appropriate.

### 8.2.5 Atlantic Bluefin Tuna Domestic Management Measures

NMFS received public comment in the past regarding the timing of annual BFT specification publication and that administrative or other delays in publishing the annual BFT specifications can have adverse social and economic impacts due to constituents inability to make informed business decisions. Under the preferred alternative the annual BFT quota specifications established baseline domestic quota category allocations, as well as adjusted those allocations based on the previous years under- and/or overharvest. Any delay in publishing the annual BFT quota specifications would have prolonged the establishment of a baseline quota in any of the domestic categories.

NMFS received a number of comments opposing the removal of the Angling category North/South dividing line and one comment supporting its removal. In response to those comments, NMFS modified preferred alternative F4 to include maintaining the north/south dividing line.

Fishermen have commented that knowing the exact schedule of BFT RFDs prior to the season facilitates planning and scheduling of trips and the preferred alternative F6 should help facilitate the development of timely schedules.

### 8.2.6 Timeframe for Annual Management of HMS Fisheries

The timeframe for annual management of HMS fisheries preferred alternative G2 was modified because the comment period was extended. The actual compressed fishing year would occur in 2007 rather than 2006 as described in the draft Consolidated HMS FMP. During the public comment period, several commenters expressed concern about the effect of a calendar year management cycle on the availability of quota rollover from the previous calendar year during the January portion of the south Atlantic fishery. Under changes to the BFT management program included in this Consolidated HMS FMP, the January subperiod would be provided with a quota of 5.3 percent of the annual ICCAT allocation.

### 8.2.7 Authorized Fishing Gear

In regard to authorized gears, there was strong public comment support for the preferred alternative H2 authorizing speargun fishing as a permissible gear type for recreational Atlantic BAYS tuna. NMFS has received written requests, comment at public hearings, and has heard presentations at AP meetings requesting that NMFS authorize the use of speargun fishing gear in the Atlantic tuna fishery. NMFS has received comment that recreational spearfishermen place a high value on spearfishing for tunas and are currently traveling outside of the United States for the opportunity to participate in tunas speargun fisheries.

During the public comment period, numerous comments were received expressing confusion over the current regulatory regime regarding green-stick gear, unease over the potential impacts and intent of the preferred alternative in the draft Consolidated HMS FMP, and concern over potential negative impacts of the green-stick gear. Therefore, the agency does no longer prefer H4, the green-stick authorization alternative.

In regard to buoy gear, the Agency received public comment requesting that commercial vessels be limited to deploying fewer than 35 individual buoy gears. Additionally, commercial fishermen familiar with this gear type requested that they be allowed to attach multiple floatation devices to buoy gears to aid in monitoring and retrieval, as well as allow them to use "bite indicator" floats that will alert them to gears with fish attached. In response to public comment, NMFS modified the preferred alternative to allow fishermen to use more than one floatation device per gear and configure the gear differently depending on vessel and crew capabilities, or weather and sea conditions. This increased flexibility may result in positive social impacts and increased safety at sea.

The Agency has also received public comment in support of the clarification of the allowance of cockpit gears associated with alternative H7.

### 8.2.8 Regulatory Housekeeping

The public also provided comment on the proposed regulatory housekeeping alternatives. NMFS requested public comment regarding whether or not to include a definition of "fishing floats" in the regulations, and on potential language for a "float" definition. Based on these comments, NMFS has chosen not to prefer alternative I1(b) in this document. Several commenters indicated that the number of floats is not an appropriate gauge to determine the type of fishing gear that is being deployed, and that the presence of "bullet floats," anchors, or the type of mainline would be better indicators. Other commenters stated a float requirement would be an unnecessary burden that could diminish the flexibility of vessel operators to participate in different fishing activities, depending upon the circumstances. Finally, consultations with NMFS Office of Law Enforcement indicated that the float requirement in alternative I1(b) would not be practical. For these reasons, alternative I1(b) is no longer preferred. Although alternative I1(b) was preferred in conjunction with alternative I1(c) in the draft HMS FMP, NMFS believes that the objective of this alternative can be effectively achieved by implementing alternative I1(c) alone, species composition of catch.

On the basis of public comment, the list of demersal "indicator" species associated with alternative I1(c) has been modified from the Draft HMS FMP by removing silky, great hammerhead, scalloped hammerhead, and smooth hammerhead sharks from the list, and by adding tilefish, blueline tilefish, and sand tilefish to the list. NMFS believes that these changes are appropriate because those shark species can be caught on both pelagic and bottom longlines, and because the tilefish species are representative of demersal fishing activity.

NMFS received comments indicating that alternative I1(c) could adversely impact longline vessels that fish, at least part of a trip, in HMS closed areas and that catch both demersal and pelagic species on those trips. Similar to the comments received regarding alternative I1(b), there were concerns that, by establishing a species threshold when fishing in HMS closed areas, this alternative would restrict the flexibility of longline vessel operators to participate in different fishing activities depending upon the circumstances. Also, adverse economic impacts could result if vessel operators are unable to retain a portion of their catch that otherwise would have been retained on mixed fishing trips in the closed areas, or if they must necessarily choose to fish outside of the closed areas. NMFS received other comments indicating that there could be additional costs on vessels if they are boarded at sea by enforcement, and it was necessary to retrieve or observe fish in the hold in order to calculate the percentages of demersal and pelagic species possessed onboard. The Agency, however, still finds that this preferred alternative is important in maintaining existing time/area closures.

In regards to alternative I2(b) regarding that the second dorsal fin and anal fin remain on all sharks through landing, NMFS received various comments supporting the preferred alternative, as well as comments confirming that retention of second dorsal and anal fins through landing could improve shark identification and species-specific landing data. However, NMFS also received comments indicating that this alternative would do little to improve shark identification. NMFS received comment that although these species have valuable fins, retaining them until landing was acceptable. The Agency received a comment opposing this alternative due to additional time and revenue losses that may result from removing the smaller/secondary fins after docking. While initial adjustments may have to be made to the offloading and processing procedures, in the long-term, improved quota monitoring and stock assessment data as a result of this alternative could result in a larger quota and therefore larger net revenues for both the fishermen and the dealer.

Public comment suggests that, among active fishery participants, a requirement for handlines to remain attached to all vessels would reduce the number of handlines that could be fished or deployed. Operationally, it may also be less efficient to fish with several attached handlines as they may be more prone to entanglement. Because this alternative could restrict or limit fishing effort, it is projected to produce unquantifiable positive ecological impacts, including a reduction in the bycatch of undersized swordfish, other undersized species, protected species, and target species catches. Based upon public comment the practice does not appear to be widespread, but it may be growing among a small number of vessel operators primarily targeting swordfish in the East Florida Coast closed area. According to public comment, recreational swordfish catches would most likely be affected, as that is the primary target species. If few recreational vessels are currently fishing with unattached handlines, then any social or economic impacts associated with this alternative would be minimal.

NMFS prefers alternative I7(b) regarding allowing the option for electronic reporting for BFT dealer reports, and has received public comment supporting this alternative. The preferred alternative would provide an option for BFT dealers to submit certain reports electronically over the Internet once such a system is developed, but would not require it.

Based upon public comment regarding requiring vessel owners to report non-tournament recreational landing of North Atlantic swordfish and Atlantic billfish under preferred alternative I9(b), this alternative has been modified slightly from the draft HMS FMP by specifying that a vessel owner's designee may also report landings, in lieu of the owner. NMFS received comment indicating that this alternative could potentially disadvantage absentee vessel owners. In consideration of this comment, NMFS has modified the preferred alternative to allow an owner's designee to report.

During the comment period, NMFS received comments from several states who felt that NMFS was exceeding their authority with the permit condition. NMFS believes that the Magnuson-Stevens Act does provide the authority to manage HMS species throughout their range (16 U.S.C. 1812 Section 102). NMFS could opt to pre-empt state's authority either through the Magnuson-Stevens Act or through ATCA. However, NMFS prefers to work with states and the Atlantic and Gulf States Marine Fisheries Commissions towards consistent regulations that meet both international and domestic goals because each state is different and the fishermen in each state prefer to fish for different HMS (*e.g.*, fishermen in the Gulf of Mexico may fish for Atlantic sharpnose sharks while fishermen in New Jersey would not) and use different gears.

Finally, NMFS received several comments in general regarding the information presented regarding the HMS recreational sector. Section 3.5.2 provides detailed information regarding the data available and past research concerning the HMS recreational fisheries. Economic data on recreational data is difficult to collect and challenging to interpret. Nevertheless, efforts have been undertake to improve, update, and expand upon the economic information regarding the HMS recreational fisheries.

## 8.3 Description and Estimate of the Number of Small Entities to Which the Proposed Rule Will Apply

NMFS considers all permit holders to be small entities as reflected in the Small Business Administration's (SBA) size standards for fishing entities. All permit holders are considered to be small entities because they either had gross receipts less than $3.5 million for fish-harvesting, gross receipts less than $6.0 million for charter/party boats, or 100 or fewer employees for wholesale dealers. These are the SBA size standards for defining a small versus large business entity in this industry. A description of the fisheries affected, the categories and number of permit holders, and registered tournaments can be found in Chapter 3.

### 8.3.1 Workshops

The alternatives considered for requiring attendance at workshops on protected species release, disentanglement, and identification for pelagic longline, bottom longline, and gillnet owners and operators (A2, A3, and A5) are estimated to apply to 549 vessels permitted to fish for HMS with longline gear and 20 shark gillnet vessels. The preferred alternatives for shark identification workshops (A9) would impact approximately 336 Federally permitted shark dealers.

### 8.3.2 Time/Area Closures

The preferred time/area closure alternative (B4) to implement complementary HMS time/area closures in the Madison-Swanson and Steamboat Lumps Marine Reserve would apply to 549 pelagic and bottom longline permitted vessels, but would likely impact few pelagic or bottom longline vessels based on past observer and logbook data indicating only one pelagic longline and two bottom longline sets reported in those areas. This preferred alternative would also apply to 4,173 permitted HMS charter/headboat businesses and 25,238 HMS angling permit holders. However, the impacts to charter/headboat businesses and recreational fishermen are not expected to be substantial since this alternative includes a seasonal surface trolling allowance. In addition, many of these businesses have already been impacted by the previously implemented Madison-Swanson and Steamboat Lumps Marine Reserves established by the GOMFMC, and therefore are not likely to face further economic impacts as a result of the preferred complimentary HMS closure in the same area.

### 8.3.3 Northern Albacore Tuna

The preferred alternative considered for northern albacore management (C3), which would establish the foundation for developing an international rebuilding program through ICCAT, would apply to all tuna categories, a total of 34,501 permit holders. However, the preferred alternative does not have any direct impacts on small entities in the short term because it does not require any changes to direct management measures at this time.

### 8.3.4 Finetooth Sharks

The preferred alternative for finetooth sharks, a strategy for preventing overfishing (D4), also would not have any direct impacts on small entities but could affect 20 commercial vessels and potentially some of the 25,238 HMS angling permit holders. The non-preferred commercial management alternative, however, would apply to the estimated 20 shark gillnet vessels that are permitted and could apply to all commercial shark permit holders depending on what the management measures would be. The non-preferred recreational management alternative would apply to the 25,238 HMS angling permit holders; however, a small percentage of these recreational anglers target small coastal sharks or finetooth sharks.

### 8.3.5 Atlantic Billfish

The preferred Atlantic billfish Alternatives E3 and E6 would apply to 25,238 Angling, 4,173 CHB, and up to 4,824 valid General (those participating in tournaments) category permits. In addition, there are currently 256 registered HMS tournaments that would be impacted by the Atlantic billfish alternatives.

### 8.3.6 Atlantic Bluefin Tuna Domestic Management Measures

The alternatives being considered for bluefin tuna management for time-periods and subquota allocations would primarily apply to the 4,824 General category tuna permit holders. However, other bluefin tuna alternatives to streamline management processes would apply to all tuna categories, a total of 34,501 permit holders (Section 3.9.4).

### 8.3.7 Timeframe for Annual Management of HMS Fisheries

The alternatives that consider changing the timeframe for annual management of HMS fisheries from a fishing year to a calendar year would essentially apply to all 36,925 HMS permit and tournament registrants, including dealer permits. Under the preferred alternative (G2), only the shark fishery would not be impacted by the shift in annual management timeframe because it is already managed on a calendar year basis at this time.

### 8.3.8 Authorized Fishing Gear

Several alternatives allowing or defining authorized gears would apply to small entities. The authorization of recreational speargun fishing for Atlantic tunas (H2) would apply to an unknown number of speargun users. This preferred alternative may also positively impact the 4,173 CHB permit holders by potentially increasing charter revenues. The non-preferred alternative to allow speargun in both recreational and commercial tuna fisheries (H3) would also apply directly to the 4,824 General category and 4,173 CHB permit holders. Alternative H5, which address the utilization of unattached handlines, would apply to 279 permit holders (88 swordfish handgear and 191 swordfish directed). The preferred alternative clarifying the authorized use of secondary cockpit gears (H7) would apply to all HMS permit holders.

### 8.3.9 Regulatory Housekeeping

Finally, a variety of regulatory housekeeping preferred alternatives would apply to small entities. Specifically, the preferred change to the definitions of pelagic and bottom longline (alternative I1(c)) would apply to the 576 permitted pelagic and bottom longline vessels. The preferred alternative requiring smaller second dorsal and anal fins would need to remain attached to the shark (alternative I2(b)) would apply to the 240 directed shark and 312 incident shark permit holders. The preferred HMS retention limit requirements (I3) would apply to the 621 permitted shark and swordfish dealers and the 416 permitted Atlantic tuna dealers. The change in the definition of the East Florida Coast Closed Area (I4) is unlikely to directly impact any small entities but could affect any commercial permit holders fishing in that area. The preferred alternative prohibiting the retention of Atlantic billfish by vessels issued commercial permits and operating on a non-for-hire trip or outside of a tournament (I6(b)) would apply to General category, bottom longline, and shark gillnet vessels utilizing rod and real gear, but it is unlikely that many would be impacted by this proposed regulation. The preferred alternative to amend the HMS regulations to provide an option for Atlantic tunas dealers to submit required BFT reports using the Internet (I7(b)) would apply to the 416 Atlantic tuna permit dealer holders. The preferred alternative requiring vessel owners or proxies to report non-tournament recreational landings of North Atlantic swordfish and Atlantic billfish (I9(b)) would apply to 4,173 CHB permit holders and 25,238 Angling permit holders, but it is not expected that this proposal would impact many entities. Finally, the preferred alternative requiring recreational vessels with a Federal permit to abide by Federal regulations (I11(b)), regardless of where they are fishing, would potentially apply to 25,238 Angling, 4,173 CHB, and up to 4,824 valid General (those participating in tournaments) category permits.

Other sectors of the HMS fisheries such as dealers, processors, bait houses, and gear manufacturers, some of which are considered small entities, might be indirectly affected by the preferred alternatives, particularly time/area closures, Atlantic billfish, and authorized gear alternatives. However, the rule does not apply directly to them, unless otherwise noted above. Rather, it applies only to permit holders and fishermen. As such, economic impacts on these other sectors are discussed in Chapters 4, 6, and 7.

## 8.4 Description of the Projected Reporting, Record-Keeping, and Other Compliance Requirements of the Proposed Rule, Including an Estimate of the Classes of Small Entities Which Will Be Subject to the Requirements of the Report or Record

None of the preferred alternatives in this document would result in additional reporting, record-keeping, and compliance requirements that would require new Paperwork Reduction Act filings. However, some of the preferred alternatives could modify existing reporting and recordkeeping requirements. These include workshops, coordination efforts directed at gathering additional information about finetooth shark mortality, and bluefin tuna dealer reporting. The preferred alternatives for workshops (A2, A3, A5, A6, A9, and A16) would require record-keeping by NMFS to record attendance at workshops and the certification status of pelagic and bottom longline vessel owners and operators, as well as shark gillnet owners and operators and shark dealers and proxies. This Agency record keeping would not have an impact on small entities although small entities will need to keep their own certificates and may decide to keep copies of certificates for their own records. Attending workshops would also be a change in compliance.

In addition, the finetooth shark preferred alternative (D4) may expand the coverage of the current HMS observer programs. In addition, this preferred alternative would result in efforts to expand data that are currently collected by NMFS observers on shrimp trawl vessels to include finetooth shark and other HMS species of interest. Fishermen themselves would not need to change reporting.

Finally, under regulatory housekeeping, the preferred alternative to allow bluefin tuna dealers the option to report electronically (I7(b)) once a system is developed and is made available would modify current reporting requirement, but would not result in additional reporting or burden. In fact, this option may reduce the potential need to report the same data on multiple reports for those some small entities that chose this option.

In addition to the reporting and record-keeping requirements of the preferred alternatives, there are also compliance requirements associated with the preferred alternatives. These compliance requirement include limiting billfish tournament participants to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations (E3), requiring the retention of shark second dorsal and anal fins (I2(b)), and establishing the minimum and maximum number of floats for bottom longline and pelagic longline gear definitions (I1(b)).

The other preferred alternatives, which are outlined in Chapter 2, would change quota allocations, timeframes, authorized gear types, definitions, and other management measures, but would not likely change reporting or compliance in the fishery.

## 8.5 Description of the Steps the Agency Has Taken to Minimize the Significant Economic Impact on Small Entities Consistent with the Stated Objectives of Applicable Statutes, Including a Statement of the Factual, Policy, and Legal Reasons for Selecting the Alternative Adopted in the Final Rule and the Reason That Each One of the Other Significant Alternatives to the Rule Considered by the Agency Which Affect Small Entities Was Rejected

One of the requirements of an FRFA is to describe any alternatives to the proposed rule that accomplish the stated objectives and that minimize any significant economic impacts. These impacts are discussed below and in Chapters 4 and 6 of this document. Additionally, the Regulatory Flexibility Act (5 U.S.C. § 603 (c) (1)-(4)) lists four general categories of “significant” alternatives that would assist an agency in the development of significant alternatives. These categories of alternatives are:

1. Establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
2. Clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
3. Use of performance rather than design standards; and,
4. Exemptions from coverage of the rule for small entities.

As noted earlier, NMFS considers all permit holders to be small entities. In order to meet the objectives of this final HMS FMP and the statutes (*i.e*., Magnuson-Stevens Act, ATCA, ESA) as well as address the management concerns at hand, NMFS cannot exempt small entities or change the reporting requirements for small entities. Among other things, this final HMS FMP would set quotas for the fishing season, retention limits for the recreational fishery, and gear restrictions, all of which would not be as effective with differing compliance and reporting requirements. Thus, there are no alternatives discussed which fall under the first and fourth categories described above. Alternatives under the second and third categories are discussed below with the alternatives that were considered but not preferred.

As described below, NMFS considered a number of alternatives that could minimize the economic impact on small entities, particularly those pertaining to workshops, time/area closures, northern albacore tuna, finetooth sharks, Atlantic billfish, bluefin tuna quota management, timeframe for annual management, authorized fishing gears, and regulatory housekeeping measures.

### 8.5.1 Bycatch Reduction

#### *8.5.1.1 Workshops*

The preferred alternatives for protected species safe handling, release, and identification workshops require mandatory workshops and certification on a three year renewal timeline (A6) for all HMS pelagic and bottom longline vessel owners (A2) and operators (A3) and shark gillnet vessel owners and operators (A5). These measures were designed to minimize the economic impacts on fishermen, while simultaneously complying with 2003 BiOp and the post-release mortality targets for protected resources established in the June 2004 BiOp. Alternative A2 is estimated to have an economic impact to each bottom and pelagic longline vessel owner of up to $281 and $448 in potentially lost revenue share based on 2004 logbook data, as well as unquantified travel costs to attend a workshop. The aggregate economic impact is estimated to be between $154,269 and $258,048 in the first year. Longline vessel operators would also be impacted by the preferred alternative, but it might not impact the economic well-being of the small business for which they work. In addition, the estimated twenty shark gillnet owners that would be participating in required workshops would each have an economic impact of up to $424 in lost revenue share based on 2004 logbook data, as well as unquantified travel costs to attend a workshop.

Specifically, under these alternatives, NMFS would strive to host a number of workshops in regional fishing hubs in order to minimize travel and lost fishing time. Besides the costs of travel and lost time, there would be no additional costs for workshop participants. NMFS would attempt to hold workshops during periods when the fishery is typically inactive, effectively minimizing lost fishing time. To minimize the overall economic cost of these workshops, the preferred alternatives would limit required participation in these workshops to owners and operators. Owners and operators could pass information and appropriate direction to their crew concerning release, disentanglement, and identification of protected resources. NMFS would also select a recertification period that would allow for sufficient retraining to maintain proficiency and update fishermen on new research and development related to the subject matter while not placing an excessive economic burden on the participants due to lost fishing time and travel resulting from attending a recertification workshop in person. In addition, to lower the costs of recertification, NMFS is considering the use of alternative sources of media including CD-ROM, DVDs, or web-based media that would not result in travel costs or lost fishing time, as well as allowing private certified trainers to provide training at tailored times and locations to minimize any costs.

Other alternatives considered were voluntary workshops for longline fishermen (A1) and mandatory workshops that would include crewmembers in addition to owners and operators (A4). Several alternatives would have less onerous economic impacts to small businesses relative to the preferred alternatives. These include: the No Action alternative (A1) and mandatory workshops for only owners or only operators. These alternatives would not satisfy the RPA under the June 2004 BiOp issued pursuant to Section 7 of the ESA.

The preferred alternative for identification workshops, which would require mandatory workshops for all Federally permitted shark dealers (A9), is preferred because species-specific identification of offloaded shark carcasses is much more difficult than other HMS as evidenced by the large proportion of “unclassified” sharks listed on shark dealer logbooks. The Agency would attempt to minimize economic impacts to shark dealers by holding workshops at fishing ports to minimize travel costs and during non-peak fishing times to minimize perturbations to business activity, to the extent possible. As a result of public comment, dealers would also have the option to specify proxies to attend workshops in order to increase flexibility and minimize costs. Similar measures as those being considered for disentanglement and identification recertification are being considered for the identification workshops for shark dealers in order to minimize the economic impacts caused by this measure.

Other alternatives in addition to the No Action alternative were voluntary HMS identification workshops (A8), mandatory identification workshops for swordfish and tuna dealers (A10), mandatory identification workshops for all commercial longline vessel owners (A11) and operators (A12), mandatory identification workshops for all commercial vessel (longline, CHB, General category, and handgear/harpoon) owners (A13) and operators (A14), and mandatory identification workshops for all HMS Angling permit holders (A15). The economic impacts of these alternatives are detailed in Chapter 6. The No Action (A7) and voluntary HMS identification workshop alternative (A8) would have less onerous economic impacts relative to the preferred alternative. However, these alternatives would not address the persistent problems with species-specific shark identification in dealer reports nor satisfy the requirements and goals of this final HMS FMP or aid in rebuilding the shark fishery.

In addition to the type of workshops, NMFS considered two additional renewal timetables of two and five years. A renewal timetable of five years would have a less adverse impact than the preferred timetable of three years. However, recertification every five years for bycatch release and disentanglement workshops would allow a more extensive period of time to lapse between certification workshops than necessary to maintain proficiency and provide updates on research and development of handling and dehooking protocols. In a similar fashion, recertification every five years for HMS identification workshops would also allow a more extensive period of time to lapse between certification workshops than necessary to maintain proficiency in species identification.

#### *8.5.1.2 Time/Area Closures*

The preferred alternatives for time/area closures, which would implement complementary measures in Madison-Swanson and Steamboat Lumps closures (B4) and establish criteria to be considered when implementing new time/area closures or making modifications to existing time/area closures (B5), were designed to minimize economic impacts incurred by fishermen, while simultaneously reducing the bycatch of non-target HMS and protected species, such as sea turtles, in Atlantic HMS fisheries. Alternative B4 would establish complementary HMS regulations in the Madison-Swanson and Steamboat Lumps closures with minimal economic impacts. Creating these complementary HMS regulations would consolidate and simplify requirements for fishermen, and therefore simplify compliance. This alternative would also implement compatible regulations that would provide for a seasonal allowance (May – October) for surface trolling to partially alleviate any negative economic impacts associated with the closures or the HMS recreational and charter/headboat sector.

Other alternatives considered in addition to the No Action alternative were a closure of 11,191 $nm^2$ in the central Gulf of Mexico to pelagic longline gear (B2(a)), a closure of 2,251 $nm^2$ in the Northeast to pelagic longline gear (B2(b)), a closure of 101,670 $nm^2$ in bluefin tuna spawning areas in the Gulf of Mexico (B2(c)), a closure west of 86º W Longitude in the Gulf of Mexico to pelagic longline gear (B2(d)), a closure of 46956 $nm^2$ in the Northeast to pelagic longline gear (B2(e)), a prohibition on the use of bottom longline gear in an area off the Florida Keys to protect endangered smalltooth sawfish (B6), and a prohibition on the use of pelagic longline gear in HMS fisheries in all areas (B7). These closures alternatives were not preferred due to large economic impacts with conflicting ecological benefits between species. The details of the economic impacts associated with these other alternatives are detailed in Section 4.1.2 and Chapter 6. In addition to the closure alternatives, modifications to existing closures were also considered for the Charleston Bump closure (B3(a)) and the Northeastern U.S. closure (B3(b) which provided some economic relief but did not meet ecological needs.

Alternative B5 would establish criteria that would guide future decision-making regarding implementation or modification of time/area closures. This would provide enhanced transparency, predictability, and understanding of HMS management decisions. The time/area closure criteria would not have immediate impacts. Any ecological, social, or economic impacts of a specific closure or modified closure would be analyzed in the future when that specific action is proposed.

### 8.5.2 Rebuilding and Preventing Overfishing

#### *8.5.2.1 Northern Albacore Tuna*

The preferred alternative for northern albacore management, which would establish the foundation for developing an international rebuilding program (C3), was designed to address rebuilding of the northern albacore tuna fishery while simultaneously minimizing economic impacts incurred by fishermen. This alternative would have minimal economic impacts, because it would not implement any additional restrictions at this time. Even under an international plan, the United States is a small participant in this fishery and only has a small allocation that it does not even fully harvest at this time.

Other alternatives considered were No Action (C1) and taking unilateral proportional reductions in northern albacore tuna harvest (C2). Taking unilateral action to address northern albacore tuna on the part of the United States would likely not be effective in rebuilding the stock because the United States is a small participant in this fishery, and would have larger economic impacts than the preferred alternative.

The No Action alternative would have the same economic impacts as the preferred alternative because NMFS has been promoting an international rebuilding plan at ICCAT. In a prior rulemaking, NMFS addressed the same northern albacore tuna alternatives but did not incorporate them into the HMS FMP. The No Action alternative is rejected, because it would not include the rebuilding strategy in the FMP.

#### *8.5.2.2 Finetooth Sharks*

The preferred alternative for finetooth shark management (D4) was designed to address overfishing while minimizing economic impacts incurred by fishermen and potential negative ecological impacts. This alternative would be expected to have minimal to no economic impacts, because no new restrictions are being proposed at this time. Long-term, the alternative would have positive ecological impacts by addressing finetooth mortality in HMS and other fisheries and positive economic impacts if the fishery is sustained.

Other alternatives considered were No Action (D1), commercial management measures (D2), and recreational management measures (D3). Only the No Action alternative would have less economic impact relative to the preferred alternative. However, this alternative was not preferred because it would not facilitate efforts to address overfishing of finetooth sharks.

#### *8.5.2.3 Atlantic Billfish*

The preferred alternatives for Atlantic billfish management, which include requiring the use of non-offset circle hooks when using natural baits in tournaments (E3) and implementing the ICCAT marlin landings limits (E6), were designed to minimize economic impacts incurred by recreational fishing sector, while simultaneously enhancing the management of the directed Atlantic billfish fishery. Specifically, alternative E3 would likely have a minimal economic impact, since it would not affect all billfish recreational anglers, only tournament participants.

Therefore, the impacts on hook manufactures, retailers, and anglers would likely be limited given that J-hooks would continue to be permitted outside of tournaments and within tournaments with artificial lures. In addition, delayed implementation to 2007 would help lower any potential economic impacts due to supply and demand changes. Impacts on tournaments would also likely be minimal, given the increase in the number of tournaments that provide special award categories or additional points for billfish captured and released on circle hooks. Alternative E3 would also likely have high compliance rates given the self-policing that is likely to occur among tournament participants competing for prizes, as well as the increasing use of tournament observers.

Alternative E6 is the preferred alternative because management measures can be implemented in response to the needs of a given fishing year to ensure maximum utilization of the ICCAT landing limit. The alternative considers three levels of management measures based upon marlin landing thresholds to minimize the economic impact. When it is not expected that marlin landings will approach the threshold for action, then no in-season actions would occur and there would not be any economic impacts. If the threshold for action were achieved, minimum size requirements for Atlantic marlins would increase to a level sufficient to curtail landings. Finally, if the ICCAT landing limits were achieved in any one year, the fishery would shift to a catch and release only fishery for the remainder of that year. This last scenario would be unlikely given historical landings and minimum size requirements that would occur at the action threshold. Under the preferred calendar year management alternative (G2), alternative E6 also would help reduce any disproportionate economic impacts to CHB operators, tournaments, and anglers who fish for marlin late in the fishing year or in late season tournaments by providing anglers the greatest opportunity to land marlin over the entire length of the fishing year. Alternative E6 is estimated to potentially result in $1.3 to $2.7 million in economic impacts as compared to the $13.4 to $20.0 million in impacts for catch-and-release only for Atlantic blue and white marlin (Alternatives E7 and E8 combined) resulting in an estimated one to two tournament cancellations and unquantified impacts on CHB businesses.

Other alternatives considered were No Action (E1), limiting all participants in the Atlantic HMS recreational fishery to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations in all HMS fisheries (E2), increasing the minimum size limit for Atlantic white and/or blue marlin (E4), implementing recreational bag limits of one Atlantic billfish per vessel per trip (E5), allowing only catch and release fishing for Atlantic white marlin (E7), and allowing only catch-and-release fishing for Atlantic blue marlin (E8). Only the No Action alternative would have less onerous economic impacts relative to the preferred alternative. However, the No Action alternative would not satisfy the requirements and goals of implementing the ICCAT recommendations under ATCA, rebuilding the Atlantic blue and white marlin fishery under the Magnuson-Stevens Act, or the objectives of the HMS FMP.

### 8.5.3 Management Program Structure

#### *8.5.3.1 Bluefin Tuna Quota Management*

The preferred alternatives for bluefin tuna quota management include revised General category time-periods and subquotas to allow for a formalized winter fishery (F3(c)), clarified procedures for calculating the Angling category school size-class subquota allocation (F4), modification of the bluefin tuna specification process and streamlining annual under/overharvest procedures (F6), an individual quota category carryover limit and authorization of the transfer of quota exceeding limit (F8), and revised and consolidated criteria that would be considered prior to performing a BFT inseason action (F10). These preferred alternatives were designed to minimize economic impacts incurred by fishermen, while simultaneously enhancing and clarifying bluefin tuna quota management and inseason actions.

Alternative F3(c) would strike a balance between providing consistent quota allocations and having the flexibility to amend them in a timely fashion. This alternative would slightly reduce General category quota from early time periods, thereby allowing for a formal winter General category bluefin tuna fishery to take place during the months of December and January, and therefore would increase regional access. By shifting the allocated quota from the June through August time-period, which has an overall higher allocation, to a later time-period any adverse impacts would be mitigated by the increased revenue generated in the later time-period. In addition, the fishermen from the Northeast are not precluded from fishing in southern areas during winter bluefin tuna season.

Alternative F4 would clarify the procedures NMFS uses in calculating the ICCAT recommendation regarding the eight percent tolerance for BFT under 115 cm. It would also maintain the north/south dividing line that separates the Angling category. This alternative is not likely to have an economic impact.

Alternative F6 would simplify quota allocations by eliminating the need to allocate each domestic quota categories' baseline allocation each year, as the allocation percentages and the actual quota equivalents (measured in metric tons) would be codified in the regulations implementing the consolidated HMS FMP at least until ICCAT alters its BFT TAC recommendation. This alternative would have positive economic impacts to the domestic BFT fishery as a whole by allowing BFT fishery participants, either commercial or recreational in nature, to make better informed decisions on how to best establish a business plan for the upcoming season.

Alternative F8 would have some economic impacts as a result of limiting the amount of underharvest of the bluefin tuna quota that could be rolled over from one year to the next within a category. However, this alternative was designed to mitigate any impacts by allowing NMFS to redistribute quota exceeding the proposed 100 percent rollover cap to the Reserve or to other domestic quota categories, provided the redistributions are consistent with ICCAT recommendations and the redistribution criteria.

Alternative F10 would result in slightly more positive economic impacts as the criteria NMFS must consider when making an inseason action determination would be consolidated and consistent regardless of what type of inseason action is being considered. This would minimize confusion and provide additional transparency to the management process.

Other alternatives considered in addition to the No Action (F1, F5, and F9) alternatives were establishing General category time-periods, subquotas, and geographic set asides annually via framework actions (F2); establishing monthly General category time-periods and subquotas (F3(a)); revising the General category time-periods and subquotas to allow for a formalized winter fishery with different time-period allocations (F3(b) and (d)); eliminating the underharvest quota carryover provisions (F7), and eliminating the BFT inseason actions (F10). These additional alternatives would not likely reduce overall impacts to the fishery as a whole further relative to the preferred alternatives.

#### *8.5.3.2 Timeframe for Annual Management of HMS Fisheries*

The preferred alternative for the timeframe for annual management of HMS fisheries, which would shift the time frame to a calendar year (January 1 to December 31 (G2)), was designed to minimize economic impacts on HMS fisheries and simplify HMS fishery management and reporting to ICCAT. This alternative would not impact the shark fishery, since that fishery is already operating under a calendar year. The shift in the other HMS fisheries' timeframe for annual management would establish consistent timing between U.S. domestic and international management programs, reducing the complexity of U.S. reports to ICCAT and creating more transparent analyses in the U.S. National Report. Setting an annual quota and other fishery specifications on a multi-year basis for bluefin tuna could mitigate any potential negative impacts associated with reduced business planning periods that may result from a calendar year timeframe. The flexibility established in alternative E6 for billfish could partially mitigate any negative regional economic impacts to marlin tournaments, charters, and other related recreational fishing businesses. To facilitate the transition to a calendar year management timeframe for bluefin tuna and swordfish, the 2007 fishing year would be abbreviated from June 1, 2007 through December 31, 2007, which could provide slightly higher quotas during that time period and slight positive impacts for fishermen. The specifics of this abbreviated season would be implemented under a separate action.

Other alternatives considered were to maintain the current fishing year (G1) and to shift the fishing year to June 1 - May 31 for all HMS species (G3). These alternatives are not likely to result in economic impacts substantially different than the preferred alternative; however, they would not meet the objectives of this action.

#### *8.5.3.3 Authorized Fishing Gears*

The preferred alternatives for authorized gears, which would authorize speargun fishing in the recreational Atlantic tuna fishery (H2), authorize buoy gear for the commercial swordfish fishery (H5), and clarify the allowance of hand-held cockpit gear (H7), were designed to reduce the economic impacts to fishermen, in the case of H5, and enhance the economic opportunities in recreational and commercial fishing. Specifically, alternative H2 would enhance economic opportunities in the tuna recreational fishery by including a new authorized class of recreational fishing, speargun fishing.

The swordfish handgear fishery may currently utilize individual handlines attached to free-floating buoys, however, preferred alternative I5(b) would require that handlines used in HMS fisheries be attached to a vessel. Alternative H5 would change the definition of individual free-floating buoyed lines, that are currently considered to be handlines, to “buoy gear,” allowing the commercial swordfish handgear fishery to continue utilizing this gear type. Alternative H5 would explicitly authorized this gear type but limit vessels to possessing and deploying no more than 35 individual buoys with each having no more than two hooks or gangions attached. The economic impact of this alternative would likely be minimal, since the upper limit on the number of buoys is based on information obtained about the fishery though public comment, and based on what NMFS has identified as the manageable upper limit for the commercial sector.

Finally, alternative H7 would also likely reduce confusion over the allowable use of secondary cockpit gears to subdue HMS captured on authorized gears. The use of these secondary gears might result in positive economic benefits from anticipated increases in retention rates.

Other alternatives considered in addition to No Action were to authorize speargun in both the commercial tuna handgear and recreational tuna fisheries (H3), authorizing green-stick fishing gear (H4), and authorizing buoy gear in the commercial swordfish handgear fishery with 50 buoys with 14 hooks each (H6). None of the non-preferred alternatives would have less economic impacts than the preferred alternatives.

#### *8.5.3.4 Regulatory Housekeeping*

The preferred alternatives for regulatory housekeeping items were designed to minimize economic impacts, while also clarifying regulatory definitions and requirements, facilitating species identification, and enhancing regulatory compliance.

The preferred alternative I1(c), which would differentiate between BLL and PLL gear by using the species composition of catch landed, would more clearly define the difference between BLL and PLL gear using a combination of gear configuration and performance standards based on the composition of catch landed. This would clarify the difference between these two gear types and enhance compliance with time/area closures that place restrictions on these two gear types. There could be some, but likely limited, economic impacts to vessels that may currently fish in gear restricted time/areas closures that do not conform to the proposed BLL and PLL gear specifications and performance standards. This performance based standard could adversely impact those longline vessels that regularly target both demersal and pelagic species on the same trip. Other alternatives considered in addition to the No Action alternative were to specify maximum and minimum number of floats for BLL and PLL gear (I1(b)) require time/depth recorders on all HMS longlines (I1(d)) and base closures on all longline vessels (I1(e)). Only the No Action alternative could have less onerous economic impacts relative to the preferred alternatives. However, the No Action alternative would not address the Agency’s concerns with differentiating between bottom and pelagic longline gear.

The preferred alternative for shark identification, which would require that the second dorsal fin and anal fin remain attached on all sharks (I2(b)), addresses issues associated with shark species identification, but would be flexible enough to still allow fishermen to remove the most valuable fins in order to minimize the economic impacts of this alternative. Fishermen could experience, in the short-term, some adverse economic impacts associated with lower revenues associated with keeping the second dorsal and anal fins on sharks. Other alternatives considered in addition to the No Action alternative (I2(a)) were to require the dorsal and anal fin on all sharks except lemon and nurse sharks (I2(c)) and to require all fins on all sharks be retained (I2(d)). Some alternatives could have fewer economic impacts relative to the preferred alternative. These include the No Action alternative and the alternative requiring the dorsal and anal fin on all sharks except lemon and nurse sharks (I2(c)). These alternatives, however, would not satisfy enforcement and species identification needs.

The preferred alternatives I3(b) and I3(c), which would prohibit the purchase or sale of HMS from vessels in excess of retention limits, would enhance compliance with current regulations by consolidating the requirement for both vessels and dealers. These alternatives would have minimal economic impact on dealers and vessels following the current retention limits. The only additional alternative considered was No Action, which would have less economic impact than the preferred alternatives but would not satisfy the enforcement or monitoring objectives.

The preferred alternative I4(b), which would amend the Florida East Coast closed area, would clarify the regulations regarding this closed area and make them consistent with the boundary of the EEZ. The only additional alternative considered was No Action. Neither alternative is expected to have any economic impact since fishing activity is likely to be limited in this small area.

The preferred alternative I5(b), which would amend the definition of handline gear to require that they be attached to a vessel, would clarify the definition of handline. The economic impact of this new definition would be minimal since unattached handline gear would be defined as "buoy gear" under alternative H5. Other alternatives considered were No Action (I5(a)) and to require handlines be attached to recreational vessels only (I5(c)). These two alternatives could have less economic impacts relative to the preferred alternative, but they would not meet the ecological objectives of this document.

The preferred alternative I6(b), which would prohibit commercial vessels from retaining billfish, would not have any economic impacts because current regulations do not allow these vessels to sell the billfish that are landed. This alternative would clarify and consolidate the requirements for commercial vessels to make them consistent with the regulations prohibiting vessel with pelagic longline gear from retaining billfish. The only other alternative considered was No Action, which could have less social impacts than the preferred alternative but it would not satisfy ecological needs of rebuilding billfish stocks.

The preferred alternative I7(b), which would allow Atlantic tuna dealers to submit reports using the Internet, would simplify reporting and potentially reduce costs. The other alternatives considered were No Action and providing BFT dealers the option to report online (with specific exceptions). They would not result in less economic burden than the preferred alternative.

The preferred alternatives I8(b) and I8(c), which would require the submission of no fishing and cost-earnings reporting forms, would clarify current regulations and potentially enhance compliance. The other alternative considered was No Action; that alternative would not meet the NMFS' objectives to collect quality data to manage the fishery. Neither alternative is expected to have any economic impacts.

The preferred alternative I9(b), which would require vessel owners to report non-tournament recreational landings, would clarify and simplify the reporting process by codifying the current prevalent practice of recreational landings being reported by vessel owners versus individual anglers. The other alternative considered, No Action (I9(a), might result in less economic burden to small businesses but would not satisfy the goal of improving reporting or other objectives of the FMP.

The preferred alternative I10(c) would conduct additional discussions at ICCAT regarding the long-term implications of allowing unused BFT quota from the previous year being added to the subsequent year's allocation. Depending on the results these discussions the regulations and operation procedures may need to be further amended in the future. In the interim, NMFS would maintain the current regulatory text, but would amend the practice of allowing under/overharvest of this set-aside allocation to be rolled into, or deducted from, the subsequent fishing year's set-aside allocation. Other alternatives considered include No Action and amending the regulatory text to clarify that rollover provisions would apply to this set-aside quota. There could be potential economic impacts associated with all of these alternatives, for instance the potential economic gain attributed to quota being carried forward from the preceding fishing year would remain be available under alternative I10(a) and I10(b), however alternative I10(c) would prevent excessive rollovers from occurring, thereby eliminating an incentive for PLL vessel operators to increase effort, or even possibly directing their effort, on BFT in this area. Accumulation of incidental quota, and possibly providing an incentive to target BFT with longline gear would not fully reflect the intent of the recommendation.

Finally, the preferred alternative I11(b), which would require recreational vessels with a Federal permit to abide by Federal regulations regardless of where they are fishing, would standardize compliance with HMS regulations for vessels possessing a federal HMS permit. This would likely simplify compliance with regulations, except in cases where a state has more restrictive regulations. The other alternative considered was No Action, which could have marginally less economic impact than the preferred alternative, but it would not result in simplified compliance with regulations, and therefore would not meet the objectives of the FMP.

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# 9.0 COMMUNITY PROFILES

This Chapter identifies and describes the HMS fishing communities as required under the Magnuson-Stevens Act and other laws. This Chapter consolidates all of the communities profiled in previous HMS FMPs or FMP amendments and updates the community information where possible. The communities profiled in this chapter were originally selected due to the proportion of HMS landings in the town, the relationship between the geographic communities and the fishing fleets, the existence of other community studies, and input from the HMS and Billfish Advisory Panels. Though additional communities could be impacted by changes to the current HMS regulations, the communities profiled in this section were previously identified as ones that are most likely to experience the most significant impacts. After reviewing the HMS permit databases, additional HMS-related community profiles should be developed in the future. Recommendations for these new profiles are included at the end of this chapter (Section 9.1).

## 9.1 Introduction

The Magnuson-Stevens Act requires, among other things, that all FMPs include a fishery impact statement intended to assess, specify, and describe the likely effects of the measures on fishermen and fishing communities (§303(a)(9)).

The National Environmental Policy Act (NEPA) also requires federal agencies to consider the interactions of natural and human environments by using a "systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making" (§102(2)(A)). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects, which may be direct, indirect, or cumulative. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. The consequences of management actions need to be examined to better ascertain and, if necessary and possible, mitigate regulatory impacts on affected constituents.

Social impacts are generally the consequences to human populations resulting from some type of public or private action. Those consequences may include alterations to the ways in which people live, work or play, relate to one another, and organize to meet their needs. In addition, cultural impacts, which may involve changes in values and beliefs that affect people's way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Community profiles are an initial step in the social impact assessment process. Although public hearings and scoping meetings provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

The Magnuson-Stevens Act outlines a set of National Standards (NS) that apply to all fishery management plans and the implementation of regulations. Specifically, NS 8 notes that:

> "Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of

> overfished stocks), take into account the importance of fishery resources to fishing communities in order to: (1) provide for the sustained participation of such communities; and, (2) to the extent practicable, minimize adverse economic impacts on such communities." (§301(a)(8)). See also 50 CFR §600.345 for National Standard 8 Guidelines.

"Sustained participation" is defined to mean continued access to the fishery within the constraints of the condition of the resource (50 CFR §600.345(b)(4)). It should be clearly noted that NS 8 "does not constitute a basis for allocation of resources to a specific fishing community nor for providing preferential treatment based on residence in a fishing community" (50 CFR §600.345(b)(2). The Magnuson-Stevens Act further defines a "fishing community" as:

> " ... a community that is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, crew, and fish processors that are based in such communities." (§3(16))

The National Standard guidelines expand upon the definition of a fishing community, and state that, "A fishing community is a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries-dependent services and industries (for example, boatyards, ice suppliers, tackle shops)" (50 CFR §600.345(b)(2)). So while there is a diffuse Vietnamese-American population in Louisiana actively participating in the pelagic longline fishery and commuting to fishing ports as mentioned in Section 4.6, this group of individuals is not considered a fishing community, according to the National Standard guidelines.

NMFS (2001) guidelines for social impact assessments specify that the following elements are utilized in the development of FMPs and FMP amendments:

1. The size and demographic characteristics of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region.

2. The cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities.

3. The effects of proposed actions on social structure and organization; that is, on the ability to provide necessary social support and services to families and communities.

4. The non-economic social aspects of the proposed action or policy; these include life-style issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats.

5. The historical dependence on and participation in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights.

## 9.2 Methodology

### 9.2.1 Previous community profiles and assessments

NMFS contracted with Dr. Doug Wilson, from the Ecopolicy Center for Agriculture, Environmental and Resource Issues at Rutgers, the State University of New Jersey, to help develop the community profiles and social impact assessments for the 1999 HMS FMP and Amendment 1 to the FMP for Atlantic Billfish. Dr. Wilson and his colleagues completed their fieldwork in July 1998. This study covered four species groups (tunas, swordfish, sharks and billfishes) that have important commercial and recreational fisheries extending along the Atlantic and Gulf coasts from Maine to Texas and in the Caribbean. The study investigated the social and cultural characteristics of fishing communities in five states and one U.S. territory: Massachusetts, New Jersey, North Carolina, Florida, Louisiana, and Puerto Rico. These areas were selected because they each had important fishing communities that could be affected by the 1999 HMS FMP and Atlantic Billfish Amendment, and because they are fairly evenly spread along the Atlantic and Gulf coasts and the Caribbean. The study compiled basic sociological information from at least two coastal communities for each state or territory. These locations were visited for further analysis. In the 1998 study, towns were selected based on HMS landings data, the relationship between the geographic communities and the fishing fleets, and the existence of other community studies. The information in this document incorporates by reference the Wilson *et al.,* (1998) study of the HMS fishery and the work of McCay and Cieri (2000) for the Mid-Atlantic Fishery Management Council, "The Fishing Ports of the Mid-Atlantic."

Additionally, this Chapter uses the information gathered under the contract with the Virginia Institute of Marine Science (VIMS) at the College of William and Mary to re-evaluate several of the baseline HMS communities (Kirkley, 2005). The VIMS study gathered a profile of basic sociological information for the principal states involved with the Atlantic shark fishery. From the 255 communities identified as involved in the 2001 commercial fishery, Amendment 1 to the 1999 HMS FMP focused on specific towns based on shark landings data, the size of the shark fishing fleet, the relationship between the geographic communities and the fishing fleets, and the existence of other community studies. While the recreational fishery is an important component in the overall shark fishery, the VIMS study did not profile the shark recreational fishery because participation and landings were not documented in a manner that permits community identification. The Wilson *et al*., study selected only the recreational fisheries found within the commercial fishing communities for a profile due to the lack of community-based data for the sport fishery. To the extent that it is available, the information on the HMS-related recreational fisheries has been incorporated into the community profiles.

### 9.2.2 Information Used in this Assessment

To ensure continuity with the 1999 HMS FMP and previous amendments, if a community was selected and described as being involved with an HMS fishery, the same community was included in this assessment. The HMS permit data support the need to include the previously profiled communities as communities that continue to be active in HMS fisheries. The communities selected for detailed study are Gloucester and New Bedford, Massachusetts; Barnegat Light and Brielle, New Jersey; Wanchese, and Hatteras Township, North Carolina;

Pompano Beach, Fort Pierce, Madeira Beach, Panama City Beach, and Islamorada, Florida; Boothville/Venice and Dulac, Louisiana; and Arecibo, Puerto Rico. These communities are not intended to be an exhaustive list of every HMS-related community in the United States; rather the objective is to give a broad perspective of representative areas. The demographic profile tables in this chapter were modified from previous documents to include the same baseline information for each community profiled. As a result, most of the tables include more information than portrayed in previous HMS FMPs and amendments. The demographic tables use both 1990 and 2000 Bureau of the Census data for comparative purposes. A profile for the U.S. Virgin Islands could not be created because the 1990 Census data were not available, and only some of the demographic information was available for 2000. Additionally, a descriptive profile for the Virgin Islands has not been developed for any previous HMS-related actions. The descriptive community profiles in this chapter include information provided by Wilson, *et al.* (1998) and Kirkley (2005) with some new information provided by Impact Assessment, Inc (2004) on the Gulf of Mexico communities. Unlike the Wilson, *et al.* (1998) study used in the 1999 HMS FMP, it was not possible to undertake field research for this assessment. In this chapter, the community descriptions are organized by state.

This assessment also reviewed the available information on location of HMS permit holders to provide information about residence and to identify additional HMS-related fishing communities that may be profiled in the future. Six GIS maps were generated to identify the communities where angler, charter/headboat, HMS dealers (tunas, shark, and swordfish combined), commercial tuna (all gear categories combined), directed and incidental shark, and swordfish (directed, incidental, and handgear combined) permit holders reside with four regional maps for the angler permits due to the volume of permit holders. In past community profile and social impact analyses, it was difficult to identify where HMS recreational fishermen were located because no data were available for the number of recreational fishermen and their landings by community. As a result, the previous assessments report on charter fishing operations, fishing tournaments, and related activities to identify the scope of recreational fishing for each of the communities described. The permit holder information should assist in identifying future recreational industry community profiles, such as Ocean City and Berlin, Maryland.

While geographic location is an important component of a fishing community, the transient nature of HMS may cause the permitted fishermen to shift location in an attempt to follow the fish. Because of this characteristic, management measures for HMS often have the most identifiable impacts on fishing fleets that use specific gear types. The geographic concentrations of HMS fisheries may also fluctuate from year to year, as the behavior of these migratory fish is variable. The relationship between these fleets, gear types, and geographic fishing communities is not always a direct one; however, they are important variables for understanding social and cultural impacts. As a result, the inclusion of typical community profiles in HMS management decisions is somewhat difficult, as geographic factors and use of a specific gear type have to be considered.

Several other chapters in this FMP include information that addresses the requirements described Section 9.1 and that is an integral part of this social impact assessment and fishery impact statement. Please refer to the Description of the Fisheries in Chapter 3, the Economic

Evaluation in Chapter 6, the Regulatory Impact Review (RIR) in Chapter 7, and the Final Regulatory Flexibility Analysis (FRFA) in Chapter 8. Furthermore, each of the management alternatives in Chapter 4 includes an assessment of the potential social and economic impacts associated with the proposed alternatives. The preferred alternatives are selected to minimize economic impacts and provide for the sustained participation of fishing communities, while taking the necessary actions to rebuild overfished fisheries as required by the Magnuson-Stevens Act.

#### *9.2.2.1 Community Impacts from Hurricanes Katrina and Rita*

The impacts of both Hurricane Katrina (late August 2005) and Hurricane Rita (September 2005) have yet to be fully realized, but have had a devastating effect on many Gulf of Mexico communities. NMFS has conducted assessments of the commercial and recreational fishing sectors, as well as the coastal communities and the supporting marine infrastructure (NMFS, 2005b). Much of this information is still preliminary and has not been thoroughly documented to date.

Storm surge and/or broken levies destroyed many of the Gulf communities, such as Venice, Louisiana and areas south of Belle Chasse (Ingles, pers. com.). Many individuals involved with HMS fisheries, and their families, have lost their homes and have been displaced or are living in temporary structures with no electricity or running water and only minimal monetary assistance from Federal Emergency Management Agency (pers. com. with affected fisheries participants). In some instances, vessels have become the primary residence because their homes were destroyed. Rebuilding has been challenging because many people did not have insurance prior to the hurricanes. Those with insurance found that it covered only wind and not water damage. And others with basic coverage found that it was not enough to cover the boat, business, and home. As a result, the hurricanes have accelerated gentrification in many of the communities (Ingles, pers. com.).

In addition to their homes, the storms had a devastating impact on fishing vessels in the Gulf region. These impacts include, vessels sunk, displaced, piled up, or completely destroyed (Ingles, pers. com.). Even though some vessel did survive the hurricanes, there was a major impact to the supporting infrastructure that the commercial industries rely upon (*e.g.*, seafood dealers, processors, suppliers) and anglers require to go fishing (*e.g.*, bait shops, marinas, etc.) (NMFS, 2005b). Where vessels escaped relatively unscathed by the hurricanes, but lost the supporting infrastructure to continue landing in their usual ports, fishermen chose to land their catch in Gulf ports located further west where the damage was not as great (Ingles, pers. com.).

The pelagic longline fishery was significantly impacted by the hurricanes since about 60 percent of the Eastern pelagic longline vessels were in the Gulf region when the hurricanes arrived (National Fishermen, 2006). The number of sets made in 2005 declined compared to 2004 with a majority of that decline attributable to the Gulf of Mexico area (National Fishermen, 2006). About 22 percent of the active PLL fleet showed no activity during third quarter of 2005, likely due to the impact of Hurricane Katrina; and about 14 percent of the active fleet showed no activity in the fourth quarter, possibly a result of Hurricane Rita. More than half the longline vessels operating out of Louisiana were fishing again by March 2006 with the remainder of the vessels severely damaged or being used for housing, rather than fishing (National Fishermen, 2006). Even those vessels that can still operate may not be in an area where the infrastructure is sufficient to support a commercial fishery and may not be able to relocate due to the rising price of fuel (Ingles, pers. com.).

While the impacts of Hurricanes Katrina and Rita were devastating to many Gulf communities, at least half of the inactive permit holders in the second half of 2005 had renewed their permits as of March 2006 (Preliminary Logbook Data, 2005). Though this does not necessarily indicate that these vessels are actively fishing, it at least indicates that the permit holders are hopeful about using the permits again.

## 9.3 United States Demographic Profile

In 1990, the United States had a total population of 248.7 million (Table 9.1). The population increased to 281.4 million in 2000. Throughout the previous decade, the population was roughly half female and half male. Individuals between 20 and 44 years of age comprised the largest proportion of the population in both 1990 and 2000. The dominant race was white. Ninety-two million total households, in 1990, grew to 105.5 million households in 2000. The average household and family size remained about the same between the two decades. The number of high school graduates, ages 25 and older, increased between 1990 and 2000 by about five percent (Table 9.1). Between 1990 and 2000, the total number of business establishments in the United States increased from 6.2 to 7.1 million. While unemployment decreased by half in 2000, the individuals below the poverty line decreased by less than one percent. In 1990, employment in farming, fishing, forestry, and mining industries accounted for 3.3 percent collectively; whereas in 2000, collective employment in these industries accounted for less than two percent.

**Table 9.1 Demographic Profile of the United States.** Source: U.S. Census, 1990 and 2000.

| **Demographics** | **1990** | **2000** |
|---|---|---|
| Total Population | 248,709,873 | 281,421,906 |
| **Sex** | | |
| Male | 48.7% | 49.1% |
| Female | 51.3% | 50.9% |
| **Age** | | |
| < 20 | 25.6% | 28.6% |
| 20 - 44 | 43.2% | 36.9% |
| 45 - 64 | 18.6% | 22.0% |
| > 65 | 12.6% | 12.4% |
| **Race** | | |
| White | 80.3% | 75.1% |
| Black or African American | 12.1% | 12.3% |
| American Indian and Alaska Native | 0.8% | 0.9% |
| Asian | 2.8% | 3.6% |
| Native Hawaiian and Other Pacific Islander | 0.1% | 0.1% |
| Other | 3.9% | 5.5% |
| **Household** | | |
| **Total** | **91,947,410** | **105,480,101** |
| Family households | 70.2% | 68% |
| Nonfamily households | 29.8% | 32% |
| Average household size | 3 | 2.59 |
| Average family size | 3.16 | 3.14 |
| **Housing Occupancy** | | |
| Total housing units | 102,263,678 | 115,904,641 |
| Vacant housing units | 10.1% | 9.0% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 64.2% | 66.2% |
| Renter-occupied housing units | 35.8% | 33.8% |

| **UNITED STATES** | **1990** |
|---|---|
| **Population:** | 281,421,906 |
| **Education:** | |
| High school graduates (25 years or older) | 75.2% |
| **Economic Characteristics** | |
| Labor force (16 years and over) | 65.3% |
| Unemployed | 6.3% |
| Median Household Income | $ 30,056 |
| Individuals below the poverty line* | 13.1% |
| **Employment in some industry sectors:** | |
| Managerial/professional | 26.4% |
| Technical, Administrative, & Sales | 31.7% |
| Construction, Production, Maintenance, & Transportation | 26.2% |
| Farming, fishing, forestry, & mining | 2.5% |
| **Industry** | |
| Farming, fishing, forestry & mining | 3.3% |
| Construction | 6.2% |
| Manufacturing | 17.7% |
| Wholesale trade | 4.4% |
| Retail | 16.8% |
| Education, health & social services | 23.3% |
| Arts, recreation, lodging & food services | 1.4% |

## 9.4 State and Community Profiles

### 9.4.1 Maine

Between 1990 and 2000, the population in the state of Maine increased by about 4.6 percent (Table 9.2). The number of high school graduates, ages 25 years and older, has increased over the past decade. The unemployment rate decreased, while the percentage of individuals below the poverty line remained the same. Employment in the farming, fishing, forestry, and mining industries remained about the same with education, health, and social services industries providing the greatest source of employment for the state's residents.

As of February 2006, Maine had nine commercial vessels with shark and swordfish fishing permits (Table 9.38 and Table 9.39) and 517 commercial tuna permit holders (Figure 9.4 and Table 9.36). Maine also has 26 licensed dealers for tunas, sharks, and swordfish; ten of the dealers reside in Portland (Table 9.37 and Figure 9.5). In fact, Maine has the third greatest number of commercial tuna permit holders with 10.2 percent of the total (Table 9.36).

Despite having only four shark permits issued to Maine residents in 2006, there were several communities involved with the commercial shark fishery in 2003, such as Cape Elizabeth, Harpswell, and Portland (Cumberland County); Southwest Harbor and Winter Harbor (Hancock County); Owls Head and Rockland (Knox County); and Kittery, Milbridge, and Old Orchard Beach (York County) (NMFS 1999a). Many of the vessels homeported in Maine participate in the shark fisheries in southern waters and make landings in Florida and other states; therefore, landings are not always indicative of a community's involvement in a fishery. The incidental nature of shark catches off Maine for the commercial fishery is also true for the recreational fishery. Sharks are often taken incidentally during tuna fishing trips. There is, however, a small group of anglers who fish with light tackle for blue shark, mako, and porbeagle in the Gulf of Maine. To date, no HMS-related community profiles have been developed for the State of Maine, as there are no significant concentrations of HMS-related fisheries in any particular community.

In 2004, an estimated 287,000 sportfishermen made 760,000 fishing trips in marine waters off Maine (NMFS, 2005a). Of these anglers, about 54 percent were from out of state. About one percent of the HMS angling permit holders live in the state of Maine (Table 9.34 and Figure 9.1). The American Sportfishing Association (ASA) estimated that all saltwater recreational fishing in Maine in 2001 generated some $67.8 million in direct and indirect retail sales. Employment in marine recreational fishing services was estimated to be 1,287 jobs (ASA, 2002). An indication of recreational interest in shark fishing is that charterboats advertise for shark fishing trips from York Harbor, Sheepscot, Casco Bay, Saco Bay, Bath, Damariscotta, and Old Orchard Beach. Sixty-one charter/headboats in Maine held HMS permits as of February 2006 (Table 9.35). These Maine charter operations are seasonal, typically from Memorial Day to Labor Day, and some of the operators advertise that they move to Florida, or the Caribbean, to run charters during the Florida season from November to May.

**Table 9.2 Maine Demographic Profile.** Source: U.S. Census, 1990 and 2000.

| Maine | 1990 | 2000 |
|---|---|---|
| **Population:** | **1,227,928** | **1,274,923** |
| **Education:** | | |
| High school graduates (25 years or older) | 78.8% | 85.4% |
| **Employment:** | | |
| Labor force (16 years and over) | 65.6% | 65.3% |
| Unemployment Rate | 6.6% | 4.8% |
| Median Household Income | $27,854 | $37,240 |
| Individuals below the poverty line* | 10.8% | 10.9% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 2.8% | 2.6% |
| Construction | 7.3% | 6.9% |
| Manufacturing | 19.7% | 14.2% |
| Wholesale trade | 3.6% | 3.4% |
| Retail | 18.4% | 13.5% |
| Education, health & social services | 24.8% | 23.2% |
| Arts, recreation, lodging & food services | 0.9% | 7.1% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

### 9.4.2 New Hampshire

New Hampshire's population increased by about 10.3 percent between 1990 and 2000 (Table 9.3). The number of high school graduates, ages 25 years and older, increased slightly. The unemployment rate decreased, while the percentage of individuals below the poverty line remained the same. Employment in the farming, fishing, forestry, and mining industries declined by six percent with education, health, and social services industries continued to provide the greatest source of employment for the state's residents.

New Hampshire's commercial shark fishery is very small and largely incidental to the take of other species. The local shark fishery involves three vessels (Table 9.38). Only one swordfish permit holder resides in New Hampshire (Table 9.39). There are 26 HMS dealers in the state of New Hampshire (Table 9.37). New Hampshire has the sixth greatest number of commercial tuna permit holders (Table 9.36). Slightly greater than one percent of the angling permit holders reside in New Hampshire (Table 9.34). Because of the relatively small size of the HMS fisheries, community profiles were not developed for New Hampshire ports.

The recreational fishery for sharks in New Hampshire waters is largely incidental, on a very small scale, and similar to that of Maine. Occasionally caught close to shore, most makos are taken in water reaching depths over 20 fathoms. New Hampshire is home to 324 HMS angling permit holders in 2005 (Table 9.34). There are 55 charterboat operators in Portsmouth, Rye, Seabrook, Hampton, as well as a few other towns, held HMS permits in 2005 (Table 9.35). Many of these charterboats advertise shark fishing trips offshore from June through September, with the best fishing in June and July. Target species for these trips are mako, blue, thresher and porbeagle sharks.

In 2003, 164,000 anglers made 361,000 fishing trips to the marine waters off New Hampshire (NMFS, 2003). Of these saltwater anglers, 43 percent were visitors from out-of-state. It is estimated that these saltwater anglers generated some $59.3 million in direct and indirect retail sales related to their fishing in New Hampshire in 2001 (ASA, 2002). The marine recreational fishing services sector provided some 1,103 jobs in the state in 2001.

**Table 9.3 New Hampshire Demographic Profile.** Source: U.S. Census, 1990 and 2000

| New Hampshire | 1990 | 2000 |
|---|---|---|
| **Population:** | **1,109,252** | **1,235,786** |
| **Education:** | | |
| High school graduates (25 years or older) | 82.2% | 87.4% |
| **Employment:** | | |
| Labor force (16 years and over) | 71.9% | 70.5% |
| Unemployment Rate | 6.2% | 3.8% |
| Median Household Income | $36,329 | $49,467 |
| Individuals below the poverty line* | 6.4% | 6.5% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 1.5% | 0.9% |
| Construction | 7.1% | 6.8% |
| Manufacturing | 22.5% | 18.1% |
| Wholesale trade | 4.0% | 3.6% |
| Retail | 17.6% | 13.7% |
| Education, health & social services | 22.6% | 20.0% |
| Arts, recreation, lodging & food services | 1.2% | 6.9% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

### 9.4.3 Massachusetts

Commercial fisheries in Massachusetts are diverse, and range from small-scale inshore small-boat fisheries for lobster and clams, to offshore scallops, groundfish dragging, and longline fishing for HMS species. In 2003, New Bedford, Massachusetts ranked eighth in the United States for the weight of fish landed, and first for value with ex-vessel sales, bringing in 176.2 million dollars (NMFS, 2004). In the same year, Gloucester ranked twelfth in weight of fish landed and thirteenth in ex-vessel value. Due to the number of HMS permit holders and the relative importance of commercial and recreational fisheries to the Commonwealth, community profiles for both New Bedford and Gloucester were originally developed for the 1999 HMS FMP and have been included below.

The population in the Commonwealth of Massachusetts increased from 6 million people to 6.3 million people over the past decade (Table 9.4). The majority of individuals 25 years and older have a high school diploma and/or a graduate level degree. The percentage of employed individuals and individuals below the poverty line has remained about the same in the past decade, but there has been a slight decline in the unemployment rate, almost two percent. Employment in the farming, fishing, forestry, and mining industries has declined over the last decade. The arts, recreation, lodging, and food services industries are the only industries that expanded.

Massachusetts holds the greatest number of commercial tuna permits with 1,601 vessels permitted in 2005 (Table 9.36). In addition, Gloucester has the greatest concentration of commercial tuna permit holders with 106 vessels permitted (Figure 9.4). Massachusetts is ranked fourth in the greatest number of swordfish permit holders with just over nine percent of the total swordfish permit holders residing in Massachusetts (Table 9.39). In addition to swordfish, there are 17 directed and incidental shark permit holders (Table 9.38). Boston has the greatest concentration of HMS permitted dealers with New Bedford and New York City in second and third for the greatest number of HMS dealers (Table 9.37 and Figure 9.5).

**Table 9.4 Massachusetts Demographic Profile.** Source: U.S. Census, 1990 and 2000

| Massachusetts | 1990 | 2000 |
|---|---|---|
| **Population:** | **6,016,425** | **6,349,097** |
| **Education:** | | |
| High school graduates (25 years or older) | 80.0% | 84.8% |
| **Employment:** | | |
| Labor force (16 years and over) | 67.8% | 66.2% |
| Unemployment Rate | 6.7% | 4.6% |
| Median Household Income | $36,952 | $50,502 |
| Individuals below the poverty line* | 8.9% | 9.3% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 1.2% | 0.4% |
| Construction | 5.5% | 5.5% |
| Manufacturing | 18.1% | 12.8% |
| Wholesale trade | 4.1% | 3.3% |
| Retail | 16.2% | 11.0% |
| Education, health & social services | 28.0% | 23.7% |
| Arts, recreation, lodging & food services | 1.1% | 6.8% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

In 2003, marine recreational fishing in Massachusetts attracted an estimated 1,017,000 anglers making 4,569,000 fishing trips in both state and Federal waters (NMFS, 2004b). Approximately, 344,000 (34 percent) of the anglers were from out of state. Direct and indirect retail sales generated by marine recreational fishermen in Massachusetts in 2001 were estimated to be $320.7 million (ASA, 2002). The marine recreational fishing industry generated 5,423 jobs in the Commonwealth in 2001. Shark fishing, largely catch-and-release using light tackle, takes place in offshore waters (NMFS, 2003). Recreational vessels often travel 50 - 100 miles out to their fishing grounds and most shark trips are 10 - 12 hours in duration, with some extending to an overnight trip, or even two- or three-day trips. Massachusetts residents held 557 charter/headboat permits in 2005. Sharks are usually taken incidental to bluefin tuna fishing, but a number of charterboat operators advertise shark fishing trips. The target shark species South and East of Cape Cod are mako, blue and porbeagle sharks and these species, as well as thresher, dusky, and tiger sharks are found throughout the Gulf of Maine.

HMS fishing tournaments are promoted, and participated in, by some charterboat operators (NMFS 2003). Examples of these tournaments include Boston Big Game and Monster Shark Tournaments (Oak Bluffs); Nantucket Angler's Club (Nantucket); Fisherman Outfitter's

Cutty Hunk Shootout (Cutty Hunk); and Giant Bluefin Tournament (Hyannis). Charterboat operations advertising shark fishing trips are based in Newburyport, Rockport, Gloucester, Boston, Quincy, Chatham, Harwich Port, South Yarmouth, Hyannis, Mashpee, East Falmouth, Oak Bluffs, Edgartown, Vineyard Haven, Menemsha, Mattapoisett, Fairhaven, New Bedford, and Westport Point.

#### *9.4.3.1 Gloucester, Massachusetts*

In 1990, the population of Gloucester was 28,716. There was a minimal population increase of approximately 1,500 individuals between 1990 and 2000 (Table 9.5). Forty percent of the population was between the ages 20 – 44 years old in 2000. The median age of the Gloucester population has gotten older by five years, rising to 40 years old in 2000. There is a slightly larger percentage of females in the Gloucester population, 48 percent males to 52 percent females. In 2000, the number of households is two and half times greater than in 1990, but the total number of housing units increased only slightly, from 13,125 to 13,958.

A greater percentage of the 16 years and older population was an active part of the labor force during 2000 (Table 9.5). While the percentage of unemployed declined, the percentage of individuals below the poverty line increased in the last decade. The greatest source of employment in 1990 was the technical and administrative industries. In 2000, 36 percent of the population was employed in the managerial and professional industries. The number of businesses engaged in the forestry, fishing, hunting, mining, and agriculture industries declined over the last decade from 3.9 percent to 2.5 percent. The greatest percentage of businesses was engaged in education, health, and social service.

Gloucester residents hold the largest number of commercial tuna permits with 106 permits issued in 2005 (Table 9.36 and Figure 9.4). The Atlantic bluefin tuna purse seine fishery lasts for a short period of time each year and is limited by regulation to five vessels. One purse seine vessel operates out of Gloucester. The economic health of the purse seine fishery is heavily dependent on bluefin tuna prices and, concomitantly, on the value of the Japanese yen. Finding crew is not a problem; many of the current crew members have had their berths for years. The owner and many of the crew of purse seine vessels, even some who do not reside in the community, are well-integrated through kinship ties into the fishing community. They see themselves as responsible for creating the bluefin tuna fishery and the fleet enjoys the respect of the extended fishing communities in Gloucester (Wilson *et al*., 1998).

There are also a large number of HMS dealers in the Gloucester area, licensed to purchase and sell tuna, sharks, and swordfish (Table 9.37 and Figure 9.5). Bluefin tuna dealers in Gloucester work with a large number of vessels of various types, including purse seine vessels. Most bluefin tuna are sold on consignment, and some dealers give a minimum guarantee on fish they take. Personal networks are very important and the competition can be intense. During the bluefin tuna season, some transient dealers come to Gloucester. The largest dealer buys from the purse seine vessels because it is one of the few dealers that is able to finance the transaction. This business has only one full-time employee and up to seven seasonal employees, who may be fishermen seeking alternative employment. The dealer to whom the purse seine vessels sell their bluefin tuna heavily depends on those vessels to maintain its current profit margins. However, this dealer reports that the structure of its business is such that there would be no lost jobs even if the purse seine landings were significantly reduced, since BFT reallocated to another gear category would likely be handled by the same dealer (Wilson *et al*., 1998).

**Table 9.5 Demographic Profile of Gloucester, Massachusetts.** Source: U.S. Census, 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 28,716 | 30,273 |
| **Sex** | | |
| Male | 48.2% | 47.9% |
| Female | 51.8% | 52.1% |
| **Age** | | |
| Median Age | **35.5** | **40.2** |
| < 20 | 25.2% | 23.9% |
| 20 - 44 | 39.3% | 34.4% |
| 45 - 64 | 20.2% | 26.1% |
| > 65 | 15.4% | 15.6% |
| **Race** | | |
| White | 99.4% | 97.0% |
| Black or African American | 0.2% | 0.6% |
| American Indian & Alaska Native | 0.1% | 0.1% |
| Asian | 0.2% | 0.7% |
| Other | 0.1% | 0.5% |
| **Household** | | |
| **Total** | **11,550** | **29,913** |
| Family households | 66.1% | 62.7% |
| Nonfamily households | 33.9% | 37.3% |
| Average household size | 2.49 | 2.38 |
| Average family size | 3.11 | 3.00 |
| **Housing Occupancy** | | |
| Total housing units | 13,125 | 13,958 |
| Vacant housing units | 11.8% | 9.8% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 57.8% | 59.7% |
| Renter-occupied housing units | 42.2% | 40.3% |

| Gloucester, Massachusetts | 1990 | 2000 |
|---|---|---|
| **Population:** | 28,716 | 30,273 |
| **Education:** | | |
| High school graduates (25 years or older) | 75.6% | 85.7% |
| **Economic Characteristics** | | |
| Labor force (16 years and over) | 62.6% | 66.1% |
| Unemployed | 4.5% | 3.2% |
| Median Household Income | $ 32,690 | $ 47,722 |
| Individuals below the poverty line | 7.5% | 8.8% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 26.8% | 36.1% |
| Technical/administrative | 28.0% | 25.4% |
| Construction, Production, Maintenance, & Transportation | 2.8% | 21.4% |
| Farming, fishing, forestry, & mining | 13.0% | 2.0% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 3.9% | 2.5% |
| Construction | 5.5% | 7.1% |
| Manufacturing | 22.1% | 16.7% |
| Wholesale trade | 4.7% | 3.6% |
| Retail trade | 16.2% | 10.8% |
| Education, health & social services | 14.1% | 20.2% |
| Arts, recreation, lodging & food services | 1.4% | 9.2% |

Commercial rod and reel tuna fishing (with General category permits) as well as recreational rod and reel tuna fishing (with Angling category permits) drive a large shoreside economy, including the sale and repair of tackle, vessels, and engines, and the sale of supplies such as bait and ice. The rod and reel fishery also supports general tourist services such as restaurants and hotels. This community is competing with many other possible tourist destinations for tuna fishermen, increasing their dependence on the bluefin tuna as a prominent attraction. Vulnerabilities stem from the seasonal nature of tuna fishing in Gloucester and the general dependence of tuna fishing on the health of the economy. According to those interviewed, seasonality makes business planning, as well as finding and retaining trained employees, more difficult (Wilson, *et al*., 1998).

The bluefin tuna rod and reel fishery attracts wealthier fishermen than the fisheries for many other species. The bluefin tuna fishing experience is not always a family activity, but it is often the attraction that brings an adult, and hence the rest of the family, to the community. It attracts experienced and amateur fishermen alike, as well as adventure seekers who are often outdoors enthusiasts in other arenas. Gloucester used to have an annual bluefin tuna tournament organized by the largest of the recreational marinas. However, limited availability of fish has canceled the tournament in past years (Wilson *et al*., 1998). Most fishing tourists who come to Gloucester are from the northeastern United States. These “weekend warrior” bluefin tuna fishermen have an important impact on the community's economy, particularly weekend fuel sales (Wilson, *et al*., 1998).

The Gloucester charter fleet follows a standard policy that, when a bluefin tuna is landed, the fish belongs to the vessel and the charter for the day is free, since the vessel operator may sell the fish to the dealer (Wilson *et al*., 1998). Serious customers want to target bluefin tuna, even though there is a low probability that they will catch them. Very often when the General category is open, charter captains will take an extra mate and fish for bluefin tuna without paying passengers. They feel that having no amateurs on board enhances their chances of actually landing a fish.

Of the three retail tackle shops in Gloucester, only one specializes in offshore fishing. Eighty-five percent of its business is related to both commercial and recreational bluefin tuna fishing. Bluefin tuna and shark fishing gear is very expensive; reels cost $800 to $1,000 and are useful for shark and bluefin tuna only. Fishermen in Gloucester often choose high quality gear and show little concern about price (Wilson *et al*., 1998).

In the HMS rod and reel fishery of Gloucester, sharks are usually not the primary target species, but they are encountered incidentally to tunas. Most sharks caught in Gloucester recreational fisheries are released (Wilson *et al*., 1998). Researchers noted tension and distance between the recreational and commercial fishing communities, as recreational fishermen tend to believe that commercial fishing is to blame for the decline in local shark populations.

#### *9.4.3.2 New Bedford, Massachusetts*

New Bedford is a long and narrow city along the coast of southern Massachusetts, facing the city of Fairhaven across the water. New Bedford faces problems associated with its urban setting, such as low education levels and high unemployment. The working waterfront and its industry have become increasingly important economically as the manufacturing base of the city has declined. With multiplier effects, the city's economy may benefit from the fishing industry by $500 million (Wilson *et al*., 1998). Thousands of people are employed in supporting services such as processing, manufacturers of equipment, transport companies, supply houses, oil companies, welders, pipe fitters, stores, settlement houses, *etc*. Once the "whaling capital of the world," New Bedford still possesses one of the largest fishing fleets in the eastern United States (NOAA, 1996). New Bedford ranked seventh in the United States for the weight of fish landed in 2004, and first for value with ex-vessel sales bringing in 206.5 million dollars (NMFS, 2005a).

New Bedford has learned a great deal about how to survive crises in fisheries. Many of the members of this fishing community are descended from Portuguese fishing families and kinship networks are an extremely important influence on employment patterns in the fishing industry (NMFS, 1999a). The Portuguese families are very close and many trace their families back to fishermen in Portugal. The Fishermen's Family Assistance Center opened in 1994 with help from the Federal government in response to the collapse in the groundfish fishery. Thirty-two vessels in New Bedford were removed through the buyback program. With help from the Center, ex-fishermen are finding jobs, particularly in the marine trade, computer, and trucking industries. The marine trade jobs tend to be in New York, New Jersey, and Massachusetts.

Other industries in New Bedford have been supportive of the fishermen through the crisis and extended family networks have helped minimize social impacts (Wilson, *et al*., 1998).

Between 1990 and 2000, New Bedford experienced a decrease in its population of over 6,000 individuals — 99,922 in 1990 to 93,768 in 2000 (Table 9.6). The median age of the population increased slightly, from 33 to 36 years old. The 2000 age distribution remains relatively similar to the age distribution in 1990 with the greatest percentage of individuals in the 20 to 44 years age group. The percentage of females in the population is larger than the percentage of males in both 1990 and 2000 by 6 percent. The number of total households increased by 42 percent in the last decade, which could be attributed to an increase in the number of non-family households.

The number of high school graduates increased by almost 8 percent in the 1990s (Table 9.6). The size of the 16 years and older labor force increased, and the percentage of unemployed declined, but the percentage of individuals below the poverty line increased by almost 4 percent. A large percentage of New Bedford residents are employed in the construction, production, maintenance, and transportation industries. This was a significant increase over the last decade in this sector, where the greatest percentage of employment was in the technical, administrative, and sales industries throughout the 1990s. The percentage of businesses engaged in the forestry, fishing, hunting, and agriculture industries declined by almost a third throughout the 1990s. In 2000, the major industries were manufacturing and education, health, and social services.

**Table 9.6 Demographic Profile of New Bedford, Massachusetts.** Source: U.S. Census, 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 99,922 | 93,768 |
| **Sex** | | |
| Male | 46.7% | 47.1% |
| Female | 53.3% | 52.9% |
| **Age** | | |
| Median Age | **32.6** | **35.9** |
| < 20 | 29.1% | 27.4% |
| 20-44 | 35.4% | 35.6% |
| 45- 64 | 18.0% | 20.1% |
| > 65 | 17.4% | 16.7% |
| **Race** | | |
| White | 87.8% | 78.9% |
| Black or African American | 3.8% | 4.4% |
| American Indian and Alaska Native | 0.4% | 0.6% |
| Asian and Pacific Islander | 0.3% | 0.7% |
| Other | 7.6% | 9.5% |
| **Household** | | |
| **Total** | **38,646** | **91,782** |
| Family households | 69.0% | 63.1% |
| Nonfamily households | 31.0% | 39.9% |
| Average household size | 2.59 | 2.40 |
| Average family size | 3.15 | 3.01 |
| **Housing Occupancy** | | |
| Total housing units | 41,760 | 41,511 |
| Vacant housing units | 7.1% | 8.0% |
| Housing Tenure | | |
| Owner-occupied housing units | 43.8% | 43.8% |
| Renter-occupied housing units | 56.2% | 56.2% |

| New Bedford, Massachusetts | 1990 | 2000 |
|---|---|---|
| **Population:** | 99,922 | 93,678 |
| **Education:** | | |
| High school graduates (25 years or older) | 49.7% | 57.6% |
| **Economic Characteristics** | | |
| Labor force (16 years and over) | 52.1% | 57.7% |
| Unemployed | 7.2% | 5.0% |
| Median Household Income | $ 22,647 | $ 27,569 |
| Individuals below the poverty line | 16.8% | 20.2% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 17.0% | 20.8% |
| Technical, Administrative, & Sales | 27.2% | 23.6% |
| Construction, Production, Maintenance, & Transportation | 2.6% | 34.9% |
| Farming, fishing, forestry, & mining | 11.9% | 1.0% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 3.16% | 1.1% |
| Construction | 6.1% | 7.1% |
| Manufacturing | 27.8% | 20.7% |
| Wholesale trade | 4.3% | 4.4% |
| Retail trade | 17.0% | 12.1% |
| Education, health & social services | 15.4% | 20.9% |
| Arts, recreation, lodging & food services | 0.7% | 7.4% |

New Bedford also has a large number of residents with a commercial tuna permit (Table 9.36 and Figure 9.4). All pelagic longline vessels that land HMS in New Bedford are large "distant water" vessels. The fleet consists of large vessels that follow swordfish throughout their migrations. These vessels make long trips, are relatively expensive to operate, and are highly specialized to distant water fishing (*i.e*., they have large holds and additional fuel capacity). Respondents to the Wilson *et al*. study report that these large distant water vessels have developed a minimal history in other U.S. fisheries, though it is fairly easy for both the vessels and captains to find work in foreign longline fisheries. Many of these vessels already moved from the Atlantic Ocean to the Pacific Ocean, and others are currently for sale (Wilson *et al*., 1998). In summer months, the remaining large distant water vessels fish on the Grand Banks and land swordfish in New England and Canadian ports. During winter months, their product is initially landed in San Juan, Puerto Rico and transhipped to New Bedford and other destinations. San Juan, Puerto Rico is the only international airport in the Caribbean with the necessary lift capacity to tranship their product. Long storage time at sea means that this fleet produces relatively lower quality swordfish, so they compete directly with cheaper imports for the low-end markets. Participants report concern over expenses and the decreased price of swordfish.

Because of these problems and the pressures brought about by increased regulation and several decreasing fish stocks, the distant water fleet has responded by staying out at sea for longer periods (Wilson *et al*., 1998). This has affected family life; wives of fishermen do not want to raise children essentially alone. While some members of this fleet, their suppliers, and their customers live in the New Bedford area, the distant water fleet is not attached to a geographical community in the same sense as other fleets. Participants in this fleet tend to be fairly isolated within the communities where they live, even when those communities are strongly integrated fishing communities like New Bedford. The wives of captains and crew who participate in the distant water fishery generally do not know each other well. New Bedford has a fishermen's wives association but it is mainly for older Portuguese women whose husbands are scallopers and draggers "who do only 14-day trips" (Wilson *et al*., 1998). New Bedford respondents not associated with the distant water fleet report that they see it as socially distant from the rest of the community. This isolation from other fishing people, and the length of the trips, has placed a strain on the family life of participants.

The distant water fleet has used its longer reach to recruit crew members from overseas, particularly the West Indies, thus avoiding crew supply problems typical of other sectors of the longline fleet. The range of these vessels over many different waters makes them particularly dependent on the skill and experience of their captains. New Bedford does not offer these captains alternative employment outside of the fishing industry at comparable income levels (Wilson, *et al*., 1998).

A dealer in the New Bedford area who purchases from the distant water fleet does $15 million to $20 million worth of business each year, including imports. About half of the dealer's purchases are domestic. Overall, his business consists of 60 percent swordfish, 15 percent tunas (yellowfin, bigeye, bluefin), ten percent lobster, and 15 percent other (sharks, bait, *etc.*). The dealer employs 40 to 65 people depending on supply conditions (Wilson *et al*., 1998). There are also a large number of HMS dealers in Gloucester licensed to purchase and sell tunas, sharks, and swordfish (Figure 9.5).

When fishing is disrupted through closures, the dealers experience large labor fluctuations. Even the increased reliance on imports has not completely solved this problem. When they make an effort to buy from U.S. vessels in distant waters, special arrangements and timing are required to get the fish to market and maintain vessels. The fishermen have to unload close to an international airport with lift capacity, which in the Caribbean means San Juan. The dealers have to hire people to unload any vessel landings in San Juan, and send supervisors so that the fish is kept cold, weighed properly and counted correctly. Then they need to arrange for cargo departure and negotiate freight weight. These activities can be easily disrupted by short notice of seasonal closures and other regulatory decisions.

Of the five vessels that hold permits to fish in the bluefin tuna purse seine fishery, four are associated with New Bedford. One of these vessels is owned by a resident while the three other vessels are owned by non-residents. All four land their catch in New Bedford and have crew members who live in the city. The owners and many of the crew of the purse seine vessels, even some who do not reside in the community, are well integrated through kinship ties into the fishing community. They are generally thought of as being responsible for creating the bluefin tuna fishery, and the fleet enjoys the respect of extended fishing communities in New Bedford (Wilson *et al*., 1998). Three of these vessels do nothing else but fish for bluefin tuna and are tied up at the dock for the rest of the year. The fourth vessel holds a scallop permit as well. Many of the current crew members have had their berths for years. In 1998, these vessels employed 26 crew members combined, 24 percent less than they did at the height of this fishery in the 1980s. Many of these crew members are family and almost all have been with these vessels for a long time. The average age is considerably older than that of most fishing crews. When the vessels are tied up, the crew members collect unemployment and do odd jobs. A greater percentage of the crew members' wives worked outside the home in the 1990s compared to the 1980s (Wilson *et al*., 1998).

The purse seine fleet's economic health is heavily dependent on bluefin tuna prices and, concomitantly, on the value of the Japanese yen. The New Bedford dealer who buys bluefin tuna from the purse seine fleet has been in business since the early 1960s. This dealer currently depends on the purse seiners to maintain profit margins. However, he reports that the structure of his businesses is such that there would be no lost jobs even if the purse seine landings were to be significantly reduced, since any bluefin tuna reallocated to other commercial categories would likely be handled by the same dealer. The business employs 200 people and would not lay off workers if the bluefin tuna quota were cut. While bluefin tuna currently makes up only 1.25 percent of their gross dollars, it accounts for 25 percent or more of their net profit.

The recreational tuna fishing industry in New Bedford is a highly diverse one, with an increasing emphasis on providing an enjoyable fishing experience for all ages. Fishery participants feel that bluefin tuna fishing is an adventure, and the prize is an important aspect of the experience. It attracts experienced and amateur fishermen alike, as well as adventure seekers who are often outdoors enthusiasts in other arenas. Most charterboats in the New Bedford area are owner-operated. Respondents report that it can be hard to find suitable crew members because the business is seasonal and they are unwilling to hire unemployed commercial fishermen (Wilson *et al*., 1998).

Recreational fishing in these communities drives a much larger economy, including the marine trades (tackle, vessels, engines, *etc.*), suppliers of bait and ice, and general tourist services such as restaurants and hotels. These communities are competing with many other possible tourist destinations, increasing their dependence on large, well-known fish that act as prominent attractions. Economic vulnerabilities stem from the seasonal nature of recreational fishing in these communities and recreational fishing's general dependence on the health of the economy. The seasonality of this fishery makes business planning, as well as training and keeping employees, more difficult. Respondents emphasized that these communities depend on potential customers' expectation that they will have a reasonable chance to land a fish (Wilson *et al*., 1998).

Shark tournaments are also an important component in promoting business in the New Bedford area, attracting numerous repeat customers. They bring in curious people because sharks are considered a dangerous and exciting fish. Recreational shark fishing in New Bedford is mainly catch-and-release (Wilson *et al*., 1998). However, respondents argue that New Bedford is not the appropriate area for catch-and-release tournaments, because the length of the trip (100 miles) makes taking observers impractical. Although shark fishing is comparatively less important to recreational fishermen in this community, some customers are attracted by the particular challenge of shark fishing. Recreational fishermen throughout the area tend to believe that commercial fishing is to blame for the decline in shark populations.

### 9.4.4 Rhode Island

Rhode Island's population increased from just over one million people in 1990 to 1.1 million people in 2000 (Table 9.7). The percentage of individuals 25 years and older with a high school diploma and/or some graduate level degree has increased by three percent. The percentage of employed individuals and the unemployment rate declined slightly, but the number of individuals below the poverty line increased from 9.6 percent to almost 12 percent. Employment in the farming, fishing, forestry, and mining industries has declined with the education, health, and social services industries providing the greatest employment opportunities in 2000. Due to the relatively low involvement in the HMS fisheries in the past, there are no community profiles describing the relationship of HMS fisheries to any Rhode Island communities.

Over four and half percent of the commercial tuna permit holders reside in Rhode Island (Table 9.36) with a concentration of permit holders residing in Wakefield (Figure 9.1). Nine shark permit holders and 27 swordfish permit holders are located in the state of Rhode Island (Table 9.38 and Table 9.39). Communities involved with the commercial fisheries are Warwick, Little Compton, Newport, Tiverton, Block Island, Narragansett, Peace Dale, Point Judith, South Kingstown, Wakefield and West Kingstown. Rhode Island also has 45 HMS dealers, operating in Newport, Point Judith, Middletown, Wakefield, Narragansett, Peace Dale, South Kingstown, and Block Island (Table 9.37 and Figure 9.5). In the future, NMFS may want to consider developing a HMS-related community profile for Wakefield, Rhode Island due to the number of residents involved in the commercial tuna and swordfish fisheries according to the information from the HMS permit databases.

**Table 9.7 Rhode Island Demographic Profile.** Source: U.S. Census, 1990 and 2000

| Rhode Island | 1990 | 2000 |
|---|---|---|
| **Population:** | **1,003,464** | **1,048,319** |
| **Education:** | | |
| High school graduates (25 years or older) | 72.0% | 78.0% |
| **Employment:** | | |
| Labor force (16 years and over) | 66.1% | 64.6% |
| Unemployment Rate | 6.6% | 5.6% |
| Median Household Income | $32,181 | $42,090 |
| Individuals below the poverty line* | 9.6% | 11.9% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 1.3% | 0.5% |
| Construction | 5.7% | 5.4% |
| Manufacturing | 22.7% | 16.4% |
| Wholesale trade | 3.7% | 3.4% |
| Retail | 17.5% | 12.1% |
| Education, health & social services | 25.0% | 23.0% |
| Arts, recreation, lodging & food services | 1.2% | 8.6% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

In 2004, some 351,000 anglers took 1,444,000 saltwater fishing trips for all species of fish in the state of Rhode Island (NMFS, 2005a). Of these marine anglers, about 65 percent were from out-of-state. In 2005, 831 Rhode Island residents held an HMS angling permit (Table 9.34). Retail sales generated by marine anglers in Rhode Island in 2001 are estimated to total $86.2 million and 1,382 jobs were generated in the marine recreational fishing industry (ASA, 2002). Recreational shark fishing from Rhode Island is seasonal between late June and October, with a peak in late August (NMFS 2003). A variety of shark species are available with the most common being mako sharks between 60 - 100 pounds. After mako, thresher, blue, dusky and sandbar sharks are the most common species caught by anglers. Light tackle is the gear preferred for shark fishing by the charter operators and most private boat fishermen, and catch-and-release is normal in the fishery.

In Rhode Island, the number of charter/headboat permit holders increased from 94 in 2003 to 143 in 2005 (Table 9.35). Charter operators offering shark fishing trips are based in Block Island, Point Judith, Little Compton, Warwick, West Greenwich, Newport, and Westerly. Charter trips for sharks are usually to the deep waters South of Rhode Island and the eastern tip of Long Island, last at least 10 hours and, in August, are often overnight trips. On the ten-hour trips with five anglers onboard, the average fee was on the order of $800 in 2003 (NMFS, 2003). This fee is comparable to those charged in the other New England states. Fees for participation in a five-day fishing tournament are on the order of $4,500 for a fully rigged and provisioned boat with skipper and mate (the angler is responsible for the payment of the tournament fees, which can be in excess of $5,000 per angler).

### 9.4.5 Connecticut

Connecticut's population has increased by 3.5 percent between 1990 and 2000 (Table 9.8). The percentage of individuals 25 years and older with a high school diploma and/or a graduate level degree has increased by about five percent. The percentage of employed individuals has declined, and correspondingly, the unemployment rate and individuals below the poverty line have increased over the past decade. Employment in the farming, fishing, forestry, and mining has declined with the education, health, and social services industries providing the greatest employment opportunities in 2000.

In general, Connecticut's involvement in the commercial fishery has been minimal. There are 170 commercial tuna permit holders living in the state (Table 9.36) with two permit holders for the shark and swordfish permits (Table 9.38 and Table 9.39). Only two HMS permitted dealers are located in Connecticut (Table 9.37). The communities involved in the commercial shark fishery are New London and Old Lyme. Due to the relatively minimal involvement with HMS fisheries, there are no community profiles for the state of Connecticut.

In 2003, some 369,000 anglers took 1,579,000 saltwater fishing trips for all species of fish (NMFS, 2004b). Of these marine anglers, about 18 percent were from out-of-state. In 2005, 1,080 Connecticut residents held an HMS angling permit (Table 9.34). Recreational shark fishing is conducted throughout Long Island Sound, but primarily from the eastern ports in the state from which offshore waters can be easily reached. The number of charter/headboats permit holders in Connecticut has increased from 62 in 2003 to 110 in 2005 (Table 9.35). Charterboats advertising shark fishing trips operate from Milford, New London, Norwalk, Old Lyme, Saybrook, Stonington and Westport. The recreational fishery is principally a catch-and-release fishery using light tackle.

**Table 9.8 Connecticut Demographic Profile.** Source: U.S. Census, 1990 and 2000

| Connecticut | 1990 | 2000 |
|---|---|---|
| **Population:** | **3,287,116** | **3,405,565** |
| **Education:** | | |
| High school graduates (25 years or older) | 79.2% | 84.0% |
| **Employment:** | | |
| Labor force (16 years and over) | 69.0% | 66.6% |
| Unemployment Rate | 5.4% | 5.3% |
| Median Household Income | $41,721 | $53,935 |
| Individuals below the poverty line* | 6.8% | 7.9% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 1.3% | 0.4% |
| Construction | 5.9% | 6.0% |
| Manufacturing | 20.5% | 14.8% |
| Wholesale trade | 4.2% | 3.2% |
| Retail | 15.4% | 11.2% |
| Education, health & social services | 24.8% | 22.0% |
| Arts, recreation, lodging & food services | 1.1% | 6.7% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

### 9.4.6 New York

The state of New York's population increased by nearly one million people in the decade between 1990 and 2000 (Table 9.9). The percentage of individuals 25 years and older with a high school diploma and/or some graduate level degree has increased by about five percent. The percentage of employed individuals has declined slightly, while both the unemployment rate and individuals below the poverty line have increased over the past decade. Employment in the farming, fishing, forestry, and mining industries has declined with the education, health, and social services industries providing the greatest employment opportunities in 2000.

Twenty-one individuals holding an HMS shark permit and 29 individuals holding a swordfish permit reside in New York (Table 9.38 and Table 9.39). In addition to the shark and swordfish permit holders, there are also 327 commercial tuna permit holders in New York (Table 9.36). New York has the third greatest number of HMS dealer permit holders (86 total) with a large concentration of dealers located in New York City and the surrounding areas (Table 9.37 and Figure 9.5). The communities participating in the shark commercial and recreational fisheries include Freeport, Lawrence, Ammagansett, Brightwaters, East Hampton, East Quogue, Greenport, Hampton Bays, Islip, Montauk, Oakdale, Brooklyn, Riverhead, Seaford, Port Jefferson, Babylon, Hauppauge, Staten Island, Southold, and Wantagh. While no HMS community profiles have been developed for New York, a profile should be developed for Montauk due to the residents' significant participation in the commercial tuna, charter/headboat and the number of shark permit holders.

**Table 9.9 New York Demographic Profile.** Source: U.S. Census, 1990 and 2000

| New York | 1990 | 2000 |
|---|---|---|
| **Population:** | **17,990,455** | **18,976,457** |
| **Education:** | | |
| High school graduates (25 years or older) | 74.8% | 79.1% |
| **Employment:** | | |
| Labor force (16 years and over) | 63.6% | 61.1% |
| Unemployment Rate | 6.9% | 7.1% |
| Median Household Income | $40,927 | $43,393 |
| Individuals below the poverty line* | 13.0% | 14.6% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 1.3% | 0.6% |
| Construction | 5.2% | 5.2% |
| Manufacturing | 14.7% | 10.0% |
| Wholesale trade | 4.2% | 3.4% |
| Retail | 14.9% | 10.5% |
| Education, health & social services | 27.9% | 24.3% |
| Arts, recreation, lodging & food services | 1.5% | 7.3% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

In 2004, some 677,000 anglers took 4,743,000 saltwater fishing trips for all species of fish in both state and Federal waters (NMFS, 2005a). The majority of these anglers are residents of New York State, with about 11 percent were from out-of-state. In 2005, New York had the fourth greatest number of HMS angling permit holders with 2,391 permitted vessels (Table 9.34) and a large concentration of these anglers residing in New York City (Figure 9.2). The Amecian Sportfishing Association (ASA) estimated that, in 2001, saltwater angling generated some $389.3 million in New York State in retail sales and some 5,122 jobs in the marine recreational fishing industry (ASA, 2003). Shark fishing by anglers appears to be largely catch-and-release, using light tackle, and tends to be incidental to tuna and billfish fishing offshore. In New York State, there are 379 charter/headboats were permitted for HMS fishing in 2005 (Table 9.35). A number of charterboat operators advertise shark fishing as part of their offerings. A large percentage of the 41 charterboats operating out of Montauk advertise shark fishing either as an occasional exciting catch or offering shark fishing trips offshore. Montauk is positioned well for offshore trips as it lies only 20 – 40 miles from the edge of deep water and Gulf Stream eddies. Connecticut and Rhode Island boats on the other hand have to travel at least 60-100 miles to reach the prime fishing waters for tunas and sharks.

### 9.4.7 New Jersey

Between the 1990 Census and the 2000 Census, New Jersey's population increased from 7.7 million people to 8.4 million people, respectively (Table 9.10). The percentage of individuals 25 years and older with a high school diploma and/or some graduate level degree has increased by about five percent. The percentage of employed individuals has declined slightly, while the unemployment rate remained about the same and individuals below the poverty line increased over the past decade. As with many of the other states, employment in the farming, fishing, forestry, and mining industries has declined, whereas the education, health, and social services industries provided the greatest employment opportunities in 2000.

While both Barnegat Light and Brielle have already been profiled for HMS fisheries, NMFS may want to also consider an HMS profile for Cape May due to the number of HMS angling, charter/headboat, shark and swordfish permits located in the community.

In 2005, there were 357 commercial tuna permit holders in the state of New Jersey (Table 9.36). New Jersey has the second greatest number of shark permit holders living within the state, second to Florida (Table 9.38) with significant concentrations of shark permit holders living in Barnegat Light and Cape May (Figure 9.6). New Jersey is also home to 50 swordfish permit holders (Table 9.39) with many of these permit holders in Barnegat Light and Cape May (Figure 9.7). Fifty-six HMS dealers are also located in New Jersey (Table 9.37).

Marine recreational fishing attracted 1,120,000 participants to New Jersey in 2004 (NMFS, 2005a). These anglers, collectively, made 6,580,000 saltwater fishing trips during the year. Of these anglers, 33 percent were from out-of-state, and about two percent from non-coastal counties in New Jersey. In 2005, New Jersey has the greatest number of HMS angling permit holders at 3,439 (Table 9.34) with large concentrations of these anglers residing in Point Pleasant Beach, Brick, Toms River, Forked River, and Tuckerton (Figure 9.2). The ASA estimated that saltwater angling-related retail sales in New Jersey were some $448.7 million in 2001. The marine recreational fishing industry provided some 7,762 jobs in New Jersey in 2001 (ASA, 2002).

**Table 9.10 New Jersey Demographic Profile.** Source: U.S. Census, 1990 and 2000

| New Jersey | 1990 | 2000 |
|---|---|---|
| **Population:** | **7,730,188** | **8,414,350** |
| **Education:** | | |
| High school graduates (25 years or older) | 76.9% | 82.1% |
| **Employment:** | | |
| Labor force (16 years and over) | 67.4% | 64.1% |
| Unemployment Rate | 5.7% | 5.8% |
| Median Household Income | $40,927 | $55,146 |
| Individuals below the poverty line* | 7.6% | 8.5% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 1.2% | 0.3% |
| Construction | 6.0% | 5.6% |
| Manufacturing | 16.9% | 12.0% |
| Wholesale trade | 5.4% | 4.4% |
| Retail | 15.2% | 11.3% |
| Education, health & social services | 23.4% | 19.8% |
| Arts, recreation, lodging & food services | 1.7% | 6.9% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

The recreational fishery for sharks is primarily incidental to fishing for tuna and billfish. New Jersey is also second to Florida in the number of HMS charter/headboats permit holders with 578 permitted vessels in 2005 (Table 9.53). Many of the angling communities are also home to the charter/headboat permit holders, but also Cape May, and Ocean City (Figure 9.3). Of these party and charterboats, some advertise shark trips using light tackle during the summer and early fall (July-October) (NMFS, 2003). These trips go offshore between 25 and 60 miles to the heads of the canyons, and thus are full-day or overnight trips.

#### *9.4.7.1 Barnegat Light, New Jersey*

Barnegat Light is one of eleven municipalities on Long Beach Island, a large "barrier beach" island that helps form the seaward boundary of Barnegat Bay. This small town measures less than one square mile and is located on the northern end of the barrier island. The town is named after its famous lighthouse that guided ships for generations along the New Jersey coast. This lighthouse was replaced in 1855 with the second-tallest lighthouse in the United States operating until 1927 (NMFS, 2003). The building continues as both a community landmark and a navigation mark. The name Barnegat originates from "Barende-gat," a Dutch name meaning "inlet of breakers" (NMFS, 1999a). Prior to 1820, fishing operations and maritime trade were conducted in the small settlements on the mainland inside the chain of islands and sand bars fringing the New Jersey Coast (NMFS, 2003). Barnegat Inlet was one of the important channels to the open ocean, with a sheltered anchorage immediately inside the inlet, and ample resource for a fishing community. A lighthouse was built in 1824 to mark the entrance to the inlet. In 1995, the infamous inlet's fierce currents were tamed by a $45 million Army Corps of Engineers project that constructed a South jetty along with a three-quarter-mile beach and a fishing pier (NMFS, 1999a).

Barnegat Light has grown and changed in the decade between the 1990 and 2000 Censuses. The changes are reflected in two demographic dimensions. The first is a shift to higher education and higher qualification occupations and the second is a continued shift to an older, retired population. The change in age structure also signifies a change in the workforce and the source of household earnings. In 2000, there were 371 households with an average size of 2.05 persons per household (Table 9.11). Of these households, 233 (62.8 percent) received income in the form of earnings, while 202 households (54.4 percent) received income from Social Security (NMFS, 2003). One hundred and thirty households received retirement income (35.0 percent). For households receiving income from earnings, the average income was $63,373 in 1999[1]. The average Barnegat Light household with retirement income received $22,168 (plus appropriate Social Security payments). In comparison with New Jersey as a whole, employment earnings were less than the state average, while retirement income was above the state average. However, the median household income in Barnegat Light ($52,361) in 1990 was some $2,800 lower than the statewide median household income.

**Table 9.11 Demographic Profile of Barnegat Light.** Source: U.S. Census, 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 681 | 764 |
| **Sex** | | |
| Male | 52.0% | 50.9% |
| Female | 48.0% | 49.1% |
| **Age** | | |
| Median Age | **50.9** | **54.9** |
| < 20 | 12.8% | 15.4% |
| 20-44 | 29.8% | 20.9% |
| 45-64 | 27.0% | 29.4% |
| > 65 | 30.4% | 34.3% |
| **Race** | | |
| White | 99.6% | 98.3% |
| Black or African American | 0.4% | 0.5% |
| American Indian and Alaska Native | 0.0% | 0.0% |
| Asian and Pacific Islander | 0.0% | 0.6% |
| Other | 0.0% | 0.4% |
| **Household** | | |
| **Total** | **342** | **371** |
| Family households | 62.0% | 62.0% |
| Nonfamily households | 38.0% | 38.0% |
| Average household size | 1.99 | 2.05 |
| Average family size | 2.42 | 2.60 |
| **Housing Occupancy** | | |
| Total housing units | 1,167 | 1,207 |
| Vacant housing units | 71.0% | 69.3% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 82.6% | 87.9% |
| Renter-occupied housing units | 17.4% | 12.1% |

| Barnegat Light, New Jersey | 1990 | 2000 |
|---|---|---|
| **Population:** | 681 | 764 |
| **Education:** | | |
| High school graduates (25 years or older) | 84.9% | 92.1% |
| **Economic Characteristics** | | |
| Labor force (16 years and over) | 52.6% | 46.9% |
| Unemployed | 0.5% | 1.2% |
| Median Household Income | $ 37,955 | $ 52,361 |
| Individuals below the poverty line | 7.2% | 4.7% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 32.4% | 40.8% |
| Technical, Administrative, & Sales | 31.4% | 23.3% |
| Construction, Production, Maintenance, & Transportation | 10.4% | 16.4% |
| Farming, fishing, forestry, & mining | 13.9% | 6.5% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 12.6% | 8.2% |
| Construction | 12.6% | 10.3% |
| Manufacturing | 7.4% | 4.8% |
| Wholesale trade | 1.3% | 1.7% |
| Retail trade | 21.0% | 9.2% |
| Education, health & social services | 7.4% | 16.8% |
| Arts, recreation, lodging & food services | 2.9% | 11.0% |

Barnegat Light is a vacation and retirement destination. Of the 1,207 housing units available in 2000, 64.3 percent (781 units) were vacation homes, and 371 homes were occupied year-round (NMFS, 2003). Some 69.3 percent of the homes were unoccupied at the time of the 2000 census. About one-quarter of the resident population had lived in Barnegat Light for less than five years in 2000, and most of the new residents moved to the town from other parts of New Jersey. Of the population of Barnegat Light in 2000, 55 percent (430 persons) had been

[1] Income and earnings data reported in the decennial Censuses is for the previous year, *i.e.* the income reported in the 1990 Census is for 1989, for the 2000 Census it is for 1999.

born in New Jersey, while 41 percent were born elsewhere in the United States. There is a "community stickiness" factor among persons resident in Barnegat Light, since 70 percent had lived there prior to 1995, but there is also evidence of change that could affect life-style and the culture of the community. One of the elements of "community stickiness" is that many of the "new" residents are retirees who have converted their former vacation homes to year-round residences.

In 1881, the Barnegat City Improvement Company was formed and developed the present-day town as a resort and recreation area, with the town owning all the beaches and dunes (NMFS, 2003). The mix of tourism and fishing has continued to the present. Fishing operations are now linked to their markets by road and there is a tight mesh between the winter and summer economies. Local shops and services are sustained by the fishing activities in the winter months, and it is estimated that the direct employment in fisheries and fishing services was on the order of 52 percent of the 300 persons civilian workforce in 2000. This number does not agree with the Census Bureau's data of fisheries employment of 6.5 percent, probably due to failure of respondents to complete census forms or undercounting because fishermen were at sea.

There are four full service marinas in Barnegat Light in addition to 44 municipal boat slips and a municipal ramp (NMFS, 2003). The marinas and slips are on the bayside of Long Beach Island and extend southwards some 18 blocks from the inlet. Commercial fishing docks and fishhouses also line Bayview Avenue, but are clustered towards the southern end of the street. Five bait and tackle shops, three of which also provide boat rentals, provide services to local and visiting fishermen. The charter fleet working from Barnegat Light is estimated to be 20 boats, including eight vessels with HMS permits. About half this fleet is active year-round in Barnegat Light, while the other vessels at least fish elsewhere in the winter months. Some of the boat fish for tuna off North Carolina in the winter and spring, while others fish from November through April from ports in Florida.

One dock is completely occupied by privately-owned, commercial vessels, including seven scallopers, ten longliners that fish for tunas, swordfish, and tilefish, and about nine inshore net vessels. Three offloading stations are part of this dock. Five or six locally hired full-time employees, the vessel captain, and the crew perform the offloading. Additional dock hands are hired locally for the busy season. The owners of the dock sell some of the catch to fresh fish markets in Boston, Philadelphia, Maryland, and New York with the remaining being sold to local restaurants, retailers, wholesalers or at their own fish market, which is open from April to October (McCay, 1993).

Some of the fisheries organizations in Barnegat Light include Blue Water Fishermen's Association; Forked River Tuna Club; Jersey Devils Fishing Club; Beach Haven Marlin and Tuna Club; Long Beach Island Fishing Club; and United National Fishermen's Association.

The Barnegat Light port is known for its pelagic longline fishery. Today, the fleet targets yellowfin and bigeye tunas for most of the year and swordfish for part of the year. Pelagic and large coastal sharks are important incidental catches and some species like mako, porbeagle, and sandbar sharks are usually kept and sold. There are a large number of residents that hold a commercial permit for sharks (22 permits; Table 9.38) and swordfish (18 permits; Table 9.39).

During the winter, a few vessels continue to bottom longline for tilefish in the deep waters of the outer continental shelf and canyons. Some captains from this port have begun to fish off the coasts of other countries. Pelagic longline crews are increasingly from other regions, such as Nova Scotia and some of the southern states. Some of the pelagic longline fishermen from Barnegat Light have become distant-water operators, going to the Grand Banks off Newfoundland, the waters off Greenland, as well as the Caribbean, Brazil, and other distant fishing grounds. The owner of one major fleet (six longline vessels) has left Barnegat Light to fish for HMS in the Pacific Ocean (Wilson *et al*., 1998).

Other captains of pelagic longline vessels strongly prefer to work closer to home or to take shorter trips. The options of those who resist going to other ports are far more restricted. Distant water fishing is very disruptive to families and the community. Some local vessels are now converting from pelagic longline fishing to monkfishing, although many who have tried to convert to other fisheries have failed to meet deadlines for limited entry. Another concern of local residents is that the demise of commercial fisheries is likely to transform the use of the waterfront, bringing in condominium development where marinas are now located, an outcome that many long-term residents find undesirable.

#### *9.4.7.2 Brielle, New Jersey*

Brielle is located in the southernmost region of Monmouth County, and borders the Manasquan River of central New Jersey. For the purposes of this document, the community will include Brielle/Point Pleasant. This is an area where recreational fishermen are as traditional as commercial fishermen, and recreational fishermen have been distressed about the management of tunas and sharks.

Brielle experienced a modest population increase between 1990 and 2000 from 4,406 to 4,893 individuals (Table 9.12). The percent of males and females remained virtually unchanged between 1990 and 2000 with 48 percent of the population comprised of males and 52 percent females. The age distribution of the Brielle population remained virtually the same for the past decade. The age distribution is fairly even between the under 20 years old, 20 – 44, and 45 – 64 years old. The over 65 year olds are the smallest age group with about 19 or 18 percent. Whites accounted for approximately 93 percent of the population in both 1990 and 2000. The percent of other races, however, declined between 1990 and 2000. The largest industry in 1990 was retail trade, which dropped significantly by 2000 (7.3 percent). In 2000, the largest industries in Brielle were education, health, and social services. In both 1990 and 2000, the greatest source of employment was managerial and professional related jobs. Employment in the farming, fishing, forestry, and mining declined from 6.8 percent in 1990 to 0.7 percent in 2000.

The Brielle/Point Pleasant port is one of the most important of the inlet ports along the barrier beach complex that makes up the New Jersey coast. It has been a center of both recreational and commercial fishing since the early 1800s. It is estimated that up to 100 working charterboats used this port historically. Today, Brielle has ten charter/headboats, and there are 17 charter/headboats in Point Pleasant. The majority of vessels that fish offshore are private vessels. It is reported that although these vessels actively fish for tunas and are thus required to have an Atlantic tunas permit, many of these vessels do not hold the necessary permit.

New Jersey, and in particular Brielle, recreational fishermen (private and charter/headboats) have historically targeted school bluefin tuna (measuring 27 inches to less than 47 inches). There is documentation back to the 1890s regarding the recreational fishery for bluefin tuna. According to respondents in the Wilson *et al.*, study, New Jersey vessels landed nearly 20,000 bluefin tuna in one month of 1939. The 1998 annual coastwide Angling category quota was 269 mt, or about 19,000 fish.

**Table 9.12 Demographic Profile of Brielle, New Jersey**. Source: U.S. Census, 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 4,406 | 4,893 |
| **Sex** | | |
| Male | 48.2% | 47.4% |
| Female | 51.8% | 52.6% |
| **Age** | | |
| Median Age | **42.7** | **42.9** |
| < 20 | 23.2% | 25.2% |
| 20 - 44 | 28.6% | 27.9% |
| 45 - 64 | 29.1% | 29.1% |
| > 65 | 19.2% | 17.8% |
| **Race** | | |
| White | 93.8% | 93.1% |
| Black or African American | 5.4% | 3.5% |
| American Indian and Alaska Native | 0.8% | 0.1% |
| Asian and Pacific Islander | 0.0% | 0.7% |
| Other | 0.0% | 2.7% |
| **Household** | | |
| **Total** | **1,735** | **1,938** |
| Family households | 74.6% | 73.0% |
| Nonfamily households | 25.4% | 27.0% |
| Average household size | 2.54 | 2.52 |
| Average family size | 3.00 | 3.00 |
| **Housing Occupancy** | | |
| Total housing units | 1,986 | 2,123 |
| Vacant housing units | 12.6% | 8.7% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 82.3% | 83.4% |
| Renter-occupied housing units | 17.7% | 16.6% |

| Brielle, New Jersey | 1990 | 2000 |
|---|---|---|
| **Population:** | 4,406 | 4,893 |
| **Education:** | | |
| High school graduates (25 years or older) | 91.3% | 94.8% |
| **Economic Characteristics** | | |
| Labor force (16 years and over) | 58.6% | 59.4% |
| Unemployed | 4.4% | 2.1% |
| Median Household Income | $ 53,485 | $ 68,368 |
| Individuals below the poverty line | 2.3% | 3.9% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 44.7% | 56.0% |
| Technical, Administrative, & Sales | 31.5% | 21.8% |
| Construction, Production, Maintenance, & Transportation | 0.9% | 11.3% |
| Farming, fishing, forestry, & mining | 6.8% | 0.7% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 1.6% | 0.7% |
| Construction | 5.9% | 7.4% |
| Manufacturing | 11.7% | 8.4% |
| Wholesale trade | 6.7% | 2.5% |
| Retail trade | 21.4% | 7.3% |
| Education, health & social services | 18.7% | 23.1% |
| Arts, recreation, lodging & food services | 2.1% | 7.8% |

Here, as elsewhere in New York and New Jersey, HMS fisheries often take place in the "canyons" and around eddies and at the edge of the continental shelf. In the past, bluefin tuna could be caught on day trips in coastal waters, rather than the canyons, and they were the major source of profit for the charter/headboat fleet here (and elsewhere in New Jersey and the larger Mid-Atlantic). Today, the canyon fisheries for tunas are thought of as additional opportunities for most charter/headboat captains, who regularly take clients fishing for bluefish, fluke, or other tunas.

At one time, the full-time canyon fishermen included hundreds of inshore bluefin tuna vessels, and "six-pack" boats (smaller vessels certified to carry no more than six passengers; also known as uninspected vessels). Respondents to the 1998 Wilson *et al*. study indicated that they must steam 80 miles offshore to reach the canyons, and are therefore limited by weather. A similar trend is found in Cape May, New Jersey, where anglers fish in the Baltimore Canyon. The Hudson Canyon offshore fishery started 15 to 20 years ago, and the Brielle/Point Pleasant fleet rely heavily on the canyon for the fall fishery. This fishery has diminished, and the smaller, less powerful vessels are gone. Recent improvements in the U.S. economy have once again fueled investment in expensive offshore fishing vessels, and this is a major contribution to New Jersey's economy. For example, the majority of the private vessels purchased in the Cape May area are built in New Jersey. There are eight tackle shops in the Brielle/Point Pleasant area.

Charter/headboat captains indicate that in 1998, they were generally unable to book tuna trips, because passengers do not like to take trips when the bluefin tuna retention limit is low or when retention is prohibited. One of the charterboat owners said that in 1991, the four busiest captains averaged 30 to 35 tuna trips each, but that the average number of trips dropped to approximately 12 in 1996 (Wilson *et al*., 1998). The argument for more liberal retention limits includes the idea that it is necessary to keep people interested in the gambling aspect of the fishery. Although people may not actually land more fish, customers are attracted by the possibility. Charterboat captains emphasize that reasonable recreational retention limits are important to their clients, who wish to bring fish home to eat and share with others.

Due to landings restrictions on bluefin tuna, bluefish generally replaced the tunas as the important inshore/offshore fishery in northern New Jersey. The Brielle/Point Pleasant charter/headboat fishermen, like most other people involved in the sport fisheries, would like to see the economic value of their fisheries documented. In this light, a recent study done in Virginia found that 30 percent of the fisheries income in the state came from the offshore recreational fisheries. Respondents emphasized that the figure is likely to be much larger for New Jersey (Wilson *et al*., 1998).

Adding to the general problems of the bluefin tuna fishery in New Jersey is the effect of the "North-South line." This line (38° 47' N), roughly at Delaware Bay, is used to separate the Angling category fishery into a northern and a southern area. Recreational bluefin tuna fishermen from Brielle fish in the northern area whereas fishermen from Cape May and other southern ports have historically fished in the southern area. However, because it is unlawful to possess bluefin tuna in excess of the daily retention limit in the respective area, those who fish in the southern zone and return to a New Jersey port with their catch must abide by northern area regulations. The Draft Consolidated HMS FMP contained a preferred alternative to remove the Angling category's North/South line (see Section 2.3.1). Removal of the North-South line would mean consistent regulations in the EEZ off of New Jersey; making it easier for New Jersey anglers to comply with the daily retention limits and allowing them to land in any New Jersey port. Due to public comment on the alternative, the Consolidated HMS FMP would maintain the North/South line as a management tool and would provide an equitable opportunity to harvest the recreational BFT allocation.

Sharks are comparatively less important to recreational fishermen in Brielle than bluefin tuna. Sharks play an important role in the fishing industry, and, while other fish may be available, some customers are attracted by sharks in particular. Makos are the sharks with the greatest economic importance to the recreational fishery in New Jersey. Mako tournaments are popular and several impose catch restrictions on participants. They have recently canceled some traditional shark tournaments out of concern for the stock, and two recent shark tournaments in New Jersey did not catch a single mako above the tournament's minimum size. Researchers reported that the shark fishery in Brielle is being strongly affected by a decrease in its historical tuna fishery and is therefore more vulnerable to negative impacts.

### 9.4.8 Delaware

Between 1990 and 2000, Delaware's population increased by 15 percent (Table 9.13). The percentage of individuals 25 years and older with a high school diploma and/or a graduate level degree has increased by about five percent. The percentage of employed individuals has declined slightly, while both the unemployment rate and individuals below the poverty line increased over the past decade. As with many of the other states, employment in the farming, fishing, forestry, and mining industries has declined, whereas the education, health, and social services industries provided the greatest employment opportunities in 2000.

**Table 9.13 Delaware Demographic Profile.** Source: U.S. Census, 1990 and 2000

| Delaware | 1990 | 2000 |
|---|---|---|
| **Population:** | **666,168** | **783,600** |
| **Education:** | | |
| High school graduates (25 years or older) | 77.50% | 82.60% |
| **Employment:** | | |
| Labor force (16 years and over) | 68.3% | 65.7% |
| Unemployment Rate | 4.0% | 5.2% |
| Median Household Income | $34,875 | $47,381 |
| Individuals below the poverty line* | 8.7% | 9.2% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 2.3% | 1.1% |
| Construction | 8.0% | 7.4% |
| Manufacturing | 18.8% | 13.2% |
| Wholesale trade | 3.5% | 2.6% |
| Retail | 2.1% | 11.6% |
| Education, health & social services | 23.0% | 19.4% |
| Arts, recreation, lodging & food services | 10.4% | 7.7% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

Thirty-nine commercial tuna permit holders lived in Delaware during 2005 (Table 9.36). There are three HMS dealers for tuna located in Delaware, one in Rehoboth, another in Harrington, and the last in Middletown (Table 9.37 and Figure 9.5). There was one shark and one swordfish permit holder in the state of Delaware during 2005 (Table 9.38 and Table 9.39).

The recreational fishery in Delaware Bay and offshore is popular because of the diversity of species and habitats available to anglers. In 2004, Delaware's recreational fisheries attracted 354,000 saltwater anglers of whom 68 percent were from out-of-state. In total, the anglers made 1,163,000 fishing trips in 2004 (NMFS, 2005a). In 2005, Delaware was home to 741 HMS angling permit holders (Table 9.34) with a significant concentration of anglers in Millsboro, Delaware. The retail sales generated by the Delaware anglers were estimated to be $48.9 million in 2001 and the marine recreational fishing service sector provided some 724 jobs in Delaware (ASA, 2002). One hundred and three charter/headboats with HMS permits were operating from Delaware communities in 2005. Communities where these HMS-permitted charter/headboats are registered include Bethany Beach, Cedar Creek, Dagsboro, Dewey Beach, Dover, Fenwick Island, Georgetown, Indian River, Lewes, Long Neck, Middletown, Milford, Millsboro, Ocean

View, Rehoboth Beach, and Wilmington (NMFS, 2003). To date, no HMS community profiles have been developed for any Delaware communities due to the relatively low level of involvement with HMS fisheries.

### 9.4.9 Maryland

Maryland's population increased from 4.8 million people in 1990 to 5.3 million people in 2000 (Table 9.14). The percentage of individuals 25 years and older with a high school diploma and/or some graduate level degree has increased by about five percent. The percentage of employed individuals, ages 16 and older, has declined slightly, while both unemployment rate and individuals below the poverty line remain approximately the same over the past decade. As with many of the other states, employment in the farming, fishing, forestry, and mining industries has declined, whereas the education, health, and social services industries provided the greatest employment opportunities in 2000.

In Maryland, there are 57 commercial tuna permit holders (Table 9.36). In addition, ten shark permit holders and seven swordfish permit holders reside in Maryland (Table 9.38 and Table 9.39). To support these HMS fisheries, there are sixteen dealers permitted for tuna, sharks and swordfish (Table 9.37).

**Table 9.14 Maryland Demographic Profile.** Source: U.S. Census, 1990 and 2000

| Maryland | 1990 | 2000 |
|---|---|---|
| **Population:** | **4,781,468** | **5,296,486** |
| **Education:** | | |
| High school graduates (25 years or older) | 78.4% | 83.8% |
| **Employment:** | | |
| Labor force (16 years and over) | 70.6% | 67.8% |
| Umemployment Rate | 4.3% | 4.7% |
| Median Household Income | $39,386 | $52,868 |
| Individuals below the poverty line* | 8.3% | 8.5% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 1.7% | 0.6% |
| Construction | 7.9% | 6.9% |
| Wholesale trade | 3.8% | 2.8% |
| Retail | 15.0% | 10.5% |
| Manufacturing | 10.3% | 7.7% |
| Education, health & social services | 25.8% | 20.6% |
| Arts, recreation, lodging & food services | 1.2% | 6.8% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

In 2004, some 485,000 Maryland residents were marine recreational fishermen (NMFS, 2005a). Another 336,000 out-of-state marine anglers also fished in Maryland. Between them these two groups made some 2.7 million fishing trips for saltwater species (NMFS, 2005a). In 2005, Maryland was home to 1,563 HMS angling permit holders (Table 9.34). The ASA estimated that saltwater anglers generated $335.9 million in retail sales, and the marine recreational fishing industry provided some 6,981 jobs in Maryland in 2001 (ASA, 2002).

The recreational fishery for sharks is largely offshore, although sharks are found in the lower reaches of the Chesapeake Bay. The offshore fishery takes place at least 15 miles out to sea and charterboats often run 60 to 70 miles offshore to areas of deep water. In Maryland, the number of HMS charter/headboat permit holders increased from 155 in 2003 to 196 in 2005 (Table 9.35). Most of these vessels are registered in Ocean City, which is known as the "White Marlin Capital of the World". This hotspot for recreational fishing industry is home to the Annual White Marlin Open, which brings approximately $1 million as the top prize for the tournament. Other communities involved with the HMS charter/headboat industry include Annapolis, Baltimore, Cambridge, Chesapeake City, Chester, Conowingo, Edgewater, Glen Burnie, Ocean Pines, Pasadena, Pocomoke, Salisbury, Severna, St. Michaels, Stevensville, Tilghman, White Hall, and White Haven.

### 9.4.10 Virginia

Virginia's population increased from 6.2 million people in 1990 to 7.1 million people in 2000 (Table 9.15). The percentage of individuals 25 years and older with a high school diploma and/or some graduate level degree has increased by six percent. The percentage of employed individuals, ages 16 and older, has declined slightly, while both the unemployment rate and individuals below the poverty line remained approximately the same over the past decade. Employment in the farming, fishing, forestry, and mining industries has declined, whereas the education, health, and social services industries provided the greatest employment opportunities in 2000.

Virginia ranked second for the quantity of commercial fishery landings at its Reedville port and third for the value of the commercial landings in the Hampton Roads area in 2004 (NMFS, 2005a). Virginia has 106 commercial tuna permit holders (Table 9.36). The Virginia commercial HMS fisheries have 27 licensed dealers, with two or more dealers operating in Chincoteague, Hampton, Newport News, Norfolk, and Virginia Beach (Table 9.37 and Figure 9.5). Six shark and five swordfish permit holders live in the Commonwealth of Virginia (Table 9.38 and Table 9.9). The commercial landings of tuna, sharks, and swordfish are not as significant as the total commercial landings coming into the state; therefore, HMS fisheries are not significantly tied to any particular Virginia community and no HMS-specific community profiles have been developed for Virginia.

In 2003, the Virginia recreational saltwater fishery attracted 996,000 anglers, of whom just over 42 percent were from out-of-state (NMFS, 2005a). Collectively, these anglers made 3.6 million recreational fishing trips in 2004. In 2005, Virginia was home to 1,351 HMS angling permit holders (Table 9.34) with a large concentration of angling permit holders living in Virginia Beach and Chesapeake (Figure 9.1). It is estimated that these saltwater anglers generated some $246.8 million in retail sales in Virginia in 2001 and their activity provided 4,251 jobs in the marine recreational fishing industry (ASA, 2002). Principal species sought were striped bass, flounder, bluefish, weakfish (sea trout) and drum. Offshore fishing was principally for mackerels, tuna, dolphin fish, and billfish.

The Virginia recreational fishery for sharks is similar to that of Delaware and Maryland. There is a very small directed shark fishery in the private boat sector, but most sharks are taken incidentally to the catch of other species. There are 153 charter/headboats in Virginia with HMS permits (Table 9.35). The communities with the greatest number of charterboats with HMS permits were Virginia Beach, Norfolk, Chincoteague, Wachapreague, and Portsmouth. The principal shark fishing season for recreational anglers is June through October.

**Table 9.15 Virginia Demographic Profile.** Source: U.S. Census, 1990 and 2000

| Virginia | 1990 | 2000 |
|---|---|---|
| **Population:** | **6,187,358** | **7,078,515** |
| **Education:** | | |
| High school graduates (25 years or older) | 75.2% | 81.5% |
| **Employment:** | | |
| Labor force (16 years and over) | 68.9% | 66.8% |
| Unemployment Rate | 4.5% | 4.2% |
| Median Household Income | $33,328 | $46,677 |
| Individuals below the poverty line* | 10.2% | 9.6% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 2.6% | 1.3% |
| Construction | 7.8% | 7.3% |
| Wholesale trade | 3.4% | 2.7% |
| Retail | 16.1% | 11.4% |
| Manufacturing | 15.1% | 11.3% |
| Education, health & social services | 23.2% | 18.3% |
| Arts, recreation, lodging & food services | 1.1% | 7.2% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

### 9.4.11 North Carolina

The population in North Carolina increased by nearly 18 percent between 1990 and 2000 (Table 9.16). The percentage of individuals 25 years and older with a high school diploma and/or some graduate level degree has increased by eight percent. The percentage of employed individuals, ages 16 and older, has remained roughly the same, while the unemployment rate increased and the individuals below the poverty line declined slightly over the past decade. As with many of the other states, employment in the farming, fishing, forestry, and mining industries has declined, whereas the manufacturing industry provided the greatest employment opportunities in 2000.

North Carolina's commercial fishery has a distinctive split between the North and South with Cape Hatteras as the dividing point as a result of the local oceanographic conditions. The Gulf Stream, as it skirts the Cape Hatteras shoals, is twenty miles offshore. This is the closest it approaches land after leaving the Cape Canaveral area. The cold Labrador Current influences the waters North of Cape Hatteras. The area off Dare and Hyde Counties, North Carolina is where these two water bodies mix and provides very rich fishing grounds. South and West of Cape Hatteras, the coast curves away to the West forming the relatively shallow Carolina Bight. Vessels operating in this area have further to travel from shore to the Gulf Stream and do not have the same diversity and richness found in the fisheries immediately to the North of Cape Hatteras.

North Carolina has the fifth largest number of HMS angling permit holders with 1,863 permits issued to its residents (Table 9.34). In 2004, NMFS estimated that 2,055,000 anglers fished in North Carolina's marine waters making a total of 7,025,000 million recreational fishing trips (NMFS, 2005a). Of these fishermen, 1,152,000 anglers (56 percent) were from out-of-state and 14 percent were from non-coastal counties in North Carolina. Marine recreational fishing is thus an important element in the life and economies of coastal counties. In 1996, expenditures by saltwater anglers in North Carolina were approximately $673 million, accounting for nearly eight percent of the total U.S. expenditures by saltwater anglers. Saltwater fishing in North Carolina incurred expenditures of nearly $1.3 billion (about five percent of the U.S. total), generated wages and salaries of approximately $357 million and created over 19,000 jobs (ASA, 1997 cited by Wilson, 1998). In 2001, ASA estimated that saltwater recreational fisheries generated about $388 million in retail sales and the marine recreational fishing industry provided 8,551 jobs (ASA, 2002).

**Table 9.16 Demographic Profile of North Carolina.** Source: U.S. Census, 1990 and 2000

| North Carolina | 1990 | 2000 |
|---|---|---|
| **Population:** | **6,628,637** | **8,049,313** |
| **Education:** | | |
| High school graduates (25 years or older) | 70.0% | 78.1% |
| **Employment:** | | |
| Labor force (16 years and over) | 67.6% | 65.7% |
| Unemployment Rate | 4.8% | 5.3% |
| Median Household Income | $26,647 | $39,184 |
| Individuals below the poverty line* | 13.0% | 12.3% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 2.9% | 1.6% |
| Construction | 7.0% | 8.2% |
| Wholesale trade | 4.2% | 3.4% |
| Retail | 16.1% | 11.5% |
| Manufacturing | 26.7% | 19.7% |
| Education, health & social services | 20.3% | 19.2% |
| Arts, recreation, lodging & food services | 1.0% | 6.9% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

The marine recreational fisheries in North Carolina fall into three groups by species, gear and access. First, the recreational fishery in the Sounds and behind the barrier islands is typically a small, open boat fishery for flounder, croaker and drum, spot and sea trout. Striped bass (rockfish) forms an important fishery in Albemarle Sound and around the northern inlets. Second, the inshore and ocean beach fisheries target the same species but also include striped bass, bluefish, and king and spanish mackerel. These inshore fisheries require larger boats and heavier gear, but the boats operate within sight of land. Third, the offshore recreational fisheries target billfish, tunas (bluefin, yellowfin and blackfin), mackerels, dolphin fish (mahi mahi), wahoo, and, in the southwestern area, shark. In the area North of Hatteras and around Cape Lookout, recreational fishermen view sharks as a nuisance in their pursuit of other fish, particularly tuna, marlin, and swordfish. Typically, the boats are 22 feet long or longer, have electronic navigation systems, and are powered by an inboard engine. Generally, heavy tackle is used, and fighting chairs are usually installed for the billfish and giant tuna fishing. The offshore boats normally fish 15 to 60 miles offshore. North Carolina marine recreational fisheries are seasonal, but fishing is year-round as fish species move through the area.

In 2005, North Carolina had the fourth largest fleet of charter/headboats holding HMS permits with 441 vessels (Table 9.35). A significant percentage of these boats operated from communities North of Cape Hatteras. Some of these charterboats were highly specialized, for seeking only billfish for example. The vessels specializing in tunas usually began the year fishing off Dare or Hyde counties, and then moved North to operate off New Jersey and then later off Cape Cod. Vessels specializing in billfish fisheries, would fish off North Carolina in the summer months and then head to the Caribbean for the winter season. Other charterboats, and some headboats, would fish in North Carolina waters from April through November, and then travel south to Florida to fish from December through March. From the advertising materials distributed by charter operations it would appear that from 12 to 15 percent of the fleet changed their operating base during the fishing year.

An unusual feature of the North Carolina charter/headboat fleet is the number of boats built locally. This appears to be particularly true for vessels over 35 feet in length and fishing offshore. Similarly, information about captains and crew of the charter fleet emphasized their local connections, and often relatives of different generations fished together. While this information has not been gathered systematically, it appears that community linkages between North Carolina captains and crews are stronger than those in many of the other states.

North Carolina has historically been an important commercial shark fishing state with 35 to 60 percent of all South Atlantic region landings coming from North Carolina in recent years. The time/area closure implemented in January 2005, to protect essential fish habitat for sandbar and dusky sharks has forced commercial shark fishermen to seek out other fisheries or other gears to target sharks and other species. Many fishermen claim that the closure has hurt their business. After North Carolina's petition to NMFS reopen Federal waters or adjust the Mid-Atlantic shark closure was denied, the State of North Carolina decided to reopen state waters to the commercial shark fishery in 2006.

In addition to recreational and for-hire industries, North Carolina residents hold the second largest number of commercial tuna permits with 659 permitted vessels (Table 9.36). Thirty-eight North Carolina residents hold shark permits and 20 residents hold swordfish permits (Table 9.38 and Table 9.39). In addition to these commercial permit holders, there are 58 dealers authorized to purchase and sell tunas, sharks, and swordfish. North Carolina is fourth in HMS dealers behind Florida, Massachusetts, and New York (Table 9.37).

#### *9.4.11.1 Hatteras*

Hatteras Township is located in the "Outer Banks" of North Carolina, and includes the villages of Avon, Buxton, Frisco and Hatteras. Hatteras Village is a rural community at the southern end of Hatteras Island on North Carolina's Outer Banks. Hatteras Island is a dynamic barrier island, bordered by the Atlantic on the East and Pamlico Sound on the West. In the 18th century, Hatteras established itself as a seaport community, where activities included whaling and exporting/importing. Since World War II, the economy of the Hatteras community has depended on charter and commercial fishing (Wilson *et al*., 1998).

According to the 1990 and 2000 Census data, the population decreased from 2,675 in 1990 to 2,596 in 2000 (Table 9.17). The population decline can be attributed to mortality and out-migration exceeding births and in-migration. The number of males and females were approximately equal in 1990 and 2000. The age structure of the population has changed; the population has aged markedly, with consequences for educational attainment and other demographic indicators. In 1990, 37 percent of the population was 45 years or older, while in 2000 some 57 percent of the year-round residents were aged 45 years or older. The racial composition of the township has not changed significantly between the 1990 and 2000 censuses with the majority of the township Caucasian and European ancestry predominant. The number of households has increased from 1,078 in 1990 to 1,171 in 2000, while the average size of households has dropped from 2.46 persons to 2.20 persons/household. These trends are consistent with an aging and declining population as "empty-nesters" and retirement couples and widows/widowers make up a higher proportion of households. The farming, fishing, forestry, and mining industries employed about 34 percent of the Hatteras population, a significant increase from 1990, and the greatest sources of employment (Table 9.17). One of the most prominent fishing organizations is the Hatteras-Ocracoke Auxiliary of the North Carolina Fishermen's Association (Wilson *et al*, 1998).

**Table 9.17 Demographic Profile of Hatteras, North Carolina** Source: U.S. Census, 1990 and 2000

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 2,675 | 2,596 |
| **Sex** | | |
| Male | 51.6% | 49.2% |
| Female | 48.4% | 50.8% |
| **Age** | | |
| Median Age | **35.1** | **42.1** |
| < 17 | 23.9% | 20.4% |
| 18 - 44 | 39.6% | 33.7% |
| 45 - 64 | 25.4% | 39.6% |
| > 65 | 11.1% | 17.2% |
| **Race** | | |
| White | 98.8% | 97.1% |
| Black or African American | 0.4% | 0.0% |
| American Indian and Alaska Native | 0.8% | 0.0% |
| Asian and Pacific Islander | 0.0% | 0.0% |
| Other | 0.0% | 2.3% |
| **Household** | | |
| **Total** | **1,078** | **1,171** |
| Family households | 69.7% | 78.1% |
| Nonfamily households | 30.3% | 21.4% |
| Average household size | 2.46 | 2.20 |
| Average family size | 2.97 | 2.73 |
| **Housing Occupancy** | | |
| Total housing units | 1,919 | 2,156 |
| Vacant housing units | 43.4% | 45.7% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 72.3% | 79.1% |
| Renter-occupied housing units | 27.7% | 20.9% |

| Hatteras Township, North Carolina | 1990 | 2000 |
|---|---|---|
| **Population:** | 2,675 | 2,596 |
| **Education:** | | |
| High school graduates (25 years or older) | 74.4% | 68.1% |
| **Employment:** | | |
| Labor force (16 years and over) | 67.3% | 83.1% |
| Unemployed | 2.80% | 4.6% |
| Median Household Income | $ 24,667 | $ 39,881 |
| Individuals below the poverty line | 6.4% | 4.7% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 28.4% | 23.2% |
| Technical, Administrative, & Sales | 29.9% | 23.3% |
| Construction, Production, Maintenance, & Transportation | 16.6% | 10.8% |
| Farming, fishing, forestry, & mining | 6.7% | 33.8% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 6.4% | 10.4% |
| Construction | 16.2% | 15.5% |
| Manufacturing | 3.4% | 2.4% |
| Wholesale trade | 2.7% | 4.0% |
| Retail trade | 26.1% | 14.9% |
| Education, health & social services | 11.3% | 14.0% |
| Arts, recreation, lodging & food services | 1.2% | 13.4% |

Fishing from Hatteras is a year-round activity, subject to weather conditions. The cycle of the offshore fishery begins in December, when giant bluefin tuna are passing through the area through March. This catch-and-release fishery is followed by the availability of yellowfin tuna, dolphin, and wahoo from March through December. In the summer months, a catch-and-release fishery for blue and white marlin, swordfish and sailfish takes place between May and September. If ocean conditions are poor, fishermen are able to fish in the sheltered waters behind the barrier islands and in Pamlico Sound for striped bass, drum, sea trout and redfish.

Commercial fishing is a major occupation on Hatteras Island, where there are approximately 500 to 600 part-time and full-time commercial and charterboat fishermen (Wilson *et al*., 1998). The 2000 Census indicates that 34 percent of the population is employed in the farming, fishing, forestry, and mining industry (Table 9.17). Since fishermen are customarily self-employed either as owner-operators of vessels or as crew/independent contractors receiving a share of the catch or tips as payment for their services, Wilson's estimate of 500-600 part-time and full-time commercial and charterboat fishermen is considered to be accurate for 2003 (NMFS, 2003).

Tourism and recreational fishing are also major industries in Hatteras in terms of seasonal employment. There are three economic "seasons" in Hatteras (NMFS, 1999a). In the spring, weekend and holiday travelers cause an increase in revenue; several vessels from the commercial fleet become active in charter fishing beginning in April. During the second season, June through August, family vacations provide tourist income. The third season is the fall, when fishing, surfing and windsurfing are the dominant activities.

There are five seafood wholesalers, one retail market, and three marinas (Wilson *et al*., 1998). The three marinas in Hatteras provide dockage for as many as 56 offshore charter/headboats, some 15 inshore boats that can fish along the coast, and six charterboats that fish only in the Sounds. In addition, there are approximately 210 berths for private boats. Some commercial boats use the marinas during the late fall and winter months, but otherwise dock at fish houses and the fishermen's private docks.

The three marinas each have a charterboat fleet of independent owner/operators, and each maintains a booking and information system for its fleet. The charterboats operate with a captain and mate or crewman, and often have a second relief captain available for peak seasons when the boat will be making trips every day. The captain takes his profits (pay) from the revenues earned by the boat, and the mate customarily receives a tip of 15 - 20 percent of the charter fee from the client. In many cases, the boat will retain the sale rights to fish caught by clients and if the right is exercised, the ex-vessel price is apportioned between boat, captain, and mate (crew). At the height of the summer season, the recreational fisheries and fishing services (marinas, bait and tackle, *etc*) in Hatteras provide employment for approximately 205 persons.

The recreational rod and reel fishery for pelagic fish flourishes in Hatteras. A bluefin tuna fishery during winter months is intense but somewhat unpredictable. Early in the spring, fishermen target offshore yellowfin tuna, dolphin, and wahoo, followed by marlin and sailfish fishing in the summer. Other species caught seasonally include king mackerel and striped bass. Fly-fishing has become more popular, although it still comprises a small number of offshore trips from Hatteras. Captains say it is very hard to find a year-round mate because college students work summers only and most skilled fishermen want their own vessels (Wilson *et al*., 1998).

About half of fishing parties are all male and the other half are families, some of which participate in other tourist activities while the others fish. "Make-up charters", where marinas organize the parties, are becoming increasingly common (Wilson *et al*., 1998). One captain estimated that his marina did 140 make-up charters in the past year. The majority of the charter customers want to fish offshore. Customers are often willing to accept retention limits imposed by the captain, although the possibility of landing at least one fish is important to many anglers. Changes in fishing conditions including weather conditions and the availability of fish affect charter bookings almost instantly, and there is not much customer loyalty to Hatteras. Clients cancel trips when they hear a species has moved out of the area. Because Hatteras attracts top sport fishermen from around the world, the issues of minimum sizes and trophy fish take on special significance. Many fishermen are interested in setting records by catching smaller bluefin tuna on fly rods.

In 2005, there were 25 HMS charter/headboat permit holders from Hatteras, North Carolina, but many of the charterboats operating in Hatteras are from other areas. They come for the winter bluefin tuna fishery but stay year-round. Researchers report tension between the local charterboats and the transient charterboats because of increased competition for both fish and customers. There is also tension with private recreational fishermen who follow the charter/headboats to see where they fish (Wilson *et al*., 1998).

The status of the relatively new winter bluefin tuna fishery is hot topic for HMS fishermen in Hatteras is the status of the relatively new winter fishery for bluefin tuna. In their study of the 1997 bluefin tuna fishing season, Ditton *et al*. (1998) found that bluefin tuna anglers spent $3.6 million dollars in Hatteras in two and one-half months in the 1997 winter season. They estimate that this meant a $7.6 million impact on the output of the Hatteras area economy and supported 170 jobs. Dare County unemployment estimates indicate that the bluefin tuna fishery may have reduced unemployment by eight percent during the first quarter of 1997. Unemployment in Dare County in March 1998, a year when the bluefin tuna did not show up in numbers anywhere near the 1997 level, was 29 percent higher than in March 1997.

Respondents view and respond to the winter fishery very differently, even disagreeing on the year it started. Because of the unpredictability of the appearance of bluefin tuna and the duration of their stay, there is uncertainty among local businesses about whether or not to invest further and stay open during winter months. Those who now have winter jobs, and those who hire them, have a different perspective. Businesses are generally pleased to retain year-round employees rather than hiring and training seasonally. Finding a place to live on Hatteras Island is already difficult for low wage workers. Many people, especially fishermen, did not think the winter fishery would last (Ditton *et al*., 1998).

#### *9.4.11.2 Wanchese, North Carolina*

Wanchese is located on the southern part of Roanoke Island, in the northern Outer Banks. The village continues to revolve around fishing and fish processing. Wanchese's first seafood dealership was opened in 1936 by a family that still operates two seafood businesses in the community. The Wanchese Seafood Industrial Park was constructed in 1980 by the state. It has 30 acres of leasable land, a 15-acre deep-water harbor, and 1,500 feet of commercial-style concrete docks, and seven seafood-related businesses (CNCSS, 1993). The industrial park is also the scene of the annual blessing of the fleet, which is organized by the Oregon Inlet Users Association. Although commercial fishing has historically been a major industry, there has been an increasing emphasis on recreational angling and tourism.

Between 1990 and 2000, the population increased from 1,374 to 1,527 individuals (Table 9.18). The population is roughly divided between males and females. The population of Wanchese is about 98 percent Caucasian, and mostly of European ancestry. The largest age group is the 18 - 44 year old individuals and continues to remain about the same over the past two decades. The most dramatic shafts in the population distribution have been the decline in the percent of individuals under 20 and increase in the 45 - 64 year old group. In 1990, there were 503 households in Wanchese, with an average of 2.73 persons per household. The number of households had grown to 614 in 2000, with an average of 2.49 persons per household.

**Table 9.18 Demographic Profile of Wanchese, North Carolina.** Source: U.S. Census 1990 and 2000

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 1,374 | 1,527 |
| **Sex** | | |
| Male | 51.2% | 50.7% |
| Female | 48.8% | 49.3% |
| **Age** | | |
| Median Age | **27.7** | **37.2** |
| < 20 | 36.8% | 25.9% |
| 20 - 44 | 35.7% | 37.9% |
| 45 - 64 | 20.2% | 24.1% |
| > 65 | 7.2% | 12.0% |
| **Race** | | |
| White | 98.5% | 98.1% |
| Black or African American | 0.0% | 30.0% |
| American Indian and Alaska Native | 1.5% | 0.6% |
| Asian and Pacific Islander | 0.0% | 0.1% |
| Other | 0.0% | 0.5% |
| **Household** | | |
| **Total** | **503** | **614** |
| Family households | 76.1% | 70.5% |
| Nonfamily households | 23.9% | 29.5% |
| Average household size | 2.73 | 2.49 |
| Average family size | 3.25 | 2.96 |
| **Housing Occupancy** | | |
| Total housing units | 574 | 690 |
| Vacant housing units | 10.8% | 11.0% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 72.1% | 89.0% |
| Renter-occupied housing units | 27.9% | 11.0% |

| Wanchese, North Carolina | 1990 | 2000 |
|---|---|---|
| **Population:** | 1,374 | 1,527 |
| **Education:** | | |
| High school graduates (25 years or older) | 67.3% | 76.5% |
| **Employment:** | | |
| Labor force (16 years and over) | 70.7% | 66.6% |
| Unemployed | 7.8% | 1.8% |
| Median Household Income | $ 25,977 | $ 39,250 |
| Individuals below the poverty line | 9.3% | 8.1% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 17.0% | 24.3% |
| Technical, Administrative, & Sales | 24.6% | 21.9% |
| Construction, Production, Maintenance, & Transportation | 18.8% | 36.0% |
| Farming, fishing, forestry, & mining | 12.6% | 9.5% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 19.7% | 8.2% |
| Construction | 5.0% | 9.9% |
| Manufacturing | 9.5% | 13.1% |
| Wholesale trade | 6.6% | 6.9% |
| Retail trade | 19.1% | 11.7% |
| Education, health & social services | 8.5% | 22.0% |
| Arts, recreation, lodging & food services | 2.9% | 7.2% |

In 1990, the largest industries in Wanchese were forestry, fishing, hunting, mining, and agriculture with retail trade as a close second (Table 9.18). The 2000 Census data show a significant decline in the forestry, fishing, hunting, mining, and agriculture industry and a marked increase in the education, health and social services industries. The decline in the farming, fishing, forestry, and mining industry is also noticeable in the employment estimates. Some of these declines can be attributed to difficulties in hiring and managing crew for pelagic longline vessels, especially for the larger vessels that need people to stay on for longer trips (Wilson *et al*., 1998). There is a lot of turnover in fishing crews, particularly when vessels shift to other fisheries and revenue drops. Many of the larger vessels have already left, and experienced fishermen are finding work overseas and other captains and vessel owners are searching for alternatives to commercial fishing. Some have switched to carpentry and building and others have gone into the charter fishing business. Finding alternative permanent work may prove difficult for many fishermen who are highly skilled in their profession but have less formal education than the average worker (Wilson *et al*., 1998).

Fishing related associations include the Oregon Inlet Users Association and the North Carolina Fisheries Association. The former is involved with supporting the plans for jetties at Oregon Inlet and are responsible for organizing both the Wanchese Seafood Festival and the Blessing of the Fleet. The latter is a trade organization of seafood dealers and commercial fishermen from the state; two members of the 18-member Board of Directors are from Wanchese (CNCSS, 1993).

Recent growth in tourism and recreational fishing has sparked competition for a restricted resource. However, commercial and recreational fishermen still see themselves as being part of the same fishing-based community and many come from the same families. Members of the non-fishing public are generally supportive of the fishing industry. Unlike the surrounding communities, and in distinct contrast to Hatteras Township, Wanchese has very little seasonal variation in employment resulting from tourism; what seasonal fluctuations do exist are caused by the availability of the fisheries resources and are countered by the flexibility and opportunistic nature of the Wanchese fishermen (CNCSS, 1993).

Wanchese is not a community linked to tourism in the way that most other Outer Banks and Dare County communities are. Of the housing stock, only eleven percent was rental properties in 2000 (Table 9.18). The marinas and boatyards in Wanchese cater to transient boats and the charterboat fleets, but recreational fishing from Wanchese is more likely to be done by local fishermen in the Albemarle, Currituck, or Pamlico Sounds, rather than by tourists fishing offshore in private or charterboats. The reason for this is the distance to Oregon Inlet, and the presence of the Oregon Inlet Fishing Center with extensive recreational boat docks, facilities for charterboats, and launching ramps with large parking areas close to the inlet.

A large number of commercially important marine fish are landed in Wanchese, including inshore and offshore species. Many fishermen emphasized that they have to be versatile due to quick changes in water temperature and therefore in availability of species in the area (Wilson *et al*., 1998). The species that longline fishermen target off the mid-Atlantic coast include swordfish, sharks, and tunas (primarily, yellowfin and bigeye). Although targeting bluefin tuna with longline gear is prohibited, there is an incidental catch allowance of bluefin tuna as part of other fishing operations. Fishermen aboard large longline vessels fish for swordfish, tunas, and dolphin. Because of the weather, tunas and swordfish are accessible to the medium-sized vessels that gillnet for other species and longline in the summer. Respondents explained that they also gillnet for dogfish, bluefish, and Spanish mackerel (in spring and fall), and trout and croaker (in winter). They also bottom fish for bass and grouper. There are a number of vessels that gillnet in some seasons and then switch over to charterboat fishing in the summer. Other fishing activities in Wanchese include trawling trips for squid in the summer, and fishing for weakfish, croaker, and flounder in the winter. Market considerations are crucial in deciding which species should be targeted by longline vessels (Wilson *et al*., 1998).

Researchers found pressure on this sector of the longline fishery to be substantial. Hiring and managing crew for pelagic longline vessels is increasingly difficult, especially for the larger vessels that need people to stay on for longer trips. There is a lot of turnover in fishing crews, particularly when vessels shift to other fisheries and revenue drops. Many of the larger vessels have already left, and experienced fishermen are finding work overseas and other captains and vessel owners are searching for alternatives to commercial fishing. Some have switched to carpentry and building and others have gone into the charter fishing business. Finding alternative permanent work may prove difficult for many fishermen who are highly skilled in their profession but have less formal education than the average worker (Wilson *et al*., 1998).

### 9.4.12 South Carolina

The population in South Carolina has increased by 13.1 percent between 1990 and 2000 (Table 9.19). The number of individuals with a high school diploma or greater has increased from 68.3 percent in 1990 to 76.3 percent in 2000. The unemployment rate has remained about the same and the number of individuals below the poverty line declined by just over one percent. Employment in the farming, fishing, forestry, and mining industries has declined slightly with the only significant increase in employment taking place in the arts, recreation, lodging, and food services industries, from 1.1 percent in 1990 to 8.3 percent in 2000.

**Table 9.19 South Carolina Demographic Profile.** Source: U.S. Census, 1990 and 2000

| South Carolina | 1990 | 2000 |
|---|---|---|
| **Population:** | **3,486,703** | **4,012,012** |
| **Education:** | | |
| High school graduates (25 years or older) | 68.3% | 76.3% |
| **Employment:** | | |
| Labor force (16 years and over) | 66.0% | 63.4% |
| Unemployment Rate | 5.6% | 5.9% |
| Median Household Income | $26,256 | $37,082 |
| Individuals below the poverty line* | 15.4% | 14.1% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 2.3% | 1.1% |
| Construction | 7.9% | 8.3% |
| Wholesale trade | 3.6% | 3.3% |
| Retail | 16.6% | 11.9% |
| Manufacturing | 25.7% | 19.4% |
| Education, health & social services | 19.9% | 18.6% |
| Arts, recreation, lodging & food services | 1.1% | 8.3% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

South Carolina has 89 commercial tuna permit holders, holding 1.7 percent of the total commercial tuna permits (Table 9.36). Additionally, there are 32 dealers for tunas, shark, and swordfish in the state of South Carolina. With 25 shark permits (directed and incidental), South Carolina holds the fifth greatest number of shark permits. Due to the relatively small number of HMS permit holders and landings in South Carolina, no community profiles have been developed at this time.

In 2005, South Carolina was home to 736 HMS Angling permit holders (Table 9.34). About 662,000 marine anglers fished in South Carolina's waters making 2.2 million recreational fishing trips in 2004 (NMFS, 2005a). Of these recreational fishermen, 335,000 (51 percent) were from out-of-state and 101,000 (15 percent) were from non-coastal counties within South Carolina. Estimated retail sales generated by the saltwater fishery in South Carolina in 2001 were some $264 million and the marine recreational fishing industry created 5,498 jobs (ASA, 2002). Anecdotal information suggests that the shark fishery is incidental to other fisheries, and is primarily catch-and-release.

In 2005, South Carolina had a fleet of 130 charter/headboats with HMS permits, many of which fish the Gulf Stream for tuna and billfish, dolphin and wahoo, and take shark as incidental catch (Table 9.35). There is a directed fishery by charter/headboats for sharks in South Carolina. Shark fishing trips, including night fishing, are offered by a number of charter operators. Sharks are taken, in the directed fishery, from near-shore waters, inlets, and from around breakwaters and jetties. Shark fishing is said to be particularly good from May to December, but sharks are available year-round. Principal species targeted are blacktip, hammerhead, lemon, and tiger shark. The International Game Fish Association (IGFA) world-record tiger shark was caught off Cherry Grove Beach, SC, near Myrtle Beach. Charterboat operators advertising shark fishing as special trips or part of general near-shore fishing are found in the communities of Myrtle Beach, North Myrtle Beach, Hilton Head, Georgetown, Pawley's Island, Murrell Inlet, Edisto Beach, Isle of Palms, Seabrook Island, Charleston, Mount Pleasant, Beaufort, and Little River.

### 9.4.13 Georgia

The population in Georgia has increased quite a bit in the last decade, from 6.5 million people in 1990 to 8.2 million people in 2000 (Table 9.20). The labor force (ages 16 and older) and unemployment has remained the same over the past decade, but there was a slight decline in the percentage of individuals below the poverty line. Employment in the farming, fishing, forestry, and mining industries has declined slightly since 1990; there has been only a slight employment increase in the art, recreation, lodging, and food services industries, from one percent to seven percent.

**Table 9.20 Georgia Demographic Profile.** Source: U.S. Census, 1990 and 2000

| Georgia | 1990 | 2000 |
|---|---|---|
| **Population:** | **6,478,216** | **8,186,453** |
| **Education:** | | |
| High school graduates (25 years or older) | 70.9% | 78.6% |
| **Employment:** | | |
| Labor force (16 years and over) | 66.1% | 66.1% |
| Unemployment Rate | 5.5% | 5.5% |
| Median Household Income | $29,021 | $42,433 |
| Individuals below the poverty line* | 14.7% | 13.0% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 2.7% | 1.4% |
| Construction | 6.9% | 7.9% |

| Georgia | 1990 | 2000 |
|---|---|---|
| Wholesale trade | 5.1% | 3.9% |
| Retail | 16.5% | 12.0% |
| Manufacturing | 18.9% | 14.8% |
| Education, health & social services | 20.4% | 17.6% |
| Arts, recreation, lodging & food services | 1.0% | 7.1% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

Commercial shark fishing in Georgia has traditionally been only a very small segment of the commercial fisheries in the state. There are only four vessels that hold shark permits in Georgia (Table 9.38). Both Darien and Townsend, in McIntosh County, have been involved with the commercial shark fishery. There are three dealers permitted to sell HMS such as tunas, sharks, and swordfish (Table 9.37). Twenty-six vessels are permitted to participate in the commercial tuna fisheries (Table 9.36). The number of HMS charter/headboat permits operating in Georgia increased from 27 in 2003 to 40 in 2005 (Table 9.35). Some of the active charter/headboat communities are Columbus, Brunswick, Marietta, Savannah, Atlanta, Alpharetta, and St. Simons Island.

In 2005, Georgia residents held 205 HMS angling permits (Table 9.34). In 2004, marine recreational fishing in Georgia attracted 276,000 anglers, of whom 20 percent (54,000) were from out-of-state and 43 percent from non-coastal counties (NMFS, 2005a). Collectively, these anglers made 929,000 recreational fishing trips in 2004. Saltwater angling is estimated to have generated some $57.8 million in retail sales in Georgia in 2001 and about 10,649 jobs in the marine recreational fishing service sector (ASA, 2002). Principal recreational fisheries are for tarpon and snook inshore, and billfish and tunas offshore. Sharks are taken incidental to these fisheries but there are targeted shark fisheries inshore on spinner, sandbar, and lemon sharks.

### 9.4.14 Florida

Florida's population increased by more than 3 million people between 1990 and 2000 (Table 9.21). The percentage of individuals 25 years and older with a high school diploma and/or a graduate level degree has increased by almost five percent in the last decade. The percentage of employed individuals has declined slight, whereas the unemployment rate and percentage of individuals below the poverty line remained about the same through the nineties. As with many of the other states, employment in the farming, fishing, forestry, and mining industries has declined, whereas the education, health, and social services industries provided the greatest employment opportunities in 2000. Employment in the arts, recreation, lodging, and food services industries has been on the rise in the last decade.

Florida's fishing industry is one of the largest and most diverse in the region. Florida residents hold more than half of the commercial shark permits with 283 permit holders residing in the state (Table 9.38). Some of the large concentrations of permit holders are in Fort Pierce, St. Petersburg, Key West, and Panama City, Florida (Figure 9.6). Florida is also home to the greatest number of swordfish permit holders with 117 permitted vessels (Table 9.39). The large numbers of swordfish permit holders are found in Fort Pierce, Pompano Beach, St. Petersburg, and Panama City. Florida residents hold about five percent of the commercial tuna permits, and are generally spread out along the entire coast of Florida (Table 9.36 and Figure 9.4). Florida residents also have the greatest number of HMS dealer permits with 137 dealers permitted to purchase and sell tunas, sharks, and swordfish (Table 9.37). A large number of these dealers can be found in Miami, Fort Lauderdale, Key West, and St. Petersburg.

Florida has the largest marine recreational fisheries in the United States. In 2004, approximately 6,534,000 saltwater anglers fished in the waters off Florida and made 27,204,000 fishing trips during that year (NMFS, 2005a). Of these fishermen, 3,291,000 (50 percent) were from out-of-state. More specifically to recreational HMS fisheries, Florida has the greatest number of HMS angling permits in the United States, with 3,439 permitted individuals (Table 9.34). A large concentration of HMS anglers reside in Jupiter, West Palm Beach, Pompano Beach, Fort Lauderdale, and Miami, Florida (Figure 9.2). The retail sales generated by saltwater anglers in Florida in 2001 were estimated to be $2,987.2 million and the marine recreational fishing industry provided 59,418 jobs (ASA, 2002). Sharks are an incidental catch for many fishermen, but some private boat fishermen have a directed fishery for sharks, including lemon, hammerhead, sandbar, blacktip and tiger sharks.

As with the recreational anglers, Florida is also the number one state for HMS charter/headboat permit holders with 632 permitted vessels (Table 9.35). Many of these charter/headboat operators are from Key West, Islamorada, Miami, and Destin, Florida (Figure 9.3). It should be noted that these 634 charterboats/headboats permit holders refer to Florida residents and do not account for the transient vessels traveling to Florida for the winter and spring fishing seasons.

**Table 9.21 Florida Demographic Profile.** Source: U.S. Census, 1990 and 2000

| Florida | 1990 | 2000 |
|---|---|---|
| **Population:** | **12,937,926** | **15,982,378** |
| **Education:** | | |
| High school graduates (25 years or older) | 74.0% | 79.9% |
| **Employment:** | | |
| Labor force (16 years and over) | 60.4% | 58.6% |
| Unemployment Rate | 5.8% | 5.6% |
| Median Household Income | $27,483 | $38,819 |
| Individuals below the poverty line* | 12.7% | 12.5% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 3.1% | 1.3% |
| Construction | 7.8% | 8.0% |
| Wholesale trade | 4.6% | 3.9% |
| Retail | 19.6% | 13.5% |
| Manufacturing | 10.5% | 7.3% |
| Education, health & social services | 21.4% | 18.1% |
| Arts, recreation, lodging & food services | 2.3% | 10.5% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

#### *9.4.14.1 Pompano Beach, Florida*

Pompano Beach is a small city directly adjacent to Fort Lauderdale. The Fort Lauderdale area is known as the "Yachting Capital of the World" and the "Venice of America" because of the vast canal system, which extends throughout Broward County and creates 165 miles of waterfront in the region. Recreational fishing is a very important activity in Pompano Beach, mainly targeting billfish. In contrast to many Florida communities, local people in addition to tourists support a substantial amount of the recreational fishing industry. Many small fishing tournaments attract about 75 percent local people and 25 percent tourists. Pompano Beach is also a globally important manufacturing center for commercial longlining equipment with its own small commercial longline fleet (Wilson *et al.,* 1998). As a community, Pompano Beach owes its current infrastructure and social and economic lifestyle to the arrival of the railroad in 1896 to a small coastal settlement. The proximity of good fishing and other natural resources encouraged the town and region's development as tourism and retirement center. The local chamber of commerce sponsors three marine festivals every year.

Between 1990 and 2000, the population increased from 72,411 to 78,191 individuals (Table 9.22). The male to female ratio in the Pompano population changed only slightly in the past decade with a slight decrease in the number of females (48:52 to 49:51). The percent of the total population by each age group remained relatively constant between 1990 and 2000. Since the 1990 Census, the ethnic and racial population of Pompano Beach has shifted to increase the number of "other" ethnicities in the population. In 1990, the population was 70 percent Caucasian and 29 percent Black-American. Twenty percent of the population was of Hispanic ancestry. In 2000, the population consisted of 67 percent Caucasians, 25 percent Black-Americans, and eight percent of people of other ethnicities. The proportion of the population with Hispanic ancestry had dropped to ten percent.

The number of households increased from 31,891 in 1990 to 35,197 in 2000 (Table 9.22). The average household size in Pompano Beach decreased from 2.2 persons/household in 1990 to 2.1 persons/household in 2000. Of the households in 2000, some 69 percent were in receipt of earned income. Some 36 percent of the households received Social Security payments, while 16 percent of households were in receipt of retirement income from pensions (NMFS, 1999a). This suggests that some 30 percent of households were retired and living on fixed incomes. The per capita income for Pompano Beach in 1989 was $17,382, and greater than the state average by $2,684 per annum. In 2000, per capita income in Pompano Beach was $23,938, and greater than the state average income by $2,381. The technical, administrative, and sales industries provide the greatest source of employment, with managerial and professional positions a close second. Employment in the farming, fishing, forestry and mining industries declined from almost 12 percent in 1990 to less than one percent in 2000.

Pompano Beach has a proud longlining heritage and there are several successful businesses that are still involved to some degree with the fleet (Wilson *et al*., 1998). This gives the current small vessel fleet and other longline business some networks of support. At the same time, Pompano Beach is now increasingly a recreational fishing community. In fact, Pompano Beach has the second largest concentration of HMS angling permit holders with 303 residents participating in the HMS recreational fishery (Figure 9.2). Virginia Beach has 316 permit holders. There is a great deal of tension between the recreational fishermen and the longliners.

At the present time, researchers found that the longline fleet is not receiving community support beyond that supplied from within their own industry. Both sides acknowledge a problem with overfished stocks, but each often blames the other side.

Pompano Beach has a small pelagic longline fleet, remnant of a much larger fleet, which mainly targets tunas and swordfish. A large number of swordfish permit holders reside in Pompano Beach (Figure 9.7). There is also some shark fishing farther North along the coast. There are eleven HMS longline permit holders residing in Pompano Beach, Florida. The most intensive local fishing takes place December through April. The longline fleet conducts business with three Pompano Beach dealers permitted for shark and swordfish and one Dania shark and swordfish permitted dealer. The development of the Pompano Beach area for yachting and recreational fishing has made dockage and access to the water more expensive (NMFS, 1999b).

Wilson *et al.* (1998) noted that commercial respondents reported increased difficulty in getting quality crew. The smaller vessels take two crew plus the captain. Owner-operators often try to have at least one consistent crew member, and then find anyone they can for particular trips. The end result of all of these factors has been a substantial reduction of the Pompano Beach longline fleet. Pompano Beach's remaining pelagic and bottom longline fleet is considered, by both its owners and suppliers, to be in major trouble (Wilson *et al*., 1998). Skilled captains were seeking employment in the Bahamas, as well as with the growing longline fleets in South Africa and South America, while the longline supply business has shifted its emphasis to supplying foreign fleets. In the urban economy of Pompano Beach, non-fishing alternatives for fishermen do exist. However, the work force is fairly well-educated, so finding employment could be competitive (Table 9.22). Commercial fishing employment alternatives for vessels and crew are minimal because of limited entry programs in other fisheries.

**Table 9.22 Demographic Profile of Pompano Beach, Florida.** Source: U.S. Census 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 72,411 | 78,191 |
| **Sex** | | |
| Male | 48.2% | 49.3% |
| Female | 51.8% | 50.9% |
| **Age** | | |
| **Median Age** | **39.8** | **42.2** |
| < 20 | 19.8% | 19.7% |
| 20 - 44 | 35.0% | 34.5% |
| 45 - 64 | 19.9% | 22.5% |
| > 65 | 25.3% | 23.4% |
| **Race** | | |
| White | 70.1% | 67.8% |
| Black or African American | 28.6% | 25.4% |
| American Indian and Alaska Native | 0.1% | 0.2% |
| Asian and Pacific Islander | 0.3% | 0.8% |
| Other | 0.9% | 2.0% |
| **Household** | | |
| **Total** | **31,981** | **35,197** |
| Family households | 57.9% | 52.4% |
| Nonfamily households | 42.1% | 47.6% |
| Average household size | 2.26 | 2.13 |
| Average family size | 2.90 | 2.85 |
| **Housing Occupancy** | | |
| Total housing units | 42,179 | 44,496 |
| Vacant housing units | 24.7% | 20.9% |

| Pompano Beach, Florida | 1990 | 2000 |
|---|---|---|
| Population: | 72,411 | 78,191 |
| **Education:** | | |
| High school graduates (25 years or older) | 73.7% | 77.2% |
| **Employment:** | | |
| Labor force (16 years and over) | 52.1% | 53.8% |
| Unemployed | 3.5% | 3.6% |
| Median Household Income | $ 29,683 | $ 36,073 |
| Individuals Below the Poverty Line | 16.0% | 17.0% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 24.8% | 28.6% |
| Technical, Administrative, & Sales | 31.8% | 30.0% |
| Construction, Production, Maintenance, & Transportation | 3.2% | 11.4% |
| Farming, fishing, forestry, & mining | 11.6% | 0.5% |
| **Industry Code Description** | | |
| Forestry, fishing, hunting, mining, and agriculture | 3.1% | 0.5% |
| Construction | 10.4% | 9.8% |
| Manufacturing | 8.5% | 7.1% |
| Wholesale trade | 5.4% | 4.7% |
| Retail trade | 18.6% | 13.6% |
| Education, health & social services | 13.2% | 14.9% |
| Arts, recreation, lodging & food services | 2.3% | 11.0% |

### *9.4.14.2 Fort Pierce, Florida*

Fort Pierce is located in St. Lucie County, a rapidly developing area in South Florida. St. Lucie County is known as a center for citrus growing, particularly grapefruit. Fort Pierce is on the site of an Army fort built in 1838, and remained an isolated outpost until the railroad reached the town in 1900. Fort Pierce was incorporated in 1901, and soon developed as a center for industry and agribusiness. At the junction of the Florida Turnpike and Interstate 95, Fort Pierce is a thriving intermodal transportation center, distribution point, and tourist stopover point.

Fort Pierce is a community in transition. The community grew rapidly between 1960 and 1990, from a population of 24,857 to 36,830 (Table 9.23). Between 1990 and 2000, the population grew by only two percent, increasing by about 800 people. Changing from a predominantly white community in 1950, the white portion of the population declined to less than half the total in 2000. The black or African American population made up just over 40 percent of the Fort Pierce population. No other ethnic or racial groups dominate the remaining 11 percent of the population. About 30 percent of the population is under 20 years old, whereas another 33 percent is between 20 and 44. The median age in 2000 was 35.4 years old.

**Table 9.23 Demographics of Fort Pierce, Florida.** Source: U.S. Census 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 36,830 | 37,516 |
| **Sex** | | |
| Male | 47.1% | 49.3% |
| Female | 52.9% | 50.7% |
| **Age** | | |
| Median Age | **34.2** | **35.4** |
| < 20 | 30.4% | 30.3% |
| 20 - 44 | 30.8% | 32.7% |
| 45 - 64 | 18.8% | 19.6% |
| > 65 | 20.0% | 17.5% |
| **Race** | | |
| White | 53.8% | 49.5% |
| Black or African American | 42.5% | 40.9% |
| American Indian and Alaska Native | 0.2% | 0.3% |
| Asian and Pacific Islander | 0.4% | 0.9% |
| Other | 3.1% | 5.4% |
| **Household** | | |
| **Total** | **14,283** | **14,407** |
| Family households | 64.4% | 61.2% |
| Nonfamily households | 35.6% | 38.8% |
| Average household size | 2.58 | 2.56 |
| Average family size | 3.21 | 3.19 |
| **Housing Occupancy** | | |
| Total housing units | 17,250 | 17,170 |
| Vacant housing units | 17.8% | 16.6% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 53.3% | 53.2% |
| Renter-occupied housing units | 46.7% | 46.8% |

| Fort Pierce, Florida | 1990 | 2000 |
|---|---|---|
| Population: | 36,830 | 37,516 |
| **Education:** | | |
| High school graduates (25 years or older) | 56.9% | 59.7% |
| **Employment:** | | |
| Labor force (16 years and over) | 48.2% | 55.1% |
| Unemployed | 6.8% | 4.9% |
| Median Household Income | $ 18,913 | $ 25,121 |
| Individuals Below the Poverty Line | 29.2% | 30.9% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 16.8% | 19.9% |
| Technical, Administrative, & Sales | 28.0% | 20.5% |
| Construction, Production, Maintenance, & Transportation | 9.7% | 9.0% |
| Farming, fishing, forestry, & mining | 10.4% | 31.3% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 9.8% | 7.8% |
| Construction | 8.2% | 12.6% |
| Manufacturing | 7.1% | 8.0% |
| Wholesale trade | 4.1% | 4.8% |
| Retail trade | 21.0% | 12.5% |
| Education, health & social services | 17.1% | 16.9% |
| Arts, recreation, lodging & food services | 1.1% | 10.8% |

There were 14,407 households in Fort Pierce, with an average household size of 2.56 persons, in 2000. The population is relatively mobile, since only 46 percent lived in the same house in 2000 as they did in 1995. It is also a relatively poor community, with median household income of $25,121 in 2000, and 31 percent of the population living below poverty level. Per capita income in Fort Pierce in 2000 was $14,345, compared to the statewide average per capita income of $21,557, and $9,593 less than the per capita income in Pompano Beach.

These earnings data reflect the unskilled and seasonal nature of jobs in agribusiness, packing plants and transportation businesses in and around Fort Pierce.

Locals refer to Fort Pierce as the "gateway to the Bahamas" because of the number of sport fishing and other vessels which use Fort Pierce as their departure point for the Bahamas and its associated Gulf Stream fisheries for HMS and other species of fish, including shark. In 2003, Fort Pierce hosted 15 fishing tournaments and related marine activities. The city's marina, in conjunction with other marinas and docks along the Indian River, Indian River Lagoon, and Intracoastal Waterway, provides sufficient dockage for recreational boaters and fishermen and for a commercial fishing fleet, principally longliners, but also the shark gillnetters. Fifteen shark and nine swordfish permit holders reside in Fort Pierce (Figure 9.6 and Figure 9.7).

The commercial fishing fleet in Fort Pierce has grown in the past decade due to lost dock space for commercial fleets in nearby ports. With the exception of the gillnet fleet unique to Fort Pierce, the commercial fishery is similar to the commercial fishery of Pompano Beach and is principally conducted during the fall and winter seasons. Smaller vessels switch gears and target species throughout the year, while larger vessels move with the fish stocks and retain the same gear configurations. Dealers and fish processors have also consolidated buying and packing operations in Fort Pierce because of the high cost of doing business in the tourism-related coastal communities North and South of Fort Pierce.

#### *9.4.14.3 Madeira Beach, Florida*

Madeira Beach is part of the Tampa Bay urban complex, one of several beach suburbs of St. Petersburg. The area is the home of the West-central Florida shark bottom longline fleet. Madeira Beach is also home to a thriving recreational HMS fishery. In terms of revenue, tourism is the number one industry in Pinellas County. Annually, four million visitors contribute about two billion dollars to the economy. The tourism industry also employs almost 60,000 of the residents either directly or indirectly, adding up to $720 million in wages (St. Petersburg-Clearwater Visitors Bureau brochure, 1998). The state of the economy since September 2001 has dampened the tourism industry, and Pinellas County Chamber of Commerce reported that the 2002 visitor and expenditure statistics were similar to those of 1998 (PCCC Report, March, 2003).

Madeira Beach's economy has changed with the changing tourism industry. A sign of the times is the renovation of much of the waterfront along St. John's Pass from a working waterfront of docks, fish houses and chandleries to a boardwalk lined with restaurants and boutiques. Many of the slips remaining are assigned to recreational vessel docking and storage. The once-dominant fishing industry is now a shadowy presence in much of Madeira Beach.

The population in Madeira Beach increased by about six percent over the last decade (Table 9.24). In 2000, 97 percent of the population was Caucasian. During the decade, the number of people in the population claiming German ancestry rose from 11 percent to 19.7 percent in 2000, although 92 percent of the population of Madeira Beach was born in the United States. The Madeira Beach population aged during the decade. The median age increased from 34.2 in 1990 to 47.6 in 2000. The number of households in Madeira Beach increased from 2,230 in 1990 to 2,523 in 2000, but the average number of persons in a household declined from 1.88

persons in 1990 to 1.78 in 2000. In 2000, almost 28 percent of the housing units in Madeira were seasonal or recreational units vacant at the time of the Census.

Per capita income in Madeira Beach in 1989 was $17,301; in 1999, per capita income had risen to $30,097, some $8,000 more than the state average per capita income and $15,752 more than the average per capita income in Fort Pierce. Individuals living at or below poverty level comprised 9.8 percent of the Madeira Beach population. Some 72 percent of Madeira Beach's households received earnings from wages or salaries. Twenty-three percent of the households were in receipt of retirement funds or pensions, while 31 percent of the households received income from Social Security. The jobs in farming, fishing, forestry, and mining industries declined over the last decade from just over ten percent to less than one percent (Table 9.24). The industry itself also declined, whereas the arts, recreation, lodging and food services related industries increased from 2.5 percent to over 21 percent.

The offshore fishing industry in Madeira Beach started as a bandit (reel fixed to transom) fishery before it shifted to bottom longlining. Grouper is the traditional fishery for the community. In the 1960s, there were two dealers supported by charterboats selling fish and a small commercial fleet targeting kingfish and grouper. Many species that are now sold in Madeira Beach, such as amberjack, were considered junk fish in earlier years. As demand for seafood began to grow, higher prices accompanied by investment programs led to substantial investment in commercial fishing within this community.

**Table 9.24 Demographic Profile for Madeira Beach, Florida.** Source: U.S. Census 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 4,225 | 4,500 |
| **Sex** | | |
| Male | 50.9% | 52.0% |
| Female | 49.1% | 48.0% |
| **Age** | | |
| **Median Age** | **34.2** | **47.6** |
| < 20 | 11.2% | 9.5% |
| 20 - 44 | 35.3% | 32.5% |
| 45 - 64 | 28.0% | 36.0% |
| > 65 | 25.6% | 21.9% |
| **Race** | | |
| White | 99.8% | 97.4% |
| Black or African American | 0.0% | 0.0% |
| American Indian and Alaska Native | 0.0% | 0.8% |
| Asian and Pacific Islander | 0.2% | 0.0% |
| Other | 0.0% | 1.8% |
| **Household** | | |
| **Total** | **2,230** | **2,523** |
| Family households | 50.5% | 59.8% |
| Nonfamily households | 49.5% | 40.2% |
| Average household size | 1.89 | 1.78 |
| Average family size | 2.49 | 2.39 |
| **Housing Occupancy** | | |
| Total housing units | 3,788 | 3,971 |
| Vacant housing units | 41.1% | 36.5% |

| Madiera Beach, Florida | 1990 | 2000 |
|---|---|---|
| **Population:** | 4,225 | 4,500 |
| **Education:** | | |
| High school graduates (25 years or older) | 83.8% | 87.3% |
| **Employment:** | | |
| Labor force (16 years and over) | 56.9% | 61.5% |
| Unemployed | 1.6% | 2.7% |
| Median Household Income | $ 24,748 | $ 36,671 |
| Individuals Below the Poverty Line | 8.4% | 9.8% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 35.3% | 30.4% |
| Technical, Administrative, & Sales | 31.2% | 28.9% |
| Construction, Production, Maintenance, & Transportation | 1.4% | 17.8% |
| Farming, fishing, forestry, & mining | 10.3% | 0.7% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 1.4% | 0.0% |
| Construction | 8.8% | 7.0% |
| Manufacturing | 7.5% | 11.3% |
| Wholesale trade | 4.5% | 4.1% |
| Retail trade | 30.7% | 11.4% |
| Education, health & social services | 11.4% | 7.9% |
| Arts, recreation, lodging & food services | 2.5% | 21.6% |

Longline vessels began to target swordfish in the 1970s, using cloth and nylon line before monofilament longlining was commonly used. Local availability of swordfish declined quickly and a group of vessels went North to look for fish. On their way back they set longline gear in deep water and caught a significant amount of shark, tilefish and yellowedge grouper; this was how the bottom longline fishery in Madeira Beach began (Wilson *et al*., 1998). Marginal swordfish vessels began to experiment with various techniques such as straight hooks, auto-baiters and circle hooks. The Madeira Beach fleet is currently 95 percent bottom longline vessels. There are three seafood dealers in this community, two of which were permitted to sell HMS species in 2005. One dealer estimated that before restrictions on shark fishing his business used to be 45 percent grouper, 45 percent shark, and ten percent swordfish and tuna; now it is 75 percent grouper, ten percent shark and 15 percent swordfish and tuna (Wilson *et al.*, 1998). With the imposition of the live-bait ban in 2000, the swordfish and tuna landings have decreased appreciably.

Sharks and grouper are both caught with bottom longline gear. For this reason, the majority of longline fishermen hold permits for multiple fisheries. Due to the various regulations for all of the fisheries, the maximum number of trips fishermen can make is about 15 trips a year, as a bottom longline trip lasts some seven to fourteen days. Grouper fishermen are subject to limited access, a minimum size, area restrictions, seasonal closures, and a quota.

Overall, the Madeira Beach bottom longliners are becoming fewer and more isolated from the rest of the fishing community (Wilson *et al*., 1998). Respondents say that antagonism and competition among dealers has gotten worse in recent years as vessels drop out of fishing, often being sold outside of the country. Many of these crews are living trip to trip and often need credit for engine repair, ice, fuel and even household and personal items. Both the fishermen and an engine supplier reported that the commercial fleet is spending more on maintaining existing gear and vessels rather than buying new equipment. Traditional patterns of dealers building relationships by extending services and credit to vessels are giving way to price-based competition to gain access to vessels (NMFS, 1999a).

Fishermen in this community have experienced restrictions on gear, harvest, and capacity in many of its important fisheries. Wilson *et al.* found that alternative employment outside of the fishery is available through expanding opportunities in the tourism and recreational fishing industries. However, this relatively ready supply of alternative employment threatened the stability of the labor pool for the fishing industry. Some reported that the best captains are leaving the country or moving on to other jobs. Like many other fishing communities, the longline fleet in Madeira Beach is experiencing market competition from imports of their target species (Wilson *et al*., 1998; NMFS, 1999a).

When the shark bottom longline fishery began in Florida, it was easy to catch sharks, but the catch from the bottom longline fishery has become marginal due to restrictions and increased steam time to fishing grounds (Wilson *et al*., 1998). Members of the fishing and supply industries reported price fluctuations in the shark fishery, which they attributed to the difficulty in maintaining steady supplies under derby-style quota management. The fins bring the most money and are exported to Asian nations. Shark trips have to be kept as short as possible to maintain good quality meat. Respondents suggest that regulations, particularly the 4,000-pound shark commercial retention limit, have turned the fishery into a small vessel fishery. Some fishermen keep both grouper and shark gear on board (NMFS, 1999a).

Approximately 50 to 60 charter/headboats participated in the recreational fisheries of Madeira Beach during the 1990s, and more than 48,000 pleasure vessels were registered in Pinellas County (Florida Bureau of Vessel Titling and Registration, 1996 and 1997). Researchers found tension and distance between the recreational and commercial fishing communities to be high, and recreational fishermen tend to maintain that commercial fishing is to blame for the declining shark populations (Wilson *et al*., 1998). Shark fishing is comparatively less important to recreational fishing in Madeira Beach than other HMS, although researchers reported that the local recreational shark fisheries are very healthy (NMFS, 1999a).

The renewal and renovation of the town's waterfront, particularly on John's Pass, removed many of the berths and infrastructure, which supported both the charterboat fleet and the commercial fishing fleet. In 2005, there was one charter/headboat with HMS permits holders living in Madeira Beach. Additionally, the Madeira Beach shark tournaments, which were mostly sponsored by a vessel or engine manufacturer, are no longer held due to loss of this infrastructure. Stores sell very little shark tackle, but some maintain the industry is beginning to come back. The miles-long remainder of the old Sunshine Skyway bridge is now used as a pier for recreational shark fishing. It is estimated that recreational shark fishing in this community is 90 percent catch-and-release (NMFS, 1999a).

#### *9.4.14.4 Panama City, Florida*

Panama City is located on the Gulf of Mexico in the Florida Panhandle. Panama City is one of the Florida's top fishing centers offering surf fishing, pier fishing, and charter/headboat fishing, according to the Panama City Tour Guide (NMFS, 2003). According to the Florida Bureau of Vessel Titling and Registration, the county has a total of 16,865 registered vessels with 15,359 pleasure and 1,433 commercial vessels. Headboats are an important part of Panama City's tourism. People enjoy bringing children along since these trips are shorter than charterboat trips. Panama City is a summer resort, with little tourist activity in the winter, as well as an important commercial fishing port.

During the winter, recreational fishermen target bottom fish and bluefish. In March, the season begins for Spanish mackerel, cobia, snapper, bonito, little tunny, amberjack, snapper, red porgies, rudder fish, blue runner, bluefish, and redfish. By summer, they also fish for king mackerel, dolphin fish, wahoo, little tunny, and barracuda. White marlin, blue marlin, and sailfish are caught recreationally in late summer. Some charterboats will go shark fishing at night for extra income. In September, the fishery is very mixed, and in October, king mackerel and bonito are popular. Tourists are mainly interested in bottom fishing. Motivations have changed; people used to be interested in catching a lot of fish and taking it home to eat or sell, but now people are satisfied to catch anything (Wilson *et al*., 1998; NMFS, 1999a).

Between 1990 and 2000, Panama City experienced a modest increase in its population from 34,378 in 1990 to 36,417 in 2000 (Table 9.25). Since 1990, there has been an increase in the male population with a corresponding decrease in the female portion of the total population; males: 47 to 49 percent and females: 53 to 51 percent. The Panama City population did get older in the past decade the median age increased from 34 years old to about 37 years old. Correspondingly, the greatest portion of the population in both decades was in the 20 – 44 years old age bracket.

Panama City had 14,033 households in 1990, and the number of households grew to 14,819 in 2000 (Table 9.25). The average household size decreased from 2.37 persons in 1990 to 2.30 persons in 2000, indicating that there might be an increase in "empty nesters" and retiree households. The percentage of individuals below the poverty line decreased slightly over the past decade from almost twenty to seventeen percent. In 1989, the per capita income in Panama City was $12,169 and was significantly lower than the state average per capita income of $14,698. This situation persisted in 1999, when the Panama City per capita income had increased to $17,830, but continued to be less than the Florida average of $21,557 per capita.

Like Fort Pierce, Panama City is a transportation hub and has an agricultural and industrial base in addition to its fisheries. Panama City's commerce rests on a supply of unskilled labor able to service agribusiness, transportation services, and the tourism industry. Panama City has two city marinas in addition to private commercial operations. The Panama City marina is located downtown on the Intracoastal Waterway and provides 240 berths for recreational, commercial and charter/headboat vessels. The second municipal marina, St. Andrews, lies on St. Andrews Bay, closer to the Gulf of Mexico, and provides docking and other facilities for much of the commercial fishing fleet. This fleet is chiefly composed of shrimp boats. Seven charter/headboats are based in the city marinas. There are thirty Panama City residents with an HMS charter/headboat permit (Figure 9.3). While the largest local employers are hospitals and resort hotels, two shipyards between them employed 650 persons in 2003 (Panama City/Bay County Chamber of Commerce, 2003).

**Table 9.25 Demographic Profile for Panama City, Florida.** Source: U.S. Census 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 34,378 | 36,417 |
| **Sex** | | |
| Male | 46.7% | 48.6% |
| Female | 53.3% | 51.4% |
| **Age** | | |
| **Median Age** | **33.9** | **37.2** |
| < 20 | 28.6% | 25.6% |
| 20 - 44 | 34.9% | 36.8% |
| 45 - 64 | 19.6% | 21.7% |
| > 65 | 16.9% | 16.0% |
| Race | | |
| White | 76.1% | 73.6% |
| Black or African American | 21.0% | 21.5% |
| American Indian and Alaska Native | 0.7% | 0.6% |
| Asian and Pacific Islander | 1.6% | 1.6% |
| Other | 0.6% | 0.8% |
| **Household** | | |
| **Total** | **14,033** | **14,819** |
| Family households | 69.2% | 61.0% |
| Nonfamily households | 30.8% | 39.0% |
| Average household size | 2.37 | 2.30 |
| Average family size | 2.90 | 2.92 |
| **Housing Occupancy** | | |
| Total housing units | 15,928 | 16,548 |
| Vacant housing units | 11.8% | 10.4% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 58.3% | 57.8% |
| Renter-occupied housing units | 41.7% | 42.2% |

| Panama City Beach, Florida | 1990 | 2000 |
|---|---|---|
| **Population:** | 34,378 | 36,417 |
| **Education:** | | |
| High school graduates (25 years or older) | 70.3% | 79.2% |
| **Employment:** | | |
| Labor force (16 years and over) | 54.0% | 53.9% |
| Unemployed | 4.6% | 3.1% |
| Median Household Income | $ 21,881 | $ 31,572 |
| Individuals Below the Poverty Line | 19.6% | 17.2% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 25.9% | 32.2% |
| Technical, Administrative, & Sales | 32.2% | 27.7% |
| Construction, Production, Maintenance, & Transportation | 1.5% | 19.0% |
| Farming, fishing, forestry, & mining | 10.2% | 0.4% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 1.6% | 0.5% |
| Construction | 7.0% | 6.7% |
| Manufacturing | 7.7% | 7.0% |
| Wholesale Trade | 3.3% | 0.1% |
| Retail Trade | 21.4% | 13.8% |
| Education, health & social services | 19.4% | 22.2% |
| Arts, recreation, lodging & food services | 1.5% | 14.2% |

In the early 1980s, yellowfin tuna was the main commercial fishery for Panama City from April through December while bluefin tuna were targeted in the winter. Some of the longline vessels shifted from yellowfin tuna fishing to bottom longline fishing for grouper and sharks in 1998, since the latter required fewer crew members (Wilson *et al*., 1998). Some of these vessels targeted dolphin fish in the summer, and swordfish more rarely. In 1998, two of these vessels were owner operated, two were owned by a dealer, three were each owned by a single person who hired a captain, and two others were jointly owned and had hired captains (Wilson *et al*., 1998). In 2005, ten longline vessels held an HMS permit; 20 shark permits and 12 swordfish permits were issued to residents of Panama City.

Some pelagic longline fishermen also participated in the reef fish and bottom longline fishery. There were 16 to 19 grouper vessels operating out of Panama City in 1998. One fish trader interviewed by the researchers in 1998 reported that his current business was 87 percent yellowfin tuna and eight percent snapper, with the remainder being a mix of swordfish, bluefin tuna, dolphin, wahoo, sandbar shark, and escolar. He bought from about ten vessels in 1998, but had bought from 30 vessels a few years ago (Wilson *et al.*, 1998). The prohibition on the use of live bait in 2000 reduced the tuna and swordfish catches of the commercial fleet and increased use of bottom longline for grouper and shark.

While Panama City was developing tourist and recreational fishing industries, the commercial fishermen were becoming fewer and more isolated from the rest of the community. The competition among dealers was perceived as becoming more aggressive in 1997 - 1998. Traditional patterns of dealers building relationships by extending services and credit to vessels in the shrimp and longline fisheries were giving way to price-based competition to gain access to vessels. Fishermen in this community had experienced restrictions on gear, harvest, and capacity in many important fisheries. Researchers found in 1998 that alternative employment outside of the fishery was available in the developing tourism and recreational fishing industries. However, researchers concluded that this relatively ready supply of alternative employment threatened the stability of the labor pool for the fishing industry (Wilson *et al*., 1998).

#### *9.4.14.5 Islamorada, Florida*

Located in the Florida Keys, Islamorada calls itself the Sportfishing Capital of the World because of its proximity to the Florida Bay, the Everglades, bonefish flats, coral reefs and the Gulf Stream. Islamorada is famous for light tackle technique and many different rods have been developed in this community. It is now increasingly a recreational fishing community, with many charterboats that troll for yellowtail snapper, grouper, blackfin tuna, dolphin, wahoo and billfish in inshore waters. Recreational activities in the Keys consist of trophy fishing, catch-and-release, spearfishing, and fishing for food. In the past decade or so, there has been a growing interest in the guided fishing industry that promotes catch-and-release (NMFS, 1999a). According to the Florida Bureau of Vessel Titling and Registration, Monroe County has a total of 23,079 registered vessels, with 18,731 pleasure and 4,260 commercial vessels as of 1996. In 1998, there were eleven marinas in Islamorada (Wilson *et al*., 1998).

Tournaments are an important marketing device for tourism in this town. The majority of vessels in Islamorada tournaments are Florida vessels, but there are some out-of-state participants. The Tourist Development Council of the Florida Keys has a large marketing budget and gives grants and sponsorship to tournaments. One tackle shop employed 57 people in 1998 and planned to open a fishing school next year that would employ six teachers and teach 24 people at a time for three to four days. Other water-related tourist businesses include powerboat rentals, boat tours, cruises, kayak, wave runner and sailboat rentals, snorkel and dive shops, boat dockage, lifts and repair shops, and fishing supply shops.

The largest resort in Islamorada began as a fishing marina and sportfishing is a big part of their marketing. The resort has two sets of vessels offshore and “back country,” the local term for the Florida Bay area. There are 19 “six-pack boats” which are charterboats and one headboat. In the winter, charter/headboats target sailfish, blackfin tuna, and bonito. Recreational fishermen in this community generally feel that retention limits, minimum sizes, voluntary catch-and-release, and other management measures are effective. Florida’s ban on inshore net fishing is also considered a success. Sea trout, bonefish, pompano, and Spanish mackerel are plentiful as a result of the net ban.

According to the Monroe County Cooperative Extension Service, fishing is better as a result of regulations. However, some charter/headboat captains are pessimistic about the future. They feel that the overall fishing is not good, and they have lost customers because there are not as many fish to target (Wilson *et al*., 1998). There is a general concern in Islamorada that it would be devastating to the community if the fish stocks were depleted. There are a lot of concerns with habitat such as the loss of grass beds, destruction of mangrove shoreline, water quality, algae blooms, and coral reefs dying from ozone depletion and too much sunlight. Some people are concerned with runoff from the lower part of the peninsula including phosphates and exhaust. There is also a concern over an increasing number of fishermen in the area (Wilson *et al*., 1998).

Islamorada has been subject to considerable expansion. In 1990, the population was 1,220 individuals and in 2000, it was 6,846 - 429.5 percent increase over a ten-year period (Table 9.26). The population was roughly half male and half female in both census years. The pattern of age distribution, however, changed between 1990 and 2000. The population in Islamorada is older than Fort Pierce, Pompano, and Panama City. The median age increased from just over 42 years to just over 46 years old over the past decade. The dominant age group shifted from 20 – 44 years old to 45 – 64 years old. Islamorada has a very well educated population with almost 92 percent having at least graduated high school.

The labor force has declined over the past decade indicating that the population is aging (Table 9.26). While the median household income and the percentage of individuals above the poverty line increased, the employment rate also increased slightly. In both 1990 and 2000, the greatest source of employment is in the technical, administrative, and sales industry sectors. Employment in farming, fishing, forestry, and mining decreased by one half. Correspondingly, the forestry, fishing, mining, and agriculture industry decreased by one half. The largest industry in Islamorada was retail trade in 2000.

Due to limited range and safety concerns about venturing farther offshore, Islamorada has a small vessel longline fleet that fishes year-round in nearby waters. While these vessels are experiencing increased difficulty with finding crew, this is significantly less of a problem for them than for larger pelagic longline vessels. Researchers found that the commercial fishing community has an increasingly smaller niche relative to recreational fisheries. They cited limited entry in the snapper, king mackerel, and crab fisheries; a ban on net use in inshore waters in Florida; and incidental catch limits for bluefin tuna as limiting factors for the commercial fisheries. Florida Keys National Marine Sanctuary has also proposed a “no take” zone policy, which will put many commercial fishermen out of business (NMFS, 1999a).

Skilled captains were seeking employment in the Bahamas, as well as the growing longline fleets in South Africa and South America, while the longline supply business has shifted its emphasis to supplying foreign fleets. In Islamorada, a growing recreational fishing industry provides alternative employment opportunities for commercial fishermen familiar with charter/headboats and as fishing guides. In fact, there is a significant concentration of charter/headboat permits issued to Islamorada residents, 27 permitted vessels in 2005. However, the Islamorada work force is fairly well educated, so finding alternative employment could be competitive.

**Table 9.26 Demographic Profile for Islamorada, Florida.** Source: U.S. Census, 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 1,293 | 6,846 |
| **Sex** | | |
| Male | 54.2% | 53.0% |
| Female | 45.8% | 47.0% |
| **Age** | | |
| Median Age | **42.3** | **46.2** |
| < 20 | 13.3% | 17.0% |
| 20 - 44 | 40.8% | 30.6% |
| 45 - 64 | 26.7% | 35.6% |
| > 65 | 19.2% | 16.9% |
| **Race** | | |
| White | 95.3% | 96.8% |
| Black or African American | 0.9% | 0.5% |
| American Indian and Alaska Native | 0.0% | 0.2% |
| Asian and Pacific Islander | 0.0% | 0.7% |
| Other | 3.9% | 0.8% |
| **Household** | | |
| **Total** | **672** | **3,174** |
| Family households | 51.6% | 58.4% |
| Nonfamily households | 48.4% | 41.6% |
| Average household size | 1.92 | 2.10 |
| Average family size | 2.54 | 2.63 |
| **Housing Occupancy** | | |
| Total housing units | 966 | 5,461 |
| Vacant housing units | 32.4% | 41.9% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 65.9% | 71.1% |
| Renter-occupied housing units | 34.1% | 28.9% |

| Islamorada, Florida | 1990 | 2000 |
|---|---|---|
| **Population:** | 1,293 | 6,846 |
| **Education:** | | |
| High school graduates (25 years or older) | 77.8% | 91.7% |
| **Employment:** | | |
| Labor force (16 years and over) | 73.2% | 62.9% |
| Unemployed | 0.9% | 2.3% |
| Median Household Income | $ 26,266 | $ 41,522 |
| Individuals Below the Poverty Line | 9.1% | 6.9% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 25.9% | 28.0% |
| Technical, Administrative, & Sales | 30.7% | 30.0% |
| Construction, Production, Maintenance, & Transportation | 7.8% | 17.9% |
| Farming, fishing, forestry & mining | 7.9% | 3.9% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 6.8% | 3.7% |
| Construction | 3.8% | 6.6% |
| Manufacturing | 4.6% | 1.9% |
| Wholesale trade | 2.9% | 1.2% |
| Retail trade | 39.4% | 20.2% |
| Education, health & social services | 6.1% | 12.7% |
| Arts, recreation, lodging & food services | 3.2% | 21.1% |

### 9.4.15 Alabama

The population in Alabama has increased by about 400,000 people between 1990 and 2000 (Table 9.27). The percentage of individuals 25 years and older with a high school diploma and/or some graduate level degree has increased by about eight percent. The percentage of employed individuals, unemployment rate, and percentage of individuals below the poverty line have declined slightly in the last decade. As with many of the other states, employment in the farming, fishing, forestry, and mining industries has declined, whereas the education, health, and social services industries provided the greatest employment opportunities in 2000. Also, the arts, recreation, lodging, and food services, and manufacturing industries have been the greatest source of employment Alabama residents over the past decade.

In 2005, Alabama residents held 20 commercial tuna permits (Table 9.36). There are seven commercial shark permits allocated to Alabama residents and three swordfish permit (Table 9.38 and Table 9.39). The communities involved in the shark fishery are Andalusia, Bayou la Batre, Elba, Elberta, Gulf Shores, and Lillian. There are five licensed HMS dealers working in coastal Alabama (Table 9.37). Alabama residents hold about one percent or less of the commercial tuna, shark, and swordfish permits; therefore, no community profiles have been developed to date.

The marine recreational fishery off Alabama attracted 806,000 anglers in 2004, who made 2.0 million fishing trips (NMFS, 2004b). Of these recreational fishermen, 398,000 (49 percent) are from out-of-state and another 183,000 anglers (22.7 percent) are from non-coastal counties within Alabama. In 2005, there were 320 Alabama residents who held an angling permit to fish recreationally for HMS (Table 9.34). A large number of these anglers are in Mobile, Alabama. The estimated retail sales generated by saltwater anglers in Alabama in 2001 were valued at $235.9 million. Some 5,477 jobs were attributed to the marine recreational fishing industry in 2001 (ASA, 2002). Thus recreational fishing off Alabama also benefits the local tourist industry as it does in Florida. Shark fishing is largely incidental to recreational fishing for other fish species.

**Table 9.27 Alabama Demographic Profile.** Source: U.S. Census, 1990 and 2000.

| Alabama | 1990 | 2000 |
|---|---|---|
| **Population:** | **4,040,587** | **4,447,100** |
| **Education:** | | |
| High school graduates (25 years or older) | 66.9% | 75.3% |
| **Employment:** | | |
| Labor force (16 years and over) | 61.1% | 59.7% |
| Unemployment Rate | 6.9% | 6.2% |
| Median Household Income | $23,597 | $34,135 |
| Individuals below the poverty line* | 18.3% | 16.1% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 3.03% | 1.90% |
| Construction | 7.1% | 7.6% |
| Wholesale trade | 4.1% | 3.6% |
| Retail | 16.2% | 12.2% |
| Manufacturing | 22.9% | 18.2% |
| Education, health & social services | 21.6% | 19.3% |
| Arts, recreation, lodging & food services | 0.9% | 6.4% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

There are 78 vessels with an HMS charter/headboat permit in Alabama (Table 9.35). A significant number of these vessels are located in Orange Beach (34.5 percent). Some other communities with several charter/head boat permit owners are Birmingham, Mobile, Gulf Shores and Dauphin Island. There is a small, directed shark fishery advertised by some of the charter/headboats, but most take shark incidentally to other fish species throughout the year.

### 9.4.16 Mississippi

Between 1990 and 2000, Mississippi's population increased from 2.6 million people to 2.8 million people (Table 9.28). The percentage of individuals 25 years and older with a high school diploma and/or some graduate level degree has increased significantly by almost 24 percent. The percentage of employed individuals has remained the same over the past decade, while the unemployment rate declined slightly and percentage of individuals below the poverty line declined by almost five percent. As with many of the other states, employment in the farming, fishing, forestry, and mining industries has declined, whereas the education, health, and social services industries provided the greatest employment opportunities in 2000. Also, the arts, recreation, lodging, and food services industries have been growing source of employment in Mississippi over the past decade.

Eight Mississippi residents held a commercial tuna permit in 2005 (Table 9.36). As for other HMS-related permits, there are eight residents that held a shark permit and two that held a swordfish permit (Table 9.38 and Table 9.39). Communities involved in the commercial shark fishery are Moss Point, Biloxi, and Pascagoula. Only one HMS permitted dealer resided in Mississippi during 2005 (Table 9.37).

Mississippi's saltwater recreational fisheries attracted approximately 278,000 anglers in 2004 (NMFS, 2005a). Fifty-four thousand (19 percent) of these anglers were from out-of-state, and 29,000 (10 percent) were from non-coastal counties within Mississippi. In 2005, there were 194 Mississippi residents with an HMS angling permit (Table 9.34). The ASA estimated that marine recreational fishing generated $50.5 million in retail sales in Mississippi in 2001 and some 1,003 jobs (ASA, 2002). There are 36 charter/headboats with HMS permits home-ported in Mississippi (Table 9.35). Communities involved in the charter and headboat fishery include Biloxi, Gautier, Gulfport, Long Beach, Pascagoula, Pass Christian, and Picayune. Biloxi and Gulfport are each homeport to about one-third of the charter and head boat fleet with HMS permits.

**Table 9.28 Mississippi Demographic Profile.** Source: U.S. Census, 1990 and 2000.

| Mississippi | 1990 | 2000 |
|---|---|---|
| **Population:** | **2,573,216** | **2,844,658** |
| **Education:** | | |
| High school graduates (25 years or older) | 64.3% | 87.9% |
| **Employment:** | | |
| Labor force (16 years and over) | 59.7% | 59.4% |
| Unemployment Rate | 8.4% | 7.4% |
| Median Household Income | $20,136 | $31,330 |
| Individuals below the poverty line* | 25.2% | 19.9% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 4.6% | 3.4% |
| Construction | 6.4% | 7.6% |

| Mississippi | 1990 | 2000 |
|---|---|---|
| Wholesale trade | 3.8% | 3.4% |
| Retail | 16.1% | 11.8% |
| Manufacturing | 23.4% | 18.3% |
| Education, health & social services | 22.5% | 20.1% |
| Arts, recreation, lodging & food services | 0.7% | 8.3% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

Marine recreational fishing in Mississippi has three modes: shoal water fishing along salt-water marshes, behind barrier islands, and in the sounds; near-shore fishing in relatively shallow water out to some 15 miles from shore, including trips to artificial reefs and oil platforms; and offshore fishing in deeper water with HMS species as a target. Sharks are, however, taken in all three modes and it is reported that some are retained for personal use by anglers.

### 9.4.17 Louisiana

The population of Louisiana has not changed by much in the past decade, 4.2 million people in 1990 and 4.5 million people in 2000 (Table 9.29). The percentage of individuals 25 years and older with a high school diploma and/or some graduate level degree has increased by almost seven percent. The percentage of employed individuals has remained the same over the past decade, while the unemployment rate and percentage of individuals below the poverty line have declined. As with many of the other states, employment in the farming, fishing, forestry, and mining industries has declined, whereas the education, health, and social services industries provided the greatest employment opportunities in 2000. Also, the arts, recreation, lodging, and food services industries have been growing source of employment over the past decade.

Louisiana was second only to Alaska in the quantity of its commercial fisheries in the United States in 2003 and fifth in value (NMFS, 2004b). Several of Louisiana's communities were in the top ten major U.S. ports for the greatest quantity of commercial fishery landings: Empire-Venice, Intracoastal, and Cameron. Two communities were ranked in the top ten for the value of the commercial fishery landings: Empire-Venice and Dulac-Chauvin, Louisiana. The menhaden fishery is based in Venice, while shrimping is the principal fishery in Dulac. Both of these fisheries have declined during the past two decades, from the peak year of Louisiana commercial landings in 1984 when 1,931,027,000 pounds of fish were landed in the state.

**Table 9.29 Louisiana Demographic Profile.** Source: U.S. Census, 1990 and 2000.

| Louisiana | 1990 | 2000 |
|---|---|---|
| **Population:** | **4,219,973** | **4,468,976** |
| **Education:** | | |
| High school graduates (25 years or older) | 68.0% | 74.8% |
| **Employment:** | | |
| Labor force (16 years and over) | 59.3% | 59.4% |
| Unemployment Rate | 9.6% | 7.3% |
| Median Household Income | $21,949 | $32,566 |
| Individuals below the poverty line* | 23.6% | 19.6% |
| **Employment in some industry sectors:** | | |

| Louisiana | 1990 | 2000 |
|---|---|---|
| Farming, fishing, forestry & mining | 5.7% | 4.2%* |
| Construction | 6.8% | 7.9% |
| Wholesale trade | 4.5% | 3.5% |
| Retail | 17.5% | 11.9% |
| Manufacturing | 12.5% | 10.1% |
| Education, health & social services | 25.3% | 21.7% |
| Arts, recreation, lodging & food services | 1.1% | 9.1% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

Eighty-six Louisiana residents held a commercial tuna permit in 2005 (Table 9.36). Louisiana was home to the third largest number of shark permit holders with 47 permitted vessels (Table 9.38). Sixteen of those permit holders live in New Orleans, Louisiana (Figure 9.4). The largest concentrations of shark vessels were home ported in New Orleans, Houma, Dulac, and Gretna. There are also 43 swordfish permit holders in Louisiana (Table 9.39). To support these HMS fisheries, there are 25 dealers licensed to purchase and sell tunas, sharks, and/or swordfish in Louisiana.

The recreational saltwater fisheries off Louisiana attracted some 1,102,000 anglers in 2004, collectively making 4,810,000 fishing trips (NMFS, 2005a). Of these anglers, 19 percent (207,000) were from out-of-state, while 13 percent were from non-coastal counties within Louisiana. There were 602 HMS angling permit holders residing in Louisiana during 2005 (Table 9.34). The ASA estimated that salterwater angling generated some $409.6 million in Louisiana in 2001, and 7,786 jobs in marine recreational fisheries (ASA, 2002). The center of fishing activity is off the Mississippi delta, and ports like Boothville-Venice, Port Fourchon and Grand Isle with good road access to the metropolitan areas of Baton Rouge and New Orleans, benefit from their access to good bottom-fishing areas and to "blue-water" areas offshore. Sharks are taken in both the bottom-fishery and in the blue-water fishery.

In 2005, there are 90 charter/headboats with HMS permits operating from Louisiana communities. The majority of websites sampled show that sharks is a component of most trips offered by these vessels. Communities involved in the charter and head boat fishery for sharks include Venice, New Orleans, Chauvin/Dulac, Houma, Baton Rouge, Golden Meadow, Belle Chase, Metaire, Grande Isle, Cut-Off, Chalmette, Lake Charles, and Monroe.

As described in Section 9.2.2.1, the impacts from Hurricanes Katrina and Rita have been devastating to Louisiana and many Gulf Coast communities. NMFS is involved in several studies to determine the full economic and social impacts of these hurricanes.

#### *9.4.17.1 Venice, Louisiana*

Venice is another Louisiana community with historical ties to the commercial fishing industry. Venice has a strong focus on commercial fisheries, and cites the large volume of local shrimp landings and numerous residents involved in the fishing industry as evidence. Many residents fish commercially, at least on a part-time basis (Impact Assessment, 2004). In the past 20 years, however, oil and recreational fishing have become increasingly important for the economy of Venice. Wilson *et al*. (1998) note, however, few if any, Venice residents commercially harvest highly migratory species. Boothville-Venice is a "census designated place" and the Bureau of the Census statistics includes both small communities. Similarly, NMFS links Empire and Venice as a single port. Thus, both the port and community are referred to as Venice in this document.

The population of Venice has declined from 2,743 in 1990 to 2,220 in 2000 (Table 9.30). There is a slightly greater percentage of males compared to females in the population. The median age increased from about 26 to 32 between 1990 and 2000. The number of individuals under 20 declined by almost seven percent, while those 45 and older increased by almost seven percent in the last decade. Whites account for a majority of the resident population, but blacks or African Americans accounted for about 29 percent of the total population in both 1990 and 2000. Despite apparent overall out-migration, numerous families of Vietnamese and Cambodian ancestry have moved to the area over the last decade (Impact Assessment, 2004). While many initially went into the fishing industry, more recently, there has been an apparent shift among many new arrivals toward citrus farming.

In 1990, there were 836 households with an average size of 3.23 people. The number of households decreased to 746 in 2000 and the average household size had dropped to 2.96 people. The number of people employed in farming, fishing, forestry, and mining decreased over the last decade from 16.9 percent to 11 percent. The forestry, fishing, hunting, mining, and agriculture industries continued to make up twenty-two percent area's businesses. Retail trade is the second largest industry in the area.

In 1990, thirty-six percent of the population of Venice lived below the poverty level, but this figure dropped to 18 percent in 2000 (Table 9.30). In 1990, the median household income was $16,250. Eighteen percent of the households in Venice in 1990 received Social Security, averaging $5,433 per year, and 11 percent of the households received public assistance income, averaging $3,301 per year (NMFS, 1999a). In 2000, the per capita income of Venice residents was $13,123, while the per capita income for the state of Louisiana had increased to $16,912.

Venice is located about 30 miles south of the parish seat Point à la Hache, which is flanked by eroding wetlands and levees that border the Mississippi River. The unemployment rate is low compared to that of Dulac, perhaps because Venice has been the epicenter of oil industry activity in Louisiana. The main job opportunities in Venice are oil, seafood harvest and processing and, increasingly, recreational fishing (Wilson *et al*, 1998). Fishing infrastructure in Venice is extensive. There are several seafood dealers and docks; sale and repair facilities for commercial and recreational boats, bait shops, ice houses, boat launches, and several small marinas and marine suppliers (Impact Assessment, 2004). One of the marinas, the Cypress Cove Marina and Lodge, is a large facility offering boat storage, charter services, guided waterfowl hunting with air boat transportation, hotel, restaurant, and various support services essential for recreational fishing and hunting (Impact Assessment, 2004). The majority of business is sport-recreational. Venice extends into the Gulf of Mexico close to billfish areas that are frequented by recreational fishermen. Recreational fishing increased steadily there during the 1990s (Wilson *et al*., 1998).

Marina owners suggest that commercial fishing activity has declined over the last several years, and that Venice residents seem to be more focused on recreational fishing and oil field support. A local retail seafood dealer suggests that Louisiana's unpredictable weather and foreign shrimp imports are detrimentally affecting the local commercial fleet. Other informants suggest that the commercial fishing fleet is struggling in many ways, but that the involvement of the larger community in alternative industries, such as offshore oil field support and citrus, is keeping the local economy fairly dynamic (Impact Assessment, 2004).

Animosity regarding competition for fish extends to the political arena, as commercial and recreational fishermen oppose each other on regulatory issues. Commercial fishery participants claim that law enforcement agents harass them, while recreational fishery participants claim that regulations are not enforced in Venice because there are simply not enough agents to cover the area. Among local commercial fishermen, there is a sense that recreational fishermen have helped create a regulatory environment that is pushing commercial fishermen out of business (Wilson *et al*., 1998).

Most of the commercial vessels landing in Venice are home-ported in New Orleans or other Mississippi River towns further upriver from the Gulf of Mexico. Even Louisiana natives who fish for shark with nets in state waters live in neighboring towns, not in Venice. Shrimp is the largest commercial catch bought and sold in Venice, although this fishery has become less profitable since the late 1980s (Wilson *et al*., 1998). The longline fleet is not well integrated into the Louisiana community of Venice. The longline fishermen are mostly "commuters" from towns and cities further inland, such as New Orleans, and most of them are from a different ethnic background, including many Vietnamese-Americans. Due to the language barrier, many of these fishermen do not participate in public fisheries meetings (NMFS, 1999a).

In 1998, several dealers in Venice drew 40 percent of their business from the longline fleets. Another dealer drew only about 20 percent from longline vessels. A large wholesaler dealt only in longline catches and purchased fish from local dealers. In 1997, 60 percent of this business was tuna, 30 percent shark and ten percent swordfish. The competition between dealers in 1998 was perceived as becoming more aggressive (Wilson *et al*., 1998). Traditional patterns of dealers building relationships by extending services and credit to vessels are giving way to price-based competition to gain access to vessels.

**Table 9.30 Demographic Profile of Venice, Louisiana.** Source: U.S. Census, 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 2,699 | 2,220 |
| **Sex** | | |
| Male | 51.4% | 51.0% |
| Female | 48.6% | 49.0% |
| **Age** | | |
| Median Age | **26.3** | **31.7** |
| < 20 | 42.0% | 35.2% |
| 20 - 44 | 35.1% | 35.2% |
| 45 - 64 | 18.3% | 22.0% |
| > 65 | 4.6% | 7.6% |
| **Race** | | |
| White | 63.9% | 61.9% |
| Black or African American | 31.3% | 28.7% |
| American Indian and Alaska Native | 3.3% | 3.4% |
| Asian and Pacific Islander | 1.4% | 4.0% |
| Other | 0.0% | 0.3% |
| **Household** | | |
| **Total** | **836** | **746** |
| Family households | 84.7% | 78.3% |
| Nonfamily households | 15.3% | 21.7% |
| Average household size | 3.23 | 2.96 |
| Average family size | 3.58 | 3.38 |
| **Housing Occupancy** | | |
| Total housing units | 960 | 933 |
| Vacant housing units | 14.0% | 20.0% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 87.5% | 87.1% |
| Renter-occupied housing units | 12.5% | 12.9% |

| Boothville & Venice, Louisiana | 1990 | 2000 |
|---|---|---|
| **Population:** | 2,699 | 2,220 |
| **Education:** | | |
| High school graduates (25 years or older) | 43.5% | 48.4% |
| **Employment:** | | |
| Labor force (16 years and over) | 48.1% | 53.0% |
| Unemployed | 3.3% | 2.0% |
| Median Household Income | $ 16,250 | $ 33,813 |
| Individuals Below the Poverty Line | 36.2% | 17.3% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 13.8% | 18.1% |
| Technical, Administrative, & Sales | 20.7% | 19.5% |
| Construction, Production, Maintenance, & Transportation | 12.1% | 40.8% |
| Farming, fishing, forestry, & mining | 16.9% | 11.0% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 22.5% | 22.7% |
| Construction | 10.8% | 8.1% |
| Manufacturing | 7.1% | 4.8% |
| Wholesale Trade | 9.4% | 0.0% |
| Retail Trade | 16.0% | 13.1% |
| Education, health & social services | 5.6% | 14.4% |
| Arts, recreation, lodging & food services | 0.0% | 10.4% |

While pelagic longline fishermen with large vessels work year-round, pelagic longlining in the area tends to intensify in May and ease up during the wintertime. There are four docks in Venice where longline vessels unload. Docks in Venice employ between five and 15 workers on a seasonal basis for unloading vessels and packing seafood, as well as five to eight people year-round. The docks purchase tuna year round, shrimp from May through December, bottom fish such as drum, catfish, and sheepshead, from January through May, mullet (for the roe) from October through December (NMFS, 1999a).

Researchers in 1998 found that alternative employment outside of the fishery was available. For instance, the oil industry hired unskilled labor from this area in recent years, and employed three percent of the civilian labor force in 2000. The agricultural sector also provides employment opportunities during the off-season for fishing, as reported by one Vietnamese-American captain. However, researchers found that this relatively ready supply of alternative employment threatened the stability of the labor pool for the fishing industry. The Vietnamese-American community has avoided such personnel problems to some extent by relying on tight kinship networks in both fishing and fish buying, although they did report some difficulty in finding captains. The Vietnamese-American community was the only one studied which reported recent investment in new longline vessels. Concerns cited by the fishermen in Venice included the safety of small vessels during winter openings, and the prospect of small vessels having to pay for observers and VMS (Wilson *et al.*, 1998).

Other commercial fisheries in the area that could provide alternative employment include pompano in October, mullet from October to January, shrimp from May to December, and oysters from January to May (Wilson *et al.*, 1998). Wilson *et al.* concluded that the overall effect of increased restrictions on this fleet would be increased pressure on grouper and yellowfin tuna, increased difficulty in finding and retaining employees, and an acceleration in the rate at which the fleet's vessels and experienced fishermen are moving overseas, especially to Mexico.

Recreational fishermen fish from Venice year-round, but are affected by inclement weather during the winter. The larger vessels can fish for yellowfin tuna year round, in addition to inshore species like redfish, snapper and speckled trout. Bluefin tuna are found too far away (100 miles offshore) and recreational fishermen are prohibited from directing effort on bluefin tuna anyway. They fish for billfish, particularly blue marlin, from May through November. Blacktip shark was once a popular catch, but recreational fishermen say they are now too small to be an enjoyable catch. There is some animosity between recreational and commercial fishermen, which seems to arise from competition for particular species. Charterboats regularly specify sharks as a species available to their clients.

There are only two marinas in Venice that cater to recreational fishermen, although a third parish-run marina offers vessel slips to both recreational and commercial fishermen. One opened in the mid-1980s and offers boat slips, launches, a hoist, a couple of condominiums, baitshop, fuel, and ice. The marina employs 13 people during peak summer months. Most of the marina's business comes from private vessels from New Orleans and border states. Less than one percent of this business consists of charterboats. The other marina opened only a few years ago, offering 120 pre-paid boat slips, a 64-room two-story hotel, condominiums, a dry dock storage facility, fuel, and ice. This second marina employs 12 to 15 people in its newly opened hotel and another 15 to 25 in the marina. Eight charterboats operate from the marina, and there is room for ten more.

Researchers in 1998 reported that the catch-and-release ethic for billfish was strong among recreational fishermen in Venice, but local billfishing tournaments require that trophy fish be brought to the dock and weighed. Sportfishermen prefer to catch and retain tunas, dolphin fish, and wahoo for consumption, although they voiced support for tag and release programs (NMFS, 1999a).

#### *9.4.17.2 Dulac, Louisiana*

Dulac is located in the center of Terrebonne Parish, about 15 miles South of Houma, Louisiana. Houma lies at the intersection of the Houma Navigational Canal and the Intercoastal Waterway and serves as the parish seat and a locale of employment opportunities in offshore equipment building for Dulac residents (Wilson *et al*., 1998). With easy access to Timbalier Bay and the Gulf of Mexico via the Houma Navigational Canal, many Dulac residents are deeply involved in commercial fishing, and many recreational fishers from Houma and distant Lafayette maintain camps in this area (Impact Assessment, 2004). Terrebonne Parish government is a consolidated government so most data are gathered on a parish-wide basis. According to the Terrebonne Parish Planning Department in 1998, the parish did not spend much time tracking the importance of the commercial fishing industry, but anecdotal evidence suggests that it is a long-standing and significant part of the community economy (Wilson et al., 1998). Landings of tunas, swordfish, and sharks indicate that Dulac is among the most important fishing ports in the state. However, many of the fishermen who target HMS are a commuter population; they land fish in Dulac or purchase fish in Dulac, but they live elsewhere. Three dealers purchase fish from longline vessels; two are owned and operated by first-generation Vietnamese immigrants, and the other is run by a New Orleans native whose father operates a large tuna wholesale company in Venice.

In 1990, the population was 3,273 individuals; it declined to 2,458 in 2000 (Table 9.31). Dulac reported the same number of males as females both 1990 and 2000. Individuals under 20 years old make up the greatest proportion of the population in both 1990 and 2000 with individuals between 20 and 44 comprising the second largest age group. Whites comprise the largest proportion of race — 49 and 54 percent in 1990 and 2000, respectively. American Indian and Native Alaskans accounted for 48 and 39 percent of the total population in 1990 and 2000, respectively. As noted in Wilson *et al*. (1998), however, this latter category is made up mostly of the Houma Indians, which is a tribe not recognized by the U.S. government. Less than two percent of the population was Asian/Pacific Islander, despite the fact that most of the longline captains who sustain the Dulac commercial industry for tunas, swordfish, and sharks were Vietnamese.

In 1990, Dulac had 922 households with an average size of 3.55 persons per household (Table 9.31). By 2000, the number of households had decreased to 768 and the average size of each household had dropped to 3.20 persons. At the time of the 1990 Census, nearly half of the individuals in Dulac were living below the poverty level, with a median household income of $12,653. In 2000, median household income in Dulac had increased to $22,900, but more than 30 percent of individuals continued to live below poverty level. Per capita income in Dulac in 1990 was $4,946; for the State of Louisiana, average per capita income was $10,635. By 2000, per capita income in Dulac had risen to $8,785, while for the state as a whole, per capita income had risen to $16,912. In 1990, the largest proportion of the Dulac population was employed in the technical, administrative, and sales industries. Whereas in 2000, the largest proportion of the population was employed in construction, production, maintenance, and transportation. Sixteen percent of the population was employed in the farming, fishing, forestry, and mining industries in 2000. Forestry, fishing, hunting, mining, and agriculture were the largest industries in Dulac in both 1990 and 2000.

The combination of a high concentration of minorities in the Dulac population and the high percentage of individuals living below the poverty line highlights the need to consider Executive Order 12898 or Environmental Justice. Under this Executive Order, agencies determine if there will be disproportionately high and adverse environmental effects of its regulations on the activities of minority and low-income populations. As mentioned in Chapter 4, some of the preferred alternatives may have some negative social and/or economic impacts in general, but most of these could be mitigated and none of the preferred alternatives are likely to have disproportionate impacts on minority and low-income sectors of the Dulac population.

**Table 9.31 Demographic Profile of Dulac, Louisiana.** Source: U.S. Census, 1990 and 2000.

| Demographics | 1990 | 2000 |
|---|---|---|
| Total Population | 3,273 | 2,458 |
| **Sex** | | |
| Male | 49.3% | 50.0% |
| Female | 50.7% | 50.0% |
| **Age** | | |
| Median Age | **25.5** | **31.8** |
| ≤ 20 | 41.8% | 35.2% |
| 20 – 44 | 35.2% | 32.2% |
| 45 – 64 | 17.0% | 22.8% |
| ≥ 65 | 6.0% | 9.8% |
| **Race** | | |
| White | 49.4% | 54.0% |
| Black or African American | 2.3% | 2.5% |
| American Indian and Alaska Native | 48.1% | 39.4% |
| Asian and Pacific Islander | 0.0% | 0.5% |
| Other | 0.3% | 0.5% |
| **Household** | | |
| **Total Households** | **922** | **768** |
| Family households | 85.8% | 79.3% |
| Nonfamily households | 14.2% | 20.7% |
| Average household size | 3.55 | 3.20 |
| Average family size | 3.93 | 3.55 |
| **Housing Occupancy** | | |
| Total housing units | 1,182 | 1,063 |
| Vacant housing units | 33.0% | 27.8% |
| **Housing Tenure** | | |
| Owner-occupied housing units | 80.1% | 79.3% |
| Renter-occupied housing units | 19.9% | 20.7% |

| Dulac, Louisana | 1990 | 2000 |
|---|---|---|
| **Population:** | 3,273 | 2,458 |
| **Education:** | | |
| High school graduates (25 years or older) | 27.1% | 39.1% |
| **Employment:** | | |
| Labor force (16 years and over) | 37.8% | 44.9% |
| Unemployed | 8.0% | 3.0% |
| Median Household Income | $ 12,653 | $ 22,900 |
| Individuals Below the Poverty Line | 49.3% | 30.9% |
| **Employment in some industry sectors:** | | |
| Managerial/professional | 5.7% | 12.4% |
| Technical, Administrative, & Sales | 18.1% | 17.7% |
| Construction, Production, Maintenance, & Transportation | 17.2% | 41.4% |
| Farming, fishing, forestry, & mining | 12.3% | 15.9% |
| **Industry** | | |
| Forestry, fishing, hunting, mining, and agriculture | 23.6% | 25.9% |
| Construction | 3.7% | 3.1% |
| Manufacturing | 14.0% | 10.0% |
| Wholesale Trade | 8.5% | 5.7% |
| Retail Trade | 17.7% | 10.3% |
| Education, health & social services | 9.7% | 8.5% |
| Arts, recreation, lodging & food services | 0.0% | 10.7% |

Pelagic longline fishermen in Dulac target yellowfin tuna all year. Dulac longline vessels do not target swordfish, and incidentally-caught sharks are often discarded (Wilson *et al*., 1998). The competition between dealers was perceived as becoming more aggressive in 1998. Traditional patterns of dealers building relationships by extending services and credit to vessels were giving way to price-based competition to gain access to vessels. Researchers reported, in 1998, that one dock in Dulac employed three to four people, but laid them all off in 1998. That dealer purchased tuna (50 percent), shark (30 percent), swordfish (20 percent), and dolphin, wahoo, and amber jack (20 percent combined). Another dealer employed six or seven people in 1998, all of whom lived in Dulac. Of this dealer's purchases, 60 percent were tuna, 20 percent were swordfish and 20 percent were divided among other pelagic species like shark, wahoo, amber jack. A third dealer employed six Mexican workers, supplemented by local residents on a seasonal basis (Wilson *et al.*, 1998). The pelagic longline fleet has seen reductions in its catches with the prohibition of the use of live-bait in 2000 causing a reduction in the community's employment rate. In 2005, HMS permit data show only one dealer in Dulac with several HMS dealer permits.

Researchers in 1998 found that alternative employment outside of the fishery was available. For instance, while unemployment in Louisiana fishing communities has been high in the past, the oil industry hired unskilled labor from this area in recent years. In 1990, 33 residents of Dulac worked in the oil fields and a similar number were employed by the oil industry in 2000. The agricultural sector also provides employment opportunities, as reported by one Vietnamese-American captain, particularly during the off-season for fishing. However, this supply of alternative employment threatened the stability of the labor pool for the fishing industry (Wilson *et al*., 1998). This was true for both captain and crew positions, particularly among the non-Vietnamese-American population. The Vietnamese-American community avoided such personnel problems to some extent by relying on tight kinship networks in both fishing and fish buying. The Vietnamese-Americans, however, did report some difficulty in finding captains. The Vietnamese-American community was the only one studied which reported recent investment in new longline vessels. In Louisiana, the Vietnamese-American may be impacted more intensely by changes in the regulations given the extent of their investment in this fishery (NMFS, 1999a).

Dulac was also a homeport for a limited inshore shark bottom longline fishery in Federal waters in 1998. Blacktip shark was the main catch in this fishery. These fishermen did not fish much during the winter because of the safety concerns associated with small vessels (Wilson *et al*., 1998). Typically, sharks are caught between five and 20 miles from shore. Almost all vessels that sell in Dulac are owner-operated. Owners are usually their own captains or they hire a close relative to captain their vessel. Good first mates try to acquire their own vessels. At least five bottom longline vessels were built in 1997 and have been added to the fleet in Dulac. Some participants in the bottom longline fishery for sharks also participated in the reef fish fishery. The local fishermen, fishing for shark in state waters, use a gillnet and fish under a special state license because longlining for sharks in state waters is banned.

### 9.4.18 Texas

The population of Texas has increased by nearly 4 million people over the past decade, reaching 20.1 million in 2000 (Table 9.32). The percentage of individuals 25 years and older with a high school diploma and/or a graduate level degree has increased slightly. The percentage of employed individuals, the unemployment rate, and percentage of individuals below the poverty line, have all declined over the past decade. As with many of the other states, employment in the farming, fishing, forestry, and mining industries has declined, whereas the education, health, and social services industries provided the greatest employment opportunities in 2000.

In the state of Texas, 26 residents possessed a commercial tuna permit (Table 9.36). In addition to the commercial tuna permit holders, thirteen individuals held a shark permit and seven individuals held a swordfish permit (Table 9.38 and Table 9.39). The commercial shark fishery generally tends to be a small portion of the commercial fisheries of Texas. There are licensed HMS dealers for tuna, shark, and swordfish operating in 14 different locations in coastal Texas (Table 9.37).

In 2005, there were 586 Texas residents that held an HMS angling permit (Table 9.34). The ASA estimated that saltwater angling generated some $622.2 million in retail sales in Texas in 2001 and that there were 13,322 jobs in Texas associated with the marine recreational fishing industry (ASA, 2002). The number of charter/headboat permit holders from Texas has increased from 129 in 2003 to 168 in 2005 (Table 9.35) with a significant concentration of the 2005 permit holders in Port Aransas (Figure 9.3). Most of these take shark as an incidental catch to other near-shore and offshore fish. In addition to Port Aransas, Freeport, Galveston, Houston, Port Isabel, and Port O'Connor, as well as several other communities, are home to HMS angling permit holders.

**Table 9.32 Texas Demographic Profile.** Source: U.S. Census, 1990 and 2000.

| Texas | 1990 | 2000 |
|---|---|---|
| **Population:** | **16,986,510** | **20,851,820** |
| **Education:** | | |
| High school graduates (25 years or older) | 72.1% | 75.7% |
| **Employment:** | | |
| Labor force (16 years and over) | 66.0% | 63.6% |
| Unemployment Rate | 7.1% | 6.1% |
| Median Household Income | $27,016 | $39,927 |
| Individuals below the poverty line* | 18.1% | 15.4% |
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | 4.9% | 2.7% |
| Construction | 6.7% | 8.1% |
| Wholesale trade | 4.9% | 3.9% |
| Retail | 17.4% | 12.0% |
| Manufacturing | 14.4% | 11.8% |
| Education, health & social services | 22.5% | 19.3% |
| Arts, recreation, lodging & food services | 1.2% | 7.3% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

### 9.4.19 Puerto Rico

The population in Puerto Rico increased by nearly 300,000 people in the last decade (Table 9.33). The percentage of individuals 25 years and older with a high school diploma and/or a graduate level degree has increased by over ten percent in the last decade. The percentage of employed individuals, unemployment rate, and percentage of individuals below the poverty line all declined through the nineties. Education, health, and social services provide the greatest sources of employment. The farming, fishing, forestry, and mining employed less than two percent of the population in 2000.

While Puerto Rico was home to 100 commercial tuna permit holders in 2005, there were no permit holders for sharks or swordfish (Table 9.36). A large number of the commercial tuna permit holders are in Aguadilla (44 percent) and another large group is located in Rincon (13 percent). There are six HMS dealer permit holders in Puerto Rico; four for tunas in Aguadilla; one for tunas in Aquada; and one for sharks and swordfish in San Juan (Table 9.37).

**Table 9.33 Puerto Rico Demographic Profile.** Source: U.S. Bureau of the Census, 1990 and 2000.

| Puerto Rico | 1990 | 2000 |
|---|---|---|
| **Population:** | **3,522,037** | **3,808,610** |
| **Education:** | | |
| High school graduates (25 years or older) | 49.7% | 60.0% |
| **Employment:** | | |
| Labor force (16 years and over) | 47.3% | 40.7% |
| Unemployment Rate | 20.4% | 19.2% |
| Median Household Income | | $ 14,412 |
| Individuals below the poverty line* | 58.9% | 48.2% |

| Puerto Rico | 1990 | 2000 |
|---|---|---|
| **Employment in some industry sectors:** | | |
| Farming, fishing, forestry & mining | | 1.7% |
| Construction | | |
| Wholesale trade | | 4.4% |
| Retail | | 11.7% |
| Manufacturing | | 13.5% |
| Education, health & social services | | 19.3% |
| Arts, recreation, lodging & food services | | 6.5% |

*U.S. Census uses data from 1989 and 1999 to estimate these values.

The recreational saltwater fisheries in Puerto Rico attracted 167,000 anglers in 2004, collectively making 1,055,000 fishing trips (NMFS, 2005a). Of these anglers, 16 percent of the anglers were not from Puerto Rico. In 2005, 899 HMS angling permit holders were residing in Puerto Rico (Table 9.34). The following communities have the largest concentrations of HMS anglers: San Juan, Guaynabo, Arecibo, Mayaguez, Vega Baja, Ponce, Carolina, as well as several other communities with smaller concentrations of permit holders. Twenty-seven vessels from Puerto Rico held an HMS charter/headboat permit in 2005, specifically several were located in San Juan and Rincon (Table 9.35). Due to the number of HMS permits issued to individuals located in San Juan, a community profile should be developed in the future.

Generally, the fishing industry of Puerto Rico is made up of private clubs for the upper and middle class and small, and poor artisanal fishing communities. There are approximately 2,500 licensed artisanal fishermen who are required to report their landings to the Office of Natural Resources' Fisheries Laboratory. However, interviews and informal conversation with artisanal fishermen suggest that the reported and actual landings differ widely (Wilson *et al.*, 1998). At the local level, there are artisanal fishermen's associations (villages) and recreational fishermen's membership clubs.

The fishing industry is not a prominent economic activity in Puerto Rico and variations in fishing incomes have little impact on the island's economy. Most of the recreational fishing activity centers around the capital city of San Juan. Artisanal fishing communities are found throughout the island. These communities are extremely poor and will likely be the communities most affected by changes in regulations. The extremely deep inshore waters off these areas make billfish and other highly migratory species accessible to the artisanal fishery.

#### *9.4.19.1 Arecibo, Puerto Rico*

The Arecibo population in 1990 was 93,385 people; approximately 99 percent of those people were born in Puerto Rico or in the United States (NMFS, 1999b). The majority of the population is classified as Hispanic or Latino. Naturalized citizens and non-citizens each make up less than one percent of the population of Arecibo, but their ethnicity is unknown. According to interviews with local government officials, the vast majority of immigrants in Arecibo are from the Dominican Republic; however, there is no way to confirm that information due to waves of illegal immigration. In 2000, the U.S. Census reported the Arecibo population grew by less than seven percent (101,131 people).

The number of households in Arecibo grew by almost ten thousand throughout the last decade, from 24,333 to 34,245 households. In 1990, the median household income is $7,520. By 2000, the median household income increased by $5,000 to $12,520. In the early nineties, thirty-two percent of the households are receiving some kind of public assistance; the average public assistance income is $1,939. The number of individuals below the poverty line did decrease over the past decade, from 73 percent to almost 51 percent. The unemployment rate also declined from 23 percent to eight percent in 2000. Of the population age 16 and older, 43.9 percent are in the civilian labor force in 1990, whereas this number declined to 38 percent in 2000. In 1990, the highest employing industries for men and women were manufacturing and services. In 2000, the construction, production, maintenance, and transportation industries supplied the greatest number of employment opportunities.

Recreational fishing is the predominant mode of participation in the HMS fisheries in Arecibo, Puerto Rico. Fifty-one Arecibo residents hold an HMS angling permit, but none of 28 charter/headboat permit holders in Puerto Rico are from Arecibo. Two Arecibo residents hold a commercial tuna permit. Despite the lack of commercial shark and swordfish permit holders in Puerto Rico, there is one HMS permitted dealer for sharks and swordfish in San Juan, one for tunas in Aquada, and four for tunas in Aquadilla.

The Arecibo Yacht Club is a private club created by and for the local recreational fishermen. The members of the club formed the Association of Sport Fishing of Arecibo and its facilities. Members of the Arecibo Yacht Club organize marlin and inshore fishing tournaments. According to local government officials, the municipality does not get any economic benefit from those tournaments because all the profits go directly to the Club, which is a private business. The tournament does not affect the economy of the region even indirectly by promoting related business because the participants are mainly the same local fishermen. The marlin tournament is held in May. However, according to the commodore of the club, the tournaments are not always lucrative, even for the club (Wilson *et al*., 1998). The club has approximately 253 members, and among them, 82 are boat owners. The size of the vessels fluctuates between 18 and 50 feet. The larger boats, measuring 33 feet or more, have a crew consisting of a captain and a mate. The crew is in charge of the maintenance of the boats while in the marina and directing the fishing journeys. The facilities of the club and marina were constructed with private funds and are a very exclusive place for the middle-upper class of Arecibo. Although, the commodore reports that in the club's facilities there is an area available for the boats of the artisanal fishermen.

Among the members are part-time artisanal fishermen, but most of them are recreational fishermen. However, usually they come out on the weekends and use the money they obtain from the catch to pay for the trip expenses. The artisanal fishermen catch mostly red snapper and grouper by bottom fishing. This kind of fishing is done with a line that goes to the bottom of the sea, mostly in rocky areas. The rest of the fishermen mainly target dolphin and tuna. To catch these species, they use a hand line, or a single cord with one hook. From May through October, marlin, white needle, and blue needle are typically found seven to ten miles from the shore.

## 9.5 Future Assessments

In the future, the HMS permit databases, landings information, and HMS APs should be consulted to determine the most appropriate community profiles for HMS-related fisheries. The 2005 HMS permit data indicate that several new community profiles should be developed and some of the previously profiled communities may not have as significant an investment in the fishery as the community may have in the past (Figure 9.1 – Figure 9.7). Wakefield, Rhode Island should be considered due to the number of commercial tuna and swordfish permit holders in the area. Montauk, New York has a large concentration of charter/headboat, commercial tuna, and HMS dealers in the community. A large number of Cape May residents hold an HMS angling, charter/headboat, shark and/or swordfish permits. Ocean City and Berlin, Maryland have a high concentration of HMS Angling and Charter/headboat permit holders in residence. The commercial fishery is less significant compared to other towns with higher concentrations. In addition to the information from the HMS permit databases, NMFS received a large number of public comments describing the importance of the White Marlin Open Tournament to the Ocean City area economy. Morehead City, North Carolina is home to a number of HMS angling, charter/headboat, and commercial tuna permit holders. Each of these towns is actively involved with more than one sector of HMS fisheries, and therefore changes to HMS regulations may have could have an impact on each of these communities. While the number of permit holders in Puerto Rico and the Virgin Islands are not as numerous as the permit holders on the U.S. mainland, HMS fisheries are active in these two area and several communities benefit from those activities. This chapter does not include a general profile for the Virgin Islands because 1990 and 2000 Census data was incomplete. Future HMS actions should consider developing general profile for the Virgin Islands and a community profile for Christiansted, St. Croix, as well as San Juan, Guaynabo, Aguadilla, Mayaguez, and/or Vega Baja Puerto Rico due to the number of HMS permit holders in these areas. While NMFS may have community profiles describing these areas, to best determine the impact of changes to HMS-related regulations, an HMS-specific community profile should be developed for these towns.

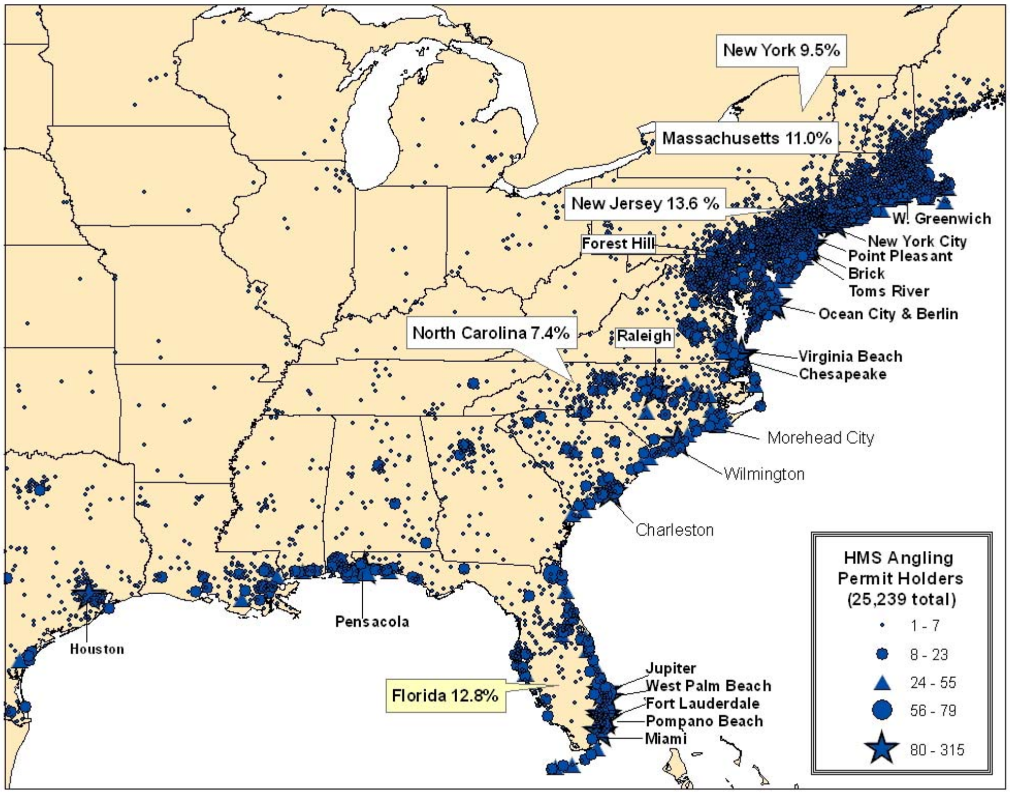


**Figure 9.1 Location of HMS Angling Permit Holders in 2005 and the percentage of Angling permit holders for the top five states.**

**Table 9.34 Number and Percentage of HMS Angling Permits by State and Country in 2005.**

| Angling Permits | | |
|---|---|---|
| **State** | **Total** | **%** |
| New Jersey | 3,439 | 13.6% |
| Florida | 3,238 | 12.8% |
| Massachusetts | 2,769 | 11.0% |
| New York | 2,391 | 9.5% |
| North Carolina | 1,863 | 7.4% |
| Maryland | 1,563 | 6.2% |
| Pennsylvania | 1,520 | 6.0% |
| Virginia | 1,351 | 5.4% |
| Connecticut | 1,080 | 4.3% |
| Puerto Rico | 899 | 3.6% |
| Rhode Island | 831 | 3.3% |
| Delaware | 741 | 2.9% |
| South Carolina | 736 | 2.9% |
| Louisiana | 602 | 2.4% |
| Texas | 586 | 2.3% |
| New Hampshire | 324 | 1.3% |
| Alabama | 320 | 1.3% |
| Maine | 251 | 1.0% |
| Georgia | 205 | 0.8% |
| Mississippi | 194 | 0.8% |
| Tennessee | 52 | 0.2% |
| Virgin Islands | 31 | 0.1% |
| Vermont | 31 | 0.1% |
| Ohio | 24 | 0.1% |
| Michigan | 22 | 0.1% |
| Illinois | 17 | 0.1% |
| Missouri | 17 | 0.1% |
| California | 14 | 0.1% |
| West Virginia | 14 | 0.1% |
| Washington, DC | 13 | 0.1% |
| Arkansas | 12 | 0.0% |
| Wisconsin | 9 | 0.0% |
| Kentucky | 8 | 0.0% |
| Minnesota | 8 | 0.0% |
| Indiana | 7 | 0.0% |
| Nevada | 6 | 0.0% |
| Oklahoma | 6 | 0.0% |
| Alaska | 5 | 0.0% |
| Colorado | 5 | 0.0% |
| Iowa | 5 | 0.0% |
| Kansas | 4 | 0.0% |
| New Mexico | 4 | 0.0% |
| Arizona | 3 | 0.0% |
| Marshall Islands | 2 | 0.0% |
| North Dakota | 2 | 0.0% |
| Nebraska | 2 | 0.0% |
| Palau | 2 | 0.0% |
| Washington | 2 | 0.0% |
| Wyoming | 2 | 0.0% |
| British Virgin Islands | 1 | 0.0% |
| Canada | 1 | 0.0% |
| Micronesia | 1 | 0.0% |
| Hawaii | 1 | 0.0% |
| Montana | 1 | 0.0% |
| Oregon | 1 | 0.0% |
| South Dakota | 1 | 0.0% |
| **Grand Total** | **25,239** | **100%** |

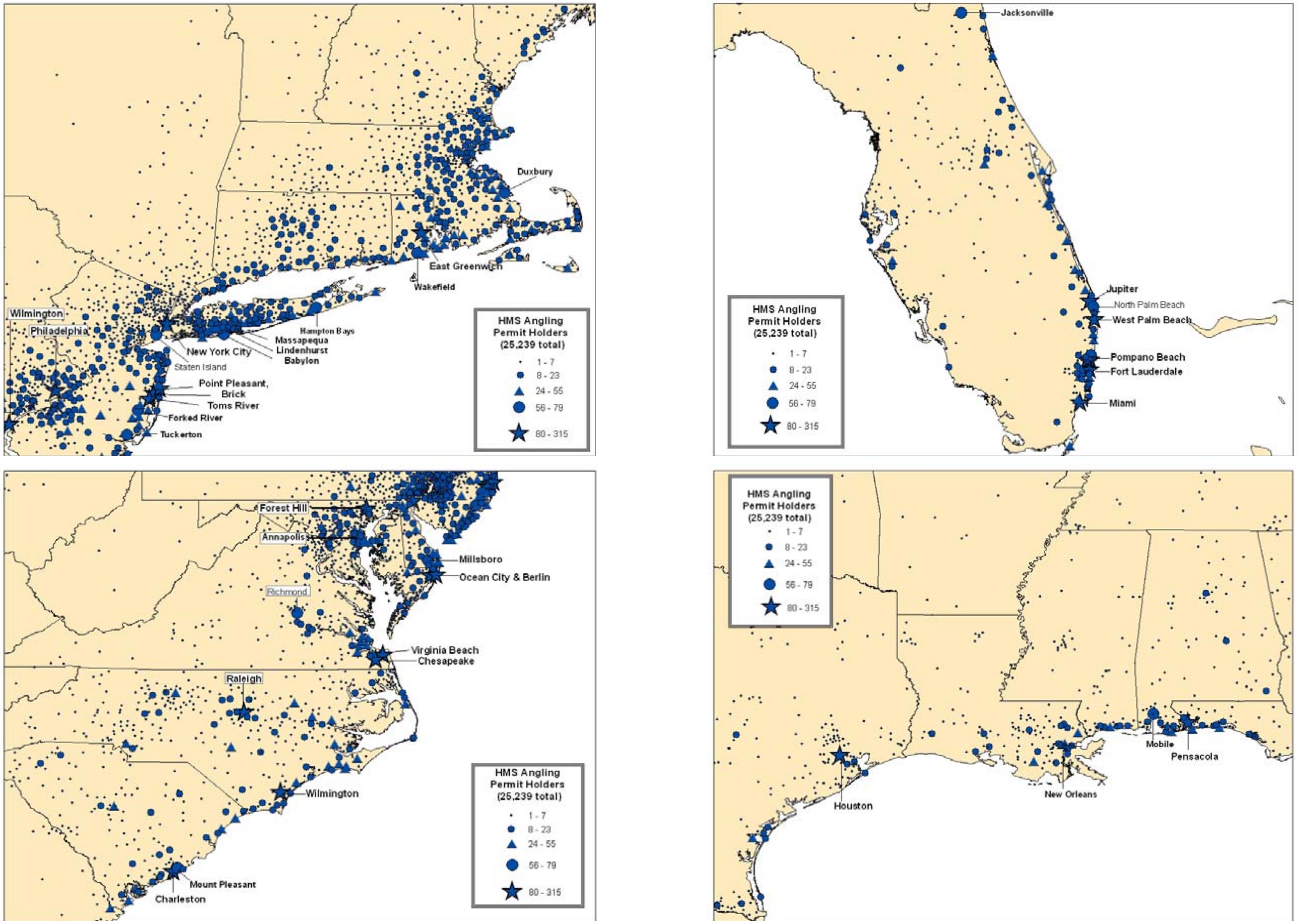


**Figure 9.2 Location of HMS Angling Permit Holders in 2005 by region.**

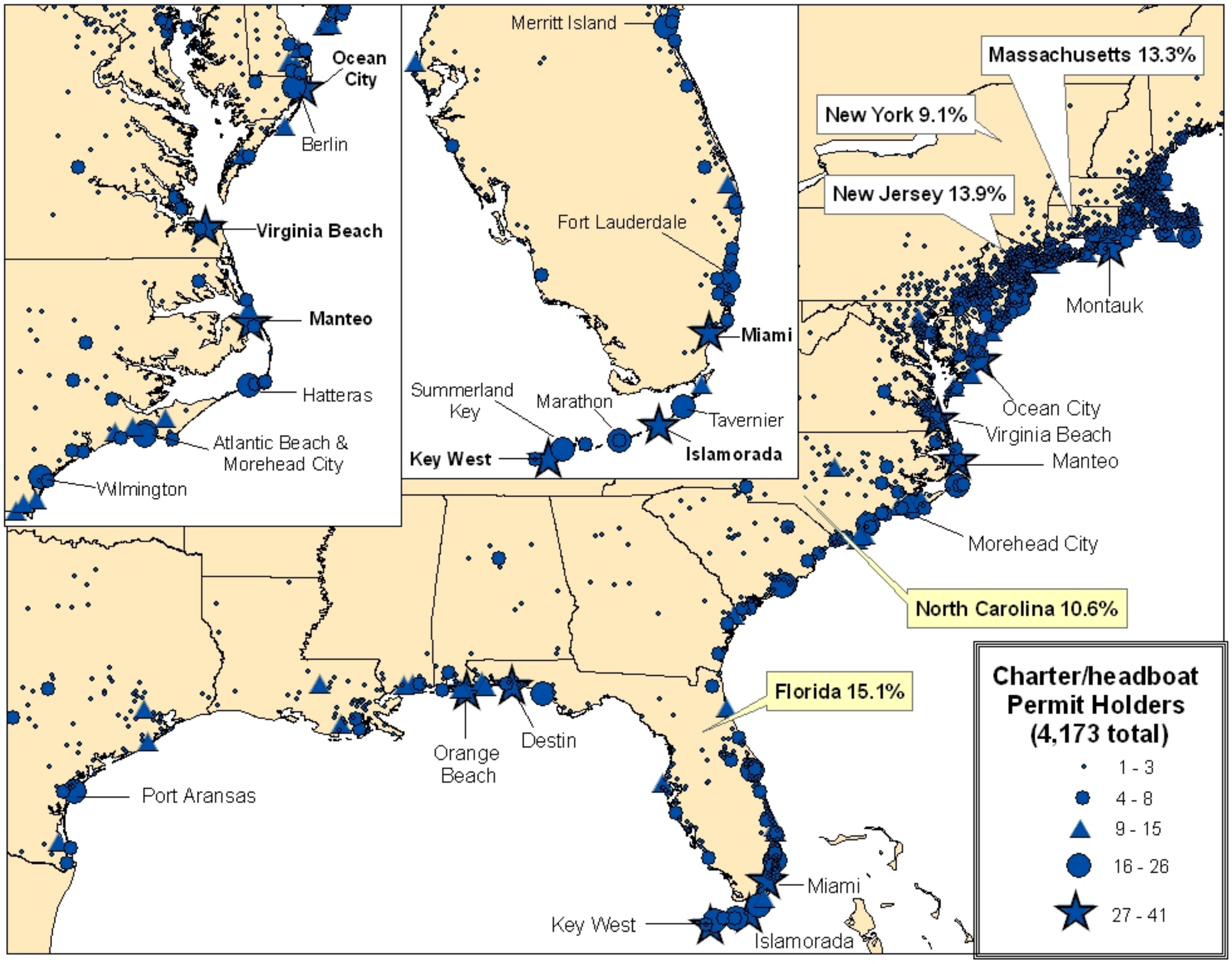


**Figure 9.3 Location of the HMS Charter/Headboat Permit Holders in 2005 and the percentage of HMS Charter/Headboat permit holders for the top five states.**

**Table 9.35 Number and Percentage of HMS Charter/Headboat Permits by State and Country in 2005.**

| Charter/Headboat Permits | | |
|---|---|---|
| **State** | **Total** | **%** |
| Florida | 632 | 15.1% |
| New Jersey | 578 | 13.9% |
| Massachusetts | 557 | 13.3% |
| North Carolina | 441 | 10.6% |
| New York | 379 | 9.1% |
| Maryland | 196 | 4.7% |
| Texas | 168 | 4.0% |
| Virginia | 153 | 3.7% |
| Pennsylvania | 143 | 3.4% |
| Rhode Island | 143 | 3.4% |
| South Carolina | 130 | 3.1% |
| Connecticut | 110 | 2.6% |
| Delaware | 103 | 2.5% |
| Louisiana | 90 | 2.2% |
| Alabama | 78 | 1.9% |
| Maine | 61 | 1.5% |
| New Hampshire | 55 | 1.3% |
| Georgia | 40 | 1.0% |
| Mississippi | 36 | 0.9% |
| Puerto Rico | 27 | 0.6% |
| Virgin Islands | 20 | 0.5% |
| California | 1 | 0.0% |
| Tennessee | 6 | 0.1% |
| Michigan | 4 | 0.1% |
| Ohio | 3 | 0.1% |
| Illinois | 2 | 0.0% |
| Kentucky | 2 | 0.0% |
| Oklahoma | 2 | 0.0% |
| Vermont | 2 | 0.0% |
| West Virginia | 2 | 0.0% |
| Alaska | 1 | 0.0% |
| Hawaii | 1 | 0.0% |
| Indiana | 1 | 0.0% |
| Marshall Islands | 1 | 0.0% |
| Minnesota | 1 | 0.0% |
| Missouri | 1 | 0.0% |
| Nebraska | 1 | 0.0% |
| Nevada | 1 | 0.0% |
| Palau | 1 | 0.0% |
| **Grand Total** | **4,173** | **100%** |

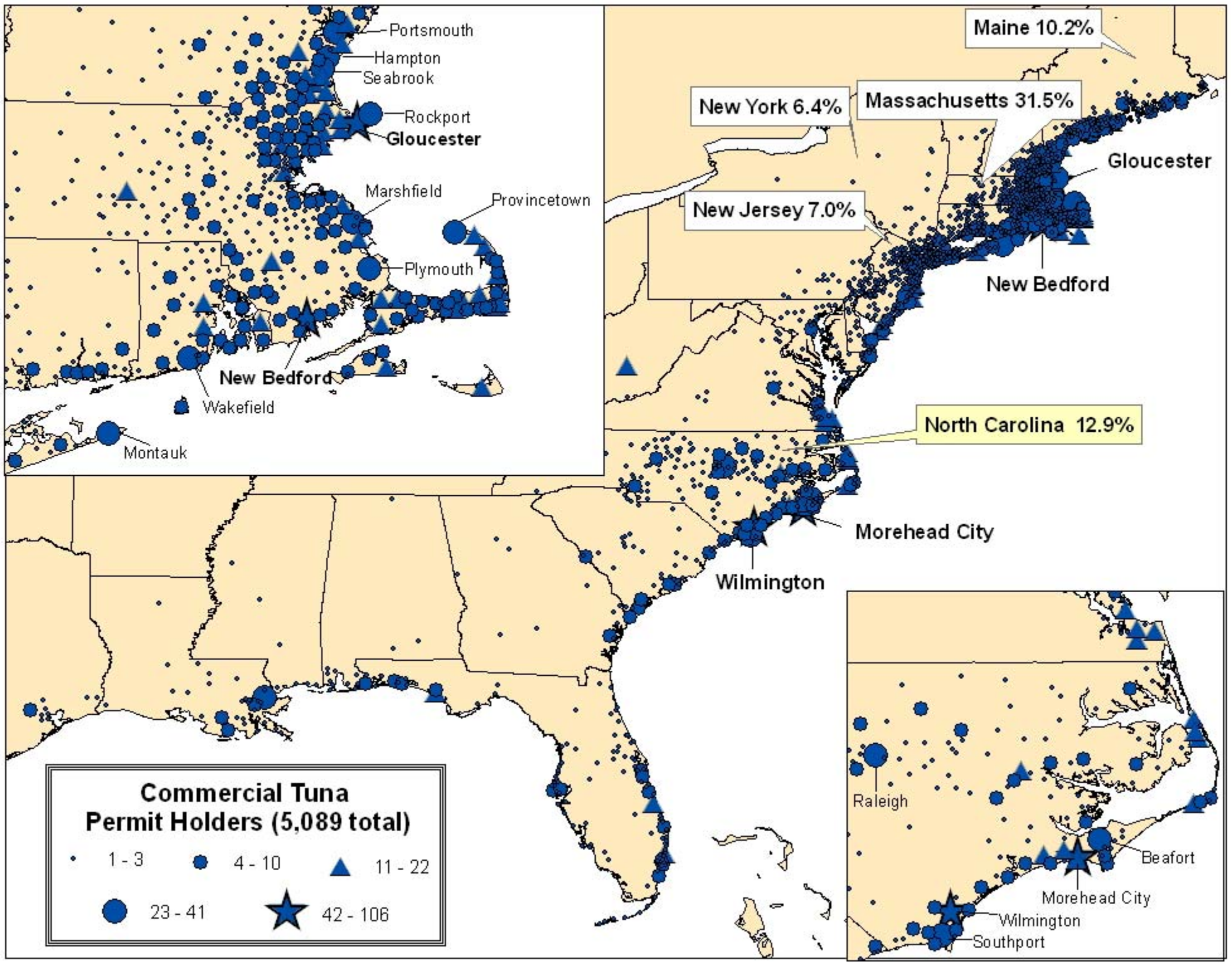


**Figure 9.4 Location of the Commercial Tuna Permit Holders in 2005 (all gear categories - harpoon, longline, purse seine, and trap) and the percentage of commercial tuna permit holders for the top five states.**

**Table 9.36 Number and Percentage of Commercial Tuna Permits by State and Country in 2005.**

| Commercial Tuna Permits | | |
|---|---|---|
| **State** | **Total** | **%** |
| Massachusetts | 1,601 | 31.5% |
| North Carolina | 659 | 12.9% |
| Maine | 517 | 10.2% |
| New Jersey | 357 | 7.0% |
| New York | 327 | 6.4% |
| New Hampshire | 278 | 5.5% |
| Florida | 250 | 4.9% |
| Rhode Island | 232 | 4.6% |
| Connecticut | 170 | 3.3% |
| Puerto Rico | 106 | 2.1% |
| Virginia | 106 | 2.1% |
| South Carolina | 89 | 1.7% |
| Louisiana | 86 | 1.7% |
| Pennsylvania | 59 | 1.2% |
| Maryland | 57 | 1.1% |
| Virgin Islands | 46 | 0.9% |
| Delaware | 39 | 0.8% |
| Georgia | 26 | 0.5% |
| Texas | 26 | 0.5% |
| Alabama | 20 | 0.4% |
| Vermont | 11 | 0.2% |
| Mississippi | 8 | 0.2% |
| Colorado | 2 | 0.0% |
| Washington, DC | 2 | 0.0% |
| Hawaii | 2 | 0.0% |
| Michigan | 2 | 0.0% |
| Alaska | 1 | 0.0% |
| Arizona | 1 | 0.0% |
| California | 1 | 0.0% |
| Idaho | 1 | 0.0% |
| Indiana | 1 | 0.0% |
| Minnesota | 1 | 0.0% |
| Montana | 1 | 0.0% |
| Oklahoma | 1 | 0.0% |
| Tennessee | 1 | 0.0% |
| Washington | 1 | 0.0% |
| West Virginia | 1 | 0.0% |
| **Grand Total** | **5,089** | **100%** |

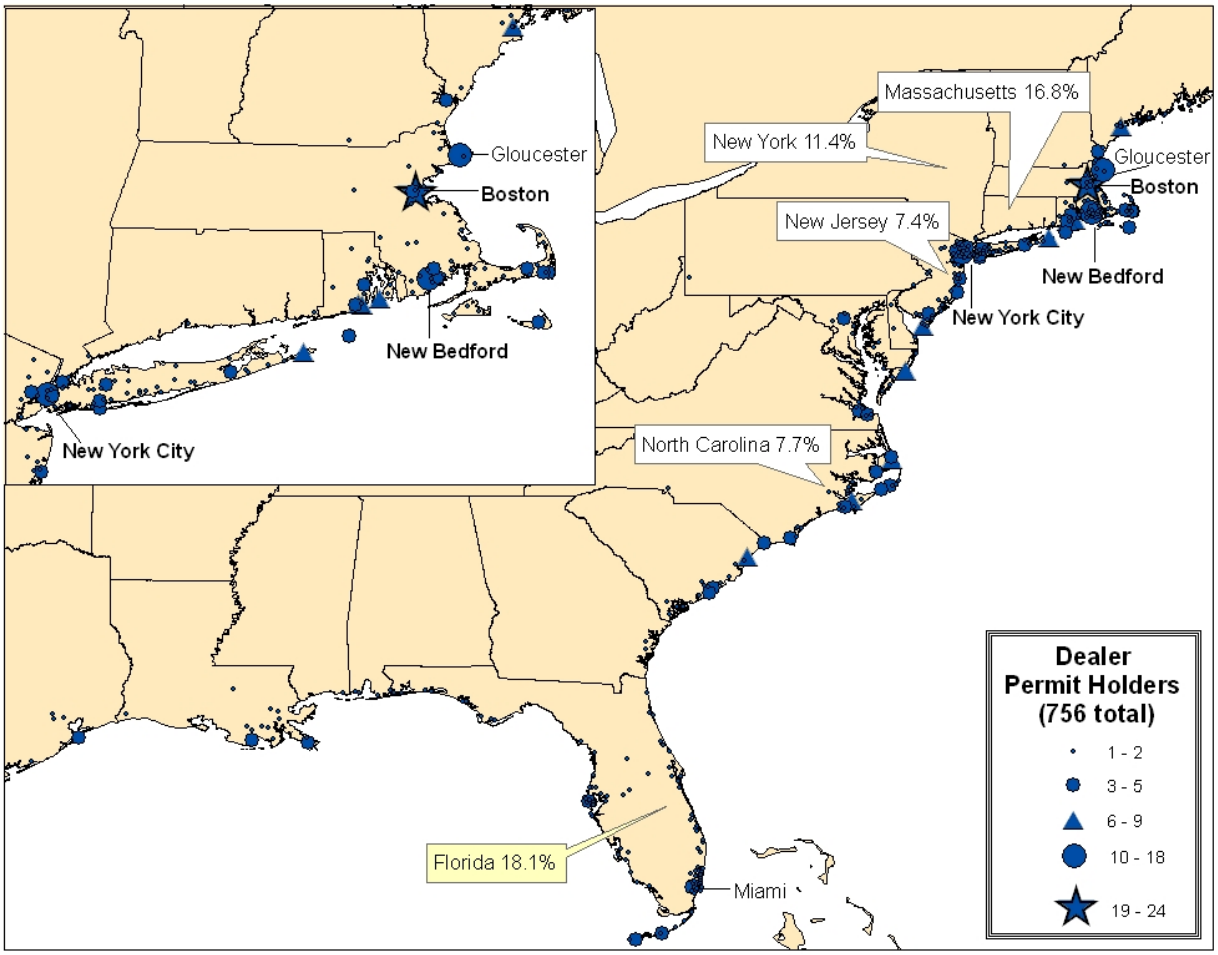


**Figure 9.5** Location of all HMS Dealer Permit Holders as of February 2006 for shark and swordfish permits and for fishery year 2005 for tunas and the percentage of total HMS dealer permit holders for the top five states.

**Table 9.37** Number and Percentage of HMS Dealers by State and Country as of February 2006 (sharks and swordfish) and for calendar year 2005 (tunas).

| HMS Dealer Permits | | |
|---|---|---|
| **State** | **Total** | **%** |
| Florida | 137 | 18.1% |
| Massachusetts | 127 | 16.8% |
| New York | 86 | 11.4% |
| North Carolina | 58 | 7.7% |
| New Jersey | 56 | 7.4% |
| Rhode Island | 45 | 6.0% |
| California | 42 | 5.6% |
| South Carolina | 32 | 4.2% |
| Virginia | 27 | 3.6% |
| Maine | 26 | 3.4% |
| Louisiana | 25 | 3.3% |
| Maryland | 16 | 2.1% |
| Texas | 14 | 1.9% |
| Hawaii | 9 | 1.2% |
| Washington | 9 | 1.2% |
| Canada | 8 | 1.1% |
| Puerto Rico | 7 | 0.9% |
| Alabama | 5 | 0.7% |
| New Hampshire | 5 | 0.7% |
| Pennsylvania | 5 | 0.7% |
| Virgin Islands | 5 | 0.7% |
| Delaware | 3 | 0.4% |
| Georgia | 3 | 0.4% |
| Connecticut | 2 | 0.3% |
| Chile | 1 | 0.1% |
| Illinois | 1 | 0.1% |
| Missouri | 1 | 0.1% |
| Mississippi | 1 | 0.1% |
| **Grand Total** | **756** | **100%** |

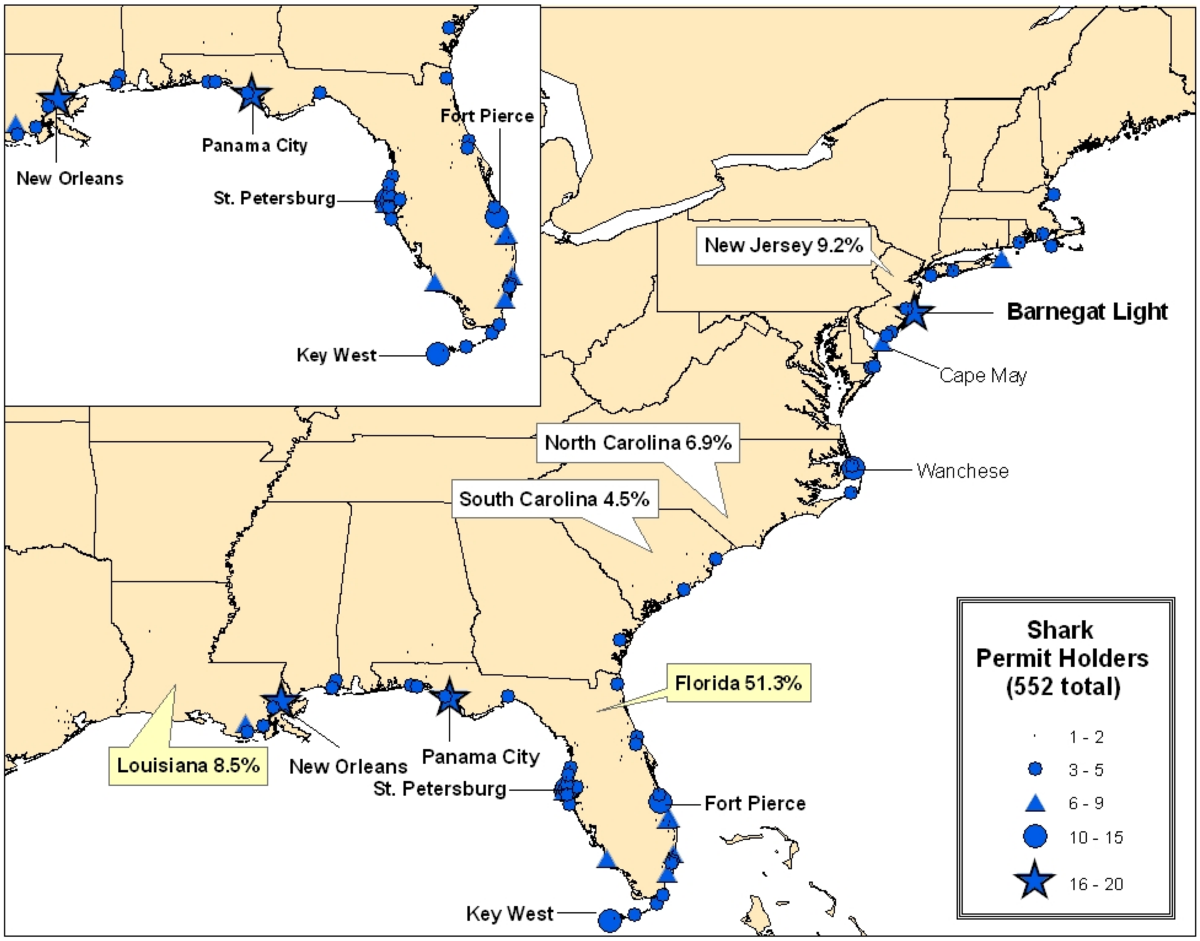


**Figure 9.6** **Location of the Shark Directed and Incidental Permit Holders as of February 2006 and percentage of shark permit holders for the top five states.**

**Table 9.38** **Number and Percentage of Directed and Incidental Shark Permit Holders by State as of February 2006.**

| Shark Permits | | |
|---|---|---|
| **State** | **Total** | **%** |
| Florida | 283 | 51.3% |
| New Jersey | 51 | 9.2% |
| Louisiana | 47 | 8.5% |
| North Carolina | 38 | 6.9% |
| South Carolina | 25 | 4.5% |
| New York | 21 | 3.8% |
| Massachusetts | 17 | 3.1% |
| Texas | 13 | 2.4% |
| Maryland | 10 | 1.8% |
| Rhode Island | 9 | 1.6% |
| Mississippi | 8 | 1.4% |
| Alabama | 7 | 1.3% |
| Virginia | 6 | 1.1% |
| Maine | 5 | 0.9% |
| Georgia | 3 | 0.5% |
| New Hampshire | 3 | 0.5% |
| California | 2 | 0.4% |
| Connecticut | 2 | 0.4% |
| Delaware | 1 | 0.2% |
| Virgin Islands | 1 | 0.2% |
| **Grand Total** | **552** | **100%** |

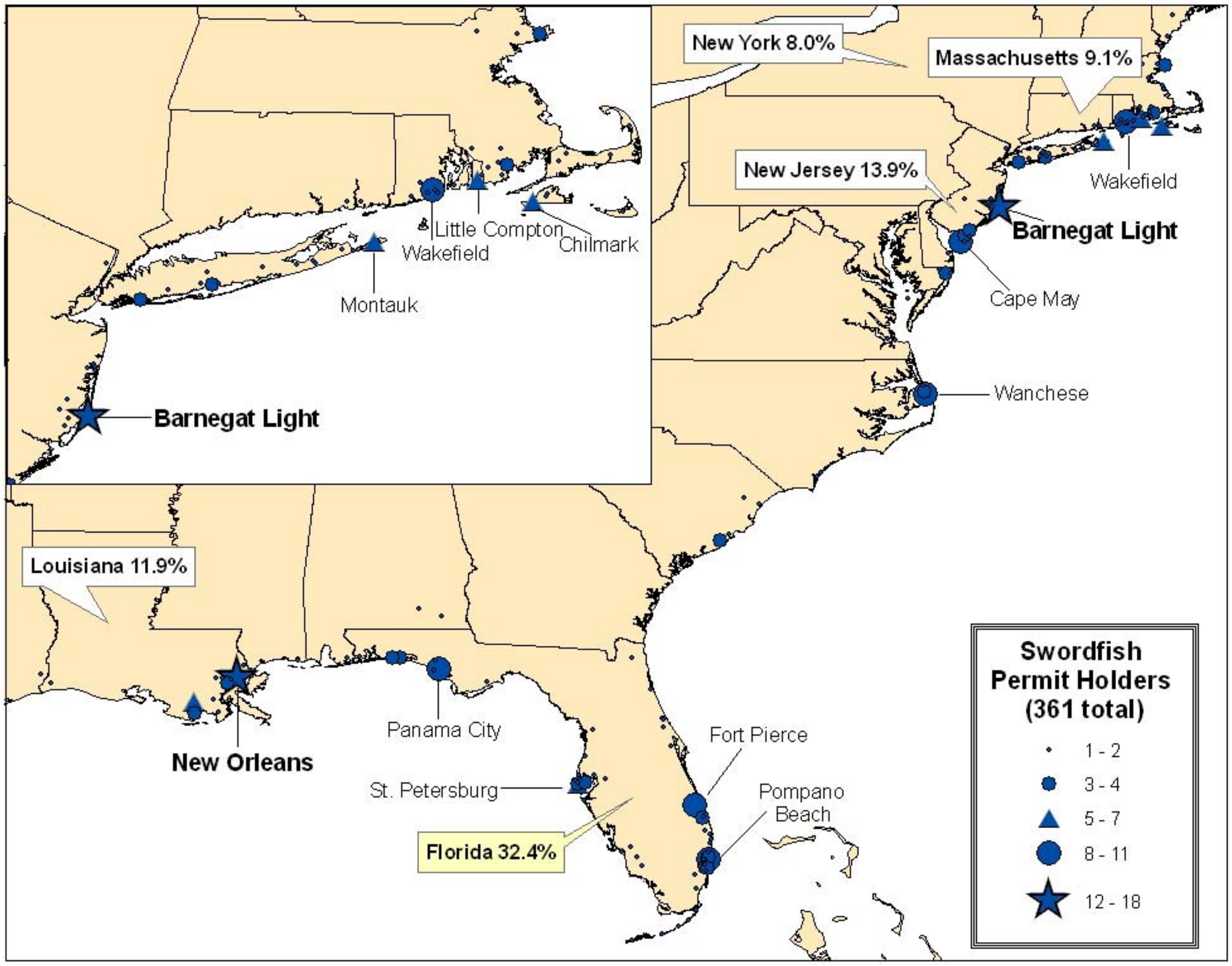


**Figure 9.7** **Location of the Swordfish Permit Holders as of February 2006 and the percentage of swordfish permit holders for the top five states.**

**Table 9.39** **Number and Percentage of Swordfish Permit Holders by State as of February 2006.**

| Swordfish Permits | | |
|---|---|---|
| **State** | **Total** | **%** |
| Florida | 117 | 32.4% |
| New Jersey | 50 | 13.9% |
| Louisiana | 43 | 11.9% |
| Massachusetts | 33 | 9.1% |
| New York | 29 | 8.0% |
| Rhode Island | 27 | 7.5% |
| North Carolina | 20 | 5.5% |
| Maryland | 7 | 1.9% |
| South Carolina | 7 | 1.9% |
| Texas | 7 | 1.9% |
| Virginia | 5 | 1.4% |
| Maine | 4 | 1.1% |
| Alabama | 3 | 0.8% |
| California | 2 | 0.6% |
| Connecticut | 2 | 0.6% |
| Mississippi | 2 | 0.6% |
| Delaware | 1 | 0.3% |
| New Hampshire | 1 | 0.3% |
| Virgin Islands | 1 | 0.3% |
| **Grand Total** | **361** | **100%** |

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# 10.0 ESSENTIAL FISH HABITAT

## 10.1 Introduction

In 1996 Congress reauthorized the Magnuson Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), which required NMFS to describe and identify essential fish habitat (EFH) for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of EFH. In doing so, Congress recognized the importance of habitat in maintaining viable and sustainable fisheries. EFH is defined as those habitats necessary to the species for spawning, breeding, feeding, or growth to maturity. The EFH guidance published on January 17, 2002 (67 FR 2343) stated that EFH must be identified and described for each life stage and for all species in the fishery management unit (FMU), as well as the physical, biological, and chemical characteristics of EFH, and, if known, how these characteristics influence the use of EFH by each species and life stage. FMPs and FMP amendments must provide written descriptions of EFH and must also provide maps of the geographic locations of EFH or the geographic boundaries within which EFH for each species and life stage is found (50 CFR 600.815(a)(1)(i)).

The Magnuson-Stevens Act states that NMFS should periodically review and revise or amend the EFH provisions as warranted based on available information (50 CFR 600.815(a)(10). The EFH guidance further states that NMFS should review all EFH information at least once every five years. EFH, including habitat areas of particular concern (HAPCs), for HMS were identified in the 1999 HMS FMP. This amendment constitutes Phase 1 of the comprehensive five-year review of EFH for all HMS. The purpose of the EFH review is to gather any new information and determine whether modifications to existing EFH descriptions and delineation's are warranted. While NMFS has presented new information relative to HMS EFH in the annual Stock Assessment and Fishery Evaluation (SAFE) reports, this is the first comprehensive review of all new information related to EFH that has been completed since 1999.

NMFS does not intend to modify any of the existing EFH descriptions or boundaries in this FMP or to minimize impacts from fishing gear. Rather, NMFS is presenting new EFH information and data collected since 1999, including gear evaluations, and requesting public comment on any additional data or information that may need to be included in the five-year review. Based on an assessment of the data collected thus far, NMFS has made a preliminary determination that modification to existing EFH for some species and/or life stages may be warranted. At this time, even though NMFS is conducting the gear evaluations, NMFS is not minimizing any impacts due to fishing gears. Any modifications to existing EFH descriptions and boundaries and potential measures to minimize fishing impacts would be addressed in a subsequent FMP action. In order to consolidate EFH descriptions and maps previously provided in separate documents, all of the EFH descriptions and maps from the 1999 FMP, Amendment 1 to the FMP, and Amendment 1 to the Billfish FMP are provided in this FMP. Maps in this FMP include data acquired through the review process and will provide an opportunity for public comment on the need for any additional information to be considered. These maps can be found in Appendix B.

To further the conservation and enhancement of EFH, the EFH guidelines encourage FMPs to identify HAPCs. HAPCs are areas within EFH that meet one or more of the following criteria: they are ecologically important, particularly vulnerable to degradation, undergoing stress from development, or they are a rare habitat type. HAPCs can be used to focus conservation efforts on specific habitat types that are particularly important to the managed species. Currently, only three HAPCs for sandbar sharks have been identified, including: three separate areas off North Carolina; Chesapeake Bay, MD; and Great Bay, NJ (NMFS, 1999). Although no new HAPCs have been identified since the 1999 FMP, and none are proposed in the current Amendment, NMFS may consider alternatives for HAPCs in a subsequent FMP action, based upon information provided by experts in the field or from other information gathered during this review. Once additional information is compiled and analyzed for the five-year EFH review, additional HAPC alternatives may be proposed.

Additionally, FMPs are required to identify fishing and non-fishing activities and to minimize any adverse effects on EFH. Each FMP must include an evaluation of the potential adverse impacts of fishing on EFH designated under the FMP, including effects of each fishing activity regulated under the FMP; also the effects of other Federal FMPs and non-Federally managed fishing activities (*i.e.*, state fisheries) on HMS EFH. FMPs must describe each fishing activity and review and discuss all available relevant information such as the intensity, extent, and frequency of any adverse effects on EFH; the type of habitat within EFH that may be adversely affected; and the habitat functions that may be disturbed (§ 600.815(a)(2)). If adverse effects of fishing activities are identified, the Magnuson-Stevens Act requires that these effects on EFH are minimized to the extent practicable (MSA § 303(a)(7)).

NMFS completed the original analysis of fishing and non-fishing impacts in the 1999 FMP, and is now presenting information gathered to complete the five-year review, including all fishing and non-fishing impacts. Considerable new information is available regarding gear impacts that have been incorporated into this review. For example, new information presented in the Gulf of Mexico and Caribbean Fishery Management Council EFH FEIS' (2004) suggest that bottom longline gear may have an adverse affect on coral reef habitat which serves as EFH for certain reef fishes, and both Councils have taken action to minimize fishing impacts on those areas. Bottom longline gear in HMS fisheries is primarily used in sandy and/or muddy habitats where it is expected to have minimal to low impacts. An assessment of whether HMS bottom longline gear is fished in coral reef areas, and if so, the intensity, extent, and frequency of such impacts, including any measures to minimize potential impacts will be considered in a subsequent rulemaking. At that time, NMFS may consider similar alternatives to prohibit HMS gears in those areas identified by the Councils, or other areas identified by NMFS. Other gear types that contact the bottom, such as tuna traps or anchored gillnets, are either so few in number, as in the case of the tuna traps, or are also used in sand or mud habitats, as is the case of the anchored gillnets, that impacts from these HMS gear types are expected to be minimal, and will be addressed in a subsequent rulemaking.

## 10.2 EFH Five-Year Review Process

The original identification and description of EFH for HMS was completed for tunas, swordfish, and sharks in the 1999 FMP, and for billfish in the 1999 Amendment 1 to the Billfish FMP. Amendment 1 to the 1999 FMP included a review and update of EFH for five shark species. EFH for these species was updated based on either a change in management status (*e.g.* from overfished to not overfished or vice versa) or based on new information that had become available. Species for which management status had changed included the blacktip shark (*Carcharhinus limbatus*) (no longer overfished), sandbar shark (*C. plumbeus*) (overfishing is occurring), and finetooth shark (*C. isodon*) (overfishing is occurring). Species for which new information had become available included the dusky shark (*C. obscurus*) and nurse shark(*Ginglymostoma cirratum*). As described above, these updated descriptions and maps are included in this Amendment.

As part of the five-year review process, a search of all new literature and information on HMS EFH was undertaken to assess habitat use and ecological roles of HMS EFH in the FMU. Published and unpublished scientific reports, fishery independent and fishery dependent datasets, and expert and anecdotal information detailing the habitats used by the managed species were evaluated and synthesized for inclusion in the five-year review process in this FMP Amendment (See Section 10.3). Ongoing research on the biology, ecology, and early life history of Atlantic HMS, and research and publications relating to HMS EFH, are described in greater detail below.

### 10.2.1 Descriptions of Datasets Used in the Review

A number of different data sets from state, Federal, and non-governmental organizations were compiled during the review process. For the most part, these are updated versions of the same data sources that were used for the original 1999 EFH identifications. One new data set, from the Cooperative Atlantic States Shark Pupping and Nursery (COASTSPAN) program, was initiated in 1998 by the Northeast Fisheries Science Centers (NEFSC) Apex Predator Program (APP). Although several of the data sets described below appear to be focused on a particular species, there may be an overlap in the species that are documented, particularly in the tagging programs. For example, the Cooperative Shark Tagging Program (CSTP), described below, includes data on 114 adult white marlin tagged between 1964 and 2002, and 318 juvenile white marlin tagged between 1967 and 2003, even though the primary focus is on Atlantic sharks.

The CSTP, managed by the NEFSC APP, provides one of the most comprehensive, long-term data sets available on Atlantic sharks and, to a lesser degree, swordfish, tunas, and billfish. The CSTP data set has a continuous time series of observations dating back to 1962. Between 1962 and 2004, more than 171,000 sharks of 52 species have been tagged and more than 10,000 sharks of 33 species have been recaptured. Information is collected by distributing tags to scientists and commercial and recreational fishermen who record information on the species, capture or tagging location, date, gear, and size of the tagged fish prior to its release.

The NEFSC APP has also been conducting surveys since 1986 which represented the first systematic survey of sharks covering most of the U.S. Atlantic coast from Southern New England to mid-Florida in depths of 5 to 200 m. Pre-determined stations were positioned roughly 30 nautical miles (nmi) apart, with additional (tagging only) stations in regions of high shark abundance. The cruise was designed to obtain baseline information on the abundance and distribution of large pelagic fishes, primarily sharks, using standard pelagic longline gear. By 1989, the objectives of the survey were shifted from pelagic fish to large coastal sharks and this survey covered the waters from Tampa, FL, to southern New England. The gear was weighted and the bottom longline survey was initiated. Survey procedures and gear were standardized between the NEFSC and Southeast Fisheries Science Center SEFSC in 1995 to make the surveys comparable and to mimic the gear used in the commercial large coastal shark fishery. Changes to the NEFSC survey were: 1) gear changed from New England pelagic (rope mainline, rope and wire gangions) to Florida bottom (monofilament mainline and gangions), 2) soak time increased from 1 to 3 hrs, 3) bait changed from mackerel to spiny dogfish, 4) stations limited to depths between 5 and 40 fms, and 5) longline fished entirely on the bottom, eliminating the pelagic sets of the previous surveys, 6) 300 hooks fished rather than 100.

The Cooperative Tagging Center (CTC) operated by the SEFSC was established in 1992 in response to expansion of tag release and recapture activities, data requests from other tagging agencies, and domestic and international tagging research needs. The CTC runs the Cooperative Tagging System (CTS), and other projects aimed at tagging research and cooperative work with endangered species emphasizing highly migratory species such as tunas and billfishes. The CTC collects catch, effort, tagging, and bio-profile data on tunas and billfish to monitor trends in abundance.

The Commercial Shark Fishery Observer Program (CSFOP), also referred to as the Shark Observer Program (SOP), administered by the Florida Museum of Natural History, University of Florida, has been collecting information on the directed shark bottom longline fishery since 1994. A voluntary program for many years, it became mandatory in 2002. Trained observers collect fishery-dependent information on the location of each longline set, species composition, number of each species caught, disposition of the catch, and information on individual sharks such as length and sex. The coverage for this data set extends from the Atlantic east coast to the Gulf of Mexico. Data from this program are essential to monitoring the fishery and providing distributional information for many different shark species.

The Pelagic Observer Program (POP), administered by SEFSC in Miami, has been monitoring the commercial pelagic longline fishery since 1992. The program places trained observers aboard commercial fishing vessels, monitoring the U.S. pelagic longline fleet in the Atlantic and Gulf of Mexico. Observers collect information on location, number of fish caught per set, species identification, sex, length, and weight for swordfish, sharks, tunas, and billfish. The POP targets approximately 8 percent of the vessels based on the fishing effort of the fleet, and supplies data on all species included in the 1999 FMP.

The COASTSPAN program, also administered by the NEFSC APP, has been collecting information on shark nursery areas for several Atlantic east coast states since 1998. The purpose of these surveys is to assess the geographical and seasonal extent of shark nursery habitat, determine which shark species use these areas and gauge the relative importance of these coastal habitats. NOAA scientists and state and university researchers monitoring shark populations in Delaware, North Carolina, South Carolina, Georgia, and Florida collect the information. In 2002, a synthesis document of research including several other states bordering the Atlantic east coast and Gulf of Mexico was completed, resulting in additional information on shark EFH. The information included in this data set was derived through a variety of collecting methods including longline, gillnet and trawl surveys, and standardized to include information on location, species, length, and data source.

The Southeast Fishery Longline Shark Survey, administered by the SEFSC, Pascagoula Laboratory, has been conducting biological surveys to assess the relative abundance and distribution of coastal sharks since 1995. Biological data is collected from all captures and associated environmental data is recorded from each longline location. Most of the sharks captured are tagged and released. The longline surveys provide a useful fisheries independent database for sharks.

The Mote Center for Shark Research (CSR), operated out of the Mote Marine Laboratory (MML), includes data on sharks and any tuna and billfish bycatch. MML is an independent, nonprofit marine research institution with a nearly 50-year history of shark research, including: collecting angler tag data to provide basic biological information on shark migrations, age and growth studies, natural mortality studies, and investigations on behavior and habitats.

The Southern Atlantic SEAMAP Shallow Water Trawl Survey, administered by the South Carolina Department of Natural Resources is a state sponsored public tagging program. Over the past twenty-seven years, close to12,000 anglers have participated in the program. Over 100,000 fish have been tagged with an overall recovery rate of around 13 percent. Species tagged include sharks, tunas, and billfish. For example, a blue marlin tagged through SEAMAP became the first documented Atlantic blue marlin to cross the equator. This marlin was tagged off Georgetown, South Carolina and was recaptured several months later 750 miles off the coast of Brazil. It had traveled approximately 4,300 nautical miles from its original tagging location.

The Virginia Institute of Marine Science (VIMS) longline survey began in 1973 and is still continued today. This project allows VIMS scientists to assess the abundance of local shark stocks and to monitor changes in this abundance over time. The survey is a depth-stratified field survey of the Chesapeake Bay and Virginia coastal waters.

The Billfish Foundation (TBF) is a non-profit organization that has been collecting data on billfish tagging for a number of years, and providing the data to the NMFS SEFSC. The Billfish Foundation developed the widely used hydroscopic nylon tag head, which has been employed in offshore and inshore fisheries tagging efforts. In addition, TBF has contributed to the development and use of satellite tagging technology for marlin.

In addition to these data sets, data were obtained from individual researchers involved in shark, tuna, swordfish, and billfish research. For example, in 2002 a synthesis document of shark nursery research conducted along the U.S. Atlantic and Gulf of Mexico coasts was initiated, resulting in additional information on shark EFH. The data collected by the various researchers were synthesized into a single standardized data set to provide a comprehensive view of shark nursery and pupping areas in state waters. The information included in this data set was derived through a variety of collecting methods including longline, gillnet and trawl surveys, and standardized to include information on location, species, length, and data source.

The Pelagic Longline Logbook (PLL), a comprehensive fisheries dependent logbook reporting system, was also compiled during the review, but could not be included in the maps due to the lack of size information. The PLL data include, among other things, targeted species caught, bycatch, effort, and gear. However, since EFH descriptions are based on different lifestages of HMS, information on sizes is required for EFH mapping and analysis. Thus, NMFS was only able to use the PLL data to confirm the presence of HMS in areas that appeared to be outside of the normal distribution range of points from other data sets.

### 10.2.2 Methods Used to Map and Analyze EFH Data

The overall approach used to analyze data and identify EFH is described in the EFH regulations (§ 600.815(a)(1)) and was followed during the initial identification of HMS EFH in 1999, as well as during this five-year review. The regulations recommend using an approach of categorizing data according to different levels. The regulations require that, at a minimum, distribution data (level 1 information) be used to identify EFH. This level 1 information is based on presence/absence data of the species or life stages in specific habitats used. Where possible, data sets and information on habitat-related densities of species (level 2), growth, reproduction and survival within habitats (level 3), and production rates by habitat (level 4), should be used to identify EFH. Distribution data (level 1) are the most common data available for HMS. As described in further detail below, the interpretation and application of these data are subject to certain limitations.

As part of the review process NMFS scientists who have expertise working with HMS were consulted to determine whether the data included in the updated maps for this amendment were appropriate, whether appropriate size ranges for species' individual life stages applied to the mapped data points, and whether modifications to existing EFH areas may need to be considered in the future. For mapping purposes, there were no changes to the size ranges for the three life stages of tunas, swordfish, or billfish from the 1999 FMP. However, the naming conventions for the life stages were modified slightly to provide clarity and help distinguish between them. Size ranges for each of the species' life stages are indicated on the bottom of each of the maps. Due to a lack of published literature on length-at-age data for several HMS, NMFS changed the 1999 categories for size classes of tunas, swordfish, and billfishes from juvenile/subadults to juveniles only. NMFS is aware of the inherent difficulties in accurately determining the size, sex, and in certain cases, species for classification purposes (described in more detail in section 10.3).

After reviewing published scientific reports and consulting with experts in the field, NMFS believes that several of the size ranges for various life stages of sharks may need to be changed from those described in the 1999 FMP. Identifications and descriptions of shark life stages by size are provided in Appendix B. The data points on the maps provided in this Amendment represent these new size ranges. The data points reflect a "neonate" life stage (where available) and do not contain an "early juvenile" life stage, as was the case in the 1999 FMP. The 1999 definition was modified to include primarily neonates and young-of-the-year sharks in the neonate category in order to better define and identify the life stage that occupies nursery habitat. The change in classification of "late juveniles/subadults," to "juveniles" was done to ensure that all immature sharks from young juveniles to older or late juveniles were included in the juvenile category. Finally, the "adult" size class still consists of mature sharks based on the size at first maturity for females of the species. Similar modifications to other HMS species' size ranges may be undertaken in the future.

After careful screening to ensure standardization and quality of the data, all of the data points for each species were compiled in a Geographic Information Systems (GIS) program for mapping. By combining all of the data sets, the number of observations for an individual life stage for a single species ranged from several hundred to over 18,000. Each observation included at a minimum the species, size, life stage, latitude and longitude coordinates, date of collection, sex, and data source.

Identifying areas with the highest concentration of observations was determined by superimposing individual observations on a regional grid covering coastal waters in the U.S. Exclusive Economic Zone (EEZ). The grid was constructed of ten-minute squares that are all equal to 0.0279 square degrees or 100 square degree minutes[1], or approximately 100 $nm^2$. The grid and individual data points were spatially joined and each square was given a summary of the numeric attributes and a count field of the points that fell inside it. Depending upon the species, the number of observations per 100 $nm^2$ ranged from zero to several thousand. The squares containing observations were color-coded depending upon the number of observations per square, and scaled to reflect the frequency of occurrence.

A grid was used rather than individual data points so that reviewers could determine the relative concentration of fish in a given area, something that is difficult to determine with overlapping data points. However, the grid and associated scale are not meant to represent abundance or density estimates (level 2 data). In addition, the grid will be helpful in future efforts to revise existing boundaries by providing a scale that can be used as a guide for the inclusion or exclusion of given areas. For example, in Amendment 1 to the FMP, criteria (presented here for reference only) for including or excluding a given number of observations per square were established for each species based on the status of the stock, and used as a guide to identify appropriate EFH areas. For a rebuilt species like blacktip shark, a criteria of greater than 10 observations per 100 $nm^2$ was used to help identify and map areas as EFH. For an overfished species such as finetooth shark, a more precautionary criteria of > 1 observation per 100 $nm^2$ was used to help identify and map EFH areas. Thus, the grid might be used in a future rulemaking to analyze potential alternatives based on including or excluding a specific number of observations per 100 $nmi^2$ area.

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[1]A minute of latitude equals a nautical mile, but the distance represented by a minute of longitude varies according to distance from the equator. Thus, ten minute “squares” are larger in size near the equator and get progressively smaller in size as you approach the poles.

Due to natural variability in abundance for different species and lifestages, which is reflected by the variation in the number of observations per 100 $nm^2$, the relative concentrations were tailored to each species. NMFS adopted this approach because it made the data easier to view and analyze, but there may also be a benefit to a uniform scale for certain species and lifestages.

## 10.3 Summary of Review and Findings

As part of the review process, NMFS provided draft maps of the 1999 EFH boundaries overlayed both new and existing data for each HMS to technical reviewers for their feedback and comment. Several reviewers raised concerns regarding identification of EFH for a number of reasons described in further detail below. The comments ranged from questions regarding size classifications for various species' life stages to potential errors in species identification. NMFS is providing a summary of these comments and observations so that the public and others reviewing the current distributions and maps will have a better understanding of the issues involved in interpreting the data, and ultimately modifying EFH.

One of the overarching comments was the challenge of identifying EFH for tunas, swordfish, billfish, and sharks, and the limitations of relying too heavily on distribution data alone. By nature, these species are highly migratory and occupy a wide range of habitats including estuarine, coastal, and offshore pelagic environments. HMS are typically associated with oceanographic features such as fronts, current boundaries, temperature discontinuities, or water masses with particular physical characteristics, which may be ephemeral, difficult to map, and difficult to correlate with specific periods in which they are occupied by HMS. Other features such as shelf edges and sea mounts are more easily identified and may be sites of higher abundance for some HMS on a seasonal basis. In the past, areas with readily identifiable geographic or bathymetric features that coincided with, or overlapped with areas of HMS aggregations, were used to delineate the boundary, or a portion of the EFH boundary. Where expert opinion was available and data points were scarce, areas were identified as EFH based on the best interpretation of life history accounts.

Distribution data alone may not provide sufficient information on whether the habitat should be considered essential even if correlations can be drawn between the presence of HMS in a given area and a particular habitat. For many HMS, additional information from surveys, or observations of feeding or spawning activity may be used to further confirm the importance of the habitat. Information about the life history of a particular species, such as the timing of the reproductive cycle, may also be used to correlate the presence of HMS in an area. However, as described in greater detail below, these types of correlations are difficult to confirm, are not well documented in the scientific literature, and should be viewed with caution. Due to difficulties in identifying EFH, a precautionary approach of selecting large areas has been used in the past.

EFH information for most of the data sets described above is based on distribution information (level 1) derived from systematic presence/absence sampling and relative abundance (CPUE) data. Level 2 density information (*i.e.*, number of sharks/$m^3$) is generally not available due to the types of gear used to collect HMS. For example, data from the McCandless *et al.* (2002) report on shark nursery areas in coastal waters were gathered using a wide variety of sampling techniques including gillnet, longline, and trawl surveys. Of the 15 separate research studies conducted from Massachusetts to Texas that contributed to the McCandless *et al.* (2002) report, only one provided trawl data that might have been used to generate habitat related densities. Additional equipment would have been needed to collect information on water volume sampled in order to estimate densities. The other sampling techniques (gillnet and longline) provide presence/absence or relative abundance through CPUE data (*e.g.* number of sharks/gillnet hour, or number of sharks/100 hooks), but not density data. Additionally, due to the differences in fishing effort, a cross comparison of CPUE among the different studies was not possible. Due to the types of gear used to sample other HMS (longline, rod and reel, handline, harpoon), similar difficulties are encountered for nearly all HMS. However, the information may nonetheless prove to be useful in providing a broad overview of the regional distributions, habitat requirements, and nursery areas for a wide variety of species.

Despite the lack of density information, other valuable information may be derived from studies such as these, including data on growth rates from recaptured tags and habitat utilization information through sampling, telemetry, and tagging efforts. By determining the life stage of a species at capture, through size measurements, additional information may be derived about habitat utilization. Information on where and when HMS are located in a given area, how long they may have been in the area, when migrations occur, and whether they return to the same area in subsequent years may be determined. In combination, all of these data help to determine habitat value and provide a more complete overview of habitat utilization than simple distribution data might suggest.

To the extent possible, these and other types of information from studies of life history dynamics of HMS, reports, and expert opinion are utilized to identify EFH. The sources that were used to identify EFH areas are referenced in the text. When environmental information was available, it was included in the EFH descriptions. The information included temperature, dissolved oxygen, salinity ranges, depths, seasons, and geographic locations. The textual accounts for each species serve as the legal description of EFH, and where environmental characterizations are known they have been included. Maps are provided as supplemental material to facilitate the description and identification of EFH.

Additionally, NMFS conducted a review of new publications related to HMS EFH and has provided a summary of ongoing EFH research efforts. For each of the HMS groups, the major issues involved with identifying and describing EFH are discussed in greater detail below. One of the major considerations for any future adjustments to existing EFH boundaries will be whether the existing areas can be refined. Currently, HMS EFH encompasses the entire U.S. EEZ from the U.S. Atlantic and Gulf coast to the border of Mexico. One of the objectives of the proposed modifications in the future would be to reduce the scope of HMS EFH while still providing the maximum amount of habitat protection. This may require additional research on HMS habitat use which could be related to landings and logbook data to establish definitive relationships between fish presence and what is deemed essential fish habitat.

### 10.3.1 Tunas

In recent years, archival tags and popup satellite tags (PSATs) have been used to successfully monitor ocean-wide movements of giant bluefin tuna as well as other HMS (Block *et al*., 2001, 2005, Lutcavage *et al*., 1999). This technology has greatly expanded the understanding of migratory patterns, reproductive behavior, and habitat use for bluefin tuna as well as other HMS such as blue and white marlin (NMFS, 2004). However, despite these advances, there are considerable gaps in the understanding of habitat requirements as they relate to identifying EFH for tunas. Accurate identification of certain species of tunas can be difficult unless one has sufficient knowledge to check for appropriate distinguishing characteristics. This is particularly true for planktonic larval stages of all tuna species and adult stages of bigeye and blackfin tuna. For example, bigeye tuna may easily be mistaken for blackfin or juvenile yellowfin tuna, and can only be positively distinguished from one another by examining the liver and gill rakers. Reviewers raised concerns regarding presence of a high number of bigeye tuna in the Gulf of Mexico, which are much more rare than blackfin tuna, and which may have been misidentified. The distribution maps for bigeye tuna indicate a significant number of observations in the Gulf of Mexico that may need to be reviewed and reanalyzed for accuracy prior to any modifications being made to existing boundaries (J. Lamkin, pers. comm.).

The Tag A Giant (TAG) program is a collaborative effort among scientists from Stanford University, the Monterey Bay Aquarium, and NMFS which continues to place electronic tags internally and externally on Atlantic bluefin tuna in the North Atlantic to continuously record data. Tag A Giant deployed 201 archival and 37 pop-up satellite archival tags (PSATs) over the past two years, during which time 21 archival tags were recovered, more than a third of which were recaptured east of the 45 degree management line. The program has collected over 13,000 geopositions obtained from 330 bluefin tuna. It is now possible to examine data in relation to year class, season, and spawning grounds visited. Bluefin tuna tagged in the western Atlantic have migrated to both the Mediterranean and Gulf of Mexico spawning grounds. Most migration to spawning grounds in the Gulf of Mexico occurred in the spring months where spawning fish appear to prefer mesoscale cyclonic eddies in the western Gulf. Results indicate that spawning occurs in the Gulf of Mexico primarily during the months of April to June (Block *et al*., 2005).

The results attained from the TAG program detail the movements and behaviors of Atlantic bluefin tuna. These data answer questions about habitat preferences, spawning and feeding grounds, spawning site fidelity, the level of mixing between eastern and western stocks, and how movements are influenced by age class and season. Linking biological data with environmental data can assist in understanding relationships between the bluefin's physical environment and its behavior, movements, abundance and distribution, leading to predictive models enabling researchers to estimate the abundance and distribution of bluefin based on oceanographic features, season, and year class. This information is being collected primarily for ICCATs consideration in updating management strategies and quotas that reflect the bluefin tunas life history in the Atlantic Ocean.

Data collected to date consistently show that spawning occurs primarily after the bluefin reach 10 years of age. Bluefin tuna that are 8.5 years and younger tend to remain near New England in the summer and fall whereas older fish move offshore, many traveling to the east of the 45 degree management zone to the Mid-Atlantic Bight and Flemish Cap. Seasonal patterns are also apparent. Bluefin tuna remained in the coastal and offshore waters of North Carolina and the South Atlantic Bight throughout the winter months, predominately over the shallow continental shelf. In the spring, most fish move north depending on age class, where they remain for the summer before returning to the south in the fall. The movements among regions appear to be dependent on temperature.

In 2002 and 2003, the TAG program expanded tagging efforts to New England, off the coast of Nantucket to spread efforts over a broader area. In 2003, efforts were expanded to the eastern Atlantic off the coast of Ireland where the program has obtained the first data on a new group of fish that have not yet been studied with this technology. Deploying tags off Ireland will also increase the likelihood of documenting the behaviors of fish spawning in the Mediterranean for comparison to those spawning in the Gulf of Mexico. The improved understanding of bluefin movements and behaviors has important applications for management and can serve as the basis for necessary changes in current management strategies.

Beginning in 1997, studies led by the New England Aquarium have implanted pop-up and pop-up archival satellite tags (PSATs) on western Atlantic bluefin tuna. Recent studies involved the implantation of PSATs into 68 Atlantic bluefin tuna in the southern Gulf of Maine and off the coast of North Carolina between July 2002 and January 2003 (Wilson *et al*., In Press). Most of the fish tagged in the southern Gulf of Maine in late summer/early fall remained in that area until late October, consistent with previous studies. Of the 33, 14 remained in northern shelf waters (between Maryland and Nova Scotia), 14 moved south to waters off the coasts of Virginia and North Carolina, and five were in offshore waters of the northwestern Atlantic Ocean. In the spring, six of the 11 fish either stayed in northern waters or moved to that area from Virginia and North Carolina waters, and the other five fish moved offshore into the Mid-Atlantic Ocean. Similar seasonal movement patterns have been shown by individuals tagged in coastal waters off North Carolina. During the winter months, these fish remained either on the Carolina shelf or in offshore waters of the northwestern Atlantic Ocean and moved offshore along the path of the Gulf Stream in spring. By summer, many were in northern shelf waters.

Swimming depth was significantly correlated with location, season, size class, time of day, and moon phase. The greatest depth recorded was 672 m (2,218 ft), and fish experienced temperatures ranging from 3.4° to 28.7°C (38° to 83.7° F). The data show that Atlantic bluefin tuna spend the majority of their time in the top 20 m (66 ft) of the water column, descending occasionally to depths in excess of 500 m (1,650 ft). The vertical behavior of bluefin tuna differed among locations, with shallower swimming depths occurring when the fish were in inshore waters.

A recent study of the diet and trophic position of bluefin tuna in coastal Massachusetts and the Gulf of Maine used stable isotope analyses to investigate feeding habits of bluefin tuna. The results suggest that bluefin tuna feed on a variety of schooling fish, including silver hake, Atlantic mackerel, and Atlantic herring (Estrada *et al*., 2005). Juvenile bluefin tuna appear to have isotopic nitrogen signatures similar to those of suspension feeders, suggesting that nektonic crustaceans or zooplankton may contribute significantly to the diet of juvenile bluefin tuna (Estrada *et al*., 2005).

Combined, all of the studies and data are providing a higher resolution of potential spawning, feeding, and other important habitat areas for bluefin tuna. Given that there is a considerable and growing body of science on bluefin tuna, it may be one of the species for which NMFS may consider modifying the boundaries in the future. For example, although bluefin tuna spawning habitat has been described as encompassing nearly all of the Gulf of Mexico by Block *et al.* (2005), adult bluefin tuna EFH is limited to a smaller portion of the western Gulf of Mexico, and the adult EFH areas may not necessarily correspond to areas considered most likely as bluefin tuna spawning habitat (Block *et. al*., 2005). NMFS may need to reconsider these boundaries to account for new information being developed through PSAT technology and other means. Similarly, some of the highest individual counts of adult bluefin tuna (per 100 $nm^2$) have been observed off of North Carolina, yet these areas are not currently included as adult bluefin tuna EFH. Furthermore, the SEFSC is currently conducting a comprehensive review of larval distributions from 1984 to the present from ichthyoplankton collections in the northern Gulf of Mexico. Once larval movement due to local currents is accounted for these data may prove useful in the review of potential modification of EFH boundaries for other tunas as well.

In addition, the distribution and abundance of other tuna species (*i.e.*, albacore, bigeye, skipjack, and yellowfin tunas) have been attained through fishery data combined with other information, such as remote sensing data. Many of these species have similar bioecological responses (*i.e.*, many species are specialized in high energy foraging strategies of sustained fast swimming, searching over large areas (Sharp and Dizon, 1978; Au 1986)) and therefore, have similar physiological responses to oceanographic conditions (Ramos *et al.*, 1996). Skipjack and albacore are highly migratory tunas with active thermic exchanges with the environment (Sharp and Dizon, 1978). Consequently, their distribution is influenced by changes in marine features at different spatial and temporal scales (Ramos *et al.*, 1996). For instance, both species are visual predators and are unable to efficiently capture small pelagic prey in colder turbid upwelled waters (Ramos *et al.*, 1996). Therefore, over small spatial and temporal scales, the most suitable areas based on the physiology and feeding strategies for these two species are the boundary between warm and cold water where food and other abiotic features are physiologically optimal (Ramos *et al.*, 1996). Over longer temporal and spatial scales, such as migration pathways, sea surface temperatures generated by the Intertropical Zone of Convergence play an important role (Ramos *et al.*, 1996). In addition, concentration of food and water quality (*i.e.*, higher temperature, high concentration of oxygen and low level of turbidity) lead to the concentration of skipjack and albacore in their respective fishing grounds (the northeast Atlantic for albacore and Senegal waters 10° North to the Canarian area 28° North for skipjack; Ramos *et al.*, 1996).

Yellowfin tuna is a cosmopolitan species mainly distributed in the tropical and subtropical oceanic water of the three oceans. In the Atlantic Ocean, tagging and catch-at-size data analyses have shown that yellowfin tuna move at different scales in the whole tropical Atlantic Ocean (Maury *et al.*, 2001). Environmental conditions are probably the main causes driving migration phenomena and massive population movements (Mendelssohn and Roy, 1986; Lehodey *et al.*, 1997). Recent work by Maury *et al.* (2001) showed that on a large spatiotemporal scale (the whole ocean), low salinity was a good predictor of yellowfin habitat. Juveniles were mainly distributed in low-salinity waters (< 35 parts per thousand) whereas adults extend their range to water of 36 parts per thousand. This can be due to two reasons; for young tuna (<3 yrs old), salinity could be a marker of favorable feeding areas, such as low salinity levels in the Gulf of Guinea where freshwater runoff contains high levels of nutrients. Secondly, the metabolic cost of osmotic regulation could prevent young yellowfin tuna from reaching high salinity levels (Maury *et al.*, 2001). After breeding in the Gulf of Guinea, adults, however, disperse in an east-west fashion related to salinity and warmwater seasonal oscillations (Maury *et al.*, 2001). On a mesoscale (1000 km), north-south seasonal movements are clearly related to warmwater seasonal oscillations. Such seasonal migrations should be due to surface water temperatures where adults preferentially stay in zones of water temperature between 26 to 29° C and where deeper waters are warmer than 15° C. Juveniles stay in surface waters where the sea surface temperature is 27° C or higher (Maury *et al.*, 2001). Finally, at the local level (100 km), yellowfin tuna seem to be influenced by both local hydrological and biological features, such as tuna prey distribution and the spatial stability of water masses. For instance, the presence of floating objects, and the existence of small-scale hydrological events like local fronts or convergences can all be responsible for yellowfin concentrations (Bakun 1996).

Lastly, bigeye tuna are large epi-and mesopelagic fish that are found in surface waters ranging in temperatures from 13 to 29°C (Collette and Nauen, 1983). However major concentrations coincide with the temperature range of the permanent thermocline, between 17 and 22°C. Therefore, temperature and thermocline depth appear to be important environmental factors governing the vertical and horizontal distribution of bigeye tuna (Alvarado Bremer *et al.*, 1998). Such oceanographic features can have important implications for fisheries management; for instance, water temperature can prevent movement of fish between ocean basins, influencing stock structure (Alvarado Bremer *et al.*, 1998). On the basis of fisheries data, geographic distribution, tagging results, and the location of spawning and nursery areas, a single population is assumed to inhabit the Atlantic Ocean (ICCAT, 1997). For management purposes, both the Indian Ocean and Pacific populations are considered to be single units. Recent molecular work has indicated that the Atlantic and Indo-Pacific populations are two regions and genetically distinct (Alvarado Bremer *et al.*, 1998), confirming a single spawning stock of bigeye in the Atlantic and a single spawning stock in the Indo-Pacific. In the Atlantic Ocean, juvenile bigeye tuna have been observed only in the Gulf of Guinea (ICCAT, 1997). Tagging studies indicate trans-Atlantic movements of bigeye from the Gulf of Guinea to the central Atlantic north of Brazil, and northerly migration from the Gulf of Guinea to the eastern Atlantic (ICCAT, 1997).

As with most other HMS, salinity and temperature appear to be primary factors influencing the distribution of tunas and may ultimately determine EFH. The challenge remains in identifying specific EFH areas based solely on environmental parameters; in most cases, distribution data may still provide the best indication of habitat preference of these different species. For additional EFH information on these tuna species, see Appendix B.

### 10.3.2 Swordfish

Based on a review of the swordfish maps and current distribution points, reviewers commented that additional research may be needed to validate the current size ranges for juvenile and adult swordfish. In addition, further analysis may be needed to determine whether certain areas have been used consistently over time. Analyzing spawning areas that are consistently used over a number of years may provide a better understanding of swordfish EFH. Several discrepancies in distribution points and EFH areas delineated in 1999 were noted, including a high concentration of observed occurrences of juvenile swordfish in an area north of Long Island Sound that was not defined as EFH in 1999. NMFS may consider modifying swordfish EFH boundaries in the future, particularly in the Long Island Sound area, and conversely, areas currently delineated as EFH that have few if any observed occurrences in the data sets being analyzed.

Pinpointing definitive EFH for spawning swordfish is difficult because research indicates that presence of larvae may not always be a sign that spawning occurred in the vicinity of the collection. Adult swordfish, and HMS in general, may move significant distances during spawning, and eggs and larvae may be transported substantial distances by currents as well. Govoni *et. al*. (2000) determined that since a swordfish egg's incubation period is 3 days at 24°C, with an additional three or four days for posthatch growth, along with an average velocity of the Gulf Stream of 1.5 m/s (Olson *et al*., 1994), larvae of four to five mm SL in the Atlantic could have been transported from as far away as 900 km. A similar trajectory was projected for small larvae of bluefin tuna (McGowan and Richards, 1989).

### 10.3.3 Billfish

Similar to other HMS, billfish EFH is not easily identified due to a lack of association with readily identifiable features such as benthic habitat or other underwater structures. Billfish tend to aggregate in areas with dynamic features such as temperature gradients, ocean fronts or currents resulting from interactions between a number of factors. Many of these water column features are dynamic, making detailed delineation of billfish spawning, nursery, and feeding habitats difficult. Adding to the difficulty of designating billfish EFH is that most of the literature on billfish larvae and juveniles mention them as incidental catches in studies that were directed at other species or that were concerned with characterizing ichthyofaunal or plankton communities as a whole (NMFS, 2004).

Comments received during the Draft FMP indicate that *Sargassum* may be an important component of billfish habitat, particularly during early life stages, and that NMFS should investigate this further. If NMFS determines that EFH for some or all HMS needs to be modified, then that would be addressed in a subsequent rulemaking, at which point *Sargassum* could also be considered as potential EFH. With regard to harvest, the final South Atlantic Fishery Management Council FMP for Pelagic *Sargassum* Habitat in the South Atlantic Region was approved in 2003 and implemented strict restrictions on commercial harvest of *Sargassum*. The approved plan includes strong limitations on future commercial harvest. Restrictions include prohibition of harvest south of the NC/SC state boundary, a total allowable catch (TAC) of 5,000 pounds wet weight per year, limiting harvest to November through June to protect turtles, requiring observers onboard any vessel harvesting *Sargassum*, prohibiting harvest within 100 miles of shore, and gear specifications.

One of the key issues associated with delineating billfish EFH is the difficulty of accurately identifying billfish larvae. However, new molecular techniques are being developed that show promise (Luthy *et al.*, 2005). Without accurate identification of larvae, it is difficult to draw conclusions on spawning areas, habitat associations, and requirements. Billfish larvae may be swept miles from actual spawning grounds before they are sampled. Thus, even though peak spawning periods for blue and white marlin are known to occur from May to June, there are significant issues related to positive identification of larvae that must be overcome to verify spawning locations. Research off Punta Cana, Dominican Republic, is one of the few instances on record where spawning by blue and white marlin was confirmed through simultaneous collections of both larvae and tracking of spawning adults using pop-up satellite tags (Prince *et al*., 2005).

Collaborative studies conducted by NMFS and University of Miami scientists using PSATs while simultaneously conducting adult and larval sampling off the Dominican Republic in the spring of 2003 have revealed important information concerning white and blue marlin spawning locations as well as horizontal and vertical movements. Co-occurrence of larval blue marlin and white marlin in samples suggest that the two species share a spawning location in the vicinity of Punta Cana, Dominican Republic. Adult white and blue marlin caught in the area appear to have similar vertical and horizontal movement patterns in terms of time at depth, time at temperature, average horizontal displacement per day, net horizontal displacement, and directional dispersion (compass heading).

Displacements of seven white marlins tagged with PSATs ranged from 31.7 to 267.7 nm (58.7 to 495.8 km), while displacement of one blue marlin was 219.3 nm (406.2 km). In general, all marlin spent a high proportion of the monitoring time in the upper 25 m (82 ft) and at temperatures at or above 28°C (82°F). Minimum and maximum depth and temperatures monitored show that on most days marlin visited depths of 100 m (330 ft) or more, but generally stayed at these depths less that 10 percent of the time. Minimum temperatures ranged from 16.8° to 20.6°C (62.2° to 69°F), while maximum temperatures ranged from 28.2° to 30.0°C (82.7° to 86°F). Additional research in other areas of the Gulf of Mexico and U.S. Atlantic coast would help improve understanding and delineation of billfish EFH (Prince *et al*., 2005).

The characterization of adult movements and larval distribution in a potentially important spawning area is paramount for establishing improved management and rebuilding strategies for depressed Atlantic billfish stocks. However, more information on the distribution of reproduction and nursery areas and on adult movement patterns is needed to help managers make more informed decisions regarding conservation of the resource.

Scientists at VIMS have been involved with electronic tagging of blue and white marlin since 1999, some of which has been conducted in conjunction with the NOAA SEFSC. More recently, VIMS has deployed over 60 PSAT on white marlin during the past three years from both recreational sport boats and a commercial pelagic longline vessel to determine post-release survival (Prince *et. al*., 2005). In addition to this work, VIMS is also in the process of updating information regarding habitat preferences and vertical movements of white marlin using environmental data obtained from the PSAT work as well as other environmental data. Most of the work at VIMS, however, remains focused on the interactions of billfish with the various fisheries.

There are a few considerations and limitations of these data that reviewers should keep in mind as they look at EFH determinations (E. Prince pers. comm.). Inaccurate EFH maps for billfish can be created because of boat side misidentification of billfish, sexual dimorphism, and criteria used in defining groups can result in both under and overestimates and ultimately impact the accuracy of the maps. The CTS is the main source of data for most of the billfish EFH maps and it obtains size information of tagged, released, and recovered fish from constituents based mostly on boatside estimates of fish size. This approach introduces a significant amount of error.

In addition, most size estimates are made when the fish is underwater and the reflective index biases these estimates upwards by as much as 30 percent (E. Prince, pers. comm.).

Billfish are sexually dimorphic (size difference between sexes), with this being most severe for blue marlin. The maps provided in this amendment do not include a consideration of sexually dimorphic differences in size and thus the characterization of juvenile size limits on the maps may be quite different for male and female marlin. The tagging data only infrequently have recoveries that include gender, so separating the maps into males and females would not likely be practical, even though it would probably be more accurate (E. Prince, pers. comm.). Furthermore, the accuracy of the maps for defining juvenile marlin based on size could vary depending on the criteria used in this definition.

Data from the CTS, which account for a significant portion of the overall data points for billfish, were historically recorded only to the nearest degree, and did not include minutes or seconds. As a result, reviewers will notice that certain data points that reflect a high number of observations are lined up along major lines of latitude or longitude, both in the Gulf of Mexico and the Atlantic coast. This may be an artifact resulting from the way in which tagging locations were recorded rather than the true points of highest observed occurrence. Depending on reviewer comments received on this aspect of the data, NMFS may consider removing these data points during future considerations of EFH boundaries. Therefore, as a result of technical reviewer comments, several changes to EFH boundaries may be considered in the future. These include, but are not limited to, potential modifications of EFH boundaries for blue and white marlin for the reasons stated above (E. Prince, pers. comm.).

### 10.3.4 Sharks

Significant progress has been made in recent years in identifying habitat requirements and EFH for sharks. The proximity of nursery and pupping grounds to coastal areas has provided research opportunities that do not exist for other HMS that spawn much farther from shore. Sampling has increased in a number of different locations under the auspices of several different programs (Cooperative Atlantic States Shark Pupping and Nursery Survey (COASTSPAN), Cooperative Gulf of Mexico States Shark Pupping and Nursery Survey (GULFSPAN), and others). Considerable research has been devoted to determining the size ranges of the different shark life stages (neonate, juvenile, and adult). The size ranges for each species' lifestage used in this review as well as size ranges used in the 1999 FMP are presented in Table B.1, Appendix B. The table reflects new information and updates to the 1999 FMP size ranges. Based on these size ranges, the distribution data have been mapped for each species and life stage.

The 1999 FMP highlighted the importance of coastal nursery and pupping areas in maintaining viable shark populations. It also identified continued delineation of shark nurseries as a research priority. As a result, several studies and cooperative research projects aimed at improving NMFS' understanding of EFH and shark reproductive habitat requirements have been undertaken since the 1999 HMS FMP.

In 2002, the COASTPAN project initiated a synthesis document of information on shark nursery grounds along the U.S. Atlantic east coast and the Gulf of Mexico. Researchers from universities and state and Federal agencies in twelve different states from Massachusetts to Texas contributed information to the preliminary report (McCandless *et al*., 2002; McCandless et. al., 2005). This information was included in updates to EFH for several shark species in Amendment 1 to the FMP, and is being incorporated into the data for the current review. Results for the 2003 sampling year were compiled and synthesized, and the final report is currently under review. Participants in the 2003 COASTSPAN survey included the North Carolina Division of Marine Fisheries, the South Carolina Department of Natural Resources, Coastal Carolina University, the University of Georgia's Marine Extension Service and the University of Florida's Program for Shark Research. Researchers from the National Marine Fisheries Service's Apex Predators Program and the University of Rhode Island conducted the survey in Delaware Bay. A total of 3,698 sharks were sampled in the 2003 COASTSPAN survey. Juvenile sharks sampled, tagged and released during the survey were the Atlantic sharpnose, blacknose, blacktip, bonnethead, bull, dusky, finetooth, nurse, sandbar, sand tiger, scalloped hammerhead, silky, spinner, and tiger sharks, and also the smooth and spiny dogfish. Environmental parameters for each sampling location were also measured to indicate habitat preferences. There were a number of tag recaptures returned by fishery biologists and commercial and recreational fisherman in 2003 from sharks that were tagged by COASTSPAN cooperators in previous years.

A final synthesis document entitled "Shark Nursery Grounds of the Gulf of Mexico and the East Coast Waters of the United States" is currently under review for publication by the American Fisheries Society (AFS). It is a compilation of 20 individual papers documenting shark distributions in coastal habitats similar to the project described above, but expanded to include several new studies. This document provides valuable information for the possible modification or inclusion of additional shark EFH.

In 2003, NMFS initiated the GULFSPAN Survey to expand upon the Atlantic COASTSPAN Survey. States involved in the program during 2004, the second year of the program, include Florida, Mississippi, Alabama, and Louisiana. Sharks sampled, tagged, and released during the surveys included the Atlantic sharpnose, blacknose, blacktip, bonnethead, bull, finetooth, great hammerhead, sandbar, scalloped hammerhead, and spinner sharks. In addition, environmental parameters were measured qualitatively. The most abundant sharks included the Atlantic sharpnose, blacktip, and bull sharks. Results of this study are under review in the AFS synthesis document as well.

In Florida waters, most species captured were juveniles and young-of-the-year. Among sharks for all areas combined, the Atlantic sharpnose shark, a member of the small coastal shark (SCS) management group, was the most abundant shark captured, while the blacktip shark was the most abundant species captured in the LCS management group. The bonnethead shark was the second most abundant species captured in the SCS group and overall was the third most encountered species. The remaining species commonly captured in decreasing order of abundance were the finetooth, spinner, scalloped hammerhead, blacknose, and sandbar sharks. Other species infrequently caught were bull shark, great hammerhead shark, and the Florida smoothhound.

In Mississippi and Alabama waters, 75 percent of the sharks captured were immature. The blacktip shark was the most abundant species caught, followed by the Atlantic sharpnose, finetooth, and bull sharks.  In Louisiana in the 2004 sampling season, most species captured were juveniles.  The blacktip shark was the most abundant species caught, followed by the bull shark.  A single adult specimen of the finetooth shark in addition to young-of-the-year Atlantic sharpnose shark was also collected in 2004.

New information on habitat preferences is also emerging from this study.  Juvenile bonnethead sharks appear to prefer habitat dominated by seagrass (in northwest Florida) or mangroves (Louisiana), although these areas have not yet been identified as EFH.  In areas where neither of these habitat types is available, juvenile bonnetheads are in very low numbers or absent (*i.e.* Mississippi Sound).  Adult bonnethead sharks, however, are found in diverse habitats ranging from areas with a mud or sand bottom to areas dominated by seagrass.  Evidence indicates bull sharks are found among the most diverse environmental conditions with salinities ranging from 15 ppt (in Louisiana and Mississippi) to 33 ppt (in northwest Florida), and over all habitat types.  Within the Gulf of Mexico, most juvenile sandbar sharks are still predominately caught in the northwest portion while blacktip, finetooth, and Atlantic sharpnose sharks are found throughout all areas.  Although bull sharks can be found over a variety of habitats, the areas of highest abundance are those adjacent to freshwater inflow.

Obtaining information regarding trophic relationships and feeding habits of sharks, also critical to understanding essential fish habitat, is another goal of the GULFSPAN program.  A quantitative examination of feeding ecology from different areas can assist in understanding how juvenile sharks use nursery habitats, and which habitats are more valuable as nursery areas than others.

Mote Marine Laboratory's CSR program is focusing on identifying and understanding shark nursery areas of the U.S. Gulf of Mexico and southeast Atlantic coasts.  Through tagging studies, this program aims to characterize these nursery areas, obtain estimates of juvenile shark relative abundance, distribution, and growth rates, and reveal the movement patterns of these sharks.  As of fall 2004, the CSR has collected data on 20,732 sharks of 16 species that utilize these coastal waters as pupping and nursery areas.  More than half of the captured sharks (12,241) comprise neonate, young-of-the-year (YOY) or older juvenile sharks.  The studies found that most pupping activity in the region occurs in the late spring and early summer, and the neonate and YOY animals inhabit the primary nurseries throughout the summer and into the fall.  Typically, declining water temperatures in the fall are associated with the southward movement of sharks from these natal waters to warmer and in some cases offshore, winter nurseries.  Tag returns of Year-1 sharks have demonstrated travel distances to winter nursery areas of at least 500 km (311 mi).  Tag return data have further demonstrated annual cycles of philopatric behavior whereby juveniles of both large and small coastal species migrate back to their natal nurseries in spring and summer (Hueter and Tyminski, in review).

In the 1999 HMS FMP, the smallest size class of sharks was described as "neonates and early juveniles."  This definition has been modified to include primarily neonates and only small young-of-the-year sharks in order to better define and identify nursery areas.  The total length cutoff for this size class is determined as the maximum embryo size in term females plus 10 percent.  This criteria was used because it helps to eliminate some of the small one-year-old sharks that fall within the young-of the-year size range, making it easier to identify primary nursery areas (where pupping occurs and young-of-the-year are present). This criteria can also be more easily applied to other species given the lack of published data on growth rates for many species, especially during the first year. This modification should also better represent the habitat shift between primary nursery areas and secondary nursery areas (occupied by age 1+ sharks), although many species do overlap habitat use between these two size classes.

The middle size class designated in the 1999 HMS FMP, "late juveniles and subadults," has been renamed "juveniles". This size class includes all immature sharks from young juveniles to older or late juveniles. Some overlap between the "neonate and early juveniles" and the "adult" EFH areas may occur, depending on the species, due to the return to primary nursery areas by many juveniles, age 1+, and the developing conformity to adult migration patterns by late juveniles. As in the 1999 HMS FMP, the largest size class, "adults," still consists of mature sharks based on the size at first maturity for females of the species. Changes to the size range of the adult size class for some species have been made based on new information on the size at first maturity for females of those particular species.

As a result of technical reviewer comments, several changes to EFH boundaries may be considered in the future. These include, but are not limited to, potential modification of EFH boundaries for basking, hammerhead, white, bull, Caribbean reef, lemon, spinner, tiger, Atlantic sharpnose, blacknose, longfin mako, shortfin mako, oceanic whitetip, and thresher sharks (J. Castro and J. Carlson, pers. comm.). In summary, based on the preliminary examination of new information acquired since the original EFH identifications in 1999, and on comments from technical reviewers, modifications to some of the existing EFH descriptions and boundaries may be warranted. Any proposed modifications to existing boundaries, as well as consideration of any new HAPC areas, would be addressed in a subsequent document.

## 10.4 Threats to Essential Fish Habitat

### 10.4.1 Regulatory Requirements and Fishing Activities That May Affect EFH

*Regulatory Requirement*

The EFH regulations and the Magnuson-Stevens Act require the Regional Fishery Management Councils and NMFS, on behalf of the Secretary of Commerce, to minimize adverse effects on EFH from fishing activities to the extent practicable. Although NMFS is not taking any action to minimize fishing impacts in this FMP, NMFS may propose actions to minimize adverse effects from fishing in a subsequent rulemaking. Adverse effects from fishing may include physical, chemical, or biological alterations of the substrate, and loss of or injury to benthic organisms, prey species and their habitat, and other components of the ecosystem. Based on an assessment of the potential adverse effects of all fishing equipment types used within an area identified as EFH, NMFS must act if there is evidence that a fishing practice is having an a more than minimal and not temporary adverse effect on EFH.

The Magnuson-Stevens Act states that each FMP must contain an evaluation of the potential adverse effects of fishing on EFH designated under the FMP, including effects of each fishing activity regulated under the FMP or other Federal FMPs. This evaluation should consider the effects of each fishing activity on each type of habitat found within EFH. FMPs must describe each fishing activity, review and discuss all available relevant information (such as information regarding the intensity, extent, and frequency of any adverse effect on EFH; the type of habitat within EFH that may be affected adversely; and the habitat functions that may be disturbed), and provide conclusions regarding whether and how each fishing activity adversely affect EFH. The evaluation should also consider the cumulative effects of multiple fishing activities on EFH. The evaluation should list any past management actions that minimize potential adverse effects on EFH and describe the benefits of those actions to EFH. The evaluation should give special attention to adverse effects on habitat areas of particular concern and should identify for possible designation as habitat areas of particular concern any EFH that is particularly vulnerable to fishing activities. Additionally, the evaluation should consider the establishment of research closure areas or other measures to evaluate the impacts of fishing activities on EFH. In

This section includes an assessment of fishing gears and practices that are used in the Highly Migratory Species (HMS) fisheries to describe impacts to EFH and conservation recommendations or mitigation measures, as necessary.

### 10.4.2 Potential Impacts of HMS Fishing Activities on HMS and non-HMS EFH

Adverse effects from fishing may include physical, chemical, or biological alterations of the substrate, and loss or injury to benthic organisms, prey species and their habitat, and other components of the ecosystem. However, the degree to which fishing will impact EFH also depends on the substrate that makes up the EFH; certain substrates, such as complex coral reef habitat, will be more susceptible to damage due to fishing gears than will mud and/sand substrates or even the water column because of the extended time for habitat recovery. Below is a brief overview of HMS EFH followed by an assessment of HMS fishing gear impacts on both HMS EFH and non-HMS EFH.

#### *10.4.2.1 HMS EFH Overview*

From the broadest perspective, fish habitat is the geographic area where the species occurs at any time during its life. Habitat can be described in terms of location, physical, chemical and biological characteristics, and time. Ecologically, habitat includes structure or substrate that focuses distribution (*e.g.*, coral reefs, topographic highs, areas of upwelling, frontal boundaries, particular sediment types, or submerged aquatic vegetation) and other characteristics that are less distinct but are still crucial to the species' continued use of the habitat (*e.g.*, turbidity zones, salinity, temperature or oxygen gradients) (NMFS, 1999a).

Species use habitat for spawning, breeding, migration, feeding and growth, and for shelter from predation to increase survival. Spatially, habitat use may shift over time due to changes in life history stage, abundance of the species, competition from other species, and environmental variability in time and space. Species distributions and habitat use can be altered by habitat change and degradation resulting from human activities and impacts, or other factors. The type of habitat available, its attributes, and its function are important to species productivity, diversity and survival (NMFS, 1999a).

The role of habitat in supporting the productivity of organisms has been well documented in the ecological literature, and the linkage between habitat availability and fishery productivity has been examined for several fishery species. Because habitat is an essential element for sustaining the production of a species, the goals of FMPs must include maintaining suitable habitat for the considered species (NMFS, 1999a). However, the quantitative relationships between fishery production and habitat are very complex, and no reliable models currently exist. Accordingly, the degree to which habitat alterations have affected fishery production is unknown. In one of the few studies that have been able to investigate habitat fishery productivity dynamics, Turner and Boesch (1987) examined the relationship between the extent of wetland habitats in the Gulf of Mexico and the yield of fishery species dependent on coastal bays and estuaries. They found reduced fishery stock production following wetland losses, and stock gains following increases in the areal extent of wetlands. While most of the studies examined shrimp or menhaden productivity, other fisheries show varying degrees of dependence on particular habitats and likely follow similar trends. Accordingly, a significant threat facing fishery production is the loss of habitat due to natural and/or anthropogenic causes (NMFS, 1999a).

HMS utilizes diverse habitats that have been identified as essential to various life stages. Some billfish use both offshore and inshore habitats (*e.g.*, sailfish spawning in coastal habitats off southeastern Florida) (NMFS, 1999b). Many of the shark species use bays, estuaries and shallow coastal areas as crucial pupping and nursery areas (NMFS, 1999a). In most cases the neonates (newborn) and juveniles occupy different habitats than the adults. For example, neonate blacktip sharks are found in very shallow waters, juvenile blacktip sharks inhabit a variety of coastal habitats, and adults are found in both coastal and oceanic waters (Castro, 1993). There is little published information correlating life stages and migratory movements, and there are few descriptions correlating shark habitat use to physical habitat characteristics (but see McCandless *et al*., 2002). Parameters that could describe shark habitat are temperature, salinity, depth, dissolved oxygen, light levels, substrate, and food availability, although there are probably other important factors or requirements that remain unknown. Unlike certain reef or benthic fishes, it is difficult to draw definitive links between presence of a given species of HMS and characteristics of marine substrate (*i.e.,* sand, SAV, cobble) or types or marine ecosystems (*i.e.* mangroves, seagrass beds, and coral reefs). For example, Amendment 1 to the HMS FMP updated the EFH for juvenile (37-221 cm TL) nurse sharks as:

> *Shallow waters from the shoreline to the 25 m isobath off the east coast of Florida from south of Cumberland Island, GA (30.5 N) to the Dry Tortugas; also shallow waters from Charlotte Harbor, FL (26 N) to the north end of Tampa Bay, FL (28 N); also off Puerto Rico, shallow coastal waters out to the 25 m isobath from 66.5 W to the southwest tip of the island.*

In only a few cases for HMS are there particular bottom types that can be attributed to influencing the choice of habitats, *e.g.*, the bonnethead shark juvenile stages are associated with seagrass (Section 10.3.4). More typically, pelagic species (or life stages), such as the pelagic sharks, tuna and swordfish, are most often associated with areas of convergence or oceanographic fronts such those found over submarine canyons, the edge of the continental shelf, or the boundary currents (edge) of the Gulf Stream. Some species aggregate at frontal boundaries in the ocean, with floating objects (such as *Sargassum* for swordfish and billfish), or at bottom features such as the continental shelf break, submarine canyons, and even shipwrecks (NMFS, 1999b).

Occasionally, the aggregations form where a front or boundary lies above one of these bottom features. These aggregations are most likely associated with prime feeding grounds and, as such, these areas are identified as EFH. Although there is no substrate or hard structure in the traditional sense, these water column habitats can be characterized by their physical, chemical and biological parameters (NMFS, 1999a). The water column can be defined by a horizontal and vertical component. Horizontally, salinity gradients strongly influence the distribution of biota. Horizontal gradients of nutrients, decreasing seaward, affect primarily the distribution of phytoplankton and, secondarily, the organisms that depend on this primary productivity. Vertically, the water column may be stratified by salinity, oxygen content, and nutrients (SAFMC, 1998). The water column is especially important to larval transport. While the water column is relatively difficult to precisely define in terms of habitat characteristics, it is no less important since it is the medium of transport for nutrients and migrating organisms between estuarine, inshore, and offshore waters (SAFMC, 1998).

#### *10.4.2.2 Impact of HMS Federally regulated gear on HMS and non-HMS EFH*

Generally, HMS is associated with hydrographic structures of the water column, e.g., convergence zones or boundary areas between different currents. Because of the magnitude of water column structures and the processes that create them, there is little effect expected from the HMS fishing activities undertaken to pursue these animals. There are, however, some impacts that can be manifest on the biological or chemical characteristics of some of these sites, e.g., excess dead discards causing increased biological oxygen demand (BOD) (NMFS, 1999a). For fisheries in which gear does contact the substrate, there is certainly the potential for disturbance of the habitat. An analysis of the effects and the impacts they may have on the associated fisheries is complicated by the fact that scientists are not certain of the particular characteristics that draw the fish to these habitats (NMFS, 1999a).

Impacts of HMS fishing gears and practices were analyzed by examining published literature and anecdotal evidence of potential impacts or comparable impacts from other fisheries. An assessment was made based on this literature review of the gears and practices employed in HMS fisheries to determine whether these fishing activities cause adverse impacts on HMS EFH and non-HMS EFH ( Table 10.1). The degree of impact from fishing activities depends in large part on the susceptibility of particular habitats to damage. EFH varies in its vulnerability to disturbance, as well as its rate of recovery. A variety of gears are used to target HMS species. Fishing gears that are only associated with the water column are expected to have no impact on the benthic environment and minimal to no impact to the pelagic environment (Table 10.1). However, fishing gears that interact with the benthic environment can have an impact, depending on the composition of the benthos. For example, due to its simple composition, sediments (*i.e.*, sand, mud) are impacted to a lesser degree than a complex coral reef under similar treatments. Coral reefs are composed of numerous structures forming species, with many that grow vertically into the water column (*e.g.*, sponges, stony corals, gorgonians) and create a greater surface area than sediments (Barnette, 2001). The vertical profile and increased surface area of coral reefs allow gear to easily become snagged or entangled, thus providing more opportunities for habitat to be impacted from fishing as compared to sediments (Barnette, 2001). While NMFS and the Councils have jurisdiction only in Federal waters of the exclusive economic zone under the Magnuson-Stevens Act, estuarine and nearshore waters are critical to various life stages of many organisms; numerous managed species utilize estuaries and bays for reproduction or during juvenile development (Barnette, 2001).

Since most HMS are pelagic species that are predominantly found in the mid- to upper water column of the neritic environments, most HMS gears are fished in the water column, as opposed to bottom tending gears such as trawls and dredges that are used to target bottom-dwelling or benthic species. The exception is bottom longline gear, which could potentially have adverse effects on HMS and non-HMS EFH (Table 10.1). Bottom longlines principally target large coastal sharks in the EEZ between Texas and Maine. Typically they are placed in sandy and muddy bottom habitats where expected impacts would be minimal to low (Barnette, 2001). The 1999 NMFS EFH Workshop categorized the impact of bottom longline gear on mud, sand, and hard-bottom as low (Barnett, 2001). Bottom longline may have some negative impact if gear is set in more complex habitats, such as hardbottom or coral reefs in the Caribbean or areas with gorgonians, or soft corals and sponges in the Gulf of Mexico (Barnette, 2001, NREFHSC, 2002; Morgan and Chuenpagdee, 2003). Bottom longline set with cable groundline or heavy monofilament with weights can damage hard or soft corals and potentially become entangled in coral reefs upon retrieval, resulting in coral breakage due to line entanglement. However, the extent to which bottom longline gear is fished in areas with coral reef habitat has not been determined. This gear type is similar to that employed in fisheries targeting reef fish in the Gulf of Mexico and South Atlantic regions.

One of the only studies available regarding the impact of bottom longline gears is from submersible observations of halibut longline gear off the southeast coast of Alaska (NPFMC, 1992). For example, halibut longline gear generally consists of 5/16- inch nylon or polyester rope as groundline with 3-4 foot long twine gangions (branch lines) spaced at 3-18 feet. To the degree that Caribbean, Gulf of Mexico, and Atlantic longlines differ in construction from the Alaska longlines, potential damage will also differ. Unlike Alaskan fisheries, Atlantic longlines can use cable or heavy monofilament with weights for groundline. In addition, the Alaskan marine ecosystem is much different from that in the Caribbean, Gulf of Mexico, and Atlantic Ocean in that it does not have tropical coral reefs. However, the Alaskan marine ecosystem does have sponges and other vertical relief, which makes it somewhat analogous to the Gulf of Mexico conditions, and therefore, may give some insight to the type of damage bottom longlines can cause. For instance, the shearing action of the longlines under tension would have similar results on sensitive vertical structure (Barnette, 2001). However, in instances where target species are attracted to the habitat due to hydrographic characteristics (*i.e.*, up-welling, convergences, etc.), the scale of impact from careless placement of bottom longlines is probably not of sufficient magnitude to affect the characteristics of the habitat. Bottom longline gear may have a detrimental effect on non-HMS EFH if it is placed in coral reefs, hard bottom or SAV habitats. However, bottom longline gear in HMS fisheries is primarily used in sandy and/or muddy habitats where it is expected to have minimal to low impacts.

Other HMS gears that contact the bottom are tuna traps and anchored gillnets. However, these are either so few in number that their expected impact is low (*i.e.*, there were only two tuna trap permit holders in 2004), or they are usually set in sand or mud areas where there is minimal to low impact on the benthic substrate, as is the case with anchored gillnets. In some cases, rod and reel or handlines (*i.e.*, "vertical gear") are used in areas with coral reefs and/or hardbottom, and impacts from these gears may include entanglement and minor degradation of benthic species from line abrasion and the use of weights (sinkers). Schleyer and Tomalin (2000) noted that discarded or lost fishing line appeared to entangle readily on branching and digitate corals and was accompanied by progressive algal growth. This subsequent fouling eventually overgrows and kills the coral, becoming an amorphous lump once accreted by coralline algae (Schleyer and Tomalin, 2000). Lines entangled among fragile coral may break delicate gorgonians and similar species. Due to the widespread use of weights over coral reef or hardbottom habitat and the concentration of effort over these habitat areas from recreational and commercial fishermen, the cumulative effect may lead to significant impacts resulting from the use of these gear types (Barnette, 2001).

Since most of HMS gears are fished in the water column, the impacts on EFH are generally considered negligible, minimal, or low. In other words, HMS gears do not affect the physical characteristics that define HMS EFH such as salinity, temperature, dissolved oxygen, and depth. Similarly, most HMS gears are not expected to impact other fisheries' EFH, with the possible exception of bottom longline, depending on where it is fished. Each of the HMS gears, the means by which they are fished, and their potential impacts on HMS and other species' EFH are described in the following section. However, no new management measures, and therefore no regulations, are proposed in this document. Rather, this document serves as an evaluation of fishing impacts on EFH and could help identify areas appropriate for HAPC and/or time/area closures in the future. NMFS is, however, currently exploring potential alternatives that could minimize the impacts of bottom longline, especially in areas of with hardbottom, hard and soft coral structure and sponges. For instance, bottom longlines used in the Caribbean reef fish fishery are typically 700 feet long. Potentially shorter longlines will likely do less habitat damage than longer longlines (Barnette, 2001). In addition, avoiding or reducing bottom longline effort on corals, gorgonians, or sponge habitat will minimize risk of habitat damage to these areas. The two following conservation recommendations are meant as precautionary measures, and should be used whenever possible in the event that impacts to coral reef or other hard bottom EFH habitat may be occurring but unverified: (1) fishers should take appropriate measures to identify bottom obstructions and avoid setting gear in areas where it may become entangled; and (2) if gear is lost, diligent efforts should be undertaken to recover the lost gear.

The Gulf of Mexico and Caribbean Fishery Management Councils (GOMFMC and CFMC, respectively) are evaluating the impacts of several gear types, including bottom longline, on EFH areas identified under their respective reef fish and coral reef fisheries (GOMFMC, 2004; CFMC, 2005). Specifically, both Councils are evaluating measures to minimize the impacts of bottom longline gear on coral reef habitat identified as EFH for several of their managed species in areas adjacent to the Dry Tortugas Marine Reserve in Florida and the Gramantic Banks off of Puerto Rico. However, NMFS would first need to assess the extent of HMS fishing effort, if any, in these areas. And, if those measures are finalized, NMFS will consider further rulemaking, as necessary, for the Atlantic shark fisheries, because there may be overlap in fishery participants (NMFS, 2003).

In summary, according to the best scientific information available to NMFS, NMFS concludes that most HMS gears are having minimal to no impact on HMS EFH or to other species' EFH.

**Table 10.1. Impact assessment of HMS fishing gear on HMS and non-HMS EFH. '-' indicates that the gear type is not used in these habitat types. Habitat impacts are as follows: negligible = 0, low = +, medium = ++, high = +++, unknown=?, and a blank indicates not evaluated.** Source: Symbols before the slash are from the Caribbean FEIS, 2004 (Table 3.15a). The symbols after the slash are taken from Barnette, 2001.

| | | on-HMS EFH | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Estuarine/Inshore** | | | | | **Offshore** |
| HMS Gear Type | Contacts Bottom | SAV | Coral Reef | Hard Bottom | Sand/Shell | Soft Bottom | HMS EFH Water column |
| Bandit Gear | | | | /+ | | | 0 |
| Bottom Longline | X | 0/ | +/ | +/+ | 0/+ | 0/+ | 0 |
| Handline | | 0/ | +/ | +/+ | 0/ | 0/ | 0 |
| Harpoon | | | | | | | 0 |
| Gillnet, Anchored | X | +/+ | ++/ | +/+ | +/+ | 0/+ | 0 |
| Gillnet /Strikenet | | | | | | | 0 |
| Pelagic Longline | | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0 |
| Purse Seine, Tuna | | 0/? | 0/ | 0/ | 0/+ | 0/+ | 0 |
| Rod and Reel | | 0/ | +/ | +/+ | 0/ | 0/ | 0 |
| Tuna Trap/Fish Weir | X | ++/++ | - | - | 0/? | 0/? | 0 |

### 10.4.3 Potential Impacts of non-HMS Fishing Activities on HMS EFH

At this time, only limited information exists to relate fishing activities to habitat damage (Rester, 2000; Hamilton, 2000; Barnette, 2001; Johnson, 2002; NRC, 2002; Stevenson *et al.*, 2004), and the degree to which habitat damage affect fishery production to date is unknown (NMFS, 1999b). Therefore only a speculative, qualitative evaluation of the degree of impairment of the function of the habitat from fishing impacts can be made. This section provides an overview of potential impacts of non-HMS fishing gears on HMS EFH.

Nearly all HMS EFH is similarly defined according to the geographic boundaries of a given area as opposed to specific benthic habitat types that might be affected by fishing gears. However, for some species of sharks (blacktip, spinner, blacknose and finetooth) certain substrates, such as mud bottom and seagrasses in a specific area of Apalachicola and Apalachee Bay, have been identified as EFH (see Appendix B). For these specific coastal and estuarine habitats, there may be an impact on benthic habitats from bottom tending gears in state waters. Trawl fisheries that scrape the substrate, disturb boulders and their associated epiphytes or epifauna, re-suspend sediments, flatten burrows and disrupt seagrass beds have the potential to alter the habitat characteristics that are important for survival of early life stages of many targeted and non-targeted species. According to the GOMFMC (2004), bottom tending gears in this area consist of shrimp trawls and stone crab pots. The fishing impact index for these gears in this area was assessed as being low (based on habitat type and fishing effort from 2000-2001) (Figures 3.5.24 and 3.5.27b; GOMFMC, 2004). Thus, the adverse effects of these gears on these species' EFH are expected to be minimal. No other benthic habitat types have been identified as EFH for neonate or juvenile sharks (*i.e*., neonate and juvenile shark EFH has been designated based on depth, and/or isobath; Appendix B). Therefore, until such habitat types are identified and the degree of overlap and the extent to which habitat is altered by various bottom tending gears is known, NMFS cannot assess the impact of such gears on neonate and juvenile shark EFH.

The degree of impact and long-term habitat modification depends on the severity and frequency of the impacts as well as the amount of recovery time between impacts (Auster and Langton, 1999; Barnette, 2001). The extent to which particular parameters are altered by trawl gear is somewhat dependent on the configuration of the gear and the manner in which the gear is fished. Additional efforts are required to study HMS EFH areas that are fished for non-HMS species and identify fishing gears that impact these habitats in a "more than minimal and not temporary in nature" (50 CFR 600.815(a)(2)(ii)). In this regard, coordination efforts should be undertaken with the respective Councils to identify potential common areas. Research into the spatial distribution of these activities, the frequency of disturbance, and the short and long-term changes induced in the habitat are of primary importance. A better understanding of specific habitat types for HMS (the highest, most refined level of information available with which to identify EFH, and which is currently not available for HMS), and the habitat characteristics that influence the abundance of managed species within those habitats, is also needed in order to better understand the effects of fishing activities on habitat suitability for sharks (NMFS, 2003). The potential impacts of different gears with different habitats types are given in more detail in Barnette (2001), the Caribbean FEIS (2004), and Stevenson *et al*., (2004). Nonetheless, until specific habitat types are associated with HMS EFH, the degree to which these impacts will affect HMS EFH is currently unknown.

Besides altering the physical characteristics of EFH, other fisheries may remove prey species that make up the necessary biological components of HMS EFH. Many of these impacts have been addressed in other fishery management plans (*e.g.*, SAFMC, 1998; GMFMC, 1998) that focus on restricting the removal of attached species such as corals or kelp that provide essential structure in their respective habitats; however, for pelagic species other biological components must be considered.

As described in the EFH guidelines, loss of prey species may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat. Therefore, actions that reduce the availability of a major prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat that are known to cause a reduction in the population of the prey species, may be considered adverse effects on EFH if such actions reduce the quality of EFH. For example, bluefin tuna are opportunistic feeders that prey on a variety of schooling fish, including Atlantic herring in the Gulf of Maine. NMFS would need to determine the extent to which herring or other prey species contribute to bluefin tuna EFH, and whether the removal of a portion of herring would constitute a negative effect on bluefin tuna EFH.  These types of analyses would be part of a follow up rulemaking in which changes to EFH boundaries may be proposed, potential impacts on EFH would need to be analyzed, and if necessary, measures to minimize adverse effects would be proposed.  NMFS will continue to examine the importance of forage species on bluefin tuna and other HMS species EFH.

Besides direct harvest, prey species such as herring may be susceptible and sensitive to noise and schools are known to disperse when approached by vessels or when disturbed by mid-water nets or purse seines (NMFS, 2005).  This disturbance could be interpreted as a potential impact on the pelagic habitat of juvenile or adult herring.  The effect, however, is known to be temporary: schools of herring that are dispersed by vessels or mid-water trawls re-form quickly after passage of the boat or the net, within a matter of minutes (NMFS, 2005 are references therein).  This may adversely affect the pelagic habitat for juvenile and adult herring, but the effects are minimal and temporary in nature and do not need to be minimized.

Some tuna and swordfish life stages have been found to be associated, or to co-occur, with floating mats of the brown algae, *Sargassum* spp.  The mats are pelagic and are moved extensively by winds and currents.  They are frequently found in convergence zones, windrows, or at current boundaries - areas that are EFH for many of the HMS life stages.  Whether the floating mats serve as shelter, act as a source for aggregating prey (because of the abundance of prey species associated with them), serve as a means of camouflage, or serve some other biological function is not entirely clear.  It is a biological component that may focus, particularly on the small scale, the distribution of certain life stages of tuna and swordfish, and it may need to be examined as EFH.

In summary, there are few anticipated impacts from other (*i.e.*, non-HMS) Federally regulated and non-Federally regulated gears on HMS EFH.  Since most HMS EFH is defined as the water column or attributes of the water column (*i.e.*, temperature gradients, frontal boundaries, etc.), there are anticipated to be minimal or no cumulative impacts from non-HMS fishing gears.  The only exceptions are nearshore and estuarine shark pupping grounds in the specific area described above and the effect of bottom tending gears in this area.  Since benthic habitats have not been identified as EFH for neonate and juvenile sharks (with the exception of blacktip, spinner, finetooth and blacknose sharks in Apalachee Bay; see above), NMFS cannot currently assess the impact of these gears.  If specific benthic habitat types (*i.e.*, SAV, mud, coral reefs, etc.) were to be identified as EFH for other sharks species, and the degree of overlap and impact of various bottom tending gears is known in these areas, NMFS would assess whether those types of gear have negative impacts on HMS EFH and determine if these impacts are more than minimal and not temporary in nature.

### 10.4.4 Federally Managed Fishing Activities

The following tables describe the comprehensive set of gears managed by HMS and by the different Fishery Management Councils in each of the regions.  A brief description of all gears is given below in Section 10.4.6.

**Table 10.2. A comprehensive list of all gear types used in HMS fisheries.**

| | HMS Fishery | | | |
|---|---|---|---|---|
| **HMS Gear Type** | **Shark** | **Tuna** | **Swordfish** | **Billfish** |
| Bandit Gear | X | X | X | |
| Harpoon | | X | X | |
| Gillnet, Drift/Strikenet | X | | | |
| Longline, Bottom | X | | | |
| Longline, Pelagic | X | X | X | |
| Purse Seine, Tuna | | X | | |
| Trap | | X | | |
| Vertical Gear | | | | |
| Handline | X | X | X | |
| Rod and Reel | X | X | X | X |

The Federally managed gears for the Northeast region and their potential effects on HMS EFH are outlined in

Table 10.3. The Northeast region is comprised of the New England, Mid-Atlantic and South Atlantic Fishery Management Councils.

**Table 10.3. Fishing gear types regulated in Federal waters of the Northeast region and their effects on HMS EFH. Habitat impact is as follows: minimal/negligible = 0.** Source: Stevenson *et al*., 2004.

| ***Northeast Region*** | | ***Effects of Fishing Gear on HMS EFH*** |
|---|---|---|
| **Gear Type** | **Contacts Bottom*** | **Water Column** |
| Bag Nets | | 0 |
| Dredge, Clam | X | 0 |
| Dredge, Sea Scallop | X | 0 |
| Gill Nets, Drift | | 0 |
| Gill Nets, Runaround | | 0 |
| Gill Nets, Sink/Anchor | X | 0 |
| Gill Nets, Stake | X | 0 |
| Hand Harvest | | 0 |
| Haul Seines, Long (Danish) | X | 0 |
| Longline (Bottom) | X | 0 |
| Longline (Pelagic) | | 0 |
| Otter Trawl Bottom, Fish | X | 0 |
| Otter Trawl Bottom, Sea Scallop | X | 0 |
| Otter Trawl Bottom, Shrimp | X | 0 |
| Otter Trawl Midwater | | 0 |
| Pots and Traps, Red Crab | X | 0 |
| Pots and Traps, Fish | X | 0 |
| Pots and Traps, Lobster Offshore | X | 0 |
| Purse Seine, Herring | | 0 |
| Purse Seine, Tuna | | 0 |
| Scottish Seine | X | 0 |
| Traps, Floating Fish | | 0 |

| *Northeast Region* | | *Effects of Fishing Gear on HMS EFH* |
|---|---|---|
| **Gear Type** | **Contacts Bottom*** | **Water Column** |
| Trawl, Beam | X | 0 |
| Trawl Midwater, Paired | | 0 |
| Troll Lines | | 0 |
| Trot Lines | | 0 |
| Vertical Gear | | |
| Handline | | 0 |
| Reel, Electric or Hydraulic | | 0 |
| Rod and Reel | | 0 |

*At this time, there are no benthic habitats identified as HMS EFH that may be affected by bottom tending gears. In addition, there is insufficient evidence to indicate an impact of bottom tending gear on HMS EFH that is defined as the "water column."

The Federally managed gears for the Southeast region and their potential effects on HMS EFH are outlined in

Table **10.4**. The Southeast region is comprised of the Gulf of Mexico and the Caribbean Fishery Management Councils.

**Table 10.4. Fishing gear types regulated in Federal waters in the Southeast region and their effects on HMS EFH. Habitat impact is as follows: minimal/negligible = 0.** Source: Hamilton, 2000; Barnette, 2001; GOMFMC FEIS 2004.

| *Southeast Region* | | *Effects of Fishing Gear on HMS EFH* |
|---|---|---|
| **Gear Type** | **Contacts Bottom*** | **Water Column** |
| Allowable Chemical | X | 0 |
| Bandit Gear | | 0 |
| Dip Net | | 0 |
| Gill/Trammel Nets | | 0 |
| Hand Harvest | | 0 |
| Longline (Bottom) | X | 0 |
| Slurp Gun | | 0 |
| Snare | | 0 |
| Spears/Powerheads | | 0 |
| Trap, Lobster | X | 0 |
| Trap/Pots, Fish | X | 0 |
| [1]Trawl, Frame | X | 0 |
| [1]Trawl, Otter | X | 0 |
| Vertical Gear | | 0 |
| Hook and Line | | 0 |
| Rod and Reel | | 0 |

*At this time, there are no benthic habitats identified as HMS EFH that may be affected by bottom tending gears. In addition, there is insufficient evidence to indicate an impact of bottom tending gear on HMS EFH that is defined as the "water column."
[1]Not currently used in the Caribbean; however, potential exists for future use.

### 10.4.5 Non-Federally Managed Fishing Activities

The following tables describe the comprehensive set of gears that are not managed under fishery management plans.

Table 10.5 and Table 10.6 outline allowable gears that are used in state waters of the Northeast and Southeast regions. A brief description of all gears is given below in Section 10.4.6.

The non-Federally managed gears for the Northeast region and their potential effects on HMS EFH are outlined in. The Atlantic States Marine Fisheries Commission manages non-Federal fisheries in the New England, Mid-Atlantic and South Atlantic regions.

**Table 10.5. Non-FMP Fishing Gear in the Northeast region and their effects on HMS EFH. Habitat impact is as follows: minimal/negligible = 0.** Source: Stevenson *et al*., 2004.

| ***Northeast RegionNon-FMP*** **(state waters)** | | ***Effects of Fishing Gear on HMS EFH*** |
|---|---|---|
| **Gear Type** | **Contacts Bottom*** | **Water Column** |
| Cast Nets | | 0 |
| Clam Kicking | X | 0 |
| Diving | | 0 |
| Dredge, Conch | X | 0 |
| Dredge, Crab | X | 0 |
| Dredge, Mussel | X | 0 |
| Dredge, Oyster, | X | 0 |
| Dredge, Bay Scallop | X | 0 |
| Dredge, Sea Urchin | X | 0 |
| Fyke and Hoop Nets, Fish | X | 0 |
| Hand Hoes | X | 0 |
| Pots and Traps, Conch | X | 0 |
| Pots and Traps, Blue and Blue Peeler Crab | X | 0 |
| Pots and Traps, Eel | X | 0 |
| Pots and Traps, Lobster Inshore | X | 0 |
| Pounds Nets, Crab | X | 0 |
| Pound Nets, Fish | X | 0 |
| Purse Seines, Menhaden | | 0 |
| Rakes | X | 0 |
| Scrapes | X | 0 |
| Seines, Haul-Beach | X | 0 |
| Seines, Haul-Long | X | 0 |
| Seines, Haul-Long (Danish) | X | 0 |
| Seines, Stop | X | 0 |
| Spears | | 0 |
| Tongs and Grabs, Oyster | X | 0 |
| Tongs Patent, Clam | X | 0 |
| Tongs Patent, Oyster | X | 0 |
| Trawl, Otter-Crab | X | 0 |
| Weirs | X | 0 |

*At this time, there are no benthic habitats identified as HMS EFH that may be affected by bottom tending gears. In addition, there is insufficient evidence to indicate an impact of bottom tending gear on HMS EFH that is defined as the "water column."

The non-Federally managed gears for the Southeast region and their potential effects on HMS EFH are outlined in Table 10.6. The Gulf States Marine Fisheries Commission manages non-federal fisheries in the Gulf of Mexico and the Caribbean regions.

**Table 10.6. Non-FMP Fishing Gear in Southeast region: Effects of other fishing gear on HMS EFH. Habitat impact is as follows: minimal/negligible = 0.** Source: Hamilton, 2000; Barnette, 2001; GOMFMC, 2004.

| ***Southeast Region*** ***Non-FMP* (state waters)** | | ***Effects of Fishing Gear on HMS EFH*** |
|---|---|---|
| **Gear Type** | **Contacts Bottom*** | **Water Column** |
| Barrier Net | X | 0 |
| Cast Net | | 0 |
| Crab Scrapes | X | 0 |
| Dredge-Oyster | X | 0 |
| Drop Net | | 0 |
| Lampara Net | | 0 |
| Longline (Pelagic) | X | 0 |
| Purse Seine | | 0 |
| Rakes and Tongs | X | 0 |
| Seine, Beach | X | 0 |
| Traps/Pots- Crab | X | 0 |
| Trawl, Skimmer | X | 0 |
| Vertical Gear | | |
| Handline | | 0 |

*Currently the only benthic habitat types identified as EFH for neonate sharks are in Apalachee Bay off the Florida Panhandle. In this area, neonate blacktip, spinner, finetooth and blacknose sharks have been associated with mud or seagrass areas. The GOMFMC (2004) has determined that bottom tending gears (shrimp trawls and crab pots) have a low impact on these habitat types in this area. In addition, there is insufficient evidence to indicate an impact of bottom tending gear on HMS EFH that is defined as the "water column."

### 10.4.6 Description of Fishing Gears

Fishing gears that are dragged over the seabed or through the water column are called mobile gear (*e.g.*, trawls, dredges, and purse seines), whereas gear that remains stationary are called static gear (nets, traps, and longlines). Unless otherwise noted, gear descriptions were taken from Stevenson *et al*., (2004).

*Bottom Tending, Mobile Gear*

Trawls

Trawls are classified by their function, bag construction, or method of maintaining the mouth opening. Function may be defined by the part of the water column where the trawl operates (*e.g.*, bottom), by the species that it targets, or the composition of the bottom (smooth versus rough and soft versus hard) (Hayes, 1983). There is a wide range of otter trawl types used in the Northeast and Southeast as a result of the diversity of fisheries prosecuted and bottom types encountered in the region. For instance, trawls target flatfish, crabs scallops, lobsters, and shrimp in the Northeast (Stevenson *et al.*, 2004), and shrimp, calico scallops, flounder and butterfish in both state and Federal waters of the Gulf of Mexico (GFMC FDEIS 2004).

*Otter Trawls* - Bottom trawls are towed at a variety of speeds, but average about 5.5 km/hr (3 knots or nmi/hr). There are three components of the otter trawl that come in contact with the sea bottom: the doors, the ground cables and bridles, which attach the doors to the wings of the net, and the sweep (or foot-rope) which runs along the bottom of the net mouth.

The traditional otter board door is a flat, rectangular wood structure with steel fittings and a steel “shoe” along the bottom that prevents the bottom of the door from damage and wear as it drags over the bottom. Other types include the V-type (steel), polyvalent (steel), oval (wood), and slotted spherical otter board (steel) (Sainsbury, 1996). It is the spreading action of the doors resulting from the angle at which they are mounted that creates the hydrodynamic forces needed to push them apart. Steel cables are used to attach the doors to the wings of the net. The ground cables run along the bottom from each door to two cables (the “bridle”) that diverge to attach to the top and bottom of the net wing. The bottom portion of the bridle also contacts the bottom.

On smooth bottoms, the sweep may be a steel cable weighted with chain, or may be merely rope wrapped with wire. On rougher bottoms, rubber discs (“cookies”) or rollers are attached to the sweep to assist the trawl's passage over the bottom (Sainsbury, 1996). There are two main types of sweep used in smooth bottom in New England (Mirarchi, 1998). In the traditional chain sweep, loops of chain are suspended from a steel cable, with only 2-3 links of the chain touching bottom. Streetsweeper gear is much heavier in the water due to the use of steel cores in the brush components. Roller sweeps and rockhoppers are used on irregular bottom (Carr and Milliken, 1998). Vertical rubber rollers rotate freely and are as large as 14.5 cm (36 inches) in diameter. In New England, the rollers have been largely replaced with "rockhopper" gear that uses larger fixed rollers and are designed to “hop” over rocks as large as 1 meter in diameter. Small rubber “spacer” discs are placed in between the larger rubber discs in both types of sweep.

In the Northeast, flatfish are primarily targeted with a mid-range mesh flat net that has more ground rigging and is designed to get the fish up off the bottom. A high rise or fly net with larger mesh is used to catch demersal fish that rise higher off the bottom than flatfish (NREFHSC, 2002). Crabs, scallops, and lobsters are also harvested in large mesh bottom trawls. Small mesh bottom trawls are used to capture northern and southern shrimp, whiting, butterfish and squid and usually employ a light chain sweep. Small-mesh trawls are designed, rigged, and used differently than large-mesh fish trawls and are used to catch northern shrimp in the Gulf of Maine. In the Southeast, bottom trawl fisheries target demersal species throughout the U.S. Atlantic Ocean (Barnette, 2001, National Academy of Sciences, 2002). These activities are managed under Federal fishery management plans.

*Beam Trawls* - The beam trawl is much like an otter trawl except the net is spread horizontally by a steel beam that runs the horizontal width of the net rather than with otter boards. The net is spread vertically by heavy steel trawl heads that generally have skid-type devices with a heavy shoe attached (Sainsbury, 1996). It is believed that beam trawls are not currently used in the Northeast United States (NREFHSC, 2002). A few beam trawls were used in the 1970s to catch monkfish, but the fishery was unsuccessful. In the mid 1990's, a number of boats off New Bedford, MA used what were referred to as beam trawls, but the gear more closely resembled a scallop dredge rather than the traditional, European beam trawls. There are a few boats that are currently recorded as using beam trawls in the NMFS fishery landings database, but it is believed these were most likely mis-characterized and are actually otter trawls being deployed from the side of the vessels (NREFHSC, 2002). In the Southeast, beam trawls are used for monkfish, shrimp, and other demersal species. These trawls are also used for scientific sampling as the fixed mouth opening allows for consistent benthic sampling. In Florida, roller frame trawls are used to harvest bait shrimp primarily in state waters (National Academy of Sciences, 2002). These activities are managed under Federal fishery management plans.

Dredges

Most dredges are used for clams, oysters and scallops and are primarily used in the Northeastern region.

*Hydraulic Clam Dredge* - Hydraulic clam dredges have been used in the surfclam (*Spisula solidissima*) fishery and in the ocean quahog (*Arctica islandica*) fishery. These dredges are highly sophisticated and are designed to: 1) be extremely efficient (80 to 95% capture rate); 2) produce a very low bycatch of other species; and 3) retain very few undersized clams (NREFHSC, 2002). The typical dredge is 3.7 m (12 feet) wide and about 6.7 m (22 feet) long and uses pressurized water jets to wash clams out of the seafloor. Towing speed at the start of the tow is about 4.5 km/hr (2.5 knots or nmi/hr) and declines as the dredge accumulates clams. The water jets penetrate the sediment in front of the dredge to a depth of about 20 - 25 cm (8 - 10 inches), depending on the type of sediment and the water pressure. The water pressure that is required to fluidize the sediment varies from 50 pounds per square inch (psi) in coarse sand to 110 psi in finer sediments. The objective is to use as little water as possible since too much pressure will blow sediment into the clams and reduce product quality. The "knife" (or "cutting bar") on the leading bottom edge of the dredge opening is 14 cm (5.5 inches) deep for surfclams and 8.9 cm (3.5 inches) for ocean quahogs. This activity is managed under a Federal fishery management plan.

Dredges are not fished in clay, mud, pebbles, rocks, coral, large gravel greater than one half inch, or seagrass beds (NREFHSC, 2002). In the soft-clam (*Mya arenaria* ) fishery, the dredge manifold and blade are located just forward of an escalator, or conveyor belt, that carries the clams to the deck of the vessel. These vessels are restricted to water depths less than one-half the length of the escalator and are typically operated from 15 m (49 ft) vessels in water depths of 2-6 m (6.6 - 20 ft) (DeAlteris, 1998). The escalator dredge is not managed under Federal fishery management plans.

*Quahog Dredge* - Ocean quahogs are also harvested in eastern Maine coastal waters using a non-hydraulic dredge that is essentially a large metal cage on skis with 15 cm (6 inch) long teeth projecting at an angle off the leading bottom edge. Maine state regulations limit the length of the cutter bar to 91 cm (36 inches). The teeth rake the bottom and lift the quahogs into the cage. This fishery takes place in small areas of sand and sandy mud found among bedrock outcroppings in depths of 9 to > 76 m (30 - 250 ft) in state and Federal coastal waters. These dredges are used on smaller boats, about 9 - 12 m long (30 to 40 ft) and are pulled through the seabed using the boat's engine (NREFHSC, 2002). This fishery is managed under the MAFMC Surf Clam and Ocean Quahog FMP (MAFMC).

*Sea Scallop Dredges* - The New Bedford (or "chain sweep") dredge is the primary gear used in the Northeast U.S. sea scallop (*Placopecten magellanicus*) fishery and is very different than scallop dredges utilized in Europe and the Pacific because it is a toothless dredge. The forward edge of the New Bedford dredge includes the cutting bar, which rides above the surface of the substrate, creating turbulence that stirs up the substrate and kicks objects (including scallops) up from the surface of the substrate into the bag. Shoes on the cutting bar are in contact with and ride along the substrate surface (NREFHSC, 2002). A sweep chain is attached to each shoe and to the bottom of the ring bag (Smolowitz, 1998). The bag is made up of metal rings with chafing gear on the bottom and twine mesh on the top, and drags on the substrate when fished. Tickler chains run from side to side between the frame and the ring bag and, in hard bottom, a series of rock chains run from front to back to prevent large rocks from getting into the bag (Smolowitz, 1998). New Bedford dredges are typically 4.3 m (14 feet) wide; two of them are towed by a single vessel at speeds of 4 to 5 knots. Chain sweep dredges used along the Maine coast are smaller. In the Northeast region, scallop dredges are used in high and low energy sand environments, and high energy gravel environments. This activity is managed under a Federal fishery management plan.

<u>Other Non-Hydraulic Dredges</u>

*Oyster or Crab Dredge/Scrape/Mussel Dredge* - The oyster dredge is a toothed dredge consisting of a steel frame 0.5-2.0 m (1.6 -6.6 ft) in width, a tow chain or wire attached to the frame, and a bag to collect the catch. The bag is constructed of rings and chain-links on the bottom to reduce the abrasive effects of the seabed, and twine or webbing on top. The dredge is towed slowly (<1 m/sec) in circles, from vessels 7 to 30 m (23 - 98 ft) in length (DeAlteris, 1998). Crabs are harvested with dredges similar to oyster dredges. Stern-rig dredge boats (approximately 15 m (49 ft) in length) tow two dredges in tandem from a single chain warp. The dredges are equipped with 10 cm (4 inch) long teeth that rake the crabs out of the bottom. (DeAlteris, 1998). The toothed dredge is also used for harvesting mussels (Hayes, 1983). These dredging activities are not managed under Federal fishery management plans.

*Bay Scallop Dredge* - Bay scallops usually reside on the bottom. The bay scallop dredge may be 1 to 1.5 m (3.3 - 4.9 ft) wide and about twice as long. The simplest bay scallop dredge can be just a mesh bag attached to a metal frame that is pulled along the bottom. For bay scallops that are located on sand and pebble bottom, a small set of raking teeth are set on a steel frame, and skids are used to align the teeth and the bag (Sainsbury, 1996). This dredging activity is not managed under Federal fishery management plans.

*Sea Urchin Dredge* - Similar to a simple bay scallop dredge, the sea urchin dredge is designed to avoid damaging the catch. It has an up-turned sled-like shape at the front that includes several leaf springs tied together with a steel bar. A tow bail is welded to one of the springs and a chain mat is rigged behind the mouth box frame. The frame is fitted with skids or wheels. The springs act as runners, enabling the sled to move over rocks without hanging up. The chain mat scrapes up the urchins. The bag is fitted with a codend for ease of emptying. This gear is generally only used in waters up to 100 m (330 ft) deep (Sainsbury, 1996). This dredging activity is not managed under Federal fishery management plans.

*Clam "Kicking"* - Clam kicking is a mechanical form of hard clam harvest practiced in North Carolina, which involves the modification of boat engines so that the propeller is directed downwards instead of backwards (Guthrie and Lewis, 1982). In shallow water the propeller wash is powerful enough to suspend bottom sediments and clams into a plume in the water column, which allows them to be collected in a trawl net towed behind the boat (Stephan *et al.*, 2000). This activity is not managed under a Federal fishery management plan.

<u>Seines</u>

*Haul Seines* - Haul seining is a general term describing operations where a net is set out between the surface and seabed to encircle fish. It may be undertaken from the shore (beach seining), or away from shore in the shallows of rivers, estuaries or lakes (Sainsbury, 1996). Seines typically contact the sea bottom along the lead line. Additionally the net itself may scrape along the bottom as it is dragged to shore or the recovery vessel. This activity is not managed under a Federal fishery management plan.

*Beach Haul Seines* - The beach seine resembles a wall of netting of sufficient depth to fish from the sea surface to the seabed, with mesh small enough that the fish do not become gilled. A floatline runs along the top to provide floatation and a leadline with a large number of weights attached ensures that the net maintains good contact with the bottom. Tow lines are fitted to both ends. The use of a beach seine generally starts with the net on the beach. One end is pulled away from the beach, usually with a small skiff or dory, and is taken out and around and finally back in to shore. Each end of the net is then pulled in towards the beach, concentrating the fish in the middle of the net. This is eventually brought onshore as well and the fish are removed. This gear is generally used in relatively shallow inshore areas (Sainsbury, 1996). This activity is not managed under a Federal fishery management plan.

*Long Haul Seines* - The long haul seine is set and hauled in shallow estuarine and coastal areas from a boat typically 15 m (49 ft) long. The net is a single wall of small mesh webbing less than 5 cm (2 inches), and is usually greater than 400 m (1440 ft) in length and about 3 m (9.8 ft) in depth. The end of the net is attached to a pole driven into the bottom, and the net is set in a circle so as to surround fish feeding on the tidal flat. After closing the circle, the net is hauled into the boat, reducing the size of the circle, and concentrating the fish. Finally, the live fish are brailed or dip-netted out of the net. (DeAlteris, 1998). This activity is not managed under Federal fishery management plans

*Stop Seines* - These are seines that are used in coastal embayments to close off the opening to a small cove or bight. This method is used in Maine to harvest schools of juvenile herring (Everhart and Youngs, 1981). This activity is not managed under a Federal fishery management plan.

*Danish and Scottish Seines* - The Danish seine is a bag net with long wings, that includes long warps set out on the seabed, enclosing a defined area. As the warps are retrieved, the enclosed area (a triangle) reduces in size. The warps dragging along the bottom herd the fish into a smaller area, and eventually into the net mouth. The gear is deployed by setting out one warp, the net, then the other warp. On retrieval of the gear, the vessel is anchored. This technique of fishing is aimed at specific schools of fish located on smooth bottom. In contrast to Danish seining, if the vessel tows ahead while retrieving the gear, then this is referred to as Scottish seining or fly-dragging. This method of fishing is considered more appropriate for working small areas of smooth bottom, surrounded by rough bottom. This activity is managed under a Federal fishery management plan.

*Bottom Tending, Static Gear*

<u>Pots</u>

Pots are portable, rigid devices that fish and shellfish enter through small openings, with or without enticement by bait (Everhart and Youngs, 1981; Hubert, 1983). They are used to capture lobsters, crabs, black sea bass, eels and other bottom dwelling species seeking food or shelter (Everhart and Youngs, 1981; Hubert, 1983). Traps and pots are weighted to rest on the bottom, marked with buoys at the surface, and are sometimes attached to numerous other trap and one long line called a trot line. Pot fishing can be divided into two general classifications: (1) inshore potting in estuaries, lagoons, inlets and bays in depths up to about 75 m (250 ft) and; (2) Offshore potting using larger and heavier vessels and gear in depths up to 730 m (2400 ft) or more (Sainsbury, 1996).

In the Southeast region, pots are used for a number of fish and invertebrates. In certain areas of the Gulf of Mexico and Caribbean, due to their use to harvest species associated with coral and hardbottom habitat, traps and pots have been identified to impact and degrade habitat (Barnette, 2001).

*Lobster Pots* - Lobster pots are typically rectangular and are divided into two sections, the chamber and the parlor. The chamber has an entrance on both sides of the pot and is usually baited. Lobsters then move to the parlor via a tunnel (Everhart and Youngs, 1981). Escape vents are installed in both areas of the pot to minimize the retention of sub-legal sized lobsters (DeAlteris, 1998). Lobster pots are fished as either 1) a single pot per buoy (although two pots per buoy are used in Cape Cod Bay, and three pots per buoy in Maine waters), or 2) a “trawl” or line with up to 100 pots. According to NREFHSC (2002) important features of lobster pots and their use are the following:

- About 95% of lobster pots are made of plastic - coated wire.
- Floating mainlines may be up to 7.6 m (25 ft) off bottom.
- Sinklines are sometimes used where marine mammals are a concern – neutrally buoyant lines may soon be required in Cape Cod Bay.
- Soak time depends on season and location - usually 1-3 days in inshore waters in warm weather, to weeks in colder waters.
- Offshore pots are larger (more than 1 m (4 ft) long) and heavier (~ 100 lb or 45 kg), with an average of ~ 40 pots/trawl and 44 trawls/vessel. They have a floating mainline and are usually deployed for a week at a time.
- There has been a three-fold increase in lobster pots fished since the 1960's, with more than four million pots now in use.
- Although the offshore component of the fishery is regulated under Federal rules, American lobster is not managed under a Federal fishery management plan.

*Fish Pots* - Fish pots are similar in design to lobster pots. They are usually fished singly or in trot lines of up to 25 pots, in shallower waters than the offshore lobster pots or red crab pots. Pots may be set and retrieved 3-4 times/day when fishing for scup (NREFHSC, 2002). Wire-mesh fish traps are one of the principal fishing gears used in coral reef areas in the Caribbean (Appledorn *et al.*, 2000). This activity is managed under a Federal fishery management plan.

Hagfish pots (40 plastic gallon barrels) are fished in deep waters, on mud bottoms. Cylindrical pots are typically used for capturing eels in Chesapeake Bay, however, half-round and rectangular pots are also used and all are fished in a manner similar to that of lobster pots (Everhart and Youngs, 1981). Hagfish and eel activities are not managed under a Federal fishery management plan.

*Crab Pots* - Crabs are often fished with pots consisting of a wire mesh. A horizontal wire partition divides the pot into an upper and lower chamber. The lower chamber is entered from all four sides through small wire tunnels. The partition bulges upward in a fold about 20 cm (8 inches) high for about one third of its width. In the top of the fold are two small openings that give access to the upper chamber (Everhart and Youngs, 1981).

Crab pots are always fished as singles and are hauled by hand from small boats, or with a pot hauler on larger vessels. Crab pots are generally fished after an overnight soak, except early and late in the season (DeAlteris, 1998). These pots are also effective for eels (Everhart and Youngs, 1981). This activity is not managed under a Federal fishery management plan.

Deepsea red crab pots are typically wood and wire traps 1.2 m by 0.75 m (48 by 30 inches) with top entry. Pots are baited and soak for about 22 hours before being hauled. Currently, vessels are using an average of 560 pots in trawls of 75- 180 pots per trawl along the continental slope at depths from 400 to 800 m (1300 - 2600 ft). These vessels are typically 25 -

41 m (90 - 150 ft) in length. Currently there are about 6 vessels engaged in this fishery (NEFMC, 2002). This activity is managed under a Federal fishery management plan.

Traps

A trap is generally a large-scale device that uses the seabed and sea surface as boundaries for the vertical dimension. The gear is installed at a fixed location for a season, and is passive, as the animals voluntarily enter the gear. Traps are made of a leader or fence, that interrupts the coast parallel migratory pattern of the target prey, a heart or parlor that leads fish via a funnel into the bay or trap section that serves to hold the catch for harvest by the fishermen. The non-return device is the funnel linking the heart and bay sections (DeAlteris, 1998).

*Fish Pound Nets* - Pound nets are constructed of netting staked into the seabed by driven piles (Sainsbury, 1996). Pound nets have three sections: the leader, the heart, and the pound. The leader (there may be more than one) may be as long as 400 m (1300 ft) and is used to direct fish into the heart(s). One or more hearts are used to further funnel fish into the pound and prevent escapement. The pound may be 15 m (49 ft) square and holds the fish until the net is emptied. These nets are generally fished in waters less than 50 m (160 ft) deep. Pound nets are also used to catch crabs. This activity is not managed under a Federal fishery management plan.

*Fyke and Hoop Nets* - Constructed of wood or metal hoops covered with netting, hoop nets are 2.5 to 5 m (8.2 - 16 ft) long, “Y-shaped” nets, with wings at the entrance and one or more internal funnels to direct fish inside, where they become trapped. Occasionally, a long leader is used to direct fish to the entrance. Fish are removed by lifting the rear end out of the water and loosening a rope securing the closed end. These nets are generally fished to about 50 m (160 ft) deep (Sainsbury, 1996). A common fyke net is a long bag mounted on one or several hoops which keep the net from collapsing as well as provide an attachment for the base of the net funnels to prevent the fish from escaping. This gear is used in shallow water and extensively in river fisheries (Everhart and Youngs, 1981). This activity is not managed under a Federal fishery management plan.

*Bag Nets* – Bag nets are large nets that are kept vertically open by a frame, usually constructed of wood, and are held horizontally stretched by the water current. Bag nets are fished usually in deep water and are held in position by floats and anchors. This activity is not managed under a Federal fishery management plan.

*Shallow Floating Traps* - In New England, much of the shoreline and shallow subtidal environment is rocky and stakes cannot be driven into the bottom. Therefore, the webbing of these traps is supported by floats at the sea surface, and held in place with large anchors. These traps are locally referred to as “floating traps.” The catch, design elements, and scale of these floating traps is similar to pound nets (DeAlteris, 1998). The floating trap is designed to fish from top to bottom, and is built especially to suit its location. The trap is held in position by a series of anchors and buoys. The net is usually somewhat “T-shaped,” with the long portion of the net (the leader net) designed to funnel fish into a box of net at the top of the “T.” The leader net is often made fast to a ringbolt ashore (Sainsbury, 1996). This activity is not managed under a Federal fishery management plan.

*Weirs* - A weir is a simple maze that intercepts species that migrate along the shoreline. Brush weirs are used in the Maine sardine/herring fishery. These are built of wooden stakes and saplings driven into the bottom in shallow waters. The young herring encounter the lead, which they follow to deeper water, finally passing into an enclosure of brush or netting. The concentrated fish are then removed with a small seine (Everhart and Youngs, 1981). This activity is not managed under a Federal fishery management plan. However, there are a few Federal permits for incidental catch of bluefin tuna using weirs in the Northeast. This activity is managed under a Federal fishery management plan.

Sink Gill Nets and Bottom Longlines

*Sink/Anchor Gill Nets* - Individual gill nets are typically 91 m (300 ft) long, and are usually fished as a series of 5-15 nets attached end-to-end. Gill nets have three components: leadline, webline and floatline. Fishermen are now experimenting with two leadlines. Leadlines used in New England are ~65 lb (30 kg)/net, but in the Middle Atlantic leadlines may be heavier. Weblines are monofilament, with the mesh size depending on the target species. Nets are anchored at each end, using materials such as pieces of railroad track, sash weights, or Danforth anchors, depending on currents. Anchors and leadlines have the most contact with the bottom. Some nets may be tended several times/day, (*e.g.*, when fishing for bluefish in the Middle Atlantic). For New England groundfish, frequency of tending ranges from daily to biweekly (NREFHSC, 2002).

*Trammel Net* - A trammel net is made up of two or more panels suspended from a float line and attached to a single lead line. The outer panel(s) are of a larger mesh size than the inner panel. Fish swim through the outer panel and hit the inner panel, which carries it through the other outer panel, creating a bag and trapping the fish. Smaller and larger fish become wedged, gilled, or tangled (Barnette, 2001). Trammel nets are primarily used in state waters, though they are an authorized gear in the Caribbean for both the spiny lobster and shallow water reef fish fisheries.

*Strikenets* - Vessels fishing in a strikenet fashion used nets 364.8 meters long, 30.4 meters deep, and with mesh size 22.9 cm. Strikenetting consists of using an additional smaller, second vessel to actively set the net around a school of sharks. These nets are sometimes referred to runaround drift gillnets. Nets used for sharks in the southeast region are typically 456 to 2,280 meters long and 6.1 to 15.2 meters deep, with stretched mesh from 12.7 to 22.9 cm. This fishery is currently prohibited in the state waters off South Carolina, Georgia, and Florida, Texas and Louisiana thereby forcing some of these vessels to operate in deeper waters under Federal jurisdiction, where gillnets are less effective. The entire process (set to haulback) takes approximately 9 hours (Carlson and Baremore, 2002). These activities are managed under Federal fishery management plans.

*Stake Gill Nets* - Generally a small boat is used inshore so that a gill net is set across a tidal flow and is lifted at slack tide to remove fish. Wooden or metal stakes run from the surface of the water into the sediment and are placed every few meters along the net to hold it in place. When the net is lifted, the stakes remain in place. These nets are generally fished from the surface to about 50 meters deep (Sainsbury, 1996). These activities are not managed under Federal fishery management plans.

*Runaround Drift Gillnet* – see "Strikenets".

*Bottom Longlines* - Longlining for bottom species on continental shelf areas and offshore banks is undertaken for a wide range of species including cod, haddock, dogfish, skates, and various flatfishes (Sainsbury, 1996). A 9.5 m (31 ft) vessel can fish up to 2,500 hooks a day with a crew of one and double that with two crew members. Mechanized longlining systems fishing off larger vessels up to 60 m (195 ft) can fish up to 40,000 hooks per day (Sainsbury, 1996).

In the Northeast, up to six individual longlines are strung together, for a total length of about 460 m (1500 ft), and are deployed with 20-24 lb (9 - 11 kg) anchors. The mainline is parachute cord or sometimes stainless steel wire. Gangions (lines from mainline to hooks) are 38 cm (15 inches) long and 1-2 m (3-6 ft) apart. The mainline, hooks, and gangions all come in contact with the bottom. Circle hooks are potentially less damaging to habitat features than other hook shapes. These longlines are usually set for only a few hours at a time (NREFHSC, 2002). Longlines used for tilefish are deployed in deep water, may be up to 40 km (25 miles) long, are stainless steel or galvanized wire, and are set in a zig-zag fashion (NREFHSC, 2002).

The Southeast bottom longline fishery targets both large coastal sharks (LCS) and small coastal sharks (SCS) of sharks as well as reef fish. Bottom longline is the primary commercial gear employed in the LCS and SCS fisheries in all regions. Gear characteristics vary by region, but in general, an approximately ten-mile long bottom longline, containing about 600 hooks, is fished overnight. Skates, sharks, or various finfishes are used as bait. The gear typically consists of a heavy monofilament mainline with lighter weight monofilament gangions. Some fishermen may occasionally use a flexible 1/16 inch wire rope as gangion material or as a short leader above the hook. This activity is managed under a Federal fishery management plan.

*Trot Lines* – see "Pots" section

*Pelagic Gear*

*Mid-Water Otter Trawl* - The mid-water trawl is used to capture pelagic species that school between the surface and the seabed throughout the water column. The mouth of the net can range from 110 m to 170 m (360 - 560 ft) wide and requires the use of large vessels (Sainsbury, 1996). Successful mid-water trawling requires the effective use of various electronic aids to find the fish and maneuver the vessel while catching them (Sainsbury, 1996). This activity is managed under a Federal fishery management plan. This gear is not expected to have contact with or impacts upon bottom habitats.

*Paired Mid-Water Otter Trawl* - Pair-trawling is used by smaller vessels, which herd small pelagics such as herring and mackerel into the net (Sainsbury, 1996). Large pelagic species are also harvested with a huge pelagic pair trawl towed at high speed near the surface. The nets have meshes exceeding 10 m (33 ft) in length in the jibs and first belly sections, and reduce to cod-end mesh sizes of 20 cm (8 inches) (DeAlteris, 1998). This activity is managed under a Federal fishery management plan. This gear is not expected to have contact with or impacts upon bottom habitats.

*Purse Seines* - Purse seines are very efficient for taking pelagic schooling species. The purse seine is a continuous deep ribbon of web with corks on one side and leads on the other. Rings are fastened at intervals to the lead line and a purse line runs completely around the net through the rings (Everhart and Youngs, 1981). One end of the net is fastened to the vessel and the other end to a skiff. The vessel then encircles a school of fish with the net, the net pursed and hauled back to the vessel. Purse seines vary in size according to the vessel size, the size of the mesh, the species sought and the depth to be fished. Tuna seines are nearly one kilometer (0.6 miles) long and fish from 55 - 640 m (180 - 2100 ft) (Everhart and Youngs, 1981). Due to the large depth of the net for tuna purse seines, they have been shown to contact and interact with the sea bottom when fishing in some shallow water locations such as Massachusetts Bay and vicinity (NMFS, 2001). Purse seines are also utilized to harvest menhaden in the Gulf and South Atlantic. Purse seines in the Gulf menhaden fishery frequently interact with the bottom, resulting in sediment re-suspension (Barnette, 2001). Currently there are only five vessels permitted to fish for tunas with purse seine gear. This activity is managed under a Federal fishery management plan.

*Lampara Net* - The lampara net has a large central bunt, or bagging portion, and short wings. The buoyed float line is longer than the weighted lead line so that as the lines are hauled, the wings of the net come together at the bottom first, trapping the fish. As the net is brought in, the school of fish is worked into the bunt and captured. In the Florida Keys, a modified lampara net is used to harvest baitfish near the top of the water column. The wing is used to skim the water surface as the net is drawn in and fish are herded into the pursing section to be harvested with a dip net. This activity is not managed under a Federal fishery management plan. This gear is not expected to have contact with or impacts upon bottom habitats.

*Drift Gill Nets* - Gillnets operate principally by wedging and gilling fish, and secondarily by entangling (DeAlteris, 1998). The nets are a single wall of webbing, with float and lead lines. Drift gillnets are designed so as to float from the sea surface and extend downward into the water column and are used to catch pelagic fish. In this case the buoyancy of the floatline exceeds the weight of the leadline. Drift gillnets may be anchored at one end or set-out to drift, usually with the fishing vessel attached at one end (DeAlteris, 1998). This activity is managed under a Federal fishery management plan. This gear is not expected to have contact with or impacts upon bottom habitats.

*Pelagic Longline Gear* - The pelagic or subsurface longline is a technique directed mostly towards tunas, swordfish, sailfish, dolphin (dorado), and sharks. The gear is typically set at depths from the surface to around 330 m (1100 ft). The gear can also be set with a main line hanging in arcs below the buoy droplines to fish a band of depths (Sainsbury, 1996). The gear is set across an area of known fish concentration or movement, and may be fished by day or night depending upon the species being sought (Sainsbury, 1996). The length of the mainline can vary up to108 km (67 miles) depending on the size of the vessel. If the mainline is set at a fixed depth, then the leader or gangion lengths vary from 2-40 m (6.6 - 130 ft), so as to ensure the hooks are distributed over a range of depths (DeAlteris, 1998). If a line-shooter is used to set the mainline in a catenary shape with regard to depth, then the gangions are usually a single minimal length, but are still distributed by depth (DeAlteris, 1998). Each gangion typically contains a baited hook and chemical night-stick to attract the fish. Traditional or circle hooks may be used.

Swordfish vessels typically fish 20 to 30 hooks per 1.6 km (one mile) of mainline between 5 and 54 km (3 - 34 miles) in length (Sainsbury, 1996). This activity is managed under a Federal fishery management plan. This gear is not expected to have contact with or impacts upon bottom habitats.

*Troll Lines* - Trolling involves the use of a baited hook or lure maintained at a desired speed and depth in the water (Sainsbury, 1996). Usually, two to four or more lines are spread to varying widths by the use of outrigger poles connected to the deck by hinged plates. Line retrieval is often accomplished by means of a mechanized spool. Each line is weighted to reach the desired depth and may have any number of leaders attached, each with a hook and bait or appropriate lure. This gear is generally fished from the surface to about 20 meters (Sainsbury, 1996). This activity is managed under a Federal fishery management plan. This gear is not expected to have contact with or impacts upon bottom habitats.

*Other Gear*

*Rakes* - A bull rake is manually operated to harvest hard clams and consists of a long shaft with a rake and basket attached. The length of the shaft can be variable but usually does not exceed three times the water depth. The length and spacing of the teeth as well as the openings of the basket are regulated to protect juvenile clams from harvest (DeAlteris, 1998). Rakes are typically fished off the side of a small boat. This activity is not managed under a Federal fishery management plan.

*Tongs* - Tongs are a more efficient device than rakes for harvesting shellfish. Shaft-tongs are a scissor-like device with a rake and basket at the end of each shaft. The fisherman stands on the edge of the boat and progressively opens and closes the baskets on the bottom gathering the shellfish into a mound. The tongs are closed a final time, brought to the surface, and the catch emptied on the culling board for sorting. The length of the shaft must be adjusted for water depth. Oysters are traditionally harvested with shaft tongs in water depths up to 6 m (21 ft), with shaft tongs 8 m (29 ft) in length (DeAlteris, 1998).

Patent tongs are used to harvest clams and oysters and are opened and closed with a drop latch or with a hydraulic ram and require a mechanized vessel with a mast or boom and a winch (DeAlteris, 1998). Patent tongs are regulated by weight, length of teeth, and bar spacing in the basket. This activity is not managed under a Federal fishery management plan.

Line Fishing/Handgear/Vertical Gear

*Handlines/Hook and Line* - The simplest form of hook and line fishing is the hand line. It consists of a line, sinker, leader and at least one hook. The line is usually stored on a small spool and rack and can vary in length. The line varies in material from a natural fiber to synthetic nylon. The sinkers vary from stones to cast lead. The hooks are single to multiple arrangements in umbrella rigs. An attraction device must be incorporated into the hook, usually a natural bait and artificial lure (DeAlteris, 1998). Although not typically associated with bottom impacts, this gear can be fished in such as manner so as to hit bottom and bounce or be carried by currents until retrieved. This activity is managed under a Federal fishery management plan.

*Electric or Hydraulic Reel* - Mechanized line hauling systems have been developed to allow more lines to be worked by smaller crews and use electrical or hydraulic power to work the lines on the spools or jigging machines (Sainsbury, 1996). These reels, often termed bandits, are mounted on the vessel bulwarks and have a spool around which the mainline is wound (Sainsbury, 1996). Each line may have a number of branches and baited hooks, and the line is taken from the spool over a block at the end of a flexible arm. This gear is used to target several species of groundfish, especially cod and pollock, and it has the advantage of being effective in areas where other gears cannot be used. Jigging machine lines are generally fished in waters up to 600 m (2000 ft) deep (Sainsbury, 1996). This gear may also have the ability to contact the bottom depending upon the method selected to fish. This activity is managed under a Federal fishery management plan.

*Bandit Gear* – see "Electric or Hydraulic Reel."

*Rod and Reel* – Rod and reel consists of a handheld fishing rod with a manually or electronically operated reel attached. This gear may have the ability to contact the bottom. This activity is managed under a Federal fishery management plan.

*Hand Hoes* - Intertidal flats are frequently harvested for clams and baitworms using hand-held hoes. These are short handled rake-like devices, which are often modified gardening tools (Creaser *et al.*, 1983). Baitworm hoes have 5 to 7 tines, 21 to 22 cm (8.3 - 8.7 ft) in length for bloodworms and 34 to 39 cm (13 – 15 inches) for sandworms. Clam hoes in Maine typically have 4 to 5 tines, 15 cm (6 inches) long (Wallace, 1997). This activity is not managed under a Federal fishery management plan.

*Diving* - By either free diving or using SCUBA, divers collect crustaceans, mollusks and some reef fish in shallow water. Most often a support vessel is used to transport the diver(s) to the fishing site and carry the landings to port. In deeper waters, helmet diving systems are used and the diver is tethered to the vessel with air pumped from the surface. This method is most often used by sea urchin divers and some lobster divers. Divers normally use small rakes or hoes to scrape creatures off rocks or dig them out of the seabed. Generally, the catch is placed in bags, which are either towed to the surface by the boat or floated to the surface using an air source and a lift bag. Divers rarely work deeper than about 20 m (66 ft) (Sainsbury, 1996). This activity is not managed under a Federal fishery management plan.

*Spears/Powerheads* - Spears were initially hand-held, then thrown, then placed in launching devices including cross-bows, spear guns for divers, etc. Spears with long shafts (gigs) are used by fishermen in small boats at night in the Carolina Sounds for flounder, through the ice for eels in New England bays, and by divers for fish in coastal waters (DeAlteris, 1998). In the Southeast, reef fish such as grouper and snapper, as well as pelagic species such as dolphin and mackerel, are targeted by divers (Barnette, 2001). Commercial divers sometimes employ a shotgun shell known as powerhead at the shaft tip. This method is commonly used to harvest large species such as amberjack (Barnette, 2001). This activity is not managed under a Federal fishery management plan.

*Harpoon* – A harpoon consists of a pointed dart or iron attached to the end of a line several hundred feet in length, the other end of which is attached to a flotation device. Harpoon gear is attached to a pole that is propelled only by hand and not by mechanical means. This activity is managed under a Federal fishery management plan.

*Slurp Guns* - Slurp guns are self-contained, handheld devices that capture tropical fish by pulling in seawater that contains target fish. These are typically used on hard bottom substrates and over coral reefs in state and Federal waters. This activity is not managed under a Federal fishery management plan.

*Allowable* Chemical - Collectors of live tropical reef fish commonly employ anesthetics such as quinaldine (Barnette, 2001). Quinaldine (2-methy quinoline, C10H9N) is the cheapest and most available of several substituted quinolines (Goldstein, 1973). This activity is not managed under a Federal fishery management plan.

*Barrier Net* - Barrier nets are used in conjunction with small tropical nets or slurpguns to collect tropical aquarium species. The net is deployed to surround a coral head or outcropping and may or may not have a pocket or bag that fish are "herded" into for capture. Barrier nets may be utilized by tropical fish collectors in both state and Federal waters (Barnette, 2001). This activity is not managed under a Federal fishery management plan.

*Snare* - Recreational divers pursuing spiny lobster often use a long, thin pole that has a loop of coated wire on the end called a snare. The loop is placed around a lobster that may be residing in a tight overhang or other inaccessible location, and then tightened by a pull toggle at the base of the pole in order to capture and extract the lobster (Barnette, 2001). This activity is managed under a Federal fishery management plan.

*Dip net/Bully Net* - Widely utilized to catch baitfish, crabs, or lobster, varieties of dip nets consist of a long pole with a bag of netting of varying mesh size that are lowered into the water. Dip nets may also be employed to capture tropical reef fish, though these utilize a short handle and very fine mesh. Additionally, landing nets or hand bully nets used to capture lobster can be considered a form of dip net. Varieties of dip nets may be used both in state and Federal waters (Barnette, 2001). This activity is managed under a Federal fishery management plan.

*Cast Net* - Used to capture baitfish and shrimp, cast nets are circular nets with a weighted skirt that is thrown over a schooling target. Cast nets are primarily used in shallow areas such as estuaries, though they may be used to catch baitfish offshore in Federal waters (Barnette, 2001). This activity is managed under a Federal fishery management plan.

*Drop Net* - Drop nets are closed-bottom square or circular nets having a square or circular frame attached to the open top of the net. A series of lines run from points on the frame to a single hand line. This allows the net to be lowered into the water to sit flat on the bottom. Bait can be attached to the bottom of the net or dropped onto the water's surface above the net to attract the target species. When the desired species is on or above the net, it is hauled up quickly, presumably capturing the organism. The drop net is also known by the name "lift net", which seems more appropriate. These nets are generally fished in calmer waters with relatively flat sand or mud bottoms in estuarine settings, and are used mostly to catch crabs (GULF FEIS, 2004). This activity is not managed under a Federal fishery management plan.

### 10.4.7 Summary

In summary, NMFS concludes that most HMS gears are having minimal to no impact on HMS EFH or to other species' EFH. Bottom longline gear is one of the only gear types that could have a detrimental effect on the benthic environment, especially if placed in coral reef, hard bottom or SAV habitats. However, bottom longline gear in HMS fisheries is primarily used in sandy and/or muddy habitats where it is expected to have minimal to low impacts. NMFS is aware of actions being taken by the Gulf and Caribbean Fishery Management Councils to minimize fishing impacts in specific habitat areas described earlier. To provide consistency between the Council regulations and HMS regulations, NMFS may consider similar alternatives to prohibit HMS gears in those areas in a subsequent rulemaking. In addition, NMFS will continue to collect the necessary data to determine if these potential adverse effects from bottom longline could be more than minimal and not temporary on non-HMS EFH in a future document.

In general, NMFS has not detected adverse effects from non-HMS fishing gears on HMS EFH. As outlined in Section 10.4.2.1, most HMS EFH is defined as the water column or attributes of the water column (*i.e.*, temperature gradients, frontal boundaries, etc.). Therefore, there are little anticipated cumulative impacts that rise above the threshold of more than minimal and not temporary from non-HMS fishing gears. The only exceptions are nearshore and estuarine shark pupping grounds where bottom tending gears (*i.e.*, trawls and dredges) that dramatically altered the benthic environment and overlap with the EFH of these species may have some negative impact on their EFH. However, habitat types associated with these species' EFH, the degree of overlap between the various bottom tending gears and these species' EFH, the extent to which the habitat is altered by these gears, and the impact these gears have on the EFH are all currently unknown. As data becomes available to NMFS, NMFS will make the determination of whether or not these gears have adverse effects on HMS EFH and if those effects are more than minimal and not temporary in nature.

## 10.5 Non-fishing Impacts to EFH

The EFH regulations require that FMPs identify non-fishing related activities that may adversely affect EFH of managed species, either quantitatively or qualitatively, or both. In addition, the regulations require that Federal agencies consult with NMFS on all actions, or proposed actions that are permitted, funded, or undertaken by the agency, and that may adversely affect EFH. NMFS must then recommend conservation measures to conserve and enhance EFH by avoiding, minimizing, mitigating, or otherwise offsetting the adverse effects to EFH.

Broad categories of activities that may adversely affect HMS EFH include, but are not limited to: (1) actions that physically alter structural components or substrate, *e.g.*, dredging, filling, excavations, water diversions, impoundments and other hydrologic modifications; (2) actions that result in changes in habitat quality, *e.g.*, point source discharges; (3) activities that contribute to non-point source pollution and increased sedimentation; (4) introduction of potentially hazardous materials; or (5) activities that diminish or disrupt the functions of EFH. If these actions are persistent or intense enough, they can result in major changes in habitat quantity as well as quality, conversion of habitats, or in complete abandonment of habitats by some species.

HMS EFH has been identified in estuarine, coastal, and offshore waters. Estuaries and coastal embayments have been identified as particularly important shark nursery areas, while offshore waters contain important spawning and feeding areas for HMS. All of these waters are at one time or another used by humans for a variety of purposes that often result in degradation of these and adjacent habitats, posing threats, either directly or indirectly, to the biota they support. These effects, either alone in combination with (cumulative) effects from other activities within the ecosystem, may contribute to the decline of some species or degradation of the habitat. In some cases such effects may be demonstrated, but they are often difficult to quantify.

Pollutants (*e.g.*, heavy metals, oil and grease, excess nutrients, improperly treated human and animal wastes, pesticides, herbicides and other chemicals) can be introduced into the aquatic environment through a number of routes, including point sources, non-point sources, and atmospheric deposition. These contaminants have been demonstrated to affect finfish and invertebrates by altering the growth, visual acuity, swimming speed, equilibrium, feeding rate, response time to stimuli, predation rate, spawning seasons, migration routes, and resistance to disease and parasites. In addition to the introduction of contaminants that cause direct effects on animal physiology, point and non-point source discharges also affect essential habitat characteristics such as temperature, pH, dissolved oxygen, salinity, and other parameters that affect habitat suitability for individuals, populations, and communities. The synergistic effects of multiple discharge components such as heavy metals and various chemical compounds are not well understood but are increasingly the focus of research efforts. More subtle effects of contaminants, such as endocrine disruption in aquatic organisms and reduced ability to reproduce or compete for food, are also being identified and investigated (Hanson *et al*., 2003).

Non-point source runoff, which is often difficult to detect, may have a more significant impact on coastal water quality, resulting in tighter controls on point source discharges. Activities that tend to increase the input of contaminants to aquatic environments through non-point sources include coastal development, urbanization, certain agriculture and silviculture practices, marina and port development, commercial and recreational boating, and hydromodification. Related activities, such as the use of septic systems and improper disposal or treatment of wastes, can also contribute biological contaminants. Many of these activities can result in large quantities of pesticides, nutrients, and bacteria or pathogens in coastal waters. Excess nutrification is one of the greatest sources of coastal water contamination. Nutrient enrichment can lead to noxious algal blooms, fish kills, and oxygen depletion (as hypoxic or anoxic events). Researchers have found reduced or stressed fisheries populations to be common in areas where hypoxia occurs (Hanson *et al*., 2003).

As required under the EFH regulations, the following discussion identifies non-fishing activities that have the potential to adversely affect HMS EFH. In many cases these activities are regulated under particular statutory authorities. As long as they are regulated within those guidelines, their potential to adversely affect EFH may be reduced, although not necessarily eliminated. Many of the standards that are used to regulate these activities are based on human health needs and do not consider long-term impacts on fish and fish habitats. Additionally, if the activity fails to meet, or is operated outside of, its permitted standards, it may adversely affect EFH. The EFH regulations require NMFS and the Councils to identify actions with the potential to adversely affect EFH, including its biological, chemical and physical characteristics. The EFH regulations also recommend the examination of cumulative impacts to EFH, as it is possible that multiple permitted actions, while each is operating within its respective regulatory bounds, may, when combined with others, cause adverse impacts to EFH. The following sections encompass a broad range of activities so as to ensure that their potential to adversely affect HMS EFH has been identified.

The review of habitat use undertaken for HMS identified both benthic and water column habitats in coastal, estuarine and offshore areas as EFH, although in many cases the particular habitat characteristics that influence species habitat use are not clearly understood or identified. Many of these factors appear to be related to water quality (*e.g.*, temperature, salinity, dissolved oxygen). Therefore, water quality degradation has been a primary focus in this section. When analyzing the impacts that water quality changes can have on HMS EFH, it is important to examine all habitats. EFH for HMS includes offshore areas, but even these distant habitats are affected by actions that originate in coastal habitats (both terrestrial and aquatic) and adjacent estuaries. Many of the HMS aggregate over submarine canyons or along river plumes; these physiographic features can serve as conduits for currents moving from inshore out across the continental shelf and slope, while carrying and redistributing contaminants from the nearshore realm to offshore habitats. Until the precise zones of influence from various river and coastal discharges can be delineated, a precautionary approach should be taken in order to protect the integrity of HMS EFH and the sustainability of the HMS fisheries.

#### *10.5.1.1 Land-based Activities That May Impact HMS EFH*

*Coastal Development*

Coastal development activities include urban, suburban, commercial, and industrial construction, along with development of corresponding infrastructure. These activities may result in erosion and sedimentation, dredging and filling (see following sub-section), point and non-point source discharges of nutrients, chemicals, and cooling water into streams, rivers, estuaries and ocean waters. Industrial point source discharges result in the contamination of water and degradation of water quality by introducing organics and heavy metals or altering other characteristics such as pH and dissolved oxygen. Improperly treated sewage treatment effluent has been shown to produce changes in water quality as a result of chlorination and increased contaminant loading, including solids, phosphorus, nitrogen and other organics, and human pathogens and parasites. Non-point source pollution - that which results from land runoff, atmospheric deposition, drainage, groundwater seepage, or hydrologic modification - results in the deposition of pathogens, nutrients, sediments, heavy metals, oxygen demanding substances, road salts, hydrocarbons and other toxics.

Coastal development can also lead to the destruction of coastal wetlands, resulting in the elimination of protective buffer zones that serve to filter sediments, nutrients, and contaminants - such as heavy metals and pesticides - that are transported to the coastal zone in ground and surface waters. In addition, hydrological modifications associated with coastal development alter freshwater inflow to coastal waters, resulting in changes in salinity, temperature, and nutrient regimes, and thereby contributing to further degradation of estuarine and nearshore marine habitats. The variety of pollutants and the severity of their effects from coastal development activities depend upon a number of factors, such as the nature of the construction, physical characteristics of the site involved, and proximity of the pollutant source to the coastline. However, all of these factors ultimately serve to degrade estuarine and coastal water quality to some degree in terms of dissolved oxygen levels, salinity concentrations, and contaminants. The result can be losses of important flora and fauna.

*Agriculture (and Silviculture)*

Cropland, livestock rangeland, and commercial nursery grounds can be connected to coastal waters and inland tributaries. Agricultural and silvicultural practices can affect estuarine, coastal and marine water quality through nutrient enrichment and chemical contamination from animal wastes, fertilizers, pesticides and other chemicals via non-point source runoff or via drainage systems that serve as conduits for contaminant discharge into natural waterways. Pesticides can adversely affect EFH through direct toxicological impact on the health or performance of exposed fish, an indirect impairment of the productivity of aquatic ecosystems, and a loss of aquatic vegetation that provides physical shelter for fish. In addition, uncontrolled or improper irrigation practices can contribute to non-point source pollution, and may exacerbate contaminant flushing into coastal waters. Major impacts also include nutrient over-enrichment with subsequent deoxygenation of surface waters; algal blooms, which can also produce hypoxic or anoxic conditions and stimulation of toxic dinoflagellate growth. Excessively enriched waters often will not support fish, and may also not support food web assemblages and other ecological assemblages needed to sustain desirable species and populations. Agricultural activities also increase soil erosion and associated sediment transport in adjacent water bodies, resulting in high turbidity. Many of these same concerns may apply to silviculture as well.

#### *10.5.1.2 Coastal and Offshore Activities That May Impact HMS EFH*

*Dredging and Disposal of Dredge Material*

Dredging operations occur in estuaries, nearshore areas, and offshore in order to maintain certain areas for activities such as shipping, boating, construction of infrastructure (*e.g.*, offshore oil and gas pipelines), and marine mining. Disposal of the dredged material takes place in designated open water disposal areas, often near the dredge site. These operations result in negative impacts on the marine environment. Of particular concern regarding HMS EFH is the temporary degradation of water quality due to the resuspension of bottom materials, resulting in water column turbidity, potential contamination due to the release of toxic substances (metals and organics), and reduced oxygen levels due to the release of oxygen-consuming substances (*e.g.*, nutrients, sulfides). Even with the use of approved practices and disposal sites, ocean disposal of dredged materials is expected to cause environmental harm since contaminants will continue to be released, and localized turbidity plumes and reduced oxygen zones may persist.

*Aquaculture and Mariculture*

Aquaculture is an expanding industry in the United States, with most facilities located in farmland, tidal, intertidal and coastal areas. Aquaculture related impacts that adversely affect the chemical and biological nature of coastal ecosystems include the discharge of excessive waste products and the release of exotic organisms and toxic substances. Problems resulting from the introduction of food and fecal wastes may be similar to those resulting from certain agricultural activities. However, greater nutrient input and localized eutrophic conditions are currently the most probable environmental effects of aquaculture activities. Extremely low oxygen levels and fish kills, of both natural stocks and cultured fish, have been known to occur in impounded wetlands where tidal and wind circulation are severely limited and the enclosed waters are subject to solar heating. In addition, there are impacts related to the dredging and filling of wetlands and other coastal habitats, as well as other modifications of wetlands and waters through the introduction of pens, nets, and other containment and production devices.

*Navigation*

Navigation-related threats to estuarine, coastal, and offshore environments that have the potential to affect HMS EFH include navigation support activities such as excavation and maintenance of channels (including disposal of excavated sediments) which result in the elevation of turbidity and resuspension of contaminants; construction and operation of ports, mooring and cargo facilities; construction of ship repair facilities; and construction of channel stabilization structures such as jetties and revetments. In offshore locations the disposal of dredged material is the most significant navigation related threat, resulting in localized burial of benthic communities and degradation of water quality. In addition, threats to both nearshore and offshore waters are posed by vessel operation activities such as the discharge and spillage of oil, other hazardous materials, trash and cargo, all of which may result in localized water quality degradation and direct effects on HMS, especially eggs, larvae and neonates that may be present. Wakes from vessel operation may also exacerbate shoreline erosion, effecting habitat modification and potential degradation.

*Marinas and Recreational Boating*

Marinas and recreational boating are increasingly popular uses of coastal areas. As marinas are located at the water's edge, there is often no buffering of associated pollutants released into the water column. Impacts caused by marinas include lowered dissolved oxygen, increased temperatures, bioaccumulation of pollutants by organisms, toxic contamination of water and sediments, resuspension of sediments and toxics during construction, eutrophication, change in circulation patterns, shoaling, and shoreline erosion. Pollutants that result from marina activities include nutrients, metals including copper released from antifouling paints, petroleum hydrocarbons, pathogens, and polychlorinated biphenyls. Also, chemicals commonly used to treat timber used for piers and bulkheads (*e.g.*, creosote, copper, chromium, and arsenic salts) are introduced into the water. Other potential impacts associated with recreational boating are the result of improper sewage disposal, fuel and oil spillage, cleaning operations, and disposal of fish waste. Propellers from boats can also cause direct damage to multiple life stages of organisms, including eggs, larvae/neonates, juveniles and adults; destratification; elevated temperatures, and increased turbidity and contaminants by resuspending bottom materials.

*Marine Sand and Minerals Mining*

Mining for sand (*e.g.*, for beach nourishment projects), gravel, and shell stock in estuarine and coastal waters can result in water column effects by changing circulation patterns, increasing turbidity, and decreasing oxygen concentrations at deeply excavated sites where flushing is minimal. Ocean extraction of mineral nodules is a possibility for some non-renewable minerals now facing depletion on land. Such operations are proposed for the continental shelf and the deep ocean proper. Deep borrow pits created by mining may become seasonally or permanently anaerobic. Marine mining also elevates suspended materials at mining sites, creating turbidity plumes that may move several kilometers from these sites. Resuspension of sediments can affect water clarity over wide areas, and could also potentially affect pelagic eggs and larvae. In addition, resuspended sediments may contain contaminants such as heavy metals, pesticides, herbicides, and other toxins.

*Offshore Oil and Gas Operations*

Offshore oil and gas operations (exploration, development, production, transportation and decommissioning) pose a significant level of potential threat to marine, coastal and estuarine ecosystems. Exploration and recovery operations may cause substantial localized bottom disturbance. However, more pertinent to HMS is the threat of contaminating operational wastes associated with offshore exploration and development, the major operational wastes being drilling muds and cuttings and formation waters. In addition, there are hydrocarbon products, well completion and work-over fluids, spill clean-up chemicals, deck drainage, sanitary and domestic wastes, ballast water, and the large volume of unrefined and refined products that must be moved within offshore and coastal waters.

Potential major contaminants used in oil and gas operations may be highly saline; have low pH; contain suspended solids, heavy metals, crude oil compounds, and organic acids; or may generate high biological and chemical oxygen demands. Also, accidental discharges of oil - crude, diesel and other oil products - and chemicals can occur at any stage of exploration, development, or production, the great majority of these being associated with product transportation activities. Blowouts and associated oil spills can occur at any operational phase when improperly balanced well pressures result in sudden, uncontrolled releases of petroleum hydrocarbons. To remove fixed platforms, explosives are frequently used. All of these activities result in harmful effects on marine water quality as well as the biota in the vicinity.

In the Gulf of Mexico, Outer Continental Shelf (OCS) oil and gas operations are extending to deeper and deeper waters, throughout which HMS are known to range. Locations such as the De Soto Canyon area in the northern Gulf and the Blake Plateau north of the Bahamas repeatedly appear in the analysis of HMS EFH as highly productive areas important to many of these species. Oil and gas production in these areas should be discouraged because of the potential impact on HMS EFH in these areas.

Considerable documentation exist that highlights the benefits of offshore production platforms as artificial reefs that attract numerous species of fishes, including HMS. It is likely that the attraction of these species to the platforms increases the potential for exposure to contaminants they may release into the aquatic environment.

*Liquid Natural Gas Development*

Liquefied natural gas, or LNG, is natural gas in its liquid form. By cooling natural gas to minus 259° F (-161° C), it becomes a clear, colorless, odorless liquid. LNG is neither corrosive nor toxic. Natural gas is primarily methane, with low concentrations of other hydrocarbons, water, carbon dioxide, nitrogen, oxygen and some sulfur compounds. During the process known as liquefaction, natural gas is cooled below its boiling point, removing most of these compounds. The remaining natural gas is primarily methane with only small amounts of other hydrocarbons. LNG weighs less than half the weight of water so it will float if spilled on water.

Ships unload LNG at specially designed terminals where the LNG is pumped from the ship to insulated storage tanks at the terminal. LNG is also converted back to gas at the terminal, which is connected to natural gas pipelines that transport the gas to where it is needed. Specially designed trucks may also be used to deliver LNG to other storage facilities in different locations. There has been an increase in the number of LNG terminals authorized for use in the Atlantic Ocean including the Gulf of Mexico (Federal Energy Regulatory Commission, 2005). Many of the offshore proposals in the Gulf of Mexico propose the use of an open-loop, or once through, regasification technology that may utilize 100 – 200 million gallons of seawater per day. These facilities can subject early life stages of marine species to entrainment, impingement, thermal shock, and water chemistry changes. Mortality caused by open-loop LNG facilities could affect the health of some marine fisheries, including bluefin tuna.

*Ocean Dumping*

The disposal of dredged sediments and hazardous and/or toxic materials (*e.g.*, industrial wastes) containing concentrations of heavy metals, pesticides, petroleum products, radioactive wastes, pathogens, etc., in the ocean degrades water quality and benthic habitats. These effects may be evident not only within the immediate vicinity of the dumping activity, but also at farther locations, as well, due to current transport and the potential influence of other hydrographic features. The disposal of uncontaminated dredged material, including adverse effects on EFH and appropriate conservation measures are addressed in Section 6.6.2.4 of this chapter. Disposal of hazardous and toxic materials by U.S. flag vessels and vessels operating in the U.S. territorial sea and contiguous zone is currently prohibited under the Marine Protection Research and Sanctuaries Act (MPRSA), although under certain circumstances the Environmental Protection Agency may issue emergency permits for dumping industrial wastes into the ocean. Major dumping threats to the marine environment are therefore limited mostly to illegal dumping and accidental disposal of material in unauthorized locations. However, given the amount of debris that is deposited along the Nation’s beaches every year, including hazardous materials such as medical wastes, it is evident that effects from such dumping may be substantial.

### 10.5.2 Cumulative Impacts

The EFH regulations suggest that cumulative impacts should be analyzed for adverse effects to EFH. Cumulative impacts on the environment are those that result from the incremental impact of actions added to other past, present and reasonably foreseeable future actions. Such cumulative impacts generally occur in inshore and estuarine areas, and can result from individually minor, but collectively significant, actions taking place over a period of time.

These impacts include water quality degradation due to nutrient enrichment, other organic and inorganic contaminants associated with coastal development, activities related to marine transportation, and loss of coastal habitats, including wetlands and sea grasses. The rate and magnitude of these human-induced changes on EFH, whether cumulative, synergistic, or individually large, is influenced by natural parameters such as temperature, wind, currents, rainfall, salinity, etc. Consequently, the level of threat posed by a particular activity or group of activities may vary considerably from location to location. These multiple effects can, however, result in adverse impacts on HMS EFH.

Wetland loss is a cumulative impact that results from activities related to coastal development: residential and industrial construction, dredging and dredge spoil placement, port development, marinas and recreational boating, sewage treatment and disposal, industrial wastewater and solid waste disposal, ocean disposal, marine mining, and aquaculture. In the late 1970s and early 1980s the country was losing wetlands at an estimated rate of 300,000 acres per year. The Clean Water Act and state wetland protection programs have helped to decrease wetland losses to 117,000 acres per year, between 1985 and 1995. Estimates of wetlands loss vary according to the different agencies. The USDA estimates attributes 57 percent wetland loss to development, 20 percent to agriculture, 13 percent to deepwater habitat, and ten percent to forest land, rangeland, and other uses. Of the wetlands lost to uplands between 1985 and 1995, the U.S. Fish and Wildlife Service estimates that 79 percent of wetlands were lost to upland agriculture. Urban development, and "other" types of land use activities were responsible for six percent and 15 percent, respectively.

Nutrient enrichment has become a major cumulative problem for many coastal waters. Nutrient loading results from the individual activities of coastal development, non-point source pollution, marinas and recreational boating, sewage treatment and disposal, industrial wastewater and solid waste disposal, ocean disposal, agriculture, and aquaculture. Excess nutrients from land based activities accumulate in the soil, pollute the atmosphere, pollute ground water, or move into streams and coastal waters. Nutrient inputs are known to have a direct effect on water quality. For example, in extreme conditions excess nutrients can stimulate excessive algal blooms or dinoflagellate growth that can lead to increased turbidity, decreased dissolved oxygen, and changes in community structure, a condition known as eutrophication. Examples of such dinoflagellates or algae include *Gymnodinium breve,* the dinoflagellate that causes neurotoxic shellfish poisoning, dinoflagellates of the genus *Alexandrium,* which causes paralytic shellfish poisoning, *Aureococcus anophagefferens,* the algae which causes "brown tides", and diatoms of the genus *Pseudo-nitzschia* which cause amnesic shellfish poisoning. *Pfiesteria piscicida* is a recently-described toxic dinoflagellate that has been documented in the water column in coastal areas of Delaware, Maryland, and North Carolina. Another *Pfiesteria*-like organism has been documented in St. John's River, FL. This organism has been associated with fish kills in some areas.

In addition to the direct cumulative effects incurred by development activities, inshore and coastal habitats are also jeopardized by persistent increases in certain chemical discharges. The combination of incremental losses of wetland habitat, changes in hydrology, and nutrient and chemical inputs produced over time, can be extremely harmful to marine and estuarine biota, resulting in diseases and declines in the abundance and quality of the affected resources.

Future investigations will seek to analyze cumulative impacts within specific geographic locations (certain estuarine, coastal and offshore habitats) in order to evaluate the cumulative impacts on HMS EFH. Information and techniques that are developed for this process will be used to supplement future revisions of these EFH provisions as the information becomes available.

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# 11.0 OTHER CONSIDERATIONS

## 11.1 National Standards

The analyses in this document are consistent with the National Standards (NSs) and their guidelines set forth in the 50 CFR part 600 regulations. The following descriptions are a summary of how the preferred alternatives are consistent. More information can be found in Chapters 1, 2, 3, 4, 6, 7, 8, and 9.

NS 1 requires NMFS to prevent overfishing while achieving, on a continuing basis, the Optimum Yield (OY) from each fishery for the U.S. fishing industry. As summarized in Chapter 3, over the past years, NMFS has undertaken numerous management actions, including the 1999 FMP, Amendment 1 to the 1999 FMP, and Amendment 1 to the Billfish FMP, to address overfishing and to rebuild HMS stocks. The preferred alternatives in this HMS FMP are consistent with ongoing management efforts to rebuild, manage, and conserve target species and with the NS 1 guidelines.

- The preferred measures in this action for workshops should support those ongoing management efforts consistent with NS 1. While the preferred workshop alternatives do not directly impact fishing effort, the HMS identification workshops for shark dealers may improve the estimates of fishing mortality rates and MSY for sharks, and thus, enhance management efforts aimed at preventing overfishing and achieving OY.
- The preferred Madison-Swanson and Steamboat Lumps closures should support efforts aimed at achieving OY for gag grouper and may have some minor positive ancillary benefits for HMS. The preferred alternative to establish criteria for time/area closures would clarify the process NMFS uses to consider the status of the species before establishing or modifying time/area closures.
- The preferred alternative for northern albacore tuna would establish the foundation to implement domestically an international rebuilding plan that the United States would, during international negotiations, seek to develop in a manner that is consistent with the Magnuson-Stevens Act.
- The preferred alternative for finetooth sharks would identify sources of fishing mortality in order to implement appropriate management measures. Historically there have been approximately five vessels "targeting" sharks with drift gillnets or strikenets and observer data indicate that their landings comprise only a small portion of the total finetooth shark landings. Observer coverage was recently expanded to other gillnet vessels that catch sharks but target other species. These data indicate that these vessels use variations of gillnet and are also responsible for finetooth shark landings. As part of the plan to prevent overfishing, NMFS intends to collect more detailed information on finetooth shark landings and then address this issue through directed management measures and/or collaborative management with Regional Fishery Management Councils, state, or other management entities. These data will

be used for future stock assessments and to develop effective management measures to prevent overfishing of finetooth sharks.

- The preferred alternatives for the directed Atlantic billfish fishery support international management efforts aimed at preventing overfishing and rebuilding billfish stocks by addressing the contribution of U.S. anglers to Atlantic-wide landings and mortalities and implementing international recommendations.
- The preferred BFT alternatives would not increase overall fishing effort or the overall U.S. quota allocation from ICCAT and are consistent with ICCAT's western Atlantic BFT rebuilding program. The adjustment of the fishing year is largely administrative and would not likely impact fishing effort, catch, or age/size at harvest.
- The authorized fishing gear and regulatory housekeeping preferred alternatives would not increase fishing effort on target species beyond domestic and/or ICCAT-adopted quotas.

NS 2 requires that conservation and management measures be based on the best scientific information available. The preferred alternatives in this HMS FMP are consistent with this NS.

- One of the goals for the workshop alternatives is to improve the quality of the scientific information used in population assessments and in estimating bycatch and bycatch mortality. Pelagic and bottom longline and gillnet owners and operators would be trained to correctly identify protected species, thereby improving the quality of logbook data. HMS permitted shark dealers would be trained to identify sharks, either in whole or log form, thereby improving the accuracy of dealer reports.
- The time/area closure alternatives are based on up-to-date logbook and observer data and were analyzed using models, which are based on generally accepted principles in fisheries science, to analyze the range of potential impacts. Additionally, the preferred alternative to establish criteria for time/area closures should help ensure that the most up-to-date information and science is taken into account when new closures are being considered.
- The preferred alternative for northern albacore tuna is based on the most recent stock assessment results and the most up-to-date landings data submitted to ICCAT.
- The preferred alternative for finetooth sharks is based on the 2002 SCS stock assessment, which constitutes the best available scientific information. As described in Section 3.2.5.3, there was a lack of bycatch data and inconsistent catch series data when this assessment was conducted. The preferred alternative seeks to gain additional finetooth shark landings data through expanded observer coverage, contacting states to obtain landings data and including finetooth sharks as a select species for bycatch reporting in the Gulf of Mexico Shrimp Trawl Fishery Observer Program.
- The analyses and preferred measures for Atlantic billfish are based on the best available scientific information, including the latest information available on the post-release mortality of Atlantic white marlin and other species.

- For BFT, the preferred alternatives consider the most recent biological information to determine the availability of BFT both geographically and temporally. The alternatives also consider current and historical harvest rates and fishing patterns to establish the General category time periods and subquota allocations. The BFT quota allocation recommended by ICCAT is based on the most recent stock assessment (2002). BFT management measures, along with management measures for other ICCAT species, may be reconsidered after the upcoming 2006 BFT stock assessment.
- The preferred alternative regarding the fishing year may slightly enhance the availability and utility of scientific information for international stock assessments and management reviews since the data would be reported in a way that would be consistent with most other international information.
- The potential impacts of preferred authorized fishing gear alternatives and regulatory housekeeping alternatives were analyzed using the best scientific information available including logbook data.

NS 3 requires that, to the extent practicable, an individual stock of fish be managed as a unit throughout its range, and interrelated stocks of fish be managed as a unit or in close coordination. The preferred alternatives in this HMS FMP are consistent with this NS.

- Many of the preferred alternatives – including the workshop, time/area closure, fishing year, authorized gear, and regulatory housekeeping alternatives – do not influence the HMS management units or the geographic scope of the fishery.
- The preferred alternative for finetooth sharks would ensure that finetooth sharks continue to be managed within the SCS complex throughout their range, which includes the south Atlantic, Gulf of Mexico, and Caribbean. NMFS intends to seek collaborative efforts with states and Regional Fishery Management Councils in these regions to address comprehensively finetooth shark fishing mortality throughout the species' range.
- The preferred alternatives for northern albacore tuna and the directed billfish fishery apply uniformly to albacore tuna and billfish stocks within those portions of their ranges over which the United States has jurisdiction, thereby facilitating management as a unit. In addition, the United States continues to participate at ICCAT to further conservation and management of HMS species through international rebuilding efforts.
- The preferred alternatives to change the time-period allocations for the BFT General category ensure that the fishery is managed throughout the geographic scope of that fishery.

NS 4 requires that conservation and management measures do not discriminate between residents of different states. Furthermore, if it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation should be fair and equitable to all fishermen; be reasonably calculated to promote conservation; and, should be carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.  The preferred alternatives in this HMS FMP are consistent with this NS.

- The workshop alternatives are consistent because they would apply to any individual that owns or operates an HMS permitted vessel that uses longline or gillnet gear and any Federally permitted shark dealers.
- With regard to time/area closures, while fishermen who live near a closure could be affected more by the closure than fishermen in other states, as explained in the NS 8 discussion below, the Madison-Swanson and Steamboat Lumps closures are not expected to have substantial economic impacts on HMS fishermen and would be closed to all HMS fishermen other than those surface trolling from May to October, regardless of what state they are from or how far they need to travel.  The preferred alternative to establish closure criteria would not have direct impacts on fishermen; potential impacts of specific closures would be evaluated as those closures are considered in the future.
- Under the preferred alternative for finetooth sharks, the current overall quota of 454 mt dw for SCS and the regional and/or trimester quota distributions applies to residents of all states and would not be modified.
- The preferred alternatives for Atlantic billfish and northern albacore tuna do not discriminate between residents of different states or allocate or assign fishing privileges.  Any reductions in the fishing mortality rates for these species are necessary throughout their ranges.
- The preferred BFT management measure to revise the General category time-period subquotas consistent with recent trends in BFT availability along the coast would ensure more opportunity for fishermen in all of the states to have access to the resource when it is available in their area.  Even if this action were to be considered an allocation, it is fair and equitable because the fishery is a coast-wide fishery and the action would promote access to the resource throughout the BFT range.  In addition, it is consistent with the BFT rebuilding program and ongoing conservation and management efforts.  The other preferred BFT alternatives (*e.g.*, establishing inseason criteria) would implement overall improvements in the BFT management process with no differing impacts on residents of different states.
- The adjustment of the fishing year in conjunction with implementation of the ICCAT marlin landings limit could have minor indirect impacts that may be slightly greater in certain regions of the nation.  However, none of the fishing year alternatives would directly allocate or assign fishing privileges among various U.S. fishermen, and all are intended to enhance conservation and management of the HMS fisheries.
- None of the authorized fishing gear and regulatory housekeeping preferred alternatives discriminate between residents of different states or allocate or assign fishing privileges.

NS 5 requires that conservation and management measures should, where practicable, consider efficiency in the utilization of fishery resources with the exception that no such measure shall have economic allocation as its sole purpose. The preferred alternatives in this HMS FMP are consistent with this NS.

- The preferred workshop alternatives would not directly impact the efficiency in the utilization of the fishery resources. To the extent that the workshops teach fishermen how to remove protected resources from fishing gear in an efficient manner that maximizes survival and improve species identification, the workshops could have some benefits.
- The preferred Madison-Swanson and Steamboat Lumps closures are not expected to have significant economic impacts, and no direct impacts are expected from the closure criteria. Neither this alternative nor the criteria alternative is expected to change efficiency in the utilization of fishery resources.
- The preferred alternatives for northern albacore tuna and finetooth sharks would have no impacts on efficiency in the short-term as they would not implement new regulatory requirements on the fisheries at this time.
- The preferred billfish alternatives consider efficiency, where practicable, by tailoring the circle hook and bait requirements, as opposed to applying them across the whole fishery, and by proposing a mechanism for implementing inseason regulatory adjustments.
- The preferred BFT inseason action alternative would consolidate criteria used for inseason and annual adjustments, and thus, could increase consistency in the inseason criteria and transparency in the management process. Having the flexibility to modify the regulations in response to variation in the fishery and the resource could also promote efficiency. One of the preferred BFT alternatives would ensure that excessive amounts of quota do not accumulate in any particular domestic quota category by allowing NMFS to limit the amount of underharvest that can be carried forward, if warranted. Excess quota would be rolled over to the Reserve or to other domestic quota categories. Thus, the alternative provides reasonable fishing opportunities, while ensuring efficient use of the resource.
- The preferred fishing year alternative should improve efficiency and transparency of managing HMS fisheries.
- The authorized fishing gear preferred alternatives consider efficiency, where practicable, and would allow fishermen some flexibility in rigging gears for speargun and buoy gear as well as flexibility in their choices of cockpit gear. This flexibility should allow different segments of the HMS fisheries to choose or rig gears in ways that maximize their efficiency in a particular area.
- The preferred alternatives for regulatory housekeeping are not expected to impact the efficiency of using the fishery resources. Requiring that the dorsal and anal fins remain on the shark could alter the efficiency of the fishery slightly, but should improve the data and conservation of the fishery and resource. In addition, the option

of submitting dealer reports over the internet, once such a system is available, could provide a more efficient and flexible method of reporting.

NS 6 states that conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches. The preferred alternatives for this HMS FMP are consistent with this NS.

- The workshop alternatives provide that the workshop requirements could be adjusted through a regulatory framework adjustment. Such adjustments would account for any unexpected changes in the HMS fisheries attributable to fishing practices, gear, effort, or the improved knowledge of safe-handling and release methods.
- The preferred alternative for time/area closure criteria specifically takes into account variations in fisheries and fishery resources by providing criteria to be applied in modifying or adding new closures either through the framework or FMP amendment process. The Madison-Swanson and Steamboat Lumps closures take variations in fisheries into account by allowing surface trolling during prime fishing months.
- The preferred alternatives for finetooth sharks and northern albacore tuna would not affect any previous measures implemented to protect against social, economic, or ecological uncertainties that may arise in HMS fisheries.
- The preferred alternatives for the directed Atlantic billfish fishery provide needed flexibility in allowable hooks and baits, as well as in both the mechanism for implementing inseason regulatory adjustments, and the measures considered for inseason adjustment.
- The preferred BFT management measures acknowledge the variation in the BFT fishery, resource, and catches, and improve NMFS' ability to account for these variations and make changes to the management actions to ensure a reasonable fishing opportunity throughout the management unit. The preferred management measures also provide the industry with consistent baseline annual quotas from year to year until ICCAT modifies the recommended U.S. BFT TAC. The preferred BFT management measures continue to provide a reserve to compensate for uncertainty in estimating domestic harvest, stock conditions, or environmental factors. Furthermore, one of the preferred alternatives allows for the transfer of unharvested quota to cover the overharvest of another gear category, compensating for the uncertainties in these fisheries. The preferred inseason action criteria for BFT would continue to allow NMFS to account for variability in the fishery or resource and provide for greater consistency in the factors considered for all inseason actions.
- Changes in the management cycle timeframe would not impact existing regulations that have been implemented to protect against social, economic, or ecological uncertainties, consistent with ICCAT recommendations.
- The preferred authorized fishing gear alternatives would allow for variability in the fishery and resource by allowing fishermen some flexibility in rigging gears for speargun and buoy gear as well as flexibility in their choices of cockpit gears. This flexibility would allow segments of the HMS fisheries to choose or rig gears

according to the current limits and season. Some of the regulatory housekeeping alternatives allow for more flexibility and variation. For example, clarifying the definitions for pelagic and bottom longline fishing gear should alleviate some confusion regarding bottom longline fishing in pelagic longline closed areas. Most of the preferred alternatives for regulatory housekeeping do not address variations or contingencies in the fishery.

NS 7 states that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication. The preferred alternatives in this HMS FMP duplicate other regulations.

- The costs associated with the preferred workshop alternatives include possible lost fishing time or other opportunity costs and travel to the workshops. These costs would be mitigated by holding workshops when fishing activity is anticipated to be slow and in locations in the vicinity of the longline and gillnet communities as well as in the vicinity of shark dealers. Nevertheless, time spent at these workshops will provide valuable skills that may offset some of the costs associated with attending the workshops. Linking the workshop certification to the permit renewal would facilitate enforcement of the requirements. The workshop alternatives are not anticipated to shift costs to another sector, such as a local government or the private sector. NMFS considered the burden of training owners, operators, and crew of vessels using longline and gillnet gear in the analysis of alternatives. However, the bycatch mortality reduction benefit of training the larger universe of owners, operators, and crew does not appear to outweigh the costs (*e.g.*, administrative burden, lost fishing, and time away from other responsibilities) of requiring everyone to attend. Thus, NMFS is preferring to require just the owners and operators of those vessels, not the crew, to attend the workshops. However, members of the larger universe other than owners and operators would be allowed to attend workshops on a voluntary basis. The same analyses were true for the HMS identification workshops. Training all of the HMS dealers, anglers, and commercial vessel owners and operators versus just the shark dealers would not improve the shark data collection enough to justify the costs.
- The preferred alternatives for time/area closures are expected to have minimal costs. Few HMS commercial longline fishermen reported fishing in the complementary Madison-Swanson and Steamboat Lumps closures and surface trolling would be allowed during prime recreational fishing months. NMFS does not expect any costs to be associated with the criteria for time/area closures.
- The preferred alternatives for the directed Atlantic billfish fishery may result in minor, short-term compliance costs, due to the initial purchase of circle hooks. However, in the long-term, there may be *de minimus* economic benefits to recreational fishermen because circle hooks typically cost less than J hooks. Additionally, allowing the continued use of J-hooks outside of tournaments and with artificial baits in tournaments minimizes costs by allowing fishermen to utilize their existing stockpile of J-hooks. Delaying the effective date also provides recreational

fishermen a chance to utilize existing stockpiles of J-hooks, and allows fishermen to replace J-hooks which they would have used with natural baits in tournaments with lower cost circle hooks over time.

- The preferred BFT alternatives take into consideration recent trends in BFT availability and attempt to provide greater fishing opportunities for all fishermen in this coast-wide fishery. Further, the preferred alternatives are also aimed at improving the efficient utilization of the available quota by improving NMFS' ability to make inseason adjustments and allowing NMFS to be responsive to the annual and seasonal variability in the fishery. While there may be some costs associated with revising the General category time-period and subquota allocations (*e.g.*, less quota would be available for fishermen in northern states), as discussed further under NS 8, any economic impacts are expected to be minor.
- The preferred alternative for adjusting the fishing year appears to minimize costs while maximizing benefits.
- The preferred alternatives for northern albacore tuna, finetooth sharks, authorized gears, and most of regulatory housekeeping do not impose any costs on the fishermen. A few of the regulatory housekeeping alternatives would impose minimal costs on fishermen. The requirement to leave the anal and second dorsal fin on the shark could have some minor impact on the cost of fishing but these impacts would be less than the impact of requiring all fins to remain on the shark.

NS 8 states that conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to provide for the sustained participation of such communities, and to the extent practicable, minimize adverse economic impacts on such communities. The preferred alternatives for this HMS FMP are consistent with this NS.

- The preferred alternatives for workshops are not anticipated to have a negative impact on the sustained participation of any HMS fishing communities. Workshops would be held near these communities and at times when the fishing activities are slow in order to minimize, to the extent practicable, any negative economic or social impacts.
- The preferred time/area closure alternatives of establishing criteria and implementing complementary closures would not have significant, adverse economic impacts or impacts on fishing communities. Few commercial sets have been reported set in the Madison-Swanson and Steamboat Lumps closures in recent years and surface trolling are allowed during prime recreational fishing months.
- The preferred alternatives for finetooth sharks and northern albacore tuna are not expected to result in any adverse social or economic impacts to fishing communities because no new regulations are being implemented as a result of this action.
- While some communities may experience heightened localized impacts if angler behavior substantially changes, the preferred alternatives for the directed billfish fishery are anticipated to minimize any economic impacts on the fishery as a whole as well as sustain participation in the directed Atlantic billfish fishery.

- The Atlantic BFT management measures are designed to ensure a reasonable fishing opportunity is provided throughout the BFT range. There may be some negative economic impacts for fishermen participating in the early portion of the season because this action would reduce the current General category time-period and subquota allocations for the early season (*e.g.*, when BFT are available for fishermen off northern states) in order to provide for a winter fishery for fishermen off southern states. However, any such impacts are expected to be minor, and NMFS, in developing BFT alternatives, took into consideration traditional fishing patterns in New England as well as recent trends in BFT availability. The other preferred alternatives would adjust BFT management procedures and are not expected to have any adverse economic or social impacts.
- Changing the fishing year for HMS fisheries to make them consistent with the calendar year is not expected to have a negative impact on the sustained participation of any HMS fishing communities. However, due to the combination of the 250-fish limit on billfish and this preferred alternative, some communities may notice short-term impacts and may need to adjust to either earlier tournaments, if possible, or catch-and-release only tournament. Communities that rely on more than billfish tournaments are unlikely to notice any impacts.
- Authorizing additional fishing gears and the preferred regulatory housekeeping alternatives are not anticipated to have a negative impact on the sustained participation of any HMS fishing community.

NS 9 states that conservation and management measures shall, to the extent practicable, minimize bycatch, and to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. The NS 9 guidelines provide that, when determining whether actions minimize bycatch and bycatch mortality to the extent practicable, several factors should be considered, consistent with other national standards and maximization of net benefits to the Nation. NMFS has taken those factors into consideration throughout the HMS FMP.

- The protected species workshops for pelagic longline, bottom longline, and gillnet fishermen are aimed at reducing the bycatch mortality of sea turtles, smalltooth sawfish, and other non-target species. These workshops would train the owners and operators of vessels using longline and gillnet gear in the safe release and disentanglement protocols, enabling the owners and operators to return these species to the sea alive, thus minimizing bycatch mortality to the extent practicable.
- NMFS conducted extensive analyses of a wide range of alternatives to see if further time/area closures or modifications of existing time/area closures would provide ecological benefits to all bycatch species. However, the analyses indicated that additional or modified closures would not provide benefits for all bycatch species; closures or combinations of closures may benefit certain species with adverse impacts on others. Additionally, the analyses are based on J-hook data (these hooks are no longer allowed in the pelagic longline fishery) and NMFS is currently evaluating the effect of circle hooks on all bycatch species. At this time, NMFS is preferring the Madison-Swanson and Steamboat Lumps closures to complement existing measures

in the Gulf of Mexico, and a closure criteria alternative that would provide greater transparency in the evaluation of new or modified closures. Complementary closures are expected to minimize bycatch on gag grouper and other reef-dwelling species.

- The preferred alternative for northern albacore tuna is not expected to change bycatch rates of any species because NMFS is not taking any regulatory actions in this FMP for this issue.
- The preferred alternative for finetooth sharks would not result in any significant modifications to fishing gear, effort, or practices currently employed for finetooth sharks in the short term because NMFS is not taking any regulatory actions in this FMP for this issue. Furthermore, the alternative would identify other fisheries that may be contributing to bycatch of finetooth sharks, in which case the agency may recommend measures or seek collaborative efforts to reduce this bycatch.
- The preferred alternatives for the directed billfish fishery are not expected to increase bycatch of Atlantic billfish, as Atlantic billfish released by anglers under the catch-and-release program established for Atlantic billfish are not considered bycatch. The preferred alternatives may substantially reduce the post-release mortality of Atlantic billfish in the directed billfish fishery, consistent with the intent of NS 9. To the extent that using circle hooks in tournaments reduces the bycatch of other species, the preferred alternatives may minimize the bycatch of other fish or marine life.
- The preferred alternatives for BFT, for modifying the fishing year, and for authorizing additional gears are not expected to modify the interaction with bycatch, or to change the bycatch mortality associated with the Atlantic HMS fisheries because overall effort across the fishery is not expected to change as a result of the actions in this Consolidated HMS FMP. Due to the nature of the gear, NMFS expects little to no bycatch in the recreational speargun fishery. Additionally, available handline data indicate that buoy gear would likely have low bycatch and limited dead discards.
- None of the preferred alternatives for regulatory housekeeping are expected to increase or decrease bycatch rates substantially. The species composition requirement in the definition between pelagic and bottom longline could increase bycatch slightly if fishermen catch greater than five percent of a particular species that is not on the list for the gear they are using. NMFS expects this scenario is unlikely given reported landings and has modified the list of indicator species based on public comment.

NS 10 states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea. The preferred alternatives in this HMS FMP are consistent with this NS.

- No impact to safety of life at sea is anticipated to result from the workshop preferred alternatives. While the preferred workshop alternatives do not require fishing vessels to carry additional gear, the owner and operator would be trained in the proper handling of the gear used for the safe-handling and disentanglement procedures for protected resources. The safe-handling and release gear is light enough that it should not have any impact on the stability of the vessel.

- The preferred alternatives for time/area closures, northern albacore tuna, finetooth sharks, the directed billfish fishery, the fishing year modifications, and the regulatory housekeeping items are not expected to have any effects on safety of human life at sea. None of those preferred alternatives would require fishermen to travel greater distances, fish in bad weather, or otherwise fish in an unsafe manner.
- The preferred management measures for Atlantic BFT are not anticipated to have an impact on safety of life. The BFT General category is managed by time-period subquotas in order to ensure that BFT is available according to traditional and historical fishing patterns and to allow for a winter fishery in the South Atlantic. The preferred alternatives provide an opportunity to fish throughout the BFT range when the tuna are present and available and do not require fishing vessels to carry additional gear. The preferred management alternative was designed to avoid "derby" style fishing and reflects the historical fishing patterns for the New England region and provides an opportunity for the South Atlantic tuna fishermen to participate in the fishery when the tuna have migrated into the area.
- None of the authorized gear alternatives are expected to have an impact on safety of life at sea, partly because fishermen are already using these gears in HMS or other fisheries. However, these gears, such as speargun and secondary cockpit gears, can be dangerous and may create additional hazards to fishermen because they have sharp points and trailing lines that could entangle fishermen. Alternative H2 (authorize recreational harvest of BAYS tunas with speargun gear) may result in fishermen traveling greater distances to find productive fishing grounds, if the speargun and rod and reel sectors compete for fishing areas. While AP members have expressed concern for the safety of individuals using speargun gear, given the safety equipment the fishermen use and their ability to use this gear safely in other fisheries around the world, NMFS does not expect the authorization of this gear to create problems with safety. Alternative H7 clarifies the allowable use of secondary cockpit gears. This alternative would also promote safety at sea by allowing fishermen to use implements specifically designed to gain control of, and subdue, large fish that were captured with authorized primary gears when they are brought alongside the vessel.

## 11.2 Ongoing Management and the Procedure for Adjusting Management Measures

The 1999 FMP, Amendment 1 to the 1999 FMP, and Amendment 1 to the Billfish FMP outlined the process for amending or modifying regulations via regulatory framework adjustment or FMP amendment. The actions that can be done via framework adjustment are also listed in 50 CFR part 635.34, and currently the list includes:

- actions to implement ICCAT recommendations, as appropriate;
- domestic quotas;
- Atlantic tunas Purse Seine category cap on BFT quota;

- commercial retention limits;
- recreational retention limits;
- maximum sustainable yield or optimum yield levels based on the latest stock assessment or updates in the SAFE report;
- species size limits;
- permitting and reporting requirements;
- monitoring and tracking programs (*e.g.*, landing tag);
- composition of the species groups;
- fishing year or season;
- time/area restrictions;
- target catch requirements;
- gear prohibitions, modifications, or use restrictions;
- effort restrictions;
- essential fish habitat;
- any shark species management group based on additions to or removals from the prohibited species list;
- classification system within shark species groups;
- shark management regions and the regional quotas; and,
- quota allocations between shark fishing seasons.

Additions to the list as a result of this Final Consolidated HMS FMP would include:

- changes to the Atlantic blue and white marlin annual landings limit;
- additions, changes, or modifications to time/area closures; and
- workshop requirements.

## 11.3 Consideration of Magnuson-Stevens Act Section 304(g) Measures

Section 304(g) of the Magnuson-Stevens Act sets forth requirements specific to the preparation and implementation of an FMP or FMP amendment for HMS. See 16 U.S.C. 1854(g) for full text. The summary of the requirements of Section 304(g) and an explanation of how NMFS is consistent with these requirements are below. The impacts of each of the preferred management measures and how they meet these requirements are described in more detail in Chapters 2 and 4 of this document.

1. *Consult with and consider the views of affected Councils, Commissioners, and advisory groups.*

NMFS provided the five Atlantic Fishery Management Councils, the Gulf and Atlantic States Marine Fisheries Commissions, and members of the HMS and Billfish Advisory Panels copies of the Issues and Options Paper (released in April 2004), the Predraft of the Consolidated HMS FMP (released in February 2005), and the draft Consolidated HMS FMP (released in August 2005). Additionally, NMFS presented the Issues and Options paper to three of the Regional Fishery Management Councils, the Atlantic States Marine Fisheries Commission, and the HMS and Billfish Advisory Panels; presented the Predraft to all five of the Atlantic Regional Fishery Management Councils, both the Atlantic and Gulf States Marine Fisheries Commissions, and the Advisory Panels; and, presented the draft Consolidated HMS FMP to all five Atlantic Regional Fishery Management Councils, the Atlantic and Gulf States Marine Fisheries Commissions, and the Advisory Panels. NMFS also engaged in active dialog with some of the Regional Fishery Management Councils during the public comment period on the draft Consolidated HMS FMP. Written comments and comments received during the presentations were considered at all stages when preparing this Final Consolidated HMS FMP. NMFS will send the Final Consolidated HMS FMP/FEIS to consulting parties including all five of the Atlantic Regional Fishery Management Councils, both the Atlantic and Gulf States Marine Fisheries Commissions, and the HMS and Billfish Advisory Panels.

2. *Establish an advisory panel for each FMP.*

NMFS established the HMS and Billfish Advisory Panels in 1997 as part of the process for drafting the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks and Amendment 1 to the Atlantic Billfish FMP. As part of this Final Consolidated HMS FMP, NMFS intends to combine those Advisory Panels into one panel that would still provide representation between all user groups and from different geographic locations.

3. *Evaluate the likely effects, if any, of conservation and management measures on participants in the affected fisheries and minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors.*

Throughout this document NMFS has described the effects of the management measures and any impacts on U.S. fishermen. None of the preferred management measures in this Final Consolidated HMS FMP are expected to disadvantage U.S. fishermen in relation to foreign competitors. Some of the preferred alternatives could aid U.S. fishermen by providing a more open and flexible fishing period (*e.g.*, changes to BFT management adjustments) or authorizing additional gear types (*e.g.*, speargun or buoy gear). Some of the non-preferred alternatives may provide potential economic benefits (*e.g.*, modifying time/area closures) or, conversely, adverse economic impacts (*e.g.*, additional time/area closures or prohibition of pelagic longline gear) to U.S. fishermen; however, NMFS has described the reasons why it is not preferring those alternatives. If it becomes necessary to implement those alternatives or types of alternatives in the future, NMFS will minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors.

4. *With respect to HMS for which the United States is authorized to harvest an allocation, quota, or fishing mortality level under a relevant international fishery agreement, provide fishing vessels with a reasonable opportunity to harvest such allocation, quota, or at such fishing mortality level.*

The preferred management measures should not prevent U.S. fishermen from a reasonable opportunity to harvest the quota or landing limit allocated by ICCAT. In the case of Atlantic billfish, NMFS prefers to implement the 250-marlin landing limit and require the use of circle hooks by HMS permitted fishermen when deploying natural baits or natural bait/artificial lure combinations in billfish tournaments. The final rule would codify the U.S. landing limit in U.S. regulations, as established by ICCAT. The ICCAT marlin landing limit alternative was specifically crafted in a manner to allow maximum utilization of the U.S. landing limit without exceeding it and, thus, is both intended and anticipated to provide U.S. fishermen reasonable opportunity to land the full 250 marlin landing limit. For BFT, NMFS prefers alternatives that would ensure more opportunity for fishermen in all of the states to have access to the resource and that would modify the manner in which inseason actions are taken to ensure the quota is taken in an equitable fashion throughout the Atlantic. Regarding swordfish, the preferred alternatives would clarify the definition of handline and authorize the use of buoy gear for targeting swordfish. This could allow U.S. fishermen greater opportunities to harvest the available quota. Unless effort in the swordfish fishery increases, it is unlikely that, in the near future, the United States would catch the entire swordfish quota as adjusted for recent underharvests. In addition, NMFS is not preferring any new time/area closures at this time except for complementary time/area closures to protect gag grouper. These complementary measures would affect all HMS fishermen; however, few HMS sets were reported in those areas. Thus, NMFS does not expect the complementary closures to have any impact on the ability of HMS fishermen to take their ICCAT quotas. Furthermore, NMFS is preferring criteria that would allow NMFS to modify the existing closures and could allow for some of the areas to be re-opened thus providing greater opportunity for U.S. pelagic longline fishermen to take ICCAT quotas, in the future.

5. *Review, on a continuing basis, and revise as appropriate, the conservation and management measures included in the FMP.*

NMFS continues to review the need for any revisions to the existing regulations for HMS. This Final Consolidated HMS FMP is the culmination of one of those reviews.

6. *Diligently pursue, through international entities, comparable international fishery management measures with respect to HMS.*

NMFS continues to work with ICCAT, and other international entities such as CITES, to implement comparable international fishery management measures. To the extent that some of the management measures are exportable, NMFS works to provide foreign nations with the techniques and scientific knowledge to implement similar management measures or conduct experiments to test similar gear modifications.

7. *Ensure that conservation and management measures under this subsection:*
   a. *Promote international conservation of the affected fishery;*

b. *Take into consideration traditional fishing patterns of fishing vessels of the United States and the operating requirements of the fisheries;*

c. *Are fair and equitable in allocating fishing privileges among United States fishermen and do not have economic allocation as the sole purpose; and*

d. *Promote, to the extent practicable, implementation of scientific research programs that include the tagging and release of Atlantic HMS.*

All of the objectives of the Final Consolidated HMS FMP, particularly 1, 2, 4, 5, 6, 8, 9, 12, 14, and 16 (see Section 1.3), indicate how NMFS promotes the international conservation of the affected fisheries in order to obtain optimum yield while maintaining traditional fisheries and fishing gear and minimizing economic impacts on U.S. fishermen. All of the combined management measures in this Final Consolidated HMS FMP are expected to meet these goals.

## 12.0 LIST OF PREPARERS

The development of both the Draft and Final consolidated HMS FMP involved input from many people within NMFS, NMFS contractors, and input from constituent groups including the HMS and Billfish Advisory Panels. Staff and contractors from the Highly Migratory Species Management Division, in alphabetical order, who worked on this document or the documents resulting in this one include:

| | | |
|---|---|---|
| Karyl Brewster-Geisz | Othel Freeman | Ron Rinaldo |
| Megan Caldwell | Kathy Goldsmith | Christopher Rogers |
| Mike Clark | Anthony Kaufman | Margo Schulze-Haugen |
| Craig Cockrell | Sari Kiraly | George Silva |
| Carol Douglas | Brad McHale | Jeron Stannard |
| Joe Desfosse | Sarah McTee | Dianne Stephan |
| Russ Dunn | Mark Murray-Brown | Heather Stirratt |
| Greg Fairclough | Rick Pearson | Jackie Wilson |
| | Chris Rilling | |

The development of this document also involved considerable input from other staff members and Offices throughout NOAA including, but not limited to:

- Other Divisions within the Office of Sustainable Fisheries (Barbara Comstock, John Dunnigan, Peter Fricke, Myles Raizin, Alan Risenhoover);
- The Southeast Fisheries Science Center (Heather Balchowsky, Charles Bergmann, Jose Castro, John Carlson, Enric Cortes, Sheryann Epperly, Eric Prince, John Lamkin, Arietta Venizelos, John Watson);
- The Northeast Fisheries Science Center (Nancy Kohler, Cami McCandless, Lisa Natanson);
- The Southeast Regional Office (David Bernhart, Vicki Cornish, Peter Hood, Dennis Klemm, Juan Levesque, Jennifer Lee, Shelley Norton, Carolyn Sramek);
- The Pacific Islands Regional Office (Collen Bass, Lewis Van Fossen);
- The Office of Habitat Conservation (Karen Abrams, Andy LoSchiavo, David McDuffee);
- The Office of Protected Resources in Silver Spring (David O'Brien);
- The Office of Law Enforcement (Sara Block, Jeff Radonski, Paul Raymond)
- NOAA General Counsel (Meggan Engelke-Ros, Mark Hodor, Adam Issenberg, Caroline Park, Stacey Nathanson, Constance Sathre, Frank Sprtel);
- National Ocean Service (Gerry Hovis, Sean Legeer); and
- NMFS NEPA coordinator (John Hansel).

# 13.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED AND TO WHOM COPIES OF THE EIS WILL BE SENT

Under 304(g)(1)(A) of the Magnuson-Stevens Act, NMFS is required to consult with affected Fishery Management Councils, ICCAT Commissioners and advisory groups, and the Advisory Panels established under the Magnuson-Stevens Act regarding amendments to the HMS FMP. As described below, NMFS provided documents and met with the consulting parties and to the Atlantic and Gulf States Marine Fisheries Commissions at various stages throughout the process. Hard copies and/or CDs of these documents were also provided to anyone who requested copies.

NMFS announced its intent to conduct an Environmental Impact Statement (EIS) and amend the two current FMPs on July 9, 2003 (68 FR 40907). On April 30, 2004 (69 FR 23730), NMFS announced the availability of an Issues and Options Paper and its intent to hold nine scoping meetings (Gloucester, MA; Ocean City, MD; New Orleans, LA; Manteo, NC; San Juan, PR; Destin, FL; Montauk, NY; Port Aransas, TX; and Cocoa Beach, FL). On May 26, 2004 (69 FR 29927), NMFS extended the comment period to July 23, 2004, and announced an additional scoping meeting (Key West, FL). During this time, NMFS presented the Issues and Options Paper to the New England, Mid-Atlantic, and Gulf of Mexico Fishery Management Councils (69 FR 22006, April 23, 2004; 69 FR 31966, June 8, 2004; and 69 FR 36066, June 28, 2004, respectively) and the Atlantic States Marine Fisheries Commission. Council and Commission members from any Council or Commission were invited to attend any of the scoping meetings and to submit comments. A summary of the major comments received during scoping was released in December 2004 and is available on the HMS Management Division webpage at http://www.nmfs.noaa.gov/sfa/hms. Hard copies can be requested at (301) 713-2347 or via fax at (301) 713-1917.

In February 2005, NMFS released the combined Predraft to the Consolidated HMS FMP and annual Stock Assessment and Fishery Evaluation (SAFE) Report. NMFS presented the Predraft document to the five Atlantic Regional Fishery Management Councils (February 9, 2005, 70 FR 6839; February 18, 2005, 70 FR 8345; March 1, 2005, 70 FR 9924; March 11, 2005, 70 FR 12204; April 4, 2005, 70 FR 17068), both the Atlantic and Gulf States Marine Fisheries Commissions, and to the HMS and Billfish Advisory Panels (August 25, 2004, 69 FR 52235). The comments received on the Predraft were summarized in a document released in June 2005. The Predraft and a summary of the comments received on the Predraft are available on the HMS webpage or hard copies can be requested at (301) 713-2347 or via fax at (301) 713-1917. Comments received on both the Issues and Options Paper and the Predraft were considered when drafting and analyzing the ecological, economic, and social impacts of the alternatives presented in both the Draft and Final Consolidated HMS FMPs.

On August 19, 2005, NMFS released the draft Consolidated HMS FMP and its proposed rule (70 FR 48704; 70 FR 48804). The comment period was expected to end on October 18, 2005 (60 days). Additionally, in the proposed rule, NMFS announced that 24 public hearings would be held from Massachusetts to Texas and in the Caribbean. On September 7, 2005, NMFS announced that the New Orleans, LA, and Orange Beach, AL, public hearings would be postponed due to the impact of Hurricane Katrina (70 FR 53146). On September 12, 2005, NMFS announced that the HMS and Billfish Advisory Panels would meet in October 2005 to discuss the draft Consolidated HMS FMP. On September 23, 2005, NMFS announced that the Key West, FL, public hearing would be postponed due to the impact of Hurricane Rita (70 FR 55814). On October 5, 2005, NMFS announced that the comment period was extended until March 1, 2006 (194 days in total), in order to ensure that entities affected by Hurricanes Katrina and Rita that could be impacted by the measures in the draft Consolidated HMS FMP would have an adequate time period in which to provide comments (70 FR 58177). In this same notice, NMFS announced that the Billfish and HMS Advisory Panels meeting scheduled for October 2005 would be delayed and that the Advisory Panels would meet instead on February 21 - 23, 2006. On December 27, 2005 (70 FR 76441), NMFS announced that the hearings that were postponed would be held in January and February 2006. Due to the damage from the hurricanes, the New Orleans, LA, hearing was moved to Houma, LA. In addition to the 24 public hearings, NMFS also attended and presented the draft Consolidated HMS FMP to the five Atlantic Regional Fishery Management Councils (July 29, 2005, 70 FR 43847; August 24, 2005, 70 FR 49567; September 6, 2005, 70 FR 52989; September 16, 2005, 70 FR 54714; and September 20, 2005, 70 FR 55112) and to both the Atlantic States and Gulf States Marine Fisheries Commissions. During the public comment period, NMFS received over 3,300 form letter comments, which were mainly in regard to the proposed billfish measures, and over 200 individual written comments on all issues including the proposed billfish measures. A list of all the entities that provided written comments is available upon request. The summary of the comments and NMFS' responses is provided in Appendix D and will also be in the final rule.

On December 16, 2004, the Office of Management and Budget (OMB) issued a directive requiring Federal Agencies to have "influential scientific information" and "highly influential scientific assessments" peer reviewed. NMFS decided that certain sections of the Draft Consolidated Atlantic HMS FMP could contain "influential scientific information," which is defined as: scientific information (factual inputs, data, models, analyses, technical information, or scientific assessments) that the Agency reasonably can determine does have or will have a clear and substantial impact on important public policies or private sector decisions. As such, during the public comment period, NMFS requested three scientists who were not involved in the drafting of the Consolidated HMS FMP to review certain sections of the HMS FMP. Specifically, NMFS asked them to review the standardized bycatch reporting methodology (Sections 3.8.2 through 3.8.5 of the draft HMS FMP), time/area closure analyses (Section 4.4.2 and Appendix A of the draft HMS FMP), and essential fish habitat (EFH) sections (Chapter 10 and Appendix B of the draft HMS FMP).

Per the OMB peer review bulletin, NMFS noted that such a peer review should evaluate the clarity of hypotheses, the validity of the research design, the quality of data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypotheses being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product. The peer reviews were used, as appropriate, to clarify assumptions, findings, and conclusions of the bycatch, time/area closure, and EFH sections of this Final Consolidated HMS FMP. Their reviews and NMFS' responses are provided in Appendix E.

After the end of the comment period, NMFS reviewed the comments, the peer reviews, and the analyses for the alternatives and made changes to the preferred alternatives and/or the supporting analyses, as needed, in order to address the comments received and/or other concerns that were raised during the comment period. All comments were considered when finalizing this document. NMFS also received comments from the Environmental Protection Agency (EPA) regarding the DEIS (March 31, 2006, 71 FR 16301). The DEIS received a rating of "LO," which means lack of objection. NMFS responds to EPA's specific comments in Appendix D with the other public comments received. Copies of this final document will be sent to the EPA regional offices, the HMS consulting parties (the affected Regional Fishery Management Councils, ICCAT Commissioners and advisory groups, and the Advisory Panels), the Atlantic and Gulf States Marine Fisheries Commissions, and other interested parties. An electronic version will also be placed on the HMS Management Division's webpage.

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# A APPENDIX: TIME/AREA CLOSURES: ADDITIONAL ANALYSES AND RESULTS

*Introduction*

As described in Chapter 4, NMFS evaluated the effectiveness of each of the time/area closure alternatives by determining the percent reduction in bycatch of non-target HMS and protected species for each month and cumulatively for the year based on both POP and HMS logbook data for the combined years 2001-2003. NMFS also analyzed data to determine the impact on catches of retained species such as swordfish, yellowfin, bigeye, and BAYS tunas. Based on the comparison of the POP and HMS logbook data, NMFS initially considered a number of alternatives for time/area closures. However, NMFS chose only a subset of the alternatives for further analysis because of their potential greater ecological benefit in terms of bycatch reduction potential for all species considered. Once a subset of alternatives was chosen for further analysis, social and economic impacts were analyzed along with ecological impacts. The social and economic impacts are not discussed in this Appendix.

This Appendix primarily serves as a summary of the potential benefits and impacts of all the various alternatives considered. Discussion on each of the alternatives that were fully analyzed (alternatives B2(a) – B2(e), B3(a) - B3(b), and B4 - B7) can be found in Chapter 4. A brief discussion of each alternative that was not selected for further analysis (alternatives B2(f) – B2(k) and B3(c) - B3(d)), can be found in Section 2.1.2. An overall summary of the predicted reduction in the number of hooks set (fishing effort) and discards of white marlin, blue marlin, sailfish, spearfish, leatherback sea turtles, loggerhead sea turtles, and bluefin tuna based on the various time/area closure alternatives is given in Table A.1 and Table A.2. Similarly, Table A.3, Table A.4, Table A.5, and Table A.6 summarize the predicted changes to swordfish, bluefin tuna, yellowfin tuna, bigeye tuna, and BAYS tuna kept and discarded under the different alternatives according to 2001 – 2003 pelagic logbook data. Table A.7 and Table A.8 provide a comparison of bycatch reduction based on HMS logbook data and pelagic observer data. Table A.9 through Table A.20 give the temporal catch of bycatch and target species associated with each alternative that was not further analyzed. Similar tables for alternatives that were further analyzed can be found in Section 4.1.2. There are also summaries of bycatch and catch of target species associated with the modification of current time/area closures (*i.e.*, Table A.21 through Table A.27). In addition, Table A.28 – Table A.30 demonstrate how different scenarios of redistributed effort were calculated. Table A.31 - Table A.33 evaluate 2004 data where as Table A.34 and Table A.35 demonstrate the effectiveness of current closures as well as the effect of current closures and circle hooks. Finally, Table A.36 shows results from the fleet mobility analysis described in Chapter 4, and Table A.37 - Table A.41 show the results of the different scenarios of redistributed effort.

A number of figures highlight the different time/area closure alternatives that have been considered (but have not been further analyzed; Figure A.1) as well as swordfish catch and modifications to current time/area closures (Figure A.2,Figure A.3, and Figure A.4). Figure A.5 - Figure A.8 show different aspects of the fleet mobility analysis described in Chapter 4, and Figure A.9 demonstrates the spatial overlap in discards of bluefin tuna, white marlin, and sea turtles in the Gulf of Mexico. Monthly interactions for these different species (*i.e.*, temporal variability) in the Gulf of Mexico were considered in the redistribution of effort analyses and can be seen in Table 4.10 and Table 4.13.

This section also describes the methodology for evaluating the ecological effects of the redistribution of fishing effort model. NMFS used this model to determine the percent change in total reported bycatch of sea turtles, non-target HMS, and retained species inside and outside of the time/area closures in the Atlantic and Gulf of Mexico. NMFS also evaluated several different scenarios based on this model that had different assumptions regarding where effort from a closed area would be redistributed. Examples (loggerhead sea turtles for alternative B2(d) and white marlin for alternative B2(c)) of how the redistribution of effort calculations were made is described in the following paragraphs and presented in Table A.28 – Table A.30. Similar tables were generated for each species under each alternative that was fully analyzed in Section 4.1.2. These individual species tables were not included in this document due to the large number of tables. Instead, summary tables of redistributed fishing effort were included in Section 4.1.2 as well as in this section.

*Redistribution of effort analyses*

NMFS examined monthly catches (number of each species) and effort (number of hooks) in each of the time/area closures in comparison to all open areas of the Atlantic and Gulf of Mexico, excluding the NED, based on HMS logbook data for the fishery. As explained in Chapter 4, only HMS logbook data were used in the redistribution of effort analysis. The number of each species caught in the open areas outside the considered time/area closures (column E in the example of redistribution of effort table, Table A.28), was calculated by subtracting the number caught in the potential closed area from the reported catch in the combined Atlantic and Gulf of Mexico (column B-column D in Table A.28). The catch-per-unit-effort (CPUE) for the species in the remaining open areas was calculated by dividing the number of each species caught in the open areas (column E) by the number of hooks fished in the open areas (calculated by subtracting the number of hooks in the closed area from those in the Atlantic and Gulf of Mexico; column A-column C in Table A.28). The number of hooks that were used in the closed area were multiplied by the open area CPUE to determine the number of loggerhead sea turtles, in this case, that would be caught in the open fishing areas by the displaced effort (column C*column F). This was then added to the existing open areas' catch (column E+column G) to give a new open area total catch (column I in Table A.28). The estimated total catch (column I) was subtracted from the original total number caught in the Atlantic and Gulf (column B-column H) to estimate the change in number of turtles that would be caught as a result of the relocated effort. Column J shows the cumulative number of turtles avoided by the time/area closure by adding each month's total to the preceding month's total. Columns K and L show the percentage reduction in overall catch by month and cumulatively as a result of the closure, respectively. The total percent reduction in catch was calculated by dividing the sum of column J (cumulative catch avoided by month) by the sum of column B (number of individuals caught in the Atlantic and Gulf of Mexico, excluding the NED). A positive result from the redistribution of effort calculation would indicate a decrease in discards, and a negative result would indicate an increase in discards.

In this example, the redistribution of fishing effort associated with alternative B2(d) would result in an increase in loggerhead sea turtle interactions of 65 percent, or 117 individuals, over three years (Table A.28). This large increase in loggerhead sea turtle interactions may be due to a number of factors. First, alternative B2(d) would be a large closure in an area that represents approximately 90 percent of the fishing effort in the Gulf of Mexico and approximately 50 percent of the total pelagic longline (PLL) fishing effort (Table 4.12 in Section 4.1.2). Therefore, closing such an area in the Gulf of Mexico could displace a large amount of fishing effort to the Atlantic Ocean. Second, and more specific to loggerhead sea turtles, there are fewer loggerhead sea turtles interactions in the Gulf of Mexico compared to the Atlantic Ocean (Table 4.36 in Section 4.1.2); therefore, as effort increases in the Atlantic as a result of a large closure in the Gulf of Mexico, and since loggerhead sea turtle numbers are higher in the Atlantic Ocean compared to the Gulf of Mexico, the number of interactions would be expected to increase. Thus, it is important to consider the ecological impacts of the redistribution of fishing effort when considering time/area closures. Often the effects may be counter-intuitive and may differ for the various species considered.

Finally, it is worth noting how the redistribution of effort was calculated for different time/area closure combinations. When NMFS considered the redistribution of fishing effort associated with the combination of time/area closures (*e.g.*, B2(a) combined with B2(b) or B2(e) combined with B2(d)), the closures were considered to be closed simultaneously. It was assumed that all fishing effort within those areas would be redistributed to open areas (*i.e.*, open areas not including the combination of B2(a) and B2(b) or B2(e) and B2(d)), and the redistribution of fishing effort was calculated according to the description outlined above. Thus, the end result, in terms of resulting bycatch when accounting for the redistribution of fishing effort, was not simply the sum of the bycatch associated with the individual closures. In cases where the time/areas closures were seasonal (*i.e.*, they were not year-round), then the time/area closures were considered to be simultaneously closed during months of overlap (*i.e.*, the month of June for alternative B2(a) and B2(b) combination). Otherwise, they were considered to be single time/area closures, and the redistribution of fishing effort was calculated as outlined above.

*Different redistribution of effort scenarios*

Based on comments received and OMB peer reviews, NMFS evaluated different scenarios of redistributed effort based on the redistribution of effort model explained above. Each scenario addressed different assumptions regarding where fishing effort could be redistributed into open areas (*i.e.,* instead of assuming all fishing effort from a closed area would be uniformly distributed to all open areas or just redistributed within the open areas of the Gulf of Mexico). NMFS performed a fleet mobility analysis to determine where the PLL fleet has been fishing from 2001-2004 (see Section 4.1.2). The analysis demonstrated that there was limited movement from the eastern seaboard into the Gulf of Mexico, therefore, NMFS redistributed fishing effort only to open areas along the eastern seaboard for B2(b). The mobility analysis also showed that vessels with homeports in the Gulf of Mexico tended to fish in a certain area of the Atlantic (Area 6). Therefore, for B2(a) and B2(c), NMFS redistributed fishing effort in the open areas of the Gulf of Mexico and Area 6. These different scenarios of redistributed effort were used to determine the percent reduction or increase in total reported bycatch of sea turtles, non-target HMS, and target species given particular catch rates in either only open portions of the Atlantic (alternative B2(b)) or open portions of the Gulf of Mexico and Area 6 (alternatives B2(a) and B2(c)). The methods used to calculate percent changes in catch for each species with these different scenarios of redistribution of effort is discussed below. The steps taken for the redistribution of effort analysis for white marlin for alternative B2(c) are presented in separate tables as examples (Table A.29 and Table A.30).

NMFS examined monthly catches (number of each species) and effort (number of hooks) for the closures B2(a), B2(b), and B2(c) in comparison to specific open areas of the Atlantic and Gulf of Mexico, excluding the NED, based on logbook data for the fishery from January 2001 through June 2004. The following example is for the redistribution of white marlin from the B2(c) closure; NMFS considered redistributing effort within the open areas of the Gulf of Mexico and in Area 6 (see Figure A.5). This scenario of redistributed effort would also apply for all species in the B2(a) and B2(c) closures. In this example, the number of white marlin caught from April through June in the open areas of the Gulf of Mexico outside B2(c) (column E in Table A.29) was first calculated by subtracting the number caught in the closed area from the reported catch in the open of the Gulf of Mexico (column B-column D in Table A.29). The CPUE for white marlin in the remaining open areas of the Gulf of Mexico (column F) was calculated by dividing the number of white marlin caught in the open areas (column E) by the number of hooks fished in the open areas (calculated by subtracting the number of hooks in the closure from those in open portion of the Gulf of Mexico; column A-column C in Table A.29). The number of hooks that were used in the closed area was then multiplied by the open area CPUE (column C*column F) to determine the number of white marlin that would be caught in the open fishing areas by the displaced effort (column G in Table A.29). This was then added to the existing open areas' catch (column E+column G) to give a new open area total catch (column I in Table A.29). Note that a positive number from the redistribution of effort calculation indicates a decrease in bycatch whereas a negative amount indicates an increase in bycatch.

Next, NMFS calculated any changes in bycatch associated with redistribution of effort in Area 6. This was done by first calculating the CPUE in Area 6 for white marlin (column F in Table A.30) by dividing the white marlin discards in Area 6 (column B in Table A.30) by the number of hooks fished in Area 6 (column A in Table A.30). The number of discards in Area 6 as a result of displaced effort from B2(c) (column G in Table A.30) was calculated by multiplying CPUE in Area 6 (column F in Table A.30) by the number of hooks displaced out of B2(c) (column C in Table A.30). Again, a positive number indicates a decrease in bycatch whereas a negative amount indicates an increase in bycatch. The total reduction or increase in catch associated with the redistributed effort of the closure (column H in Table A.30) was found by adding up the total number of discards avoided by the closure in the Gulf of Mexico (column I in Table A.29) minus the total number of discards in Area 6 as a result of displaced effort from B2(c) (column G in Table A.30). The total percent reduction in catch was calculated by dividing column H in Table A.30 by the total number of white marlin discarded in all other open areas (number of individuals caught between January 2001 through June 2004 in the Atlantic and Gulf of Mexico, excluding the NED; column I in Table A.30). The scenario of redistributed effort for B2(b) was more straightforward. It only considered redistribution of effort in the open portions of the Atlantic. Therefore, it was calculated according to the example laid out in Table A.28; however, the numbers of hooks and discards were only considered for the Atlantic and not the Atlantic and Gulf of Mexico as shown in Table A.28.

*Analyses for the potential modifications to existing closed areas*

For the analyses of modifications to existing closed areas, NMFS analyzed PLL logbook and POP data from 1997 – 1999, the period prior to enactment of the closed areas. This time period was selected since the current closures have been in place since 1999, and observer and logbook data provide a record of the bycatch and species that were interacted with during this time. A number of potential modifications to existing closures were examined, including the East Florida Coast (Table A.22), DeSoto Canyon (Table A.23), Charleston Bump (Table 4.29), and Northeastern U.S. closure (Table 4.30). NMFS mapped data from the PLL logbook and POP using GIS and used oceanographic features such as the axis of the Gulf Stream, or natural breaks in areas between high and low bycatch within the existing closure, to establish potential new boundaries for each closed area. NMFS then calculated the total number and percent bycatch of non-target HMS and protected species, as well as catch of target HMS, for the modified closure compared to all other areas of the Atlantic and Gulf of Mexico. These calculations allowed NMFS to determine the potential impact on bycatch species in comparison to all bycatch in the PLL fishery. Only after the analyses indicated that the Charleston Bump and Northeastern U.S. closure modifications would result in minimal or no increase in bycatch of non-target HMS and protected species did NMFS decide to further analyze these two areas. The remaining areas were not further analyzed, but the data for both the East Florida Coast and DeSoto Canyon modifications that resulted in increases in bycatch are presented in this Appendix.

*Analyses and the use of 2004 data*

Data from 2004 were not available when the analyses for the Draft HMS FMP were completed. However, during the public comment period, NMFS obtained the 2004 POP and PLL data and analyzed a subset of the PLL dataset from 2001 – 2004 (first six months of 2004 only) to determine whether there were any substantial differences from the 2001 -2003 data presented in the Draft HMS FMP. Since the circle hook requirement went into effect on June 30, 2004, in the NED (69 FR 40734), and in all remaining areas on August 6, 2004, NMFS analyzed only the first six months of 2004 data with the 2001 – 2003 data. Therefore, these analyses were all based on J-hook data. Since the second half of 2004 were based on circle hook data, NMFS analyzed these data separately; a discussion of the preliminary findings of the possible effects of circle hooks is given below.

Overall, the inclusion of the additional six months of data from 2004 did not substantially alter any of the data presented in the Draft HMS FMP, or result in any changes to the overall conclusions from the Draft HMS FMP to the Final HMS FMP (Table A.31). A few exceptions can be seen. For alternative B2(b), there could be an overall decrease in bycatch reduction for loggerhead sea turtles regardless of whether the year-round or June only closures is considered with the inclusion of the 2004 data (-20.7 percent vs. -15.5 percent for the year-round closure and -11.2 percent vs. -8.4 percent for the June only closures; Table A.31). For B2(c), in general, there was potential for higher bycatch reduction and less kept targeted catch for all species considered (except loggerhead sea turtles; Table A.31) with the inclusion of 2004 data. This reduction could be due to increased effort seen in the Gulf of Mexico during the first half of 2004 (Table A.35). However, this trend was not seen for B2(d), the larger, year-round closure proposed for the Gulf of Mexico, where less bycatch reduction could be gained for spearfish, but fewer bluefin tuna discards may be seen with the inclusion of 2004 data (Table A.31). There was also a slight decrease in potential bycatch reduction for loggerhead sea turtles, bluefin tuna kept, and bluefin tuna discards with the inclusion of 2004 data for B2(e) (Table A.31). Given the variability in results from the inclusion of this data, NMFS did not change any of the preferred alternatives based on the additional six months of 2004 PLL data.

NMFS also preliminary examined the second half of the 2004 data to investigate the potential effects that circle hooks may be having on bycatch and retained catch. However, because only six months of circle hook data was available when these analyses were completed, no definitive conclusions can be drawn from this analysis. Additionally, because this preliminary investigation only uses six months of circle hook data, the seasonality of catch (catch in January through June versus catch in July through December) cannot be determined for circle hooks. Therefore, for this preliminary investigation, NMFS compared CPUEs as well as absolute catch between the July through December of 2001-2003 PLL data with July through December of 2004 PLL data (Table A.32 and Table A.33). The CPUEs were calculated as the number of animals caught in a particular closure area divided by the number of hooks in that particular closure area. Absolute numbers are shown for 2004, and the yearly averages for 2001-2003 are shown in parentheses in Table A.32 and Table A.33. In general, the number of hooks increased slightly in the Gulf of Mexico in 2004 compared to 2001-2003 and decreased slightly in the Northeast (Table A.35). The analysis showed that the CPUEs increased for all species considered in the Gulf of Mexico in 2004 when compared to 2001-2003 (Table A.32 and Table A.33). The number of HMS kept also increased in 2004 except for yellowfin tuna in the Gulf of Mexico (Table A.33). The number of discards in the Gulf of Mexico increased in 2004 for all species considered, except for yellowfin tuna, swordfish discards, and loggerhead sea turtle interactions in B2(a) (Table A.32 and Table A.33). Leatherback sea turtle interactions decreased in B2(c) and B2(d) in 2004 compared to 2001-2003 (Table A.32). In the Northeast, CPUEs in 2004 were variable across closures and species considered, but in general, the number of discards and the number of species kept decreased (except for blue marlin and sailfish discards in B2(b) and B2(e), LCS discards and yellowfin tuna kept and discarded in B2(e), and bigeye tuna and BAYS discards in B2(b); Table A.32 and Table A.33). Overall, however, the catch associated with circle hooks for July through December is variable across species and closure, making it difficult to draw any definitive conclusions or identify any patterns on the effects of circle hooks. This variability is most likely due to the short time series of data. NMFS will continue to monitor retained catch, discards, and bycatch with circle hooks as that data become available.

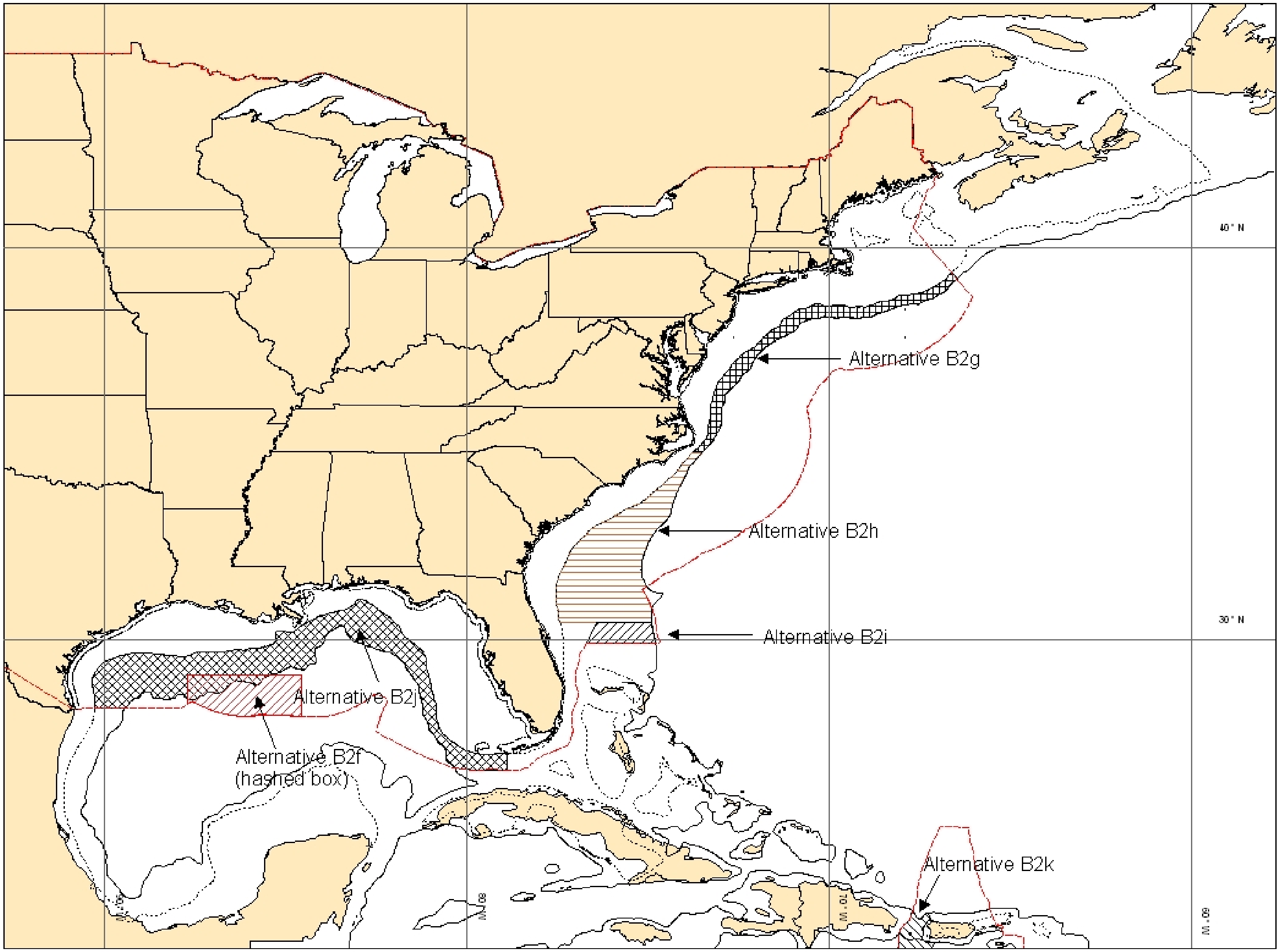


**Figure A.1 Map showing time/area closure alternatives considered but not further analyzed at this time (see Section 2.1.2) to reduce white marlin and other protected species interactions.**

**Table A.1** **The decrease (-) or increase (+) in the number of discards of white marlin, blue marlin, sailfish, spearfish, leatherback and loggerhead sea turtles and bluefin tuna based on the various time/area closures**. * excluding NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS logbook data 2001-2003.

| **Alternative** | **Number of Hooks Set** | **White Marlin discards** | **Blue Marlin discards** | **Sailfish discards** | **Spearfish discards** | **Leatherback Sea Turtles** | **Loggerhead Sea Turtles** | **Bluefin Tuna discards** |
|---|---|---|---|---|---|---|---|---|
| **WITHOUT REDISTRIBUTION OF EFFORT** | | | | | | | | |
| **B2(a)** | | | | | | | | |
| Year-round | 3,810,282 | -503 | -487 | -163 | -63 | -171 | -9 | -198 |
| May-Nov | 2,347,180 | -463 | -432 | -146 | -48 | -76 | -6 | -75 |
| | | | | | | | | |
| **B2(b)** | | | | | | | | |
| Year-round | 991,205 | -124 | -22 | -1 | -2 | -28 | -37 | -461 |
| June only | 184,435 | -12 | -4 | 0 | 0 | -10 | -20 | -365 |
| | | | | | | | | |
| **B2(c)** (April-June) | 2,844,335 | -325 | -244 | -124 | -35 | -55 | -7 | -348 |
| **B2(d)** (Year-round) | 10,020,757 | -1,487 | -1,397 | -642 | -354 | -285 | -18 | -439 |
| **B2(e)** (Year-round) | 2,127,510 | -274 | -40 | -3 | -8 | -49 | -65 | 0 |
| | | | | | | | | |
| **B2(f)** (May-Nov) | 2,998,571 | -633 | -559 | -197 | -62 | -91 | -7 | -92 |
| | | | | | | | | |
| **B2(g)** (June-October) | 2,985,688 | -481 | -49 | -11 | -7 | -40 | -40 | -60 |
| | | | | | | | | |
| **B2(h)** (March-Nov) | 1,179,865 | -139 | -138 | -134 | -27 | -10 | -3 | -2 |
| | | | | | | | | |
| **B2(i)** (Year-round) | 1,175,504 | -232 | -316 | -59 | -20 | -10 | -20 | -11 |
| | | | | | | | | |
| **B2(j)** (Year-round) | 5,182,880 | -519 | -528 | -444 | -108 | -90 | -12 | -181 |
| | | | | | | | | |
| **B2(k)** (Jan-April) | 22,321 | -7 | -14 | 0 | 0 | 0 | 0 | 0 |
| Total From All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 1,617 |
| **WITH REDISTRIBUTION OF EFFORT** | | | | | | | | |
| **B2(a)** | | | | | | | | |
| Year-round | | 27 | -98 | 11 | 17 | -99 | 27 | 128 |

| Alternative | Number of Hooks Set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Bluefin Tuna discards |
|---|---|---|---|---|---|---|---|---|
| (May-Nov) | | -84 | -178 | -8 | -9 | -39 | 14 | 166 |
| | | | | | | | | |
| **B2(b)** | | | | | | | | |
| Year-round | | 110 | 164 | 85 | 20 | -8 | -33 | -437 |
| June only | | 33 | 22 | 18 | 3 | -7 | -19 | -354 |
| | | | | | | | | |
| **B2(c)** (April-June) | | 221 | 50 | 45 | 56 | -13 | 42 | 158 |
| **B2(d)** (Year-round) | | 10 | -497 | -276 | -311 | -105 | 117 | 614 |
| **B2(e)** (Year-round) | | 189 | 360 | 182 | 38 | -3 | -60 | -658 |
| | | | | | | | | |
| **B2(f)** (May-Nov) | | -150 | -240 | -19 | -12 | -45 | 20 | 219 |
| | | | | | | | | |
| **B2(g)** (June-October) | | 71 | 494 | 239 | 62 | 29 | -26 | -360 |
| | | | | | | | | |
| **B2(h)** (March-Nov) | | 52 | -7 | -73 | -6 | 12 | 9 | 154 |
| | | | | | | | | |
| **B2(i)** (Year-round) | | -118 | -224 | -27 | 7 | 21 | -10 | 104 |
| | | | | | | | | |
| **B2(j)** (Year-round) | | 394 | 126 | -241 | -5 | 38 | 40 | 274 |
| | | | | | | | | |
| **B2(k)** (Jan-April) | | -5 | -12 | 0 | 0 | 1 | 0 | 2 |

**Table A.2** **Percent reduction (-) or increase (+) in discards of white marlin, blue marlin, sailfish, spearfish, leatherback and loggerhead sea turtles and bluefin tuna based on the various time/area closure alternatives with and without redistribution of effort.** (* = was not analyzed). Source: HMS Logbook data (2001-2003)

| Alternative | Number of Hooks Set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Bluefin Tuna discards |
|---|---|---|---|---|---|---|---|---|
| **WITHOUT REDISTRIBUTION OF EFFORT** | | | | | | | | |
| **B2(a)** | | | | | | | | |
| Year-round | -18.0% | -16.0.% | -19.9% | -15.8% | -14.9% | -34.6% | -5.0% | -12.2% |
| May-Nov | -11.1% | -14.7% | -17.6% | -14.2% | -11.3% | -15.4% | -3.4% | -4.6% |
| | | | | | | | | |
| **B2(b)** | | | | | | | | |
| Year-round | -4.7% | -3.9% | -0.9% | -0.1% | -0.5% | -5.7% | -20.7% | -28.5% |
| June only | -0.9% | -0.4% | -0.2% | 0.0% | 0.0% | -2.0% | -11.2% | -22.6% |
| | | | | | | | | |
| **B2(c)** (April-June) | -13.4% | -10.3% | -10.0% | -12.1% | -8.3% | -11.1% | -3.9% | -21.5% |
| **B2(d)** (Year-round) | -47.4% | -47.3% | -57.0% | -62.4% | -83.5% | -57.5% | -10.1% | -27.1% |
| **B2(e)** (Year-round) | -10.1% | -8.7% | -1.6% | -0.3% | -1.9% | -9.9% | -36.3% | -43.3% |
| | | | | | | | | |
| **B2(f)** (May-Nov) | -14.2% | -20.1% | -22.8% | -19.1% | -14.6% | -18.4% | -3.9% | -5.7% |
| | | | | | | | | |
| **B2(g)** (June-October) | -14.1% | -15.3% | -2.0% | -1.1% | -1.7% | -8.1% | -22.3% | -37.7% |
| | | | | | | | | |
| **B2(h)** (March-Nov) | -5.6% | -4.4% | -5.6% | -13.0% | -6.4% | -2.0% | -1.7% | -0.12% |
| | | | | | | | | |
| **B2(i)** (Year-round) | -5.6% | -7.4% | -12.9% | -5.7% | -4.7% | -2.0% | -11.2% | -0.7% |
| | | | | | | | | |
| **B2(j)** (Year-round) | -24.5% | -16.5% | -21.6% | -43.1% | -25.5% | -18.2% | -6.7% | -11.1% |
| | | | | | | | | |
| **B2(k)** (Jan-April) | -0.1% | -0.2% | -0.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| **WITH REDISTRIBUTION OF EFFORT** | | | | | | | | |
| **B2(a)** | | | | | | | | |
| Year-round | | 0.9% | -4.0% | 1.1% | 4.0% | -20.0% | 15.0% | 7.9% |
| (May-Nov) | | -2.7% | -7.3% | -0.8% | -2.1% | -8.0% | 7.9% | 10.3% |
| | | | | | | | | |

| Alternative | Number of Hooks Set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Bluefin Tuna discards |
|---|---|---|---|---|---|---|---|---|
| **B2(b)** | | | | | | | | |
| Year-round | | 3.5% | 6.7% | 8.3% | 4.8% | -1.7% | -18.5% | -27.0% |
| June only | | 1.0% | 0.9% | 1.7% | 0.8% | -1.3% | -10.3% | -21.9% |
| | | | | | | | | |
| **B2(c)** (April-June) | | 7.0% | 2.0% | 4.4% | 13.2% | -2.6% | 23.5% | 9.8% |
| **B2(d)** (Year-round) | | 0.3% | -20.3% | -26.8% | -73.3% | -21.3% | 65.5% | 38% |
| **B2(e)** (Year-round) | | 6.0% | 14.7% | 17.7% | 9.1% | -0.6% | -33.3% | -40.7% |
| | | | | | | | | |
| **B2(f)** (May-Nov) | | -4.7% | -9.8% | -1.8% | -2.8% | -9.1% | 11.2% | 13.5% |
| | | | | | | | | |
| **B2(g)** (June-October) | | 2.3% | 20.2% | 23.2% | 14.5% | 5.9% | -14.5% | -22.3% |
| | | | | | | | | |
| **B2(h)** (March-Nov) | | 1.7% | -0.29% | -7.1% | -1.4% | 2.4% | 5.0% | 9.5% |
| | | | | | | | | |
| **B2(i)** (Year-round) | | -3.8% | -9.2% | -2.6% | 1.6% | 4.2% | -5.6% | 6.4% |
| | | | | | | | | |
| **B2(j)** (Year-round) | | 12.6% | 5.1% | -23.4% | -1.2% | 7.7% | 22.3% | 17% |
| | | | | | | | | |
| **B2(k)** (Jan-April) | | -0.2% | -0.5% | 0% | 0% | 0.2% | 0% | 0.1% |

**Table A.3** **The decrease (-) or increase (+) in the number of each retained species caught or discarded based on the various time/area closure alternatives without redistribution of effort.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Alternative | Number of Hooks Set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **WITHOUT REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| **B2(a)** | | | | | | | | | | | |
| Year-round | 3,899,124 | -8,369 | -5,445 | -133 | -198 | -36,897 | -1,310 | -684 | -5 | -37,938 | -1,586 |
| May-Nov | 2,403,012 | -3,959 | -2,988 | -40 | -75 | -23,846 | -952 | -400 | -2 | -24,420 | -1,152 |
| | | | | | | | | | | | |
| **B2(b)** | | | | | | | | | | | |
| Year-round | 991,921 | -10,974 | -1,997 | -34 | -461 | -7,662 | -81 | -1,627 | -5 | -10,713 | -97 |
| June only | 183851 | -1,867 | -256 | -11 | -365 | -505 | -11 | -557 | 0 | -1,337 | -15 |
| | | | | | | | | | | | |
| **B2(c)** (April-June) | 2,844,335 | -3,594 | -3,621 | -174 | -348 | -33,053 | -1,480 | -90 | -2 | -33,176 | -1,677 |
| **B2(d)** (Year-round) | 10,020,757 | -19,215 | -11,579 | -321 | -439 | -106,941 | -3,641 | -1,299 | -19 | -108,923 | -4,661 |
| **B2(e)** (Year-round) | 2,127,510 | -17,422 | -4,054 | -74 | -700 | -12,692 | -200 | -7,303 | -139 | -27,141 | -748 |
| | | | | | | | | | | | |
| **B2(f)** (May-Nov) | 2,997,124 | -4,792 | -3,553 | -49 | -92 | -30,165 | -1,141 | -480 | -3 | -30,865 | -1,436 |
| | | | | | | | | | | | |
| **B2(g)** (June-October) | 2,986,428 | -21,799 | -7,378 | -84 | -609 | -27,023 | -544 | -10,729 | -243 | -48,317 | -1,623 |
| | | | | | | | | | | | |
| **B2(h)** (March-Nov) | 1,118,725 | -24,297 | -4794 | -5 | -2 | -3,508 | -124 | -427 | -18 | -4,148 | -152 |
| | | | | | | | | | | | |
| **B2(i)** (Year-round) | 1,175,504 | -8,104 | -1,704 | -35 | -11 | -3,690 | -297 | -8,412 | -417 | -14,631 | -725 |
| | | | | | | | | | | | |
| **B2(j)** (Year-round) | 5,186,190 | -13,469 | -6,433 | -181 | -179 | -53,854 | -1,622 | -400 | -11 | -54,579 | -1,913 |
| | | | | | | | | | | | |
| **B2(k)** (Jan-April) | 22,321 | -321 | -120 | 0 | 0 | -4 | 0 | -2 | 0 | -8 | 0 |
| Total From All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |

**Table A.4 Percent reduction (-) or increase (+) in the retained catch and discards based on the various time/area closure alternatives without redistribution of effort.** Source: HMS Logbook data (2001-2003).

| Alternative | Number of Hooks Set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **WITHOUT REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| **B2(a)** | | | | | | | | | | | |
| Year-round | -18.4% | -6.6% | -14.8% | -22.2% | -12.2% | -22.1% | -23.9% | -1.8% | -0.5% | -16.8% | -17.6% |
| (May-Nov) | -11.4% | -3.1% | -8.1% | -6.7% | -4.6% | -14.3% | -17.4% | -1.1% | -0.2% | -10.8% | -12.8% |
| | | | | | | | | | | | |
| **B2(b)** | | | | | | | | | | | |
| Year-round | -4.7% | -8.6% | -5.4% | -5.7% | -28.5% | -4.6% | -1.5% | -4.4% | -0.5% | -4.7% | -1.1% |
| June only | -0.9% | -1.5% | -0.7% | -1.8% | -22.6% | -0.3% | -0.2% | -1.5% | 0.0% | -0.6% | -0.2% |
| | | | | | | | | | | | |
| **B2(c)** (April-June) | -13.4% | -2.8% | -9.9% | -29.0% | -21.5% | -19.8% | -27.0% | -0.2% | -0.2% | -14.7% | -18.7% |
| **B2(d)** (Year-round) | -47.4% | -15.1% | -31.5% | -53.6% | -27.1% | -64.0% | -66.4% | -3.5% | -1.9% | -48.2% | -51.8% |
| **B2(e)** (Year-round) | -10.1% | -13.7% | -11.0% | -12.4% | -43.3% | -7.6% | -3.6% | -19.7% | -13.8% | -12.0% | -8.3% |
| | | | | | | | | | | | |
| **B2(f)** (May-Nov) | -13.4% | -3.8% | -9.7% | -8.1% | -5.7% | -18.0% | -20.8% | -1.3% | -0.3% | -13.6% | -16.0% |
| | | | | | | | | | | | |
| **B2(g)** (June-October) | -14.1% | -17.1% | -20.1% | -14.0% | -37.7% | -16.2% | -9.9% | -28.9% | -24.2% | -21.4% | -18.1% |
| | | | | | | | | | | | |
| **B2(h)** (March-Nov) | -5.3% | -19.1% | -13.0% | -0.8% | -0.1% | -2.1% | -2.3% | -1.1% | -1.8% | -1.8% | -1.7% |
| | | | | | | | | | | | |
| **B2(i)** (Year-round) | -5.6% | -6.4% | -4.6% | -5.8% | -0.7% | -2.2% | -5.4% | -22.7% | -41.5% | -6.5% | -8.1% |
| | | | | | | | | | | | |
| **B2(j)** (Year-round) | -24.5% | -10.6% | -17.5% | -30.2% | -11.1% | -32.2% | -29.6% | -1.1% | -1.1% | -24.1% | -21.3% |
| | | | | | | | | | | | |
| **B2(k)** (Jan-April) | -0.1% | -0.3% | -0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

**Table A.5** **The decrease (-) or increase (+) in the number of each retained species caught or discarded based on the various time/area closure alternatives with redistribution of effort.** (* = was not calculated). [1] excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003)

| Alternative | Number of Hooks Set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **WITH REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| **B2(a)** | | | | | | | | | | | |
| Year-round | | 19,485 | 2,001 | -24 | 128 | -7,615 | -381 | 7,880 | 210 | 5,187 | 126 |
| May-Nov | | 11,590 | 1,635 | 20 | 166 | -1,881 | 166 | 4,393 | 117 | 5,897 | -4 |
| | | | | | | | | | | | |
| **B2(b)** | | | | | | | | | | | |
| Year-round | | -6,993 | -697 | -21 | -437 | 2,247 | 222 | -170 | 57 | 1,480 | 407 |
| June only | | -1,033 | -21 | -7 | -354 | 1,516 | 61 | -449 | 3 | 859 | 77 |
| | | | | | | | | | | | |
| **B2(c)** (April-June) | | 26,931 | 2,218 | -110 | 158 | -18,314 | -1,001 | 4,240 | 18 | -12,260 | -1,064 |
| **B2(d)** (Year-round) | | 79,633 | 11,718 | -72 | 614 | -49,789 | -1,955 | 29,930 | 853 | -1,259 | -616 |
| **B2(e)** (Year-round) | | -8,623 | -1,061 | -45 | -658 | 9,264 | 455 | -4,417 | -25 | -723 | 369 |
| | | | | | | | | | | | |
| **B2(f)** (May-Nov) | | 15,552 | 2,081 | 25 | 219 | -3,126 | -408 | 5,465 | 150 | 6,507 | -29 |
| | | | | | | | | | | | |
| **B2(g)** (June-October) | | * | * | * | -360 | * | * | * | * | * | * |
| | | | | | | | | | | | |
| **B2(h)** (March-Nov) | | * | * | * | 154 | * | * | * | * | * | * |
| | | | | | | | | | | | |
| **B2(i)** (Year-round) | | * | * | * | 104 | * | * | * | * | * | * |
| | | | | | | | | | | | |
| **B2(j)** (Year-round) | | * | * | * | 274 | * | * | * | * | * | * |
| | | | | | | | | | | | |
| **B2(k)** (Jan-April) | | * | * | * | 2 | * | * | * | * | * | * |
| Total From All Areas[1] | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |

**Table A.6** **Percent reduction (-) or increase (+) in the retained catch and discards based on the various time/area closure alternatives with redistribution of effort.** (* = was not calculated). Source: HMS Logbook data (2001-2003).

| Alternative | Number of Hooks Set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **WITH REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| **B2(a)** | | | | | | | | | | | |
| Year-round | | 15.3% | 5.4% | -3.9% | 7.9% | -4.6% | -6.9% | 21.2% | 20.8% | 2.3% | 1.4% |
| May-Nov | | 9.1% | 4.4% | 3.4% | 10.3% | -1.1% | 3.0% | 2.6% | 11.6% | 2.6% | -0.04% |
| | | | | | | | | | | | |
| **B2(b)** | | | | | | | | | | | |
| Year-round | | -5.5% | -1.9% | -3.5% | -27.0% | 1.3% | 4.1% | -0.5% | 5.6% | 0.7% | 4.5% |
| June only | | -0.8% | -0.1% | -1.2% | -21.9% | 0.9% | 1.1% | -1.2% | 0.3% | 0.4% | 0.9% |
| | | | | | | | | | | | |
| **B2(c)** (April-June) | | 21.1% | 6.0% | -18.3% | 9.8% | -11.0% | -18.3% | 11.4% | 1.7% | -5.4% | -11.8% |
| **B2(d)** (Year-round) | | 62.5% | 31.9% | -12.1% | 38.0% | -29.8% | -35.6% | 80.6% | 84.8% | -0.6% | -6.9% |
| **B2(e)** (Year-round) | | -6.8% | -2.9% | -7.6% | -40.7% | 5.5% | 8.3% | -11.9% | -2.5% | -0.3% | 4.1% |
| | | | | | | | | | | | |
| **B2(f)** (May-Nov) | | 12.2% | 5.7% | 4.2% | 13.6% | -1.9% | -7.4% | 14.7% | 14.9% | 2.9% | -0.3% |
| | | | | | | | | | | | |
| **B2(g)** (June-October) | | * | * | * | -22.3% | * | * | * | * | * | * |
| | | | | | | | | | | | |
| **B2(h)** (March-Nov) | | * | * | * | 9.5% | * | * | * | * | * | * |
| | | | | | | | | | | | |
| **B2(i)** (Year-round) | | * | * | * | 6.4% | * | * | * | * | * | * |
| | | | | | | | | | | | |
| **B2(j)** (Year-round) | | * | * | * | 17% | * | * | * | * | * | * |
| | | | | | | | | | | | |
| **B2(k)** (Jan-April) | | * | * | * | 0.1% | * | * | * | * | * | * |

**Table A.7** **Percent reduction (-) or increase (+) in the number of hooks set; discards of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and other sea turtles based on various time/area closure alternatives without redistribution of effort.** Source: HMS Logbook data (2001-2003).

| Alternative | Number of Hooks Set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Bluefin Tuna discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|---|
| Alternative B2(a) | -18.0% | -16.0% | -19.9% | -15.8% | -14.9% | -12.2% | -34.6% | -5.0% | -45.5% |
| Alternative B2(a) (May-Nov) | -11.4% | -14.7% | -17.6% | -14.2% | -11.3% | -4.6% | -15.4% | -3.4% | 0.0% |
| Alternative B2(b) | -4.7% | -3.9% | -0.9% | -0.1% | -0.5% | -28.5% | -5.7% | -20.7% | 0.0% |
| Alternative B2(b) (June only) | -0.9% | -0.4% | -0.2% | 0.0% | 0.0% | -22.6% | -2.0% | -11.2% | 0.0% |
| Alternative B2(c) | -13.4% | -10.3% | -10.0% | -12.1% | -8.3% | -21.5% | -11.1% | -3.9% | -18.2% |
| Alternative B2(d) | -47.4% | -47.3% | -57.0% | -62.4% | -83.5% | -27.1% | -57.5% | -10.1% | -45.5% |
| Alternative B2(e) | -10.1% | -8.7% | -1.6% | -0.3% | -1.9% | -43.3% | -9.9% | -36.3% | 0.0% |
| Alternative B2(f) | -22.8% | -21.7% | -25.3% | -21.5% | -20.3% | -38.3% | -5.6% | -45.5% | -21.7% |
| Alternative B2(g) | -14.1% | -15.3% | -2.0% | -1.1% | -1.7% | -37.7% | -8.1% | -22.3% | 0.0% |
| Alternative B2(h) | -5.6% | -4.4% | -5.6% | -13.0% | -6.4% | -2.0% | -1.7% | -5.6% | 0.0% |
| Alternative B2(i) | -5.6% | -7.4% | -12.9% | -5.7% | -4.7% | -0.7% | -2.0% | -11.2% | 0.0% |
| Alternative B2(j) | -24.5% | -16.5% | -21.6% | -43.1% | -25.5% | -11.1% | -18.2% | -6.7% | -9.1% |
| Alternative B2(k) | -0.1% | -0.2% | -0.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

**Table A.8** **Percent reduction (-) or increase (+) in discards of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and other sea turtles, and bluefin tuna kept and discards combined, based on various time/area closure alternatives without redistribution of effort.** Source: Pelagic Observer Program data (2001-2003).

| Alternative | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Bluefin Tuna | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| Alternative B2(a) (year-round) | -14.6% | -11.1% | -20.9% | -4.5% | -12.2% | -18.9% | -7.0% | -25.0% |
| Alternative B2(a) (May-Nov) | -13.2% | -9.3% | -19.6% | -4.5% | -7.0% | -11.3% | -4.0% | 0.0% |
| Alternative B2(b) (year-round) | -1.4% | -0.7% | 0.0% | 0.0% | -16.2% | -0.6% | -9.0% | 0.0% |
| Alternative B2(b) (June only) | 0.0% | 0.0% | 0.0% | 0.0% | -15.4% | 0.0% | -6.0% | 0.0% |
| Alternative B2(c) (April-June) | -8.4% | -11.1% | -14.2% | -2.3% | -18.4% | -15.1% | -7.0% | -25.0% |
| Alternative B2(d) (year-round) | -38.8% | -26.8% | -52.0% | -15.9% | -24.3% | -52.8% | -14.0% | -75.0% |
| Alternative B2(e) (year-round) | -3.3% | -1.1% | 0.0% | -2.3% | -44.3% | -6.9% | -16.0% | 0.0% |
| Alternative B2(f) | -19.6% | -17.1% | -25.7% | -4.5% | -17.6% | -25.8% | -8.0% | -25.0% |
| Alternative B2(g) | -12.7% | -1.8% | -0.0% | -2.3% | -49.5% | -10.1% | -20.0% | -25.0% |
| Alternative B2(h) | -3.3% | -9.3% | -24.3% | -2.3% | -0.3% | -10.7% | -4.0% | 0.0% |
| Alternative B2(i) | -16.0% | -34.3% | -8.8% | -45.5% | -1.1% | -6.9% | -17.0% | 0.0% |
| Alternative B2(j) | -20.3% | -8.2% | -33.1% | -2.3% | -10.8% | -29.6% | -9.0% | -50.0% |
| Alternative B2(k) | -0.7% | -3.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

**Table A.9 Alternative B2(f). Temporal variation in effectiveness of Gulf of Mexico time/area closure in terms of percent reduction (-) or increase (+) of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and bluefin tuna discards.** A negative sign indicates an increase in bycatch. *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Bluefin tuna discards |
|---|---|---|---|---|---|---|---|---|
| 1 | 464,535 | 14 | 17 | 9 | 9 | 10 | 1 | 2 |
| 2 | 248,436 | 3 | 4 | 2 | 0 | 11 | 0 | 3 |
| 3 | 310,044 | 6 | 8 | 3 | 4 | 17 | 1 | 60 |
| 4 | 391,152 | 8 | 16 | 6 | 5 | 17 | 0 | 97 |
| 5 | 579,566 | 50 | 36 | 22 | 7 | 10 | 5 | 84 |
| 6 | 459,183 | 151 | 104 | 29 | 14 | 12 | 0 | 5 |
| 7 | 393,868 | 216 | 202 | 57 | 15 | 15 | 1 | 0 |
| 8 | 452,158 | 86 | 77 | 30 | 7 | 13 | 0 | 0 |
| 9 | 319,796 | 55 | 59 | 29 | 4 | 8 | 1 | 1 |
| 10 | 400,189 | 43 | 55 | 15 | 11 | 19 | 0 | 1 |
| 11 | 393,811 | 32 | 26 | 15 | 4 | 14 | 0 | 1 |
| 12 | 414,240 | 18 | 16 | 4 | 6 | 43 | 1 | 1 |
| Total | 4,826,978 | 682 | 620 | 221 | 86 | 189 | 10 | 255 |
| | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 1,617 |
| | | | | | | | | |
| % Decrease **without** redistribution of effort | -22.8% | -21.7% | -25.3% | -21.5% | -20.3% | -38.3% | -5.6% | -15.8% |
| No. discards with redistribution of effort | | -3 | -122 | 4 | 14 | -96 | 39 | 153 |
| % Decrease **with** redistribution of effort | | -0.1% | -5.0% | 0.4% | 3.3% | -19.4% | 21.8% | 9.4% |

**Table A.10 Alternative B2(g). Temporal variation in effectiveness of the Northeast time/area closure from June through October in terms of percent reduction (-) or increase (+) of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and other sea turtle discards.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| **Month** | **Number of hooks set** | **White Marlin discards** | **Blue Marlin discards** | **Sailfish discards** | **Spearfish discards** | **Leatherback Sea Turtles** | **Loggerhead Sea Turtles** | **Other Sea Turtles** |
|---|---|---|---|---|---|---|---|---|
| 1 | 94,685 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 63,028 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| 3 | 70,714 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| 4 | 83,255 | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
| 5 | 143,876 | 9 | 2 | 0 | 1 | 0 | 0 | 0 |
| 6 | 295,480 | 23 | 4 | 4 | 0 | 9 | 14 | 0 |
| 7 | 524,941 | 101 | 5 | 1 | 3 | 7 | 9 | 0 |
| 8 | 594,372 | 215 | 22 | 2 | 0 | 11 | 6 | 0 |
| 9 | 595,391 | 119 | 16 | 2 | 1 | 3 | 3 | 0 |
| 10 | 554,844 | 17 | 1 | 2 | 1 | 5 | 5 | 0 |
| 11 | 420,660 | 6 | 1 | 0 | 2 | 5 | 3 | 0 |
| 12 | 197,429 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| Total | 3,638,675 | 493 | 55 | 12 | 8 | 41 | 46 | 0 |
| June-Oct | 2,985,688 | 481 | 49 | 11 | 7 | 40 | 40 | 0 |
| | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| | | | | | | | | |
| % Decrease **without** redistribution of effort | -14.1% | -15.3% | -2.0% | -1.1% | -1.7% | -8.1% | -22.3% | -0.0% |
| No. discards with redistribution of effort | | 71 | 494 | 239 | 62 | 29 | -26 | 1 |
| % Decrease **with** redistribution of effort | | 2.3% | 20.2% | 23.2% | 14.5% | 5.9% | -14.8% | 12.5% |

**Table A.11** **Alternative B2(h). Temporal variation in effectiveness of the Southeast time/area closure closure in terms of percent reduction (-) or increase (+) of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and other sea turtle discards.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| 1 | 125,740 | 2 | 9 | 7 | 0 | 4 | 0 | 0 |
| 2 | 110,101 | 10 | 3 | 3 | 0 | 3 | 2 | 0 |
| 3 | 72,215 | 10 | 6 | 0 | 3 | 0 | 0 | 0 |
| 4 | 66,124 | 12 | 11 | 0 | 1 | 2 | 0 | 0 |
| 5 | 418,879 | 66 | 44 | 29 | 12 | 5 | 2 | 0 |
| 6 | 263,124 | 48 | 19 | 31 | 6 | 1 | 0 | 0 |
| 7 | 98,264 | 2 | 26 | 20 | 1 | 1 | 0 | 0 |
| 8 | 82,603 | 0 | 20 | 41 | 3 | 0 | 0 | 0 |
| 9 | 55,952 | 0 | 7 | 5 | 0 | 0 | 0 | 0 |
| 10 | 58,866 | 1 | 2 | 4 | 0 | 0 | 1 | 0 |
| 11 | 63,838 | 0 | 3 | 4 | 1 | 1 | 0 | 0 |
| 12 | 68,986 | 6 | 3 | 1 | 2 | 1 | 1 | 0 |
| Total | 1,484,692 | 157 | 153 | 145 | 29 | 18 | 6 | 0 |
| March-Nov | 1,179,865 | 139 | 138 | 134 | 27 | 10 | 3 | 0 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| | | | | | | | | |
| % Decrease **without** redistribution of effort | -5.6% | -4.4% | -5.6% | -13.0% | -6.4% | -2.0% | -1.7% | -0.0% |
| No. discards with redistribution of effort | | 54 | -6 | -73 | -5 | 12 | 7 | 1 |
| % Decrease **with** redistribution of effort | | 1.7% | -0.24% | -7.1% | -1.2% | 2.4% | 4.0% | 5.4% |

**Table A.12 Alternative B2(i). Temporal variation in effectiveness of the closure on the east coast of Florida in terms of percent reduction (-) or increase (+) of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and other sea turtle discards.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| 1 | 112,722 | 35 | 21 | 4 | 2 | 2 | 3 | 0 |
| 2 | 156,047 | 12 | 24 | 4 | 5 | 0 | 2 | 0 |
| 3 | 330,536 | 74 | 104 | 10 | 4 | 4 | 12 | 0 |
| 4 | 296,975 | 92 | 69 | 10 | 6 | 2 | 2 | 0 |
| 5 | 16,112 | 7 | 6 | 1 | 0 | 0 | 0 | 0 |
| 6 | 33,315 | 8 | 17 | 6 | 0 | 0 | 0 | 0 |
| 7 | 40,765 | 0 | 16 | 7 | 1 | 0 | 0 | 0 |
| 8 | 52,825 | 3 | 34 | 14 | 1 | 1 | 0 | 0 |
| 9 | 43,461 | 1 | 19 | 3 | 1 | 0 | 0 | 0 |
| 10 | 38,108 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| 11 | 26,115 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 12 | 28,523 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Total | 1,175,504 | 232 | 316 | 59 | 20 | 10 | 20 | 0 |
| | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| | | | | | | | | |
| % Decrease **without** redistribution of effort | -5.6% | -7.4% | -12.9% | -5.7% | -4.7% | -2.0% | -11.2% | 0.0% |
| No. discards with redistribution of effort | | -118 | -224 | -27 | 7 | 21 | -10 | 1 |
| % Decrease **with** redistribution of effort | | -3.8% | -9.2% | -2.6% | 1.6% | 4.2% | -5.4% | 9.5% |

**Table A.13 Alternative B2(j). Temporal variation in effectiveness of the Gulf of Mexico time/area closure in terms of percent reduction (-) or increase (+) of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and other sea turtle discards.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| 1 | 345,996 | 11 | 13 | 6 | 2 | 2 | 1 | 0 |
| 2 | 264,179 | 5 | 2 | 4 | 0 | 1 | 0 | 0 |
| 3 | 270,055 | 1 | 2 | 0 | 2 | 3 | 0 | 0 |
| 4 | 480,977 | 13 | 13 | 9 | 2 | 2 | 0 | 1 |
| 5 | 585,789 | 31 | 19 | 29 | 6 | 6 | 3 | 0 |
| 6 | 514,852 | 64 | 50 | 92 | 10 | 7 | 1 | 0 |
| 7 | 653,844 | 191 | 192 | 145 | 38 | 17 | 2 | 0 |
| 8 | 642,913 | 121 | 108 | 75 | 15 | 8 | 1 | 0 |
| 9 | 437,233 | 42 | 75 | 55 | 17 | 7 | 0 | 0 |
| 10 | 343,804 | 17 | 26 | 13 | 8 | 1 | 0 | 0 |
| 11 | 317,848 | 10 | 12 | 13 | 4 | 4 | 1 | 0 |
| 12 | 325,390 | 13 | 16 | 3 | 4 | 32 | 3 | 0 |
| Total | 5,182,880 | 519 | 528 | 444 | 108 | 90 | 12 | 1 |
| | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| | | | | | | | | |
| % Decrease **without** redistribution of effort | -24.5% | -16.5% | -21.6% | -43.1% | -25.5% | -18.2% | -6.7% | -9.1% |
| No. discards with redistribution of effort | | 394 | 126 | -241 | -5 | 38 | 40 | 2 |
| % Decrease **with** redistribution of effort | | 12.6% | 5.1% | -23.4% | -1.2% | 7.7% | 22.1% | 17.0% |

**Table A.14 Alternative B2(k). Temporal variation in effectiveness of the Caribbean time/area closure in terms of percent reduction (-) or increase (+) of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead, and other sea turtle discards.** Landings were only reported for the four months listed. *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| 1 | 6,160 | 3 | 11 | 0 | 0 | 0 | 0 | 0 |
| 2 | 826 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 13,735 | 3 | 2 | 0 | 0 | 0 | 0 | 0 |
| 4 | 1,600 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | |
| Total | 22,321 | 7 | 14 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| | | | | | | | | |
| % Reduction **without** redistribution of effort | -0.1% | -0.2% | -0.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| % Reduction **with** redistribution of effort | | -0.7% | -1.8% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% |

**Table A.15** **Alternative B2(f). Temporal variation in effectiveness of the Gulf of Mexico time/area closure in terms of percent reduction (-) in discards and retained catch.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kepts | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 464,535 | 1,495 | 678 | 15 | 2 | 4,613 | 121 | 153 | 3 | 4,820 | 128 |
| 2 | 247,536 | 1,062 | 433 | 16 | 3 | 1,174 | 48 | 54 | 2 | 1,244 | 50 |
| 3 | 310,044 | 852 | 588 | 38 | 60 | 2,097 | 49 | 17 | 0 | 2,119 | 61 |
| 4 | 392,186 | 590 | 665 | 37 | 97 | 4,022 | 127 | 11 | 0 | 4,035 | 136 |
| 5 | 577,866 | 677 | 1,077 | 37 | 84 | 5,831 | 386 | 9 | 0 | 5,856 | 403 |
| 6 | 456,786 | 721 | 616 | 10 | 5 | 5,499 | 272 | 40 | 0 | 5,539 | 307 |
| 7 | 394,518 | 573 | 413 | 0 | 0 | 5,042 | 118 | 45 | 0 | 5,094 | 156 |
| 8 | 454,358 | 786 | 360 | 0 | 0 | 4,277 | 105 | 53 | 0 | 4,350 | 147 |
| 9 | 319,796 | 530 | 325 | 0 | 1 | 2,855 | 47 | 47 | 0 | 2,907 | 97 |
| 10 | 399,389 | 704 | 421 | 0 | 1 | 3,532 | 149 | 134 | 2 | 3,724 | 183 |
| 11 | 394,411 | 801 | 341 | 2 | 1 | 3,129 | 64 | 152 | 1 | 3,395 | 143 |
| 12 | 415,190 | 1,269 | 584 | 11 | 1 | 3,873 | 130 | 144 | 1 | 4,182 | 195 |
| Total | 4,826,615 | 10,060 | 6,501 | 166 | 255 | 45,944 | 1,616 | 859 | 9 | 47,265 | 2,006 |
| | | | | | | | | | | | |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| | | | | | | | | | | | |
| % Reduction **without** redistribution of effort | -22.8% | -7.9% | -17.7% | -27.7% | -15.8% | -27.5% | -29.5% | -2.3% | -0.9% | -20.9% | -22.3% |

**Table A.16 Alternative B2(g). Temporal variation in effectiveness of the Northeast time/area closure from June through October closure in terms of percent reduction (-) in discards and retained catch.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 94,685 | 1,156 | 790 | 0 | 2 | 126 | 25 | 14 | 0 | 164 | 31 |
| 2 | 63,028 | 734 | 369 | 1 | 0 | 31 | 0 | 6 | 0 | 40 | 0 |
| 3 | 70,714 | 561 | 212 | 0 | 79 | 148 | 4 | 11 | 0 | 164 | 13 |
| 4 | 83,255 | 576 | 219 | 0 | 40 | 912 | 52 | 61 | 1 | 977 | 55 |
| 5 | 143,876 | 615 | 134 | 1 | 18 | 2,084 | 41 | 185 | 3 | 2,270 | 44 |
| 6 | 294,380 | 1,617 | 284 | 12 | 233 | 2,814 | 20 | 486 | 3 | 3,461 | 29 |
| 7 | 525,481 | 3,711 | 654 | 16 | 66 | 3,089 | 63 | 549 | 5 | 4,033 | 80 |
| 8 | 596,472 | 3,613 | 963 | 5 | 8 | 4,252 | 79 | 1,270 | 60 | 6,543 | 165 |
| 9 | 596,671 | 4,788 | 1,360 | 2 | 46 | 6,364 | 190 | 2,651 | 76 | 10,530 | 308 |
| 10 | 551,664 | 4,489 | 2,244 | 16 | 61 | 6,388 | 110 | 2,894 | 71 | 13,721 | 415 |
| 11 | 421,760 | 3,581 | 1,873 | 33 | 195 | 4,116 | 82 | 2,879 | 28 | 10,029 | 626 |
| 12 | 197,429 | 1,773 | 847 | 3 | 14 | 1,029 | 20 | 1,368 | 6 | 3,532 | 227 |
| Total | 3,639,415 | 27,214 | 9,949 | 89 | 762 | 31,353 | 686 | 12,374 | 253 | 55,464 | 1,993 |
| June-Oct | 2,986,428 | 21,799 | 7,378 | 84 | 609 | 27,023 | 544 | 10,729 | 243 | 48,317 | 1,623 |
| | | | | | | | | | | | |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| | | | | | | | | | | | |
| % Reduction **without** redistribution of Effort: June-Oct. | -14.1% | -17.1% | -20.1% | -14.0% | -37.7% | -16.2% | -9.9% | -28.9% | -24.2% | -21.4% | -18.1% |

**Table A.17 Alternative B2(h). Temporal variation in effectiveness of the time/area closure from March through November closure in terms of percent reduction (-) in discards and retained catch.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 125,740 | 1,762 | 480 | 0 | 0 | 502 | 30 | 12 | 1 | 516 | 31 |
| 2 | 110,101 | 1,115 | 329 | 0 | 1 | 619 | 29 | 96 | 3 | 823 | 32 |
| 3 | 72,215 | 471 | 65 | 1 | 0 | 278 | 18 | 214 | 0 | 638 | 18 |
| 4 | 65,324 | 547 | 78 | 1 | 0 | 161 | 11 | 59 | 3 | 268 | 16 |
| 5 | 418,879 | 9,016 | 2,073 | 1 | 1 | 561 | 24 | 8 | 0 | 574 | 25 |
| 6 | 263,124 | 4,128 | 778 | 2 | 1 | 401 | 11 | 8 | 1 | 413 | 14 |
| 7 | 97,924 | 1,941 | 321 | 0 | 0 | 434 | 24 | 37 | 8 | 471 | 33 |
| 8 | 82,603 | 1,977 | 475 | 0 | 0 | 367 | 9 | 36 | 0 | 405 | 10 |
| 9 | 55,952 | 1,833 | 314 | 0 | 0 | 283 | 6 | 28 | 3 | 313 | 9 |
| 10 | 58,866 | 2,165 | 296 | 0 | 0 | 613 | 9 | 16 | 0 | 632 | 9 |
| 11 | 63,838 | 2,219 | 394 | 0 | 0 | 410 | 12 | 21 | 3 | 434 | 18 |
| 12 | 68,986 | 1,355 | 283 | 0 | 0 | 283 | 7 | 19 | 1 | 305 | 8 |
| Total | 1,483,552 | 28,529 | 5,886 | 5 | 3 | 4,912 | 190 | 554 | 23 | 5,792 | 223 |
| March-Nov | 1,118,725 | 24,297 | 4794 | 5 | 2 | 3,508 | 124 | 427 | 18 | 4,148 | 152 |
| | | | | | | | | | | | |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| | | | | | | | | | | | |
| % Reduction **without** redistribution of effort | -7.0% | -22.4% | -16.0% | -0.8% | -0.2% | -2.9% | -3.5% | -1.5% | -2.3% | -2.6% | -2.5% |
| % Reduction **without** redistribution of Effort: March-Nov | -5.3% | -19.1% | -13.0% | -0.8% | -0.1% | -2.1% | -2.3% | -1.1% | -1.8% | -1.8% | -1.7% |

**Table A.18 Alternative B2(i). Temporal variation in effectiveness of the closure of the east Florida in terms of percent reduction (-) in discards and retained catch.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 112,722 | 726 | 213 | 1 | 1 | 345 | 11 | 930 | 35 | 1,606 | 46 |
| 2 | 156,047 | 1,132 | 263 | 1 | 0 | 235 | 9 | 1,165 | 33 | 1,924 | 44 |
| 3 | 330,536 | 1,862 | 329 | 6 | 2 | 515 | 26 | 2,610 | 62 | 4,188 | 89 |
| 4 | 296,975 | 1,592 | 174 | 26 | 4 | 986 | 28 | 1,457 | 17 | 2,825 | 45 |
| 5 | 16,112 | 106 | 19 | 0 | 1 | 32 | 0 | 40 | 0 | 87 | 0 |
| 6 | 33,315 | 232 | 20 | 1 | 3 | 149 | 1 | 113 | 0 | 280 | 1 |
| 7 | 40,765 | 379 | 120 | 0 | 0 | 300 | 74 | 205 | 111 | 516 | 185 |
| 8 | 52,825 | 636 | 234 | 0 | 0 | 278 | 125 | 476 | 114 | 778 | 241 |
| 9 | 43,461 | 383 | 152 | 0 | 0 | 152 | 0 | 413 | 20 | 606 | 20 |
| 10 | 38,108 | 486 | 101 | 0 | 0 | 288 | 7 | 393 | 7 | 712 | 16 |
| 11 | 26,115 | 316 | 54 | 0 | 0 | 162 | 3 | 382 | 3 | 582 | 7 |
| 12 | 28,523 | 254 | 25 | 0 | 0 | 248 | 13 | 228 | 15 | 527 | 31 |
| Total | 1,175,504 | 8,104 | 1,704 | 35 | 11 | 3,690 | 297 | 8,412 | 417 | 14,631 | 725 |
| | | | | | | | | | | | |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| | | | | | | | | | | | |
| % Reduction **without** redistribution of effort | -5.6% | -6.4% | -4.6% | -5.8% | -0.7% | -2.2% | -5.4% | -22.7% | -41.5% | -6.5% | -8.1% |

**Table A.19** **Alternative B2(j). Temporal variation in effectiveness of the time/area closure in the Gulf of Mexico in terms of percent reduction (-) in discards and retained catch.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 346,896 | 1,302 | 571 | 14 | 0 | 3,765 | 79 | 76 | 3 | 3,914 | 97 |
| 2 | 264,179 | 2,226 | 765 | 15 | 1 | 1,072 | 29 | 23 | 1 | 1,104 | 34 |
| 3 | 270,055 | 1,989 | 749 | 18 | 7 | 1,454 | 73 | 3 | 0 | 1,464 | 74 |
| 4 | 482,677 | 1,615 | 689 | 52 | 92 | 4,114 | 236 | 15 | 0 | 4,131 | 237 |
| 5 | 587,439 | 1,305 | 892 | 47 | 69 | 5,807 | 187 | 9 | 0 | 5,819 | 220 |
| 6 | 512,512 | 885 | 588 | 7 | 4 | 7,171 | 170 | 12 | 1 | 7,183 | 207 |
| 7 | 653,044 | 754 | 436 | 3 | 0 | 9,096 | 261 | 26 | 0 | 9,129 | 294 |
| 8 | 643,863 | 793 | 462 | 0 | 5 | 7,948 | 191 | 23 | 1 | 7,991 | 213 |
| 9 | 437,233 | 536 | 316 | 19 | 1 | 4,550 | 101 | 28 | 0 | 4,600 | 118 |
| 10 | 344,604 | 747 | 340 | 0 | 0 | 3,295 | 108 | 49 | 5 | 3,375 | 134 |
| 11 | 318,248 | 608 | 283 | 1 | 0 | 2,441 | 78 | 86 | 0 | 2,588 | 122 |
| 12 | 325,440 | 709 | 342 | 5 | 0 | 3,141 | 109 | 50 | 0 | 3,281 | 163 |
| Total | 5,186,190 | 13,469 | 6,433 | 181 | 179 | 53,854 | 1,622 | 400 | 11 | 54,579 | 1,913 |
| | | | | | | | | | | | |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| | | | | | | | | | | | |
| % Reduction **without** redistribution of effort | -24.5% | -10.6% | -17.5% | -30.2% | -11.1% | -32.2% | -29.6% | -1.1% | -1.1% | -24.1% | -21.3% |

**Table A.20 Alternative B2(k). Temporal variation in effectiveness of the time/area closure in the Caribbean in terms of percent reduction (-) in discards and retained catch.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (2001-2003).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kept | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6,160 | 76 | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 826 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 13,735 | 211 | 69 | 0 | 0 | 4 | 0 | 2 | 0 | 8 | 0 |
| 4 | 1,600 | 18 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 22,321 | 321 | 120 | 0 | 0 | 4 | 0 | 2 | 0 | 8 | 0 |
| | | | | | | | | | | | |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| | | | | | | | | | | | |
| % Reduction **without** redistribution of effort | -0.1% | -0.3% | -0.3% | -0.0% | -0.0% | -0.0% | -0.0% | -0.0% | -0.0% | -0.0% | -0.0% |

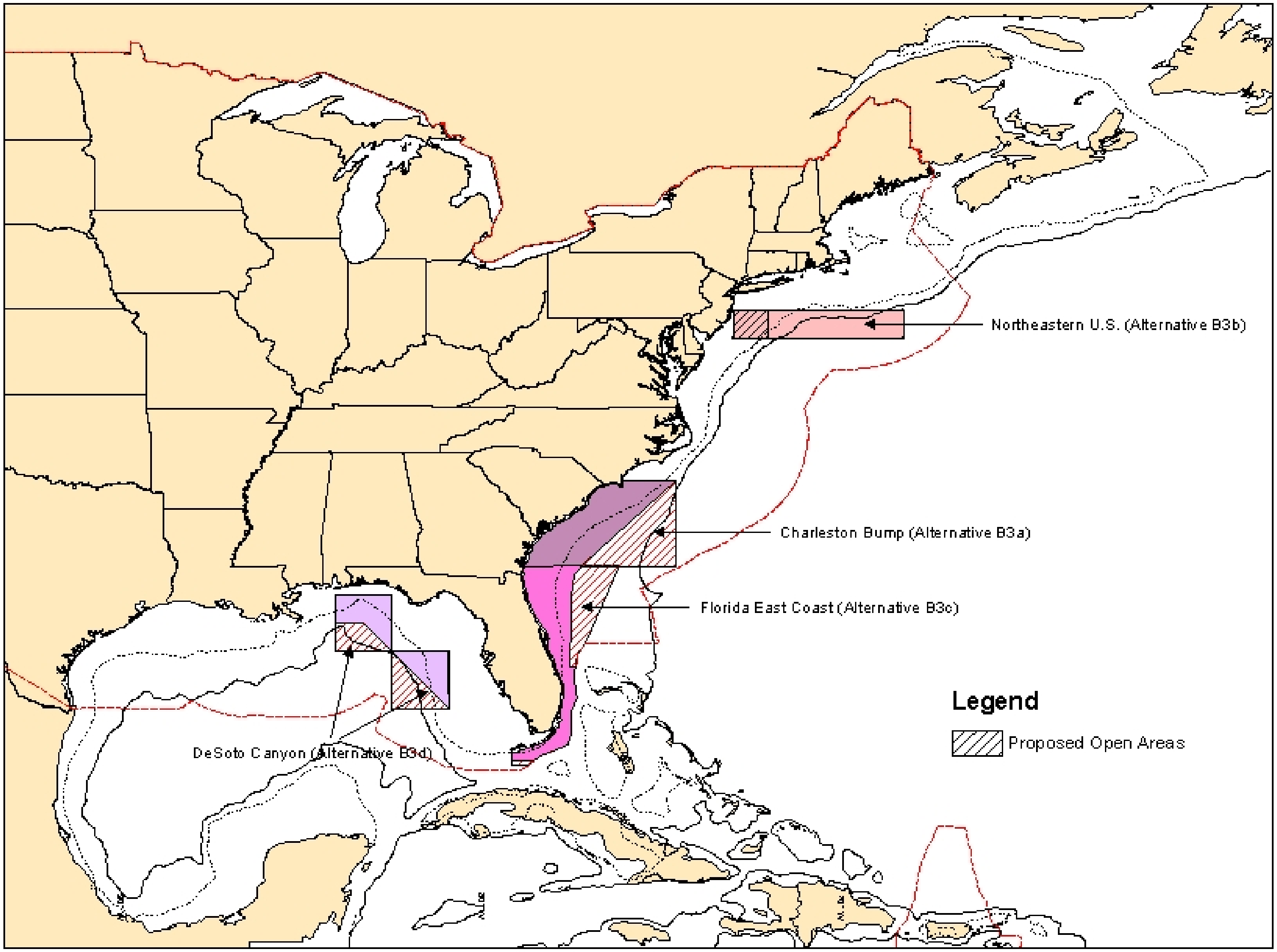


**Figure A.2** **Map showing areas considered for modifications to existing closures. Note: only alternatives B3(a) and (b) were further analyzed.**

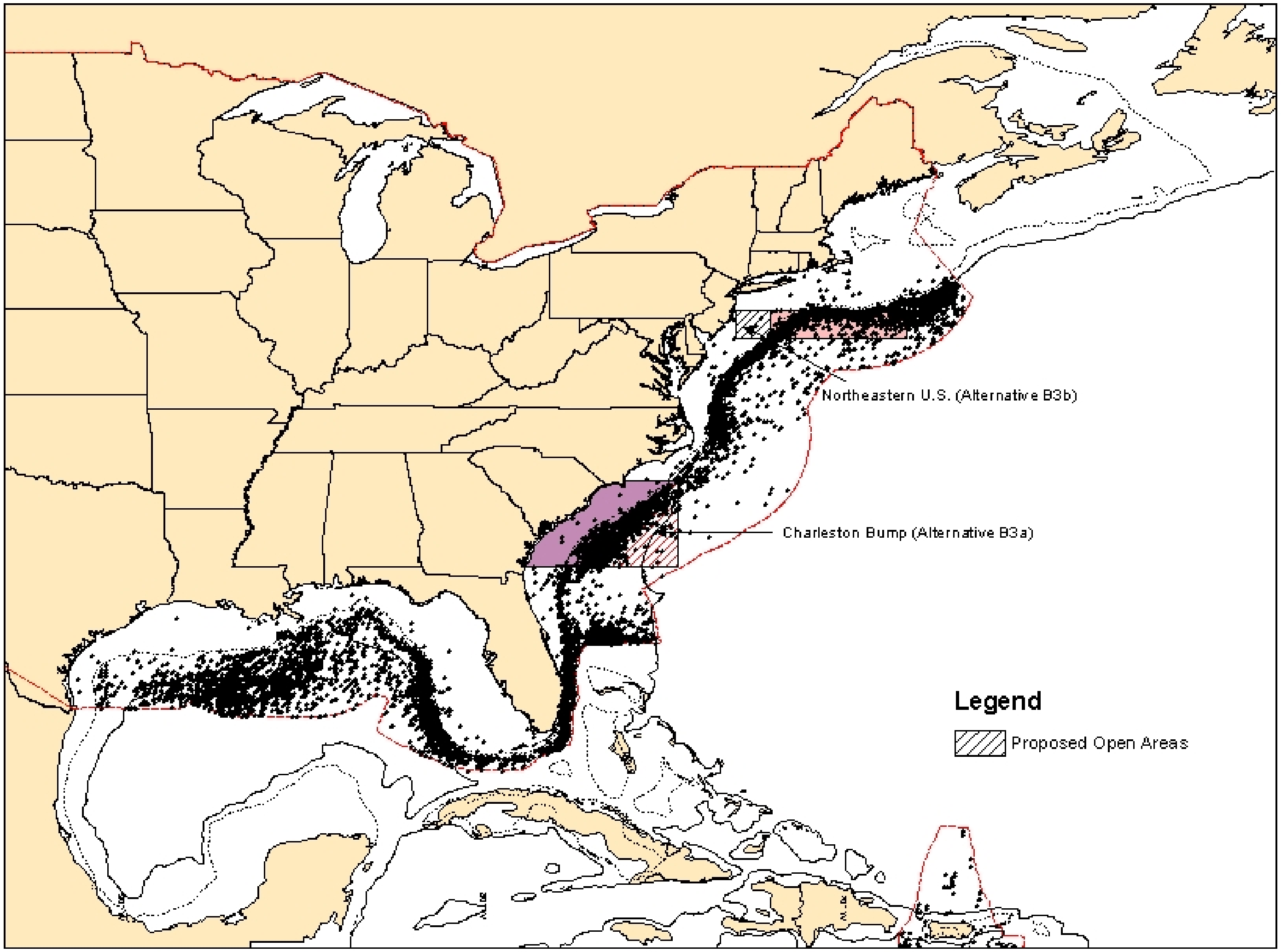


**Figure A.3** **Map showing areas considered for modifications to existing closures and juvenile swordfish data (<180 cm LJFL).** The minimum size limit for swordfish is 119 cm LJFL. Note: only alternatives B3(a) and (b) were further analyzed. Source Pelagic Observer Program 1997-1999.

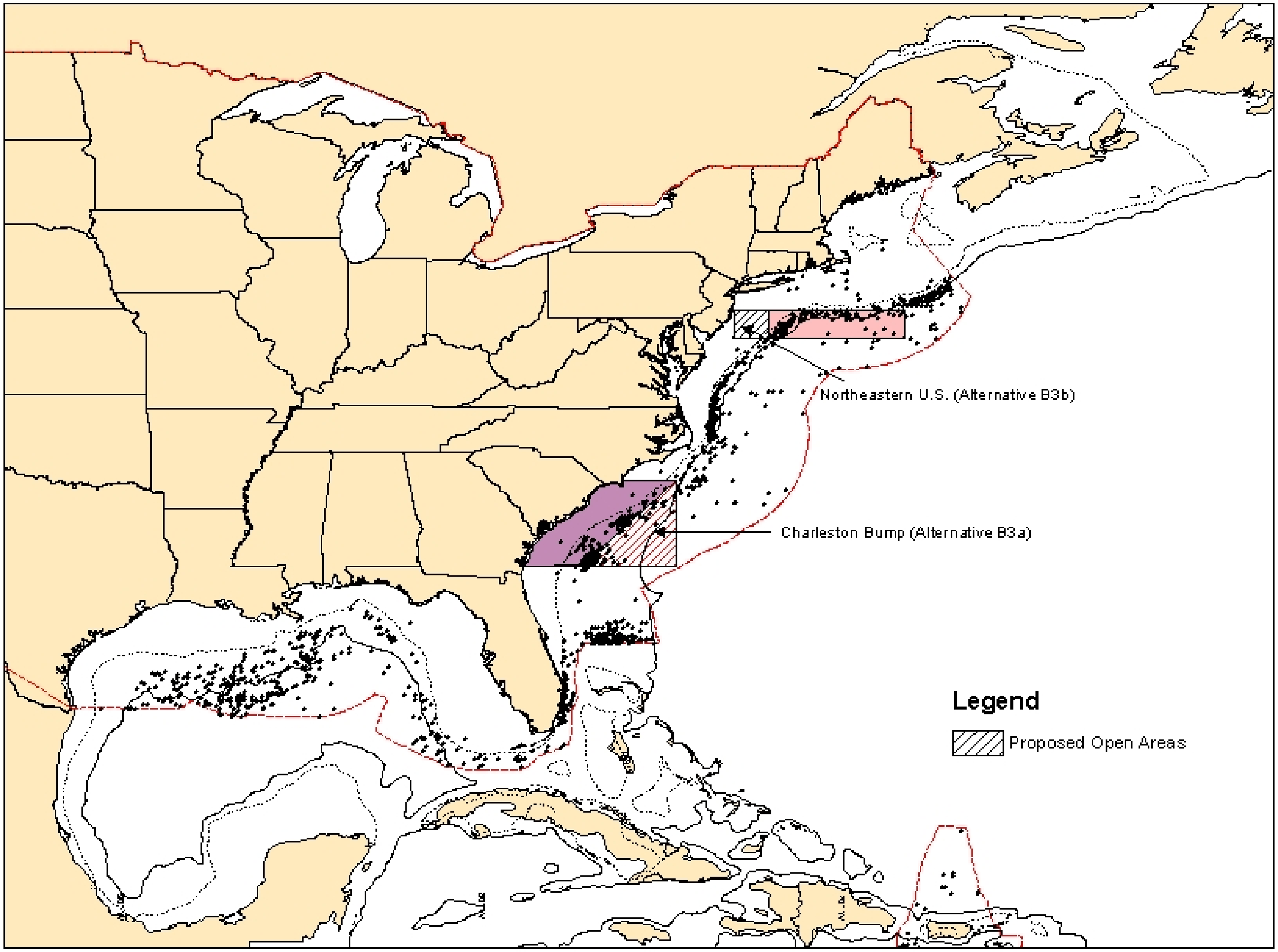


**Figure A.4** **Map showing areas considered for modifications to existing closures and adult swordfish data from the Pelagic Observer Program.** Note: only alternatives B2(a) and (b) were further analyzed. Source Pelagic Observer Program 1997-1999.

**Table A.21 Swordfish lengths (cm lower jaw fork length; LJFL) in the portion of the areas to remain closed and the portion of the areas considered for reopening.** The minimum size limit for swordfish is 119 cm LJFL. The mature size is > 180 cm LJFL. Significant differences are shaded. Source: Pelagic Observer Program 1992-1999.

| Closed Area | Portion Considered for Reopening | Sample Size | Portion to Remain Closed | Sample Size | *t*-test |
|---|---|---|---|---|---|
| | | | *1992-1999* | | |
| B3(a) Charleston Bump | 124 | 3,374 | 125 | 1,664 | *P* = 0.37 |
| B3(b) Northeastern U.S. | 96 | 1695 | 71 | 2 | *P* = 0.34 |
| B3(c) East Florida Coast | 119 | 2,744 | 124 | 679 | *P* < 0.0001 |
| B3(d) DeSoto Canyon | 106 | 634 | 101 | 314 | *P* = 0.50 |
| | | | *1997-1999* | | |
| B3(a) Charleston Bump | 125 | 2,067 | 126 | 455 | *P* = 0.10 |
| B3(b) Northeastern U.S. | 112 | 409 | 71 | 2 | *P* = 0.05 |
| B3(c) East Florida Coast | 120 | 1,094 | 125 | 527 | *P* < 0.0001 |
| B3(d) DeSoto Canyon | 116 | 152 | 108 | 55 | *P* = 0.03 |

**Table A.22 Alternative B3(c) Florida East Coast modification. Discards of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead and other sea turtles in the portion of the area to remain closed and the portion of the area considered for reopening.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook 1997-1999.

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA TO REMAIN CLOSED** | | | | | | | |
| 1 | 81,708 | 4 | 20 | 16 | 1 | 1 | 1 | 0 |
| 2 | 68,328 | 4 | 12 | 11 | 4 | 0 | 0 | 0 |
| 3 | 107,962 | 5 | 14 | 41 | 0 | 1 | 0 | 0 |
| 4 | 134,487 | 16 | 12 | 24 | 0 | 0 | 1 | 0 |
| 5 | 161,558 | 34 | 41 | 129 | 2 | 1 | 0 | 0 |
| 6 | 100,117 | 4 | 13 | 61 | 2 | 0 | 0 | 0 |
| 7 | 100,942 | 9 | 16 | 62 | 1 | 1 | 1 | 0 |
| 8 | 74,005 | 7 | 16 | 41 | 3 | 0 | 0 | 0 |
| 9 | 43,040 | 4 | 7 | 15 | 3 | 1 | 0 | 0 |
| 10 | 62,900 | 3 | 4 | 8 | 1 | 0 | 0 | 0 |
| 11 | 79,128 | 5 | 8 | 16 | 2 | 0 | 0 | 0 |
| 12 | 101,843 | 21 | 23 | 33 | 1 | 0 | 0 | 0 |
| Total | 1,116,018 | 116 | 186 | 457 | 20 | 5 | 3 | 0 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| % of All Areas | 5.3% | 3.7% | 7.6% | 44.4% | 4.7% | 1.0% | 1.7% | 0.0% |
| | **PORTION OF AREA CONSIDERED FOR REOPENING** | | | | | | | |
| 1 | 16,421 | 1 | 11 | 1 | 2 | 0 | 0 | 0 |
| 2 | 14,664 | 4 | 4 | 1 | 0 | 0 | 0 | 0 |
| 3 | 15,385 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| 4 | 23,746 | 7 | 3 | 1 | 1 | 0 | 0 | 0 |
| 5 | 30,905 | 8 | 5 | 9 | 0 | 0 | 0 | 0 |
| 6 | 48,306 | 8 | 10 | 21 | 1 | 0 | 0 | 0 |
| 7 | 38,439 | 1 | 8 | 14 | 0 | 0 | 0 | 0 |
| 8 | 24,495 | 1 | 13 | 23 | 3 | 0 | 0 | 0 |
| 9 | 38,590 | 2 | 16 | 14 | 1 | 0 | 0 | 0 |
| 10 | 34,168 | 0 | 7 | 4 | 0 | 0 | 2 | 0 |
| 11 | 22,008 | 9 | 8 | 7 | 1 | 0 | 0 | 0 |
| 12 | 22,560 | 7 | 9 | 4 | 0 | 0 | 0 | 0 |
| Total | 329,687 | 48 | 98 | 99 | 9 | 0 | 2 | 0 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| % of All Areas | 1.6% | 1.5% | 4.0% | 9.6% | 2.1% | 0.0% | 1.1% | 0.0% |

**Table A.23 Alternative B3(d) Desoto Canyon modification. Discards of white marlin, blue marlin, sailfish, spearfish, leatherback, loggerhead and other sea turtles in the portion of the area to remain closed and in the portion of the area considered for reopening.** Source HMS Logbook 1997-1999. *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three.

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA TO REMAIN CLOSED** | | | | | | | |
| 1 | 20,270 | 3 | 2 | 0 | 0 | 0 | 0 | 0 |
| 2 | 18,321 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| 3 | 41,625 | 3 | 4 | 1 | 0 | 0 | 0 | 0 |
| 4 | 7,592 | 3 | 3 | 2 | 0 | 0 | 0 | 0 |
| 5 | 15,324 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 6 | 25,752 | 3 | 7 | 6 | 0 | 0 | 0 | 0 |
| 7 | 22,582 | 8 | 6 | 3 | 0 | 0 | 0 | 0 |
| 8 | 10,235 | 3 | 0 | 3 | 0 | 0 | 0 | 0 |
| 9 | 8,860 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 18,185 | 12 | 2 | 3 | 0 | 0 | 0 | 0 |
| 11 | 8,040 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 12 | 10,290 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 207,076 | 40 | 26 | 19 | 0 | 0 | 1 | 1 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| % of All Areas | 1.0% | 1.3% | 1.1% | 1.8% | 0.0% | 0.0% | 0.6% | 9.1% |
| | **PORTION OF AREA CONSIDERED FOR REOPENING** | | | | | | | |
| 1 | 30,678 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 2 | 17,681 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 3 | 4,703 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 23,053 | 1 | 1 | 2 | 0 | 1 | 0 | 0 |
| 5 | 81,097 | 10 | 3 | 1 | 1 | 0 | 0 | 0 |
| 6 | 92,064 | 7 | 14 | 20 | 2 | 0 | 0 | 0 |
| 7 | 86,779 | 12 | 21 | 107 | 1 | 0 | 0 | 0 |
| 8 | 61,128 | 6 | 14 | 5 | 0 | 0 | 0 | 0 |
| 9 | 50,612 | 3 | 3 | 1 | 0 | 0 | 0 | 0 |
| 10 | 45,009 | 6 | 8 | 8 | 0 | 0 | 0 | 0 |
| 11 | 11,768 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 4,496 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 509,068 | 48 | 65 | 145 | 4 | 2 | 0 | 0 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| % of All Areas | 2.4% | 1.5% | 2.7% | 14.1% | 0.9% | 0.4% | 0.0% | 0.0% |

**Table A.24** **Comparison of discards of white marlin, blue marlin, sailfish, spearfish, leatherback and loggerhead sea turtles in the portion of the areas considered for reopening.** - = decrease + = increase. *excluding the NED. Four year totals are shown; one year averages can be obtained by dividing the four year total by four. Source: HMS Logbook 1997-2000.

| Area | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles |
|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREAS CONSIDERED FOR REOPENING** | | | | | | | |
| B3(a) Charleston Bump (Feb-Apr) | 108,403 | 19 | 17 | 10 | 4 | 0 | 1 | 0 |
| B3(b) Northeastern U.S. (June) | 2,400 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B3(c) East Florida Coast | 329,687 | 48 | 98 | 99 | 9 | 0 | 2 | 0 |
| B3(d) Desoto Canyon | 509,068 | 48 | 65 | 145 | 4 | 2 | 0 | 0 |
| All Areas* | 21,148,706 | 3,143 | 2,449 | 1,029 | 424 | 494 | 179 | 11 |
| | % of All Areas | | | | | | | |
| B3(a) Charleston Bump (Feb-Apr) | 0.3% | 0.6% | 0.7% | 1.0% | 0.9% | 0.0% | 0.6% | 0.0% |
| B3(b) Northeastern U.S. | 0.01% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| B3(c) East Florida Coast | 1.6% | 1.5% | 4.0% | 9.6% | 2.1% | 0.0% | 1.1% | 0.0% |
| B3(d) Desoto Canyon | 2.4% | 1.5% | 2.7% | 14.1% | 0.9% | 0.4% | 0.0% | 0.0% |

**Table A.25 Comparison of catch of swordfish, bluefin tuna, yellowfin tuna, bigeye tuna, and BAYS in the portion of the areas considered for reopening.** *excluding the NED. Four year totals are shown; one year averages can be obtained by dividing the four year total by four. Source: HMS Logbook 1997-2000.

| Area | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kepts | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREAS CONSIDERED FOR REOPENING** | | | | | | | | | | |
| B3(a) Charleston Bump (Feb-Apr) | 108,403 | 1,371 | 548 | 0 | 0 | 275 | 19 | 8 | 1 | 297 | 21 |
| B3(b) Northeastern U.S. (June) | 2,400 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| B3(c) East Florida Coast | 329,687 | 5,313 | 2,150 | 0 | 3 | 1,247 | 60 | 405 | 25 | 1,676 | 89 |
| B3(d) DeSoto Canyon | 509,068 | 985 | 647 | 12 | 22 | 8,091 | 206 | 45 | 1 | 8,170 | 287 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| | % of All Areas | | | | | | | | | | |
| B3(a) Charleston Bump (Feb-Apr) | 0.51% | 1.1% | 1.5% | 0.0% | 0.0% | 0.16% | 0.35% | 0.02% | 0.1% | 0.13% | 0.23% |
| B3(b) Northeastern U.S. (June) | 0.01% | 0.002% | 0.0% | 0.0% | 0.06% | 0.001% | 0.0% | 0.0% | 0.0% | 0.0004% | 0.0% |
| B3(c) East Florida Coast | 1.6% | 4.2% | 5.9% | 0.0% | 0.19% | 0.75% | 1.1% | 1.1% | 2.5% | 0.75% | 0.01% |
| B3(d)Desoto Canyon | 2.4% | 0.8% | 1.8% | 2.0% | 0.06% | 4.8% | 3.8% | 0.12% | 0.1% | 3.6% | 3.2% |

**Table A.26** **Alternative B3(c) modification of East Florida Coast time/area closure. Catch and discards of various species in the portion of the area to remain closed and in the portion of the area considered for reopening.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (1997-1999).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kepts | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA TO REMAIN CLOSED** | | | | | | | | | | |
| 1 | 81,708 | 1,535 | 922 | 1 | 0 | 14 | 0 | 1 | 0 | 15 | 1 |
| 2 | 68,328 | 1,222 | 801 | 0 | 0 | 7 | 0 | 3 | 1 | 10 | 1 |
| 3 | 107,962 | 1,870 | 1,188 | 0 | 0 | 37 | 1 | 10 | 5 | 55 | 8 |
| 4 | 134,487 | 1,802 | 979 | 1 | 0 | 32 | 4 | 46 | 0 | 91 | 6 |
| 5 | 161,558 | 2,485 | 976 | 5 | 18 | 157 | 6 | 60 | 0 | 229 | 6 |
| 6 | 100,117 | 2,096 | 740 | 4 | 1 | 150 | 1 | 19 | 1 | 172 | 3 |
| 7 | 100,942 | 1,833 | 823 | 0 | 0 | 106 | 1 | 23 | 0 | 129 | 1 |
| 8 | 74,005 | 1,561 | 777 | 0 | 0 | 68 | 0 | 24 | 0 | 92 | 0 |
| 9 | 43,040 | 1,305 | 666 | 0 | 0 | 33 | 0 | 19 | 0 | 52 | 0 |
| 10 | 62,900 | 1,776 | 936 | 0 | 0 | 54 | 2 | 6 | 0 | 60 | 2 |
| 11 | 79,128 | 2,245 | 819 | 0 | 0 | 52 | 2 | 11 | 0 | 63 | 3 |
| 12 | 101,843 | 2,340 | 1,052 | 0 | 0 | 38 | 1 | 9 | 2 | 47 | 3 |
| Total | 1,116,018 | 22,070 | 10,679 | 11 | 19 | 748 | 18 | 231 | 9 | 1,015 | 34 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction | 5.3% | 17.3% | 29.1% | 1.8% | 1.2% | 0.4% | 0.3% | 0.6% | 0.9% | 0.4% | 0.4% |
| | **PORTION OF AREA CONSIDERED FOR REOPENING** | | | | | | | | | | |
| 1 | 16,421 | 184 | 190 | 0 | 0 | 35 | 5 | 9 | 2 | 44 | 7 |
| 2 | 14,664 | 72 | 37 | 0 | 0 | 29 | 2 | 9 | 3 | 38 | 5 |
| 3 | 15,385 | 187 | 87 | 0 | 0 | 8 | 0 | 10 | 0 | 18 | 0 |
| 4 | 23,746 | 237 | 98 | 0 | 0 | 36 | 2 | 19 | 3 | 56 | 5 |
| 5 | 30,905 | 213 | 52 | 0 | 0 | 43 | 4 | 15 | 0 | 60 | 4 |
| 6 | 48,306 | 632 | 163 | 0 | 3 | 94 | 0 | 43 | 0 | 142 | 4 |
| 7 | 38,439 | 603 | 177 | 0 | 0 | 107 | 3 | 83 | 1 | 195 | 4 |
| 8 | 24,495 | 442 | 158 | 0 | 0 | 102 | 7 | 105 | 0 | 212 | 7 |
| 9 | 38,590 | 798 | 301 | 0 | 0 | 391 | 23 | 51 | 3 | 445 | 26 |
| 10 | 34,168 | 1,094 | 400 | 0 | 0 | 201 | 2 | 9 | 0 | 213 | 2 |
| 11 | 22,008 | 527 | 284 | 0 | 0 | 135 | 11 | 34 | 9 | 169 | 20 |
| 12 | 22,560 | 324 | 203 | 0 | 0 | 66 | 1 | 18 | 4 | 84 | 5 |
| Total | 329,687 | 5,313 | 2,150 | 0 | 3 | 1,247 | 60 | 405 | 25 | 1,676 | 89 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction | 1.6% | 4.2% | 5.9% | 0.0% | 0.2% | 0.7% | 1.1% | 1.1% | 2.5% | 0.7% | 1.0% |

**Table A.27** **Alternative B3(d) modification of the DeSoto Canyon time/area closure. Catch and discards of various species in the portion of the area to remain closed and in the portion of the area considered for reopening.** *excluding the NED. Three year totals are shown; one year averages can be obtained by dividing the three year total by three. Source: HMS Logbook data (1997-1999).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kepts | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PORTION OF AREA TO REMAIN CLOSED** | | | | | | | | | | |
| 1 | 20270 | 278 | 63 | 0 | 0 | 2 | 0 | 0 | 0 | 4 | 2 |
| 2 | 16515 | 348 | 254 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 38760 | 497 | 216 | 0 | 0 | 10 | 0 | 0 | 0 | 10 | 0 |
| 4 | 6611 | 77 | 42 | 0 | 3 | 17 | 0 | 0 | 0 | 17 | 0 |
| 5 | 15324 | 165 | 123 | 1 | 0 | 372 | 16 | 1 | 0 | 373 | 16 |
| 6 | 25752 | 368 | 169 | 0 | 1 | 343 | 6 | 0 | 0 | 343 | 10 |
| 7 | 19832 | 189 | 107 | 0 | 0 | 75 | 5 | 1 | 0 | 76 | 5 |
| 8 | 10235 | 222 | 83 | 0 | 0 | 54 | 4 | 0 | 0 | 54 | 4 |
| 9 | 8860 | 40 | 35 | 0 | 0 | 118 | 0 | 0 | 0 | 118 | 4 |
| 10 | 18185 | 309 | 133 | 0 | 0 | 115 | 0 | 0 | 0 | 119 | 2 |
| 11 | 7415 | 101 | 36 | 0 | 0 | 28 | 0 | 0 | 0 | 28 | 0 |
| 12 | 10290 | 259 | 149 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 |
| Total | 198,049 | 2,853 | 1,410 | 1 | 4 | 1,136 | 31 | 2 | 0 | 1,144 | 43 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction | 0.9% | 2.2% | 3.8% | 0.2% | 0.2% | 0.7% | 0.6% | 0.005% | 0.0% | 0.5% | 0.5% |
| | **PORTION OF AREA CONSIDERED FOR REOPENING** | | | | | | | | | | |
| 1 | 30,678 | 122 | 57 | 1 | 0 | 351 | 0 | 13 | 0 | 364 | 0 |
| 2 | 17,681 | 183 | 37 | 1 | 0 | 191 | 0 | 9 | 0 | 200 | 1 |
| 3 | 4,703 | 25 | 59 | 2 | 0 | 74 | 0 | 0 | 0 | 74 | 0 |
| 4 | 23,053 | 94 | 77 | 1 | 7 | 317 | 4 | 0 | 0 | 317 | 13 |
| 5 | 81,097 | 56 | 13 | 5 | 11 | 1,529 | 47 | 7 | 0 | 1,542 | 61 |
| 6 | 92,064 | 195 | 175 | 2 | 4 | 1,766 | 67 | 2 | 1 | 1,768 | 87 |
| 7 | 86,779 | 149 | 99 | 0 | 0 | 1,285 | 21 | 4 | 0 | 1,294 | 22 |
| 8 | 61,128 | 99 | 91 | 0 | 0 | 601 | 2 | 2 | 0 | 608 | 8 |
| 9 | 50,612 | 17 | 9 | 0 | 0 | 1,179 | 38 | 3 | 0 | 1,199 | 45 |
| 10 | 45,009 | 22 | 18 | 0 | 0 | 649 | 27 | 3 | 0 | 652 | 47 |
| 11 | 11,768 | 4 | 5 | 0 | 0 | 59 | 0 | 2 | 0 | 61 | 3 |
| 12 | 4,496 | 19 | 7 | 0 | 0 | 90 | 0 | 0 | 0 | 91 | 0 |
| Total | 509,068 | 985 | 647 | 12 | 22 | 8,091 | 206 | 45 | 1 | 8,170 | 287 |
| All Areas* | 21,148,706 | 127,500 | 36,748 | 599 | 1,617 | 167,203 | 5,486 | 37,133 | 1,006 | 226,156 | 8,990 |
| % Reduction | 2.4% | 0.8% | 1.8% | 2.0% | 1.4% | 4.8% | 3.8% | 0.1% | 0.01% | 3.6% | 3.2% |

**Table A.28 .** **An example of the calculations for the redistribution of fishing effort model.** This example calculates the number of discards of loggerhead sea turtles considering the redistribution of fishing effort for alternative B2(d). A negative sign indicates an increase in discards.

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Month** | **Number of hooks in the Atlantic & Gulf of Mexico** | **Number of discards in Atl.& Gulf of Mexico** | **Number of hooks in the time/area closure** | **Number of discards in the potential time/area closure** | **Number of discards in open Atl. & GOM (B-D)** | **CPUE in the open Atl. & Gulf of Mexico (E/(A-C))** | **Number of additional dicards in open Atl. & GOM by displaced effort (C*F)** | **Discards from open Atl. & GOM with displaced fishing effort (E+G)** | **Number of dicards avoided by area closure (B-H)** | **Cumulative discards avoided by month (Cumulative sum of I)** | **Percent of total discards by month (I/Sum of Column B)** | **Cumulative percent of total discards avoided by closure (J/Sum of Column B)** |
| 1 | 1,647,194 | 9 | 739,191 | 1 | 8 | 8.81E-06 | 6.5 | 15 | -6 | -6 | -3.1% | -3.1% |
| 2 | 1,265,512 | 30 | 488,238 | 0 | 30 | 3.86E-05 | 18.8 | 49 | -19 | -24 | -10.5% | -13.6% |
| 3 | 1,632,848 | 21 | 546,944 | 1 | 20 | 1.84E-05 | 10.1 | 30 | -9 | -33 | -5.1% | -18.7% |
| 4 | 1,865,601 | 11 | 825,627 | 0 | 11 | 1.06E-05 | 8.7 | 20 | -9 | -42 | -4.9% | -23.6% |
| 5 | 2,000,083 | 15 | 1,085,255 | 6 | 9 | 9.84E-06 | 10.7 | 20 | -5 | -47 | -2.6% | -26.2% |
| 6 | 2,035,950 | 35 | 978,848 | 1 | 34 | 3.22E-05 | 31.5 | 65 | -30 | -77 | -17.0% | -43.2% |
| 7 | 2,253,513 | 13 | 1,136,250 | 3 | 10 | 8.95E-06 | 10.2 | 20 | -7 | -84 | -4.0% | -47.2% |
| 8 | 2,256,917 | 9 | 1,125,483 | 1 | 8 | 7.07E-06 | 8.0 | 16 | -7 | -91 | -3.9% | -51.1% |
| 9 | 1,707,630 | 7 | 820,167 | 1 | 6 | 6.76E-06 | 5.5 | 12 | -5 | -96 | -2.5% | -53.6% |
| 10 | 1,670,686 | 10 | 828,954 | 0 | 10 | 1.19E-05 | 9.8 | 20 | -10 | -106 | -5.5% | -59.1% |
| 11 | 1,528,728 | 11 | 725,772 | 1 | 10 | 1.25E-05 | 9.0 | 19 | -8 | -114 | -4.5% | -63.6% |
| 12 | 1,284,044 | 8 | 720,028 | 3 | 5 | 8.86E-06 | 6.4 | 11 | -3 | -117 | -1.9% | -65.5% |
| Total | 21,148,706 | 179 | 10,020,757 | 18 | 161 | 1.74E-04 | 135 | 296 | -117 | | | |

**Table A.29** **An example of how the modified redistribution of fishing effort was calculated.** This example calculates the number of discards of white marlin considering the redistribution of fishing effort in the Gulf of Mexico and area 6 only for alternative B2(c) from April through June. A negative sign indicates an increase in discards, and a positive value indicates a decrease in discards.

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| **Month** | **Number of hooks in the Gulf of Mexico** | **Number of discards in Gulf of Mexico** | **Number of hooks in the time/area closure** | **Number of discards in the time/area closure** | **Number of discards in open GOM (B-D)** | **CPUE in the open Gulf of Mexico (E/(A-C))** | **Number of additional dicards in open GOM by displaced effort (C*F)** | **Discards from open GOM with displaced fishing effort (E+G)** | **Number of dicards avoided by area closure (B-H)** |
| 4 | 1,285,615 | 111 | 1,139,144 | 102 | 9 | 6.14E-05 | 70.0 | 79 | 32 |
| 5 | 1,644,111 | 223 | 1,454,636 | 201 | 22 | 1.16E-04 | 168.9 | 191 | 32 |
| 6 | 1,499,224 | 329 | 1,308,060 | 293 | 36 | 1.88E-04 | 246.3 | 282 | 47 |
| Total | 4,428,950 | 663 | 3,901,840 | 596 | 67 | 3.66E-04 | 485 | 552 | 111 |

**Table A.30** **An example of how the modified redistribution of fishing effort was calculated.** This example calculates the number of discards of white marlin considering the redistribution of fishing effort in the Gulf of Mexico and area 6 only for alternative B2(c) from April through June. A negative sign indicates an increase in discards, and a positive value indicates a decrease in discards.

| | A | B | C | F | G | H | I |
|---|---|---|---|---|---|---|---|
| **Month** | **Number of hooks in Areas 6** | **Number of discards in Areas 6** | **Number of hooks displaced out of Gulf** | **CPUE in the Area 6** | **Number of discards in Area 6 as a result of displaced effort (C*F)** | **Total number of discards avoided by the area closure** | **Cumulative percent of total discards avoided by closure** |
| 4 | 311,464 | 56 | 28,198 | 1.80E-04 | 5.1 | 111-13=**98** | 98/3747=**2.6%** |
| 5 | 109,736 | 49 | 14,615 | 4.47E-04 | 6.5 | | |
| 6 | 77,284 | 35 | 2,600 | 4.53E-04 | 1.2 | | |
| Total | 498,484 | 140 | 45,413 | 1.08E-03 | 13 | | |

**Table A.31** **Comparison between the percent change of bycatch for different closures for 2001-2003 data (used in the draft Consolidated FMP) and 2001-2004 (first six months of 2004 included) without redistribution of effort.** A negative (-) sign indicates a reduction in bycatch. Source: HMS Logbook data 2001-2004 (first six months of 2004).

| Alternative | Number of Hooks Set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leather back | Logger head | Bluefin Tuna Kept | Bluefin Tuna discards | Pelagic Shark discards | LCS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **WITHOUT REDISTRIBUTION OF EFFORT** | | | | | | | | | | | |
| **2001-2003** | | | | | | | | | | | |
| **B2(a)** | | | | | | | | | | | |
| 2001-2003: Year-round | -18.0% | -16.0% | -19.9% | -15.8% | -14.9% | -34.6% | -5.0% | -22.2% | -12.2% | -0.6% | -2.5% |
| 2001-2004: Year-round | **-20.4%** | **-17.1%** | **-20.1%** | **-16.5%** | **-15.1%** | **-32.8%** | **-3.8%** | **-22.0%** | **-11.9%** | **-2.0%** | **-3.8%** |
| 2001-2003: May-Nov | -11.1% | -14.7% | -17.6% | -14.2% | -11.3% | -15.4% | -3.4% | -6.7% | -4.6% | -0.3% | -1.3% |
| 2001-2004: May-Nov | **-12.4%** | **-14.8%** | **-16.5%** | **-12.9%** | **-10.5%** | **-14.0%** | **-2.5%** | **-5.8%** | **-4.8%** | **-0.6%** | **-2.0%** |
| | | | | | | | | | | | |
| **B2(b)** | | | | | | | | | | | |
| 2001-2003: Year-round | -4.7% | -3.9% | -0.9% | -0.1% | -0.5% | -5.7% | -20.7% | -5.7% | -28.5% | -14.9% | -2.5% |
| 2001-2004: Year-round | **-4.2%** | **-3.4%** | **-0.8%** | **-0.7%** | **-0.8%** | **-4.8%** | **-15.5** | **-4.1%** | **-21.0%** | **-13.7%** | **-2.1%** |
| 2001-2003: June only | -0.9% | -0.4% | -0.2% | 0.0% | 0.0% | -2.0% | -11.2% | -1.8% | -22.6% | -3.8% | -0.0% |
| 2001-2004: June only | **-0.8%** | **-0.3%** | **-0.2%** | **-0.2%** | **-0.6%** | **-1.7%** | **-8.4%** | **-1.2%** | **-16.6%** | **-13.7%** | **-2.1%** |
| | | | | | | | | | | | |
| **B2(c)** (April-June) | | | | | | | | | | | |
| 2001-2003 | -13.4% | -10.3% | -10.0% | -12.1% | -8.3% | -11.1% | -3.9% | -29.0% | -21.5% | -0.8% | -3.7% |
| 2001-2004 | **-15.7%** | **-15.9%** | **-14.6%** | **-19.2%** | **-12.0%** | **-14.7%** | **-2.9%** | **-51.4%** | **-35.8%** | **-3.8%** | **-8.4%** |
| | | | | | | | | | | | |
| **B2(d)** (Year-round) | | | | | | | | | | | |
| 2001-2003 | -47.4% | -47.3% | -57.0% | -62.4% | -83.5% | -57.5% | -10.1% | -53.6% | -27.1% | -2.2% | -12.9% |
| 2001-2004 | **-47.7%** | **-49.2%** | **-58.1%** | **-62.3%** | **-48.0%** | **-57.2%** | **-7.6%** | **-51.7%** | **-35.8%** | **-6.5%** | **-18.3%** |
| | | | | | | | | | | | |
| **B2(e)** (Year-round) | | | | | | | | | | | |
| 2001-2003 | -10.1% | -8.7% | -1.6% | -0.3% | -1.9% | -9.9% | -36.3% | -12.4% | -43.3% | -31.6% | -2.5% |
| 2001-2004 | **-9.1%** | **-7.8%** | **-1.6%** | **-1.1%** | **-1.9%** | **-9.9%** | **-28.2%** | **-8.8%** | **-33.8%** | **-29.1%** | **-4.2%** |

**Table A.32 Comparison in the number of hooks, discards, and CPUEs (# discards/# hooks in a particular area) between July through December of 2001-2003 and 2004 data. The yearly averages for the 6 months in 2001-2003 for CPUEs, hooks, and discards are shown in parentheses.** Data source: HMS Logbook data July through December 2001-2003 and 2004.

| Alternative | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Pelagic Shark discards | Large Coastal Shark discards |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **B2(a) (Gulf of Mexico)** | | | | | | | | |
| 2001-2003: Mean CPUE | (0.00034) | (0.00037) | (0.00012) | (0.000041) | (0.00010) | (0.000002) | (0.000081) | (0.00017) |
| 2004: CPUE | 0.00075 | 0.00045 | 0.00023 | 0.00012 | 0.000061 | 0.0 | 0.00012 | 0.0004 |
| 2001-2003: Mean # discards | (105.3) | (113.3) | (36.8) | (13) | (31.7) | (0.67) | (26.3) | (54) |
| 2004: # discards | 72 | 48 | 27 | 12 | 9 | 0.0 | 14 | 43 |
| **Number of hooks** | | | | | | | | |
| 2001-2003: (646,380) | | | | | | | | |
| 2004: 627,527 | | | | | | | | |
| | | | | | | | | |
| **B2(b) (Northeast)** | | | | | | | | |
| 2001-2003: Mean CPUE | (0.00017) | (0.000031) | (0.000001) | (0.000003) | (0.00037) | (0.00025) | (0.019) | (0.00056) |
| 2004: CPUE | 0.00079 | 0.00069 | 0.000089 | 0.0 | 0.0 | 0.0 | 0.0083 | 0.0016 |
| 2001-2003: Mean # discards | (37.3) | (6) | (0.33) | (0.67) | (6) | (5.67) | (1,249.3) | (112.3) |
| 2004: # discards | 28 | 23 | 3 | 0.0 | 0.0 | 0.0 | 125 | 55 |
| **Number of hooks** | | | | | | | | |
| 2001-2003: (268,707) | | | | | | | | |
| 2004: 160,461 | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| **B2(c) (Gulf of Mexico)** | | | | | | | | |
| 2001-2003: Mean CPUE | (0.00038) | (0.00036) | (0.00013) | (0.000048) | (0.000090) | (0.000003) | (0.00011) | (0.00030) |
| 2004: CPUE | 0.00061 | 0.00044 | 0.00019 | 0.000091 | 0.000033 | 0.000008 | 0.00037 | 0.00074 |
| 2001-2003: Mean # discards | (370.3) | (350) | (123) | (45) | (77.7) | (3) | (95.7) | (248.3) |
| 2004: # discards | 189 | 123 | 59 | 33 | 12 | 3 | 75 | 231 |
| | | | | | | | | |
| **Number of hooks** | | | | | | | | |
| 2001-2003: (1,753,421) | | | | | | | | |
| 2004: 1,773,489 | | | | | | | | |
| | | | | | | | | |

| Alternative | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Pelagic Shark discards | Large Coastal Shark discards |
|---|---|---|---|---|---|---|---|---|
| **B2(d) (Gulf of Mexico)** | | | | | | | | |
| 2001-2003: Mean CPUE | (0.0003) | (0.00036) | (0.00015) | (0.000088) | (0.000076) | (0.000003) | (0.00011) | (0.00038) |
| 2004: CPUE | 0.00061 | 0.00044 | 0.00091 | 0.000090 | 0.000033 | 0.000008 | 0.00034 | 0.00079 |
| 2001-2003: Mean # discards | (376.7) | (365.7) | (153.3) | (86.7) | (64.7) | (3) | (97) | (342.3) |
| 2004: # discards | 189 | 123 | 60 | 33 | 12 | 3 | 79 | 248 |
| **Number of hooks** | | | | | | | | |
| 2001-2003: (1,786,085) | | | | | | | | |
| 2004: 1,779,789 | | | | | | | | |
| | | | | | | | | |
| **B2(e) (Northeast)** | | | | | | | | |
| 2001-2003: Mean CPUE | (0.00020) | (0.000029) | (0.000002) | (0.000005) | (0.000064) | (0.000045) | (0.012) | (0.00057) |
| 2004: CPUE | 0.00053 | 0.00035 | 0.000074 | 0.000012 | 0.000016 | 0.000089 | 0.020 | 0.0049 |
| 2001-2003: Mean # discards | (86) | (11.7) | (1) | (2.3) | (12.3) | (11.3) | (2,863.3) | (228.3) |
| 2004: # discards | 51 | 36 | 6 | 1 | 1 | 7 | 851 | 391 |
| **Number of hooks** | | | | | | | | |
| 2001-2003: (616,743) | | | | | | | | |
| 2004: 370,990 | | | | | | | | |

**Table A.33 Comparison of the number of hooks, discards, species kept, and CPUEs (#discards/#hooks or #kept/#hooks in a particular area) between July through Dec. of 2001-2003 and 2004 data. The yearly averages for the 6 months in 2001-2003 for CPUEs, hooks, discards, and species kept are shown in parentheses. .** Data source: HMS Logbook data July through December 2001-2003 and 2004.

| Alternative | Swordfish Kept | Swordfish Discards | Bluefin Tuna Kept | Bluefin Tuna Discards | YFT Kept | YFT Discards | BET Kept | BET Discards | BAYS Kept | BAYS Discards |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| **B2(a) (Gulf of Mexico)** | | | | | | | | | | |
| 2001-2003: Mean CPUE | (0.0040) | (0.0020) | (0.000011) | (0.0000021) | (0.020) | (0.00053) | (0.00051) | (0.0000030) | (0.021) | (0.00077) |
| 2004: CPUE | 0.031 | 0.0049 | 0.00016 | 0.00019 | 0.056 | 0.00070 | 0.0071 | 0.00012 | 0.068 | 0.0015 |
| 2001-2003: Mean # discards/kept | (1,311.3) | (646) | (3.6) | (0.67) | (6,319.7) | (172.7) | (170.3) | (1) | (6,588) | (249.7) |
| 2004: # discards/kept | 3,161 | 529 | 16 | 27 | 6,174 | 75 | 916 | 13 | 7,706 | 180 |
| **Number of hooks** | | | | | | | | | | |
| 2001-2003: (646,380) | | | | | | | | | | |
| 2004: 513,188 | | | | | | | | | | |
| | | | | | | | | | | |
| **B2(b) (Northeast)** | | | | | | | | | | |
| 2001-2003: Mean CPUE | (0.024) | (0.0087) | (0.00013) | (0.00030) | (0.015) | (0.00011) | (0.0080) | (0.0000070) | (0.028) | (0.00016) |
| 2004: CPUE | 0.029 | 0.0053 | 0.00023 | 0.000030 | 0.056 | 0.00060 | 0.0079 | 0.000056 | 0.068 | 0.00094 |
| 2001-2003: Mean # discards/kept | (3,033.3) | (580.3) | (7.7) | (32) | (2,385.7) | (23.3) | (356.7) | (1.67) | (3,125.3) | (27.3) |
| 2004: # discards/kept | 1,022 | 202 | 8 | 1 | 1,958 | 24 | 244 | 3 | 2,344 | 180 |
| **Number of hooks** | | | | | | | | | | |
| 2001-2003: (268,707) | | | | | | | | | | |
| 2004: 160,462 | | | | | | | | | | |

| Alternative | Swordfish Kept | Swordfish Discards | Bluefin Tuna Kept | Bluefin Tuna Discards | YFT Kept | YFT Discards | BET Kept | BET Discards | BAYS Kept | BAYS Discards |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| **B2(c) (Gulf of Mexico)** | | | | | | | | | | |
| 2001-2003: Mean CPUE | (0.0030) | (0.0018) | (0.000016) | (0.000005) | (0.021) | (0.00059) | (0.00038) | (0.000003) | (0.022) | (0.00088) |
| 2004: CPUE | 0.034 | 0.0084 | 0.00019 | 0.00049 | 0.058 | 0.0013 | 0.011 | 0.0012 | 0.076 | 0.0039 |
| 2001-2003: Mean # discards/kept | (2,591) | (1,543) | (12.7) | (4) | (19,304) | (535.7) | (299.3) | (2.67) | (19,776) | (789.7) |
| 2004: # discards/kept | 9,042 | 2,081 | 63 | 165 | 16,764 | 380 | 2,991 | 346 | 21,548 | 1,184 |
| **Number of hooks** | | | | | | | | | | |
| 2001-2003: (1,753,421) | | | | | | | | | | |
| 2004: 1,773,489 | | | | | | | | | | |
| | | | | | | | | | | |
| **B2(d) (Gulf of Mexico)** | | | | | | | | | | |
| 2001-2003: Mean CPUE | (0.0031) | (0.0018) | (0.000016) | (0.000005) | (0.021) | (0.00059) | (0.00037) | (0.000003) | (0.022) | (0.00088) |
| 2004: CPUE | 0.035 | 0.0085 | 0.00019 | 0.00048 | 0.059 | 0.0013 | 0.011 | 0.0012 | 0.076 | 0.0039 |
| 2001-2003: Mean # discards/kept | (2,633.3) | (1,552) | (13) | (4) | (19,641) | (542.3) | (300.3) | (2.67) | (20,114) | (799.3) |
| 2004: # discards/kept | 9,157 | 2,105 | 63 | 165 | 16,830 | 380 | 3,002 | 348 | 21,625 | 1,184 |
| **Number of hooks** | | | | | | | | | | |
| 2001-2003: (1,786,085) | | | | | | | | | | |
| 2004: 1,779,789 | | | | | | | | | | |
| | | | | | | | | | | |
| **B2(e) (Northeast)** | | | | | | | | | | |
| 2001-2003: Mean CPUE | (0.015) | (0.0041) | (0.000088) | (0.00037) | (0.012) | (0.00019) | (0.011) | (0.00016) | (0.034) | (0.0017) |
| 2004: CPUE | 0.024 | 0.0062 | 0.00013 | 0.00026 | 0.048 | 0.0011 | 0.0086 | 0.000063 | 0.063 | 0.0014 |
| 2001-2003: Mean # discards/kept | (4,987.7) | (1,219.7) | (20.3) | (85.3) | (3,975.7) | (61) | (2,165) | (46) | (8,354.7) | (241.7) |
| 2004: # discards/kept | 2,035 | 511 | 16 | 17 | 4,060 | 97 | 539 | 6 | 4,948 | 122 |
| **Number of hooks** | | | | | | | | | | |
| 2001-2003: (616,743) | | | | | | | | | | |
| 2004: 370,990 | | | | | | | | | | |

**Table A.34 Percent change in reported landings by area from July through December where: a) 2001-03 vs. 1997-99; b) 2004 vs. 2001-03; and c) 2004 vs. 1997-99 (1997-99 and 2001-03 are mean reported landings).** Source: HMS Logbook data.

| Area | Year | Pelagic Sharks Kept | Pelagic Sharks Discarded | Large Coastal Sharks Kept | Large Coastal Sharks Discarded | Dolphin Kept | Dolphin Discarded | Wahoo Kept | Wahoo Discarded | Blue Marlin Discarded | White Marlin Discarded | Sailfish Discarded | Spearfish Discarded | Sea Turtle Interactions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CAR** | 1997-99 | 14.3 | 132.3 | 1.3 | 18.3 | 130.7 | 3.7 | 45 | 1.7 | 29.3 | 11.3 | 49 | 1.7 | 1 |
| | 2001-03 | 1.3 | 39 | 0.3 | 11.3 | 158.7 | 0 | 15.3 | 0.3 | 19 | 14.7 | 9 | 0.3 | 1.7 |
| | 2004 | 3 | 12 | 0 | 6 | 12 | 0 | 0 | 0 | 2 | 0 | 0 | 3 | 0 |
| *% Change* | a | -90.7 | -70.5 | -75.0 | -38.2 | 21.4 | -100.0 | -65.9 | -80.0 | -35.2 | 29.4 | -81.6 | -80.0 | 66.7 |
| | b | 125.0 | -69.2 | -100.0 | -47.1 | -92.4 | --- | -100.0 | -100.0 | -89.5 | -100.0 | -100.0 | 800.0 | -100.0 |
| | c | -79.1 | -90.9 | -100.0 | -67.3 | -90.8 | -100.0 | -100.0 | -100.0 | -93.2 | -100.0 | -100.0 | 80.0 | -100.0 |
| **GOM** | 1997-99 | 108.7 | 163.3 | 173.7 | 597.3 | 3545.3 | 74 | 2514 | 67.7 | 297.7 | 279.3 | 347.7 | 26.3 | 1 |
| | 2001-03 | 51 | 111.3 | 37 | 299 | 2920.7 | 64.7 | 2276.7 | 20.7 | 387.3 | 399.7 | 162 | 44 | 68.3 |
| | 2004 | 134 | 59 | 76 | 757 | 3054 | 56 | 3050 | 21 | 242 | 267 | 118 | 56 | 23 |
| *% Change* | a | -53.1 | -31.8 | -78.7 | -49.9 | -17.6 | -12.6 | -9.4 | -69.5 | 30.1 | 43.1 | -53.4 | 67.1 | 6733.3 |
| | b | 162.7 | -47.0 | 105.4 | 153.2 | 4.6 | -13.4 | 34.0 | 1.6 | -37.5 | -33.2 | -27.2 | 27.3 | -66.3 |
| | c | 23.3 | -63.9 | -56.2 | 26.7 | -13.9 | -24.3 | 21.3 | -69.0 | -18.7 | -4.4 | -66.1 | 112.7 | 2200.0 |
| **FEC** | 1997-99 | 60.7 | 209.7 | 137 | 469.3 | 383 | 14.3 | 69.3 | 1 | 76 | 36.3 | 86 | 9 | 1.7 |
| | 2001-03 | 23 | 30.7 | 37.7 | 84.3 | 216 | 1.3 | 17 | 1 | 27.3 | 1.7 | 8.7 | 1 | 1 |
| | 2004 | 4 | 11 | 4 | 144 | 51 | 0 | 10 | 0 | 11 | 0 | 8 | 5 | 0 |
| *% Change* | a | -62.1 | -85.4 | -72.5 | -82.0 | -43.6 | -90.7 | -75.5 | 0.0 | -64.0 | -95.4 | -89.9 | -88.9 | -40.0 |
| | b | -82.6 | -64.1 | -89.4 | 70.8 | -76.4 | -100.0 | -41.2 | -100.0 | -59.8 | -100.0 | -7.7 | 400.0 | -100.0 |
| | c | -93.4 | -94.8 | -97.1 | -69.3 | -86.7 | -100.0 | -85.6 | -100.0 | -85.5 | -100.0 | -90.7 | -44.4 | -100.0 |
| **SAB** | 1997-99 | 58.3 | 213.3 | 287 | 898.7 | 398.3 | 9.3 | 95.7 | 1 | 69.7 | 19.7 | 79.3 | 5.3 | 3 |
| | 2001-03 | 23 | 80.7 | 148.7 | 422 | 297 | 40 | 22.7 | 0.3 | 20 | 2.3 | 24.3 | 2.3 | 2 |
| | 2004 | 17 | 86 | 180 | 274 | 244 | 32 | 44 | 2 | 39 | 28 | 21 | 1 | 2 |
| *% Change* | a | -60.6 | -62.2 | -48.2 | -53.0 | -25.4 | 328.6 | -76.3 | -66.7 | -71.3 | -88.1 | -69.3 | -56.3 | -33.3 |
| | b | -26.1 | 6.6 | 21.1 | -35.1 | -17.8 | -20.0 | 94.1 | 500.0 | 95.0 | 1100.0 | -13.7 | -57.1 | 0.0 |
| | c | -70.9 | -59.7 | -37.3 | -69.5 | -38.7 | 242.9 | -54.0 | 100.0 | -44.0 | 42.4 | -73.5 | -81.3 | -33.3 |
| **MAB** | 1997-99 | 773.3 | 11114.3 | 1560.3 | 504.7 | 2348.3 | 29.3 | 51.3 | 1 | 31.7 | 246.7 | 4.3 | 2.7 | 20.7 |
| | 2001-03 | 823.3 | 2957.3 | 2693.3 | 625.3 | 1370 | 6.3 | 37.3 | 12.3 | 13.7 | 115 | 2 | 2 | 8 |
| | 2004 | 1050 | 3803 | 654 | 710 | 1588 | 14 | 90 | 0 | 19 | 124 | 0 | 0 | 25 |
| *% Change* | a | 6.5 | -73.4 | 72.6 | 23.9 | -41.7 | -78.4 | -27.3 | 1133.3 | -56.8 | -53.4 | -53.8 | -25.0 | -61.3 |
| | b | 27.5 | 28.6 | -75.7 | 13.5 | 15.9 | 121.1 | 141.1 | -100.0 | 39.0 | 7.8 | -100.0 | -100.0 | 212.5 |
| | c | 35.8 | -65.8 | -58.1 | 40.7 | -32.4 | -52.3 | 75.3 | -100.0 | -40.0 | -49.7 | -100.0 | -100.0 | 21.0 |

| Area | Year | Pelagic Sharks Kept | Pelagic Sharks Discarded | Large Coastal Sharks Kept | Large Coastal Sharks Discarded | Dolphin Kept | Dolphin Discarded | Wahoo Kept | Wahoo Discarded | Blue Marlin Discarded | White Marlin Discarded | Sailfish Discarded | Spearfish Discarded | Sea Turtle Interactions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NEC** | 1997-99 | 334.3 | 11597.3 | 42.3 | 67.3 | 2621.7 | 42.3 | 22 | 0.3 | 48 | 287.3 | 2.3 | 3.7 | 57.7 |
| | 2001-03 | 371.3 | 2317 | 43.7 | 192.7 | 1458 | 37.3 | 18 | 0.3 | 9.7 | 63.7 | 1 | 1 | 19.7 |
| | 2004 | 411 | 1497 | 24 | 388 | 304 | 2 | 21 | 0 | 11 | 26 | 0 | 1 | 10 |
| *% Change* | a | 11.1 | -80.0 | 3.1 | 186.1 | -44.4 | -11.8 | -18.2 | 0.0 | -79.9 | -77.8 | -57.1 | -72.7 | -65.9 |
| | b | 10.7 | -35.4 | -45.0 | 101.4 | -79.1 | -94.6 | 16.7 | -100.0 | 13.8 | -59.2 | -100.0 | 0.0 | -49.2 |
| | c | 22.9 | -87.1 | -43.3 | 476.2 | -88.4 | -95.3 | -4.5 | -100.0 | -77.1 | -91.0 | -100.0 | -72.7 | -82.7 |
| **NED** | 1997-99 | 462.7 | 12300.7 | 0 | 0.7 | 85 | 2.3 | 0.3 | 0.7 | 2 | 7.7 | 0.3 | 0.3 | 417 |
| | 2001-03 | 230.3 | 10497 | 0 | 0.7 | 57.3 | 11.3 | 0 | 0 | 1.3 | 4 | 0 | 1 | 200.7 |
| | 2004 | 596 | 16454 | 0 | 0 | 2 | 3 | 2 | 0 | 1 | 2 | 0 | 1 | 137 |
| *% Change* | a | -50.2 | -14.7 | --- | 0.0 | -32.5 | 385.7 | -100.0 | -100.0 | -33.3 | -47.8 | -100.0 | 200.0 | -51.9 |
| | b | 158.8 | 56.7 | --- | -100.0 | -96.5 | -73.5 | --- | --- | -25.0 | -50.0 | --- | 0.0 | -31.7 |
| | c | 28.8 | 33.8 | --- | -100.0 | -97.6 | 28.6 | 500.0 | -100.0 | -50.0 | -73.9 | -100.0 | 200.0 | -67.1 |
| **SAR** | 1997-99 | 0 | 10.7 | 0 | 0.7 | 12.3 | 0.7 | 1.7 | 0 | 0 | 3.7 | 0 | 0.3 | 0.3 |
| | 2001-03 | 4.3 | 17.7 | 0.3 | 6.3 | 69 | 0 | 0.7 | 0 | 0.7 | 0 | 0 | 2 | 0 |
| | 2004 | 3 | 40 | 0 | 6 | 6 | 0 | 1 | 0 | 0 | 0 | 0 | 11 | 1 |
| *% Change* | a | --- | 65.6 | --- | 850.0 | 459.5 | -100.0 | -60.0 | --- | --- | -100.0 | --- | 500.0 | -100.0 |
| | b | -30.8 | 126.4 | -100.0 | -5.3 | -91.3 | --- | 50.0 | --- | -100.0 | --- | --- | 450.0 | --- |
| | c | --- | 275.0 | --- | 800.0 | -51.4 | -100.0 | -40.0 | --- | --- | -100.0 | --- | 3200.0 | 200.0 |
| **NCA** | 1997-99 | 16.7 | 118.3 | 0.7 | 0 | 45 | 3.7 | 3.7 | 0.7 | 6.3 | 11.7 | 0.7 | 2.7 | 2.7 |
| | 2001-03 | 15.3 | 1144.7 | 0 | 40.3 | 13.7 | 2 | 1.7 | 0 | 1.7 | 0 | 0.3 | 3 | 1.7 |
| | 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *% Change* | a | -8.0 | 867.3 | -100.0 | --- | -69.6 | -45.5 | -54.5 | -100.0 | -73.7 | -100.0 | -50.0 | 12.5 | -37.5 |
| | b | -100.0 | -100.0 | --- | -100.0 | -100.0 | -100.0 | -100.0 | --- | -100.0 | --- | -100.0 | -100.0 | -100.0 |
| | c | -100.0 | -100.0 | -100.0 | --- | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 |
| **SAT** | 1997-99 | 81.3 | 364 | 12.7 | 8.7 | 142.7 | 3.7 | 42 | 2 | 28 | 15.7 | 7 | 5 | 4.7 |
| | 2001-03 | 28.7 | 7.7 | 0 | 0 | 1.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.3 |
| | 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *% Change* | a | -64.8 | -97.9 | -100.0 | -100.0 | -99.1 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | 35.7 |
| | b | -100.0 | -100.0 | --- | --- | -100.0 | --- | --- | --- | --- | --- | --- | --- | -100.0 |
| | c | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 |

**Table A.35** **Percent change in reported landings by area from July through December where: a) 2001-03 vs. 1997-99; b) 2004 vs. 2001-03; and c) 2004 vs. 1997-99 (1997-99 and 2001-03 are mean reported landings).** Source: HMS Logbook data.

| Area | Year | Hooks Set | Swordfish Kept | Swordfish Discarded | Bluefin Tuna Kept | Bluefin Tuna Discarded | Yellowfin Tuna Kept | Yellowfin Tuna Discarded | Bigeye Tuna Kept | Bigeye Tuna Discarded | BAYS Kept | BAYS Discarded |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CAR** | 1997-99 | 70440 | 929 | 219 | 0.7 | 0.3 | 400.3 | 22.7 | 109.3 | 15.3 | 523.3 | 40 |
| | 2001-03 | 43263 | 872.3 | 137.7 | 0 | 0 | 51.7 | 1 | 70 | 3 | 127 | 5 |
| | 2004 | 11061 | 141 | 17 | 0 | 0 | 16 | 0 | 4 | 0 | 24 | 0 |
| *% Change* | a | -38.6 | -6.1 | -37.1 | -100.0 | -100.0 | -87.1 | -95.6 | -36.0 | -80.4 | -75.7 | -87.5 |
| | b | -74.4 | -83.8 | -87.7 | --- | --- | -69.0 | -100.0 | -94.3 | -100.0 | -81.1 | -100 |
| | c | -84.3 | -84.8 | -92.2 | -100.0 | -100.0 | -96.0 | -100.0 | -96.3 | -100.0 | -95.4 | -100.0 |
| **GOM** | 1997-99 | 1616703 | 3889 | 1315.3 | 15.3 | 2 | 22656.7 | 605.3 | 214.3 | 3 | 22980.7 | 762.7 |
| | 2001-03 | 1866738 | 3283.3 | 1655.3 | 12 | 4 | 20562.7 | 578.7 | 313 | 2.7 | 21039.7 | 893.7 |
| | 2004 | 1870880 | 2964 | 1561 | 10 | 13 | 16841 | 335 | 273 | 3 | 17347 | 829 |
| *% Change* | a | 15.5 | -15.6 | 25.8 | -21.7 | 100 | -9.2 | -4.4 | 46.0 | -11.1 | -8.4 | 17.2 |
| | b | 0.2 | -9.7 | -5.7 | -16.7 | 225 | -18.1 | -42.1 | -12.8 | 12.5 | -17.6 | -7.2 |
| | c | 15.7 | -23.8 | 18.7 | -34.8 | 550.0 | -25.7 | -44.7 | 27.4 | 0.0 | -24.5 | 8.7 |
| **FEC** | 1997-99 | 259498.7 | 4943.7 | 2236.7 | 1.3 | 0.3 | 686 | 38.3 | 1033.3 | 53.7 | 1807.7 | 94 |
| | 2001-03 | 90403.3 | 929.3 | 263 | 0 | 0 | 523.7 | 78.3 | 793 | 94 | 1389.7 | 176 |
| | 2004 | 58013 | 577 | 143 | 0 | 0 | 523 | 3 | 546 | 1 | 1117 | 4 |
| *% Change* | a | -65.2 | -81.2 | -88.2 | -100.0 | -100.0 | -23.7 | 104.3 | -23.3 | 75.2 | -23.1 | 87.2 |
| | b | -35.8 | -37.9 | -45.6 | --- | --- | -0.1 | -96.2 | -31.1 | -98.9 | -19.6 | -97.7 |
| | c | -77.6 | -88.3 | -93.6 | -100.0 | -100.0 | -23.8 | -92.2 | -47.2 | -98.1 | -38.2 | -95.7 |
| **SAB** | 1997-99 | 214421 | 6015.7 | 2162.7 | 1 | 0.7 | 1108.3 | 66.7 | 48.7 | 5 | 1172 | 73 |
| | 2001-03 | 140263.7 | 3782.3 | 704.3 | 0.3 | 0 | 822.3 | 19 | 31.3 | 3 | 866.3 | 22.7 |
| | 2004 | 128637 | 3179 | 532 | 2 | 0 | 716 | 1 | 34 | 0 | 765 | 2 |
| *% Change* | a | -34.6 | -37.1 | -67.4 | -66.7 | -100.0 | -25.8 | -71.5 | -35.6 | -40.0 | -26.1 | -68.9 |
| | b | -8.3 | -16.0 | -24.5 | 500.0 | --- | -12.9 | -94.7 | 8.5 | -100.0 | -11.7 | -91.2 |
| | c | -40.0 | -47.2 | -75.4 | 100.0 | -100.0 | -35.4 | -98.5 | -30.1 | -100.0 | -34.7 | -97.3 |
| **MAB** | 1997-99 | 1028022 | 3429 | 2244.7 | 33.7 | 92 | 8820.7 | 317.3 | 7013.3 | 357 | 19335.3 | 792 |
| | 2001-03 | 680704.3 | 3839 | 1970.3 | 23.7 | 76.7 | 5985 | 138 | 3653.7 | 82.3 | 12802.3 | 547.3 |
| | 2004 | 669797 | 3665 | 1728 | 58 | 241 | 11930 | 465 | 5000 | 381 | 20601 | 1096 |
| *% Change* | a | -33.8 | 12.0 | -12.2 | -29.7 | -16.7 | -32.1 | -56.5 | -47.9 | -76.9 | -33.8 | -30.9 |
| | b | -1.6 | -4.5 | -12.3 | 145.1 | 214.3 | 99.3 | 237.0 | 36.8 | 362.8 | 60.9 | 100.2 |
| | c | -34.8 | 6.9 | -23.0 | 72.3 | 162.0 | 35.3 | 46.5 | -28.7 | 6.7 | 6.5 | 38.4 |

| Area | Year | Hooks Set | Swordfish Kept | Swordfish Discarded | Bluefin Tuna Kept | Bluefin Tuna Discarded | Yellowfin Tuna Kept | Yellowfin Tuna Discarded | Bigeye Tuna Kept | Bigeye Tuna Discarded | BAYS Kept | BAYS Discarded |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NEC** | 1997-99 | 791638.3 | 3301 | 1445.7 | 17.3 | 86.3 | 7140.3 | 257.3 | 4888 | 135.3 | 13774.3 | 417.7 |
| | 2001-03 | 504159 | 4363.3 | 927 | 11.7 | 68 | 3539.3 | 43 | 1363.7 | 15 | 6132.7 | 69.7 |
| | 2004 | 363358 | 3162 | 339 | 29 | 113 | 8093 | 30 | 451 | 2 | 8832 | 33 |
| *% Change* | a | -36.3 | 32.2 | -35.9 | -32.7 | -21.2 | -50.4 | -83.3 | -72.1 | -88.9 | -55.5 | -83.3 |
| | b | -27.9 | -27.5 | -63.4 | 148.6 | 66.2 | 128.7 | -30.2 | -66.9 | -86.7 | 44.0 | -52.6 |
| | c | -54.1 | -4.2 | -76.6 | 67.3 | 30.9 | 13.3 | -88.3 | -90.8 | -98.5 | -35.9 | -92.1 |
| **NED** | 1997-99 | 435483 | 11651.3 | 1762.7 | 13.7 | 3.7 | 28.3 | 3.3 | 1468.3 | 254 | 1763.3 | 372.3 |
| | 2001-03 | 405723.3 | 7948.7 | 923.3 | 28 | 69.7 | 60 | 1.7 | 852 | 46.3 | 1142.7 | 107.3 |
| | 2004 | 455862 | 8015 | 719 | 51 | 26 | 2 | 0 | 133 | 4 | 157 | 29 |
| *% Change* | a | -6.8 | -31.8 | -47.6 | 104.9 | 1800.0 | 111.8 | -50.0 | -42.0 | -81.8 | -35.2 | -71.2 |
| | b | 12.4 | 0.8 | -22.1 | 82.1 | -62.7 | -96.7 | -100.0 | -84.4 | -91.4 | -86.3 | -73.0 |
| | c | 4.7 | -31.2 | -59.2 | 273.2 | 609.1 | -92.9 | -100.0 | -90.9 | -98.4 | -91.1 | -92.2 |
| **SAR** | 1997-99 | 7330 | 119.3 | 9.3 | 0.3 | 0 | 61 | 0 | 17 | 2.3 | 90.7 | 2.3 |
| | 2001-03 | 18061.3 | 206.7 | 12.3 | 1.3 | 0.3 | 11 | 0 | 43 | 0 | 88.7 | 0 |
| | 2004 | 28464 | 327 | 22 | 6 | 1 | 42 | 10 | 83 | 11 | 198 | 22 |
| *% Change* | a | 146.4 | 73.2 | 32.1 | 300.0 | --- | -82.0 | --- | 152.9 | -100.0 | -2.2 | -100.0 |
| | b | 57.6 | 58.2 | 78.4 | 350.0 | 200.0 | 281.8 | --- | 93.0 | --- | 123.3 | --- |
| | c | 288.3 | 174.0 | 135.7 | 1700.0 | --- | -31.1 | --- | 388.2 | 371.4 | 118.4 | 842.9 |
| **NCA** | 1997-99 | 56764.3 | 1010.7 | 74.3 | 1.7 | 0 | 77.7 | 2 | 75 | 7.3 | 209.3 | 9.7 |
| | 2001-03 | 36240 | 433 | 18.7 | 0 | 0 | 66.3 | 0 | 136.3 | 0 | 353.3 | 0 |
| | 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *% Change* | a | -36.2 | -57.2 | -74.9 | -100.0 | --- | -14.6 | -100.0 | 81.8 | -100.0 | 68.8 | -100.0 |
| | b | -100.0 | -100.0 | -100.0 | --- | --- | -100.0 | --- | -100.0 | --- | -100.0 | --- |
| | c | -100.0 | -100.0 | -100.0 | -100.0 | --- | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 | -100.0 |
| **SAT** | 1997-99 | 78901.7 | 731.3 | 144 | 0.3 | 0.3 | 623.7 | 19.7 | 254.3 | 12.7 | 945 | 34.3 |
| | 2001-03 | 22783.3 | 119.3 | 23.7 | 0 | 0 | 50 | 0 | 277.7 | 0 | 361 | 0 |
| | 2004 | 1200 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 35 | 0 |
| *% Change* | a | -71.1 | -83.7 | -83.6 | -100.0 | -100.0 | -92.0 | -100.0 | 9.2 | -100.0 | -61.8 | -100.0 |
| | b | -94.7 | -100.0 | -100.0 | --- | --- | -30.0 | --- | -100.0 | --- | -90.3 | --- |
| | c | -98.5 | -100.0 | -100.0 | -100.0 | -100.0 | -94.4 | -100.0 | -100.0 | -100.0 | -96.3 | -100.0 |

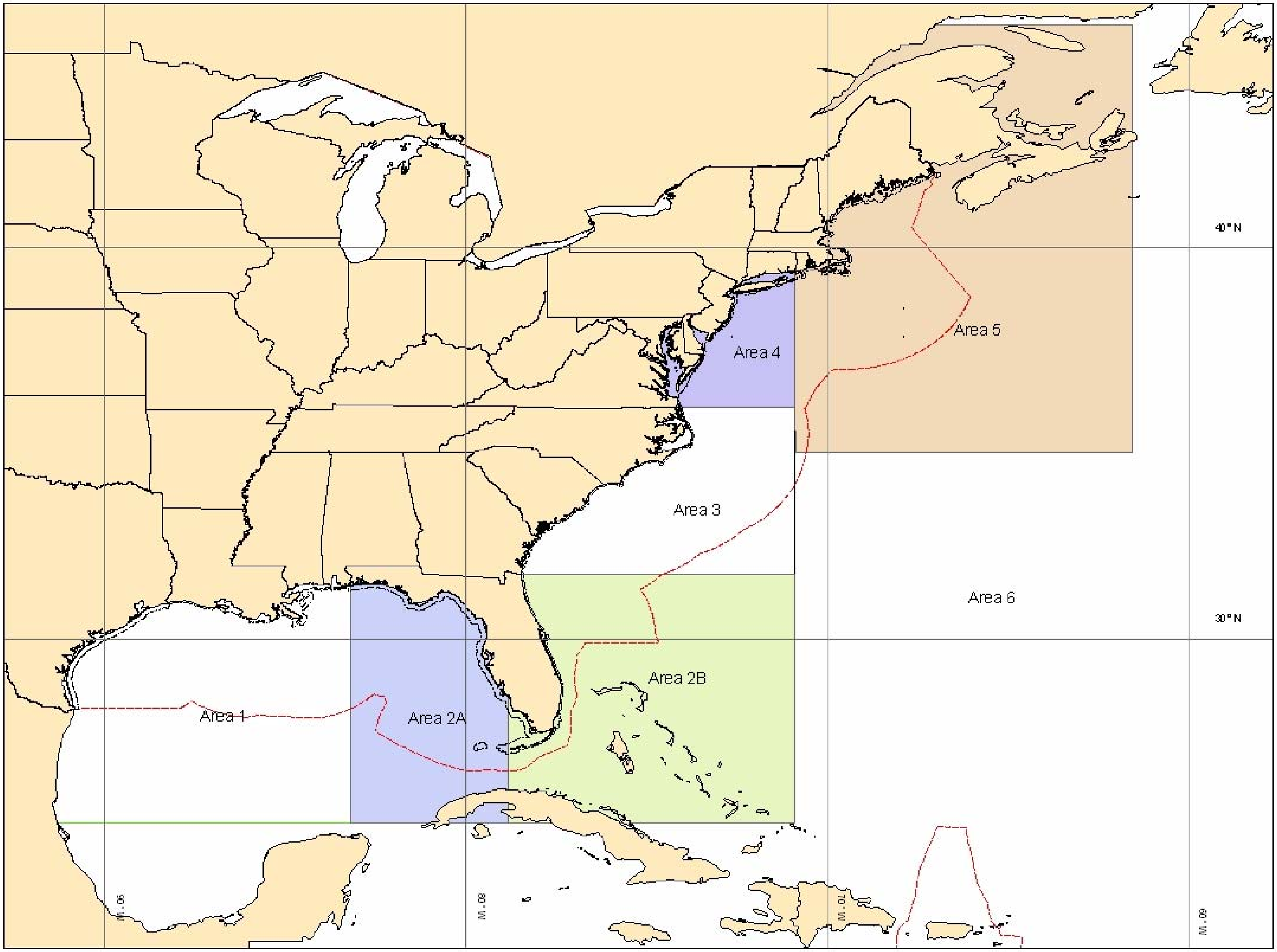


**Figure A.5** **Map showing the different areas that were used in the fleet mobility analysis.**

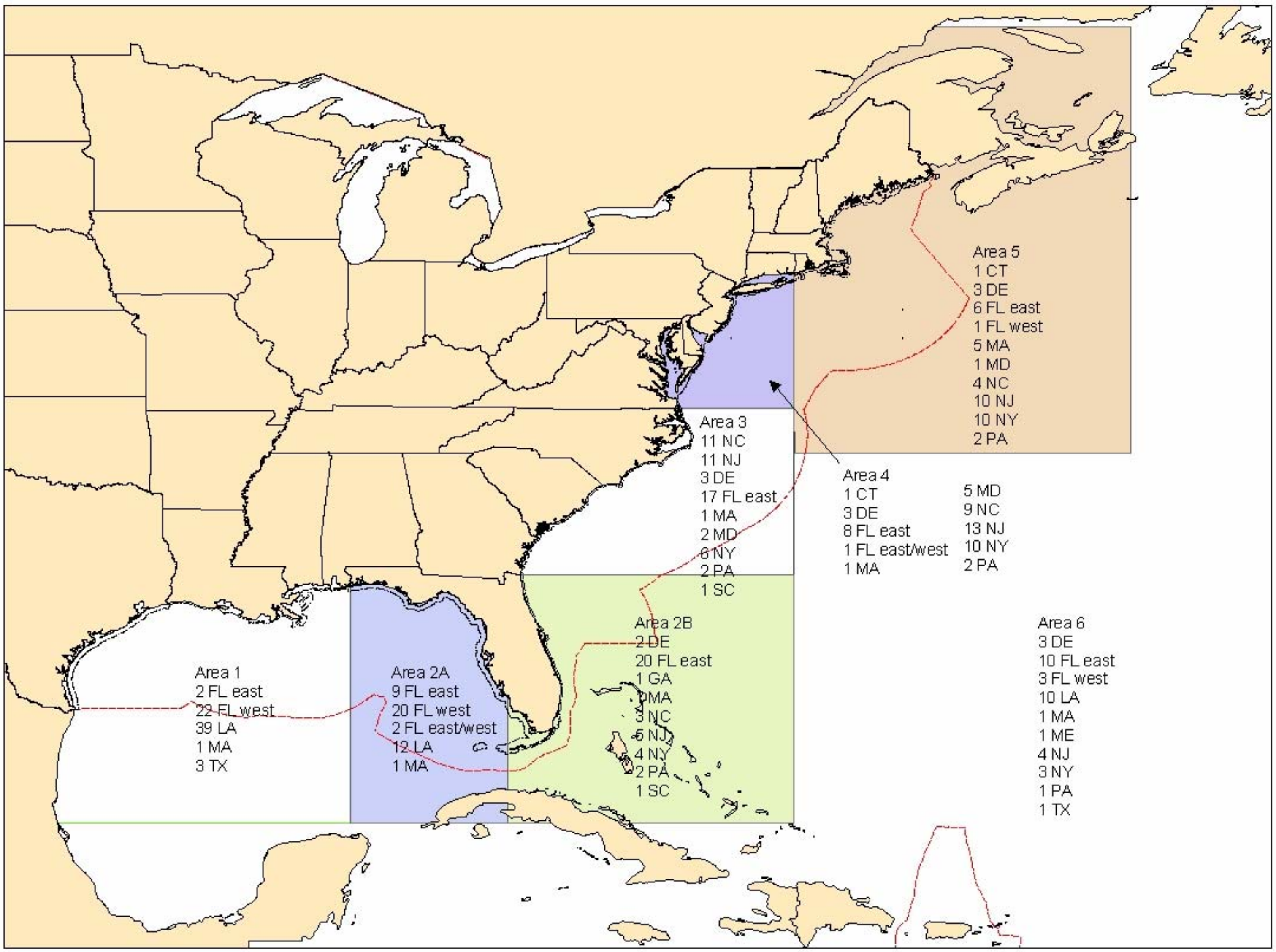


**Figure A.6** **Map showing the number of vessels fishing in different areas with their respective homeports listed.** "FL east" signifies that a vessel's homeport was in the east coast of Florida. "FL west" signifies that a vessel's homeport was in the west coast of FL, and "FL east/west" signifies that the vessel's homeport was in the Florida Keys.


**Figure A.7** **Map showing vessels originating from the Gulf of Mexico and fishing in Atlantic Areas 2B through 6.** The percentage of hooks represents the percentage of hooks that moved out of the Gulf of Mexcio and into Areas 2B, 3, 4, 5, and 6.

**Table A.36 Characteristics of vessels fishing in the Gulf of Mexico and vessels moving out of Gulf of Mexico.**

| **a) Horsepower** | | | | | |
|---|---|---|---|---|---|
| | Mean | Standard error | Range | *n* | *P* |
| Boats fishing in Gulf of Mexico | 372.2 | 20.3 | 0-1200 | 92 | 0.66 |
| Boats moving out of Gulf of Mexico | 395.7 | 41.1 | 170-800 | 14 | |
| **b) Vessel Length** | | | | | |
| | Mean (ft) | Standard error | Range (ft) | *n* | *P* |
| Boats fishing in Gulf of Mexico | 61.65 | 1.26 | 32-88 | 92 | |
| Boats moving out of Gulf of Mexico | 64.79 | 2.38 | 45-78 | 14 | 0.35 |

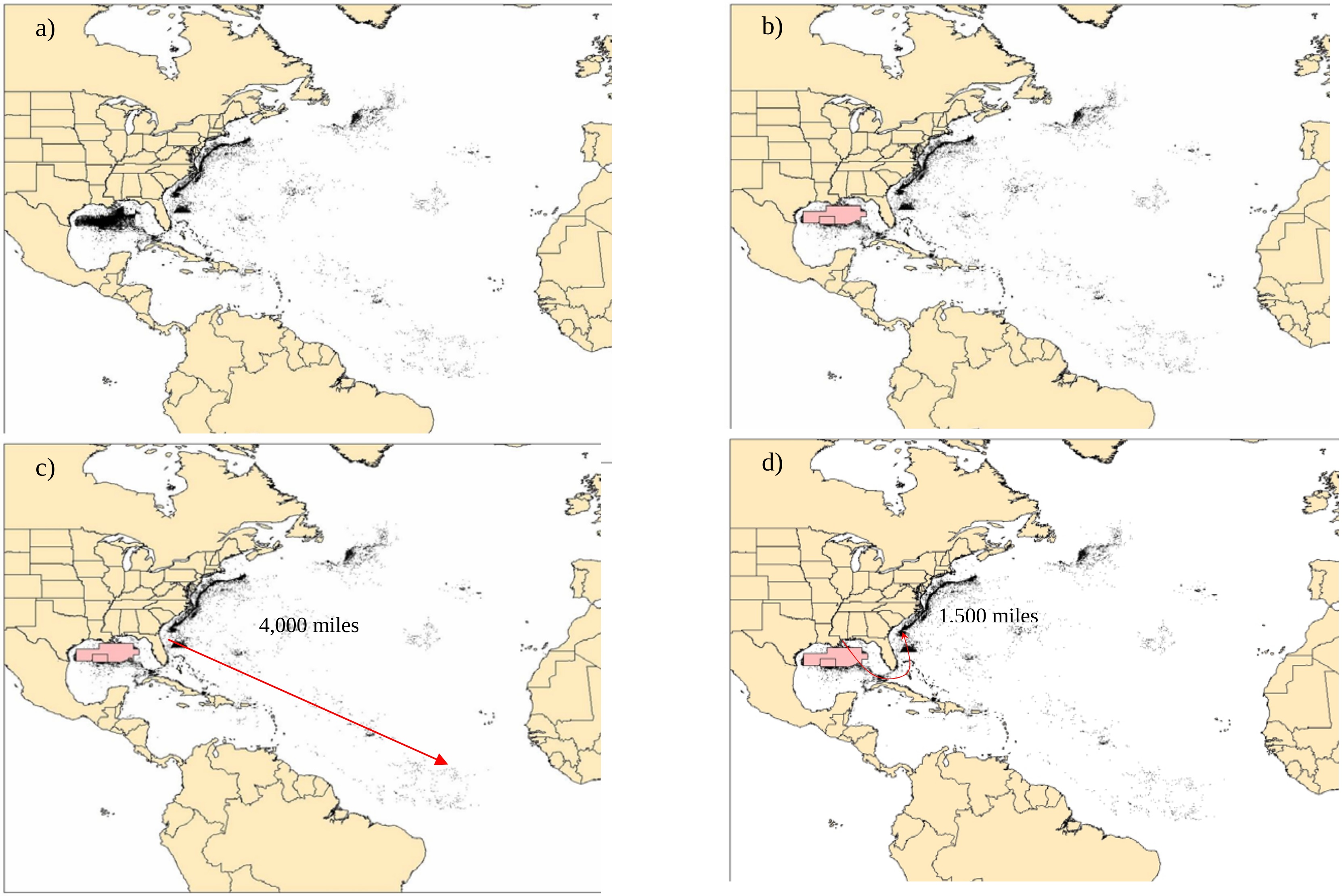


**Figure A.8** **Map of pelagic longline sets within and outside of the U. S. EEZ. a) extent of pelagic longline sets inside and outside U.S. EEZ, b) inset shows the size of B2(a) and B2(c) relative to the scope of pelagic longline sets inside and outside of U. S. EEZ, c) the distance pelagic longline vessels have made relative to the U. S. coastline, d) the distance it would take a vessel to travel from the Gulf of Mexico to the Mid-Atlantic Bight area.** Source: HMS logbook data from January 2001 to June 2004.

**Table A.37 Alternative B2(a) May through November. Cumulative number kept and discarded (over 3 1/2 years) with and without redistribution of effort in the Gulf of Mexico and Area 6 combined.** Minus sign indicates a decrease. *excluding the NED. Three and one half year totals are shown; one year averages can be obtained by dividing the totals by 3.5. Data source: HMS Logbook data 2001-2004 (first six months of 2004)**.**

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kepts | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 485,204 | 2,187 | 794 | 14 | 3 | 4,109 | 112 | 178 | 1 | 4,376 | 124 |
| 2 | 323,489 | 1,936 | 542 | 31 | 7 | 1,486 | 31 | 205 | 16 | 1,852 | 50 |
| 3 | 365,398 | 1,606 | 692 | 37 | 57 | 2,528 | 88 | 104 | 0 | 2,683 | 99 |
| 4 | 453,515 | 1,004 | 752 | 58 | 88 | 4,607 | 149 | 34 | 0 | 4,657 | 168 |
| 5 | 510,446 | 1,189 | 1,214 | 38 | 76 | 4,385 | 350 | 22 | 0 | 4,437 | 365 |
| 6 | 425,506 | 842 | 617 | 13 | 29 | 5,245 | 207 | 34 | 1 | 5,318 | 243 |
| 7 | 304,242 | 414 | 241 | 0 | 0 | 3,978 | 103 | 33 | 0 | 4,017 | 120 |
| 8 | 351,376 | 602 | 239 | 0 | 0 | 3,184 | 85 | 46 | 0 | 3,249 | 96 |
| 9 | 281,104 | 452 | 262 | 0 | 1 | 2,515 | 45 | 34 | 0 | 2,553 | 80 |
| 10 | 337,578 | 635 | 396 | 0 | 0 | 3,053 | 139 | 121 | 2 | 3,226 | 166 |
| 11 | 351,773 | 733 | 316 | 2 | 0 | 2,860 | 69 | 147 | 0 | 3,097 | 147 |
| 12 | 356,739 | 1,098 | 484 | 9 | 1 | 3,369 | 77 | 130 | 1 | 3,622 | 140 |
| Total | 4,546,370 | 12,698 | 6,549 | 202 | 262 | 41,319 | 1,455 | 1,088 | 21 | 43,087 | 1,798 |
| Total May-Nov | 2,562,025 | 4,867 | 3,285 | 53 | 106 | 25,220 | 998 | 437 | 3 | 25,897 | 1,217 |
| | | | | | | | | | | | |
| All Areas* | 24,811,867 | 151,756 | 42,325 | 917 | 2,210 | 192,252 | 6,351 | 38,589 | 1,069 | 253,842 | 10,379 |
| May-Nov decrease **without** redistribution of effort | -10.3% | -3.2% | -7.8% | -5.8% | -4.8% | -13.1% | -15.7% | -1.1% | -0.3% | -10.2% | -11.7% |
| May-Nov decrease **with** redistribution of effort | | 0.1% | -1.8% | -0.3% | 1.6% | 1.7% | -1.9% | -1.7% | 0.0% | 0.9% | 0.7% |
| No. reduced **with** redist. of effort | | 105 | -767 | -2 | 35 | 3,297 | -123 | -664 | 0 | 2,284 | 70 |

**Table A.38** **Alternative B2(b) June only. Cumulative number of discards (over 3 1/2 years) with and without redistribution of effort in the Atlantic only. Minus signs indicate a decrease.** *excluding the NED. Three and one half year totals are shown; one year averages can be obtained by dividing the totals by 3.5. Data source: HMS Logbook data 2001-2004 (first six months of 2004).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles | Pelagic Shark discards | Large Coastal Shark discards |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 485,204 | 4 | 0 | 5 | 0 | 0 | 0 | 0 | 36 | 54 |
| 6 | 323,489 | 12 | 5 | 3 | 3 | 10 | 20 | 0 | 1,315 | 7 |
| 7 | 365,398 | 31 | 3 | 0 | 0 | 7 | 9 | 0 | 1,720 | 196 |
| 8 | 453,515 | 49 | 6 | 0 | 0 | 5 | 3 | 0 | 645 | 85 |
| 9 | 510,446 | 26 | 7 | 1 | 1 | 1 | 3 | 0 | 603 | 41 |
| 10 | 425,506 | 6 | 2 | 0 | 0 | 0 | 1 | 0 | 457 | 13 |
| 11 | 304,242 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 310 | 2 |
| 12 | 351,376 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 13 | 0 |
| Total | 3,219,176 | 128 | 23 | 9 | 4 | 28 | 37 | 0 | 5,099 | 398 |
| June | 323,489 | 12 | 5 | 3 | 3 | 10 | 20 | 0 | 1,315 | 7 |
| | | | | | | | | | | |
| All Areas* | 24,811,867 | 3,747 | 2,831 | 1,303 | 516 | 586 | 238 | 13 | 37,244 | 19,116 |
| | | | | | | | | | | |
| June % Decrease **without** redistribution of effort | -1.3% | -0.3% | -0.2% | -0.2% | -0.6% | -1.7% | -8.4% | 0.0% | -3.5% | 0.0% |
| June % Decrease **with** redistribution of effort | | 2.0% | 0.9% | 1.6% | 0.5% | -0.8% | -5.9% | 0.0% | -1.1% | 3.3% |
| No. reduced **with** redist. of effort | | 73 | 26 | 21 | 3 | -4 | -14 | 0 | -419 | 634 |

**Table A.39** **Alternative B2(b) June only. Cumulative number kept and discarded (over 3 1/2 years) with and without redistribution of effort in the Atlantic only. Minus signs indicate a decrease.** *excluding the NED. Three and one half year totals are shown; one year averages can be obtained by dividing the totals by 3.5. Data source: HMS Logbook data 2001-2004 (first six months of 2004).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kepts | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 29,318 | 228 | 36 | 4 | 2 | 148 | 30 | 3 | 0 | 151 | 30 |
| 6 | 196,341 | 1,888 | 275 | 11 | 367 | 641 | 12 | 559 | 0 | 1,476 | 16 |
| 7 | 256,598 | 2,712 | 394 | 14 | 43 | 552 | 5 | 197 | 0 | 929 | 8 |
| 8 | 235,512 | 2,327 | 499 | 3 | 2 | 2,625 | 12 | 157 | 2 | 3,019 | 16 |
| 9 | 225,096 | 2,875 | 509 | 2 | 48 | 3,407 | 51 | 373 | 3 | 4,167 | 54 |
| 10 | 78,630 | 1,076 | 207 | 1 | 0 | 524 | 2 | 180 | 0 | 980 | 3 |
| 11 | 10,086 | 85 | 124 | 3 | 3 | 39 | 0 | 159 | 0 | 266 | 1 |
| 12 | 1,500 | 25 | 8 | 0 | 0 | 10 | 0 | 4 | 0 | 15 | 0 |
| Total | 1,033,081 | 11,216 | 2,052 | 38 | 465 | 7,946 | 112 | 1,632 | 5 | 11,003 | 128 |
| June | 196,341 | 1,888 | 275 | 11 | 367 | 641 | 12 | 559 | 0 | 1,476 | 16 |
| | | | | | | | | | | | |
| All Areas* | 24,811,867 | 151,756 | 42,325 | 917 | 2,210 | 192,252 | 6,351 | 38,589 | 1,069 | 253,842 | 10,379 |
| | | | | | | | | | | | |
| % Reduction **without** redistribution of effort | 0.8% | 1.2% | 0.6% | 1.2% | 16.6% | 0.3% | 0.2% | 1.4% | 0.0% | 0.6% | 0.2% |
| % Reduction **with** redistribution of effort | | -0.3% | -0.03% | -0.2% | -15.1% | 0.3% | 0.2% | -1.0% | 0.5% | -0.1% | 0.2% |
| No. reduced **with** redist. of effort | | -474 | -11 | -2 | -333 | 662 | 14 | -367 | 5 | -147 | 25 |

Table A.40 **Alternative B2(c) BFT Petition April through June. Cumulative number of discards (over 3 1/2 years) with and without redistribution of effort in the Gulf of Mexico and Area 6 combined. Minus signs indicate a decrease.** *excluding the NED. Three and one half year totals are shown; one year averages can be obtained by dividing the totals by 3.5. Data source: HMS Logbook data 2001 - 2004 (first six months of 2004).

| Month | Number of hooks set | White Marlin discards | Blue Marlin discards | Sailfish discards | Spearfish discards | Leatherback Sea Turtles | Loggerhead Sea Turtles | Other Sea Turtles | Pelagic Shark discards | Large Coastal Shark discards |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 963,895 | 43 | 53 | 32 | 28 | 15 | 1 | 0 | 273 | 244 |
| 2 | 717,192 | 41 | 30 | 13 | 7 | 15 | 0 | 0 | 166 | 206 |
| 3 | 810,044 | 31 | 39 | 22 | 13 | 25 | 1 | 0 | 255 | 317 |
| 4 | 1,139,144 | 102 | 76 | 57 | 9 | 33 | 0 | 2 | 193 | 275 |
| 5 | 1,454,636 | 201 | 118 | 77 | 24 | 29 | 6 | 0 | 563 | 817 |
| 6 | 1,308,060 | 293 | 218 | 116 | 29 | 24 | 1 | 0 | 665 | 506 |
| 7 | 1,102,300 | 545 | 548 | 178 | 59 | 47 | 3 | 0 | 58 | 123 |
| 8 | 1,101,773 | 248 | 187 | 110 | 23 | 21 | 1 | 0 | 52 | 102 |
| 9 | 807,867 | 111 | 146 | 71 | 26 | 14 | 1 | 0 | 41 | 96 |
| 10 | 818,964 | 120 | 92 | 42 | 13 | 26 | 0 | 0 | 60 | 132 |
| 11 | 715,282 | 54 | 45 | 20 | 7 | 19 | 1 | 0 | 30 | 228 |
| 12 | 714,878 | 37 | 35 | 5 | 9 | 67 | 3 | 3 | 46 | 64 |
| Total | 11,654,035 | 1,826 | 1,587 | 743 | 247 | 335 | 18 | 5 | 2,402 | 3,110 |
| Total April-June | 3,901,840 | 596 | 412 | 250 | 62 | 86 | 7 | 2 | 1,421 | 1,598 |
| | | | | | | | | | | |
| All Areas* | 24,811,867 | 3,747 | 2,831 | 1,303 | 516 | 586 | 238 | 13 | 37,244 | 19,116 |
| April-June % Decrease **without** redistribution of effort | -15.7% | -15.9% | -14.% | -19.2% | -12.0% | -14.7% | -2.9% | -15.4% | -3.8% | -8.4% |
| April-June % Decrease **with** redistribution of effort | | -2.6% | 0.7% | 21.7% | 2.0% | -1.3% | 0.0% | -15.4% | -1.4% | 12.8% |
| No. reduced **with** redist. of effort | | -98 | 20 | 283 | 10 | -8 | 0 | -2 | -535 | 2,454 |

**Table A.41 Alternative B2(c) BFT Petition April through June. Cumulative number of kept and discarded (over 3 1/2 years) species with and without redistribution of effort in the Gulf of Mexico and Area 6 combined.** Minus sign indicates a decrease. *excluding the NED. Three and one half year totals are shown; one year averages can be obtained by dividing the totals by 3.5. Data source: HMS Logbook data 2001-2004 (first six months of 2004).

| Month | Number of hooks set | Swordfish kept | Swordfish discards | Bluefin tuna kept | Bluefin tuna discards | Yellowfin tuna kept | Yellowfin tuna discards | Bigeye tuna kept | Bigeye tuna discards | BAYS kepts | BAYS discards |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 963,895 | 4,519 | 1,600 | 35 | 6 | 9,367 | 308 | 392 | 20 | 9,950 | 355 |
| 2 | 717,192 | 4,366 | 1,226 | 59 | 14 | 3,635 | 137 | 310 | 21 | 4,316 | 184 |
| 3 | 810,044 | 3,596 | 1,508 | 68 | 106 | 5,574 | 206 | 188 | 5 | 5,854 | 232 |
| 4 | 1,139,144 | 3,133 | 1,702 | 141 | 239 | 10,156 | 417 | 107 | 2 | 10,301 | 449 |
| 5 | 1,454,636 | 3,993 | 2,317 | 91 | 193 | 14,429 | 697 | 52 | 0 | 14,552 | 794 |
| 6 | 1,308,060 | 2,583 | 1,294 | 39 | 222 | 16,743 | 704 | 110 | 4 | 16,902 | 891 |
| 7 | 1,102,300 | 1,294 | 994 | 3 | 0 | 15,432 | 528 | 84 | 0 | 15,545 | 714 |
| 8 | 1,101,773 | 1,412 | 752 | 0 | 5 | 13,612 | 300 | 76 | 1 | 13,716 | 436 |
| 9 | 807,867 | 1,002 | 663 | 20 | 1 | 8,615 | 147 | 77 | 0 | 8,715 | 254 |
| 10 | 818,964 | 1,132 | 726 | 0 | 1 | 7,728 | 234 | 198 | 5 | 7,992 | 340 |
| 11 | 715,282 | 1,186 | 600 | 2 | 4 | 5,745 | 163 | 264 | 1 | 6,166 | 281 |
| 12 | 714,878 | 1,747 | 894 | 13 | 1 | 6,780 | 235 | 199 | 1 | 7,194 | 344 |
| Total | 11,654,035 | 29,963 | 14,276 | 471 | 792 | 117,816 | 4,076 | 2,057 | 60 | 121,203 | 5,274 |
| Total Apr-Jun | 3,901,840 | 9,709 | 5,313 | 271 | 654 | 41,328 | 1,818 | 269 | 6 | 41,755 | 2,134 |
| | | | | | | | | | | | |
| All Areas* | 24,811,867 | 151,756 | 42,325 | 917 | 2,210 | 192,252 | 6,351 | 38,589 | 1,069 | 253,842 | 10,379 |
| April-June % Decrease **without** redistribution of effort | -15.7% | -6.4% | -12.6% | -29.6% | -29.6% | -21.5% | -28.6% | -0.7% | -0.6% | -16.4% | -20.6% |
| April-June % Decrease **with** redistribution of effort | | 12.5% | 5.0% | -8.9% | -19.3% | -4.7% | -9.1% | 0.3% | 0.6% | -3.6% | -5.2% |
| No. reduced **with** redist. of effort | | 18,940 | 2,109 | -81 | -426 | -9,105 | -578 | 112 | 7 | -9,160 | -540 |

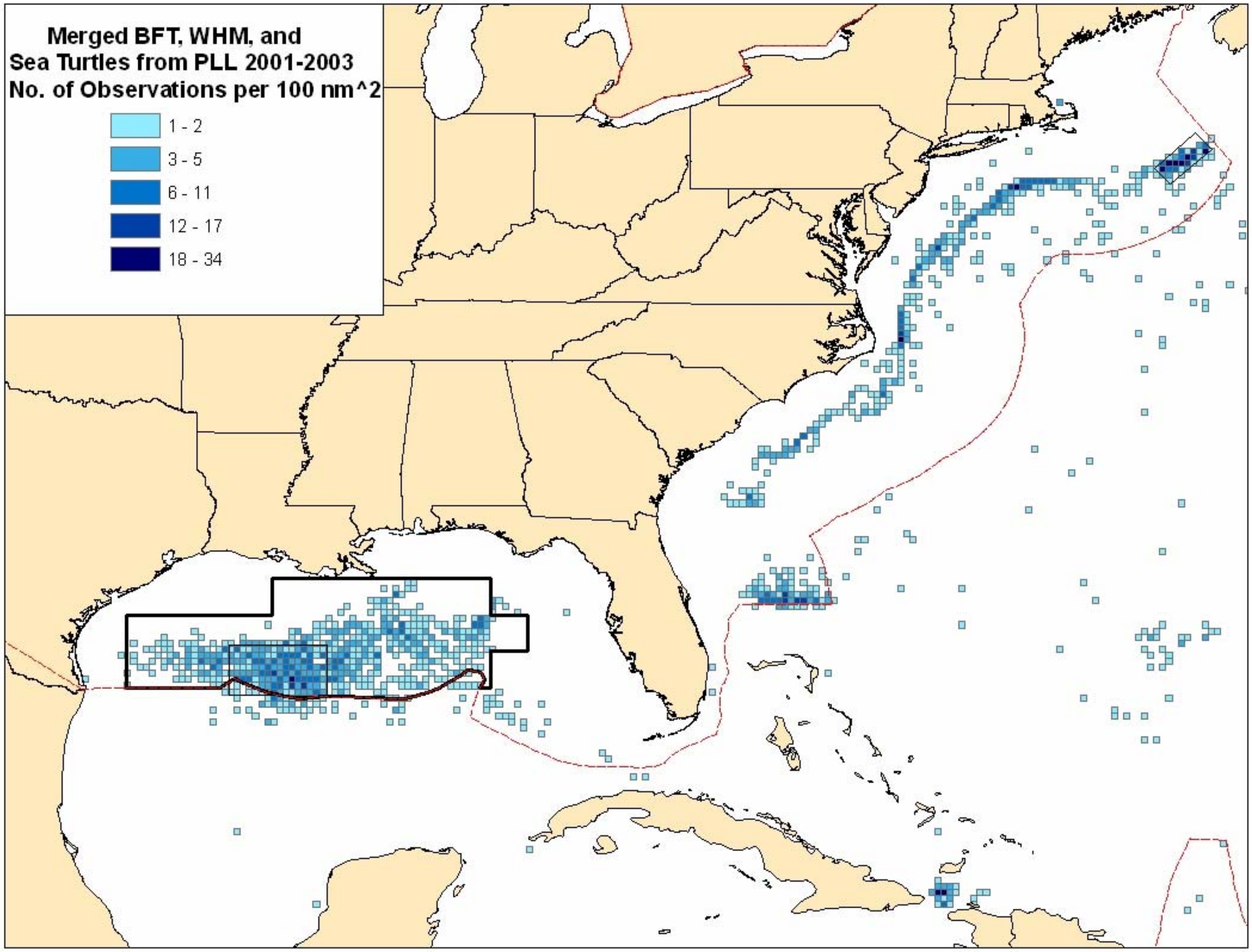


**Figure A.9** **Map showing the overlap of bluefin tuna discards, white marlin discards, and sea turtle interactions for pelagic longline sets from 2001 to 2003.** Source: HMS Logbook data 2001-2003.

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# B APPENDIX: ESSENTIAL FISH HABITAT

## B.1 Life History Accounts and Essential Fish Habitat Descriptions

### B.1.1 Tuna

#### *B.1.1.1 Atlantic Albacore Tuna*

**Atlantic Albacore (*Thunnus alalunga*)** Albacore tuna is a circumglobal species. In the west, Atlantic albacore range from 40 to 45°N to 40°S. It is an epipelagic, oceanic species generally found in surface waters with temperatures between 15.6° and 19.4°C, although larger individuals have a wider depth and temperature range (13.5° to 25.2°C). Albacore may dive into cold water (9.5°C) for short periods and can be found at depths up to 600 m in the Atlantic. However, they do not tolerate oxygen levels lower than two milliliter/liter (ml/l). Albacore undergo extensive horizontal movements. Aggregations are composed of similarly sized individuals with groups comprised of the largest individuals making the longest journeys. Aggregations of albacore may include other tuna species such as skipjack, yellowfin and bluefin tuna. North Atlantic and south Atlantic stocks are considered separate, with no evidence of mixing between the two (ICCAT, 1997; Collette and Nauen, 1983).

**Predator-prey relationships:** A wide variety of fishes and invertebrates have been found in the few stomachs of albacore tuna that have been examined. As with other tuna, albacore probably exhibit opportunistic feeding behavior, with little reliance on specific prey items (Dragovich, 1969; Matthews *et al.*, 1977).

**Life history:** Albacore spawn in the spring and summer in the western tropical Atlantic (ICCAT, 1997). Larvae are also taken in the Mediterranean Sea and historically in the Black Sea (Vodyanitsky and Kazanova, 1954).

**Fisheries:** For assessment purposes, three stocks of albacore are assumed: north and south Atlantic stocks (separated at 5°N) and a Mediterranean stock (SCRS, 1997). In the north Atlantic albacore are taken by surface and longline fisheries. Surface fisheries target juveniles at 50 to 90 cm fork length (FL), and longlines catch sub-adult and adult fish at 60 to120 cm FL. **U.S. Fishery Status**: North Atlantic albacore is overfished with overfishing occurring; South Atlantic albacore is not overfished and overfishing is not occurring.

**Growth and mortality:** The maximum size of albacore has been reported at 127 cm FL (Collette and Nauen, 1983). For both sexes sexual maturity is reached at five years at 90 to 94 cm FL (Collette and Nauen, 1983; ICCAT, 1997). Mortality is higher for females (Collette and Nauen, 1983).

***Essential Fish Habitat for Albacore Tuna:***

- **Spawning, eggs, and larvae:** At this time, available information is insufficient for the identification of EFH for this life stage within the U.S. EEZ (Figure B.1).

- **Juveniles (<90 cm FL):** In surface waters with temperatures between 15.6° and 19.4°C, offshore the U.S. east coast in the Mid-Atlantic Bight from the 50 m isobath to the 2,000 m isobath with 71°W as the northeast boundary and 38°N as the southwest boundary (Figure B.2).

- **Adults (≥90 cm FL):** In surface waters with temperatures between 13.5° and 25.2°C, offshore the U.S. eastern seaboard between the 100 and 2,000 m isobaths from southeastern Georges Bank at 41.25°N, south to 36.5°N, offshore the Virginia/North Carolina border; also, in the Blake Plateau and Spur region, from 79°W east to the EEZ boundary and 29°N south to the EEZ boundary (Figure B.3).

### *B.1.1.2 Atlantic Bigeye Tuna*

**Atlantic Bigeye Tuna (*Thunnus obesus*)** Scientific knowledge of Atlantic bigeye tuna is limited. Its range is almost the entire Atlantic from 50°N to 45°S. It is rarely taken in the Gulf of Mexico, and some of the points currently included in the EFH maps may require further validation (J. Lamkin, pers. comm.). Although its distribution with depth in the water column varies, it is regularly found in deeper waters than are other tuna, descending to 300–500 m and then returning regularly to the surface layer (Musyl *et al*., 2003). Smaller fish are probably restricted to the tropics, while larger individuals migrate to temperate waters. There is probably one population in the Atlantic (ICCAT, 1997). Young bigeye tuna form schools near the sea surface, mixing with other tuna such as yellowfin and skipjack tuna (Collette and Nauen, 1983).

**Predator-prey relationships:** The diet of bigeye tuna includes fishes, cephalopods and crustaceans (Dragovich, 1969; Matthews *et al.*, 1977). Predators include large billfishes and toothed whales (Collette and Nauen, 1983).

**Life history:** Bigeye tuna probably spawn between 15°N and 15°S. A nursery area is known to exist in the Gulf of Guinea (Richards, 1967) off the coast of Africa where larvae have been collected below the 25°C isotherm (Richards and Simmons, 1971). Peak spawning here occurs in January and February, whereas in the northwestern tropical Atlantic spawning occurs in June and July (SCRS, 1978, 1979). The collection of larvae in U.S. waters has not been confirmed.

**Fisheries:** The bigeye tuna stock has been exploited by three major gear types - longline, baitboat, and purse seine - and by many countries throughout its range of distribution. ICCAT currently recognizes one stock for management purposes, based on time/area distribution of fish and movements of tagged fish. However, other possibilities such as distinct northern and southern stocks should not be disregarded (SCRS, 1997). **U.S. Fishery Status:** Overfished and overfishing is occurring.

**Growth and mortality:** Growth rate for bigeye tuna is believed to be rapid. Sexual maturity is attained in the fourth year, at approximately 100 cm FL (SCRS, 1997).

**Habitat associations:** Juvenile bigeye form schools near the surface, mostly mixed with other tuna such as yellowfin and skipjack. These schools often associate with floating objects, whale sharks and sea mounts (SCRS, 1997).

***Essential Fish Habitat for Bigeye Tuna:***

- **Spawning, eggs and larvae:** Information is insufficient for the identification of EFH for this life stage within the U.S. EEZ; although it can not be identified as EFH under the Magnuson-Stevens Act because it is located outside the U.S. EEZ, the Gulf of Guinea, off the coast of Africa, is identified as important habitat for spawning adults, eggs and larvae (Figure B.4).

- **Juveniles (<100 cm FL):** In surface waters from southeastern Georges Bank to the boundary of the EEZ to Cape Hatteras, NC at 35°N from the 200 m isobath to the EEZ boundary; also, in the Blake Plateau region off Cape Canaveral, FL, from 29°N south to the EEZ boundary (28.25°N) and from 79°W east to the EEZ boundary (approximately 76.75°W) (Figure B.5).

- **Adults (≥100 cm FL):** In pelagic waters from the surface to a depth of 250 m; from southeastern Georges Bank at the EEZ boundary to offshore Delaware Bay at 38°N, from the 100 m isobath to the EEZ boundary; from offshore Delaware Bay south to Cape Lookout, NC (approximately the region off Cape Canaveral, FL), from 29°N south to the EEZ boundary (28.25°N), and from 79° W east to the EEZ boundary (76.75° W) (Figure B.6).

### *B.1.1.3 Atlantic Bluefin Tuna*

**Atlantic Bluefin Tuna (*Thunnus thynnus*)** In the western north Atlantic, bluefin tuna range from 45°N to 0° (Collette and Nauen, 1983). However, they have recently been found up to 55° N in the West Atlantic (Vinnichenko, 1996). Bluefin tuna move seasonally from spring (April to June) spawning grounds in the Gulf of Mexico through the Straits of Florida to feeding grounds off the northeast U.S. coast (Mather *et al.*, 1995; Block *et al.*, 2005). It is believed that there is a single stock which ranges from Labrador and Newfoundland south into the Gulf of Mexico and the Caribbean, and also off Venezuela and Brazil. The Labrador Current may separate this western stock from that found in the east Atlantic (Tiews, 1963; Mather *et al.*, 1995; ICCAT, 1997).

From November to January bluefin tuna are concentrated into two separate groups, one in the northwest and the other in the north central Atlantic. In February, the central Atlantic aggregation breaks up, with some fish moving southeast to the Azores and some moving southwest (Suda, 1994). Southerly movements from the feeding grounds off the northern United States and wintering areas are not well understood. A three-way movement between spawning, feeding, and wintering areas is assumed for mature fish and a shorter, two-way feeding-to-wintering movement for juveniles (Mather *et al.*, 1995).

Bluefin tuna distributions are probably constrained by the 12°C isotherm, although individuals can dive to 6° to 8°C waters to feed (Tiews, 1963). Year-to-year variations in movements have been noted (Mather *et al.*, 1995). While bluefin tuna are epipelagic and usually oceanic, they do come close to shore seasonally (Collette and Nauen, 1983). They often occur over the continental shelf and in embayments, especially during the summer months when they feed actively on herring, mackerel and squids in the north Atlantic. Larger individuals move into higher latitudes than do smaller fish. Bluefin tuna are often found in mixed schools with skipjack tuna, these schools consisting of similarly sized individuals (Tiews, 1963).

**Predator-prey relationships:** Bluefin tuna larvae initially feed on zooplankton but switch to a piscivorous diet at a relatively small size. Small bluefin tuna larvae prey on other larval fishes and are subject to the same predators as these larvae, primarily larger fishes and gelatinous zooplankton (McGowan and Richards, 1989). Adults are opportunistic feeders, preying on a variety of schooling fish, cephalopods, and benthic invertebrates, including silver hake, Atlantic mackerel, Atlantic herring, krill, sandlance, and squid (Dragovich, 1969, 1970a; Mathews *et al.*, 1977; Estrada et. al., 2005). Predators of adult bluefin tuna include toothed whales, swordfish, sharks and other tuna (especially of smaller individuals) (Tiews, 1963; Chase, 1992).

**Life history:** Western north Atlantic bluefin tuna spawn from April to June in the Gulf of Mexico and in the Florida Straits (McGowan and Richards, 1989; Block *et. al*., 2005). Although individuals may spawn more than once a year, it is assumed that there is a single annual spawning period. Larvae have been confirmed from the Gulf of Mexico and off the Carolinas (Richards, 1991). Most of the larvae found were located around the 1,000 fathom curve in the northern Gulf of Mexico, with some sporadic collections off Texas. In the Florida Straits they are primarily collected along the western edge of the Florida Current, suggesting active transport from the Gulf of Mexico. This would also explain their occasional collection off the southeast United States. Atlantic bluefin tuna have not been observed spawning (Richards, 1991).

It is not believed that much spawning occurs outside the Gulf of Mexico (McGowan and Richards, 1989; Richards, 1991). Also, it appears that larvae are generally retained in the Gulf until they grow into juveniles; in June, young-of-the-year begin movements in schools to juvenile habitats (McGowan and Richards, 1989) thought to be located over the continental shelf around 34°N and 41°W in the summer and further offshore in the winter. Also, they have been identified from the Dry Tortugas area in June and July (Richards, 1991; ICCAT, 1997). Juveniles migrate to nursery areas located between Cape Hatteras, NC and Cape Cod, MA (Mather *et al*., 1995).

**Fisheries:** Atlantic bluefin tuna are caught using a wide variety of gear types, including longlines, purse seines, traps, and various handgears. ICCAT recognizes two management units of Atlantic bluefin, one in the east and one in the West Atlantic; however, some mixing is probably occurring, as fish tagged in one location have been retrieved in the other (Block *et. al*., 2005). These management units are divided as follows: North of 10°N they are separated at 45°W; below the equator they are separated at 25°W, with an eastward shift between those parallels

(SCRS, 1997). The effects of reduced stock size on distribution and habitat use is unknown at this time. **U.S. Fishery Status:** Overfished, and overfishing is occurring.

**Growth and mortality:** Bluefin tuna can grow to more than 650 kg in weight and 300 cm in length, with no apparent difference between the growth rates of males and females (Mather *et al.*, 1995). Maximum age is estimated to be more than 20 years, with sexual maturity reached at approximately 196 cm (77 inches) FL and a weight of approximately 145 kg (320 lb). This size is believed to be reached in the West Atlantic at eight years, as opposed to five years in the east Atlantic. Not only do bluefin tuna in the West Atlantic mature more slowly than those in the east Atlantic, but they also are believed to grow more slowly and reach a larger maximum size (SCRS, 1997). The rapid larval growth rate is estimated as one mm/day up to 15 mm, the size at transformation (McGowan and Richards, 1989).

**Habitat associations:** It is believed that there are probably certain features of the bluefin tuna larval habitat in the Gulf of Mexico which determine growth and survival rates, and that these features show variability from year to year, perhaps accounting for a significant portion of the fluctuation in yearly recruitment success (McGowan and Richards, 1989). The habitat requirements for larval success are not known, but larvae are collected within narrow ranges of temperature and salinity - approximately 26° C and 36 ppt. Along the coast of the southeastern United States onshore meanders of the Gulf Stream can produce upwelling of nutrient rich water along the shelf edge. In addition, compression of the isotherms on the edge of the Gulf Stream can form a stable region which, together with upwelling nutrients, provides an area favorable to maximum growth and retention of food for the larvae (McGowan and Richards, 1989). Size classes used for habitat analysis for bluefin tuna are based on the sizes at which they shift from a schooling behavior to a more solitary existence. Bluefin have traditionally been grouped by small schooling, large schooling, and giant. Future analyses should more fully evaluate habitat differences between the traditional size classes, if the data are available.

***Essential Fish Habitat for Atlantic Bluefin Tuna:***

- **Spawning, eggs, and larvae:** In pelagic and near coastal surface waters from the North Carolina/South Carolina border at 33.5° N, south to Cape Canaveral, FL from 15 miles from shore to the 200 m isobath; all waters from offshore Cape Canaveral at 28.25° N south around peninsular Florida to the U.S./Mexico border from 15 miles from shore to the EEZ boundary (Figure B.7).

- **Juveniles (<145 cm TL):** All inshore and pelagic surface waters warmer than 12° C of the Gulf of Maine and Cape Cod Bay, MA from Cape Ann, MA (~42.75° N) east to 69.75° W (including waters of the Great South Channel west of 69.75° W), continuing south to and including Nantucket Shoals at 70.5° W to off Cape Hatteras, NC (approximately 35.5° N), in pelagic surface waters warmer than 12° C, between the 25 and 200 m isobaths; also in the Florida Straits, from 27° N south around peninsular Florida to 81° W in surface waters from the 200 m isobath to the EEZ boundary (Figure B.8).

- **Adults (≥145 cm TL):** In pelagic waters of the Gulf of Maine from the 50 m isobath to the EEZ boundary, including the Great South Channel, then south of Georges Bank to 39° N from the 50 m isobath to the EEZ boundary; also, south of 39° N, from the 50 m isobath to the 2,000 m isobath to offshore Cape Lookout, NC at 34.5° N. In pelagic waters from offshore Daytona Beach, FL (29.5° N) south to Key West (82° W) from the 100 m isobath to the EEZ boundary; in the Gulf of Mexico from offshore Terrebonne Parish, LA (90° W) to offshore Galveston, TX (95° W) from the 200 m isobath to the EEZ boundary (Figure B.9).

#### *B.1.1.4 Atlantic Skipjack Tuna*

**Atlantic Skipjack Tuna (*Katsuwonus pelamis*)** Skipjack tuna are circumglobal in tropical and warm-temperate waters, generally limited by the 15° C isotherm. In the west Atlantic skipjack range as far north as Newfoundland (Vinnichenko, 1996) and as far south as Brazil (Collette and Nauen, 1983). Skipjack tuna are an epipelagic and oceanic species and may dive to a depth of 260 m during the day. Skipjack tuna is also a schooling species, forming aggregations associated with hydrographic fronts (Collette and Nauen, 1983). There has been no trans-Atlantic recovery of tags; eastern and western stocks are considered separate (ICCAT, 1997).

**Predator-prey relationships:** Skipjack tuna is an opportunistic species which preys upon fishes, cephalopods and crustaceans (Dragovich, 1969, 1970b; Dragovich and Potthoff, 1972; Collette and Nauen, 1983; ICCAT, 1997). Predators include other tuna and billfishes (Collette and Nauen, 1983). Skipjack tuna are believed to feed in surface waters down to a depth of five meters. Stomach contents often include *Sargassum* or *Sargassum* associated species (Morgan *et al.*, 1985).

**Life history:** Skipjack tuna spawn opportunistically in equatorial waters throughout the year, and in subtropical waters from spring to early fall (Collette and Nauen, 1983). Larvae have been collected off the east coast of Florida from October to December (Far Seas Fisheries Research Lab, 1978) and in the Gulf of Mexico and Florida Straits from June to October. However, most spawning takes place during summer months in the Caribbean, off Brazil (with the peak in January through March), in the Gulf of Mexico (April to May), and in the Gulf of Guinea (throughout the year) (Richards, 1967; SCRS, 1978/79).

**Fisheries:** This fishery is almost exclusively a surface gear fishery, although some skipjack tuna are taken as longline bycatch. Most skipjack tuna are taken in the east Atlantic and off the coast of Brazil, most recently with the use of floating objects to attract them. ICCAT assumes two management units for this species (eastern and western) due to the development of fisheries on both sides of the Atlantic and to the lack of transatlantic tag recoveries. **U.S. Fishery Status:** Unknown.

**Growth and mortality:** Maximum size of the species is reported at 108 cm FL and a weight of 34.5 kg. Size at sexual maturity is 45 cm (18 inches) for males and 42 cm for females. This size is believed to correspond to about 1 to 1.5 years of age, although significant variability in interannual growth rates makes size-to-age relationships difficult to estimate (Collette and

Nauen, 1983; ICCAT, 1997). Growth rate is variable and seasonal, with individuals from the tropical zone having a higher growth rate than those from the equatorial zone (SCRS, 1997). Life span is estimated to be eight to 12 years (Collette and Nauen, 1983).

**Habitat associations:** Aggregations of skipjack tuna are associated with convergences and other hydrographic discontinuities. Also, skipjack tuna associate with birds, drifting objects, whales, sharks and other tuna species (Colette and Nauen, 1983). The optimum temperature for the species is 27° C, with a range from 20° to 31° C (ICCAT, 1995).

***Essential Fish Habitat for Skipjack Tuna:***

- **Spawning, eggs, and larvae:** In offshore waters, from the 200 m isobath out to the EEZ boundary, from 28.25° N south around peninsular Florida and the Gulf Coast to the U.S./Mexico border (Figure B.10).

- **Juveniles/subadults (<45 cm FL):** In pelagic surface waters from 20° to 31° C in the Florida Straights off southeastern Florida, from the 25 m isobath to the 200 m isobath, from 27.25° N south to 24.75° N southwest of the coast of Key Largo, FL (Figure B.11).

- **Adults (≥45 cm FL):** In pelagic surface waters from 20° to 31° C in the Mid-Atlantic Bight, from the 25 m isobath to the 200 m isobath, from 71° W, off the coast of Martha's Vineyard, MA, south and west to 35.5° N, offshore Oregon Inlet, NC (Figure B.12).

### *B.1.1.5 Atlantic Yellowfin Tuna*

**Atlantic Yellowfin Tuna (*Thunnus albacres*)** Atlantic yellowfin tuna are circumglobal in tropical and temperate waters. In the West Atlantic they range from 45° N to 40° S. Yellowfin tuna is an epipelagic, oceanic species, found in water temperatures between 18° and 31° C. It is a schooling species, with juveniles found in schools at the surface, mixing with skipjack and bigeye tuna. Larger fish are found in deeper water and also extend their ranges into higher latitudes. All individuals in the Atlantic probably comprise a single population, although movement patterns are not well known (Collette and Nauen, 1983; SCRS, 1997). There are possible movements of fish spawned in the Gulf of Guinea to more coastal waters off Africa, followed by movements toward the U.S. coast, at which time they reach a length of 60 to 80 cm (ICCAT, 1977). In the Gulf of Mexico yellowfin tuna occur beyond the 500-fathom isobath (Idyll and de Sylva, 1963).

**Predator-prey relationships:** Atlantic yellowfin tuna are opportunistic feeders. Stomachs have been found to contain a wide variety of fish and invertebrates (Dragovich, 1969, 1970b; Dragovich and Potthoff, 1972; Matthews *et al.*, 1977). Stomach contents of yellowfin from St. Lucia and the Caribbean contained squid and the larvae of stomatopods, crabs and squirrelfish (Idyll and de Sylva, 1963). Stomach contents often contain *Sargassum* or *Sargassum* associated fauna. Yellowfin tuna are believed to feed primarily in surface waters down to a depth of 100 m (Morgan *et al.*, 1985).

**Life history:** Spawning occurs throughout the year in the core areas of the species' distribution - between 15° N and 15° S - and also in the Gulf of Mexico and the Caribbean, with peaks occurring in the summer (ICCAT, 1994). Yellowfin tuna are believed to be multiple spawners, and larval distribution appears to be limited to water temperatures above 24° C and salinity greater than 33 ppt (Richards and Simmons, 1971). Larvae have been collected near the Yucatan peninsula and during September in the northern Gulf of Mexico along the Mississippi Delta (ICCAT, 1994).

**Fisheries:** Yellowfin tuna are caught by surface gears (purse seine, baitboat, troll, and handline) and with sub-surface gears (longline). A single stock is assumed for the Atlantic, based on transatlantic tag recaptures, time/area size frequency distribution, etc. (SCRS, 1997). **U.S. Fishery Status:** Approaching an overfished condition.

**Growth and mortality:** The maximum size of yellowfin tuna is over 200 cm FL (Collette and Nauen, 1983). Sexual maturity is reached at about three years of age, at 110 cm FL, and a weight of 25 kg. Although it is not known if there is a differential growth rate between males and females (ICCAT, 1994), males are predominant in catches of larger sized fish (SCRS, 1997). Natural mortality is 0.8 for fish less than 65 cm in length, and 0.6 for fish greater than 65 cm. Mortality is higher for females of this size (ICCAT, 1994).

**Habitat associations:** Adult yellowfin tuna are confined to the upper 100 m of the water column due to their intolerance of oxygen concentrations of less than 2 ml/l (Collette and Nauen, 1983). Association with floating objects has been observed, and in the Pacific larger individuals often school with porpoises (Collette and Nauen, 1983). Juveniles are found nearer to shore than are adults (SCRS, 1994). In the Gulf of Mexico adults usually occur 75 km or more offshore, while in the Caribbean they are found closer to shore. Although there appears to be a year-round population in the southern part of the Gulf of Mexico (Idyll and de Sylva, 1963), in June there appears to be some movement from the southern to the northern part of the Gulf of Mexico, resulting in greater catches in the northern part of the Gulf of Mexico from July to December.

***Essential Fish Habitat for Yellowfin Tuna:***

- **Spawning, eggs, and larvae:** In offshore waters, from the 200 m isobath out to the EEZ boundary, from 28.25° N south around peninsular Florida and the Gulf Coast to the U.S./Mexico border, especially associated with the Mississippi River plume and the Loop Current. Also, all U.S. waters in the Caribbean from the 200 m isobath to the EEZ boundary (Figure B.13).

- **Juveniles/subadults (<110 cm FL):** Pelagic waters from the surface to 100 m deep between 18° and 31° C from offshore Cape Cod, MA (70° W) southward to Jekyll Island, GA (31° N), between 500 and 2,000 m; off Cape Canaveral, FL from 29° N south to the EEZ boundary (approximately 28.25° N) and from 79° W east to the EEZ boundary (approximately 76.75° W); in the Gulf of Mexico from the 200 m isobath to the EEZ boundary (Figure B.14).

- **Adults (≥110 cm FL):** (Identical to juveniles/subadults EFH) Pelagic waters from the surface to 100 m deep between 18° and 31° C from offshore Cape Cod, MA (70° W) southward to Jekyll Island, GA (31° N), between 500 and 2,000 m; off Cape Canaveral, FL from 29° N south to the EEZ boundary (approximately 28.25° N) and from 79° W east to the EEZ boundary (approximately 76.75° W); in the Gulf of Mexico from the 200 m isobath to the EEZ boundary (Figure B.15).

### B.1.2 Swordfish

**Swordfish (*Xiphias gladius*)** Swordfish are circumglobal, ranging through tropical, temperate and sometimes cold water regions. Their latitudinal range is from 50° N to 40-45° S in the west Atlantic, and 60° N to 45-50° S in the east Atlantic (Nakamura, 1985). The species moves from spawning grounds in warm waters to feeding grounds in colder waters. In the western north Atlantic two movement patterns are apparent: some fish move northeastward along the edge of the U.S. continental shelf in summer and return southwestward in autumn; another group moves from deep water westward toward the continental shelf in summer and back into deep water in autumn (Palko *et al.*, 1981). Swordfish are epipelagic to meso-pelagic, and are usually found in waters warmer than 13° C. Their optimum temperature range is believed to be 18° to 22° C but they will dive into 5° to 10° C waters at depths of up to 650 m (Nakamura, 1985). Swordfish migrate diurnally, coming to the surface at night (Palko *et al.*, 1981). Arocha (1997) observed different diel migrations in two groups of fish: swordfish in neritic (shallow, near-coastal) waters of the northwest Atlantic were found in bottom waters during the day, and then they moved to offshore surface waters at night. Swordfish in oceanic waters migrated vertically from a daytime depth of 500 m to 90 m at night.

**Predator-prey relationships:** Adult swordfish are opportunistic feeders, having no specific prey requirements. They feed at the bottom as well as at the surface, in both shallow and deep waters. In waters greater than 200 m deep, they feed primarily on pelagic fishes including small tunas, dolphinfishes, lancetfish (*Alepisaurus*), snake mackerel (*Gempylus*), flyingfishes, barracudas and squids such as *Ommastrephes*, *Loligo*, and *Illex*. In shallow water they prey upon neritic fishes, including mackerels, herrings, anchovies, sardines, sauries, and needlefishes. In deep water swordfish may also take demersal fishes such as hakes, pomfrets (Bromidae), snake mackerels, cutlass fish (trichiurids), lightfishes (Gonostomatidae), hatchet fishes (Sternoptychidae), redfish, lanternfishes, and cuttlefishes (Nakamura, 1985).

In the Gulf of Mexico swordfish were found to feed primarily on cephalopods - 90 percent of stomach contents consisted of 13 species of teuthoid squids, most of which were *Illex*, and two species of octopus (Toll and Hess, 1981). Stillwell and Kohler (1985) found that 80 percent of the stomach contents of swordfish taken off the northeast coast of the United States consisted of cephalopods, of which short-finned squid (*Illex illecebrosus*) made up 26.4 percent. Adult swordfish in neritic waters will feed inshore near the bottom during the daytime and head seaward to feed on cephalopods at night. The movement of larger individuals into higher latitudes in the summer and fall may be in part to allow those individuals access to high concentrations of *Illex* (Arocha, 1997). Predators of adult swordfish are probably restricted to sperm whales (*Physeter catodon*), killer whales (*Orcinus orca*) and large sharks, such as mako (*Isurus* spp).

Typically, swordfish larvae less than 9.0 mm in length consume small zooplankton, those 9.0 to 14.0 mm feed on mysids, phyllopods and amphipods, and at sizes greater than 21 mm they begin to feed on the larvae of other fishes. Juveniles feed on squids, fishes, and some pelagic crustaceans (Palko *et al.*, 1981). Larvae are preyed upon by other fishes, and juveniles fall prey to predatory fishes, including sharks, tunas, billfishes, and adult swordfish (Palko *et al.*, 1981).

**Life history:** First spawning for north Atlantic swordfish occurs at four to five years of age (74 kg) in females. Fifty percent maturity in females is reached at 179 to 182 cm LJFL, and in males at 112 to 29 cm LJFL (21 kg) at approximately 1.4 years of age (Palko *et al.*, 1981; Nakamura, 1985; Arocha, 1997). Most spawning takes place in waters with surface temperatures above 20° to 22° C, between 15° N and 35° N (Palko *et al.*, 1981; Arocha, 1997;). In the western north Atlantic spawning occurs in distinct locations at different times of the year: south of the Sargasso Sea and in the upper Caribbean spawning occurs from December to March, while off the southeast coast of the United States it occurs from April through August (Arocha, 1997). Major spawning grounds are probably located in the Straits of Yucatan and the Straits of Florida (Grall *et al.*, 1983; Govoni *et. al.*, 2000, 2003). Larvae have been found in largest abundance from the Straits of Florida to Cape Hatteras, NC and around the Virgin Islands. Larvae are associated with surface temperatures between 24° and 29°C. The Gulf of Mexico is believed to serve as a nursery area (Palko *et al.*, 1981). Grall *et al.*, (1983) found larvae ten mm and larger to be abundant in the Caribbean, the Straits of Florida and the Gulf Stream north of Florida from December to February. In the western Gulf of Mexico, large larvae were found from March to May and from September to November; many larvae of all sizes were collected in the Caribbean and were also present year-round in the eastern Gulf of Mexico, the Straits of Florida, and the Gulf Stream. Juvenile fish are frequently caught in the pelagic longline fishery in the Gulf of Mexico, the Atlantic coast of Florida, and near the Charleston Bump regions that may serve as nurseries for north Atlantic swordfish (Cramer and Scott, 1998).

**Fisheries:** Swordfish in the Atlantic are taken by a directed longline fishery and as bycatch of the tuna longline fishery. There are also seasonal harpooning and driftnetting efforts off Nova Scotia (harpooning), off the northeast U.S. coast, and on the Grand Banks (driftnetting) (Arocha, 1997). The effect of this reduction in stock size on habitat use and species distributions is unknown. In January 1999, NMFS prohibited the use of driftnets for the swordfish fishery. In March 1999, NMFS instituted a program requiring all swordfish imported into the United States to have a certificate of eligibility specifying the origin of the fish. If the swordfish is from the Atlantic it must meet the 33-lb dw minimum size requirement of ICCAT.

**U.S. Fishery Status:** North Atlantic swordfish overfished, overfishing is not occurring, stock is in recovery. South Atlantic swordfish fully fished, overfishing may be occurring.

**Growth and mortality:** Swordfish reach a maximum length of 445 cm total length (TL) and a maximum weight of 540 kg. Males and females have different growth rates, with females longer and heavier at any given age (Nakamura, 1985). Natural mortality rate was estimated at 0.21 to 0.43 by Palko *et al.*, (1981), but ICCAT presently uses an estimate of 0.2 (Arocha, 1997). Berkeley and Houde (1981) found a higher growth rate for females than males over two years of age, and also found males to have a higher mortality rate than females.

**Habitat associations:** In the winter in the north Atlantic, swordfish are restricted to the warmer waters of the Gulf Stream, while in the summer their distribution covers a larger area. Distribution is size and temperature related, with few fish under 90 kg found in waters with temperatures less than 18° C. Larvae are restricted to a narrow surface temperature range, and are distributed throughout the Gulf of Mexico, in areas of the Caribbean, and in the Gulf Stream along the U.S. coast as far north as Cape Hatteras, NC. Concentrations of adult swordfish seem to occur at ocean fronts between water masses associated with boundary currents, including the Gulf Stream and Loop Current of the Gulf of Mexico (Arocha, 1997, Govoni *et al.*, 2003).

***Essential Fish Habitat for Atlantic Swordfish*:**

- **Spawning, eggs, and larvae:** From offshore Cape Hatteras, NC (approximately 35° N) extending south around peninsular Florida through the Gulf of Mexico to the U.S./Mexico border from the 200 m isobath to the EEZ boundary; associated with the Loop Current boundaries in the Gulf and the western edge of the Gulf Stream in the Atlantic; also, all U.S. waters of the Caribbean from the 200 m isobath to the EEZ boundary (Figure B.16).

- **Juveniles/subadults (<180 LJFL):** In pelagic waters warmer than 18° C from the surface to a depth of 500 m, from offshore Manasquan Inlet, NJ at 40° N, east to 73° N, and south to the waters off Georgia at 31.5° N, between the 25 and 2,000 m isobaths; offshore Cape Canaveral, FL (approximately 29° N) extending from the 100 m isobath to the EEZ boundary (south and east) around peninsular Florida; in the Gulf of Mexico from Key West to offshore Galveston, TX (95° W) from the 200 m isobath to the EEZ boundary, with the exception of the area between 86° W and 88.5° W, where the seaward boundary of EFH is the 2,000 m isobath (Figure B.17).

- **Adults (≥180 LJFL):** In pelagic waters warmer than 13° C from the surface to 500 m deep, offshore the U.S. east and Gulf coasts from the intersection of the 100 m isobath and the EEZ boundary southeast of Cape Cod, MA to south and offshore Biscayne Bay, FL at 25.5° N, from the 100 to 2,000 m isobath or the EEZ boundary, which ever is closer to land; from offshore Tampa Bay, FL at 85° N to offshore Mobile Bay, AL at 88° N between the 200 and 2,000 m isobaths; from offshore south of the Mississippi River delta, 89° N to offshore waters south of Galveston, TX, 95° N from the 200 m isobath to the EEZ boundary (Figure B.18).

### B.1.3 Billfish

#### *B.1.3.1 Blue Marlin*

**Blue Marlin (*Mokaira nigricans*)** Blue marlin inhabit the tropical and subtropical waters of the Atlantic, Pacific and Indian Oceans. Their geographic range is from 45° N to 35° S. In the Atlantic two seasonal concentrations occur: January to April in the southwest Atlantic from 5° to 30° S, and from June to October in the northwest Atlantic between 10° N and 35° N. May, November and December are transitional months (Rivas, 1975). This species is epipelagic and oceanic, generally found in blue water with a temperature range of 22 to 31° C. In the northern Gulf of Mexico fishermen tend to catch more blue marlin when white marlin catches are lowest and vice versa; this probably reflects differences in habitat preferences rather than any interaction between the species. Blue marlin are generally solitary, and do not occur in schools or in coastal waters (Nakamura, 1985). It had been believed that the North and South Atlantic contains two separate spawning populations, but recent evidence, including genetic data, suggests there is intermingling of the two groups. Consistent with SCRS recommendations, this amendment considers there to be a single stock of Atlantic blue marlin. Tag-recapture data from the northern Gulf of Mexico and the Bahamas suggest seasonal movements between the former in summer and the latter in winter, and also two-way movements between the Caribbean Islands and Venezuela and the Bahamas, and at least one-way movements from St. Thomas to West Africa. Blue marlin from this study traveled up to 7,000 km (4,350 mi) and have remained at-large (*i.e.*, from tagging until recapture) for up to eight years (Witzell and Scott, 1990).

As part of the Cooperative Tagging Center (CTC) program, a total of 21,547 blue marlin have been tagged and released over the last 43 years, with the recapture of 147 tagged fish reported (0.68 percent of all releases) over the 23-year collaborative tagging effort (Jones *et al.*, 1997). Most tagging activity has taken place off the U.S. east coast, Gulf of Mexico and Caribbean, generally during the months of July through September. The majority of blue marlin was recaptured in the general area of their release, traveling an average distance of 488 nm. Some individuals have exhibited extended movement patterns, and strong seasonal patterns of movement of individuals between the United States and Venezuela are evident (SCRS, 1997). A blue marlin released off Delaware and recovered off the island of Mauritius in the Indian Ocean represents the only documented inter-ocean movement of a highly migratory species in the history of the CTC. The minimum straight-line distance traveled for this fish was 9,100 nm in 1,108 days-at-large (roughly three years). Other extensive movements include trans-equatorial movements and trans-Atlantic migrations (5.4 percent of CTC recaptures; Jones *et al.*, 1997).

**Predator-prey relationships:** Blue marlin feed near the surface but also are known to feed in deeper waters than the other istiophorids. They feed primarily on tuna-like fishes, squid, and on a wide size range of other organisms, from 38 mm postlarval surgeonfish to 50 lb. bigeye tuna. Stomach contents have also included deep-sea fishes, such as chiasmodontids. Other important prey species vary by location and include dolphinfishes, especially bullet tuna (*Auxis* sp.) around the Bahamas, Puerto Rico, and Jamaica, and dolphinfishes and scombrids in the Gulf of Mexico. Octopods are also prey items (Rivas, 1975; Davies and Bortone, 1976; Nakamura, 1985). Predators of blue marlin are relatively unknown. Sharks will attack hooked billfish, but it is not known if they attack free-swimming, healthy individuals.

**Reproduction and Early Life History:** Although recent evidence indicates mixing between the two geographic areas, there are probably two separate spawning “events” (or populations); one in the north Atlantic with spawning from July to September (July to October according to de Sylva and Breder, 1997; May to November, according to Prince *et al.*, 1991) and one in the South Atlantic from February to March. May and June are the peak spawning months for fish off Florida and the Bahamas, and there is a protracted spawning period off northwest Puerto Rico from May to November. Females taken off Cape Hatteras, NC in June were found to have recently spawned (Rivas, 1975). Very few larvae have been collected in the western

Atlantic, but some have been found off Georgia, in the Gulf of Mexico, off Cat Cay, Bahamas, and in the mid- north Atlantic (Ueyanagi *et al.*, 1970; Nakamura, 1975). A few juveniles have been identified off Jamaica (Caldwell, 1962) and one from the Gulf of Mexico.

Blue marlin are sexually mature by 2 to 4 years of age (SCRS, 1997). Female blue marlin begin to mature at approximately 104 to 134 lb, while males mature at smaller weights, generally from 77 to 97 lb. Analysis of egg (ova) diameter frequency suggests that blue marlin, white marlin, and sailfish spawn more than once, and possibly up to four times a year (de Sylva and Breder, 1997). During the spawning season blue marlin release from one million to ten million small (1 to 2 mm), transparent pelagic planktonic eggs (Yeo, 1978). The number of eggs has been correlated to interspecific sizes among billfish and size of individuals within the same species. Ovaries from a 324 lb female blue marlin from the northwest Atlantic were estimated to contain 10.9 million eggs, while ovaries of a 275 lb female were estimated to contain approximately 7 million eggs.

**Fisheries:** Blue marlin are targeted as a recreational fishery in the United States and Caribbean, and are also caught as bycatch of tropical tuna longline fisheries which use shallow gear deployment. They are also caught by offshore longline fisheries which target swordfish, especially in the western Atlantic, as well as by directed artisanal fisheries in the Caribbean. **U.S. Fishery Status:** Overfished, and overfishing is occurring. The effect of reduced stock size on habitat use, migrations or distribution is unknown but should be investigated in future research.

**Growth and mortality:** Blue marlin are believed to be one of the fastest growing of all teleosts in the early stages of development, and weigh between 30 and 45 kg by age 1 (SCRS, 1997). Based on analyses of daily otolith ring counts, they reach 24 cm LJFL (lower jaw fork length) in about 40 days, and about 190 cm LJFL in 500 days, with a maximum growth rate of approximately 1.66 cm/day occurring at 39 cm LJFL (Prince *et al.*, 1991). Fish larger than 190 cm LJFL tend to add weight more than length, making the application of traditional growth curve models, in which length or weight are predicted as a function of age, difficult for fish in these larger size categories. Females grow faster and reach much larger maximum sizes than males. Examination of sagitta (otolith) weight, body weight, and length/age characteristics indicate that sex-related size differences are related to differential growth between the sexes and not to differential mortality (Wilson *et al.*, 1991). Sexually dimorphic growth variation (weight only) in blue marlin appears to begin at 140 cm LJFL (Prince *et al.*, 1991). Somatic growth of male blue marlin slows significantly at about 220 lb, while females continue substantial growth throughout their lifetime (Wilson *et al.*, 1991). Male blue marlin usually do not exceed 350 lb, while females can exceed 1,200 lb.

Blue marlin are estimated to reach ages of at least 20 to 30 years, based on analysis of dorsal spines (Hill *et al.*, 1990). Although this spine ageing technique has not been validated, longevity estimates are supported by tagging data. The maximum time at liberty recorded of a tagged individual was 4,024 days (about 11 years) for a blue marlin that was estimated to weigh 65 pounds at the time of release (SCRS, 1996b). Sagitta otolith weight is suggested to be proportional to age, indicating that both sexes are equally long-lived, based on the maximum otolith weight observed for each sex (Wilson *et al.*, 1991). Additionally, predicting age from length or weight is imprecise due to many age classes in the fishery (SCRS, 1996b). Estimates of natural mortality rates for billfish would be expected to be relatively low, generally in the range of 0.15 to 0.30, based on body size, behavior, and physiology (SCRS, 1996b).

**Habitat associations:** Adults are found primarily in the tropics within the 24°C isotherm, and make seasonal movements related to changes in sea surface temperatures. In the northern Gulf of Mexico they are associated with the Loop Current and are found in blue waters of low productivity rather than in more productive green waters. Off Puerto Rico the largest numbers of blue marlin are caught during August, September and October. Equal numbers of both sexes occur off northwest Puerto Rico in July and August, with larger males found there in May and smaller males in September (Rivas, 1975). Very large individuals, probably females, are found off the southern coast of Jamaica in the summer and off the northern coast in winter, where males are caught in December and January.

***Essential Fish Habitat for Blue Marlin:***

- **Spawning, eggs, and larvae:** Offshore Florida, identical to adult EFH in that area: from offshore Ponce de Leon Inlet (29.5° N) south to offshore Melbourne, FL from the 100 m isobath to 50 mi seaward (79.25° W); from offshore Melbourne, FL south to Key West from the100 m isobath to the EEZ boundary; also, off the northwest coast of Puerto Rico (from Arecibo to Mayaguez), bounded by the 2000 m isobath to the north and 18° N to the south (Figure B.19).

- **Juveniles/Subadults (20-189 cm LJFL):** Pelagic surface waters not less than 24° C, offshore Delaware Bay to Cape Lookout, NC from the 100 to the 2000 m isobath, and grading further offshore to 73.25° W at 35° N; continuing south from offshore Cape Lookout to Cumberland Island, GA (30.75° N), from the 200 to 2000 m isobath; offshore St. Augustine, FL (30° N) south to 26° N, (Ft Lauderdale, FL) from the 100 m isobath offshore an additional 30 miles to 29° N, then south of 29° N, seaward from the 100 m isobath to the EEZ boundary; off southwest Florida from 24.5° N between the 200 m isobath and the EEZ boundary, north to 28°N, west to 86.25° W, and south to the EEZ boundary; offshore Choctawhatchee Bay to Terrebonne Parish, LA, from the 100 to the 2000 m isobath, continuing west along the 200 m isobath to the Texas/Mexico border out to 2000 meters (Figure B.20).

- **Adults (≥ 190 cm LJFL):** Pelagic surface waters not less than 24° C, from offshore Delaware Bay (38.5° N) south to offshore Wilmington, NC (33.5° N) between the100 and 2000 m isobaths; offshore Charleston, SC (32° N) from 100 m to 78° W to offshore the Georgia/Florida border (30.75° N); from offshore Ponce de Leon Inlet (29.5° N) south to offshore Melbourne, FL from the 100 m isobath to 50 mi seaward (79.25° W); from offshore Melbourne, FL south to Key West from the 100 m isobath to the EEZ boundary; from offshore Choctawhatchee Bay (86° W) to offshore Terrebonne Parish, LA (90° W) between the 100 and 2000 m isobaths; from Terrebonne Parish, LA south to offshore Galveston, TX (95° W) between the 200 and 2000 m isobaths; Puerto Rico and the U.S. Virgin Islands: from 65.25° W east and south to the EEZ northern boundary along the 100 m isobath. Also, off the northern shore of Puerto Rico out to the 2000 m isobath from 65.5° W west to the EEZ boundary, and along the southern coast of Puerto Rico out to the 2000 m isobath, east to 66.5° W (Figure B.21).

### *B.1.3.2 White Marlin*

**White Marlin (*Tetrapturus albidus*)** White marlin is an oceanic, epipelagic species that occurs in the Atlantic Ocean, Gulf of Mexico, and Caribbean waters. It inhabits almost the entire Atlantic from 45°N to 45°S in the western Atlantic and 45°N to 35°S in the eastern Atlantic. In the tropics white marlin usually occur above the thermocline in deep (depths greater than 100 m), blue waters with surface temperatures above 22°C and salinities of 35 to 37 ppt. They are usually in the upper 20 to 30 m of the water column but may go to depths of 200 to 250 m where the thermocline is deep. In higher latitudes, such as between New Jersey and Virginia, they are found commonly in shallow coastal waters (de Sylva and Davis, 1963). White marlin are found at the higher latitudes of their range only in the warmer months. Although they are generally solitary, they sometimes are found in small, usually same-age groups. White marlin spawn in tropical and sub-tropical waters and move to higher latitudes during the summer (Mather *et al.*, 1975; Nakamura, 1985). Catches in some areas may include a rare species, *Tetrapturus georgei*, which is superficially similar to white marlin. The so-called "hatchet marlin" (Pristas, 1980) may also represent *T. georgei* and has been caught occasionally in the Gulf of Mexico. The similarity between species indicates some reported catches have the potential for error.

This species undergoes extensive movements, although not as extreme as those of the bluefin tuna and albacore. The longest distance traveled by a tagged and recaptured specimen, which had been at-large for 1.4 years, was 3,509 km. The longest time at-large recorded for a white marlin is 11.8 years. Transequatorial movements have not been documented for the species (Bayley and Prince, 1993). There have been 29,751 white marlin tagged and released by the CTC program, with 540 reported recaptures (1.8 percent of all releases). The majority of releases took place in the months of July through September, in the western Atlantic off the east coast of the United States. Releases of tagged white marlin also occurred off Venezuela, in the Gulf of Mexico, and in the central West Atlantic. As noted for blue marlin, the majority of recoveries occurred in the same general area as the original capture. The mean straight-line distance of recaptured white marlin is 455 nm. A substantial number of individuals moved between the mid-Atlantic coast of the United States and the northeast coast of South America. Overall, 1.1 percent of documented white marlin recaptures have made trans-Atlantic movements. The longest movement was for a white marlin tagged during July 1995 off the east coast near Cape May, NJ and recaptured off Sierra Leone, West Africa in November 1996. The fish traveled a distance of at least 3,519 nm over 476 days (1.3 years; Jones *et. al*., 1997).

**Predator–prey relationships:** The most important prey items of adult white marlin, at least in the Gulf of Mexico, are squid, dolphinfishes (*Coryphaena*) and hardtail jack (*Caranx crysos*), followed by mackerels, flyingfishes, and bonitos. Other food items found inconsistently and to a lesser degree include cutlassfishes, puffers, herrings, barracudas, moonfishes, triggerfishes, remoras, hammerhead sharks, and crabs. Along the central Atlantic coast food items include round herring (*Etrumerus teres*) and squid *(Loligo pealei*). Carangids and other fishes are consumed as well (Nakamura, 1985). Davies and Bortone (1976) found the most frequent stomach contents in 53 specimens from the northeastern Gulf of Mexico, off Florida and off Mississippi to include little tunny (*Euthynnus* sp.), bullet tuna (*Auxis* sp.), squid, and moonfish (*Vomer setapinnis*). They also found white marlin to feed on barracuda and puffer fish. The only predators of adult white marlin may be sharks and possibly killer whales (Mather *et al.*, 1975).

**Reproduction and Early Life History:** Sexual maturity of female white marlin is reached at about 61 inches LJFL (44 lb). Mature females probably spawn more than once a year and possibly up to four times during the spawning season. The spawning season probably occurs only once a year, from March to June (de Sylva and Breder, 1997). It is believed there are at least three spawning areas in the western north Atlantic: northeast of Little Bahama Bank off the Abaco Islands, northwest of Grand Bahama Island, and southwest of Bermuda. Larvae have also been collected from November to April (Mather *et al.*, 1975; Nakamura, 1985), but these may have been sailfish larvae (*Istiophorus platypterus*), as the two cannot readily be distinguished.

**Fisheries:** White marlin are targeted as a recreational fishery in the United States and Caribbean, and are also caught as bycatch of tropical tuna longline fisheries which use shallow gear deployment. They are also caught by offshore longline fisheries which target swordfish, especially in the western Atlantic, as well as by directed artisanal fisheries in the Caribbean.
**U.S. Fishery Status:** Overfished, overfishing is occurring. The effect of reduced stock size on habitat use, migrations or distribution is unknown but should be investigated in future research.

**Growth and mortality:** Adult white marlin grow to over 280 cm TL (total length) and 82 kg. White marlin exhibit sexually dimorphic growth patterns; females grow larger than males (Mather *et al.*, 1975; Nakamura, 1985), but the dimorphic growth differences are not as extreme as noted for blue marlin (SCRS, 1997). A minimum estimate of longevity can be calculated from the longest time at liberty for a tagged white marlin, 4,305 days (11.8 years). The individual was estimated to weigh 50 lb at the time of first capture, resulting in a minimum age estimate of 14 to15 years (SCRS, 1996b).

**Habitat associations:** The world's largest sport fishery for the species occurs in the summer from Cape Hatteras, NC to Cape Cod, MA especially between Oregon Inlet, NC and Atlantic City, NJ. Successful fishing occurs up to 80 miles offshore at submarine canyons, extending from Norfolk Canyon in the mid-Atlantic to Block Canyon off eastern Long Island (Mather, *et al.*, 1975). Concentrations are associated with rip currents and weed lines (fronts), and with bottom features such as steep dropoffs, submarine canyons and shoals (Nakamura, 1985). The spring peak season for white marlin sport fishing occurs in the Straits of Florida, southeast Florida, the Bahamas, and off the north coasts of Puerto Rico and the Virgin Islands. In the Gulf of Mexico summer concentrations are found off the Mississippi River Delta, at DeSoto Canyon, and at the edge of the continental shelf off Port Aransas, TX, with a peak off the Delta in July, and in the vicinity of DeSoto Canyon in August. In the Gulf of Mexico adults appear to be associated with blue waters of low productivity, being found with less frequency in more productive green waters. While this is also true of the blue marlin, there appears to be a contrast in the factors controlling blue and white marlin abundances, as higher numbers of blue marlin are caught when catches of white marlin are low and vice versa (Rivas, 1975; Nakamura, 1985). It is believed that white marlin prefer slightly cooler temperatures than blue marlin. Spawning occurs in early summer, in subtropical, deep oceanic waters with high surface temperatures and salinities (20 to 29°C and over 35 ppt). Spawning concentrations occur off the Bahamas, Cuba, and the Greater Antilles, probably beyond the U.S. EEZ, although the locations are unconfirmed. Concentrations of white marlin in the northern Gulf of Mexico and from Cape Hatteras to Cape Cod are probably related to feeding rather than spawning (Mather *et al.*, 1975).

***Essential Fish Habitat for White Marlin:***

- **Spawning, eggs, and larvae:** At this time the available information is insufficient to identify EFH for this life stage (Figure B.22).

- **Juvenile (20-158 cm LJFL):** Pelagic waters warmer than 22°C, from offshore the U.S. east coast from the 50 to the 2000 m isobath from the EEZ at Georges Bank at 41°N, south to offshore Miami, FL at 25.25°N; off the west coast of Florida, between the 200 and 2000 m isobath from 24.75° N to 27.75°N; then continuing between the 200 and 2000 m isobath west from 86°W to 93.5°W, then off the coast of Texas from west of 95.5°W to the 50 m isobath and south to the EEZ boundary (Figure B.23).

- **Adults (≥159 cm LJFL):** Pelagic waters warmer than 22°C, from offshore the northeast U.S. coast from the 50 to the 2000 m isobath from 33.75° N to 39.25°N, then extending along 39.25°N out to the EEZ boundary; off the coast of South Carolina in the Charleston Bump area, in the region starting from the 200 m isobath at 32.25°N, east to 78.25°W, south to 31°N, west to 79.5°W and north to the 200 m isobath; offshore Cape Canaveral, FL from the 200 m isobath, east at 29°N to the EEZ boundary, south along the 200 m isobath and out to the EEZ boundary to 82°W, in the vicinity of Key West, FL; in the Gulf of Mexico, from 86.5°W to the EEZ boundary, along the 50 m isobath near De Soto canyon, then along the 100 m isobath west to the EEZ boundary offshore the United States/Mexico border (Figure B.24).

### *B.1.3.3 Sailfish*

**Sailfish (*Istiophorus platypterus*)** Sailfish have a circumtropical distribution (Post, 1998). They range from 40°N to 40°S in the western Atlantic and 50°N to 32°S in the eastern Atlantic. Sailfish are epipelagic and coastal to oceanic, and are usually found above the thermocline at a temperature range of 21 to 28°C, but may dive into deeper, colder water. These are the least oceanic of the Atlantic billfish, often moving to inshore waters. They are found over the shelf edge, and are associated with land masses. However, they have been found to travel farther offshore than was previously thought.

A total of 62,740 sailfish have been tagged and released through the efforts of the CTC program, with reported recapture of 1,090 sailfish (1.7 percent of all releases). Most releases occurred off southeast Florida, from north Florida to the Carolinas, the Gulf of Mexico, Venezuela, Mexico, the northern Bahamas, and the U.S. Virgin Islands. One tagged and recaptured specimen traveled from Juno, FL to the mid-Atlantic, a distance of 2,972 km (Bayley and Prince, 1993). The longest movement tracked by tagging was 3,509 km, with this specimen at-large for 1.4 yrs. The longest period a recaptured tagged animal was found to be at-large was 10.9 years (Bayley and Prince, 1993). During the winter sailfish are restricted to the warmer parts of their range and move farther from the tropics during the summer (Beardsley *et al.*, 1975; Nakamura, 1985). The summer distribution of sailfish does not extend as far north as for marlins. Tag-and-recapture efforts have recovered specimens only as far north as Cape Hatteras, NC. Few transatlantic or transequatorial movements have been documented using tag-recapture methods (Bayley and Prince, 1993).

**Predator-prey relationships:** Early larvae feed on copepods, but shift to eating fish when they reach 6.0 mm in size. The diet of adult sailfish caught around Florida consists mainly of pelagic fishes such as little thunny (*Euthynnus alletteratus*), halfbeaks (*Hemiramphus* spp.), cutlassfish (*Trichiurus lepturus*), rudderfish (*Strongylura notatus*), jacks (*Caranx ruber*), pinfish (*Lagodon rhomboides*), and squids, including *Argonauta argo* and *Ommastrephes bartrami* (Nakamura, 1985). Sailfish are opportunistic feeders, and there is unexpected evidence that they may feed on demersal species such as sea robin (Triglidae), cephalopods, and gastropods found in deep water. Sailfish in the western Gulf of Mexico have been found to contain a large proportion of shrimp in their stomachs (Beardsley *et al.*, 1975; Nakamura, 1985). Davies and Bortone (1976) report that the stomach contents of 11 sailfish from the Gulf of Mexico most frequently contained little thunny, bullet tuna (*Auxis* sp.), squid, and Atlantic moonfish (*Vomer setapinnis*). Adult sailfish are probably not preyed upon often, but predators include killer whales (*Orcinus orca*), bottlenose dolphin (*Tursiops turncatus*), and sharks (Beardsley *et al.*, 1975).

**Reproduction and Early Life History:** Spawning has been reported to occur in shallow waters (30-40 ft) around Florida, from the Keys to the region off Palm Beach on the east coast. Spawning is also assumed, based on presence of larvae, offshore beyond the 100 m isobath from Cuba to the Carolinas, from April to September. However, the spawning has not been observed. Sexual maturity occurs in the third year, with females at a weight of 13 to18 kg and males at 10 kg (de Sylva and Breder, 1997). Sailfish are multiple spawners, with spawning activity moving northward in the western Atlantic as the summer progresses. Larvae are found in Gulf Stream waters in the western Atlantic, and in offshore waters throughout the Gulf of Mexico from March to October (Beardsley *et al.*, 1975; Nakamura, 1985; de Sylva and Breder, 1997).

**Fisheries:** Sailfish are primarily caught in directed sportfisheries and as bycatch of the commercial longline fisheries for tunas and swordfish. Historically, nearly all sailfish from commercial catches have been reported as Atlantic sailfish; however, nearly all of these represent longbill spearfish (and perhaps other spearfish), and it is probable that very few sailfish are taken commercially in offshore waters of the Atlantic. Thus, it is impossible to determine historical trends in sailfish catches since at least two species have been combined. **U.S. Fishery Status:** Unknown.

**Growth and mortality:** Most sailfish examined that have been caught off Florida are under three years of age. Mortality is estimated to be high in this area, as most of the population consists of only two year classes (Beardsley *et al.*, 1975). Sailfish are probably the slowest growing of the Atlantic istiophorids. Sexual dimorphic growth is found in sailfish, but it is not as extreme as with blue marlin (SCRS, 1997). An individual sailfish that was recaptured after

5,862 days (16 years) at liberty can be used to estimate minimum age of longevity. Unfortunately, the size at release is not available for this fish (SCRS, 1996b). The maximum age can be 13 to15 or more years. Growth rate in older individuals is very slow - 0.59 kg/yr (Prince *et al.*, 1986).

**Habitat associations:** In the winter sailfish are found in schools around the Florida Keys and eastern Florida, in the Caribbean, and in offshore waters throughout the Gulf of Mexico. In the summer they appear to diffuse northward along the U.S. coast as far north as the coast of Maine, although there is a population off the east coast of Florida all year long. During the summer some of these fish move north along the inside edge of the Gulf Stream. After the arrival of northerlies in the winter they regroup off the east coast of Florida. Sailfish appear to spend most of their time above the thermocline, which occurs at depths of 10 to 20 m to 200 to 250 m, depending on location. The 28°C isotherm appears to be the optimal temperature for this species. Sailfish are mainly oceanic but migrate into shallow coastal waters. Larvae are associated with the warm waters of the Gulf Stream (Beardsley *et al.*, 1975; Nakamura, 1985; Post, 1998).

***Essential Fish Habitat for Sailfish:***

- **Spawning, eggs, and larvae:** From 28.25°N south to Key West, FL, associated with waters of the Gulf Stream and Florida Straits from 5 mi offshore out to the EEZ boundary (Figure B.25)**.**

- **Juveniles/Subadults (20-142 cm LJFL):** In pelagic and coastal surface waters between 21 and 28°C, from 32°N south to Key West, FL in waters from 5 mi offshore to125 mi offshore, or the EEZ boundary, whichever is nearer to shore; west of Key West, FL, all waters of the Gulf of Mexico from the 200 to the 2000m isobath or the EEZ boundary, whichever is nearer to shore (Figure B.26).

- **Adults (≥143 cm LJFL):** In pelagic and coastal surface waters between 21 and 28°C, offshore of the U.S. southeast coast from 5 mi off the coast to 2000 m, from 36°N to 34°N, then from 5 mi offshore to 125 mi offshore, or the EEZ boundary, whichever is nearer to shore, south to Key West, then from the 200 m isobath to the 2000 m isobath. Additional EFH is delineated in the Gulf of Mexico near DeSoto Canyon up to the 50 m isobath, and areas 5 mi offshore southeast Texas, from Corpus Christy to the EEZ boundary, or the 2000 m isobath, whichever is closer (Figure B.27).

#### *B.1.3.4 Longbill Spearfish*

**<u>Longbill Spearfish (*Tetrapturus pfluegeri*)</u>** Only relatively recently (1963) has the longbill spearfish been reported as a new (distinct) species. It is known, but rare, from off the east coast of Florida, the Bahamas and the Gulf of Mexico, and from Georges Bank to Puerto Rico. More recently it has been observed to be more widely distributed, mostly in the western Atlantic. The range for this species is from 40°N to 35°S. It is an epipelagic, oceanic species, usually inhabiting waters above the thermocline (Robins, 1975; Nakamura, 1985). The species is generally found in offshore waters.

**Predator-prey relationships:** The diet of the longbill spearfish consists of pelagic fishes and squids. However, little data for diet specific to fish in the north Atlantic is available.

**Life history:** Spawning is thought to occur in widespread areas in the tropical and subtropical Atlantic (Nakamura, 1985) in the winter from November to May (de Sylva and Breder, 1997). There are a few records of larvae caught near the Mid-Atlantic Ridge from December to February, and in the Caribbean (Ueyanagi *et al.*, 1970; de Sylva and Breder, 1997)

**Fisheries:** Longbill spearfish is not a target species, but is taken in the recreational fishery; the sportfishery catches only about 100 individuals per year. It is, however, taken as bycatch of the tuna longline fishery. **U.S. Fishery Status:** Unknown.

**Growth and mortality:** The maximum weight of females at first maturity is approximately 45 kg (de Sylva and Breder, 1997).

**Habitat associations:** The species ranges farther offshore than sailfish. Nothing is known about its habitat associations.

***Essential Fish Habitat for Longbill Spearfish:***

- **Spawning, eggs, and larvae:** At this time available information is insufficient to describe and identify EFH for this life stage (Figure B.28).

- **Juvenile/Subadult (~20-182 cm LJFL):** Offshore North Carolina, from 36.5°N to 35°N, from the 200 m isobath to the EEZ boundary (Figure B.29).

- **Adults (≥183 cm LJFL):** The Charleston Bump area of the South Atlantic Bight from 78°W to 79°W, and from 37°N to 31°N; and southwest of the U.S. Virgin Islands from 65° W east to the EEZ boundary or the 2000 m isobath, whichever is nearer to shore (Figure B.30).

### B.1.4 Large Coastal Sharks

#### *B.1.4.1 Basking Sharks*

**Basking shark (*Cetorhinus maximus*)** The basking shark is the second largest fish in the world, its size exceeded only by the whale shark. Like the whale shark, it is a filter-feeding plankton eater. It is a migratory species of the subpolar and cold temperate seas throughout the world, spending the summer in high latitudes and moving into warmer water in winter (Castro, 1983). In spite of its size and local abundance in summer, its habits are very poorly known. Sims and Quayle (1998) have shown that basking sharks forage along thermal fronts and seek the highest densities of zooplankton. During the European autumn basking sharks disappear and are not seen until the following summer, when they return after giving birth. Distribution data for the basking shark is incomplete largely because the species is not commonly taken by fisheries. According to one OMB reviewer, EFH for the basking shark may need to include waters east of the Great South Channel and the Gulf of Maine to the Bay of Fundy. Pertinent information on life history and distribution of the basking shark in the North Atlantic may be found in Templeman (1963), Owen (1984), Kenney *et al.* (1985), Sims and Merrett (1997), Sims and Quayle (1998), Sims (1999), Sims *et al.* (2000), Skomal *et al.* (2004), and Wilson (2004).

**Reproductive potential:** Little is known about basking shark reproductive processes. Males are believed to reach maturity between 460 and 610 cm (Bigelow and Schroeder, 1948), at an estimated age of four to five years (Parker and Stott, 1965). However, these age estimates have not been validated. Females mature at 810 to 980 cm (Compagno, 1984). It is believed that female basking sharks give birth to young measuring about 180 cm total length (TL), probably in high latitudes. There are no modern reports on the size of litters or data on reproductive cycles.

**Impact of fisheries:** Fishing for the basking shark is prohibited in U.S. waters, although basking sharks are common off the east coast in winter.

***Essential Fish Habitat for Basking Shark*:**

- **Neonate (≥182 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.31).

- **Juveniles (183 to 809 cm TL):** Offshore the mid-Atlantic United States south of Nantucket Shoals at 70°W to the north edge of Cape Hatteras, NC at 35.5°N in waters 50 to 200 m deep; associated with boundary conditions created by the western edge of the Gulf Stream (Figure B.32).

- **Adults (≥810 cm TL):** Offshore southern New England, west of Nantucket Shoals at 70°W to Montauk, Long Island, NY at 72°W, out to the continental shelf in waters 50 to 200 m deep, where water column physical conditions create high abundances of zooplankton (Figure B.33).

### *B.1.4.2 Hammerhead Sharks*

**Great hammerhead (*Sphyrna mokarran*)** This shark found both in open oceans and shallow coastal waters. One of the largest sharks, the great hammerhead is circum-tropical in warm waters (Castro, 1983). It is usually a solitary fish, unlike the more common scalloped hammerhead which often forms very large schools.

**Reproductive potential:** In Australian waters males mature at about 210 to 258 cm TL and females mature usually at 210 to 220 cm TL (Stevens and Lyle, 1989). Pups measure about 67 cm TL at birth (Stevens and Lyle, 1989) and litters consist of 20 to 40 pups (Castro, 1983). The gestation period lasts about 11 months (Stevens and Lyle, 1989). The reproductive cycle is biennial (Stevens and Lyle, 1989). There are few reports and little data on its nurseries. Hueter (CSR data) found small juveniles from Yankeetown, FL to Charlotte Harbor, FL from May to October at temperature of 23.9 to 28.9°C and salinities of 21.9 to 34.2 ppt.

**Impact of fisheries:** Great hammerheads are caught in coastal longline shark fisheries as well as in pelagic tuna and swordfish longline fisheries. Its fins bring the highest prices in the shark fin market. Although finning is prohibited in the Atlantic, in many fishing operations elsewhere the fins are removed while the carcasses are discarded at sea. The great hammerhead is vulnerable to overfishing because of its biennial reproductive cycle and because it is caught both in directed fisheries and as bycatch in tuna and swordfish fisheries.

***Essential Fish Habitat for Great Hammerhead*:**

- **Neonate (≤74 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.34).

- **Juveniles (71 to 209 cm TL):** Off the Florida coast, all shallow coastal waters out to the 100 m isobath from 30°N south around peninsular Florida to 82.5°W, including Florida Bay and adjacent waters east of 81.5°W (north of 25°N), and east of 82.5°W (south of 25°N) (Figure B.35).

- **Adults (≥210 cm TL):** Off the entire east coast of Florida, all shallow coastal waters out to the 100 m isobath, south of 30°N, including the west coast of Florida to 85.5°W (Figure B.36).

**Scalloped hammerhead (*Sphyrna lewini*)** This is a very common, large, schooling hammerhead of warm waters. It is the most common hammerhead in the tropics and is readily available in abundance to inshore artisanal and small commercial fisheries as well as offshore operations (Compagno, 1984). It migrates seasonally north-south along the eastern United States. Additional life history information can be found in Lessa *et al.* (1998), Hazin *et al.* (2001), and Bush and Holland (2002).

**Reproductive potential:** Males in the Atlantic mature at about 180 to 185 cm TL (Bigelow and Schroeder, 1948), while those in the Indian Ocean mature at 140 to 165 cm TL (Bass *et al.*, 1973). Females mature at about 200 cm TL (Stevens and Lyle, 1989). The young are born at 38 to 45 cm TL, litters consisting of 15 to 31 pups (Compagno, 1984). The reproductive cycle is annual (Castro, 1993b), and the gestation period is nine to ten months (Stevens and Lyle, 1989). Castro (1993b) found nurseries in the shallow coastal waters of South Carolina; Hueter (CSR data) found small juveniles from Yankeetown to Charlotte Harbor on the west coast of Florida, in temperatures of 23.2° to 30.2 °C, salinities of 27.6 to 36.3 ppt, and DO of 5.1 to 5.5 ml/l.

**Impact of fisheries:** Because the scalloped hammerhead forms very large schools in coastal areas, it is targeted by many fisheries for its high priced fins. The scalloped hammerhead is considered vulnerable to overfishing because its schooling habit makes it extremely vulnerable to gillnet fisheries and because scalloped hammerheads are actively pursued in many fisheries throughout the world.

***Essential Fish Habitat for Scalloped Hammerhead*:**

- **Neonate (≤62 cm TL):** Shallow coastal waters of the South Atlantic Bight, off the coast of South Carolina, Georgia, and Florida, west of 79.5°W and north of 30°N, from the shoreline out to 25 miles offshore. Additionally, as displayed on Figure 6-10e: shallow coastal bays and estuaries less than 5 m deep, from Apalachee Bay to St. Andrews Bay, FL (Figure B.37).

- **Juveniles (63 to 227 cm TL):** All shallow coastal waters of the U.S. Atlantic seaboard from the shoreline to the 200 m isobath from 39° N, south to the vicinity of the Dry Tortugas and the Florida Keys at 82° W; also in the Gulf of Mexico, in the area of Mobile Bay, AL and Gulf Islands National Seashore, all shallow coastal waters from the shoreline out to the 50 m isobath (Figure B.38).

- **Adults (≥228cm TL):** In the South Atlantic Bight from the 25 to 200 m isobath from 36.5°N to 33°N, then continuing south from the 50 m isobath offshore to the 200 m isobath to 30°N, then from the 25 m isobath to the 200 m isobath from 30°N south to 28°N; also, in the Florida Straights between the 25 and 200 m isobaths, from 81.5°W west to 82.25°W in the vicinity of Key West and the Dry Tortugas (Figure B.39).

**Smooth hammerhead (*Sphyrna zygaena*)** This is an uncommon hammerhead of temperate waters. Fisheries data for hammerheads includes this species and the scalloped and great hammerheads; however, there is little data specific to the species.

***Essential Fish Habitat for Smooth Hammerhead*:**

- **Neonate (≤66 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.40).

- **Juveniles (67 t0 283 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.41).

- **Adults (≥284 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.42).

#### *B.1.4.3 Mackerel Sharks*

**White shark (*Carcharodon carcharias*)** The white shark is the largest of the lamnid, or mackerel, sharks. It is a poorly known apex predator found throughout temperate, subtropical, and tropical waters. Its presence is usually sporadic throughout its range, although there are a few localities (*e.g.*, off California, Australia, and South Africa) where it is seasonally common. Large adults prey on seals and sea lions and are sometimes found around their rookeries. The white shark is also a scavenger of large dead whales. It has been described as the most voracious of the fish-like vertebrates and has been known to attack bathers, divers, and even boats. According to one OMB reviewer, EFH for the white shark may need to be modified. The review by Casey and Pratt (1985) is a comprehensive size-specific examination of white shark distribution, life history, and nursery habitat in the western North Atlantic. Preliminary estimates of age and growth of this species were recently conducted by Natanson (2002). Estrada *et al.* (in press) present new information on the trophic ecology of this species in the western North Atlantic based on stable isotopes.

**Reproductive potential:** Very little is known of its reproductive processes because only two gravid females have been examined by biologists in modern times. Both specimens contained seven embryos. Recent observations show that white sharks carry seven to ten embryos that are born at 120 to 150 cm TL (Francis, 1996; Uchida *et al.*, 1996). The lengths of the reproductive and gestation cycles are unknown. White sharks are believed to mature at between 370 and 430 cm at an estimated age of nine to ten years (Cailliet *et al.*, 1985). Cailliet *et al.*, (1985) estimated growth rates of 25.0 to 30.0 cm/year for juveniles and 21.8 cm/year for older specimens, and gave the following von Bertalanffy parameters: n = 21, $L_\infty$ = 763.7 cm, K = 0.058, $t_o$ = -3.53. They estimated that a 610 cm TL specimen would be 13 to 14 years old. The types of habitats and locations of nursery areas are unknown. It is likely that the nurseries will be found in the warmer parts of the range in deep water.

**Impact of fisheries:** The white shark is a prized game fish because of its size. It is occasionally caught in commercial longlines or in near-shore drift gillnets, but it must be released in a manner which maximizes its survival. Its jaws and teeth are often seen in specialized markets where they bring high prices. Preliminary observations (Strong *et al.*, 1992) show that populations may be small, highly localized, and very vulnerable to overexploitation. The white shark has been adopted as a symbol of a threatened species by some conservation organizations, and has received protected status in South Africa, Australia, and the State of California. In 1997, the Unites States implemented a catch-and-release only recreational fishery for the white shark, while prohibiting possession of the species. There are no published population assessments, or even anecdotal reports, indicating any population decreases of the white shark. Nevertheless, it is a scarce apex predator and a long-lived species of a limited reproductive potential that is vulnerable to longlines.

***Essential Fish Habitat for White Shark*:**

- **Neonate (≤166 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.43).

- **Juveniles (167 to 479 cm TL):** Offshore northern New Jersey and Long Island, NY in pelagic waters from the 25 to 100 m isobath in the New York Bight area, bounded to the east at 71.5°W and to the south at 39.5°N; also, offshore Cape Canaveral, FL between the 25 and 100 m isobaths from 29.5° N south to 28°N (Figure B.44).

- **Adults (≥480 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.45).

### *B.1.4.4 Nurse Sharks*

**<u>Nurse shark (*Ginglymostoma cirratum*</u>** The nurse shark inhabits littoral waters in both sides of the tropical and subtropical Atlantic, ranging from tropical West Africa and the Cape Verde Islands in the east, and from Cape Hatteras, NC to Brazil in the west. It is also found in the east Pacific, ranging from the Gulf of California to Panama and Ecuador (Bigelow and

Schroeder, 1948). It is a shallow water species, often found lying motionless on the bottom under coral reefs or rocks. It often congregates in large numbers in shallow water (Castro, 1983; Pratt and Carrier, 2002).

**Reproductive potential:** The nurse shark matures at about 225 cm total length (Springer, 1938). Litters consist of 20 to 30 pups, the young measuring about 30 cm total length at birth. The gestation period is about five to six months and reproduction is biennial (Castro, 2000). The age at maturity is unknown, but the nurse shark is a long-lived species. Clark (1963) reported an aquarium specimen living up to 24 years in captivity.

Its nurseries are in shallow turtle grass (*Thalassia*) beds and shallow coral reefs (Castro, 2000; Pratt and Carrier 2002). However, juveniles are also found around mangrove islands in south Florida. Hueter and Tyminski (2002) found numerous juveniles along the west coast of Florida, in temperatures of 17.5° to 32.9°C, salinities of 28.0 to 38.5 ppt, and DO of 3.1 to 9.7 mg/l. Large numbers of nurse sharks often congregate in shallow waters off the Florida Keys and the Bahamas at mating time in June and July (Fowler, 1906; Gudger, 1912; Pratt and Carrier, 2002). A small area has been set up for protection of mating sharks at Fort Jefferson in the Dry Tortugas. It is not certain, however, whether this area is a primary mating ground or a refuge for mated females.

**Impact of fisheries:** In North America and the Caribbean the nurse shark has often been pursued for its hide, which is said to be more valuable than that of any other shark (Springer, 1950a). The fins have no value, and the meat is of questionable value (Springer, 1979). The U.S. commercial bottom longline fleet catches few nurse sharks.

***Essential Fish Habitat for Nurse Shark*:**

- **Neonate (≤ 36 cm total length):** Areas of shallow coastal areas from West Palm Beach, FL, south to the Dry Tortugas in waters less than 25 m deep, including Charlotte Harbor, FL at 82°W and 26.8°N in waters less than 25 m deep (Figure B.46).

  **Juvenile (37 to 221 cm total length):** Shallow coastal waters from the shoreline to the 25 m isobath off the east coast of Florida from south of Cumberland Island, GA (at 30.5°N) to the Dry Tortugas; also shallow coastal waters from Charlotte Harbor, FL (at 26°N) to the north end of Tampa Bay, FL (at 28°N); also, off southern Puerto Rico, shallow coastal waters out to the 25 m isobath from 66.5°W to the southwest tip of the island. Areas in the northeast Gulf of Mexico (Apalachee Bay, Apalachicola Bay, and Crooked Island Sound, FL) (Figure B.47).

- **Adults (≥ 221 cm total length):** Shallow coastal waters from the shoreline to the 25 m isobath off the east coast of Florida from south of Cumberland Island, GA (at 30.5°N) to the Dry Tortugas; also, shallow coastal waters from Charlotte Harbor, FL (at 26°N) to the north end of Tampa Bay, FL (at 28°N); also, off southern Puerto Rico, shallow coastal waters out to the 25 m isobath from 66.5°W to the southwest tip of the island (Figure B.48).

### *B.1.4.5 Requiem Sharks*

**Bignose shark (*Carcharhinus altimus*)** The bignose shark is a poorly known, bottom dwelling shark of the deeper waters of the continental shelves. It is found in tropical and subtropical waters throughout the world (Castro, 1983).

**Reproductive potential:** The smallest mature specimens recorded by Springer (1960) were a 213 cm TL male and a 221 cm TL female. Springer (1950c) reported litters of seven to eight pups, while Stevens and McLoughlin (1991) noted from three to 15 pups. Birth size is probably around 70 cm TL based on the largest embryos (65 to 70 cm TL) reported by Fourmanoir (1961), and free swimming specimens with fresh umbilical scars seen by Bass *et al.*, (1973). The lengths of the gestation period and of the breeding cycle have not been reported. The location of the nurseries is unknown.

**Impact of fisheries:** Springer (1950c) stated that the bignose shark appeared to be the most common large shark of the edges of the continental shelves in the West Indian region, and that the species made up a substantial portion of the catch in the Florida shark fishery of the1940s. In some areas bignose sharks are mistaken for sandbar sharks.

***Essential Fish Habitat for Bignose Shark*:**

- **Neonate (≤67 cm TL):** From offshore the Delmarva Peninsula at 38°N, to offshore Bull's Bay, SC at 32°N, between the 100 and 200 m isobaths (Figure B.49).

- **Juveniles (68 to 225 cm TL):** From offshore the Delmarva Peninsula at 38°N, to offshore Bull's Bay, SC at 32°N, between the 100 and 500 m isobaths; also, from St. Augustine, FL at 30°N, south to offshore West Palm Beach, FL at 27°N, between the 100 and 500 m isobaths (Figure B.50).

- **Adults (≥226 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.51).

**Blacktip shark (C*archarhinus limbatus*)** The blacktip shark is circumtropical in shallow coastal waters and offshore surface waters of the continental shelves. In the southeastern United States it ranges from Virginia to Florida and the Gulf of Mexico. Garrick (1982), on examining a large number of museum specimens, believed it to be a single worldwide species. Dudley and Cliff (1993), working off South Africa, and Castro (1996), working on blacktip sharks off the southeastern United States, showed that there were significant differences among the various populations. For example, the median size for blacktip sharks in the Atlantic is 126.6 cm fork length, whereas the median size in the Gulf region is 117.3 cm fork length. The blacktip shark is a fast moving shark that is often seen at the surface, frequently leaping and spinning out of the water. It often forms large schools that migrate seasonally north-south along the coast. This species is much sought after in the eastern United States because of the quality of its flesh. The blacktip and the sandbar shark are the two primary species in the U.S. commercial fisheries. In the markets of the United States "blacktip" has become synonymous with good quality shark; therefore, many other species are also sold under that name.

Additional information on blacktip shark nursery habitat can be found in Heupel and Hueter (2002), Heupel and Simpfendorfer (2002), Keeney *et al.* (2003), Heupel *et al.* (2004), Keeney *et al.* (2005), and Heupel and Simpfendorfer (2005a; 2005b).

**Reproductive potential:** Off the southeastern United States males mature at between 142 and 145 cm total length and females at about 156 cm total length (Castro, 1996). According to Branstetter and McEachran (1986), in the western north Atlantic males mature at 139 to 145 cm total length at four to five years and females at 153 cm total length at six to seven years. A similar pattern is evident in the Atlantic and Gulf of Mexico, with larger size at maturity in the Atlantic than in the Gulf region. However, these ages are unvalidated and based on a small sample. Branstetter and McEachran (1986) estimated the maximum age at ten years, and gave the von Bertalanffy parameters for combined sexes as: $L_\infty = 171$, $K= 0.284$, $t_o= -1.5$.

The young are born at 55 to 60 cm total length in late May and early June in shallow coastal nurseries from Georgia to the Carolinas (Castro, 1996), and in Bay systems in the Gulf of Mexico (Carlson, 2002; Parsons, 2002), and the Texas coast (Jones and Grace, 2002) Litters range from one to eight pups (Bigelow and Schroeder, 1948) with a mean of four. The gestation cycle lasts about a year; the reproductive cycle is biennial (Castro, 1996).

According to Castro (1993b), the nurseries are on the seaward side of coastal islands of the Carolinas, at depths of two to four meters. Carlson (2002) found neonates in depths of 2.1 to 6.0 m under a variety of habitat conditions. Castro (1993b) found neonates over muddy bottoms off Georgia and the Carolinas, while Hueter found them over seagrass beds off west Florida (unpublished Mote Laboratory CSR data). Neonates and juveniles were found off west Florida (from the Florida Keys to Tampa Bay) at temperatures of $18.5^o$ to $33.6^o$C, salinities of 15.8 to 37.0 ppt, and DO of 3.5 to 9.0 mg/l. The neonates were found from April to September, while juveniles were found there nearly year-round.

**Impact of fisheries:** The blacktip shark is caught in many diverse fisheries throughout the world. Off the southeastern United States it is caught in commercial longlines set in shallow coastal waters, but it is also pursued as a gamefish. There are localized gillnet fisheries in Federal waters off Florida that target blacktips during their migrations, when the schools are close to shore in clear waters. Aircraft are often used to direct net boats to the migrating schools, often resulting in the trapping of large schools. The species is pursued commercially throughout its range and is targeted because it is often found in shallow coastal waters. Their habit of migrating in large schools along shorelines makes it extremely vulnerable to organized drift gillnet fisheries.

### *Essential Fish Habitat for Blacktip Shark*

- **Neonate (≤ 69 cm total length):** Shallow coastal waters to the 25 m isobath, from Bull's Bay, SC at 33.5°N, south to Cape Canaveral, FL at 28.5°N; also, on the west coast of Florida from Thousand Islands at 26°N to Cedar Key, FL at 29°N, especially Tampa Bay and Charlotte Harbor, FL. Additionally, shallow coastal waters with muddy bottoms less than five meters deep on the seaward side of coastal islands from Apalachee Bay to St. Andrews Bay, FL.

EFH areas are identified above with the following modifications from Amendment 1. EFH includes shallow coastal waters south of the Thousand Islands, FL at 26°N south to Key West, FL at 24.5°N; also the northeastern Gulf of Mexico (Apalachee Bay, Apalachicola Bay, St. Joseph Bay, Crooked Island Sound and St Andrew Bay) at 85°W to the mouth of St. Louis Bay and the Terrebonne Timbalier Bay System, LA at 91.2°W; also, all major bay systems along the Gulf coast of Texas from Sabine Lake to Lower Laguna Madre (Figure B.52).

**Juvenile (69 to 155 cm total length):** Shallow coastal waters from the shoreline to the 25 m isobath: from Cape Hatteras, NC at 35.25°N to 29°N at Ponce de Leon Inlet; the west coast of Florida, including the Florida Keys and Florida Bay, north to Cedar Key at 29°N; from Cape San Blas, FL north of 29.5°N to the east coast of the Mississippi River delta north of 29°N; also, the west coast of Texas from Galveston, west of 94.5°N, to the U.S./Mexico border. Areas from the northeastern Gulf of Mexico (Apalachee Bay, Apalachicola Bay, St. Joseph Bay, Crooked Island Sound and St Andrew Bay) to the mouth of St. Louis Bay and the Terrebonne Timbalier Bay System, LA; also, all major bay systems along the Gulf coast of Texas from Sabine Lake to Lower Laguna Madre (Figure B.53).

- **Adult (≥ 155 cm total length):** Shallow coastal waters of the Outer Banks, NC from the shoreline to the 200 m isobath between 36°N and 34.5°N; shallow coastal waters offshore to the 50 m isobath from St. Augustine, FL (30°N) to offshore Cape Canaveral, FL (28.5°N); on the west coast of Florida, shallow coastal waters to the 50 m isobath from 81°W in Florida Bay, to 85°W, east of Cape San Blas, FL. Areas north of St. Augustine, FL at 30°N to Cumberland Island, GA at 30.9°N, but excludes areas south from Apalachicola Bay to Tarpon Springs at 28.2°N (Figure B.54).

**Bull shark (*Carcharhinus leucas*)** The bull shark is a large, shallow water shark that is cosmopolitan in warm seas and estuaries (Castro, 1983). It often enters fresh water, and may penetrate hundreds of kilometers upstream.

**Reproductive potential:** Males mature at 210 to 220 cm TL or 14 to 15 years of age, while females mature at >225 cm TL or 18+ years of age (Branstetter and Stiles, 1987). Growth parameters have been estimated by Branstetter and Stiles (1987) as $L_\infty$ = 285 cm TL, K= 0.076, $t_o$ = -3.0 yr. Thorson and Lacy (1982) estimated that females reached “their larger size at approximately 16 years and that males of maximum size were 12 years old.” The pups measure about 75 cm TL at birth (Clark and von Schmidt, 1965). Jensen (1976) stated that litters ranged from one to ten pups and that the average size was 5.5 pups. The gestation period is estimated at ten to eleven months (Clark and von Schmidt, 1965). The length of the reproductive cycle has not been published, but it is probably biennial. In the United States the nursery areas are in low-salinity estuaries of the Gulf of Mexico Coast (Castro, 1983) and the coastal lagoons of the east coast of Florida (Snelson *et al.,* 1984). Hueter (CSR data), working off the Florida west coast, found neonates in Yankeetown, Tampa Bay, and Charlotte Harbor from May to August. The neonates were in temperatures of 28.2° to 32.2°C, with salinities of 18.5-28.5 ppt. Hueter (CSR data) found juveniles off the west coast of Florida in temperatures of 21.0° to 34.0°C, salinities of 3.0 to 28.3 ppt, and DO of 3.7 to 8.4 ml/l.

Additional information on bull shark life history and nursery habitat can be found in Tremain *et al.* (2004), Neer *et al.* (2005), and Simpfendorfer *et al.* (2005).

**Impact of fisheries:** The bull shark is a common coastal species that is fished in both artisanal and industrial/modern fisheries. Clark and von Schmidt (1965) found it to be the most common shark caught in their survey of the sharks of the central Gulf coast of Florida, accounting for 18 percent of the shark catch. Dodrill (1977) reported it to be the seventh most commonly taken shark at Melbourne Beach, Florida, composing 8.6 percent of all longline landings. Thorson (1976) recorded a marked decline of the Lake Nicaragua-Rio, San Juan population from 1963 to1974, resulting from a small-scale, but sustained commercial fishing operation. This fishery intensified in 1968, and by 1972 bull sharks in the area had become so scarce that Thorson (1976) predicted that any other developments would eliminate the bull shark from Lake Nicaragua. Russell (1993) indicated that the bull shark constituted three percent of the shark catch in the directed shark fishery in the U.S. Gulf of Mexico. Castillo (1992) referred to the species in Mexico as “intensely exploited in both coasts.” The bull shark is vulnerable to overfishing because of its slow growth, limited reproductive potential, and because it is pursued in numerous fisheries.

***Essential Fish Habitat for Bull Shark*:**

- **Neonate (≤83 cm TL):** In shallow coastal waters, inlets and estuaries in waters less than 25 m deep: from just north of Cape Canaveral, FL at 29°N to just south of Cape Canaveral, FL at 28°N; from just south of Charlotte Harbor, FL at 26.5°N north to Cedar Key, FL at 29°N; the mouth of Mobile Bay, AL from 87.75°W to 88.25°W; the mouth of Galveston Bay, TX from 94.5°W to 95°W; from South Padre Island, TX south of 28.5°N to Laguna Madre, TX at 27°N (Figure B.55).

- **Juveniles (84 to 225 cm TL):** In shallow coastal waters, inlets and estuaries in waters less than 25 m deep: from Savannah Beach, GA at 32°N southward to the Dry Tortugas, FL; from Ten Thousand Islands, FL at 26°N north to northern Cedar Key, FL at 29°N; from Apalachiacola, FL at 85°W to the Mobile Bay, AL area at 88.5°W; from just east of Galveston Bay, TX at 94.5°W to the U.S./Mexico border (Figure B.56).

- **Adults (≥226 cm TL):** In shallow coastal waters, inlets and estuaries in waters less than 25 m deep: from just south of Charlotte Harbor, FL at 26.5°N to Anclote Key, FL at 28°N (Figure B.57).

**Caribbean reef shark *(Carcharhinus perezi)*** The Caribbean reef shark inhabits the southeast coast of Florida, the Caribbean, and the west Atlantic south to Brazil. This is a poorly known, bottom-dwelling species that inhabits shallow coastal waters, usually around coral reefs (Castro, 1983).

**Reproductive potential:** Males mature about 170 cm TL and females at about 200 cm TL. Pups are born at about 70 cm TL, litters consisting of four to six pups. The reproductive cycle is biennial (Castro, unpub.). The nurseries have not been described.

***Essential Fish Habitat for Caribbean Reef Shark*:**

- **Neonate (≤66 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.58).

- **Juveniles (67 to 199 cm TL):** Shallow coastal waters of the Florida Keys less than 25 m deep from Key Largo to the Dry Tortugas (Figure B.59).

- **Adults (≥200 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.60).

**Dusky shark (*Carcharhinus obscurus*).** The dusky shark is common in warm and temperate continental waters throughout the world. It is a migratory species which moves north-south with the seasons. This is one of the larger species found from inshore waters to the outer reaches of continental shelves. It used to be important as a commercial species and a game fish, but is currently prohibited.

**Reproductive potential:** Males mature at 290 cm total length and reach at least 340 cm total length. The females mature at about 300 cm total length and reach up to 365 cm total length. The dusky shark matures at about 17 years and is considered a slow growing species (Natanson, 1990). Litters consist of six to14 pups, which measure 85 to 90 cm total length at birth (Castro, 1983). The gestation period is believed to be about 16 months (Clark and von Schmidt, 1965), but this has not been confirmed. Natanson (1990) gave the following parameters for males $L_{max}$= 351 cm FL (420 cm total length), K= .047, $t_o = -5.83$; and females at $L_{max}$= 316 cm total length (378 cm total length), K= .061, $t_o$=-4.83. The growth rate is believed to be about ten cm/yr for the young and five cm/yr for the adults. Age and growth information can also be found in Natanson *et al.* (1995).

The nursery areas are in coastal waters. Castro (1993c) reported that dusky sharks gave birth in Bulls Bay, SC in April and May. Musick and Colvocoresses (1986) stated that the species gives birth in the Chesapeake Bay, MD in June and July, however, Grubbs and Musick (2002) note that they use nearshore waters in VA as nursery areas but rarely enter estuaries.

**Impact of fisheries:** The dusky shark has played an important role in the coastal shark fisheries for flesh and fins and is taken as bycatch in the swordfish and tuna fisheries. The dusky shark is one of the slowest growing requiem sharks and is often caught on both bottom and pelagic longlines, making it highly vulnerable to overfishing. Dusky sharks are currently prohibited and are a candidate for listing under the ESA.

***Essential Fish Habitat for Dusky Shark*:**

- **Neonate (≤ 110 cm total length):** Shallow coastal waters, inlets and estuaries to the 25 m isobath from the eastern end of Long Island, NY at 72°W south to Cape Lookout, NC at 34.5°N; from Cape Lookout south to West Palm Beach, FL (27.5°N), shallow coastal waters, inlets and estuaries and offshore areas to the 90 m isobath. Areas out to the 200 m isobath off the states of Maryland south to North Carolina, and out to the 70 m isobath off New Jersey north to Long Island, NY (Figure B.61).

- **Juvenile (110 to 299 cm total length):** Areas off the coast of southern New England from 70°W west and south, coastal and pelagic waters between the 25 and 200 m isobaths; shallow coastal waters, inlets and estuaries to the 200 m isobath from Assateague Island at the Virginia/Maryland border (38°N) to Jacksonville, FL at 30°N; shallow coastal waters, inlets and estuaries to the 500 m isobath continuing south to the Dry Tortugas, FL at 83° W (Figure B.62).

  **Adult (≥ 299 cm total length):** Pelagic waters offshore the Virginia/North Carolina border at 36.5°N south to Ft. Lauderdale, FL at 28°N between the 25 and 200 m isobaths, includes coastal waters offshore from the Virginia/North Carolina border at 36.5°N south to Cape Romain, NC out to the 25 m isobath; also, coastal waters offshore from the Georgia/Florida border at 30.8°N to Cape Canaveral at 28.5°N (Figure B.63).

**Galapagos shark (*Carcharhinus galapagensis*)** The Galapagos shark is circumtropical in the open ocean and around oceanic islands (Castro, 1983). It is very similar to the dusky shark and is often mistaken for it, although the dusky prefers continental shores (Castro, 1983). The Galapagos shark is very seldom seen in the continental United States. A few Galapagos sharks are undoubtedly caught off the east coast every year, but they can be easily misidentified as dusky sharks.

**Reproductive potential:** Males reach maturity between 205 and 239 cm TL and females between 215 and 245 cm TL (Wetherbee *et al.*, 1996). Pups are born at slightly over 80 cm TL, and litters range from four to16 pups, the average being 8.7. The gestation cycle is estimated to last about a year (Wetherbee *et al.*, 1996), but the length of the reproductive cycle is not known.

***Essential Fish Habitat for Galapagos Shark*:**

- **Neonate:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Juveniles:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Adults (≥215 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage.

**<u>Lemon shark (*Negaprion brevirostris*)</u>** The lemon shark is common in the American tropics, inhabiting shallow coastal areas, especially around coral reefs. It is reported to use coastal mangroves as some of its nursery habitats, although this is not well documented in the literature. The primary population in continental U.S. waters is found off south Florida, although adults stray north to the Carolinas and Virginia in the summer. Additional life history information can be found in Sundstrom *et al.* (2001) and Barker *et al.* (2005).

**Reproductive potential:** Lemon sharks mature at about 228 cm TL (Springer, 1950b). Brown and Gruber (1988) estimated an age at maturity of 11.6 years for males and 12.7 years for females, showing the species to be slow growing and long lived. Brown and Gruber reported the von Bertalanffy parameters as: $L_\infty$ =317.65, K= .057, and $t_o$= -2.302. Litters consist of five to 17 pups, which measure about 64 cm TL at birth (Springer, 1950b; Clark and von Schmidt, 1965). Its reproductive cycle is biennial (Castro, 1993c), and gestation lasts ten (Springer, 1950b) to12 months (Clark and von Schmidt, 1965). Its nurseries are in shallow waters around mangrove islands (Springer 1950b) off tropical Florida and the Bahamas. Hueter (CSR data) found lemon shark neonates in Tampa Bay, FL during the month of May, at temperatures of 22.0° to 25.4°C, salinities of 26.8 to 32.6 ppt, and DO of 5.9 to 9.6 ml/l. He also found juveniles over a wider area off western Florida and in a wider range of temperatures and salinities.

**Impact of fisheries:** The lemon shark is caught throughout its range, although it is not a primary commercially important species along the Atlantic coast. Anecdotal evidence indicates that lemon sharks are vulnerable to local depletions.

***Essential Fish Habitat for Lemon Shark*:**

- **Neonate (≤68cm TL):** Shallow coastal waters, inlets and estuaries out to the 25 m isobath from Savannah, GA at 32°N, south to Indian River Inlet, FL at 29°N; shallow coastal waters, inlets and estuaries from Miami around peninsular Florida to Cape Sable at 25.25°N including the Keys in waters less than 25 m deep; waters of Tampa Bay, FL including waters immediately offshore the mouth of the bay; shallow coastal waters, inlets and estuaries from South Padre Island, TX at 95.5°N south to the U.S./Mexico border in waters less than 25 m deep (Figure B.64).

- **Juveniles (69 to 235 cm TL):** Shallow coastal waters, inlets and estuaries offshore to the 25 m isobath, west of 79.75°W from Bull's Bay, SC to south of Cape Canaveral (West Palm Beach), FL at 28°N; Shallow coastal waters, inlets and estuaries offshore to the 25 m isobath from Miami at 25.5°N, around peninsular Florida to Tampa Bay, FL (including the Keys) to 28°N; shallow coastal waters, inlets and estuaries offshore to the 25 m isobath off the south coast of Puerto Rico from 66°W to 67°W (Figure B.65).

- **Adults (≥236 cm TL):** Shallow coastal waters, inlets and estuaries offshore to the 25 m isobath from Cumberland Island, GA at 31°N to St. Augustine, FL at 31°N; from West Palm Beach, FL at 27°N around peninsular Florida to 28.5° N near Anclote Key in shallow coastal waters, inlets and estuaries and offshore to the 25 m isobath (Figure B.66).

**<u>Narrowtooth shark (*Carcharhinus brachyurus*)</u>** This is a coastal-pelagic species of widespread distribution in warm temperate waters throughout the world. In general, it is a temperate shark, absent or rare in tropical waters (Bass *et al.*, 1973). Although the species has been reported for the California coast by Kato *et al.*, (1967) as *C. remotus*, and for the southwest Atlantic, few data exist for the western north Atlantic.

**Reproductive potential:** Males mature between 200 and 220 cm TL, and females mature below 247 cm TL. The young are born at about 60 to 70 cm TL. Six pregnant females averaged 16 embryos, with a range of 13 to 20 pups per litter (Bass *et al.*, 1973). Walter and Ebert (1991) calculated age at sexual maturity at 13 to 19 years for males and 19 to 20 years for females. Gestation is believed to last a year (Cliff and Dudley, 1992). The length of the reproductive cycle is not known, but it is probably biennial as it is for most large carcharhinid sharks.

**Impact of fisheries:** Because it appears to be a very slow growing carcharhinid (based on the unvalidated ages by Walter and Ebert (1991)), the narrowtooth shark is probably vulnerable to overfishing.

***Essential Fish Habitat for Narrowtooth Shark*:**

- **Neonate:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Juveniles:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Adults:** At this time, available information is insufficient for the identification of EFH for this life stage.

**<u>Night shark (*Carcharhinus signatus*)</u>** This carcharhinid shark inhabits the waters of the western north Atlantic from Delaware to Brazil and the west coast of Africa. It is a tropical species that seldom strays northward. It is usually found at depths greater than 275 to 366 m during the day and about 183 m at night (Castro, 1983).

**Reproductive potential:** There is little information on night shark reproductive processes. Litters usually consist of 12 to 18 pups which measure 68 to 72 cm TL at birth (Castro, 1983). Length at maturity has been reported for females as 150 cm FL (178 cm TL) (Compagno, 1984). The nurseries remain undescribed. Hazin *et al.* (2000) and Santana and Lessa (2004) provide additional information on reproduction and age and growth, respectively.

**Impact of fisheries:** The night shark was abundant along the southeast coast of the United States and the northwest coast of Cuba before the development of the swordfish fishery of the 1970s. Martinez (1947) stated that the Cuban shark fishery relied heavily on the night shark, which constituted 60 to 75 percent of the total shark catch, and that the average annual catch for 1937 to1941 was 12,000 sharks. Guitart Manday (1975) documented a precipitous decline in night shark catches off the Cuban northwest coast during the years 1971 to 1973.

Berkeley and Campos (1988) stated that this species represented 26.1 percent of all sharks caught in swordfish fisheries studied by them along the east coast of Florida from 1981 to 1983. Anecdotal evidence from commercial swordfish fishermen also indicates that in the late 1970s it was not unusual to have 50 to 80 dead night sharks, usually large gravid females, in every set from Florida to the Carolinas. During the 1970s sports fishermen in south Florida often resorted to catching night sharks when other more desirable species (marlins) were not biting. The photographic record of sport fishing trophies landed shows that large night sharks were caught daily and landed at the Miami docks in the 1970s. Today, the species is rare along the southeast coast of the United States. The decline of the night shark may be an example of how a species can decline due to bycatch mortality.

***Essential Fish Habitat for Night Shark*:**

- **Neonate (≤70 cm TL):** At this time, the information available is insufficient to identify EFH for this life stage (Figure B.67).

- **Juveniles (71 to 177 cm TL):** From offshore Assateague Island, MD at 38°N south to offshore Cape Fear at 33.5°N, from the 100 to 2,000 m isobath (Figure B.68).

- **Adults (≥178 cm TL):** In the South Atlantic Bight, from the 100 m isobath to either the 2,000 m isobath, 100 miles from shore, or the EEZ boundary, whichever is nearest, from 36°N offshore Oregon Inlet, NC to 25.5°N, off the coast of Miami, FL (Figure B.69).

**Sandbar shark (*Carcharhinus plumbeus*)** The sandbar shark is cosmopolitan in subtropical and warm temperate waters. It is a common species found in many coastal habitats. It is a bottom-dwelling species most common in 20 to 55 m of water, but occasionally found at depths of about 200 m.

**Reproductive potential:** The sandbar shark is a slow growing species. Both sexes reach maturity at about 147 cm total length or approximately 5 feet (Merson, 1998). Estimates of age at maturity range from 15 to 16 years (Sminkey and Musick, 1995) to 29 to 30 years (Casey and Natanson, 1992), although 15 to 16 years is the commonly accepted age of maturity. The von Bertalanffy growth parameters were proposed for combined sexes are $L_\infty$= 186 cm FL (224 cm total length; 168 cm PCL), K= 0.046, $t_o$= -6.45 by Casey and Natanson (1992); and re-evaluated by Sminkey and Musick (1995) as $L_\infty$= 164 cm PCL (219 cm total length; 182 cm Fl), K= 0.089, and $t_o$= -3.8. Young are born at about 60 cm total length (smaller in the northern parts of the North American range) from March to July. Litters consist of one to 14 pups, with nine being the average (Springer, 1960). The gestation period lasts about a year and reproduction is biennial (Musick *et al.*, 1993). Hoff (1990) used an age at maturity of 15 years, a life span of 35 years, and a two-year reproductive cycle to calculate that each female may reproduce only ten times. New maturity estimates and the increased mortality in the fishery may reduce that reproductive potential much further.

In the United States the sandbar shark has its nurseries in shallow coastal waters from Cape Canaveral, FL (Springer, 1960), to Great Bay, NJ (Merson and Pratt, 2002). Delaware

Bay, DE (McCandless *et al.*, 2002), Chesapeake Bay, MD (Grubbs and Musick, 2002), and the waters off Cape Hatteras, NC (Jensen *et al.*, 2002) are important primary and secondary nurseries. Juveniles return to Delaware Bay after a winter absence around May 15, and are found as far north as Martha's Vineyard, MA in the summer. Neonates have been captured in Delaware Bay in late June. Young of the year were present in Delaware Bay until early October when the temperature fell below 21°C. Another nursery may exist along the west coast of Florida and along the northeast Gulf of Mexico. Hueter and Tyminski (2002) found neonates off Yankeetown, FL from April to July, in temperatures of 25.0° to 29.0°C and salinities of 20.4 to 25.9 ppt. Neonate sandbar sharks were found in an area between Indian Pass and St. Andrew Sound, FL in June when the temperature had reached 25°C (Carlson 2002).

**Impact of fisheries:** The sandbar shark is one of the most important commercial species in the shark fishery of the southeastern United States, along with blacktip sharks. It is a preferred species because of the high quality of its flesh and large fins. Commercial longline fishermen pursue sandbar stocks in their north-south migrations along the coast; their catches can be as much as 80 to 90 percent sandbar sharks in some areas. Musick *et al.* (1993) have documented a severe decline in CPUE of the sandbar shark in the Chesapeake Bay area. It is considered highly vulnerable to overfishing because of its slow maturation and heavy fishing pressure, as evidenced in the catch per unit effort (CPUE) declines in U.S. fisheries.

***Essential Fish Habitat for Sandbar Shark*:**

- **Neonate (≤ 71 cm total length):** Shallow coastal areas to the 25 m isobath from Montauk, NY at 72°W, south to Cape Canaveral, FL at 80.5°W (all year); nursery areas in shallow coastal waters from Great Bay, NJ to Cape Canaveral, FL, especially Delaware and Chesapeake Bays (seasonal-summer); also shallow coastal waters to up to a depth of 50 m on the west coast of Florida and the Florida Keys from Key Largo at 80.5°W north to south of Cape San Blas, FL at 85.25°W. Typical parameters: salinity-greater than 22 ppt; temperatures-greater than 21°C. Also on the west coast of Florida from the 50 m isobath to the 30 m isobath and approximately 20 miles offshore from the Virginia/Maryland border at 37.8°N south to Pamlico Sound, NC at 35.4°N (Figure B.70).

- J**uvenile (71 to 147 cm total length):** Areas offshore southern New England and Long Island, NY, all waters, coastal and pelagic, north of 40°N and west of 70°W; also, south of 40°N at Barnegat Inlet, NJ, to Cape Canaveral, FL (27.5° N), shallow coastal areas to the 25 m isobath; also, in the winter, from 39°N to 36°N, in the Mid-Atlantic Bight, at the shelf break, benthic areas between the 90 and 200 m isobaths; also, on the west coast of Florida, from shallow coastal waters to the 50 m isobath, from Florida Bay and the Keys at Key Largo north to Cape San Blas, FL at 85.5°W. Includes Cape Poge Bay, MA around Chappaquiddick Island, MA, and off the south shore of Cape Cod, MA (Figure B.71).

- **Adult (≥ 147 cm total length):** Areas on the east coast of the U.S., shallow coastal areas from the coast to the 50 m isobath from Nantucket, MA, south to Miami, FL; also, shallow coastal areas from the coast to the 90 m isobath around peninsular

Florida to the Florida panhandle at 85.5°W, near Cape San Blas, FL, including the Keys and saline portions of Florida Bay (Figure B.72).

- **Habitat Areas of Particular Concern (HAPC):** Important nursery and pupping grounds have been identified in shallow areas and at the mouth of Great Bay, NJ, in lower and middle Delaware Bay, DE, lower Chesapeake Bay, MD, and near the Outer Banks, NC, and in areas of Pamlico Sound and adjacent to Hatteras and Ocracoke Islands, NC, and offshore of those islands (Figure B.73).

**Silky shark (*Carcharhinus falciformis*)** The silky shark inhabits warm, tropical, and subtropical waters throughout the world. Primarily, the silky is an offshore, epipelagic shark, but juveniles venture inshore during the summer. The silky shark is one of the most abundant large sharks in the world.

**Reproductive potential:** Data on the silky shark are variable. There is a strong possibility that different populations may vary in their reproductive potential. Litters range from six to 14 pups, which measure 75 to 80 cm TL at birth (Castro, 1983). According to Bonfil *et al.* (1993), the silky shark in the Campeche Bank, Mexico, has a 12-month gestation period, giving birth to ten to 14 pups, with an average of 76 cm TL during late spring and early summer, possibly every two years. Males mature at 225 cm TL (about ten years) and females at 232-245 cm TL (>12 yrs of age). The von Bertanffy parameters estimated by Bonfil *et al.* (1993) are: $L_\infty = 311$ cm TL, K= 0.101, and $t_o$= -2.718 yr. Maximum ages were 20+ years for males and 22+ years for females (Bonfil *et al.*, 1993). Springer (1967) describes reefs on the outer continental shelf as nursery areas. Bonfil *et al*, (1993) mentions the Campeche Bank as a prime nursery area in the Atlantic.

**Impact of Fisheries:** The silky shark is caught frequently in swordfish and tuna fisheries. Berkeley and Campos (1988) found it to constitute 27.2 percent of all sharks caught in swordfish vessels off the east coast of Florida from 1981 to1983. Bonfil *et al*, (1993) considered that the life-history characteristics of slow growth, late maturation, and limited offspring may make it vulnerable to overfishing. In all probability, local stocks of this species cannot support sustained heavy fishing pressure.

***Essential Fish Habitat for Silky Shark*:**

- **Neonate (≤85 cm TL):** Waters off Cape Hatteras, NC between the 100 and 2,000 m isobaths; plus shallow coastal waters just north and immediately west of Cape Hatteras; waters off St. Augustine, FL south to off Miami in depths 25 to 1,000 m, (likely along the west edge of the Gulf Stream); off northwest FL- De Soto Canyon area between the 200 and 2,000 m isobaths (Figure B.74).

- **Juveniles (86 to 231 cm TL):** Waters off the mouth of the Chesapeake Bay, MD south to waters offshore west of the North Carolina/South Carolina border from the 50 to 2,000 m isobath; from the North Carolina/South Carolina border south to Key West paralleling the 200 m isobath; the area northwest of Key West to west of Ten Thousand Islands between the 50 and 2,000 m isobaths (Figure B.75).

- **Adults (≥232 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.76).

**Spinner shark (*Carcharhinus brevipinna*)** The spinner shark is a common, coastal-pelagic, warm-temperate and tropical shark of the continental and insular shelves (Compagno, 1984). It is often seen in schools, leaping out of the water while spinning. It is a migratory species, but its patterns are poorly known. Off eastern North America it ranges from Virginia to Florida and in the Gulf of Mexico.

**Reproductive potential:** Males mature at 130 cm TL or four to five years, females mature at 150 to 155 cm TL or seven to eight years (Branstetter, 1987). According to Branstetter (1987), males reach maximum size at ten to 15 years and females at 15 to 20 years. However, he added the caveat that as sharks near their maximum size, their growth is slower, therefore, their maximum ages may be much greater. Branstetter (1987) gave von Bertalanffy parameters for both sexes were: $L_\infty$ = 214 cm, K= 0.212, $t_o$ = -1.94 yr. The ages have not been validated. According to Garrick (1982), the species reaches 278 cm TL. The young are born at 60 to 75 cm TL in late May and early June. The litters usually consist of six to 12 pups (Castro, 1983). It has a biennial reproductive cycle (Castro, 1993c). In the Carolinas the nursery areas are in shallow coastal waters (Castro, 1993c); however, the extent of the nursery areas is unknown. Hueter (CSR data) found juveniles along the west coast of Florida in temperatures of 21.9° to 30.1° C, salinities of 21.0 to 36.2 ppt, and DO 3.5 to 5.0 ml/l. Additional life history information on the spinner shark can be found in Allen and Wintner (2002), Capape *et al.* (2003), Bethea *et al.* (2004), Carlson and Baremore (2005), and Joung *et al.* (2005).

**Impact of fisheries:** Unknown. The spinner shark is similar in reproductive potential and habits to the blacktip shark, and its vulnerability to fisheries is probably very similar to that of the blacktip. In fact, the blacktip-spinner complex is a commonly used category that combines the landings of these two species because of species similarities and difficulties in distinguishing the two species.

***Essential Fish Habitat for Spinner Shark*:**

- **Neonate (≤71 cm TL):** Along the coast of the southeastern United States and the west coast of Florida, shallow coastal waters out to the 25 m isobath, from Cape Hatteras, NC at 35.25° N around Florida including Florida Bay and the Florida Keys, and north to 29.25° N. Additionally, as displayed in Figure 6-25e: shallow coastal waters with muddy bottoms less than five meters deep, on the seaward side of coastal islands, and in shallow bays along seagrass beds from Apalachee Bay to St. Andrews Bay, FL (Figure B.77).

- **Juveniles (72 to 184 cm TL):** Off the east coast from the Florida/Georgia border at 30.7° N south to 28.5° N, from shallow coastal waters to the 200 m isobath (Figure B.78).

- **Adults (≥185 cm TL):** Off the east coast of Florida, from shallow coastal waters out to the 100 m isobath, from 30° N to 28.5° N offshore Cape Kennedy (Figure B.79).

**Tiger shark (*Galeocerdo cuvieri*).** The tiger shark inhabits warm waters in both deep oceanic and shallow coastal regions (Castro, 1983). It is one of the larger species of sharks, reaching over 550 cm TL and over 900 kg. Its characteristic tiger-like markings and unique teeth make it one of the easiest sharks to identify. It is one of the most dangerous sharks and is believed to be responsible for many attacks on humans (Castro, 1983).

**Reproductive potential:** Tiger sharks mature at about 290 cm TL (Castro, 1983; Simpfendorfer, 1992). The pups measure 68 to 85 cm TL at birth. Litters are large, usually consisting of 35 to 55 pups (Castro, 1983). According to Branstetter *et al.* (1987), males mature in seven years and females in ten years, and the oldest males and females were 15 and 16 years of age. The ages have not been validated. Branstetter *et al*, (1987) gave the growth parameters for an Atlantic sample as $L_\infty$ = 440 cm TL, K= 0.107, and $t_o$= -1.13 years, and for a Gulf of Mexico sample as $L_\infty$ = 388 cm TL, K= 0.184, and $t_o$= -0.184. There is little data on the length of the reproductive cycle. Simpfendorfer (1992) stated that the females do not produce a litter each year. The length of the gestation period is also uncertain. Clark and von Schmidt (1965) stated that the gestation period may be slightly over a year. While this estimate has not been confirmed, it is probably correct, given that many large carcharhinid sharks have biennial reproduction and year-long gestation periods. The nurseries for the tiger shark appear to be in offshore areas, but they have not been described. More recent age and growth information on the tiger shark can also be found in Natanson *et al.* (1999) and Wintner and Dudley (2000).

**Impact of Fisheries:** This species is frequently caught in coastal shark fisheries but is usually discarded due to low fin and meat value.

***Essential Fish Habitat for Tiger Shark*:**

- **Neonate (≤90cm TL):** From shallow coastal areas to the 200 m isobath from Cape Canaveral, FL north to offshore Montauk, Long Island, NY (south of Rhode Island); and from offshore southwest of Cedar Key, FL north to the Florida/Alabama border from shallow coastal areas to the 50 m isobath (Figure B.80).

- **Juveniles (91 to 296 cm TL):** Shallow coastal areas from Mississippi Sound (just west of Mississippi/Alabama border) to the 100 m isobath south to the Florida Keys; around the peninsula of Florida to the 100 m isobath to the Florida/Georgia border; north to Cape Lookout, NC from the 25 to100 m isobath; from Cape Lookout north to just south of the Chesapeake Bay, MD from inshore to the 100 m isobath; north of the mouth of Chesapeake Bay to offshore Montauk, Long Island, NY (to south of Rhode Island between the 25 and 100 m isobaths; south and southwest coasts of Puerto Rico from inshore to the 2,000 m isobath (Figure B.81).

- **Adults (≥297 cm TL):** Offshore from Chesapeake Bay, MD south to Ft. Lauderdale, FL to the western edge of the Gulf Stream; from Cape San Blas, FL to

Mississippi Sound between the 25 and 200 m isobaths; off the south and southwest coasts of Puerto Rico from inshore to the 2,000 m isobath (Figure B.82).

### *B.1.4.6 Sand Tiger Sharks*

**Bigeye sand tiger (*Odontaspis noronhai*)** This is one of the rarest large sharks. Its large eyes and uniform dark coloration indicate that it is a deep-water species. The few catch records that exist indicate that it frequents the upper layers of the water column at night. The species was originally described based on a specimen from Madeira, FL (?). A few specimens were caught at depths of 600-1,000 m off Brazil (Compagno, 1984). A 321 cm TL immature female was caught in the Gulf of Mexico, about 70 miles east of Port Isabel, TX in 1984. Another specimen was caught in the tropical Atlantic (5° N; 35° W) at a depth of about 100 m where the water was about 3,600 m deep. These appear to be all the records for the species. Nothing is known of its habits. Possession of this species is prohibited in Atlantic waters of the United States.

***Essential Fish Habitat for Bigeye Sand Tiger Shark*:**

- **Neonate:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Juveniles:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Adults:** At this time, available information is insufficient for the identification of EFH for this life stage.

**Sand tiger shark (*Carcharias taurus*)** The sand tiger is a large, coastal species found in tropical and warm temperate waters throughout the world. It is often found in very shallow water (4 m) (Castro, 1983). It is the most popular large shark in aquaria, because, unlike most sharks, it survives easily in captivity. It has been fished for its flesh and fins in coastal longline fisheries; although possession of this species in Atlantic waters of the United States is now prohibited.

**Reproductive potential:** According to Gilmore (1983), males mature at about 191.5 cm TL. According to Branstetter and Musick (1994), males reach maturity at 190 to 195 cm TL or four to five years and females at more than 220 cm TL or six years. The largest immature female seen by J. Castro was 225 cm TL and the smallest gravid female was 229 cm TL, suggesting that maturity is reached at 225 to 229 cm TL. The oldest fish in Branstetter and Musick's (1994) sample of 55 sharks was 10.5 years old, an age that has been exceeded in captivity (Govender *et al.*, 1991). The von Bertalanffy parameters, according to Branstetter and Musick (1994), are for males: $L_{max}$= 301 cm, K= 0.17, and $t_o$= -2.25; and for females: $L_{max}$= 323 cm, K= 0.14, and $t_o$= -2.56 yrs. Gilmore (1983) gave growth rates of 19 to 24 cm/yr for the first years of life of two juveniles born in captivity. The sand tiger has an extremely limited reproductive potential, producing only two young per litter (Springer, 1948). In North America the sand tiger gives birth in March and April to two young that measure about 100 cm TL. Parturition (birth of the young) is believed to occur in winter in the southern portions of its range, and the neonates migrate northward to summer nurseries. The nursery areas are the following Mid-Atlantic Bight estuaries: Chesapeake, Delaware, Sandy Hook, and Narragansett Bays as well as coastal sounds. Branstetter and Musick (1994) suggested that the reproductive cycle is biennial, but other evidence suggests annual parturition. Additional information on the sand tiger shark may be found in Gelsleichter *et al.* (1999) and Lucifora *et al.* (2002).

**Impact of fisheries:** The species is extremely vulnerable to overfishing because it congregates in coastal areas in large numbers during the mating season. These aggregations are attractive to fishermen, although the effects of fishing these aggregations probably contribute to local declines in the population abundance. Its limited fecundity (two pups per litter) probably contributes to its vulnerability. In the United States there was a very severe population decline in the early 1990s, with sand tigers nearly disappearing from North Carolina and Florida waters. Musick *et al.,* (1993) documented a decrease in the Chesapeake Bight region of the U.S. Mid-Atlantic coast. In 1997, NMFS prohibited possession of this species in U.S. Atlantic waters.

***Essential Fish Habitat for Sand Tiger Shark*:**

- **Neonate (≤117cm TL):** Shallow coastal waters from Barnegat Inlet, NJ south to Cape Canaveral, FL to the 25 m isobath (Figure B.83).

- **Juveniles (118 to 236 cm TL):** At this time, available information is insufficient for the identification of EFH for this life stage (Figure B.84).

- **Adults (≥237 cm TL):** Shallow coastal waters to the 25 m isobath from Barnegat Inlet, NJ to Cape Lookout; from St. Augustine to Cape Canaveral, FL (Figure B.85).

### *B.1.4.7 Whale Sharks*

**Whale shark (*Rhincodon typus*)** The whale shark is a sluggish, pelagic filter feeder, often seen swimming on the surface. It is the largest fish in the oceans, reaching lengths of 1210 cm TL and perhaps longer. It is found throughout all tropical seas, usually far offshore (Castro, 1983). Possession of this species in Atlantic waters of the United States is now prohibited.

**Reproductive potential:** For many years the whale shark was believed to be oviparous, based on a presumably aborted egg case trawled from the Gulf of Mexico many years ago. Recent discoveries (Joung *et al.*, 1996) proved the whale shark to be viviparous and the most prolific of all sharks. The only gravid female examined carried 300 young in several stages of development. The embryos measured 580 to 640 mm TL, the largest appearing ready for birth. The length of the reproductive cycle is unknown, but is probably biennial such as the closely related nurse shark (*Ginglymostoma cirratum*) and most other large sharks (Castro, 1996). Based on unpublished information on the growth rate of one surviving embryo from a female reported by Joung *et al.,* (1996), the whale shark may be the fastest growing shark. Only a handful of small juveniles have ever been caught, probably because of the extremely fast growth rate or high mortality rate of juveniles. The location of the whale shark nurseries is unknown and remains as one of the interesting mysteries of shark biology. Additional life history information can be found in Chang *et al.* (1997), Colman (1997), and Wintner (2000).

**Impact of fisheries:** There are very few observations of aggregations of whale sharks. The range of the whale shark may be extremely vast, perhaps encompassing entire ocean basins. Thus it may be necessary to consider whale shark fisheries on an ocean-wide perspective. There have been a few small fisheries for whale sharks in India, the Philippines, and Taiwan, but it is of little commercial importance elsewhere. The whale shark used to be fished for its flesh, but presently the fins and oil are also used. Generally, the size of the whale shark safeguards it from most fisheries. Records of the Taiwanese fishery demonstrate that whale sharks, like most elasmobranchs, are susceptible to overfishing. In 1997, NMFS prohibited possession of this species in U.S. Atlantic waters.

***Essential Fish Habitat for Whale Shark*:**

- **Neonate:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Juveniles:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Adults:** At this time, available information is insufficient for the identification of EFH for this life stage.

### *B.1.4.8 Small Coastal Shark*

**Atlantic angel shark *(Squatina dumerili)*** The angel shark is a flattened shark that resembles a ray. It inhabits coastal waters of the United States from Massachusetts to the Florida Keys, the Gulf of Mexico, and the Caribbean. It is common from southern New England to the Maryland coast (Castro, 1983).

**Reproductive potential:** Maturity is probably reached at a length of 90 to 105 cm TL. The pups measure 28 to 30 cm TL at birth. Up to 16 pups in one litter have been observed (Castro, 1983). Very little is known about its biology.

***Essential Fish Habitat for Atlantic Angel Shark*:**

- **Neonate (≤31 cm TL):** Off the coast of southern New Jersey, Delaware, and Maryland from 39° N to 38° N, in shallow coastal waters out to the 25 m isobath, including the mouth of Delaware Bay (Figure B.86).

- **Juveniles (32 to 113 cm TL):** (Identical to neonate EFH) Off the coast of southern New Jersey, Delaware, and Maryland from 39° N to 38° N, in shallow coastal waters out to 25 m isobath, including the mouth of Delaware Bay (Figure B.87).

- **Adults (≥113 cm TL):** (Identical to neonate EFH) Off the coast of southern New Jersey, Delaware, and Maryland from 39° N to 38° N, in shallow coastal waters out to the 25 m isobath, including the mouth of Delaware Bay (Figure B.88).

### *B.1.4.9 Hammerhead Sharks*

**<u>Bonnethead (*Sphyrna tiburo*)</u>** The bonnethead is a small hammerhead that inhabits shallow coastal waters where it frequents sandy or muddy bottoms. It is confined to the warm waters of the western hemisphere (Castro, 1983).

**Reproductive potential:** Males mature at about 70 cm TL, and females at about 85 cm TL (Parsons, 1993). Litters consist of eight to12 pups, with the young measuring 27 to 35 cm TL at birth (Castro, 1983; Parsons, 1993). Parsons (1993) estimated the gestation period of two Florida populations at 4.5 to 5 months, one of the shortest gestation periods known for sharks. The reproductive cycle is annual (Castro, pers. obs.). Hueter (CSR data) found young of the year and juveniles in the west coast of Florida at temperatures of 16.1° to 31.5° C, salinities of 16.5 to 36.1 ppt, and DO of 2.9 to 9.4 ml/l. Additional life history information can be found in Cortes *et al.* (1996), Cortes and Parsons (1996), Cortes *et al.* (1996), Carlson and Parsons (1997), Lessa and Almeida (1998), Marquez-Farias *et al.* (1998), Carlson *et al.* (1999), and Lombardi-Carlson *et al.* (2003).

**Impact of fisheries:** The bonnethead is at a lesser risk of overfishing because it is a fast growing species that reproduces annually and, due to its small size, is generally not targeted by commercial fisheries. Although bonnetheads are caught as bycatch in gillnet fisheries operating in shallow waters of the southeastern United States, many of these fisheries have been prohibited by various states and therefore forced into deeper Federal waters where gillnets are less effective. Bonnethead bycatch in the U.S. Gulf of Mexico shrimp fishery seems to have remained stable over the last twenty years, from 1974 to 1994 (Pellegrin, 1996).

***Essential Fish Habitat for Bonnethead Shark*:**

- **Neonate (≤38 cm TL):** Shallow coastal waters, inlets and estuaries less than 25 m deep from Jekyll Island, GA to just north of Cape Canaveral, FL; in shallow waters on the Gulf-side of the Florida Keys as far north as Cape Sable in water less than 25 m deep. Additionally, as displayed on Figure 6-31e: shallow coastal bays and estuaries less than five meters deep, from Apalachee Bay to St. Andrews Bay, FL (Figure B.89).

- **Juveniles (39 to 82 cm TL):** Shallow coastal waters, inlets and estuaries from Cape Fear, NC southward to West Palm Beach, FL in waters less than 25 m deep; shallow coastal waters, inlets and estuaries from Miami around peninsular Florida as far north as Cedar Key in waters less than 25 m deep; shallow coastal waters, inlets and estuaries from the Mississippi River westward to the Rio Grande River (Texas/Mexico border) (Figure B.90).

- **Adults (≥83 cm TL):** Shallow coastal waters, inlets and estuaries from Cape Fear, NC to Cape Canaveral, FL; shallow waters around the Florida Keys; shallow coastal waters from Mobile Bay, AL west to South Padre Island, TX from inshore to the 25 m isobath (Figure B.91).

### *B.1.4.10 Requiem Sharks*

**<u>Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)</u>** The Atlantic sharpnose shark is a small coastal carcharhinid, inhabiting the waters of the northeast coast of North America. It is a common year-round resident along the coasts of South Carolina, Florida, and in the Gulf of Mexico and an abundant summer migrant off Virginia. Frequently, these sharks are found in schools of uniform size and sex (Castro, 1983).

**Reproductive potential:** The male Atlantic sharpnose sharks mature at around 65 to 80 cm TL and grow to 103 cm TL. The females mature at 85 to 90 cm TL and reach a length of 110 cm TL. Litters range from four to seven pups, which measure 29 to 32 cm TL (Castro, 1983). Mating is in late June; the gestation period is about 11 to 12 months (Castro and Wourms, 1993). The von Bertalanffy growth parameter estimates for the species are $L_\infty = 108$, K= 0.359, and $t_o$= -0.985 yr (Branstetter, 1987). Cortés (1995) calculated the population's intrinsic rate of increase was, at best, r= .044, or a finite increase of $e_r = 1.045$. Off South Carolina the young are born in late May and early June in shallow coastal waters (Castro and Wourms, 1993). Hueter (CSR data) found neonates off the west coast of Florida at Yankeetown and Anclote Key during the months of May to July. These neonates were found in temperatures of 24.0° to 30.7° C, salinities of 22.8 to 337 ppt, and DO of 5.7 ml/l. Larger juveniles were also found in the area in temperatures of 17.2° to 33.3° C, salinities of 22.8 to 35.5 ppt, and DO of 4.5 to 8.6 ml/l. Additional life history information can be found in Cortes (1995), Marquez-Farias and Castillo-Geniz (1998), Gelsleichter et al. (1999), Carlson and Baremore (2003), Hoffmayer and Parsons (2003), Loefer and Sedberry (2003), and Bethea et al. (2004).

**Impact of fisheries:** Large numbers of sharpnose are taken as bycatch in the U.S. shrimp trawling industry. The Texas Recreational Survey, NMFS Headboat Survey, and the U.S. Marine Recreational Fishing Statistics Survey have estimated a slow increase in the sharpnose fishery. The Atlantic sharpnose is a fast-growing species that reproduces yearly. In spite of being targeted by recreational fisheries and the large bycatch in the shrimp industry, the populations seem to be maintaining themselves.

***Essential Fish Habitat for Atlantic Sharpnose:***

- **Neonate (≤40 cm TL):** Shallow coastal areas including bays and estuaries out to the 25 m isobath from Galveston Island south to the Rio Grande (Texas/Mexico border); from Daytona Beach north to Cape Hatteras, NC. Additionally, as displayed on Fig. 32e: shallow coastal bays and estuaries less than five meters deep, from Apalachee Bay to St. Andrews Bay, FL (Figure B.92).

- **Juveniles (41 to 78 cm TL):** Shallow coastal areas including bays and estuaries out to the 25 m isobath from Galveston Island south to the Rio Grande (Texas/Mexico border); off Louisiana from the Atchafalya River to Mississippi River Delta out to the 40 m isobath; from Daytona Beach, FL north to Cumberland Island, GA; Hilton Head Island, SC north to Cape Hatteras, NC out to the 25 m isobath (slightly deeper - to the 50 m isobath off North Carolina) (Figure B.93).

- **Adults (≥79 cm TL):** From Cape May, NJ south to the North Carolina/South Carolina border; shallow coastal areas north of Cape Hatteras, NC to the 25 m isobath; south of Cape Hatteras between the 25 and 100 m isobaths; offshore St. Augustine, FL to Cape Canaveral, FL from inshore to the100 m isobath, Mississippi Sound from Perdido Key to the Mississippi River Delta to the 50 m isobath; coastal waters from Galveston to Laguna Madre, TX to the 50 m isobath (Figure B.94).

**Blacknose shark (*Carcharhinus acronotus*)** The blacknose shark is a common coastal species that inhabits the western north Atlantic from North Carolina to southeast Brazil (Bigelow and Schroeder, 1948). It is very abundant in coastal waters from the Carolinas to Florida and the Gulf of Mexico during summer and fall (Castro, 1983). Schwartz (1984) hypothesized that there are two separate populations in the West Atlantic.

**Reproductive potential:** Maturity is reached at about 100 cm TL. Litters consist of three to six pups, which measure 50 cm TL at birth (Castro, 1983). Dodrill (1977) estimated the gestation period to be ten to eleven months and suggested that the breeding cycle was biennial. Schwartz (1984) estimated that the largest adult male captured was 164 cm TL and was 9.6 years old, while an adult female 154 cm TL was also 9.6 years old. Castro (1983) stated that in South Carolina nursery areas were in shallow waters. The species is common throughout the year off Florida, suggesting that part of the population may be non-migratory and that nursery areas may exist in Florida as well. Hueter (CSR data) found 13 neonates in the Ten Thousand Islands and off Sarasota in June and July at temperatures 29° to 30.1° C, salinities of 32.2 to 37.0 ppt, and DO of 6.5 ml/l. He also found young of the year and juveniles at temperatures of 17.3° to 34° C, salinities of 25.0 to 37.0 ppt, and DO of 4.8 to 8.5 ml/l. Additional life history information can be found in Carlson *et al*. (1999), Hazin *et al*. (2002), and Driggers *et al*. (2004a; 2004b).

**Impact of fisheries:** Large numbers of blacknose sharks are caught in shallow coastal waters of the southeastern United States. The species is vulnerable to overfishing because it has typical carcharhinid characteristics such as biennial reproductive cycle, and it is targeted in the shark fisheries in the southeastern United States.

***Essential Fish Habitat for Blacknose Shark*:**

- **Neonate (≤52 cm TL):** Shallow coastal waters to the 25 m isobath from North Carolina/South Carolina border south to Cape Canaveral, FL; shallow waters to the 25 m isobath from Ten Thousand Islands north to just south of Tampa Bay, FL (Figure B.95).

- **Juveniles (53 to 106 cm TL):** Shallow coastal waters to the 25 m isobath from the Georgia/Florida border south to West Palm Beach, FL; shallow waters to the 25 m isobath from the Florida Keys north to the mouth of Tampa Bay, FL. Additionally, as displayed on Figure 6-33e: shallow coastal bays and estuaries less than five meters deep with expanses of seagrasses, from Apalachee Bay to St. Andrews Bay, FL (Figure B.96).

- **Adults (≥107 cm TL):** Shallow coastal waters to the 25 m isobath from St. Augustine south to Cape Canaveral, FL; shallow waters to the 25 m isobath from the Florida Keys north to Cedar Key, FL; Mississippi Sound from Mobile Bay, AL to the waters off Terrebonne Parish, LA in waters 25 to100 m deep (Figure B.97).

**Caribbean sharpnose shark (*Rhizoprionodon porosus*)** The Atlantic sharpnose and the Caribbean sharpnose sharks are cognate species, separable only by having different numbers of precaudal vertebrae (Springer, 1964). However, they have non-overlapping ranges - the Caribbean sharpnose shark inhabits the Atlantic from 24° N to 35° S, while the Atlantic sharpnose is found at latitudes higher than 24° N. Their biology is very similar.

***Essential Fish Habitat for Caribbean Sharpnose*:**

- **Neonate:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Juveniles:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Adults:** At this time, available information is insufficient for the identification of EFH for this life stage.

**Finetooth shark (*Carcharhinus isodon*)** This is a common inshore species of the west Atlantic. It ranges from North Carolina to Brazil. It is abundant along the southeastern United States and the Gulf of Mexico (Castro, 1983). Sharks captured in the northeastern Gulf of Mexico ranged in size from 48 to 150 cm total length were generally found in water temperatures averaging 27.3°C and depths of 4.2 m (Carlson, 2002). Important nursery habitat is also located in South Carolina (Ulrich and Riley, 2002), Louisiana (Neer *et al.*, 2002), and the coast of Texas (Jones and Grace, 2002).

**Reproductive potential:** Males mature at about 130 cm total length and females mature at about 135 cm total length. The young measure 48 to 58 cm total length at birth. Litters range from two to six embryos, with an average of four. The gestation period lasts about a year, and the reproductive cycle is biennial. Some of the nurseries are in shallow coastal waters of South Carolina (Castro, 1993b). Additional life history information can be found in Carlson *et al.* (2003), Hoffmayer and Parsons (2003), and Bethea *et al*. (2004).

**Impact of fisheries:** According to the SCS stock assessment, finetooth sharks are caught commercially almost exclusively in the South Atlantic region and mostly with gillnets (approximately 80 percent of finetooth landings) and longlines (approximately 20 percent). The SCS stock assessment estimates 16,658 finetooth sharks were landed commercially in 2000, and of these, only 8 percent were from HMS fisheries. The majority of the catch thus appears to come from fishermen in non-HMS fisheries. The species is vulnerable to overfishing because of its biennial reproductive cycle and small brood size.

***Essential Fish Habitat for Finetooth Shark*:**

**Neonate (≤ 65 cm total length):** The 1999 HMS FMP identified EFH for neonates (≤90 cm total length) as shallow coastal waters of South Carolina, Georgia, and Florida out to the 25 m isobath from 33° N to 30° N. Additionally, shallow coastal waters less than five meters deep with muddy bottoms, and on the seaward side of coastal islands from Apalachee Bay to St. Andrews Bay, FL, especially around the mouth of the Apalachicola River. Includes coastal waters out to the 25 m isobath from Mobile Bay, AL to Bay St. Louis, MS from 88° W to 89.5° W, and from near Sabine Pass, TX to Laguna Madre, TX (Figure B.98).

**Juvenile (65 to 135 cm total length):** Shallow coastal waters of South Carolina, Georgia, and Florida out to the 25 m isobath from 33° N to 30° N. Additionally, shallow coastal waters less than five meters deep with muddy bottoms, and on the seaward side of coastal islands from Apalachee Bay to St. Andrews Bay, FL, especially around the mouth of the Apalachicola River. Includes coastal waters out to the 25 m isobath from Mobile Bay, AL to Atchafalaya Bay, LA from 88° W to 91.4° W, and from near Sabine Pass, TX at 94.2° W to Laguna Madre, TX at 26° N; also, coastal waters out to the 25 m isobath from South Carolina north to Cape Hatteras, NC at 35.5° N (Figure B.99).

**Adult (≥ 135 cm total length):** Shallow coastal waters of South Carolina, Georgia, and Florida out to the 25 m isobath from 33°N to 30° N. Additionally, shallow coastal waters less than five meters deep with muddy bottoms, and on the seaward side of coastal islands from Apalachee Bay to St. Andrews Bay, FL, especially around the mouth of the Apalachicola River. Includes areas identical to those for juveniles: coastal waters out to the 25 m isobath from Mobile Bay, AL to Atchafalaya Bay, LA from 88° W to 91.4° W, and from near Sabine Pass, TX at 94.2° W to Laguna Madre, TX at 26° N; also, coastal waters out to the 25 m isobath from South Carolina north to Cape Hatteras, NC at 35.5° N (Figure B.100).

**Smalltail shark *(Carcharhinus porosus)*** This is a small, tropical, and subtropical shark that inhabits shallow coastal waters and estuaries in the West Atlantic, from the Gulf of Mexico to south Brazil, and the east Pacific from the Gulf of California to Peru (Castro, 1983). A few specimens have been caught in the Gulf of Mexico off Louisiana and Texas.

**Reproductive potential:** There is almost no published data on its reproductive processes. Females observed in Trinidad were in different stages of gestation, suggesting a wide breeding season. Embryos up to 35 cm TL were observed. The reproductive cycle appears to be annual. Additional life history information can be found in Lessa and Santana (1998) and Lessa *et al*. (1999b).

**Impact of fisheries:** The species is marketed in many areas of Central America; Springer (1950a) stated that large numbers were sold in the Trinidad market.

***Essential Fish Habitat for Smalltail Shark*** (Figure B.101)**:**

- **Neonate:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Juveniles:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Adults:** At this time, available information is insufficient for the identification of EFH for this life stage.

### B.1.5 Pelagic Sharks

#### *B.1.5.1 Cow sharks*

**Bigeye sixgill shark (*Hexanchus vitulus*)** This is a poorly known deep-water shark that was not described until 1969. Most specimens have been accidental captures at depths of 400 m in tropical waters (Castro, 1983). In North America most catches have come from the Bahamas and the Gulf of Mexico.

***Essential Fish Habitat for Bigeye Sixgill Shark*** (Figure B.102)**:**

- **Neonate:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Juveniles:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Adults:** At this time, available information is insufficient for the identification of EFH for this life stage.

**Sevengill shark (*Heptranchias perlo*)** This is a deep-water species of the continental slopes, where it appears to be most common at depths of 180 to 450 m. It has a world-wide distribution in deep tropical and warm temperate waters. In the United States the sevengill shark ranges from South Carolina to the Gulf of Mexico.

**Reproductive potential:** Maturity is reached at about 85-90 cm TL. Litters consist of nine to 20 pups, which measure about 25 cm TL at birth (Castro, 1983). According to Tanaka and Mizue (1977), off Kyushu, Japan the species reproduces year round. The lengths of the reproductive and gestation cycles are unknown. The location of the nurseries is unknown.

**Impact of fisheries:** The sharpnose sevengill shark is sometimes caught in large numbers as bycatch in fisheries using bottom trawls or longlines (Compagno, 1984). In North America it is occasionally seen in small numbers as bycatch of tilefish longlines (Castro, unpublished).

***Essential Fish Habitat for Sevengill Shark*** (Figure B.103):

- **Neonate:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Juveniles:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Adults:** At this time, available information is insufficient for the identification of EFH for this life stage.

**Sixgill shark (*Hexanchus griseus*)** One of the largest sharks, the sixgill is a common, bottom-dwelling, species usually reported from depths of 180 to 1,100 m, in deep, tropical, and temperate waters throughout the world (Castro, 1983). It often comes close to the surface at night, where it may take longlines set for other species. Juveniles stray into very shallow cool waters.

**Reproductive potential:** Very few mature sixgill sharks have been examined by biologists; thus the reproductive processes are poorly known. Ebert (1986) reported a 421-cm TL female to be gravid with term embryos. Harvey-Clark (1995) stated that males mature at 325 cm TL, without providing any evidence for this. The species has not been aged. It is probably long-lived, as the Greenland shark, another deep-water giant shark. The pups measure 60 to 70 cm TL at birth. Litters are large - up to 108 pups have been reported (Castro, 1983). Juveniles are often caught in coastal waters, suggesting that the nurseries are in waters much shallower than those inhabited by the adults. Nothing else is known about its nurseries. Additional life history information can be found in Ebert (2002) and McFarlane *et al*. (2002).

**Impact of fisheries:** Although juveniles are common in deep continental shelf waters and often enter coastal waters, the adults are seldom taken (Springer and Waller, 1969; Ebert, 1986). Apparently, adults are in waters deeper than those regularly fished, or perhaps these very large animals break the gear and escape. Thus, the very deep habitat of the adults or perhaps their large size seems to convey some measure of protection from most fisheries. According to Harvey-Clark (1995), in 1991 the sixgill shark became the target of a directed, subsidized, longline fishery off British Columbia, Canada. At about the same time, the species also became of interest as an ecotourism resource, with several companies taking diving tourists out to watch sixgill sharks in their environment. The fishery was unregulated and lasted until 1993, when the commercial harvest of sixgill sharks was discontinued due to conservation and management concerns. According to Harvey-Clark (1995), diver observations of sharks decreased in 1993, and it was unclear at the time whether the fishery or the ecotourism could be sustained. It is difficult to evaluate the vulnerability of the sixgill shark because of the lack of fisheries or landings data. The only fishing operations on record collapsed in a few years, suggesting that the species may be very vulnerable to overfishing.

***Essential Fish Habitat for Sixgill Shark*** (Figure B.104):

- **Neonate:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Juveniles:** At this time, available information is insufficient for the identification of EFH for this life stage.

- **Adults:** At this time, available information is insufficient for the identification of EFH for this life stage.

### *B.1.5.2 Mackerel Shark*

**Longfin mako shark (*Isurus paucus*)** This is a deep dwelling lamnid shark found in warm waters. The species was not described until 1966 and it is very poorly known.

**Reproductive potential:** There is very little data on the reproductive processes of the longfin mako. Litters consist of two to eight pups, which may reach 120 cm TL at birth (Castro, unpublished).

**Impact of fisheries:** The longfin mako is a seasonal bycatch of the pelagic tuna and swordfish fisheries. Possession of this species in Atlantic waters of the United States is now prohibited.

***Essential Fish Habitat for Longfin Mako Shark*:**

Note: At this time, insufficient data is available to differentiate EFH by size classes, therefore, EFH is the same for all life stages.

- **Neonate (≤149 cm TL):** Off the northeast U.S. coast from the 100 m isobath out to the EEZ boundary, from south Georges Bank to 35° N; from 35° N south to 28.25° N off Cape Canaveral, FL, from the 100 m isobath to the 500 m isobath; from 28.25° N south around peninsular Florida and west to 92.5° W in the Gulf of Mexico, from the 200 m isobath to the EEZ boundary (Figure B.105).

- **Juveniles (150 to 244 cm TL):** (Identical to neonate EFH) Off the northeast U.S. coast from the 100 m isobath out to the EEZ boundary, from south Georges Bank to 35° N; from 35° N south to 28.25° N off Cape Canaveral, FL, from the 100 m isobath to the 500 m isobath; from 28.25° N south around peninsular Florida and west to 92.5° W in the Gulf of Mexico, from the 200 m isobath to the EEZ boundary (Figure B.106).

- **Adults (≥245 cm TL):** (Identical to neonate EFH) Off the northeast U.S. coast from the 100 m isobath out to the EEZ boundary, from south Georges Bank to 35° N; from 35° N south to 28.25° N off Cape Canaveral, FL, from the 100 m isobath to the 500 m isobath; from 28.25° N south around peninsular Florida and west to 92.5° W in the Gulf of Mexico, from the 200 m isobath to the EEZ boundary (Figure B.107).

**Porbeagle (*Lamna nasus*)** The porbeagle is a lamnid shark common in deep, cold temperate waters of the north Atlantic, south Atlantic and south Pacific Oceans. It is highly esteemed for its flesh. There have been fisheries for this species in the north Atlantic for many years.

**Reproductive potential:** Very little is known about its reproductive processes. Aasen (1963) estimated that maturity was reached at 150 to 200 cm TL for males and 200 to 250 cm TL for females. Castro (year or unpublished?) estimated that porbeagles reach 20 years of age and possibly 30. Shann (1911) reported an embryo 61 cm TL, and estimated that porbeagles were probably born at about 76 cm TL. Bigelow and Schroeder (1948) recorded a free swimming specimen at 76 cm TL. Gauld (1989) gave 3.7 as the mean number of embryos in a sample of 12 females. The frequency of reproduction is not known. According to Aasen (1963), the porbeagle probably reproduces annually, but there is no evidence to support this claim. The nurseries are probably in continental shelf waters. More recent life history information can be found in Francis and Stevens (2000), Jensen *et al*. (2002), Joyce *et al.* (2002), Natanson *et al.* (2002), Campana and Joyce (2004), and Francis and Duffy (2005).

**Impact of fisheries:** The porbeagle is presently targeted in northern Europe and along the northeast coast of North America. Whether the porbeagles in the north Atlantic constitute one or more separate stocks is not known. A small porbeagle fishery resumed in the early 1990s in the northeastern United States, after being practically non-existent for decades. Intensive fisheries have depleted the stocks of porbeagles in a few years wherever they have existed, demonstrating that the species cannot withstand heavy fishing pressure.

***Essential Fish Habitat for Porbeagle Shark*:**

- **Neonate (≤79 cm TL):** From the 100 m isobath to the EEZ boundary from offshore Cape May, NJ, approximately 39° N to approximately 42° N (west of Georges Bank) (Figure B.108).

- **Juveniles (80 to 209 cm TL):** From the 200 m isobath to the EEZ boundary; from offshore Great Bay, approximately 38° N to approximately 42° N (west of Georges Bank) (Figure B.109).

- **Adults (≥210 cm TL):** From offshore Portland, ME south to Cape Cod, MA along the 100 m isobath out to the EEZ boundary and from Cape Cod south to the 2,000 m isobath out to the EEZ boundary (Figure B.110).

**Shortfin mako shark (*Isurus oxyrinchus*)** The shortfin mako is found in warm and warm-temperate waters throughout all oceans. It is an oceanic species at the top of the food chain, feeding on fast-moving fishes such as swordfish, tuna, and other sharks (Castro, 1983). It is considered one of the great game fish of the world, and its flesh is considered among the best to eat.

**Reproductive potential:** According to Pratt and Casey (1983), females mature at about 7 years of age. Cailliet *et al.* (1983) estimated the von Bertalanffy parameters ($n$= 44) for the shortfin as: $L_\infty$ = 3210 mm, K= .072, and $t_o$= -3.75. Cailliet and Mollet (1997) estimated that a female mako lives for approximately 25 years, matures at four to six years, has a two-year reproductive cycle, and a gestation period of approximately 12 months. The litters range from 12 to 20 pups, although only a handful have been examined (Castro, unpubl.). There is circumstantial evidence that the nursery areas are in deep tropical waters. The life span of the species has been estimated at 11.5 years (Pratt and Casey, 1983). Additional life history information can be found in Stillwell and Kohler (1982), Pratt and Casey (1983), Heist *et al.* (1996), Mollet *et al.* (2000), Campana *et al.* (2002), Estrada *et al.* (2003), Francis and Duffy (2005), Loefer *et al.* (2005), and MacNeil *et al.* (2005).

**Impact of fisheries:** The shortfin mako is a common bycatch in tuna and swordfish fisheries. Because of their high market value, shortfin mako are usually the only sharks retained in some pelagic fleets with high shark bycatch rates. Off the northeast coast of North America, most of the catch consists of immature fish (Casey and Kohler, 1992). The index of abundance for shortfin makos in the commercial longline fishery off the Atlantic coast of the United States shows a steady decline (Cramer, 1996a). The few indices available (ICES, 1995; Cramer, 1996a; Holts *et al.*, 1996) indicate substantial population decreases. Because the species is commonly caught in widespread swordfish and tuna operations, it is reasonable to assume that similar decreases are occurring in areas for which there are limited data.

***Essential Fish Habitat for Shortfin Mako*:**

- **Neonate (≤85 cm TL):** Between the 50 and 2,000 m isobaths from Cape Lookout, NC, approximately 35° N, north to just southeast of Georges Bank (approximately 42° N and 66° W) to the EEZ boundary; and between the 25 and 50 m isobaths from offshore the Chesapeake Bay (James River) (North Carolina/Virginia border) to a line running west of Long Island, NY to just southwest of Georges Bank, approximately 67° W and 41° N (Figure B.111).

- **Juveniles (108 to 262 cm TL):** Between the 25 and 2,000 m isobaths from offshore Onslow Bay, NC north to Cape Cod, MA; and extending west between 38° N and 41.5° N to the EEZ boundary (Figure B.112).

- **Adults (≥263 cm TL):** Between the 25 and 2,000 m isobaths from offshore Cape Lookout, NC north to Long Island, NY; and extending west between 38.5° N and 41° N to the EEZ boundary (Figure B.113).

### *B.1.5.3 Requiem Sharks*

**Blue shark (*Prionace glauca*)** One of the most common and widest-ranging of sharks, the blue shark is cosmopolitan in tropical, subtropical and temperate waters. It is a pelagic species that inhabits clear, deep, blue waters, usually in temperatures of 10° to 20° C, at depths greater than 180 m (Castro, 1983). Its migratory patterns are complex and encompass great distances, but are poorly understood. The biology, migrations, and the impact of fisheries on the blue shark must be considered on the basis of entire ocean basins. Males and females are known to segregate in many areas (Strasburg, 1958; Gubanov and Grigoryev, 1975). Strasburg (1958) showed that blue sharks are most abundant in the Pacific between latitudes of 40° N and 50° N.

**Reproductive potential:** Although some authors have examined very large numbers of blue sharks, the data on its size at maturity are imprecise. This may be due to poor criteria for maturity, incomplete samples, samples that did not include animals of all sizes, or some peculiarities of the blue shark. Pratt (1979) used different criteria for determining maturity of males and gave a range of 153 to 183 cm FL for male maturity, but when he used the standard criterion of clasper calcification, he observed that the males reached maturity at 183 cm FL (218 cm TL). Bigelow and Schroeder (1948) suggested that females mature at 213 to 243 cm TL. Strasburg (1958) stated that the smallest gravid female seen by him measured 214 cm TL. Nakano (1994) used data from 105,600 blue sharks and stated that females matured at 140 to160 cm (166 and 191 cm TL, using the regression of Pratt), and males at 130 to 160 cm PCL, based on clasper development.

This is probably the most prolific of the larger sharks; litters of 28 to 54 pups have been reported often (Bigelow and Schroeder, 1948; Pratt, 1979), but up to 135 pups in a litter have also been reported (Gubanov and Grigoryev, 1975). Nakano (1994) observed 669 pregnant females in the North Pacific and stated that the number of embryos ranged from one to 62, with an average of 25.6 embryos. Strasburg (1958) gave the birth size as 34 to 48 cm TL. Suda (1953) examined 115 gravid females from the Pacific Ocean and concluded that gestation lasts nine months and that birth occurs between December and April. Pratt (1979) examined 19 gravid females from the Atlantic and used data from 23 other Atlantic specimens to arrive at a gestation period of 12 months. Nakano (1994) stated that gestation lasts about a year, based on length frequency histograms, but did not state how many gravid animals had been observed nor showed any data. The length of the reproductive cycle is believed to be annual. Nakano (1994) gave the age at maturity as four or five years for males and five or six years for females, based on growth equations. According to Cailliet *et al*, (1983), blue sharks become reproductively mature at six or seven years of age and may reach 20 years. The nursery areas appear to be in open oceanic waters in the higher latitudes of the range. Strasburg (1958) attributed the higher CPUE in the 30° N to 40° N zone of the Pacific Ocean in summer to the presence of newborn blue sharks, and commented on the absence of small blue sharks in the warmer parts of the range. Nakano (1994) also stated that parturition occurred in early summer between latitudes of 30° N to 40° N of the Pacific Ocean. Additional life history and ecological information can be found in Kenney et al. (1985), Estrada et al. (2003), and Skomal and Natanson (2003).

**Impact of fisheries:** Although finning is now prohibited in U.S. Atlantic waters, blue sharks have historically been finned and discarded because of the low value of their flesh. Large numbers of blue sharks are caught and discarded yearly in pelagic tuna and swordfish fisheries. The blue shark is one of the most abundant large vertebrates in the world, yet it may be vulnerable to overfishing because it is caught in tremendous numbers as bycatch in numerous longline fisheries. Preliminary catch rate information for some areas suggests that this species may be declining.

***Essential Fish Habitat for Blue Shark*:**

- **Neonate (≤60 cm TL):** North of 40° N from Manasquan Inlet, NJ to Buzzards Bay, MA in waters from 25 m to the EEZ boundary (Figure B.114).

- **Juveniles (61 to 183 cm TL):** From 45°N (offshore Cape Hatteras, NC) in waters from the 25 m isobath to the EEZ boundary (Figure B.115).

- **Adults (≥184 cm TL):** From 45°N (offshore Cape Hatteras, NC) in waters from the 25 m isobath to the EEZ boundary; extending around Cape Cod, MA to include the southern part of the Gulf of Maine (Figure B.116).

**<u>Oceanic whitetip shark (*Carcharhinus longimanus*)</u>** The oceanic whitetip is one of the most common large sharks in warm oceanic waters (Castro, 1983). It is circumtropical and nearly ubiquitous in water deeper than 180 m and warmer than 21° C.

**Reproductive potential:** Both males and females appear to mature at about 190 cm TL (Bass *et al.*, 1973). The young are born at about 65-75 cm TL (Castro, 1983). The number of pups per litter ranges from two to ten, with a mean of six (Backus *et al.*, 1956; Guitart Manday, 1975). The length of the gestation period has not been reported, but it is probably ten to 12 months as for most large carcharhinids. The reproductive cycle is believed to be biennial (Backus *et al.*, 1956). Although the location of nurseries has not been reported, preliminary work by Castro indicates that very young oceanic whitetip sharks are found well offshore along the southeastern United States in early summer, suggesting offshore nurseries over the continental shelves. Additional life history information can be found in Lessa *et al.* (1999a), Lessa *et al.* (1999c), and Whitney *et al.* (2004).

**Impact of fisheries:** Large numbers of oceanic whitetip sharks are caught as bycatch each year in pelagic tuna and swordfish fisheries. Strasburg (1958) reported that the oceanic whitetip shark constituted 28 percent of the total shark catch in exploratory tuna longline fishing south of 10° N in the central Pacific Ocean. According to Berkeley and Campos (1988), oceanic whitetip sharks constituted 2.1 percent of the shark bycatch in the swordfish fishery along the east coast of Florida in 1981 to1983. Guitart Manday (1975) demonstrated a marked decline in the oceanic whitetip shark landings in Cuba from 1971 to1973. The oceanic whitetip shark is probably vulnerable to overfishing because of its limited reproductive potential, and because it is caught in large numbers in various pelagic fisheries and in directed fisheries. There are no data on populations or stocks of the species in any ocean.

***Essential Fish Habitat for Oceanic Whitetip Shark*:**

- **Neonate (≤83 cm TL):** In the vicinity of the Charleston Bump, from the 200 m isobath to the 2,000 m isobath, between 32.5° N and 31° N (Figure B.117).

- **Juveniles (84 to 136 cm TL):** Offshore the southeast U.S coast from 32° N to 26° N, from the 200 m isobath to the EEZ boundary, or 75° W, whichever is nearer (Figure B.118).

- **Adults (≥137 cm TL):** Offshore the southeast U.S. coast from the 200 m isobath out to the EEZ boundary, from 36° N to 30° N; also, in the Caribbean, south of the U.S. Virgin Islands, from east of 65° W to the EEZ boundary or the 2,000 m isobath, whichever is nearer (Figure B.119).

### *B.1.5.4 Thresher Sharks*

**Bigeye thresher shark (*Alopias superciliosus*)** The bigeye thresher is cosmopolitan in warm and warm-temperate waters. It is a deep-water species which ascends to depths of 35 to 150 m at night. It feeds on squid and small schooling fishes (Castro, 1983), which it stuns with blows from its tail. This is one of the larger sharks, reaching up to 460 cm TL (Nakamura, 1935).

**Reproductive potential:** Males mature at about 270 cm TL and females at about 340 cm TL (Moreno and Moron, 1992). Litters consist of two pups, one in each uterus. Gestation probably lasts about a year, but there is no evidence to support this. The length of the reproductive cycle and the location of nursery areas are unknown. Additional life history information can be found in Chen *et al.* (1997), Liu *et al.* (1998), and Weng and Block (2004).

**Impact of fisheries:** The bigeye thresher is often caught as bycatch of swordfish fisheries. A shark will often dislodge several baits before impaling or hooking itself. The flesh and fins of the bigeye thresher shark are of poor quality, thus it is usually discarded dead in swordfish and tuna fisheries. Possession of this species in Atlantic waters of the United States is now prohibited.

***Essential Fish Habitat for Bigeye Thresher Shark*:**

- **Neonate (≤116 cm TL):** At this time, available information is insufficient to identify EFH for this life stage.

- **Juveniles (117 to 340 cm TL):** Offshore North Carolina, from 36.5° N to 34° N, between the 200 and 2,000 m isobaths (Figure B.120).

- **Adults (≥341 cm TL):** Offshore North Carolina, from 35.5° N to 35° N, between the 200 and 2,000 m isobaths (Figure B.121).

**Thresher shark (*Alopias vulpinus*)** The common thresher shark is cosmopolitan in warm and temperate waters. It is found in both coastal and oceanic waters, but according to Strasburg (1958) it is more abundant near land. It is a large shark that uses its tremendously large tail to hit and stun the small schooling fishes upon which it feeds.

**Reproductive potential:** According to Strasburg (1958), females in the Pacific mature at about 315 cm TL. According to Cailliet and Bedford (1983), males mature at about 333 cm TL. Cailliet and Bedford (1983) stated that the age at maturity ranges from three to seven years. Litters consist of four to six pups, which measure 137 to 155 cm TL at birth (Castro, 1983). According to Bedford (1985), gestation lasts nine months and female threshers give birth annually every spring (March to June). New age and growth information can be found in Gervelis (2005).

**Impact of fisheries:** Thresher sharks are caught in many fisheries. The most detailed data available are for the California drift gillnet fishery which started in 1977 for thresher sharks, shortfin makos, and swordfish, extending from the Mexican border to San Francisco, CA

(Hanan, 1984). After 1982, the fishery expanded northward yearly, ultimately reaching the states of Oregon and Washington (Cailliet *et al.*, 1991). Thresher shark landings peaked in 1982, and the thresher shark resource quickly began to decline after that year (Bedford, 1987). Catches have continued to decline and the average size has remained small in spite of numerous regulations restricting fishing (Hanan *et al.*, 1993). Cailliet *et al.*, (1991) summarized the condition of the resource by stating, “The coastwise fishery for this once abundant shark is now a thing of the past.” Legislation passed in 1986 limited the directed thresher shark fishery in the Pacific. Off the U.S. Atlantic coast, the CPUE has shown a considerable decline (Cramer, 1996).

***Essential Fish Habitat for Thresher Shark*:**

- **Neonate (≤175 cm TL):** Offshore Long Island, NY and southern New England in the northeastern United States, in pelagic waters deeper than 50 m, between 70° W and 73.5° W, south to 40° N (Figure B.122).

- **Juveniles (176 to 388 cm TL):** (Identical to neonate EFH): Offshore Long Island, NY and southern New England in the northeastern United States, in pelagic waters deeper than 50 m, between 70° W and 73.5° W, south to 40° N (Figure B.123).

- **Adults (≥389 cm TL):** (Identical to neonate EFH) Offshore Long Island, NY and southern New England in the northeastern United States, in pelagic waters deeper than 50 m, between 70° W and 73.5° W, south to 40° N (Figure B.124).

**Table B.1 1999 FMP size ranges for different life stages of sharks.**

| | Map Neonates/ early juveniles TL (cm) ≤ or range | Text Pup size TL (cm) | Map Late Juveniles/ subadults TL (cm) | Text: M maturity TL (cm) ≥ or range | Text: F maturity TL (cm) ≥ or range | Map Adults TL (cm) ≥ or range |
|---|---|---|---|---|---|---|
| **Large Coastal Sharks** | | | | | | |
| **Cetorhinidae** | | | | | | |
| Cetorhinus maximus | N/A (text 270) | 180 | 271-810 | 460-610 | 810-980 | 810 |
| **Sphyrnidae** | | | | | | |
| Sphyrna mokarran | N/A (text 70) | 67 | 71-220 | 210-258 | 210-220 | 221 |
| S. lewini | 45 | 38-45 | 46-249 | 140-185 | 200 | 250 |
| S. zygaena | N/A | | N/A | | | N/A |
| **Lamnidae** | | | | | | |
| Carcharodon carcharias | (text 175) | 120-150 | 175-479 | 370-340 | 370-340 | (text 480) |
| **Ginglymostomatidae** | | | | | | |
| Ginglymostoma cirratum | 13-60 | 30 | 61-225 | 225 | 225 | 226 |
| **Carcharhinidae** | | | | | | |
| Carcharhinus altimus | 70-155 | 70 | 156-220 | 213 | 221 | N/A (text 221) |
| C. limbatus | 99 (text 100) | 55-60 | 100-155 (text 100-156) | 139-145 | 153-156 | 156 |
| C. leucas | 110 | 75 | 111-225 | 210-220 | 225 | 226 |
| C. perezi | N/A (text 105) | 70 | 106-199 | 170 | 200 | N/A (text 200) |
| C. obscurus | 115 | 85-100 | 116-300 | 290 | 300 | 301 |

| | Map Neonates/ early juveniles TL (cm) ≤ or range | Text Pup size TL (cm) | Map Late Juveniles/ subadults TL (cm) | Text: M maturity TL (cm) ≥ or range | Text: F maturity TL (cm) ≥ or range | Map Adults TL (cm) ≥ or range |
|---|---|---|---|---|---|---|
| | | | | | | |
| C. galapagensis | N/A | 80 | N/A | 205-239 | 215-245 | N/A (text 215) |
| Negaprion brevirostris | 90 | 64 | 91-228 | 228 | 228 | 229 |
| C. brachyurus | N/A (text 100) | 60-70 | N/A (text 101-230) | 200-220 | 247 (text 231) | N/A |
| C. signatus | N/A (text 100) | 68-72 | 101-178 | N/A | 178 | 179 |
| C. plumbeus | 90 | 60 | 90-179 | 180 | 180 | 180 |
| C. falciformis | 55-97 | 75-80 | 98-231 | 225 | 232-245 | N/A (text 232) |
| C. brevipinna | 90 | 60-75 | 91-154 | 130 | 150-155 | 155 |
| Galeocerdo cuvier | 120 | 68-85 | 121-289 | 290 | 290 | 290 |
| **Odontaspididae** | | | | | | |
| Odontaspis noronhai | N/A | N/A | N/A | N/A | N/A | N/A |
| Carcharias taurus | 125 | 100 | N/A (text 126-220) | 190-195 | 220-229 | 221 |
| **Rhincodontidae** | | | | | | |
| Rhincodon typus | N/A | N/A | N/A | N/A | N/A | N/A |
| **Small Coastal Sharks** | | | | | | |
| **Squatinidae** | | | | | | |
| Squatina dumeril | 50 | 28-30 | 51-105 | 90-105 | 90-105 | 106 |

| | Map Neonates/ early juveniles TL (cm) ≤ or range | Text Pup size TL (cm) | Map Late Juveniles/ subadults TL (cm) | Text: M maturity TL (cm) ≥ or range | Text: F maturity TL (cm) ≥ or range | Map Adults TL (cm) ≥ or range |
|---|---|---|---|---|---|---|
| **Sphyrnidae** | | | | | | |
| Sphyrna tiburo | 50 | 27-35 | 51-84 | 70 | 85 | 85 |
| **Carcharhinidae** | | | | | | |
| Rhizoprionodon terraenovae | 17-55 | 29-32 | 56-84 | 65-80 | 85-90 | 85 |
| Carcharhinus acronotus | 35-75 | 50 | 76-99 | 100 | 100 | 100 |
| R. porosus | N/A | N/A | N/A | N/A | N/A | N/A |
| C. isodon | 90 | 48-58 | 91-135 | 130 | 135 | 136 |
| C. porosus | N/A | N/A | N/A | N/A | N/A | N/A |
| **Pelagic Sharks** | | | | | | |
| **Hexanchidae** | | | | | | |
| Hexanchus vitulus | N/A | N/A | N/A | N/A | N/A | N/A |
| Heptranchias perlo | N/A | 25 | N/A | 85-90 | 85-90 | N/A |
| Hexanchus griseus | N/A | 60-70 | N/A | 325 | 421 | N/A |
| **Lamnidae** | | | | | | |
| Isurus paucus | no sizes | N/A | no sizes | N/A | N/A | no sizes |
| Lamna nasus | 50-100 | 76 | 101-224 | 150-200 | 200-250 | 225-280 |
| I. oxyrinchus | 95 | N/A | 96-279 | N/A | N/A | 280 |

| | Map Neonates/ early juveniles TL (cm) ≤ or range | Text Pup size TL (cm) | Map Late Juveniles/ subadults TL (cm) | Text: M maturity TL (cm) ≥ or range | Text: F maturity TL (cm) ≥ or range | Map Adults TL (cm) ≥ or range |
|---|---|---|---|---|---|---|
| **Carcharhinidae** | | | | | | |
| Prionace glauca | 75 | 34-48 | 76-220 | 218 | 166-243 | 221 |
| Carcharhinus longimanus | 115 | 65-75 | 116-190 | 190 | 190 | 191 |
| **Alopiidae** | | | | | | |
| Alopias superciliosus | N/A (text 135) | N/A | 136-339 | 270 | 340 | 340 |
| A. vulpinus | 200 | 137-155 | 200-319 | 333 | 315 | 320 |

## Table B.2 Size ranges used in this Amendment for mapping distribution data for different life stages of sharks.

| | **Neonates** **max embyro+10%** **TL (cm)** **≤** | **Literature** embryo size range or max embryo size in term females **TL (cm)** | **Juveniles** **TL (cm)** | **Literature** **M maturity** **TL (cm)** **≥ or range** | **Literature** **F maturity** **TL (cm)** **≥ or range** | **Adults** **F 1st mat** **TL (cm)** **≥** |
|---|---|---|---|---|---|---|
| **Large Coastal Sharks** | | | | | | |
| **Cetorhinidae** | | | | | | |
| Cetorhinus maximus | 182 | 165** Castro 83 | 183-809 | | 810 Castro 99 | 810 |
| **Sphyrnidae** | | | | | | |
| Sphyrna mokarran | 74 | 67.5 Clarke & von Schmidt 65 | 75-209 | | 210-220 Steven & Lyle 89 | 210 |
| S. lewini | 50 | 39-51 Clarke 71, Carlson 2002 | 51-227 | | 228 Steven & Lyle 89 | 228 |
| S. zygaena | 66 | 60** NMFS upubl. | 67-283 | | 284 Castro & Mejuto 95 | 284 |
| **Lamnidae** | | | | | | |
| Carcharodon carcharias | 166 | 151 Uchida *et al* 96 | 167-479 | | 480 Uchida *et al* 96 | 480 |
| **Ginglymostomatidae** | | | | | | |
| Ginglymostoma cirratum | N/A* | 28-30.5 Castro 00 | 37-221 | 214-214.6 Castro 00 | 222-232 Castro 00 | 222 |
| **Carcharhinidae** | | | | | | |
| Carcharhinus altimus | 67 | 61 Springer 60 | 68-225 | | 226 Springer 60 | 226 |
| C. limbatus | 66 | 45-70*** | 67-149 | 125-140 | 141-152 | 156 |
| C. leucas | 83 | 55-85 Clarke & von Schmidt 65 | 84-225 | | 226 Branstetter & Stiles 87 | 226 |
| C. perezi | 66 | 60**** Castro 83 | 67-199 | | 200 Compagno 84 | 200 |
| C. obscurus | 110 | 85-100 Castro 83 | 111-299 | 290 Castro 83 | 300 Castro 83 | 300 |

| | Neonates<br>max embyro+10%<br>TL (cm)<br>≤ | Literature<br>embryo size range<br>or max embryo size<br>in term females<br>TL (cm) | Juveniles<br><br>TL (cm) | Literature<br>M maturity<br>TL (cm)<br>≥ or range | Literature<br>F maturity<br>TL (cm)<br>≥ or range | Adults<br>F 1st mat<br>TL (cm)<br>≥ |
|---|---|---|---|---|---|---|
| C. galapagensis - NO DATA<br>(all Atlantic data off Bermuda) | N/A | 81<br>Wetherbee *et al* 96 | N/A | | 215<br>Wetherbee *et al* 96 | N/A |
| Negaprion brevirostris | 68 | 62<br>Clarke & von Schmidt 65 | 69-235 | | 236<br>Clarke & von Schmidt 65 | 236 |
| C. brachyurus - NO DATA | N/A | N/A | N/A | N/A | N/A | N/A |
| C. signatus | 70 | 55-75<br>Raschi *et al* 82 | 71-199 | 185-190 | 200-205 | 200 |
| C. plumbeus | 70 | 44.2-64<br>Castro 93b | 71-147 | 139-153<br>Merson 98 | 148-175<br>Merson 98 | 148 |
| C. falciformis | 85 | 77<br>Bonfil *et al* 93 | 86-231 | | 232<br>Branstetter 87<br>Bonfil *et al* 93 | 232 |
| C. brevipinna | 71 | 60-75<br>Branstetter 81 | 72-184 | | 185 | 185 |
| Galeocerdo cuvier | 90 | 82<br>NMFS upubl. | 91-296 | | 297<br>Clarke & von Schmidt 65 | 297 |
| **Odontaspididae**<br>Odontaspis noronhai -<br>NO DATA | N/A | N/A | N/A | N/A | N/A | N/A |
| Carcharias taurus | 117 | 106<br>Gilmore *et al* 83 | 118-236 | | 236.6<br>Gilmore *et al* 83 | 237 |
| **Rhincodontidae**<br>Rhincodon typus<br>LITTLE DATA, ONE MAP | N/A | | N/A | | | N/A |
| **Small Coastal Sharks** | | | | | | |
| **Squatinidae**<br>Squatina dumeril | 28 | 26**** | 26-82 | 84 | 89 | 89 |

| | **Neonates max embyro+10% TL (cm) ≤** | **Literature** embryo size range or max embryo size in term females **TL (cm)** | **Juveniles TL (cm)** | **Literature M maturity TL (cm) ≥ or range** | **Literature F maturity TL (cm) ≥ or range** | **Adults F 1st mat TL (cm) ≥** |
|---|---|---|---|---|---|---|
| **Sphyrnidae** | | | | | | |
| Sphyrna tiburo | 38 | 22-30***** | 40-66 | 66-83 | 77-94<br>Parsons 93 | 77 |
| **Carcharhinidae** | | | | | | |
| Rhizoprionodon terraenovae | 40 | 36<br>Parsons 83 | 41-75 | 73-75 | 70-85<br>Loefer & Sedberry 03<br>Carlson and Baremore 03 | 76 |
| Carcharhinus acronotus | 48 | 38-44 | 95 | 108 | 115<br>Hazin *et al* 02 | 115 |
| R. porosus - NO DATA | N/A | | | | | N/A |
| C. isodon | 64 | 43.7-58<br>Castro 93a & 93b | 65-120 | 119-130 | 123-132 | 123 |
| C. porosus<br>LITTLE DATA, ONE MAP | N/A | 30 | 30-70 | 71-75 | 70 | 70 |
| **Pelagic Sharks** | | | | | | |
| **Hexanchidae** | | | | | | |
| Hexanchus vitulus<br>LITTLE DATA, ONE MAP | N/A | | N/A | | 158<br>Springer & Waller 69 | N/A |
| Heptranchias perlo<br>LITTLE DATA, ONE MAP | N/A | | N/A | | 89-93<br>Compagno 84 | N/A |
| Hexanchus griseus<br>LITTLE DATA, ONE MAP | N/A | | N/A | | 421<br>Ebert 86 | N/A |
| **Lamnidae** | | | | | | |
| Isurus paucus | 149 | 135.5<br>NMFS upubl | 150-244 | | 245<br>Guitart-Manday 66 | 245 |
| Lamna nasus | 79 | 72<br>Jensen *et al* 02 | 80-209 | | 210<br>Jensen *et al* 02 | 210 |
| I. oxyrinchus | 85 | 77 | 108-262 | | 263 | 263 |

| | **Neonates** **max embyro+10%** **TL (cm)** **≤** | **Literature** embryo size range or max embryo size in term females **TL (cm)** | **Juveniles** **TL (cm)** | **Literature** **M maturity** **TL (cm)** **≥ or range** | **Literature** **F maturity** **TL (cm)** **≥ or range** | **Adults** **F 1st mat** **TL (cm)** **≥** |
|---|---|---|---|---|---|---|
| | | Duffy & Francis 01 | | | Mollet *et al* 00 | |
| **Carcharhinidae** | | | | | | |
| Prionace glauca | 60 | 54.4 | 61-183 | | 184 | 184 |
| | | Pratt 1979 | | | Williams 1977 | |
| C. longimanus | 83 | 75 | 84-136 | | 137 | 137 |
| | | Seki *et al* 98 | | | Seki *et al* 98 | |
| **Alopiidae** | | | | | | |
| Alopias superciliosus | 116 | 105.5 | 117-340 | | 341 | 341 |
| | | Gilmore 83 | | | Moreno & Moron 92 | |
| A. vulpinus | 175 | 159 | 176-388 | | 389 | 389 |
| | | Moreno *et al* 89 | | | Moreno *et al* 89 | |

*nurse sharks below 37 cm TL in the 1999 FMP database were actually embryos and not free swimming sharks
**confirmed report of the smallest free swimming individual, not an embryo
***Castro has seen one litter with sizes beyond the above range (70.4-74.2 cmTL). This litter was not included because it was unusually large for this species.
****based on estimated size at birth
*****average of three full term embryos from one female collected in Tampa Bay, FL

## Table B.3 **Blacktip shark (*Carcharinus limbatus*) Life History and Habitat Characteristics.** From Amendment 1 to the FMP.

| Life Stage | Species Distributions | | Habitat Characteristics | | | | Source* |
|---|---|---|---|---|---|---|---|
| | Location | Season | Temp (°C) | DO (mg/l) | Sal (ppt) | Depth (m) | |
| | | | B = bottom and S = surface | | | | |
| Neonate and young of the year (YOY) | Off Yaupon and Holden Beaches, NC | summer primary nursery | no data | no data | no data | no data | Jensen et al (2002) |
| | SC estuarine and nearshore waters | summer primary nursery, pupping late May/early June to early July | no data | no data | no data | no data | Ulrich and Riley, SEAMAP (2002) |
| | GA estuarine waters | summer primary nursery (June-Sept) | 21-30.4 | 4.35-6.08 | 22-36.1 | 0.5-11.6 | Belcher and Shierling Gurshin |
| | Yankeetown to 10,000 Islands on the west coast of Florida, Cape Canaveral on the east coast of FL and the Florida Keys. Also found in the Marquesas Islands west of the Florida Keys | summer primary nursery (June-Oct); FL Keys – found year round; Marquesas Islands – overwintering grounds | 19.1-33.6 | 3.28-9.26 | 15.8-41.1 | 0.9-12.5 | Hueter and Tyminski, Michel and Steiner |
| | Northeast Gulf of Mexico (Apalachee Bay, Apalachicola Bay, St. Joseph Bay, Crooked Island Sound and St Andrew Bay) | summer primary nursery | 22.5-31.4 | 3.6-7 | 19-38 | 2.1-6 | Carlson |
| | From the mouth of St Louis Bay, MS to the tip of Fort Morgan, AL | summer primary nursery | B 29.3<br>S 30.6 | B 6.6<br>S 6.6 | B 20.3<br>S 17.8 | 3.4 | Parsons (env. parameters are average values |
| | Terrebonne/Timbalier Bay System, LA | summer primary nursery (May-Sept) | 22.6-32.4 | no data | 18-34.7 | 1.2-5.2 | Neer et al |
| | All major bay systems along the Gulf coast of Texas from Sabine Lake to Lower Laguna Madre | summer primary nursery (May-Sept) | 16.7-34 | no data | 0-54 | no data | Jones and Grace |

| Life Stage | Species Distributions | | Habitat Characteristics | | | | Source* |
|---|---|---|---|---|---|---|---|
| **Juvenile** | Nearshore and inshore waters from Cape Hatteras and Core Sound to Holden Beach, NC | summer secondary nursery | no data | no data | no data | no data | Jensen et al. |
| | SC estuarine and nearshore waters | secondary summer and overwintering nursery (May-Dec) | 18-24 | no data | no data | no data | Ulrich and Riley, SEAMAP, Hueter and Tyminski |
| | GA estuarine waters | summer secondary nursery (June-Sept) | 21-30.4 | 4.35-6.08 | 22-36.1 | 0.5-11.6 | Belcher and Shierling, Gurshin |
| | Yankeetown to 10,000 Islands on the west coast of Florida, Cape Canaveral on the east coast of FL and the Florida Keys | summer secondary nursery (March-Nov); warm water effluents of Tampa Bay and Yankeetown power plants during winter months | 20.8-33.6 | 2-8.3 | 27-38 | 0.7-5 | Hueter and Tyminski, Michel and Steiner |
| | Northeast Gulf of Mexico (Apalachee Bay, Apalachicola Bay, St. Joseph Bay, Crooked Island Sound and St Andrew Bay) | summer secondary nursery | 16-32.5 | 1.9-8.3 | 19-38 | 0.7-6.4 | Carlson |
| | north central Gulf of Mexico | summer secondary nursery | B 27.3-28.1 | B 3.2-6.2 | B 34.3-37 | 5.8-7.6 | |
| | Coastal Alabama off Dauphin Island and Mobile Point | summer secondary nursery | B 28<br>S 28.8 | B 6.3<br>S 6.9 | B 19.4<br>S 17.7 | 3.1 | |
| | From the mouth of St Louis Bay, MS to the tip of Fort Morgan, AL | summer secondary nursery (April-Nov) | 22.6-32.4 | no data | 18-34.7 | 1.2-5.2 | Gurshin |
| | Terrebonne/Timbalier Bay System, LA | summer secondary nursery | | | | | Parsons (env. parameters are average values) |
| | All major bay systems along the Gulf coast of Texas from Galveston Bay to Lower Laguna Madre, except Corpus Christi Bay | | | | | | Neer et al |
| | | | | | | | Jones and Grace |
| | | | | | | | |
| **Adult** | Outer Banks of NC, St Augustine to Cape Canaveral, FL, | | Unk | Unk | Unk | Unk | |

* Contributing authors in: McCandless, C.T., H.L. Pratt Jr., and N.E. Kohler. 2002. Shark nursery grounds of the Gulf of Mexico and the East Coast waters of the United States: an overview. Authors and papers are cited separately in References section.

## Table B.4 Dusky shark (*Carcharinus obscurus*) Life History and Habitat Characteristics.

| Life Stage | Species Distributions | | Habitat Characteristics | | | | Source* |
|---|---|---|---|---|---|---|---|
| | Location | Season | Temp (℃) | DO (mg/l) | Sal (ppt) | Depth (m) | |
| | | | B = bottom and S = surface | | | | |
| Neonate and young of the year (YOY) | Nearshore waters from Cape Hatteras to Bogue Banks and off Holden Beach, NC | Oct and Nov; pupping April and May off Holden beach | no data | no data | no data | no data | Jensen et al, SEAMAP |
| | SC coastal waters | transient or overwintering nursery (Nov) | 18 | no data | no data | no data | Ulrich and Riley |
| **Juvenile** | In the coastal waters of Martha's Vineyard, MA ( off East and South Beaches of Chappaquiddick Island) | summer secondary nursery | 17-24 | no data | no data | 4.8-19.2 | Skomal |
| | Exposed nearshore waters in Virginia, rarely enter the estuaries (one juvenile female (79cm PCL) caught in lower Chesapeake Bay in August of 1990 | summer secondary nursery | no data | no data | no data | no data | Grubbs and Musick |
| | Nearshore waters from Cape Hatteras to Holden Beach, NC | summer secondary and overwintering nursery grounds | 18.1-22.2 | no data | no data | 4.3-15.5 | Jensen et al, SEAMAP |
| | SC coastal waters | transient or overwintering nursery (Nov) | 18 | no data | no data | no data | Ulrich and Riley |
| **Adult** | Pelagic waters offshore the Virginia/North Carolina border and south to Fort Lauderdale, FL Nearshore waters beginning at the border of Georgia and Florida south to Fort Lauderdale | Migrations moving north-south with the seasons | Unk | Unk | Unk | Unk | |

* Contributing authors in: McCandless, C.T., H.L. Pratt Jr., and N.E. Kohler. 2002. Shark nursery grounds of the Gulf of Mexico and the East Coast waters of the United States: an overview. Authors and papers are cited separately in References section.

## Table B.5 Sandbar shark (*Carcharinus plumbeus*) Life History and Habitat Characteristics

| Life Stage | Species Distributions | | Habitat Characteristics | | | | Source* |
|---|---|---|---|---|---|---|---|
| | Location | Season | Temp (℃) | DO (mg/l) | Sal (ppt) | Depth (m) | |
| | | | B = bottom and S = surface | | | | |
| Neonate and young of the year (YOY) | Great Bay, NJ | summer primary nursery (pupping early July) | 23.8 | 7.01 | 26.5 | 2.4 | Merson and Pratt |
| | Delaware Bay (DE & NJ waters) | summer primary nursery (June-Oct with majority of pupping from late June to early July) | 18-29.9 | no data | 18.3-30.4 | 0.9-16.6 | McCandless et al |
| | Lower Chesapeake Bay, VA and the tidal creeks and lagoons along Virginia's Eastern Shore | summer primary nursery | 17-28 | no data | no data | no data | Grubbs and Musick |
| | In coastal waters from Cape Hatteras to Bogue Banks, off Holden Beach and in Pamlico Sound, NC | summer primary nursery (May-July); overwintering grounds off Cape Hatteras, NC (catches increase greatly in Oct and Nov) | no data | no data | no data | no data | Jensen et al, SEAMAP |
| | SC estuarine and nearshore coastal waters | summer primary nursery (May-Sept), with coastal waters also serving as overwintering grounds | no data | no data | no data | no data | Ulrich and Riley |
| | GA estuarine waters | summer primary nursery (June-Sept) | 26.9-30.1 | 4-5.9 | 29.6-30.1 | 3.7-13.1 | Belcher and Shierling |
| | Off Yankeetown, FL (N=3) | summer primary nursery | 25-29 | no data | 20.4-25.4 | 2.4-3.7 | Hueter and Tyminski |
| | Northeast Gulf of Mexico (Apalachicola Bay and Crooked Island | summer primary nursery | 26.6-30.8 | 5-7.3 | 19-39 | 3-5.2 | Carlson |

| Life Stage | Species Distributions | | Habitat Characteristics | | | | Source* |
|---|---|---|---|---|---|---|---|
| **Juvenile** | Cape Poge Bay, MA, around Chappaquiddick Island, MA (East and South Beaches), and off the south shore of Cape Cod, MA | summer secondary nursery (June -Oct ) | 20-24 | no data | no data | 2.4-6.4 | Skomal |
| | Delaware Bay (DE & NJ waters) | summer secondary nursery (May-Oct) | 15.5-30 | no data | 18.3-31.4 | 0.8-23 | McCandless et al |
| | Lower Chesapeake Bay, VA and the tidal creeks and lagoons along Virginia's Eastern Shore | summer secondary nursery (May-Oct) | 17-28 | no data | no data | no data | Grubbs and Musick |
| | Coastal NC waters | summer secondary nursery; overwintering grounds off Cape Hatteras, NC | 22.6-28.1 | no data | no data | no data | Jensen et al, SEAMAP |
| | SC estuarine and coastal waters | summer secondary (April - Sept) and overwintering grounds (Dec) | 15-28 | no data | no data | no data | Ulrich and Riley, SEAMAP |
| | GA estuarine waters | summer secondary nursery (June-Sept) | 26.9-30.1 | 4-5.9 | 29.6-30.1 | 3.7-13.1 | Belcher and Shierling |
| | Northeast Gulf of Mexico (Apalachicola Bay and Crooked Island Sound) | summer secondary nursery | 19.8-30.8 | 5-7.3 | 19-36 | 2.1-5.2 | Carlson |
| | North central Gulf of Mexico (just north of Cat and Horn Islands, MS) (N=4) | summer secondary nursery | 23.3-24.4 | 8-8.3 | 13.4-14.8 | 2.1 | Parsons |
| | Upper Texas coast, LA  coast, and Bulls Bay, SC | spring/summer secondary nursery | no data | no data | no data | no data | Hueter and Tyminski |
| **Adult** | Unk | Unk | Unk | Unk | Unk | Unk | |

* Contributing authors in: McCandless, C.T., H.L. Pratt Jr., and N.E. Kohler. 2002. Shark nursery grounds of the Gulf of Mexico and the East Coast waters of the United States: an overview. Authors and papers are cited separately in References section.

## Table B.6 Nurse shark (*Ginglymostoma cirratum*) Life History and Habitat Characteristics.

| Life Stage | Species Distributions | | Habitat Characteristics | | | | Source* |
|---|---|---|---|---|---|---|---|
| | Location | Season | Temp (°C) | DO (mg/l) | Sal (ppt) | Depth (m) | |
| | | | B = bottom and S = surface | | | | |
| Neonate and young of the year (YOY) | Charlotte Harbor, FL and the Florida Keys | primary nursery | 31.7 | 7.01 | 33.9 | 2.1 | Hueter and Tyminski |
| **Juvenile** | Tampa Bay, Charlotte Harbor, 10,000 Islands Estuary and the Florida Keys<br><br>Dry Tortugas, FL<br><br>Northeast Gulf of Mexico (Apalachee Bay, Apalachicola Bay, and Crooked Island Sound) | secondary nursery (April-Nov)<br><br>summer secondary nursery<br><br>summer secondary nursery | 17.5-32.9<br><br>no data<br><br>22.6-28.1 | 3.1-9.7<br><br>no data<br><br>5-8.3 | 28-38.5<br><br>no data<br><br>27-37 | 0.6-2.9<br><br>no data<br><br>3.5-6 | Hueter and Tyminski, Michel and Steiner<br><br>Pratt and Carrier<br><br>Carlson |
| **Adult** | From tropical West Africa and the Cape Verde Islands in the east, and from Cape Hatteras to Brazil in the west. Littoral waters of the tropical and subtropical Atlantic, shallow water, often under coral reefs or rocks | Unk | Unk | Unk | Unk | Unk | |

* Contributing authors in: McCandless, C.T., H.L. Pratt Jr., and N.E. Kohler. 2002. Shark nursery grounds of the Gulf of Mexico and the East Coast waters of the United States: an overview. Authors and papers are cited separately in References section.

**Table B.7 Essential fish habitat maps by species.**

| | |
|---|---|
| **TUNAS**<br>Figure B.1 to B.3 Atlantic Albacore (*Thunnus alalunga*)<br>Figure B.4 to B.6 Atlantic Bigeye Tuna (*Thunnus obesus*)<br>Figure B.7 to B.9 Atlantic Bluefin Tuna (*Thunnus thynnus*)<br>Figure B.10 to B.12 Atlantic Skipjack (*Katsuwonus pelamis*)<br>Figure B.13 to B.15 Atlantic Yellowfin Tuna (*Thunnus albacares*)<br><br>**SWORDFISH**<br>Figure B.16 to B.18 Swordfish (*Xiphias gladius*)<br><br>**BILLFISH**<br>Figure B.19 to B.21 blue marlin (*Makaira nigricans*)<br>Figure B.22 to B.24 white marlin (*Tetrapturus albidus*)<br>Figure B.25 to B.27 sailfish (*Istiophorus platypterus*)<br>Figure B.28 to B.30 spearfish (*Tetrapturus pfluegeri*)<br><br>**LARGE COASTAL SHARKS**<br>**Basking sharks - Cetorhnidae**<br>Figure B.31 to B.33 basking shark (*Cetorhinus maximus*)<br>**Hammerhead sharks - Sphyrnidae**<br>Figure B.34 to B.36 great hammerhead (*Sphyrna mokarran*)<br>Figure B.37 to B.39 scalloped hammerhead (*S. lewini*)<br>Figure B.40 to B.42 smooth hammerhead (*S. zygaena*)<br>**Mackerel sharks - Lamnidae**<br>Figure B.43 to B.45 white shark (*Carcharodon carcharias*)<br>**Nurse sharks - Ginglymostomatidae**<br>Figure B.46 to B.48 nurse shark (*Ginglymostomatidae cirratum*)<br>**Requiem sharks - Carcharhinidae**<br>Figure B.49 to B.51 bignose shark (*Carcharhinus altimus*)<br>Figure B.52 to B.54 blacktip shark (*C. limbatus*)<br>Figure B.55 to B.57 bull shark (*C. leucas*)<br>Figure B.58 to B.60 Caribbean reef shark (*C. perezi*)<br>Figure B.61 to B.63 dusky shark (*C. obscurus*)<br>Figure B.64 to B.66 lemon shark (*Negaprion brevirostris*)<br>Figure B.67 to B.69 night shark (*C. signatus*)<br>Figure B.70 to B.73 sandbar shark (*C. plumbeus*)<br>Figure B.74 to B.76 silky shark (*C. falciformis*)<br>Figure B.77 to B.79 spinner shark (*C. brevipinna*)<br>Figure B.80 to B.82 tiger shark (*Galeocerdo cuvieri*) | **Sand tiger sharks - Odontaspididae**<br>Figure B.83 to B.85 sand tiger shark (*Odontaspis taurus*)<br><br>**SMALL COASTAL SHARKS**<br>**Angel sharks - Squatinidae**<br>Figure B.86 to B.88 Atlantic angel sharks (*Squatina dumerili*)<br>**Hammerhead sharks - Sphyrnidae**<br>Figure B.89 to B-91 bonnethead (*Sphyrna tiburo*)<br>**Requiem sharks - Carcharhinidae**<br>Figure B.92 to B-94 Atlantic sharpnose (*R.. terraenovae*)<br>Figure B.95 to B-97 blacknose shark (*C. acronotus*)<br>Figure B.98 to B-100 finetooth shark (*C. isodon*)<br>Figure B.101 smalltail shark (*C. porosus*)<br><br>**PELAGIC SHARKS**<br>**Cow sharks - Hexanchidae**<br>Figure B.102 bigeye sixgill shark (*Hexanchus vitulus*)<br>Figure B.103 sevengill shark (*Heptranchias perlo*)<br>Figure B.104 sixgill shark (*Hexanchus griseus*)<br>**Mackerel sharks - Lamnidae**<br>Figure B.105 to B.107 longfin mako (*Isurus paucus*)<br>Figure B.108 to B.110 porbeagle shark (*Lamna nasus*)<br>Figure B.111 to B.113 shortfin mako (*Isurus oxyrinchus*)<br>**Requiem sharks - Carcharhinidae**<br>Figure B.114 to B.116 blue shark (*Prionace glauca*)<br>Figure B.117 to B.119 oceanic whitetip shark (*C. longimanus*)<br>**Thresher sharks - Alopiidae**<br>Figure B.120 to B.121 bigeye thresher (*Alopias superciliosus*)<br>Figure B.122 to B.124 thresher shark (*A. vulpinus*) |

**Table B.8 List of abbreviations and acronyms for EFH data sources used in the maps.**

| | |
|---|---|
| Belcher | Belcher and Shierling 2002 |
| Carlson | Carlson 2002 |
| COASTSPAN | Cooperative Atlantic States Shark Pupping and Nursery Area Program |
| CSTP | Cooperative Shark Tagging Program |
| CTS | Cooperative Tagging System |
| Govoni | Govoni *et al*., 2003 |
| Gurshin | Gurshin 2002 |
| Jensen | Jensen *et al*., 2002 |
| Jones/Grace | Jones and Grace 2002 |
| Michel/ST | Michel and Steiner 2002 |
| Mote | Mote Marine Laboratory |
| Neer | Neer *et al*., 2002 |
| Parsons | Parsons 2002 |
| POP | Pelagic Observer Program |
| SEAMAP | Southeast Area Monitoring and Assessment Program |
| SELL | Southeast Longline Survey |
| SOP | Shark Observer Program |
| Ulrich | Ulrich and Riley 2002 |

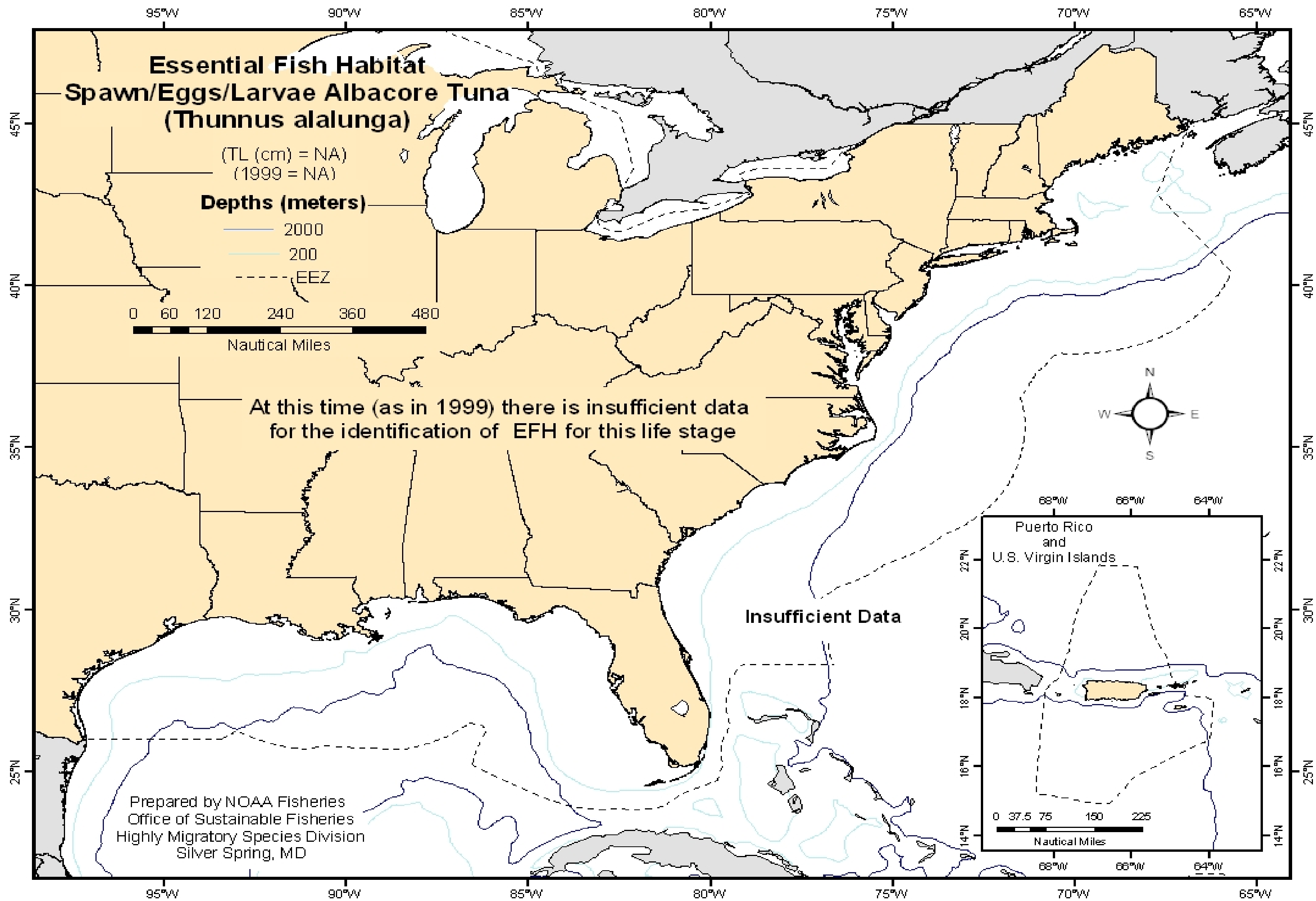


**Figure B.1** **Atlantic Albacore Tuna: Spawning, Eggs, and Larvae.**

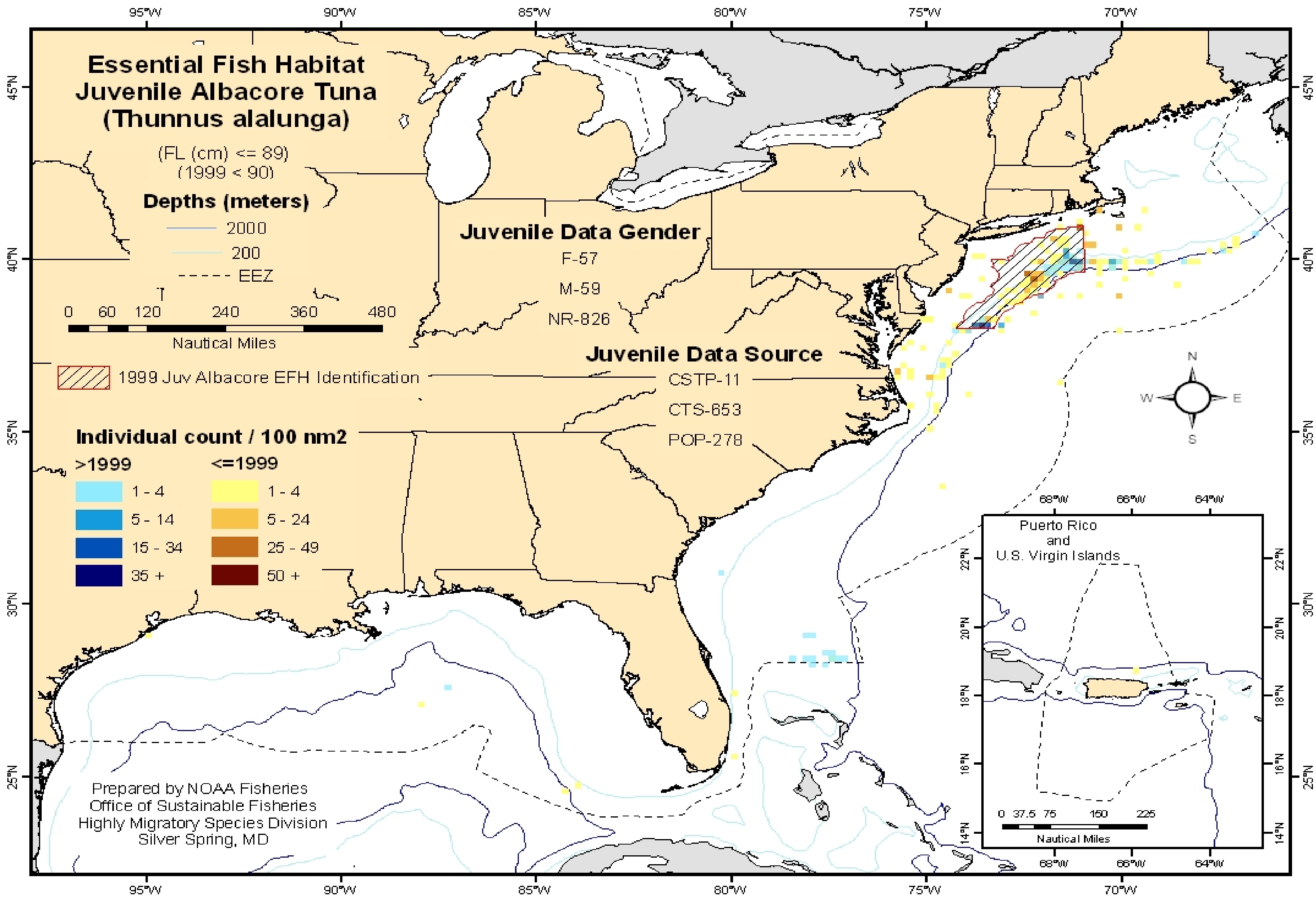


**Figure B.2** Atlantic Albacore Tuna: Juvenile.

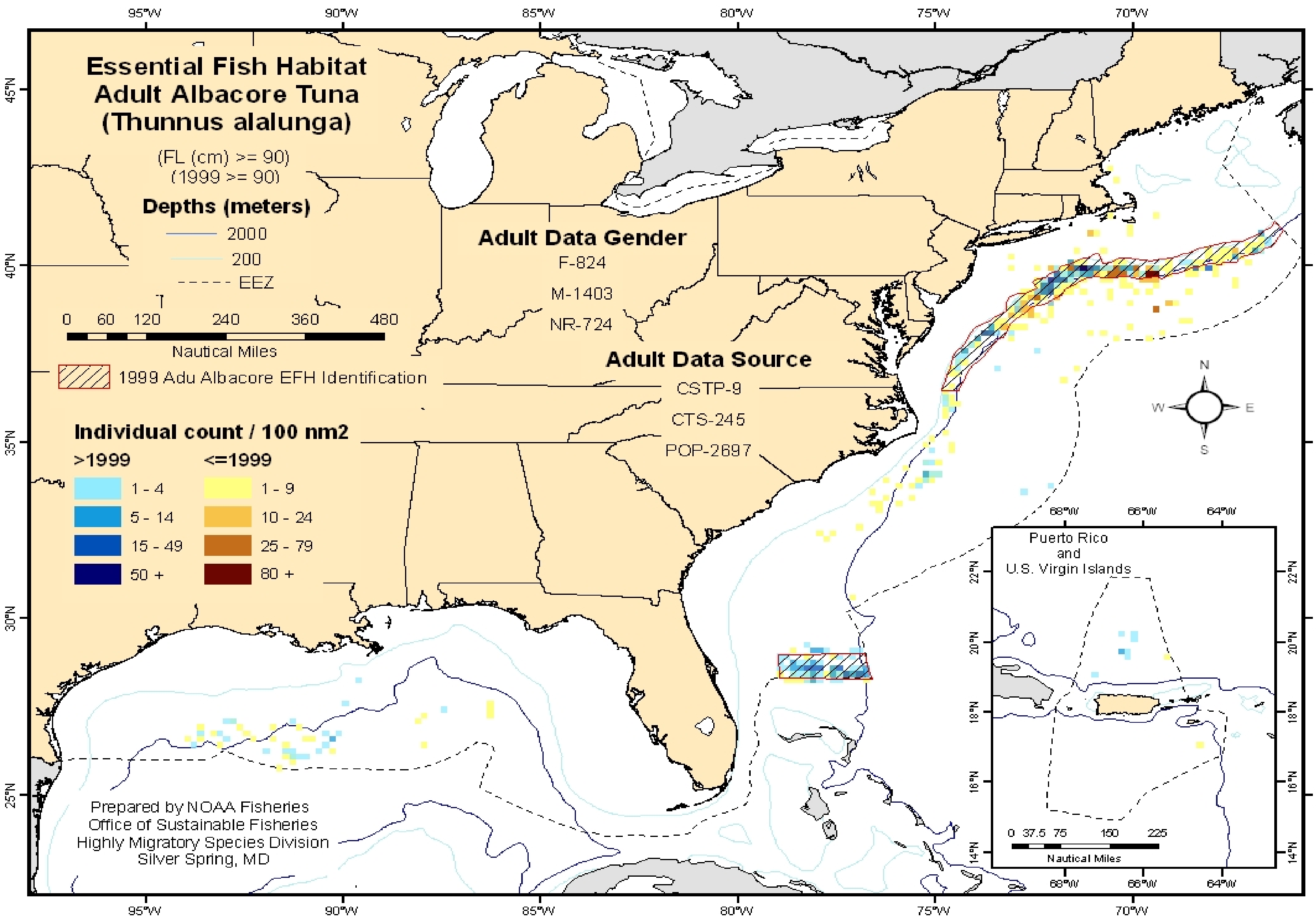


**Figure B.3** Atlantic Albacore Tuna: Adult.

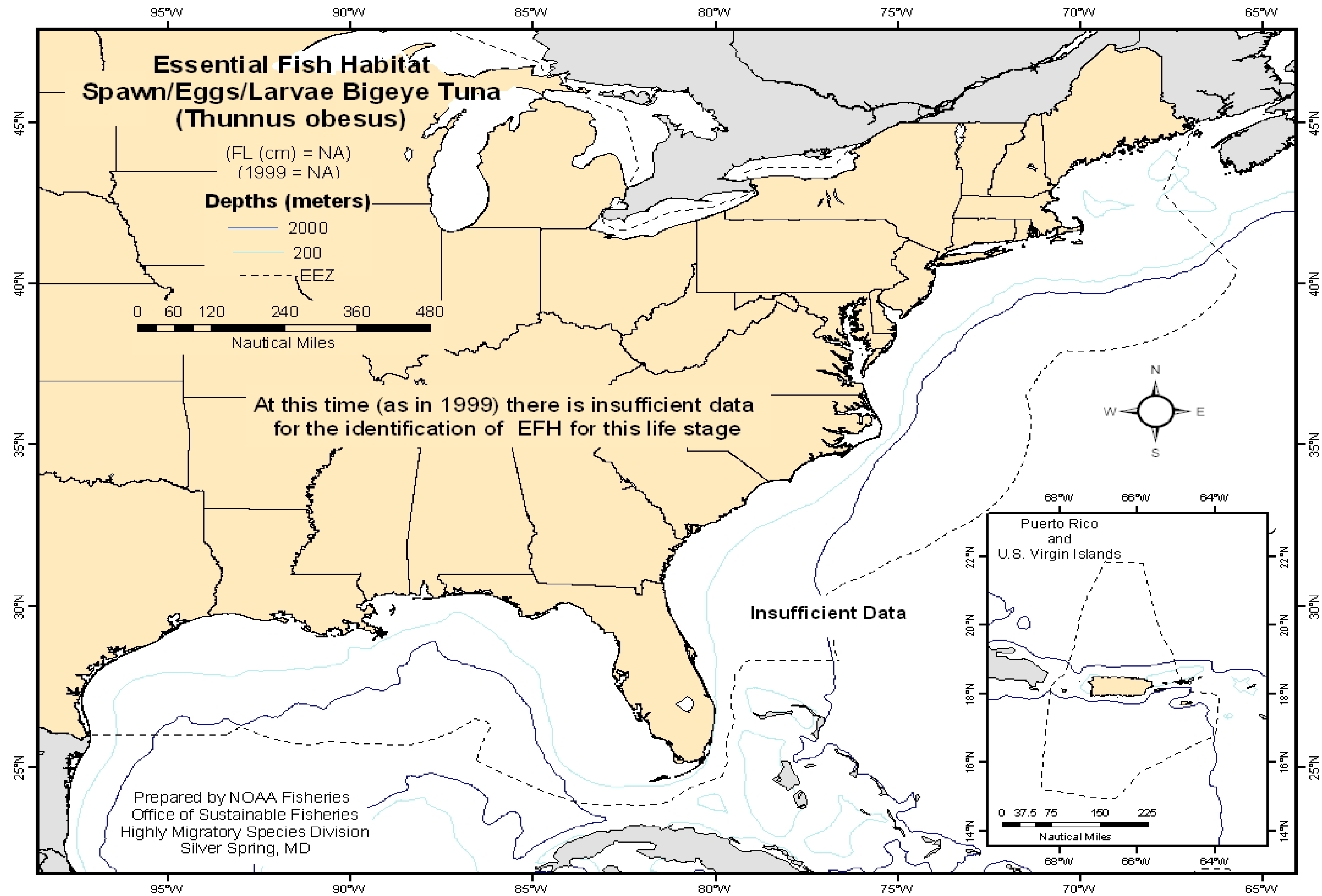


**Figure B.4** **Atlantic Bigeye Tuna: Spawning, Eggs, and Larvae.**

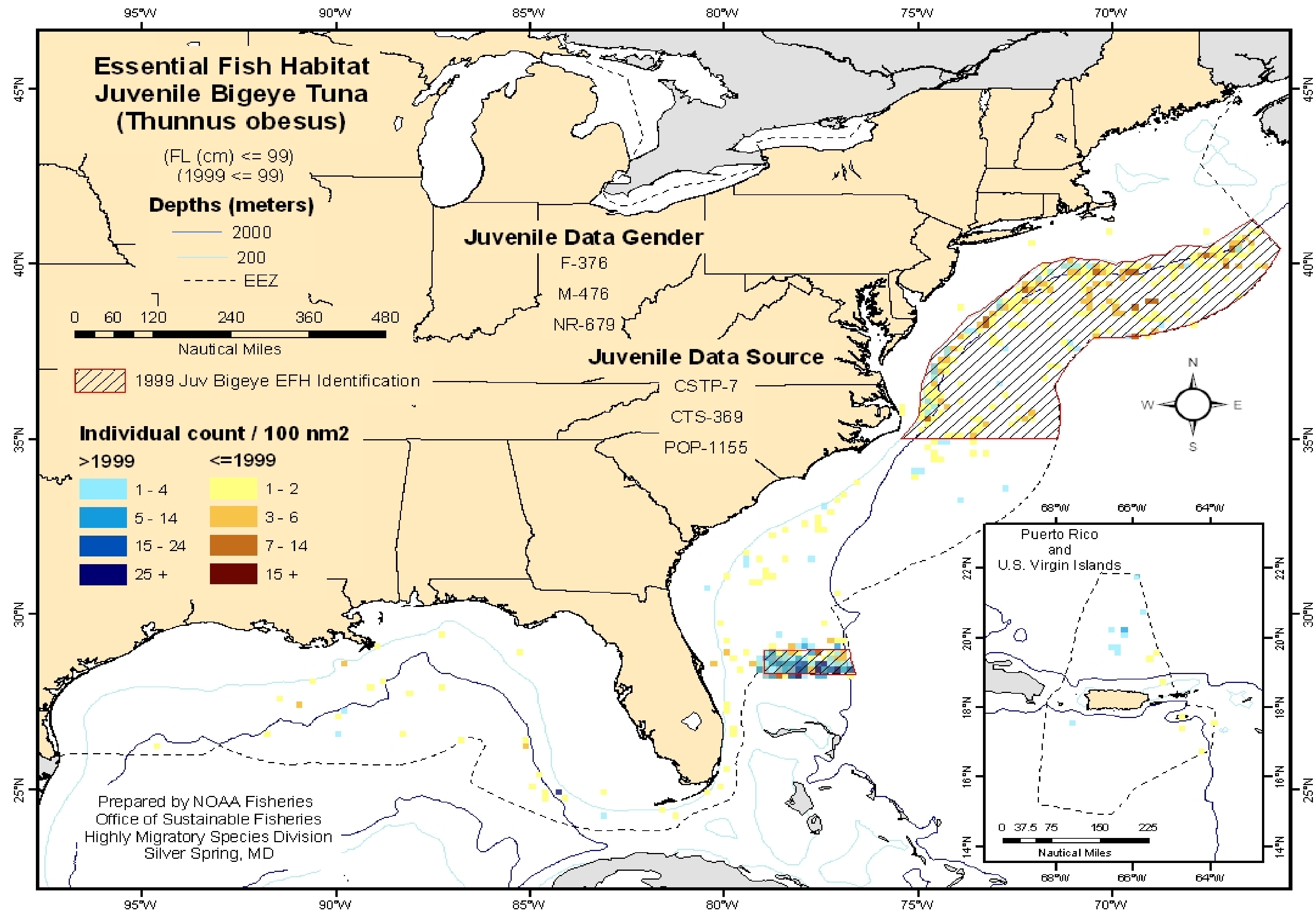


**Figure B.5** Atlantic Bigeye Tuna: Juvenile.

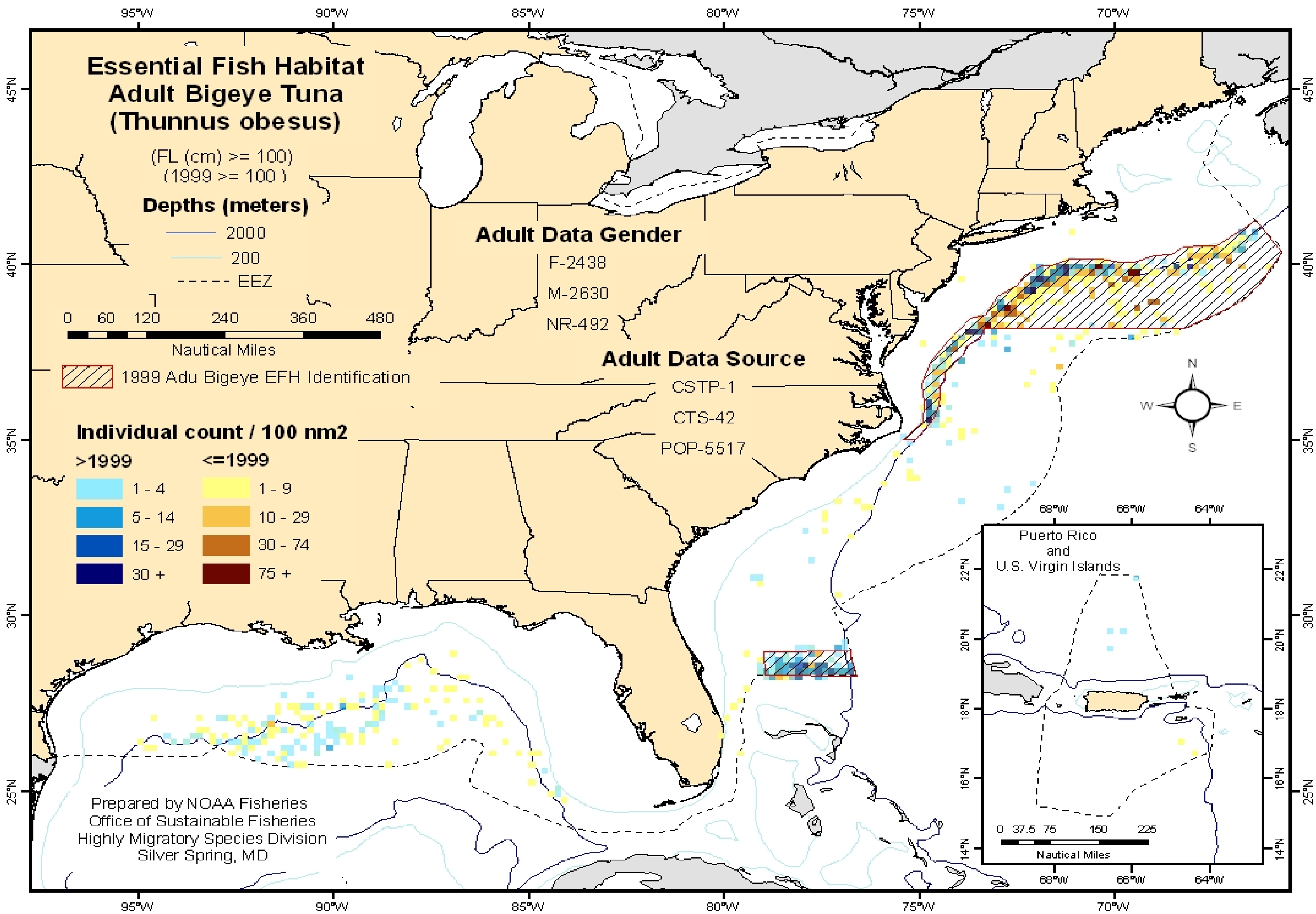


**Figure B.6** **Atlantic Bigeye Tuna: Adult.**

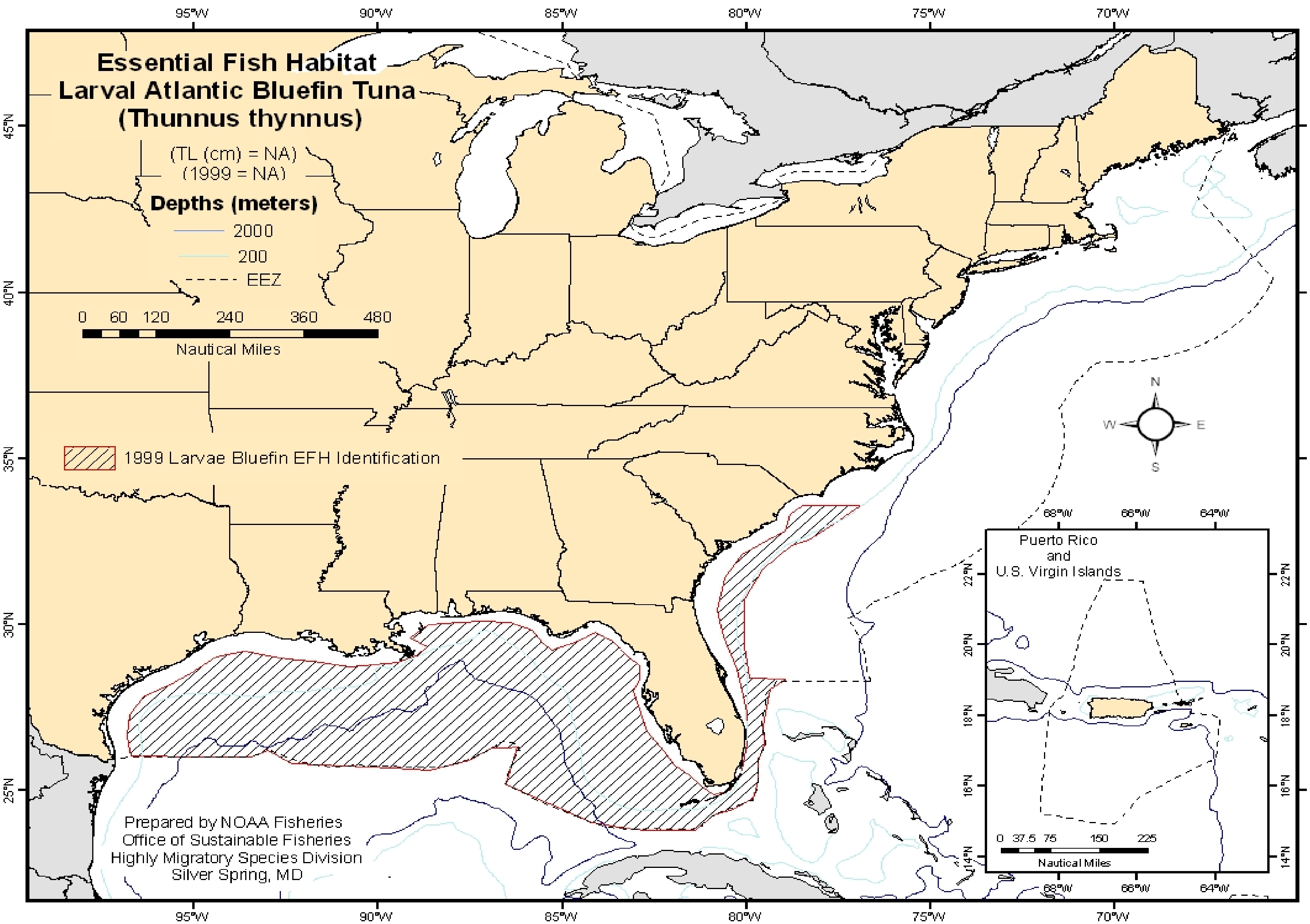


**Figure B.7** **Atlantic Bluefin Tuna: Spawning, Eggs, and Larvae.**

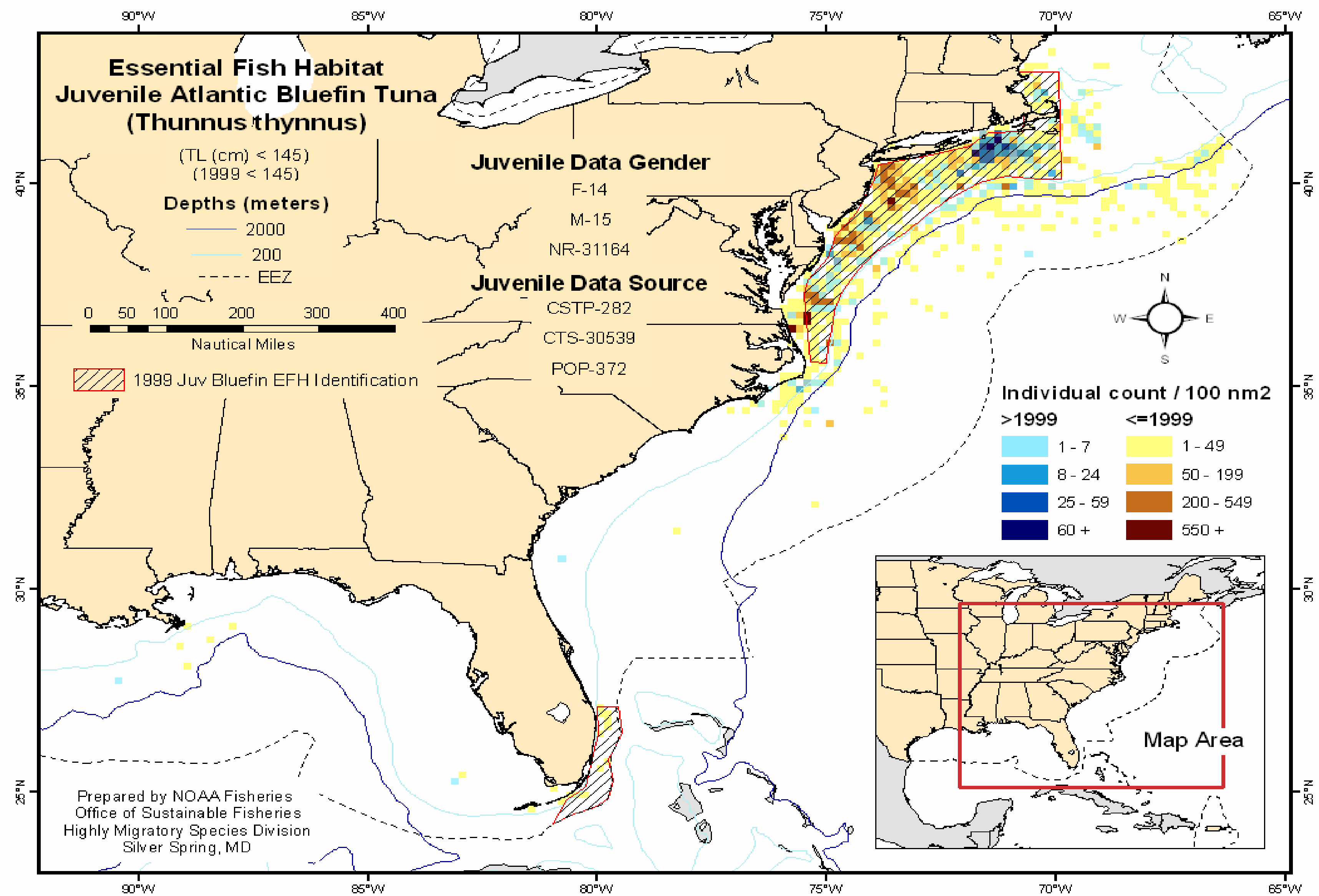


**Figure B.8** **Atlantic Bluefin Tuna: Juveniles.**

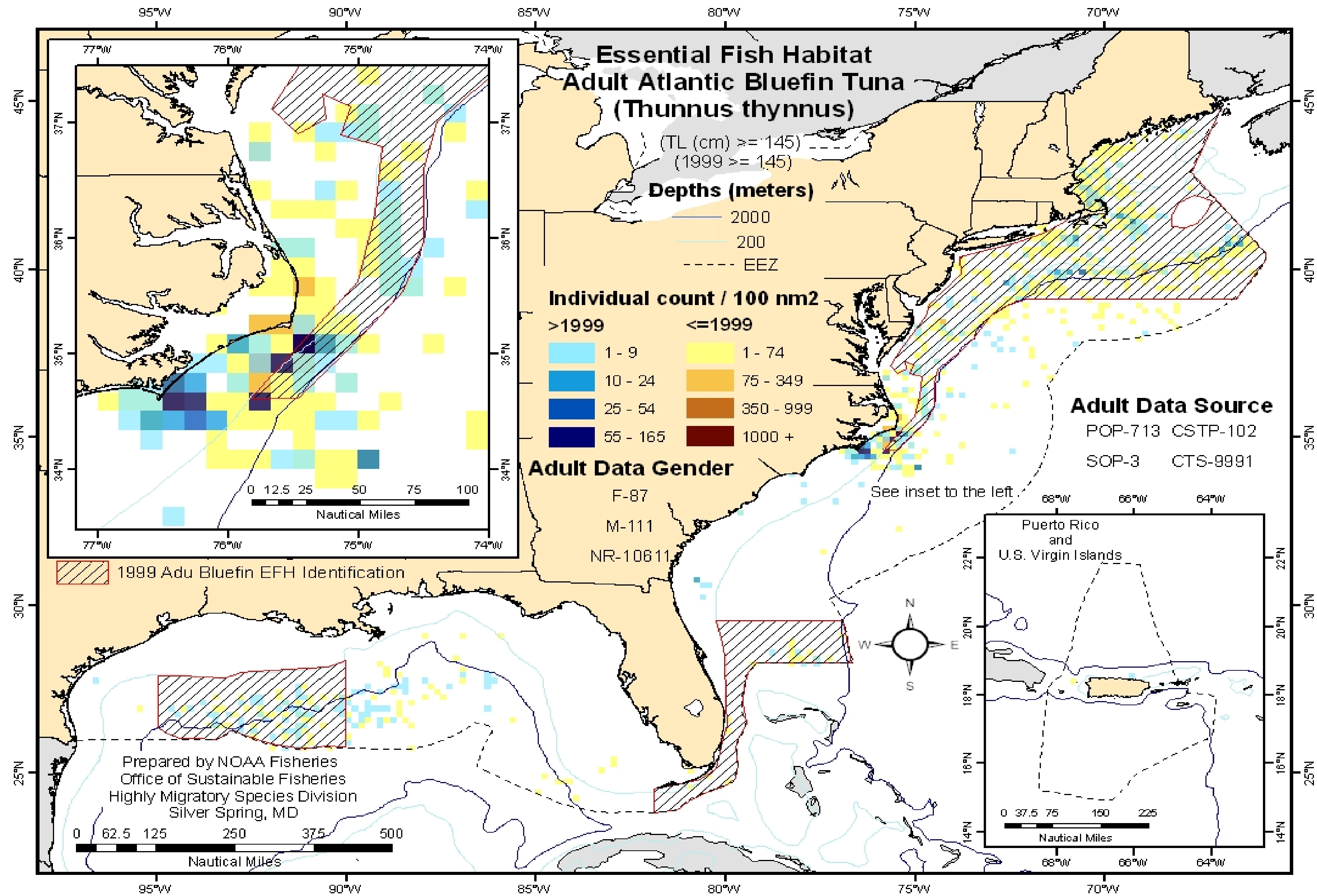


**Figure B.9** **Atlantic Bluefin Tuna: Adults.**

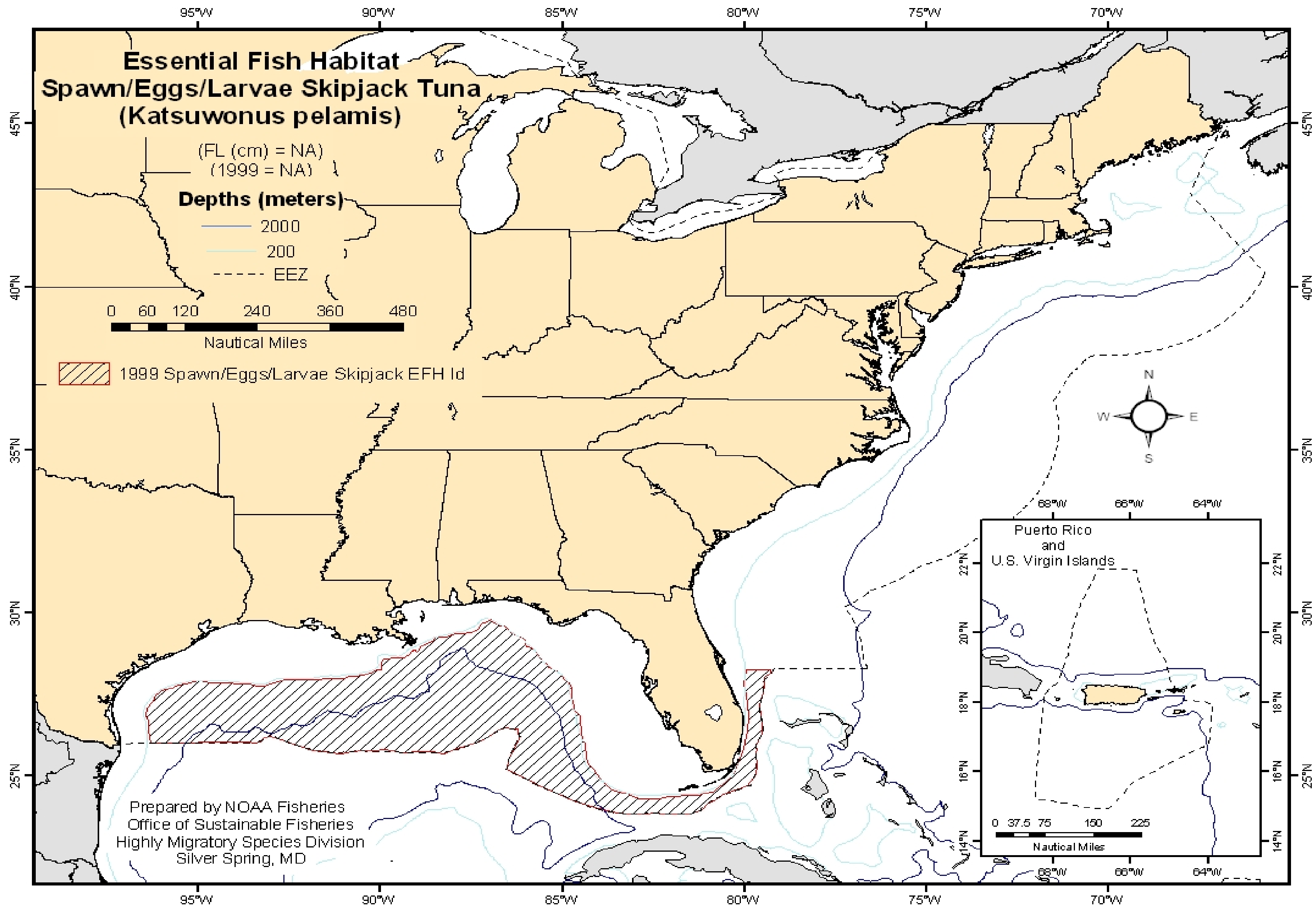


**Figure B.10** Atlantic Skipjack Tuna: Spawning, Eggs, and Larvae.

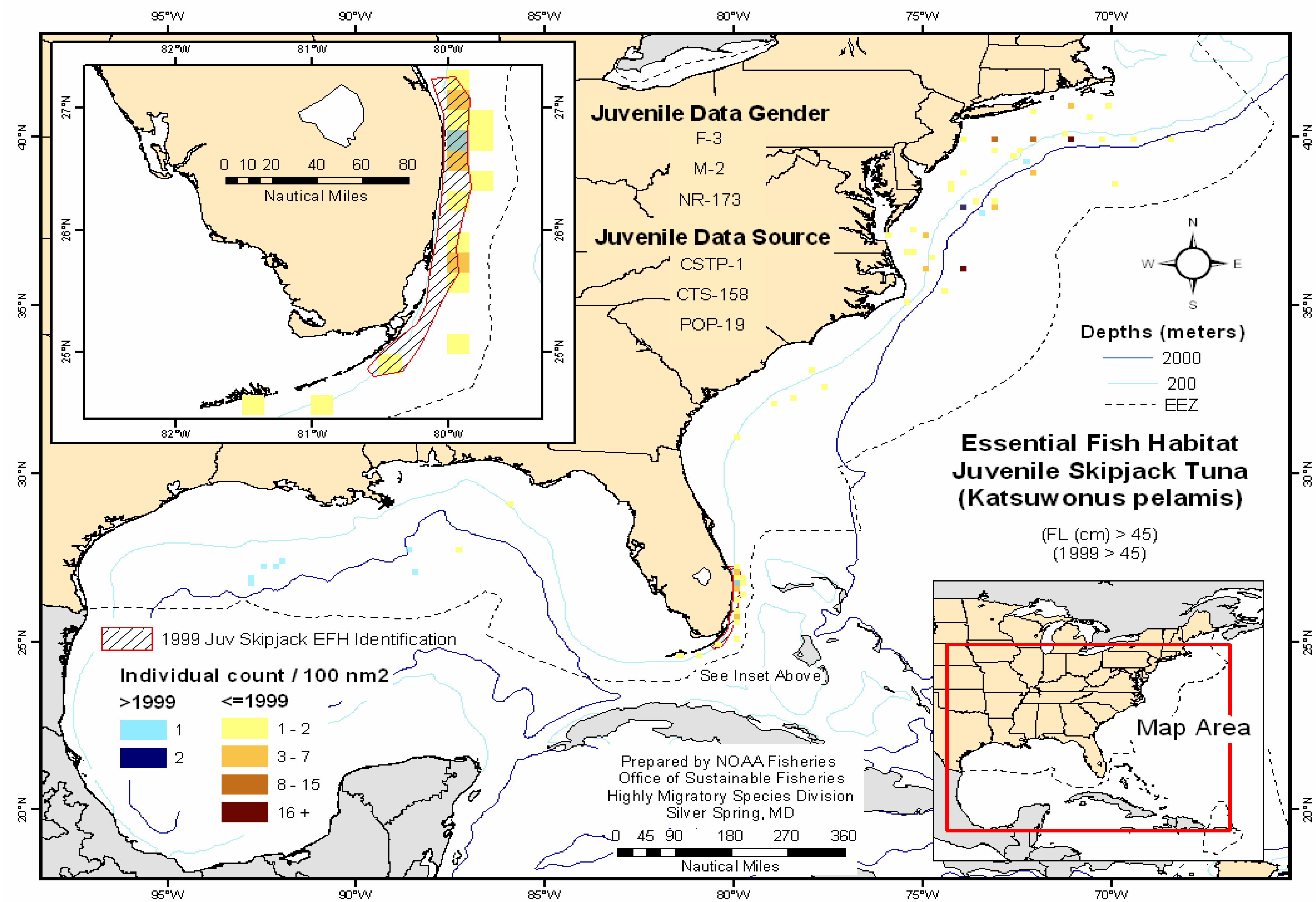


**Figure B.11** Atlantic Skipjack Tuna: Juvenile.

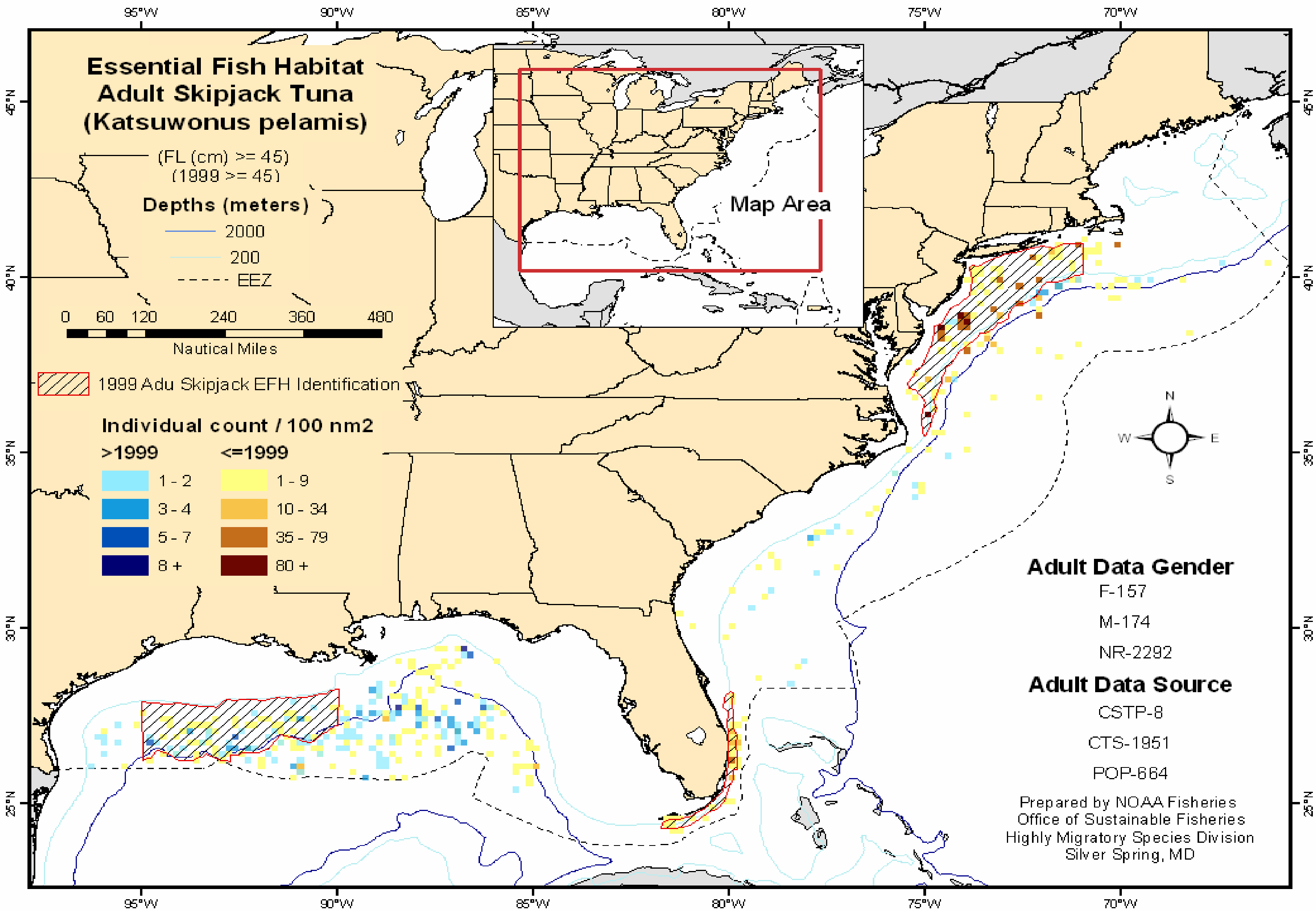


**Figure B.12** Atlantic Skipjack Tuna: Adult.

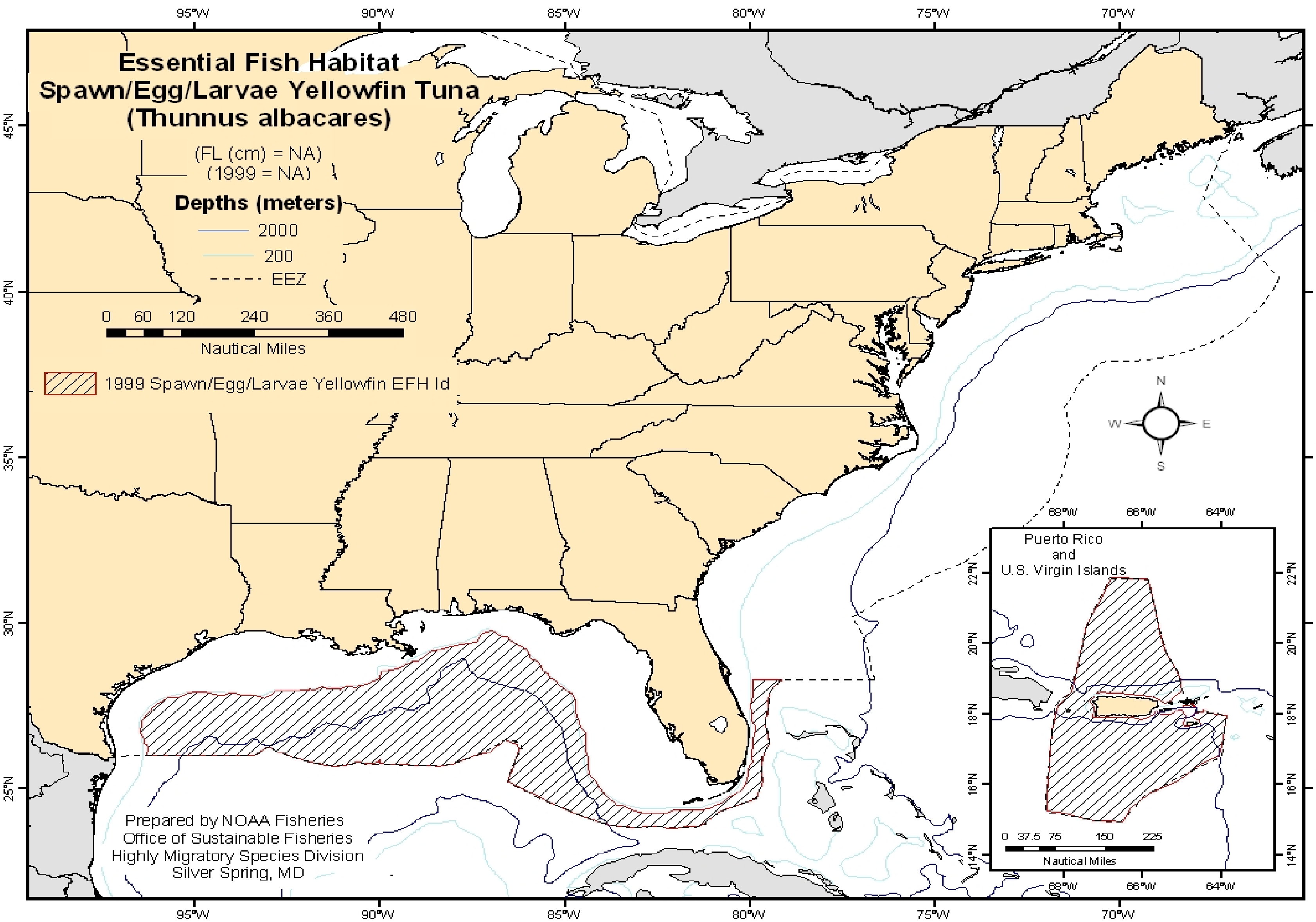


**Figure B.13 Atlantic Yellowfin Tuna: Spawning, Eggs, and Larvae.**

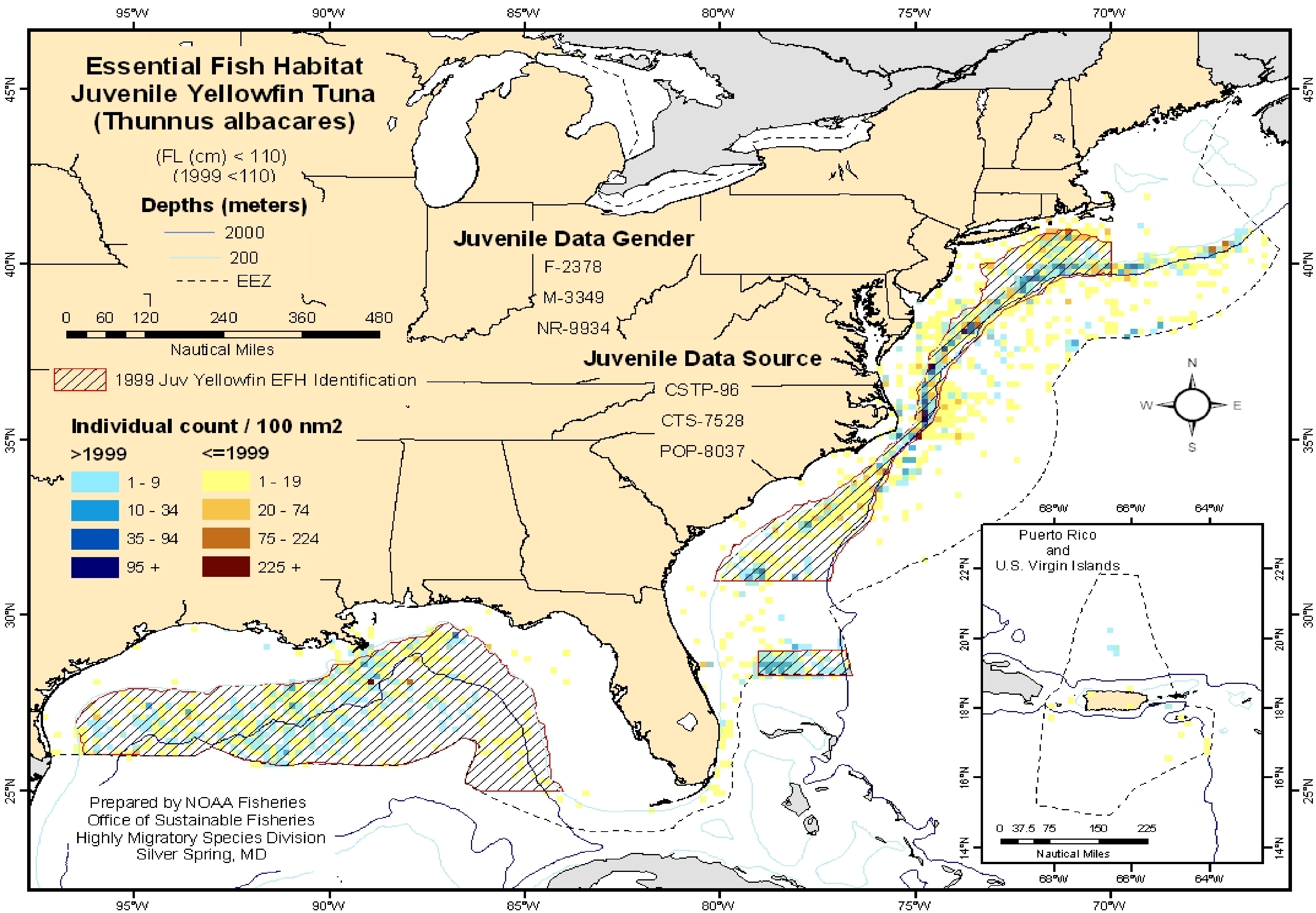


**Figure B.14** Atlantic Yellowfin Tuna: Juvenile.

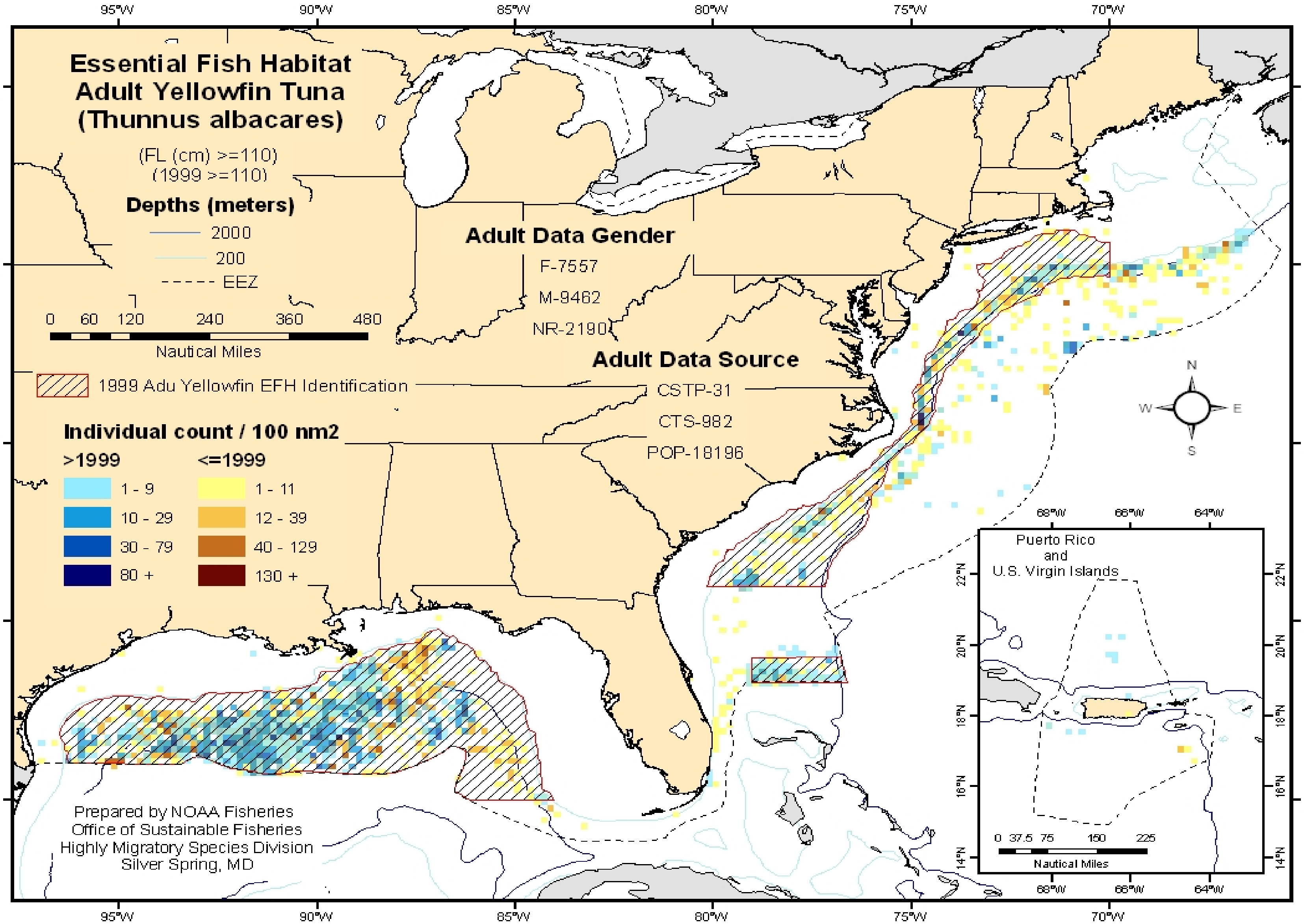


**Figure B.15** Atlantic Yellowfin Tuna: Adult.

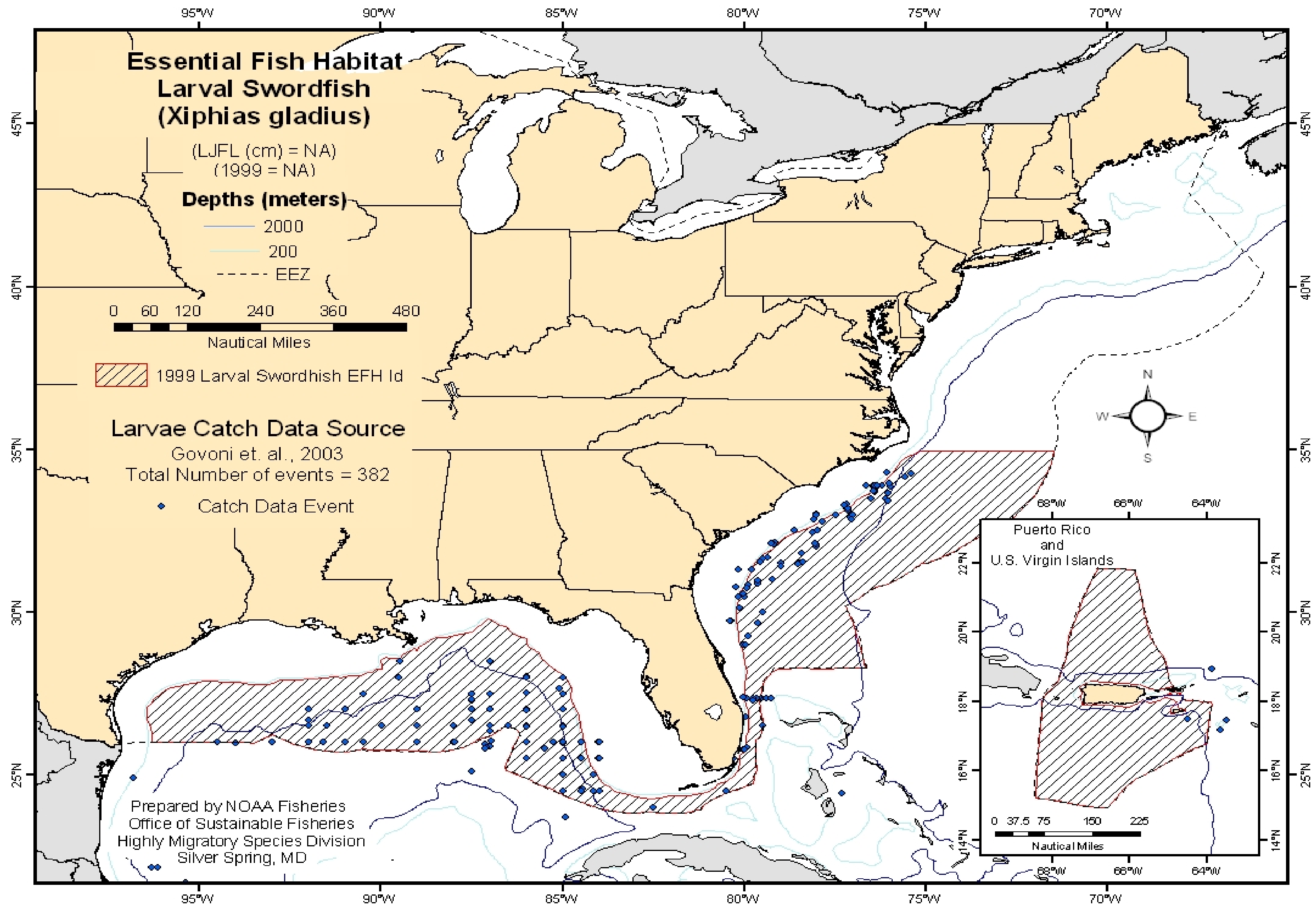


**Figure B.16** Atlantic Swordfish: Spawning, Eggs, and Larvae.

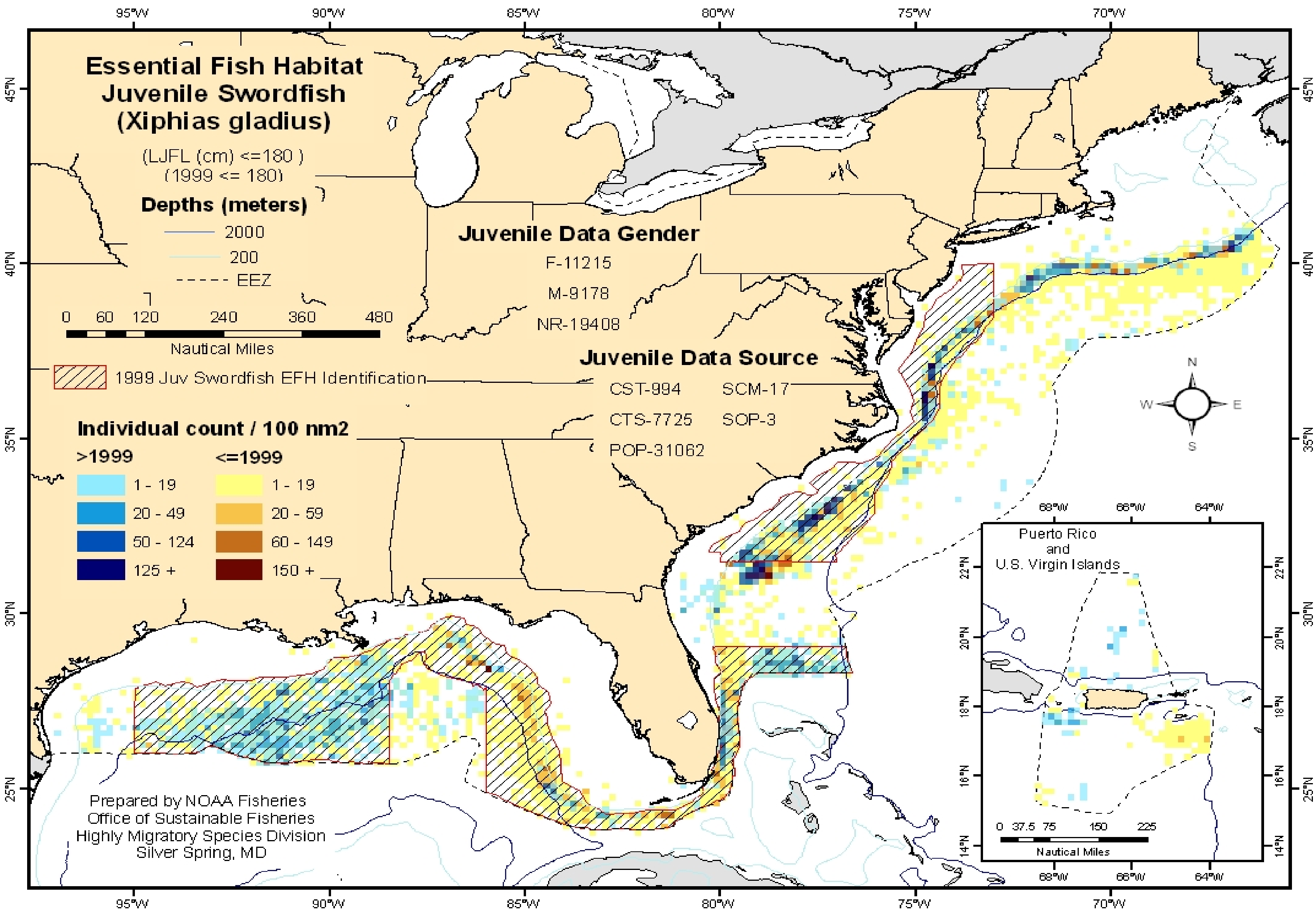


**Figure B.17** **Atlantic Swordfish: Juvenile.**

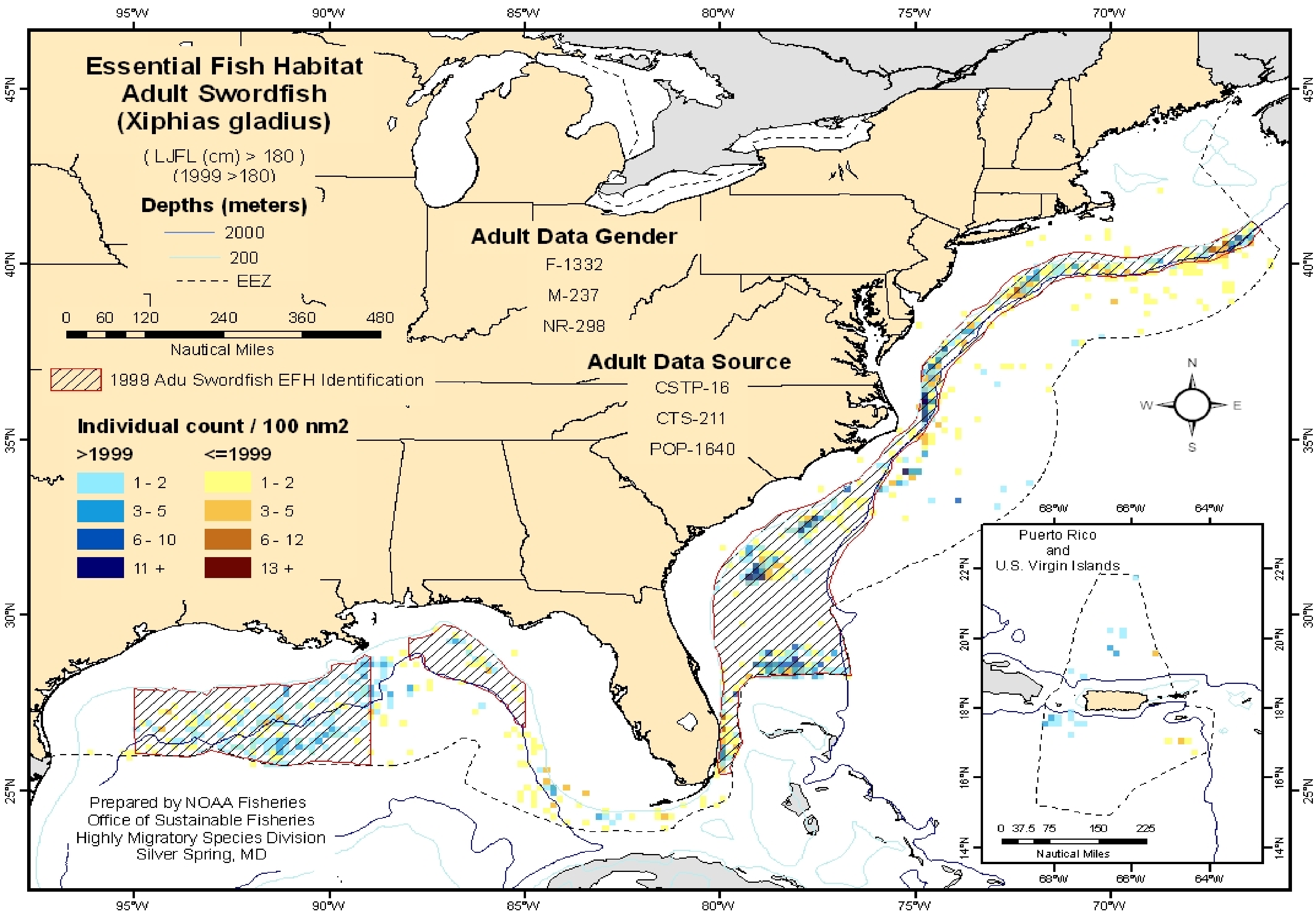


**Figure B.18** **Atlantic Swordfish: Adult.**

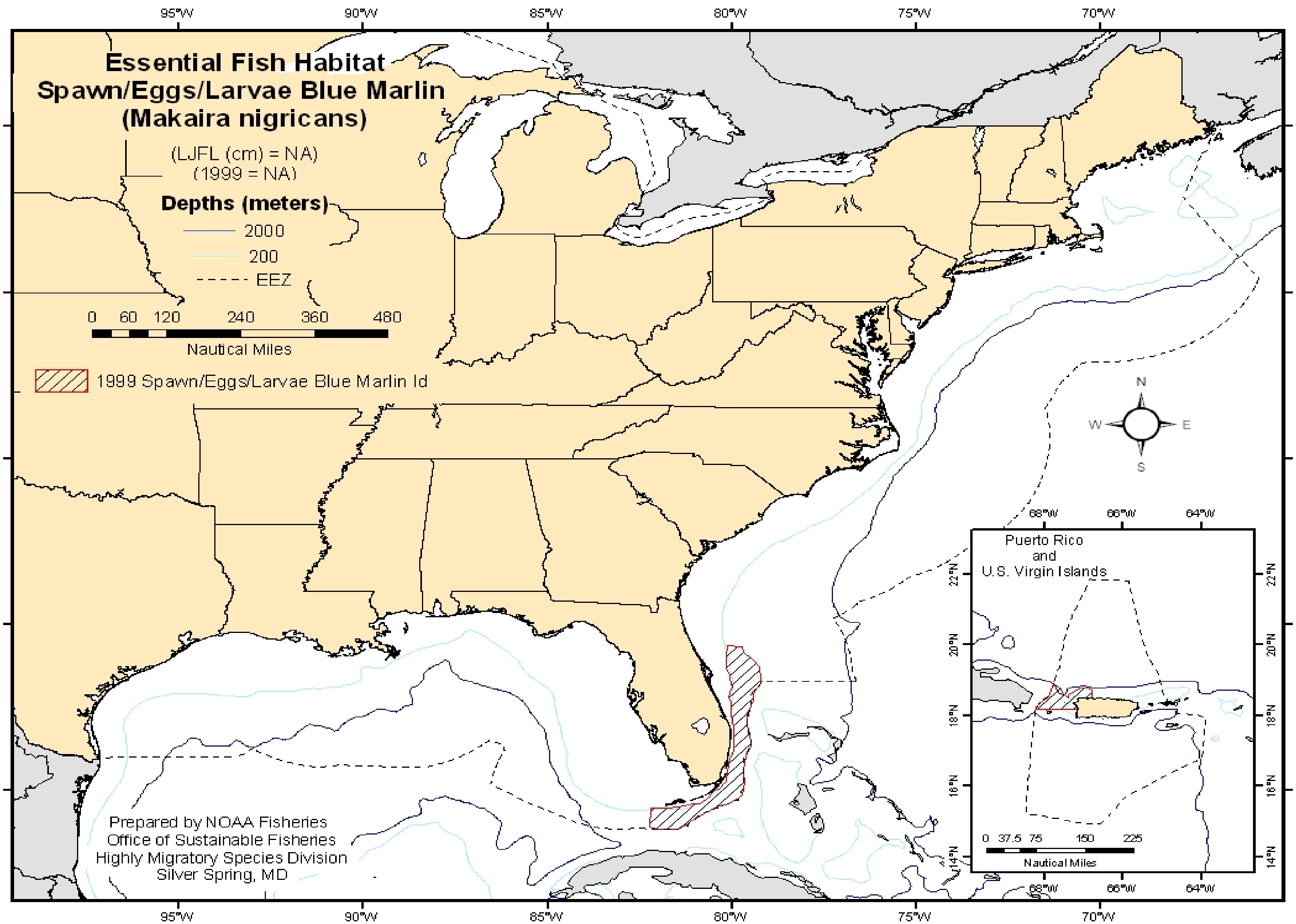


**Figure B.19** Blue Marlin: Spawning, Eggs, and Larvae.

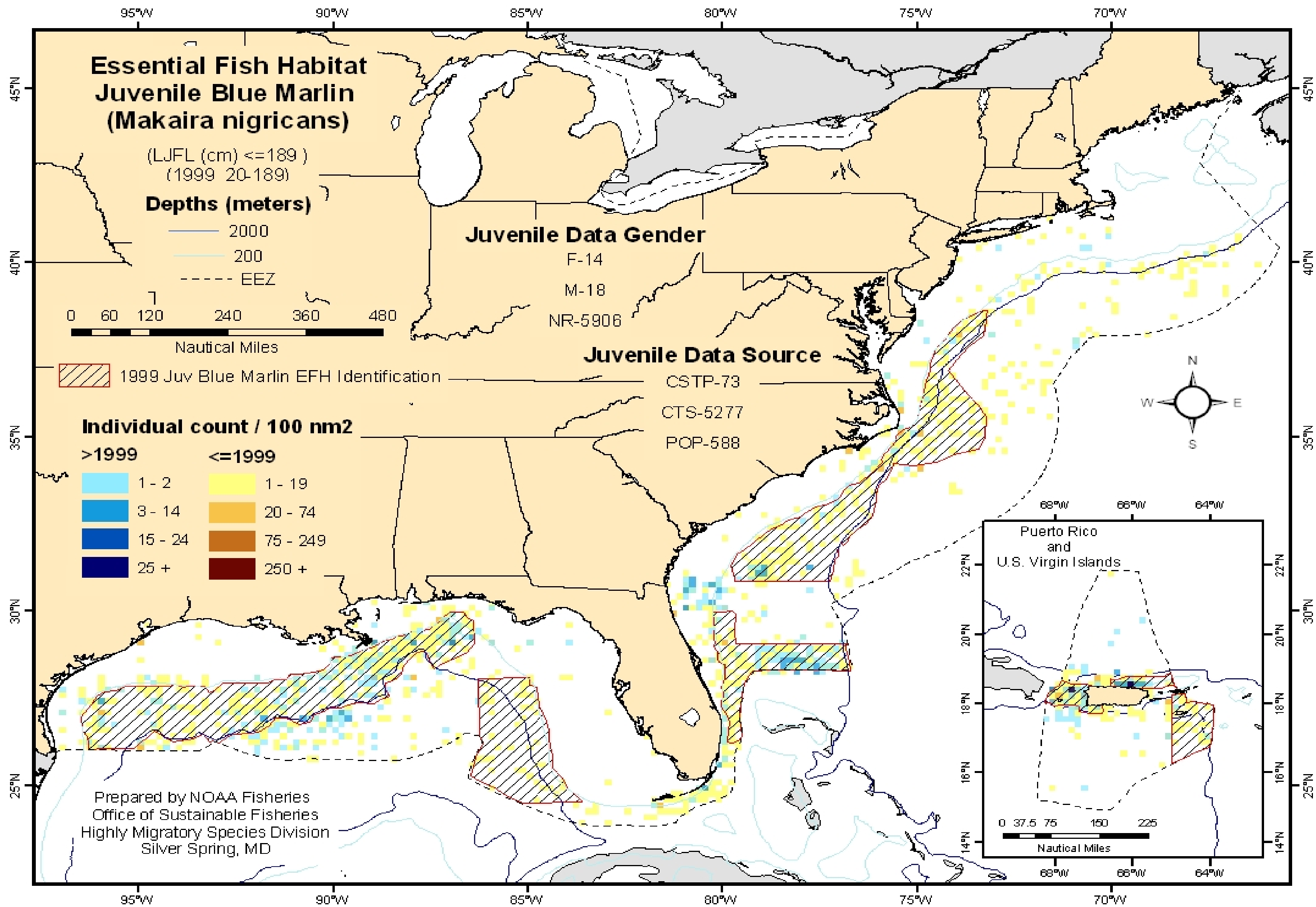


**Figure B.20** **Blue Marlin: Juvenile.**

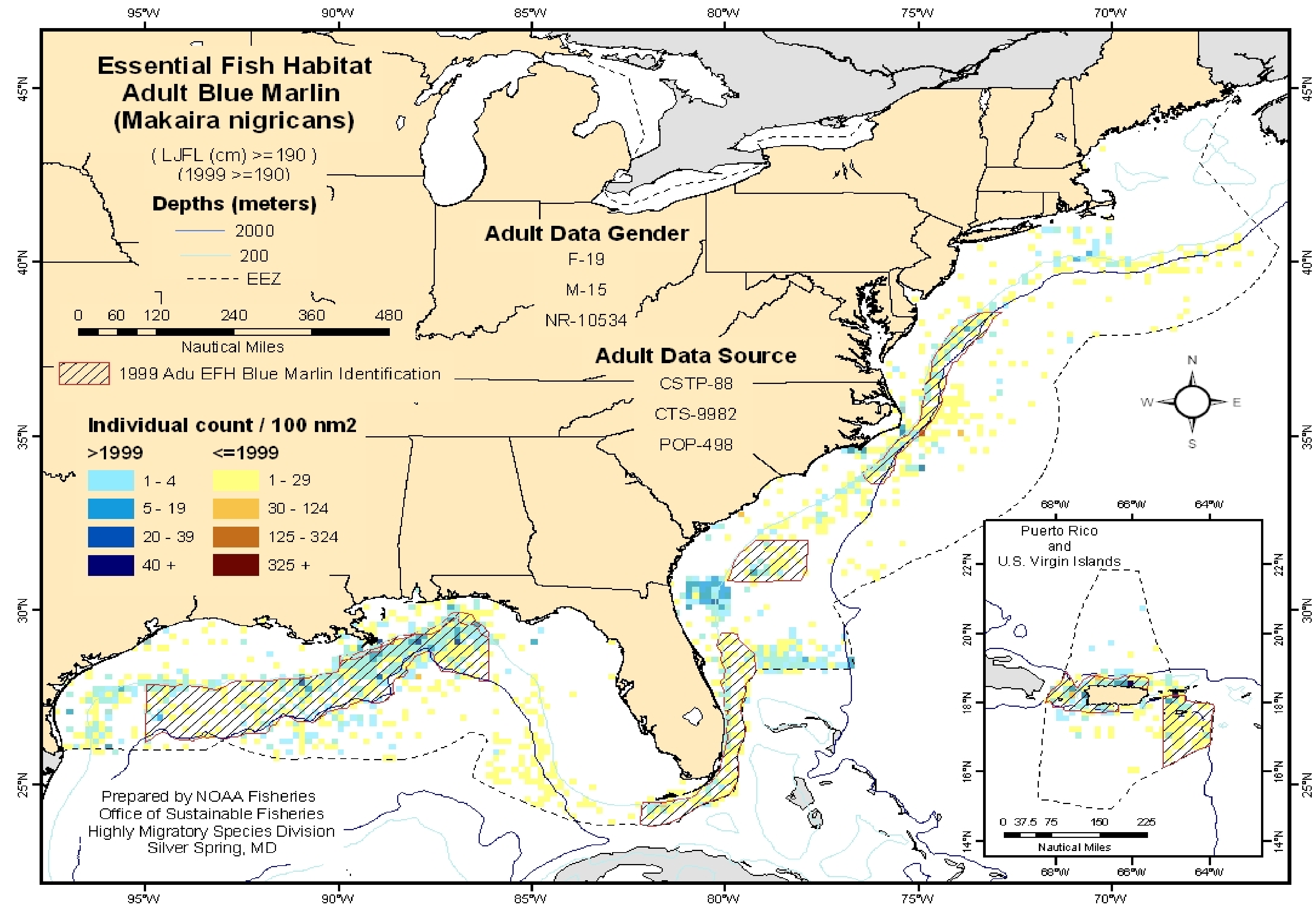


**Figure B.21** Blue Marlin: Adult.

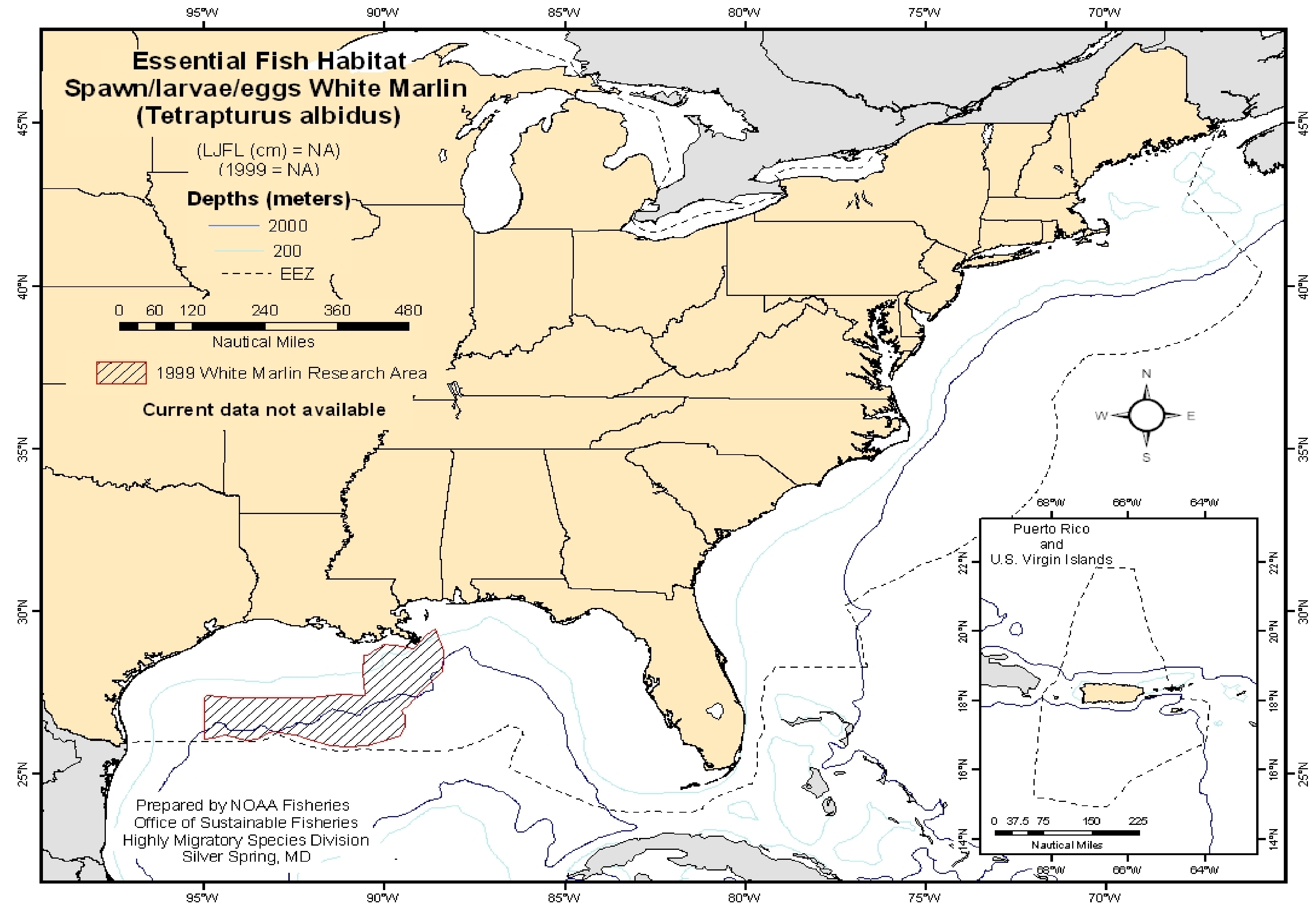


**Figure B.22** **White Marlin: Spawning, Eggs, and larvae.**

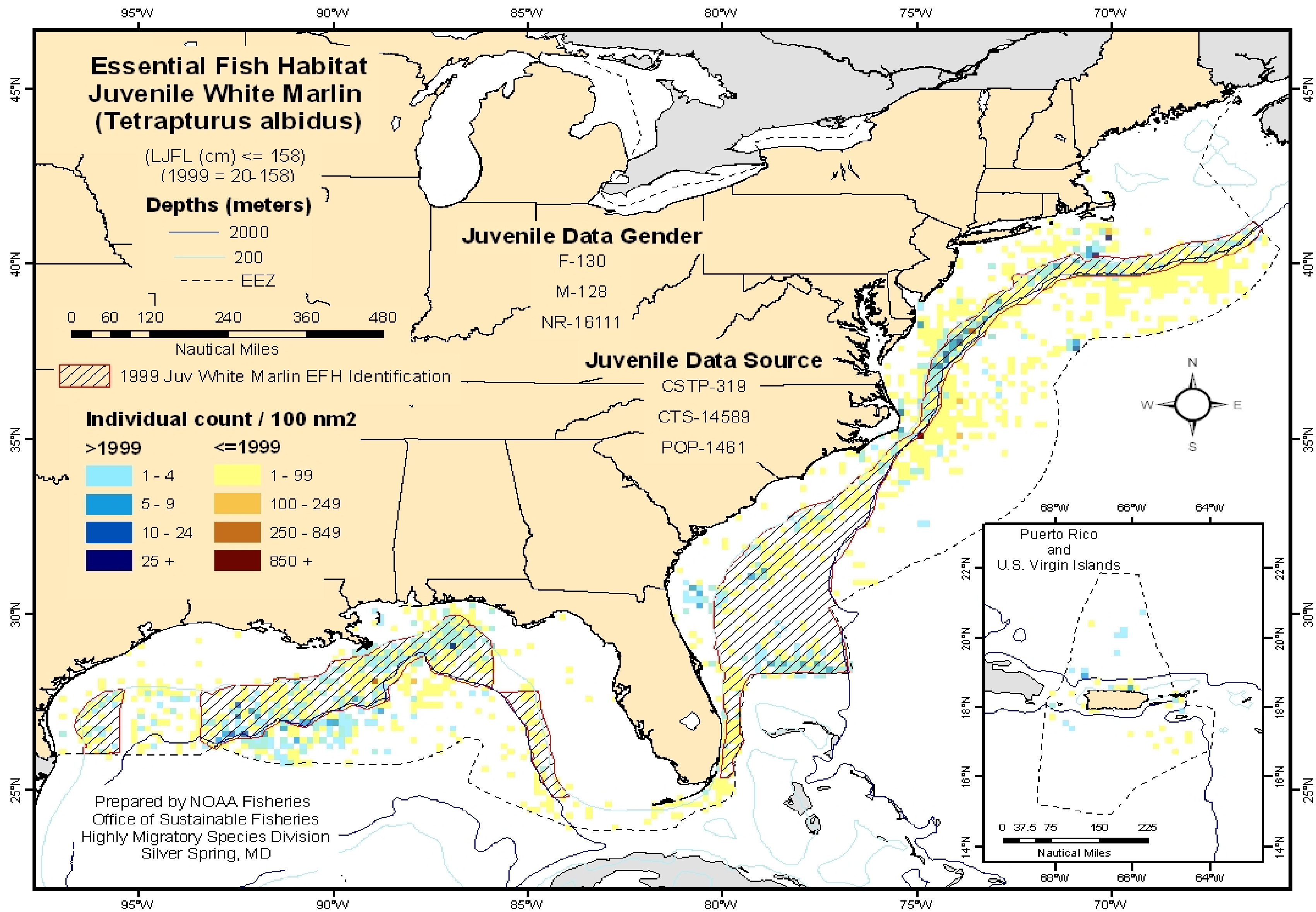


**Figure B.23 White Marlin: Juvenile.**

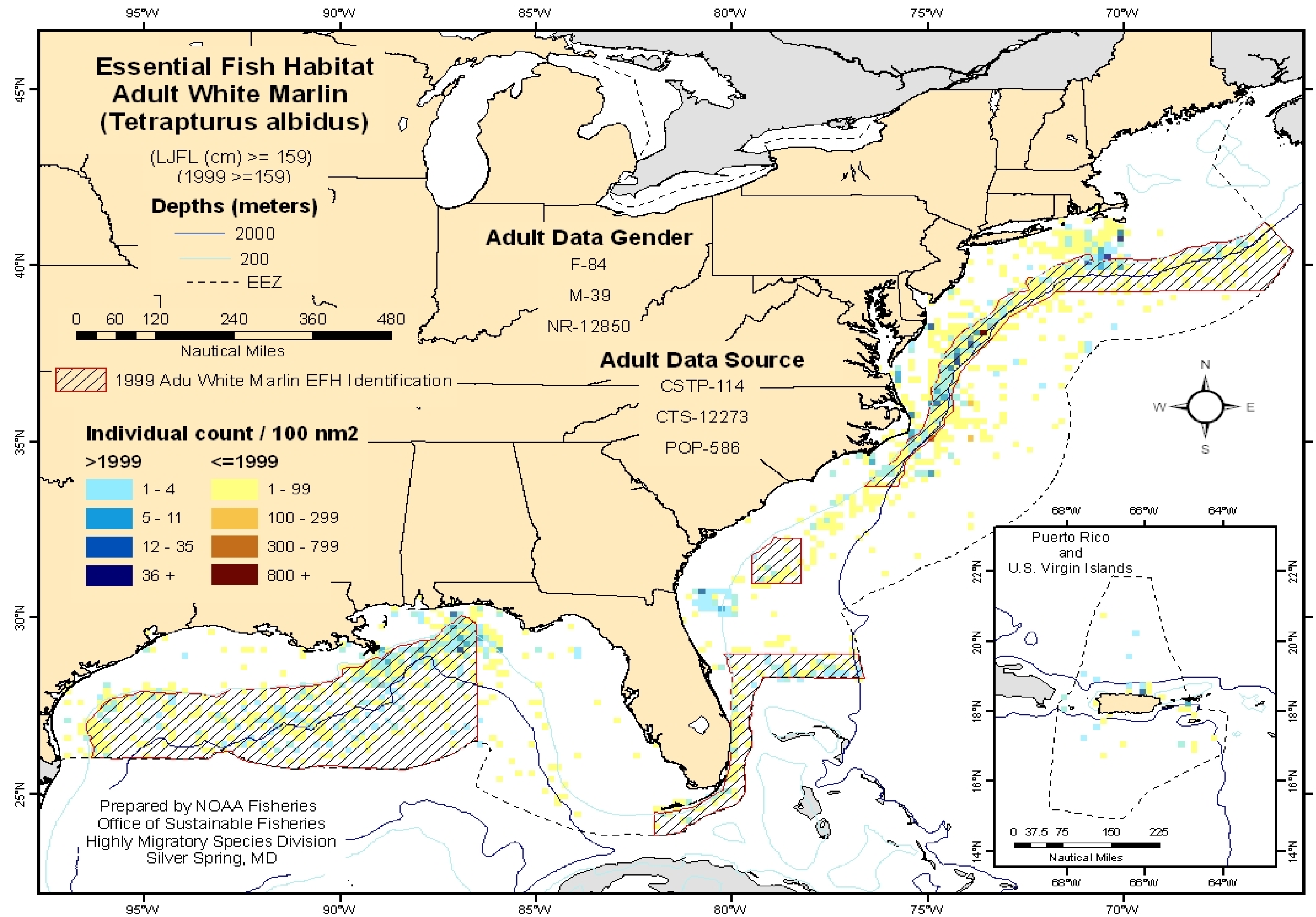


**Figure B.24** White Marlin: Adult.

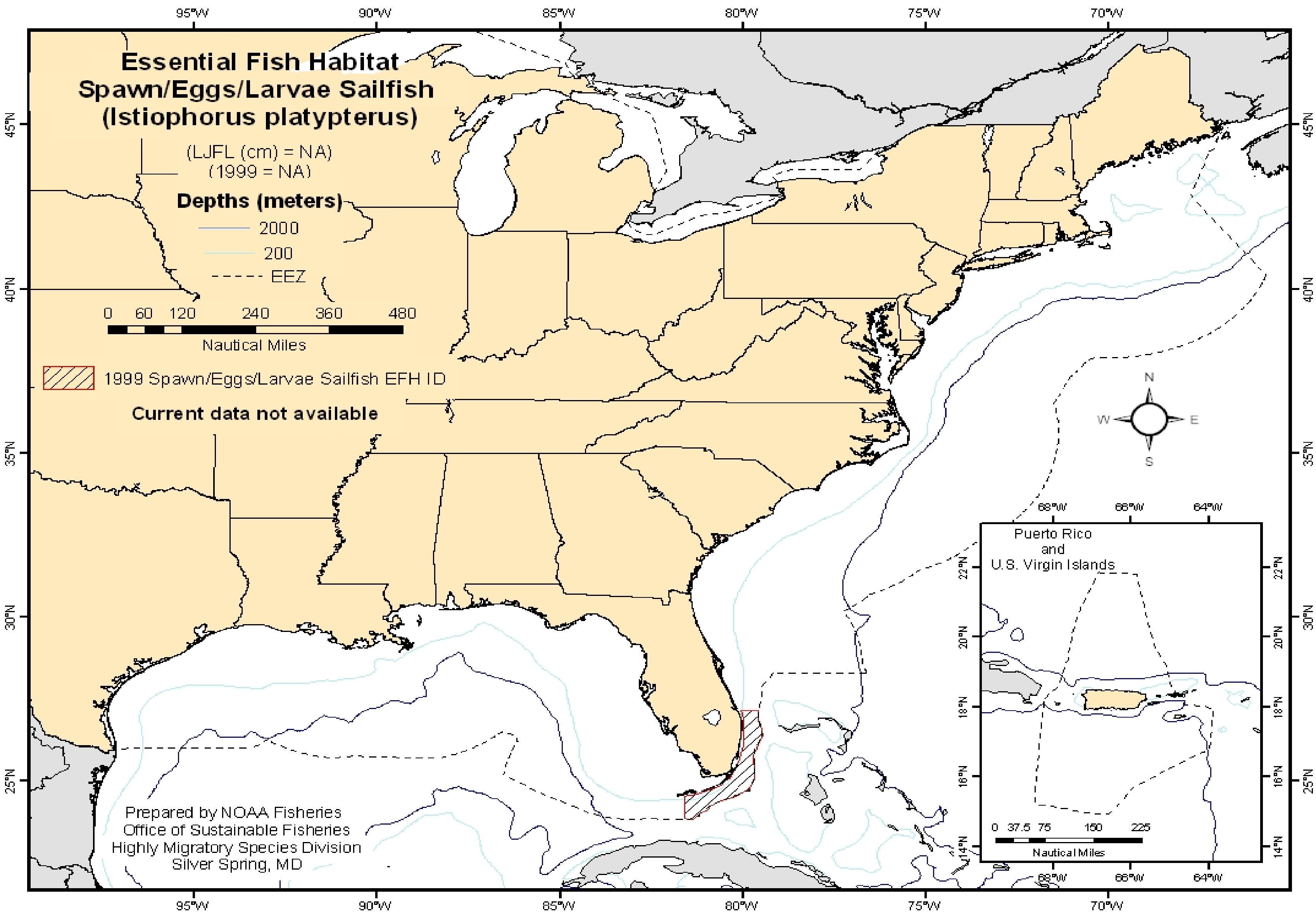


**Figure B.25 Sailfish: Spawning, Eggs, and Larvae.**

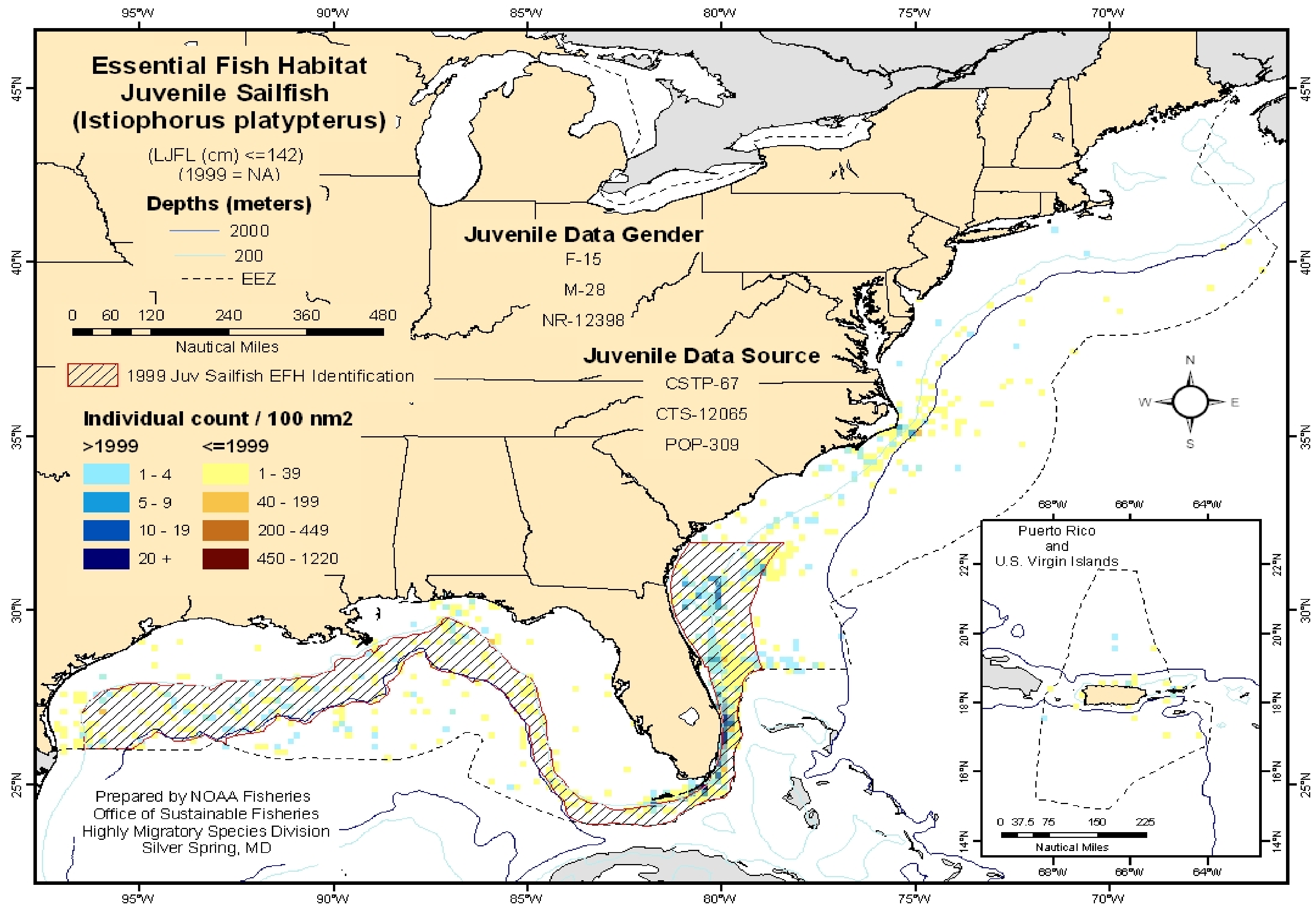


**Figure B.26** **Sailfish: Juvenile.**

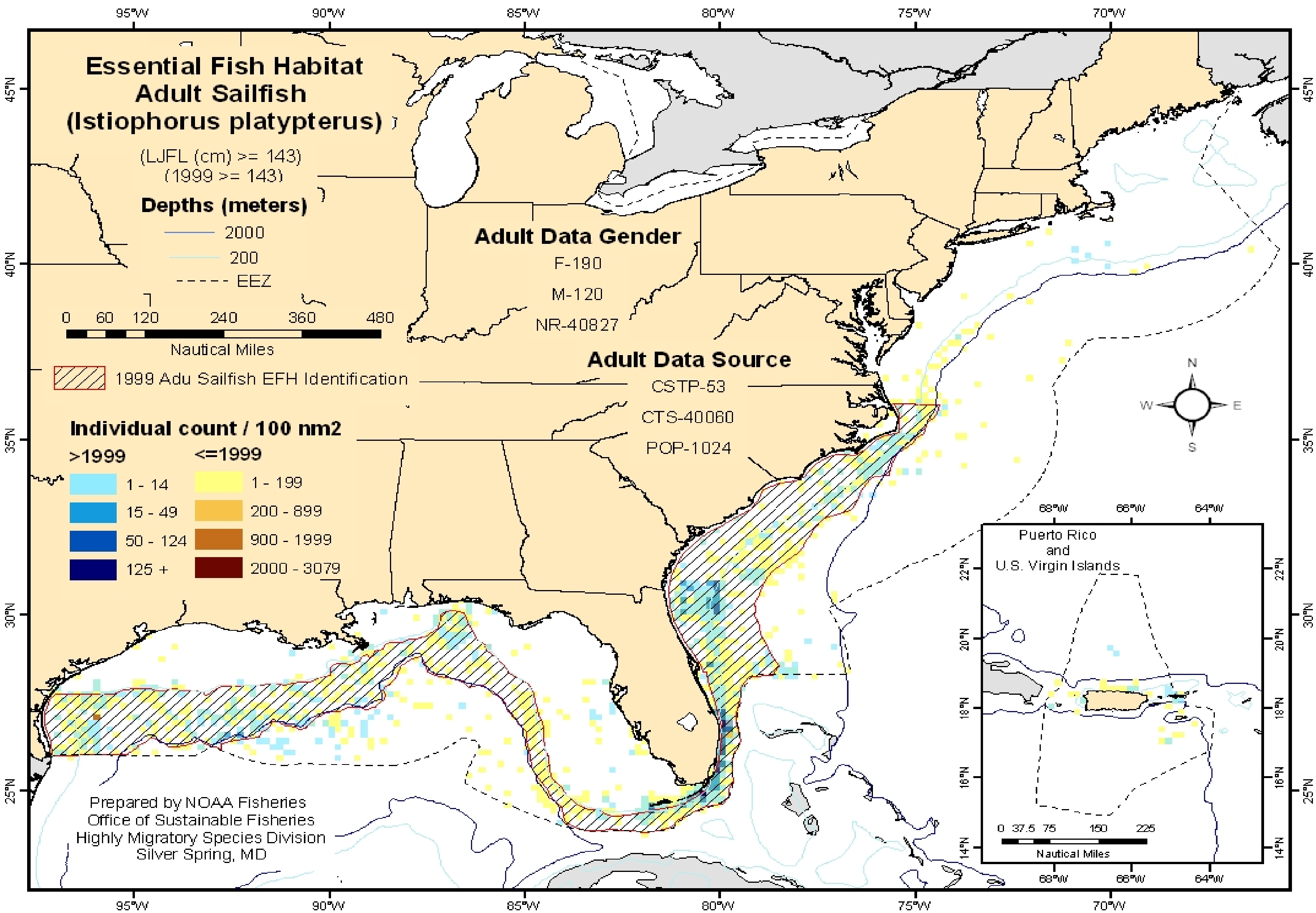


**Figure B.27 Sailfish: Adult.**

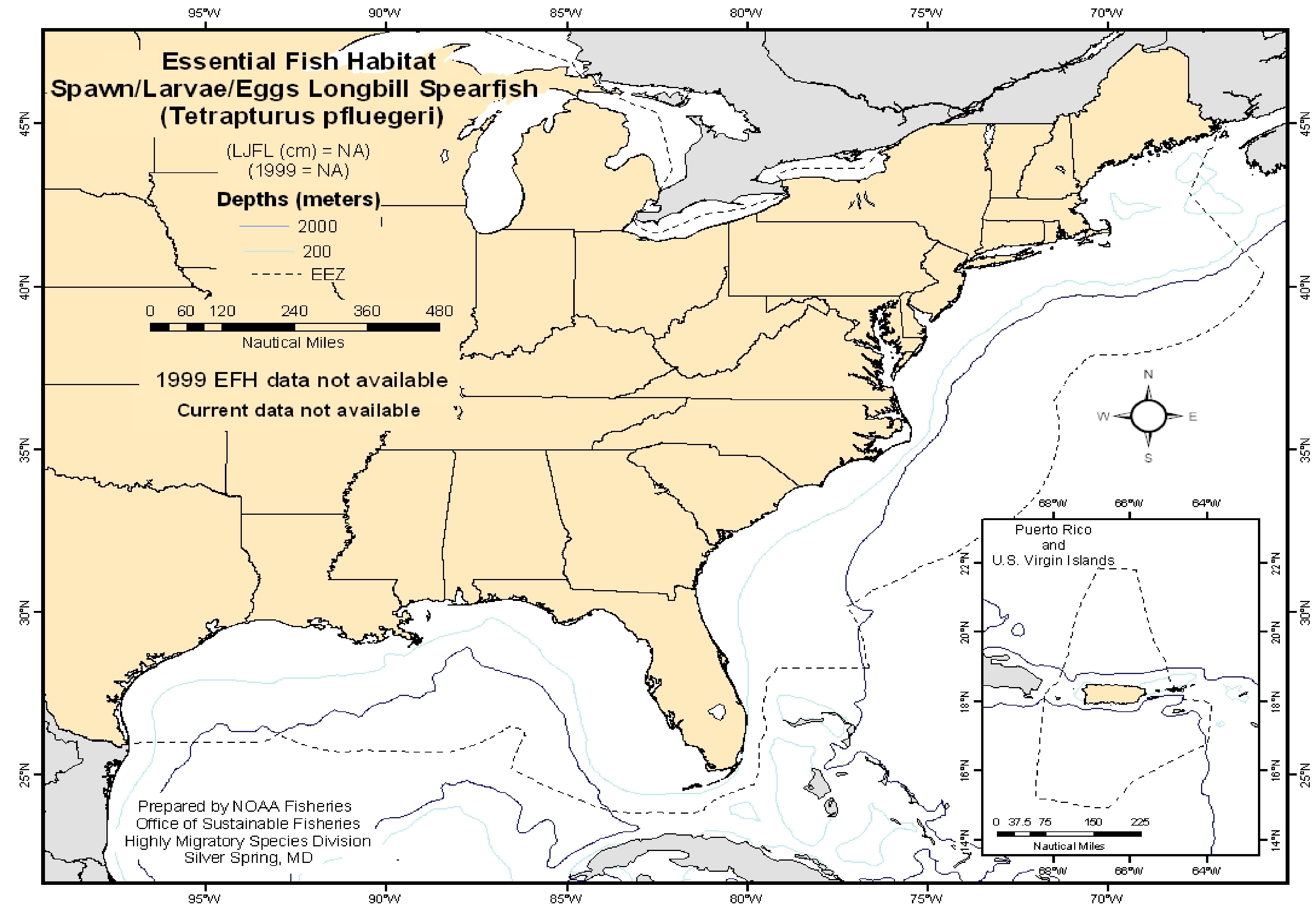


**Figure B.28** **Spearfish: Spawning, Eggs, and Larvae.**

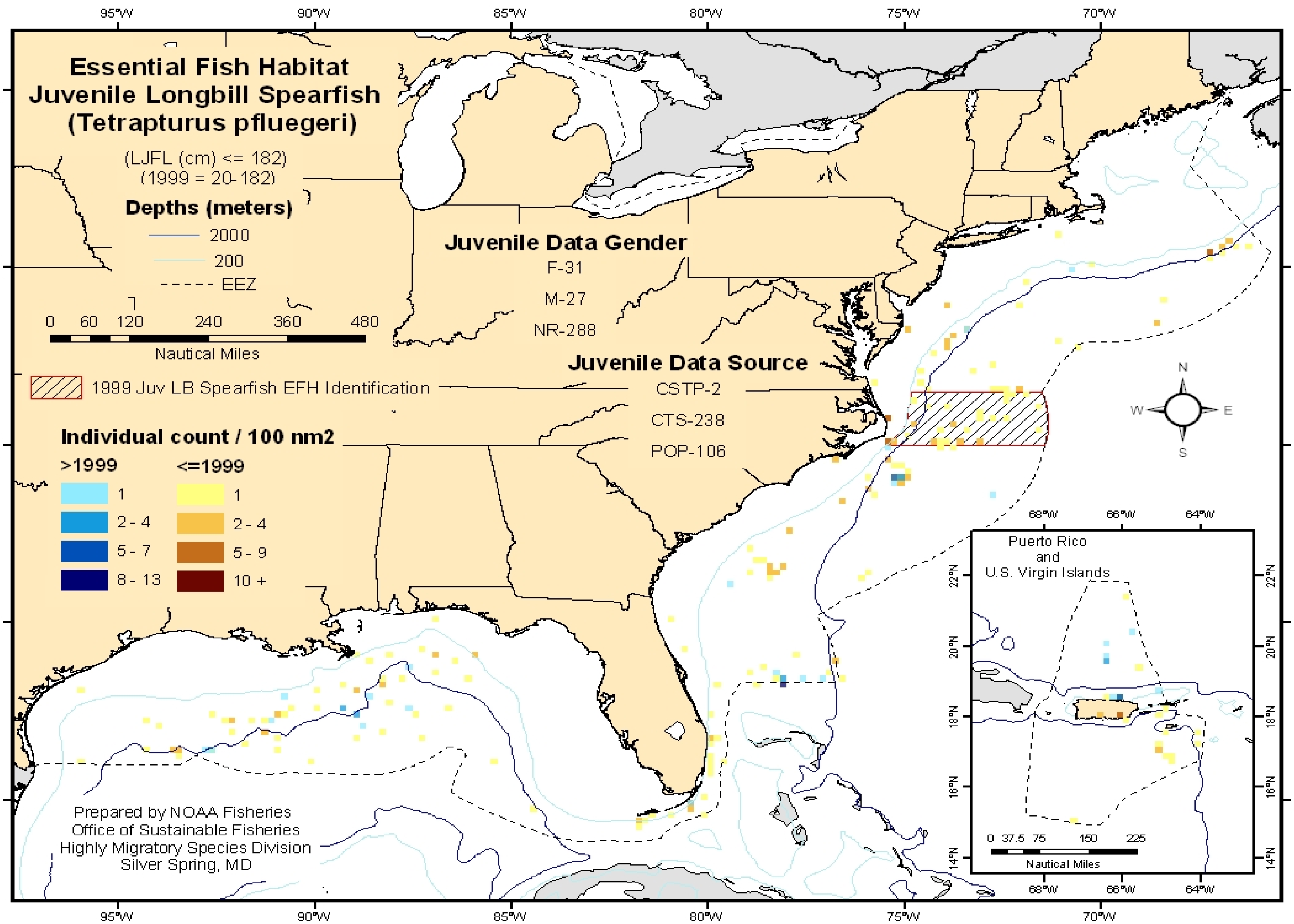


**Figure B.29** Spearfish: Juvenile.

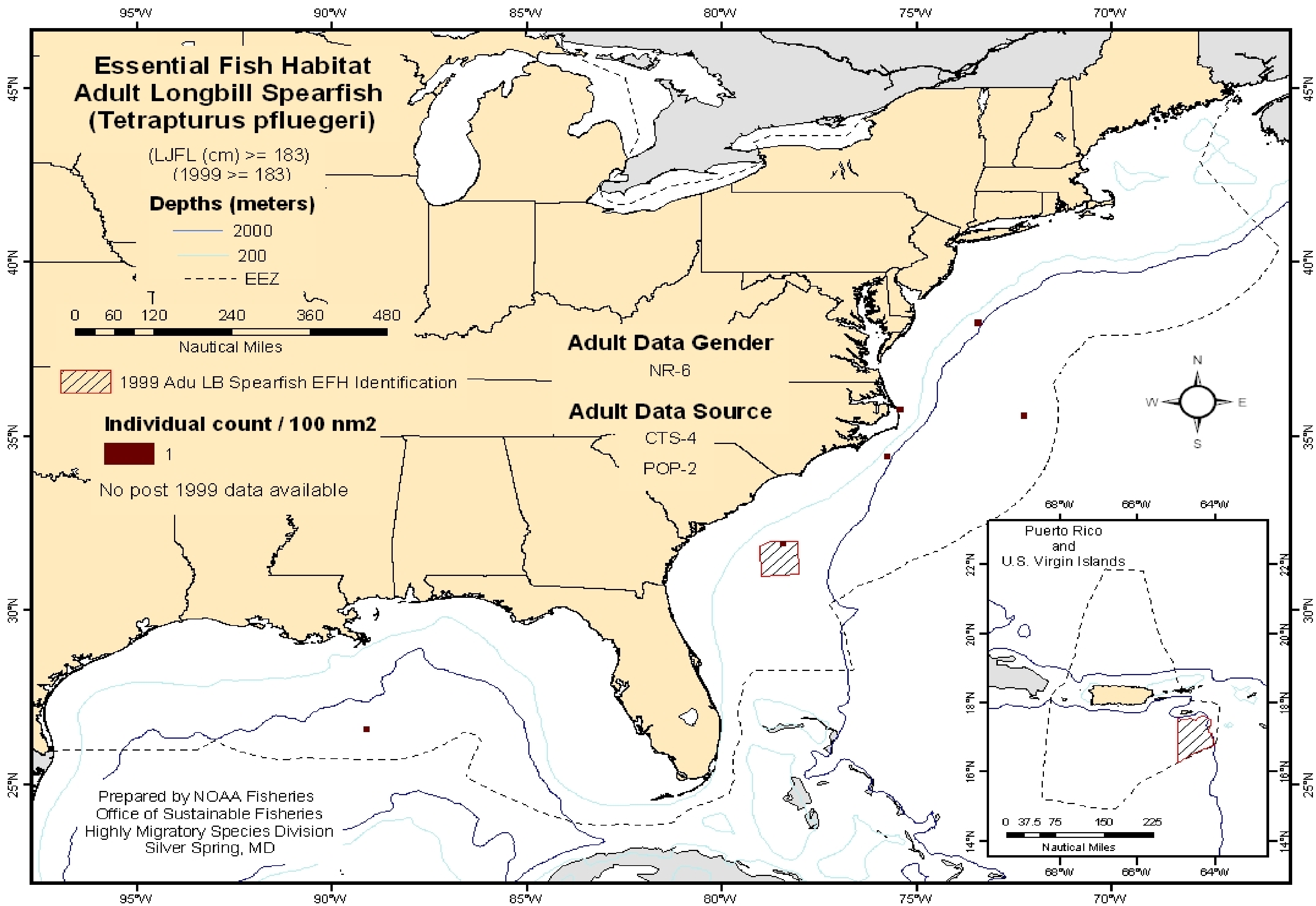


**Figure B.30 Spearfish: Adult.**

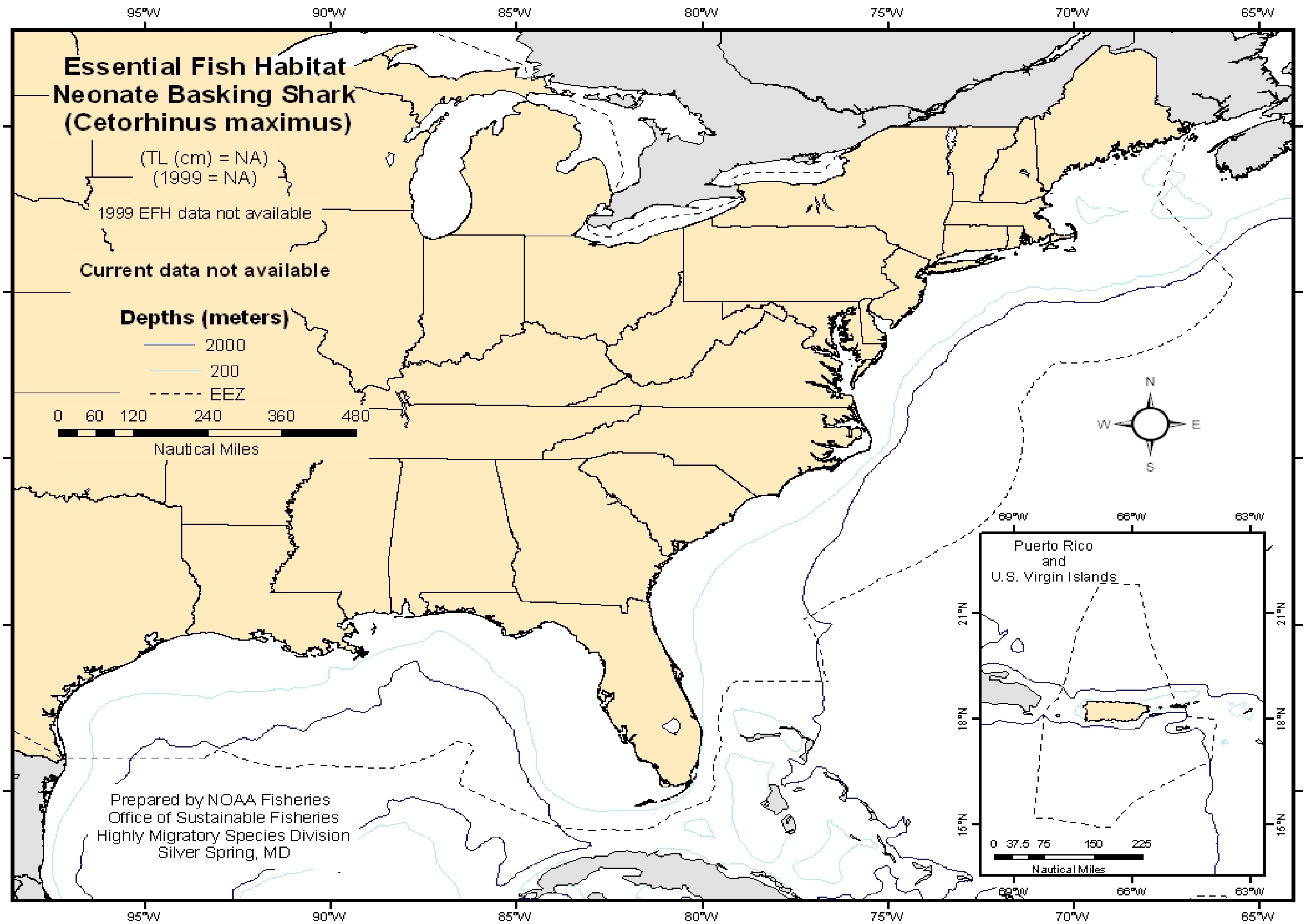


**Figure B.31 Basking Shark: Neonate.**

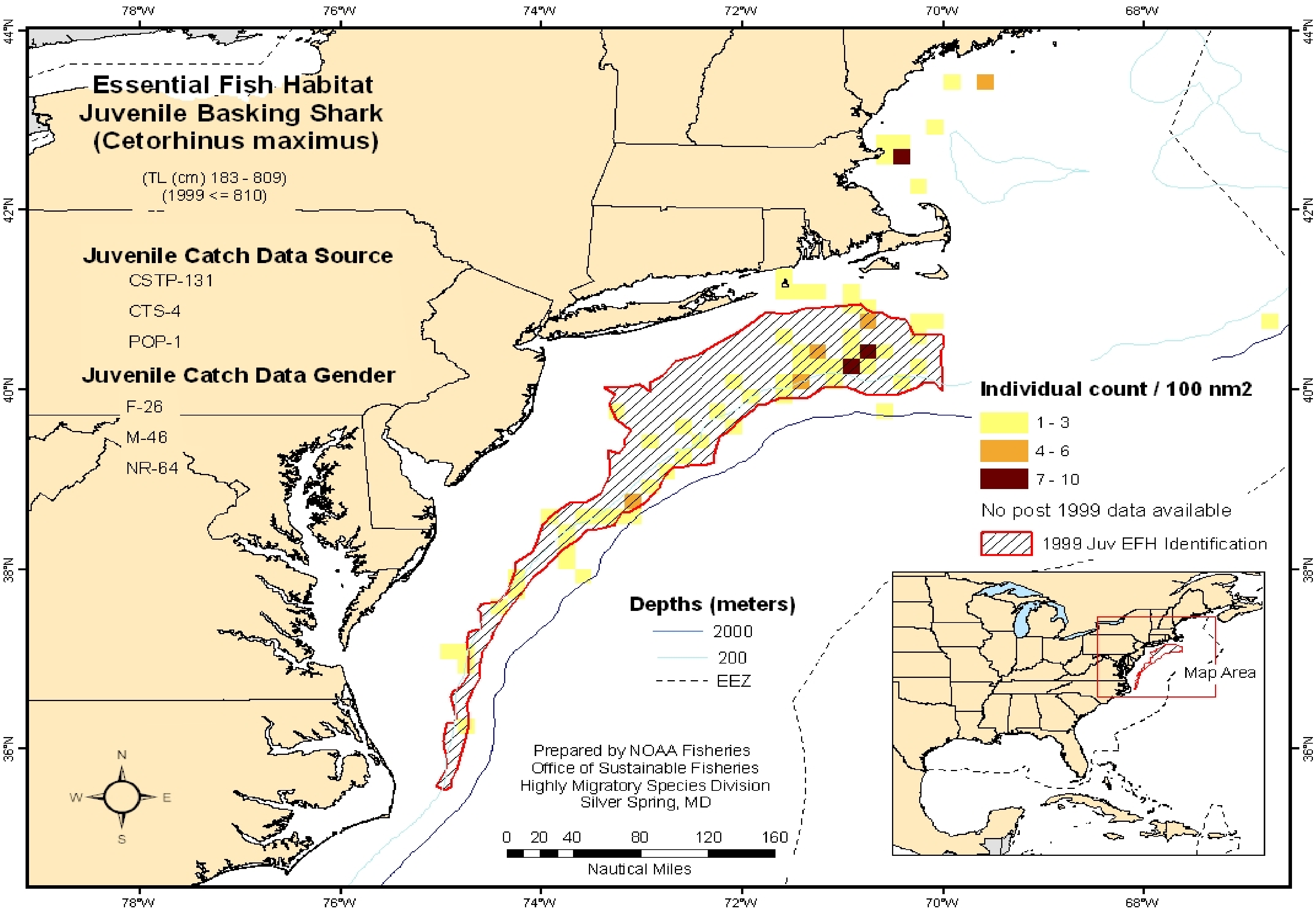


**Figure B.32** **Basking Shark: Juvenile.**

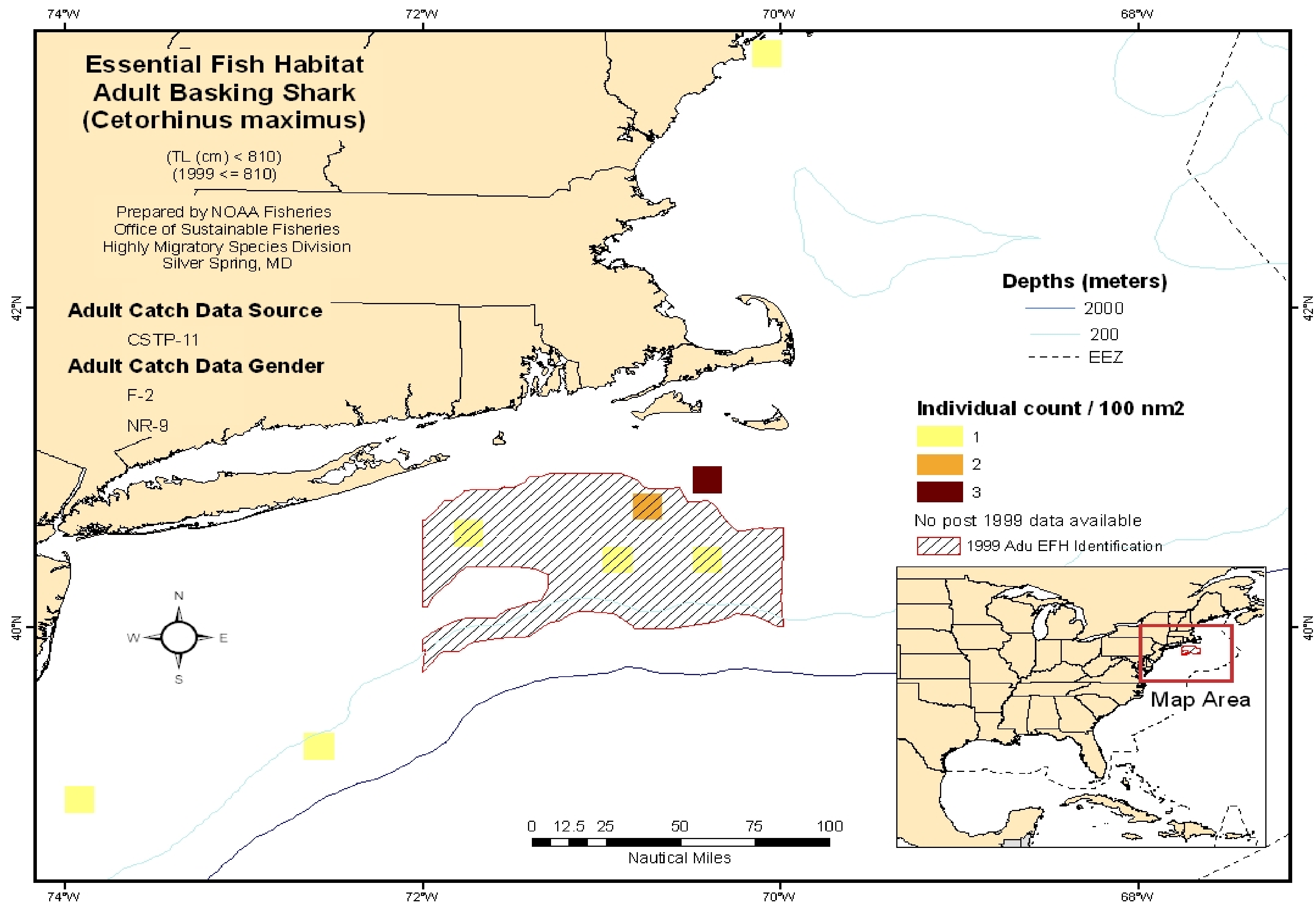


**Figure B.33** **Basking Shark: Adult.**

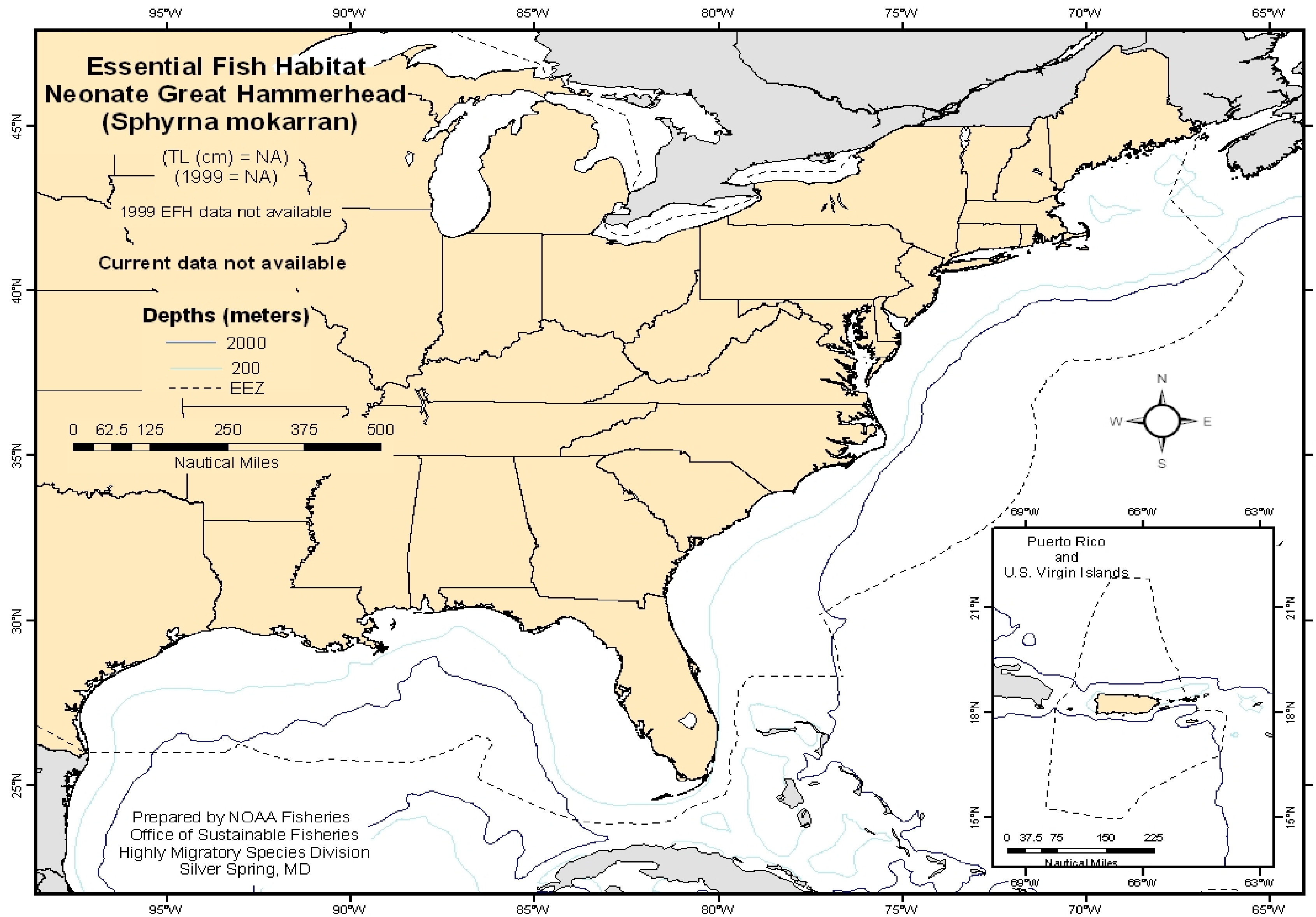


**Figure B.34** **Great Hammerhead: Neonate.**

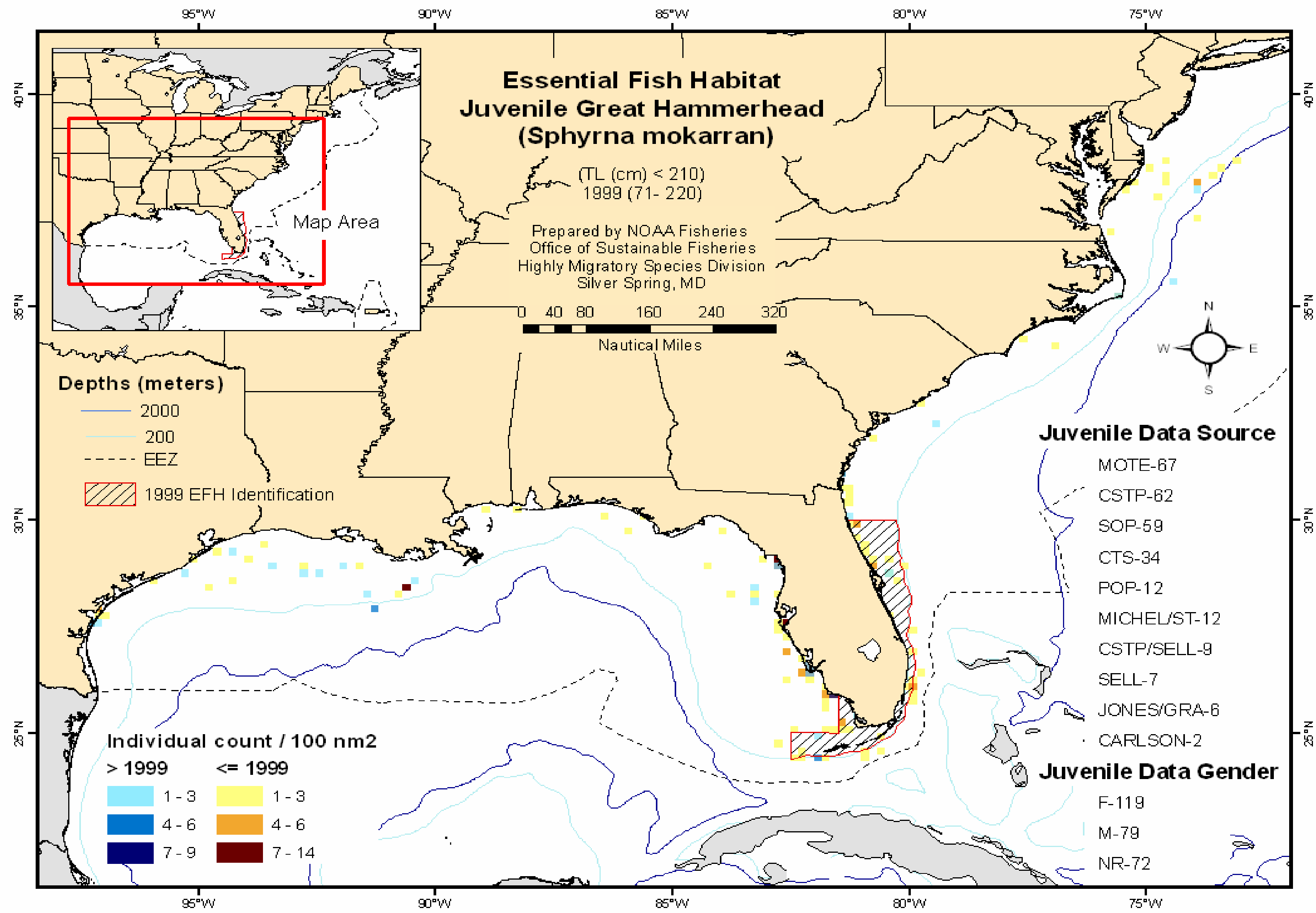


**Figure B.35** **Great Hammerhead: Juvenile.**

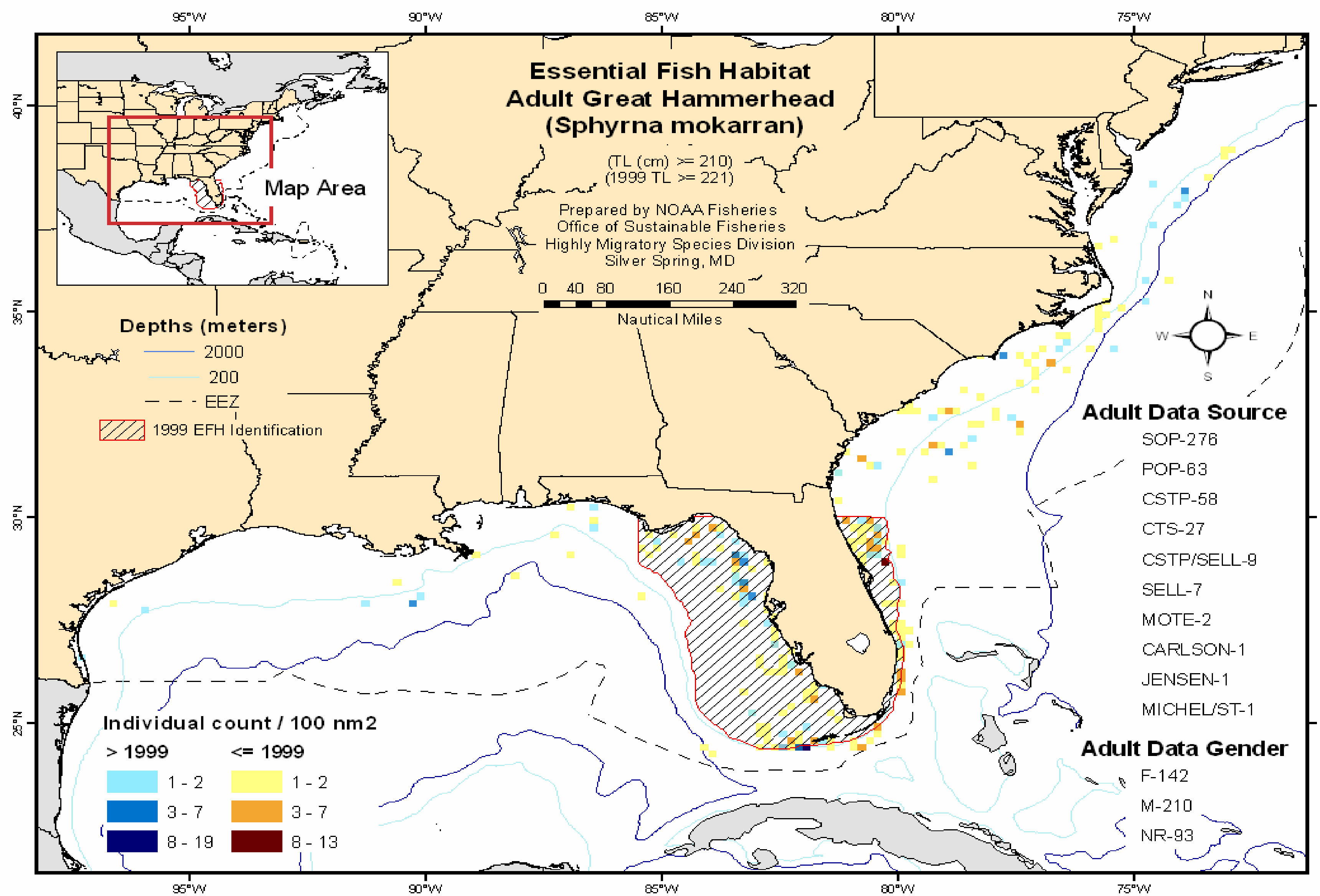


**Figure B.36** Great Hammerhead: Adult.

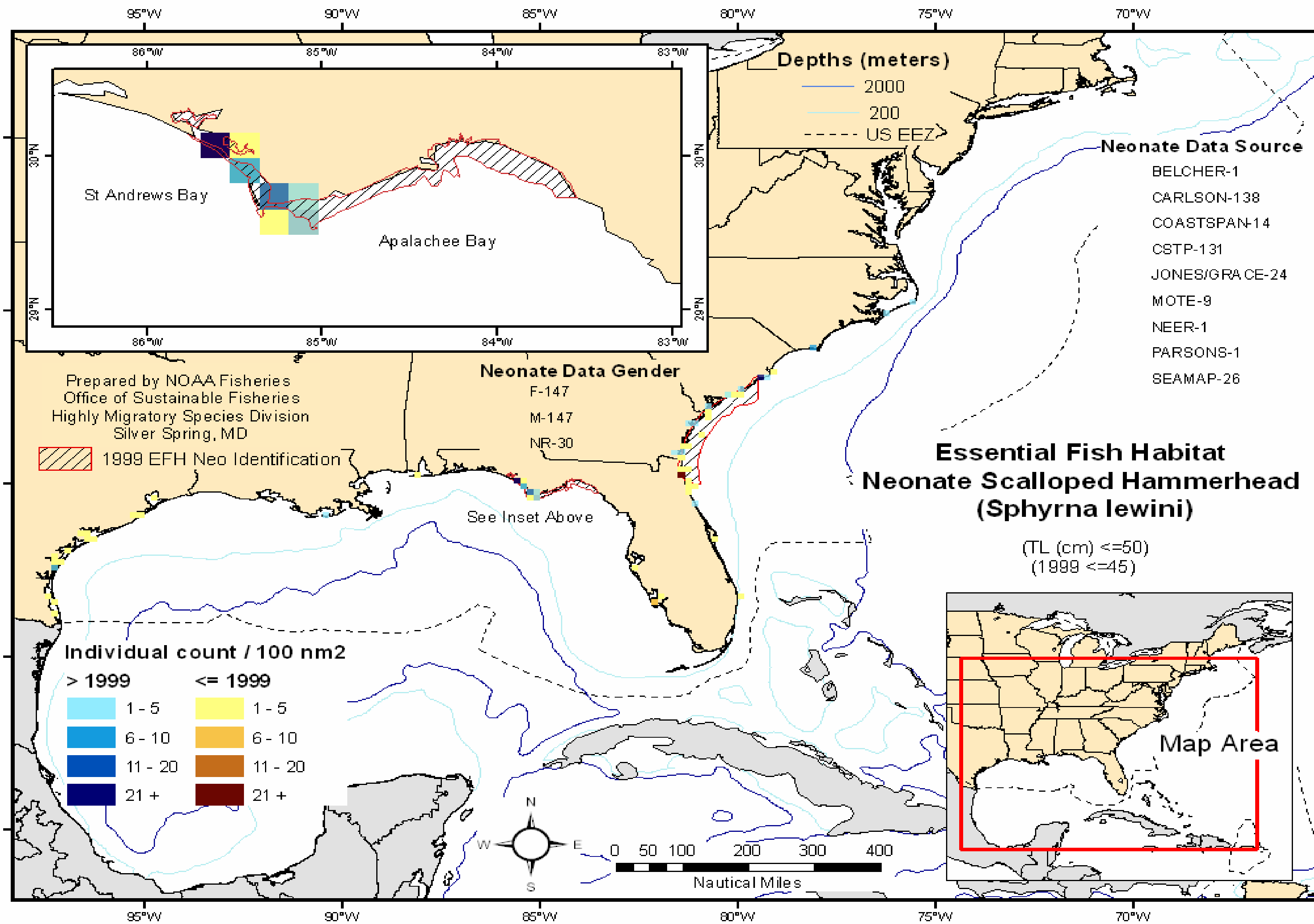


**Figure B.37** Scalloped Hammerhead: Neonate.

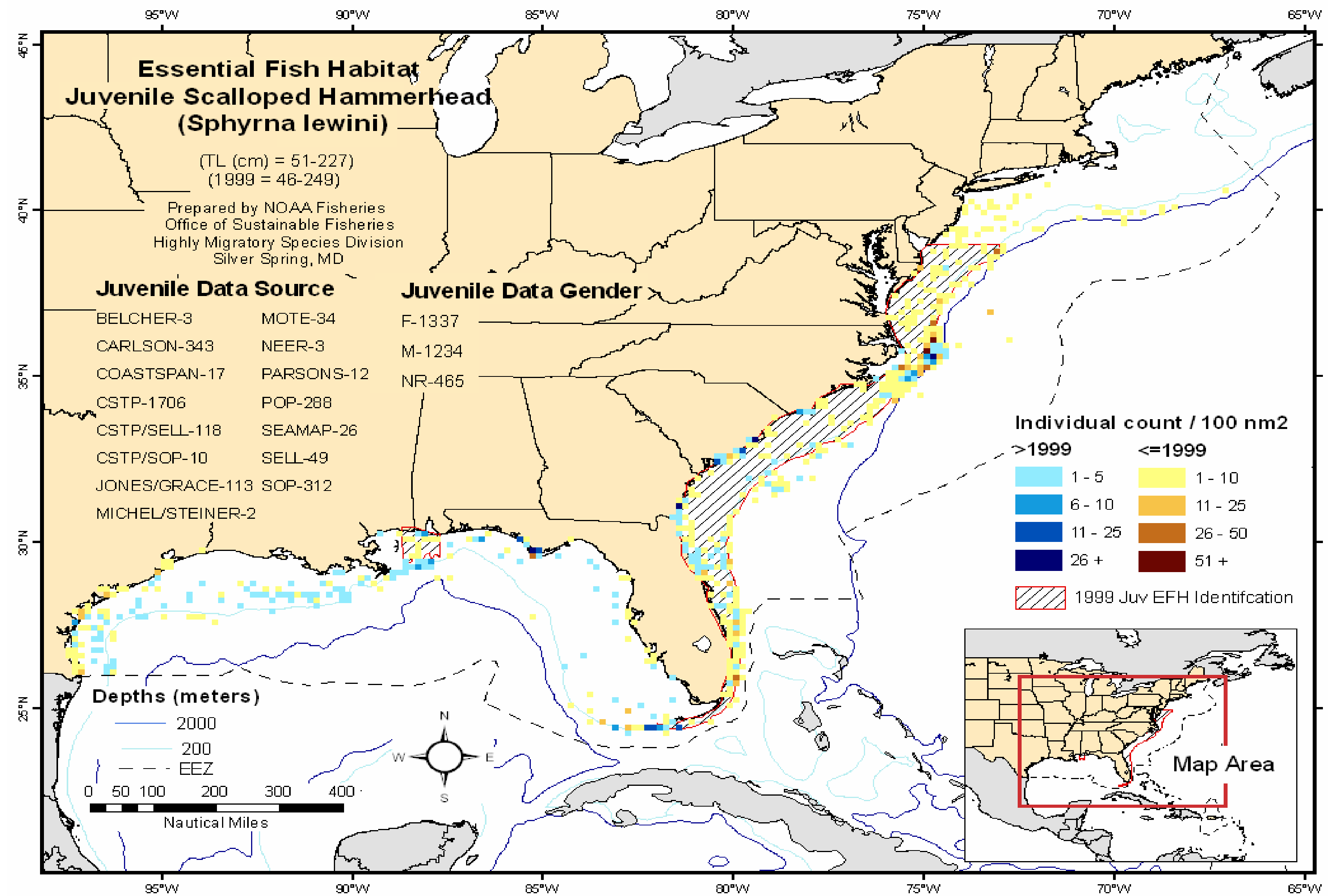


**Figure B.38** Scalloped Hammerhead: Juvenile.

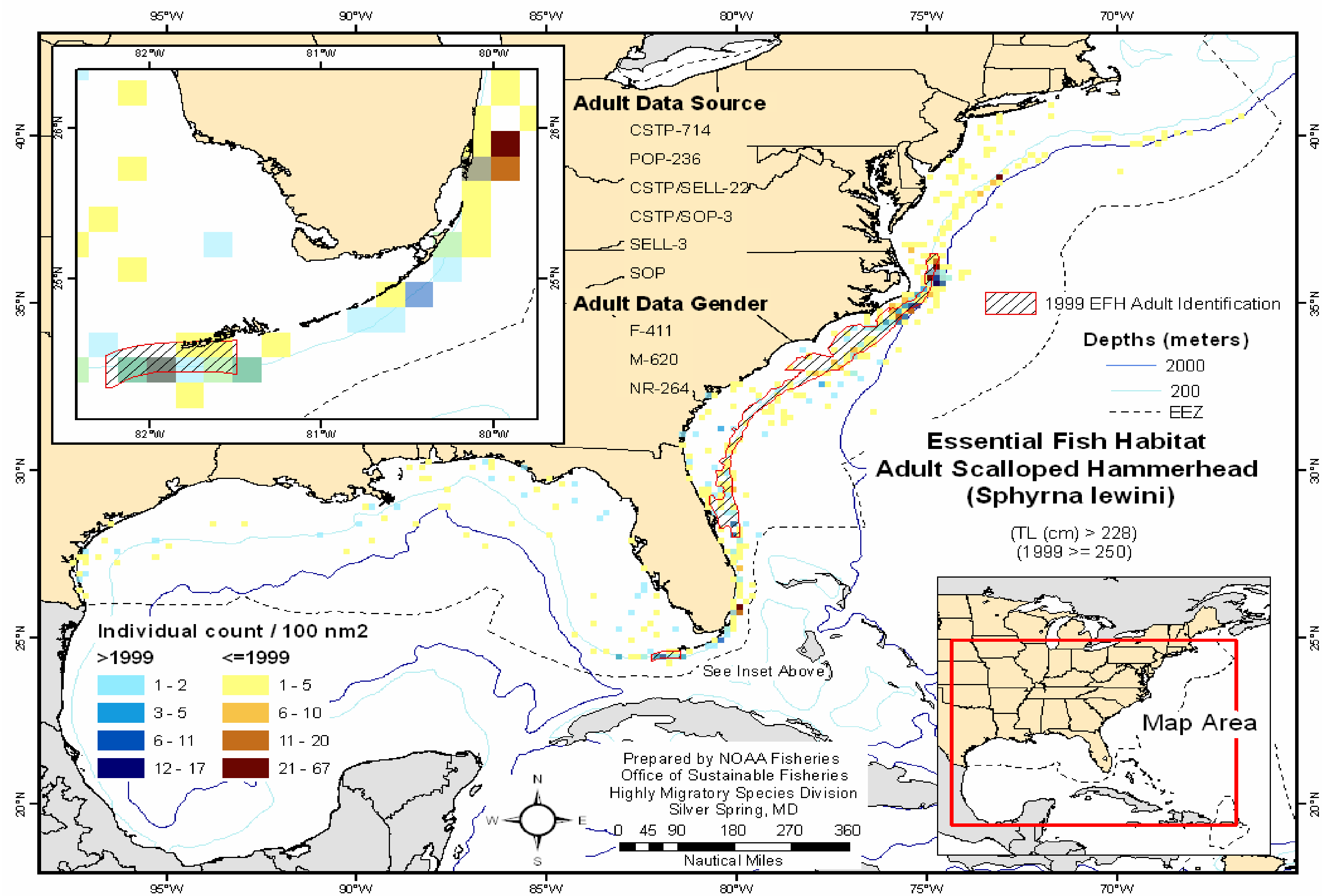


**Figure B.39** Scalloped Hammerhead: Adult.

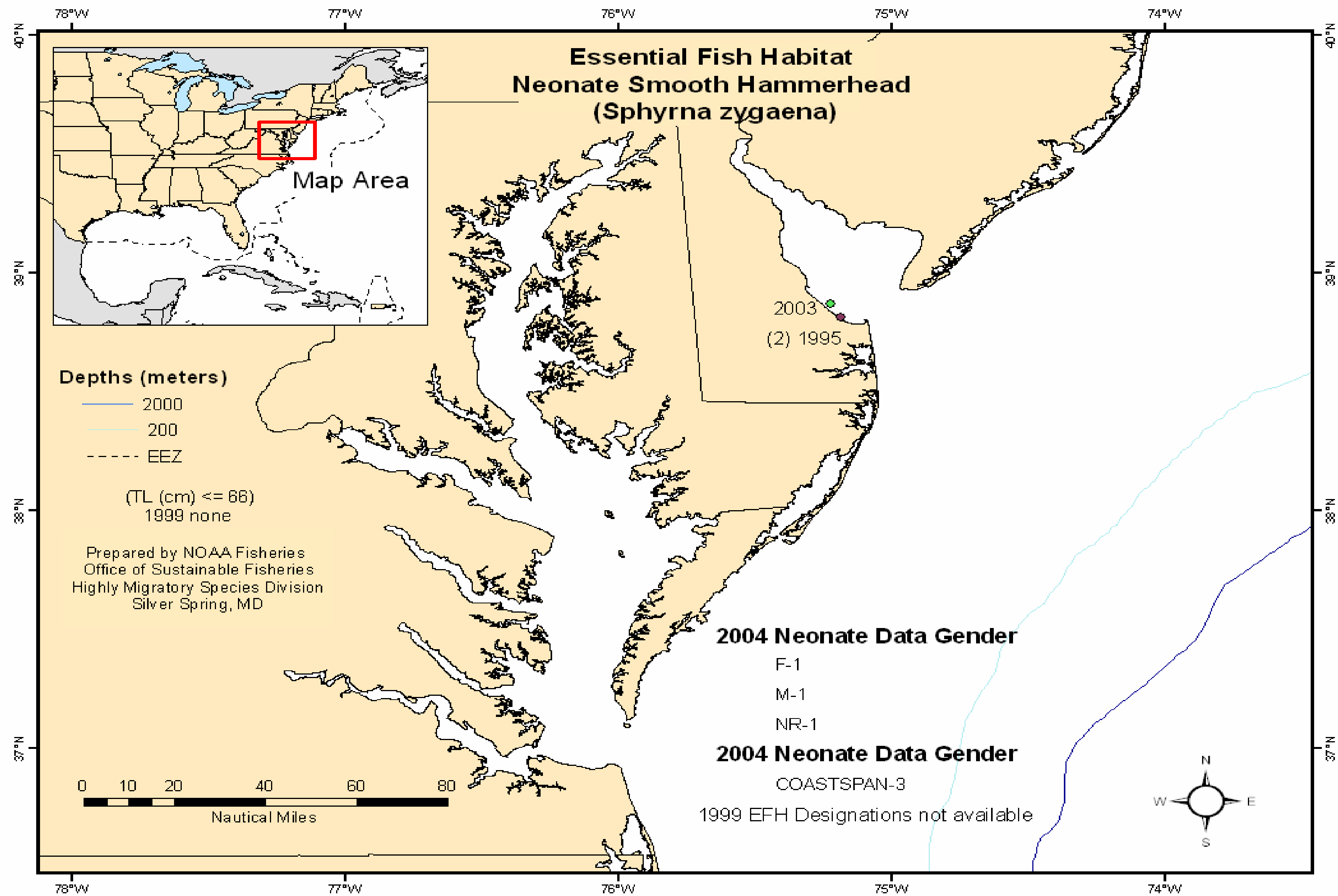


**Figure B.40 Smooth Hammerhead: Neonate.**

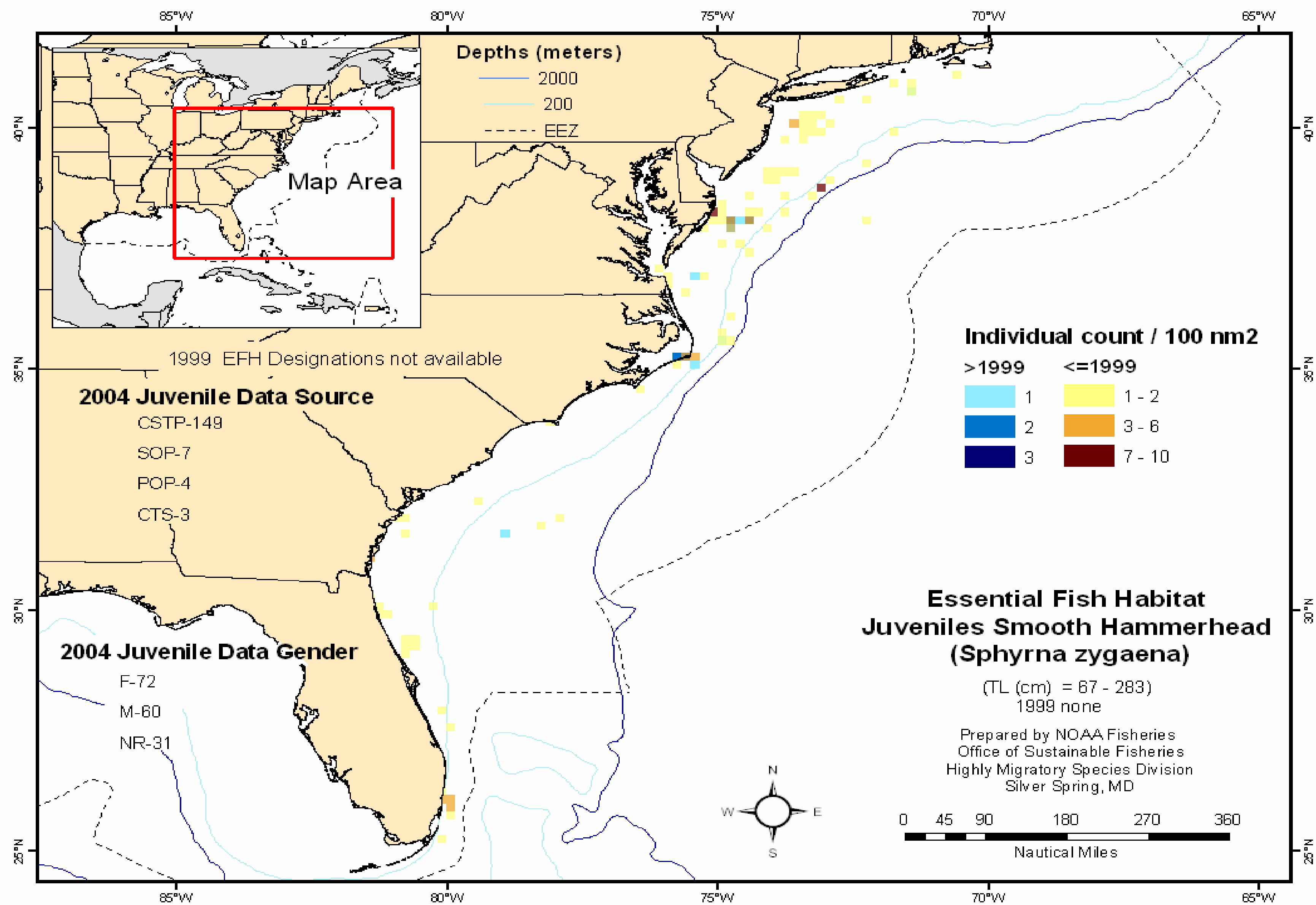


**Figure B.41** **Smooth Hammerhead: Juvenile.**

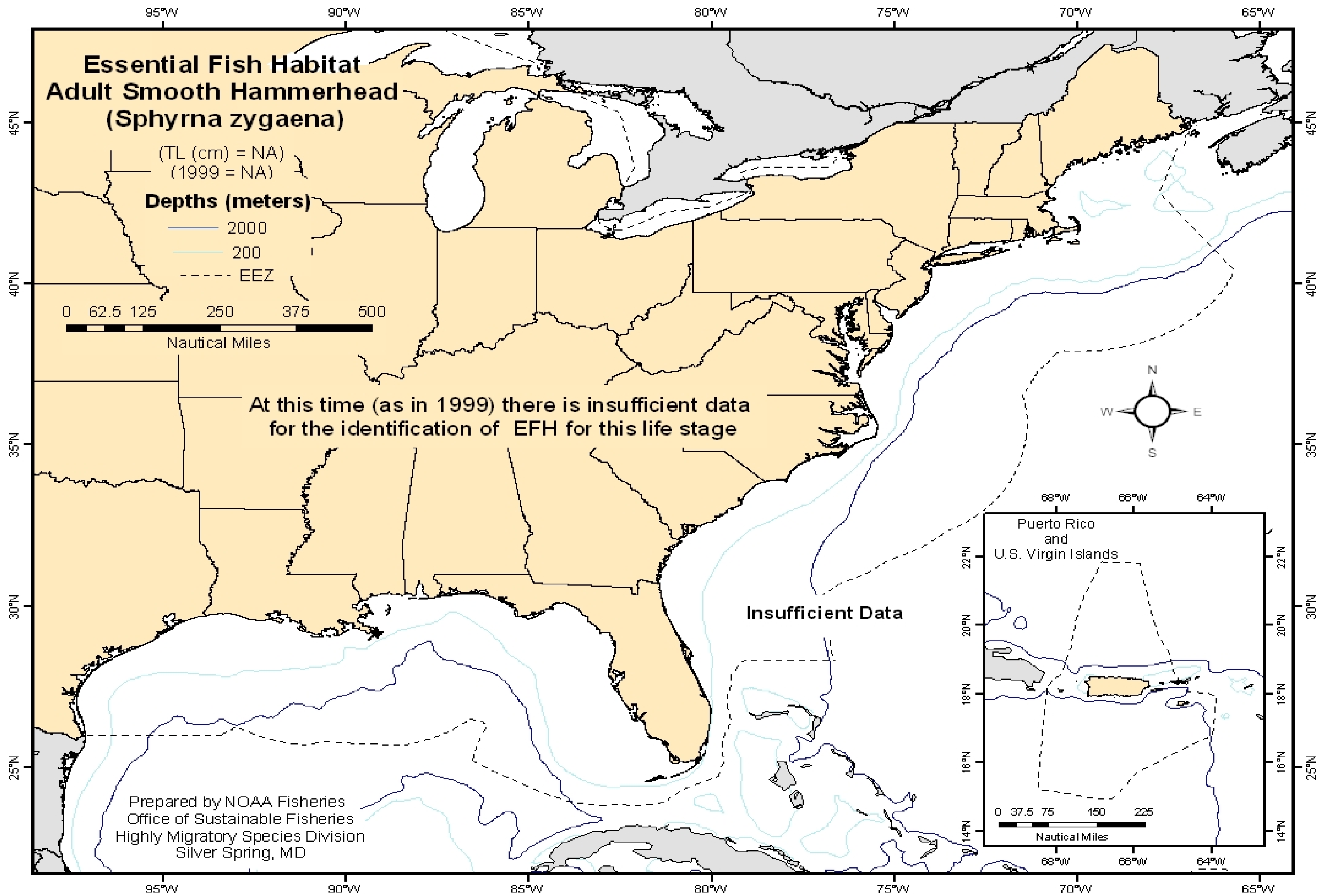


**Figure B.42 Smooth Hammerhead: Adult.**

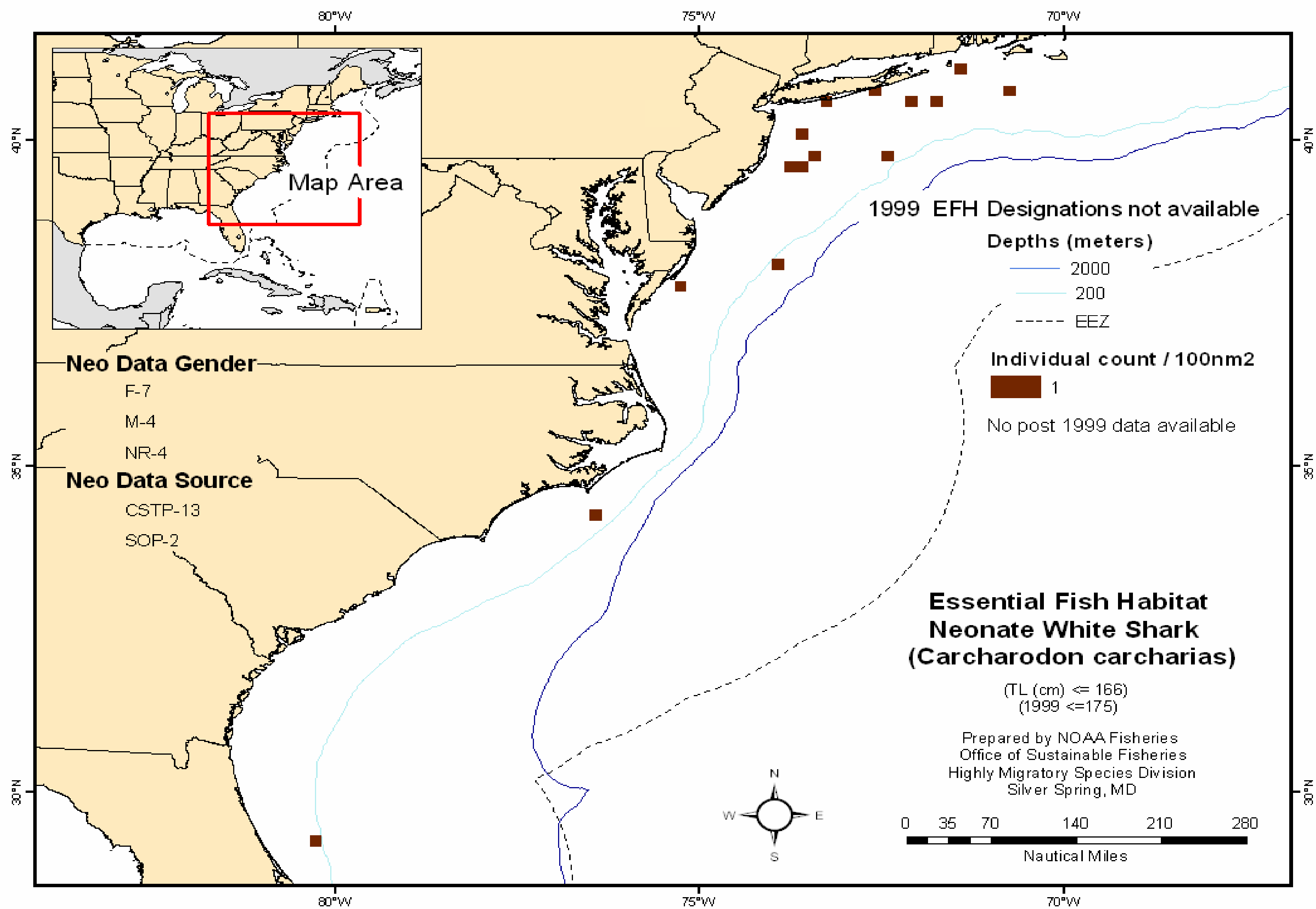


**Figure B.43 White Shark: Neonate.**

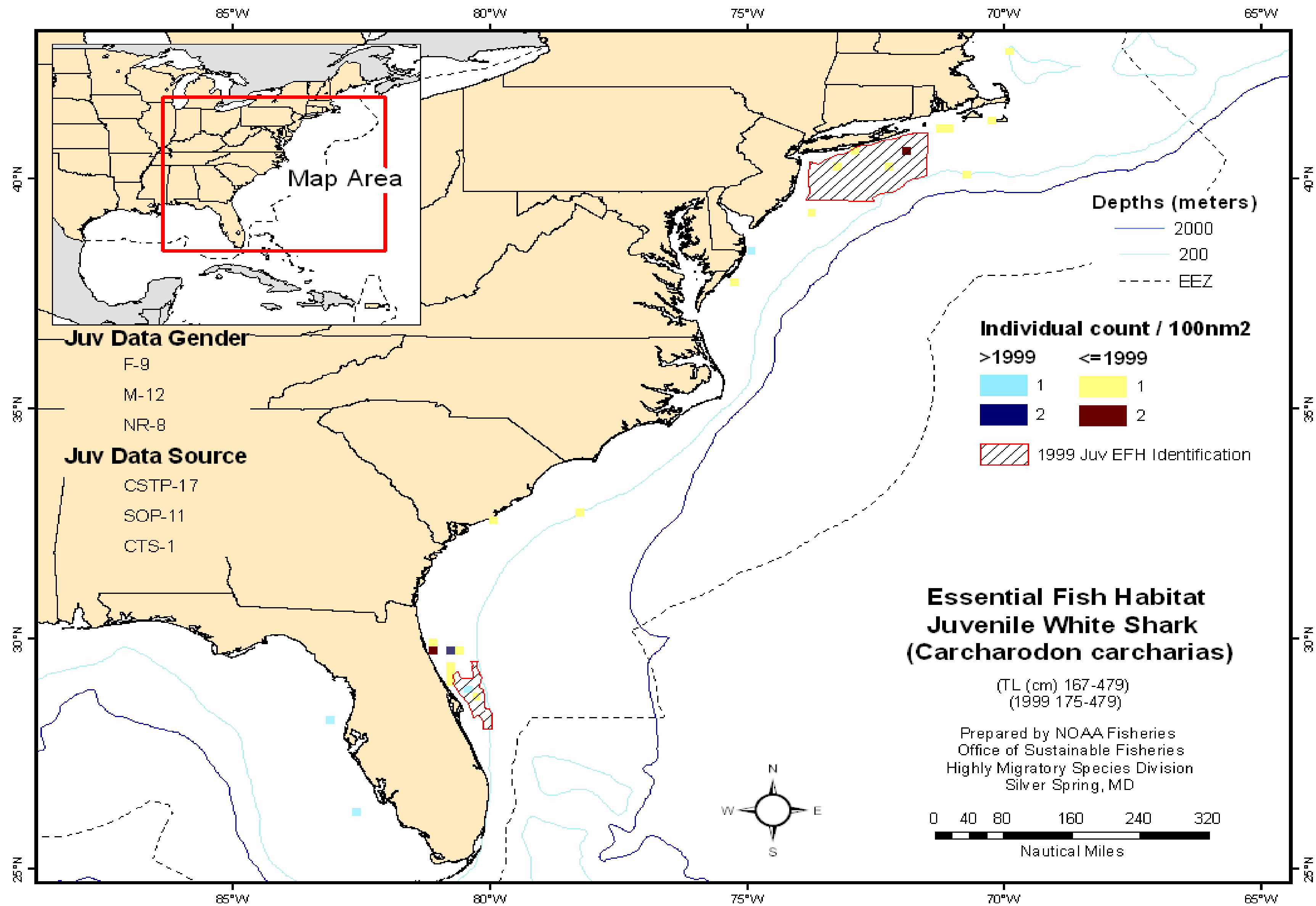


**Figure B.44** **White Shark: Juvenile.**

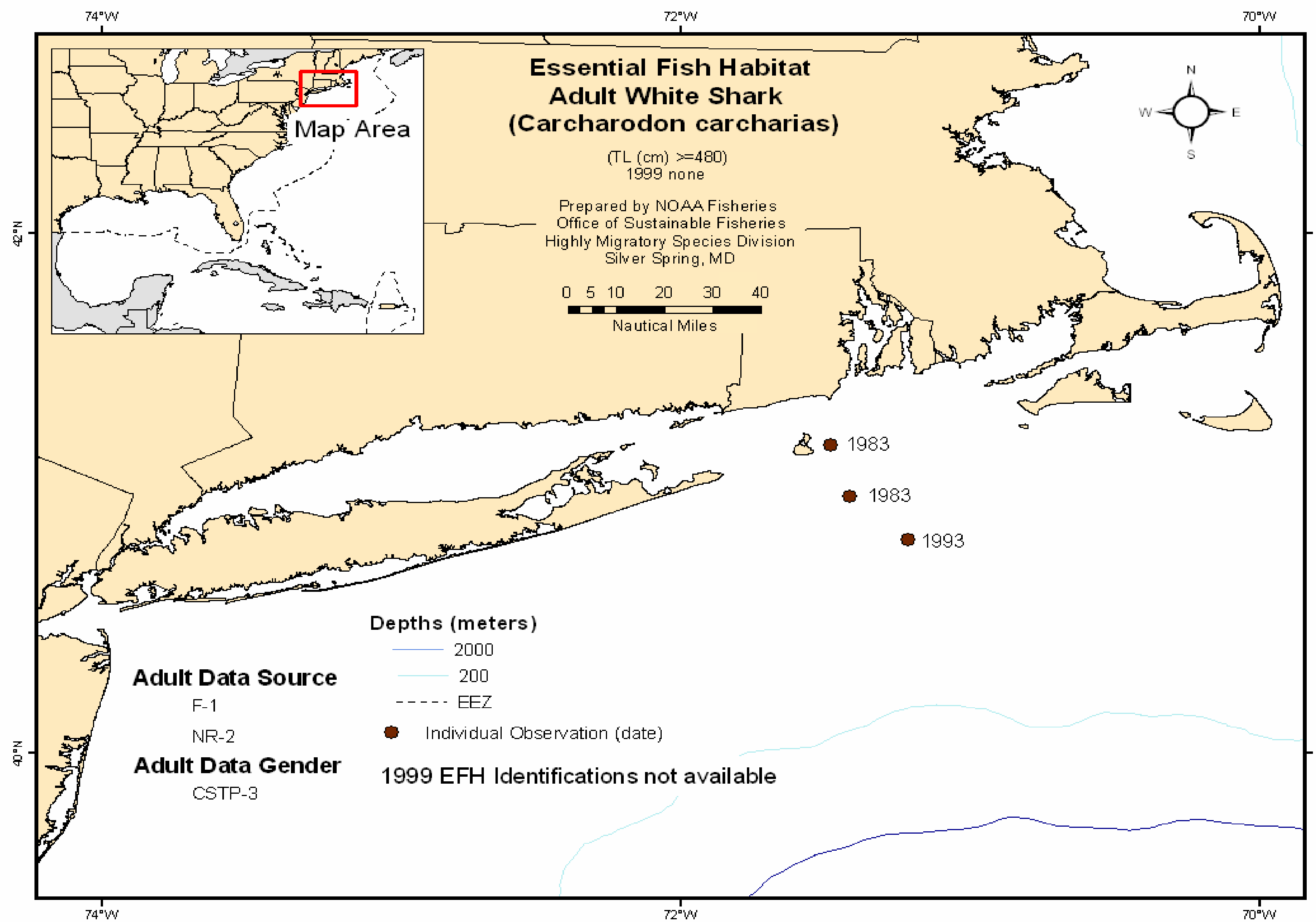


**Figure B.45** **White Shark: Adult.**

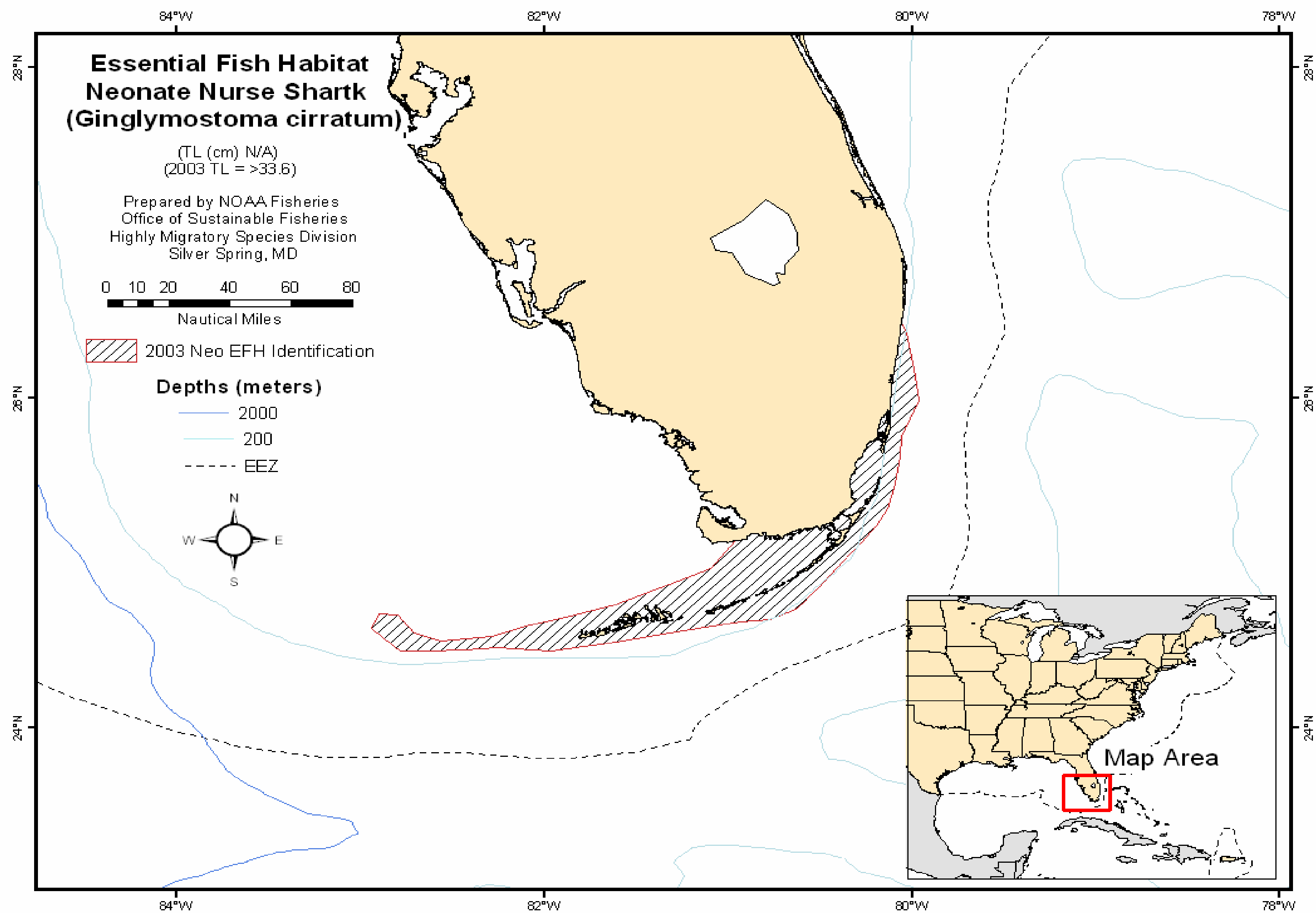


**Figure B.46 Nurse Shark: Neonate.**

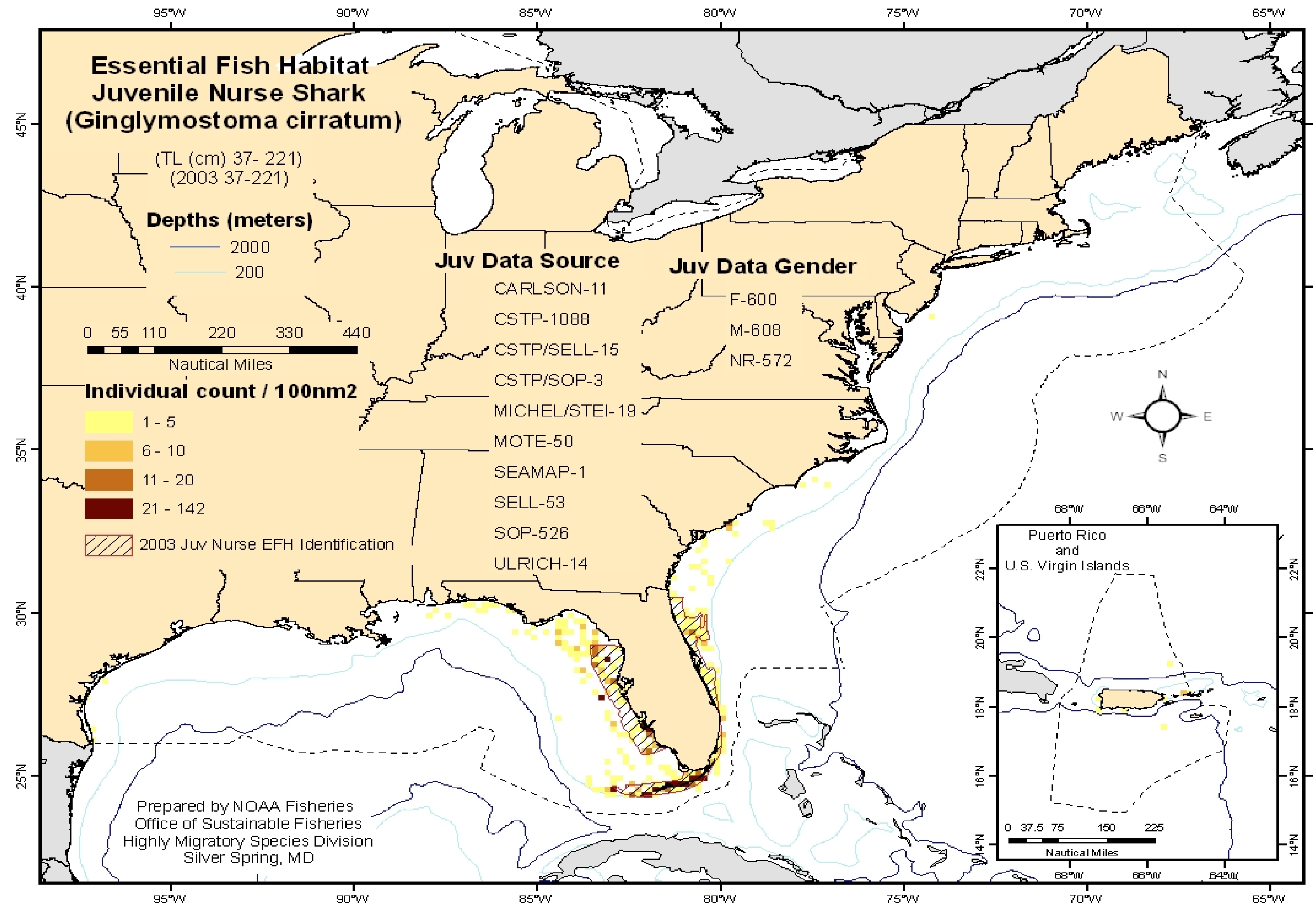


**Figure B.47** **Nurse Shark: Juvenile.**

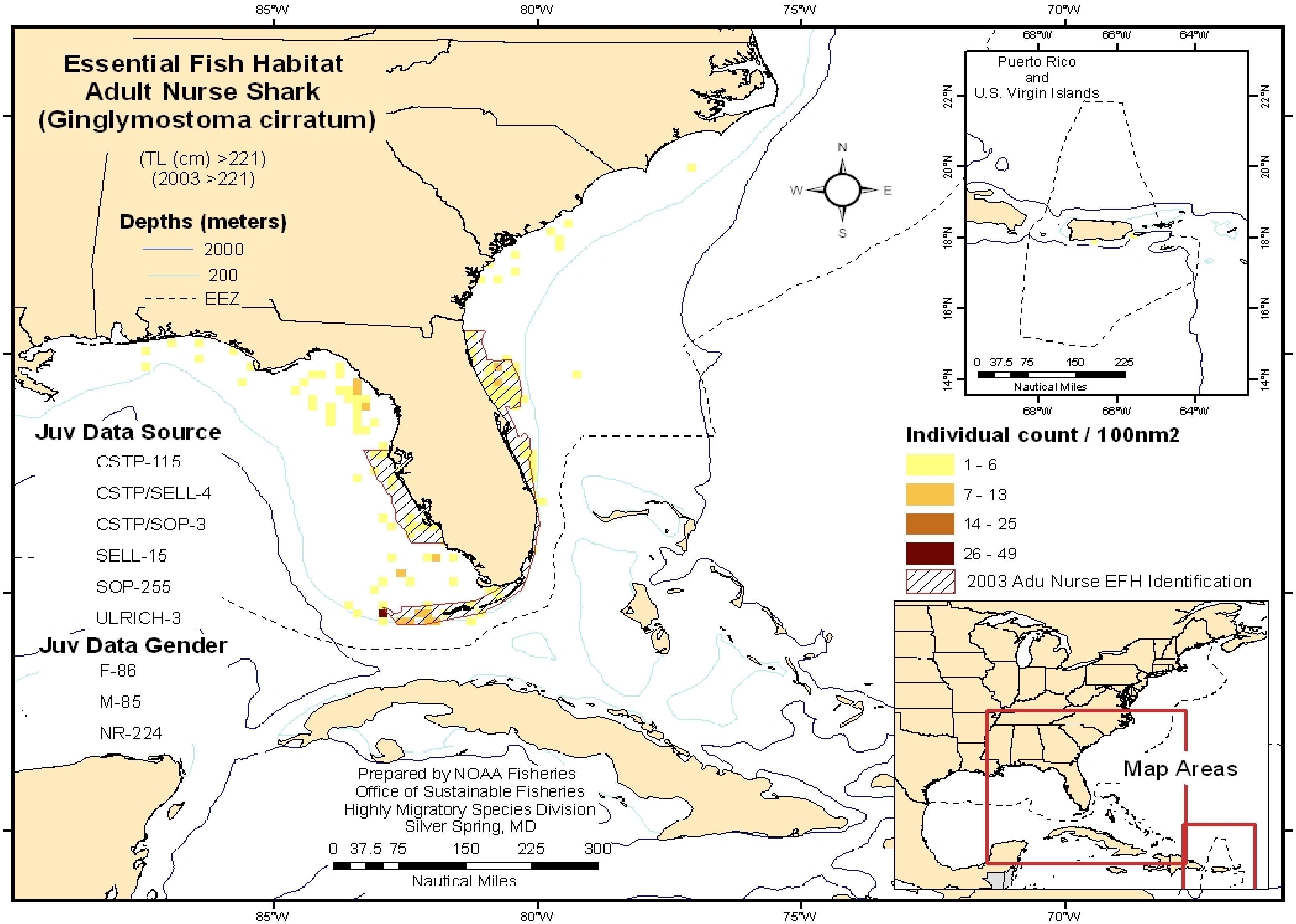


Figure B.48 Nurse Shark: Adult.

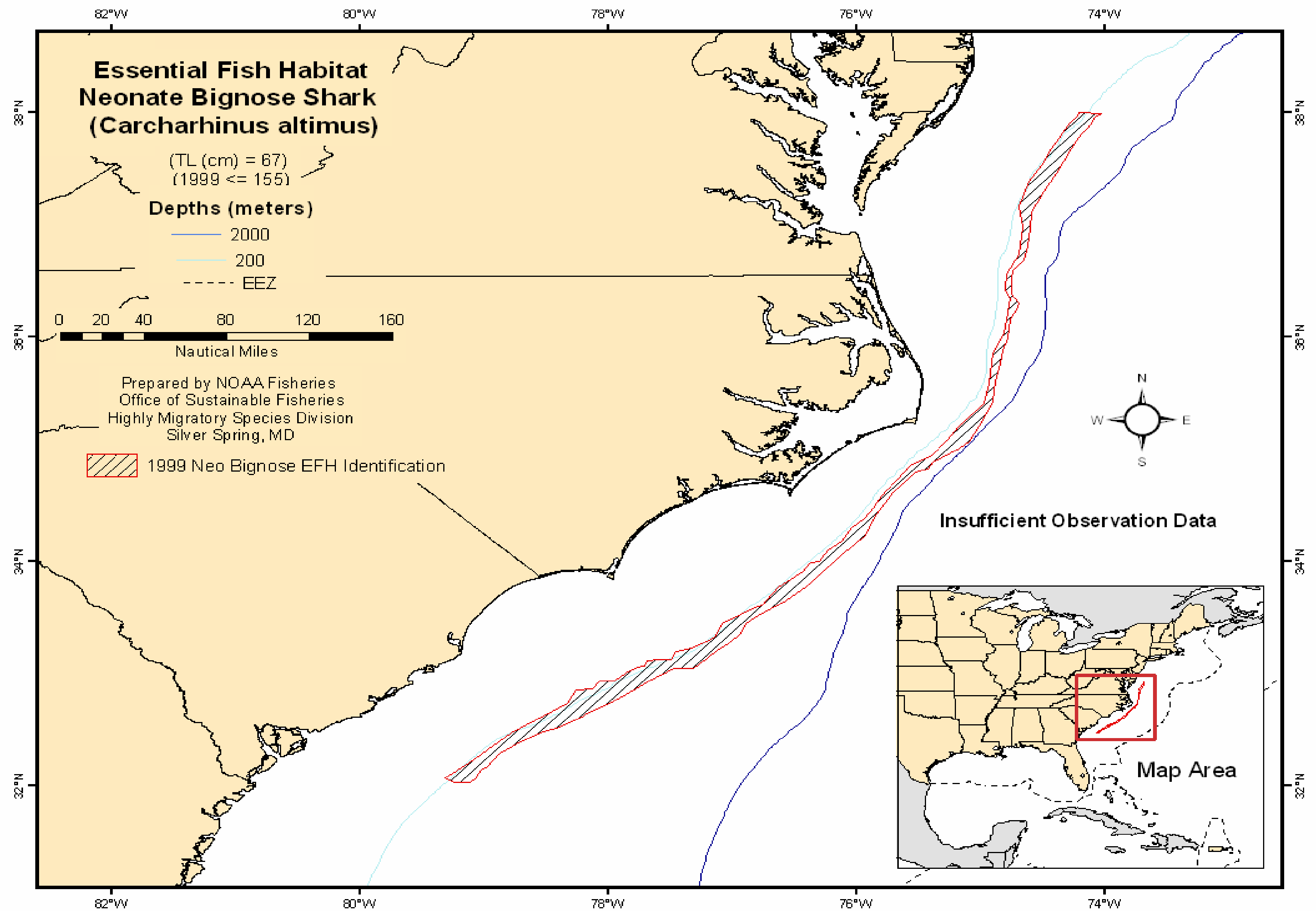


**Figure B.49** **Bignose Shark: Neonate.**

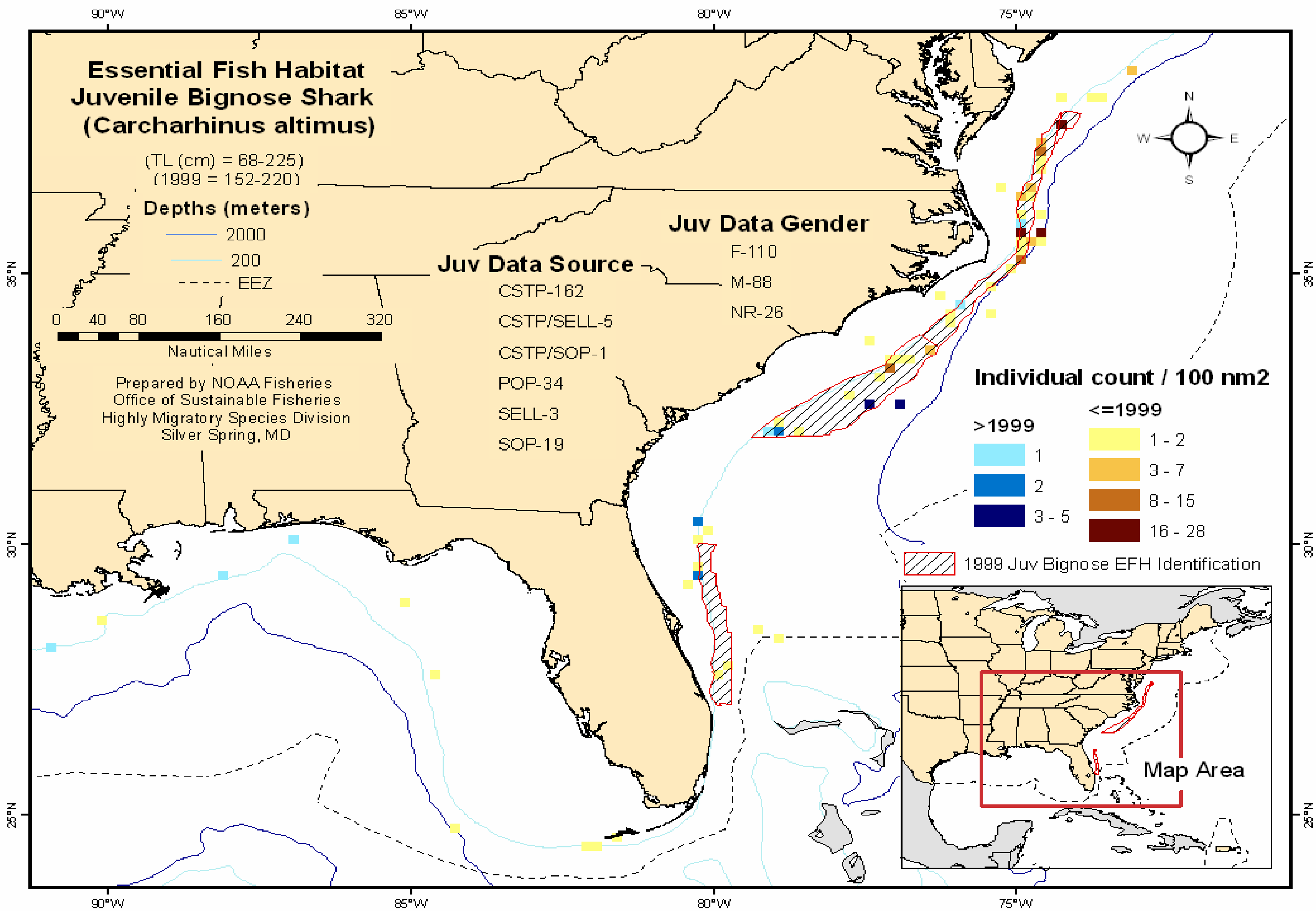


**Figure B.50** Bignose Shark: Juvenile.

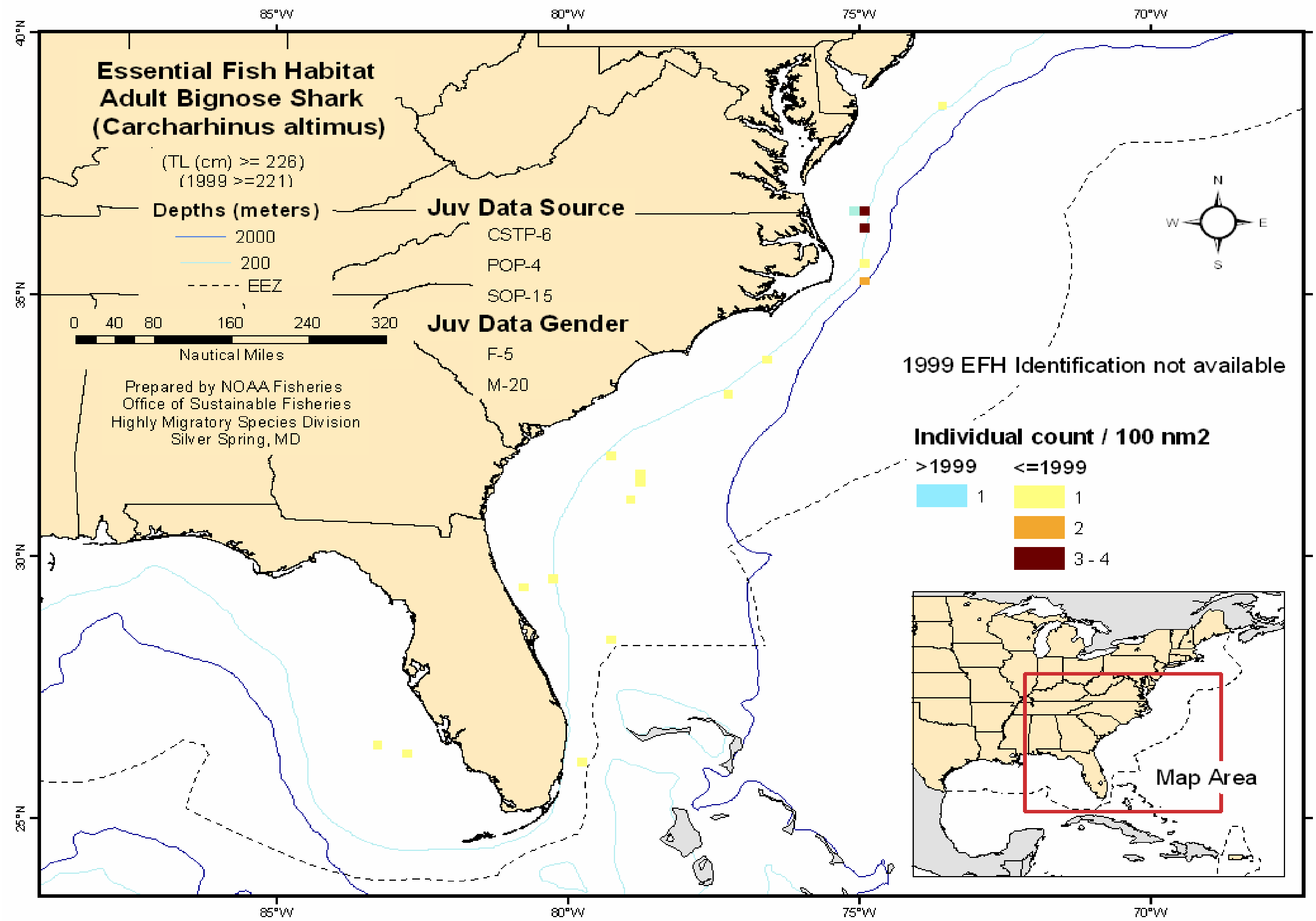


Figure B.51 Bignose Shark: Adult.

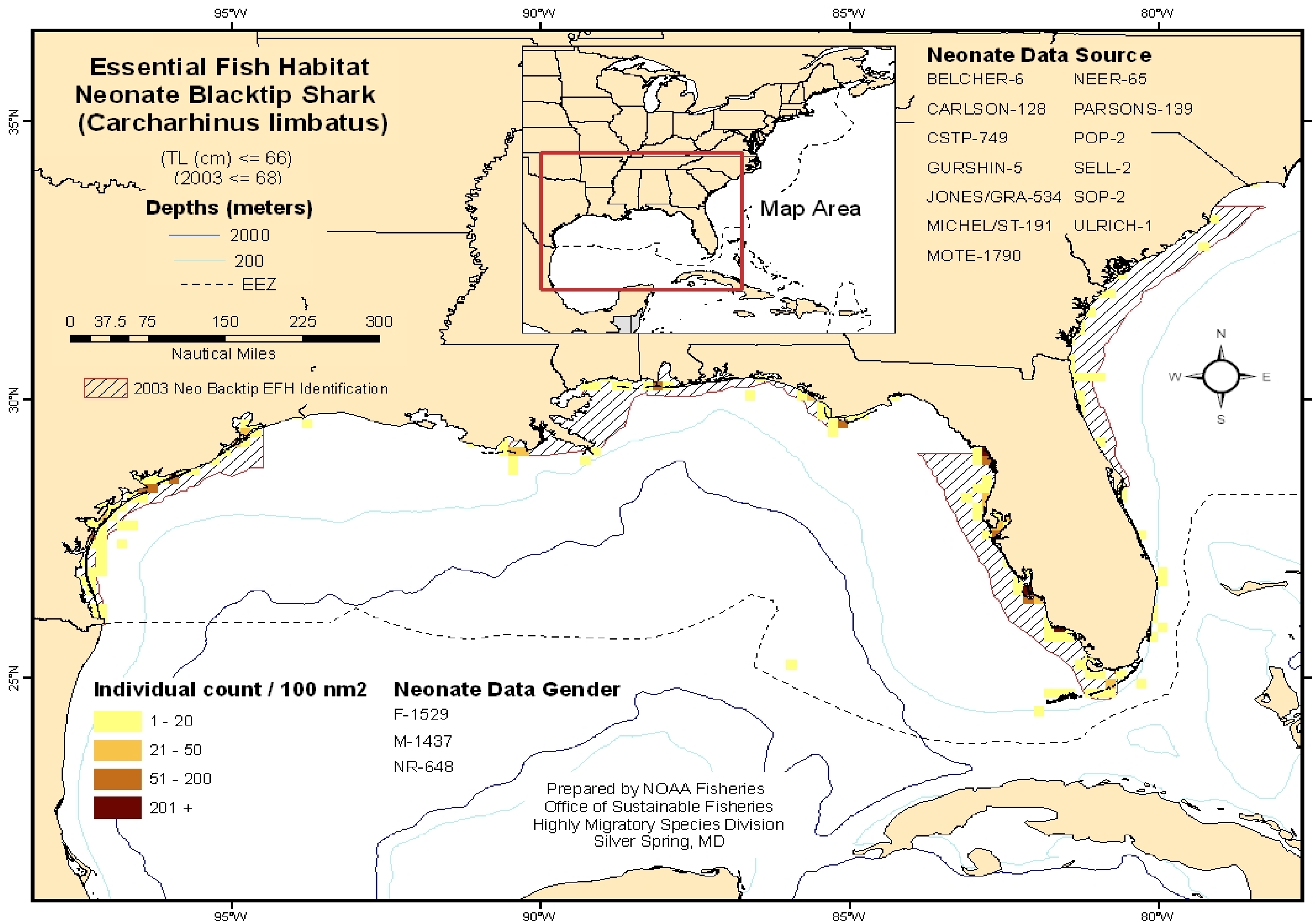


**Figure B.52** **Blacktip Shark: Neonate.**

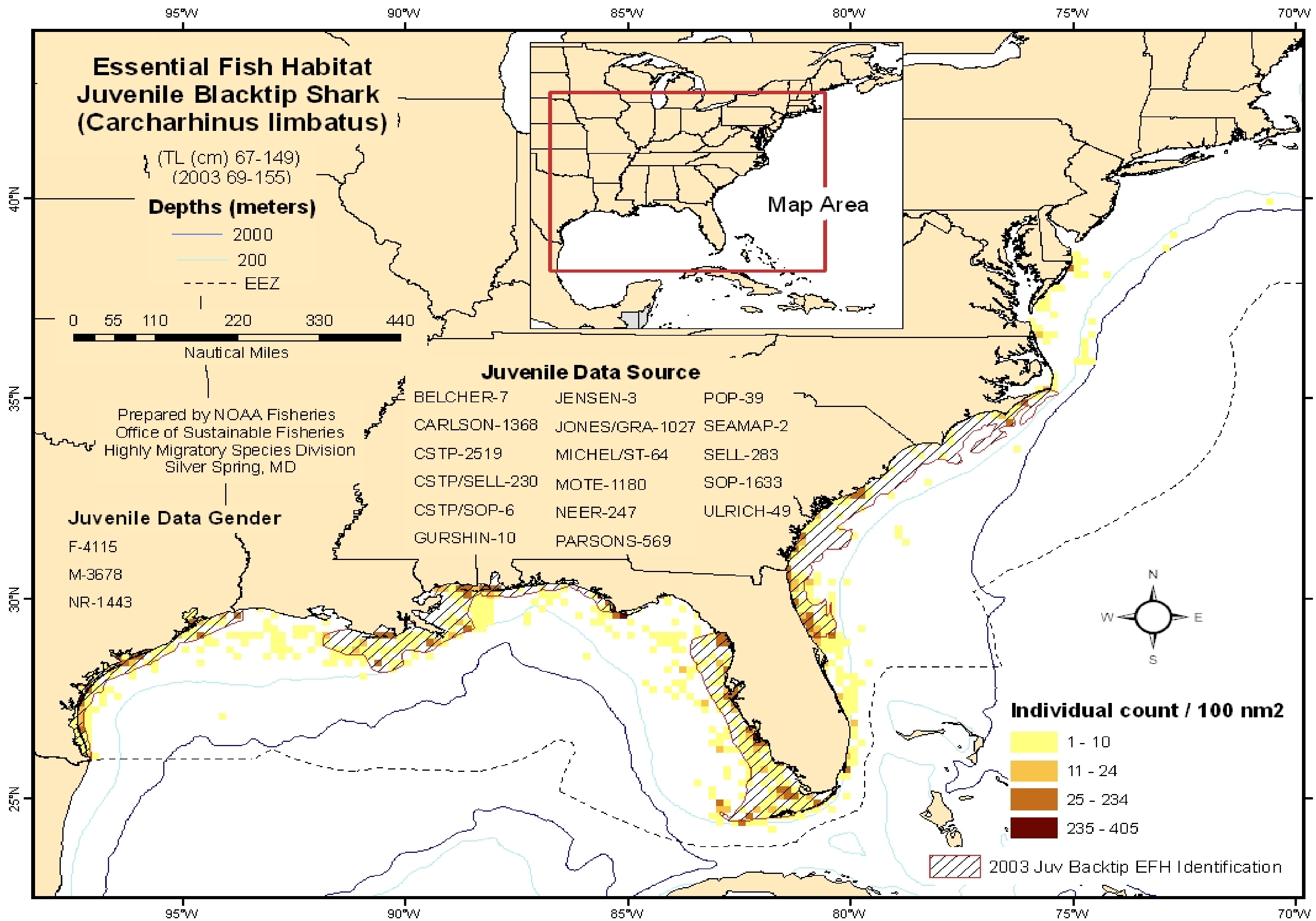


**Figure B.53 Blacktip Shark: Juvenile.**

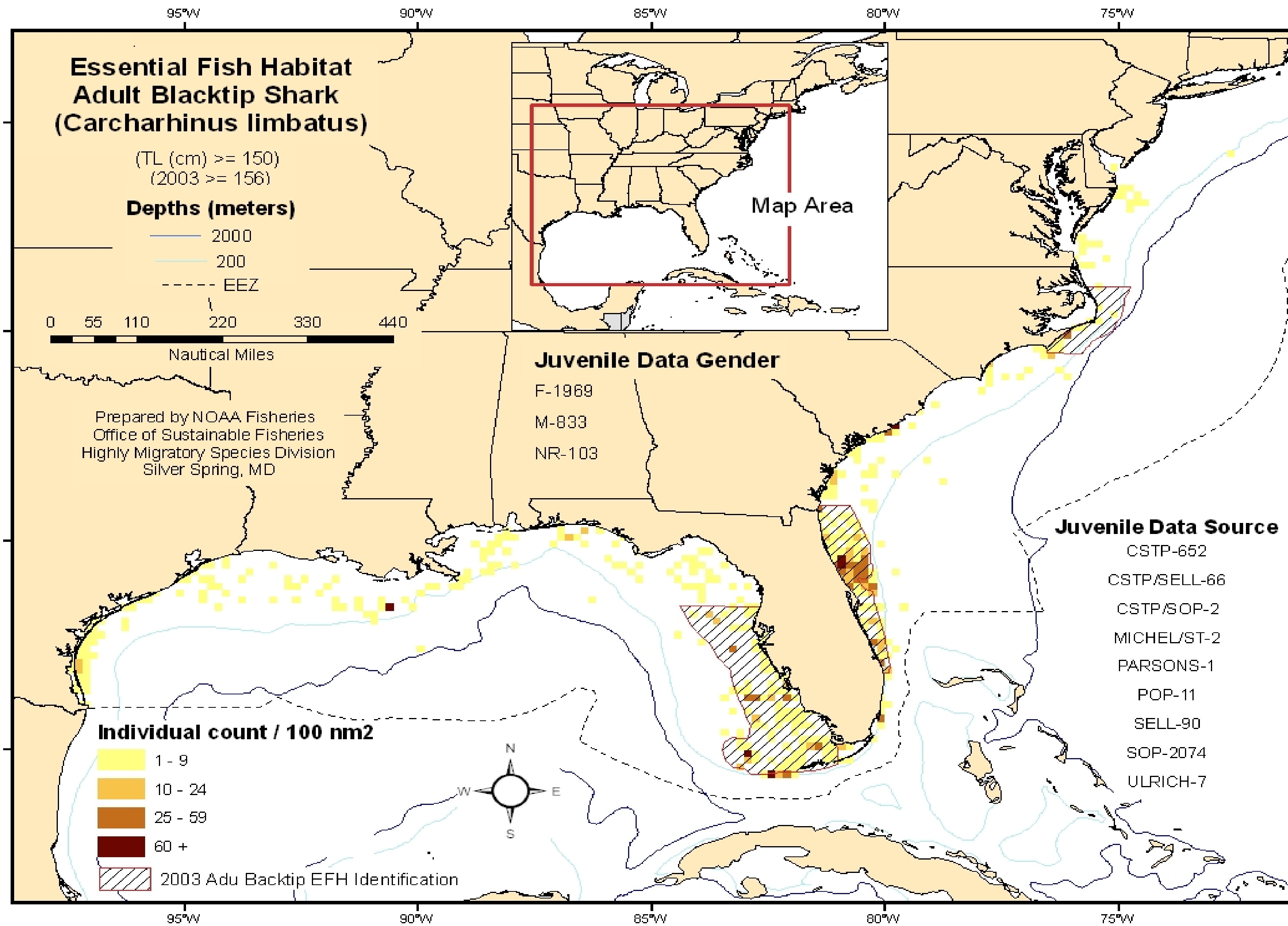


**Figure B.54** Blacktip Shark: Adult.

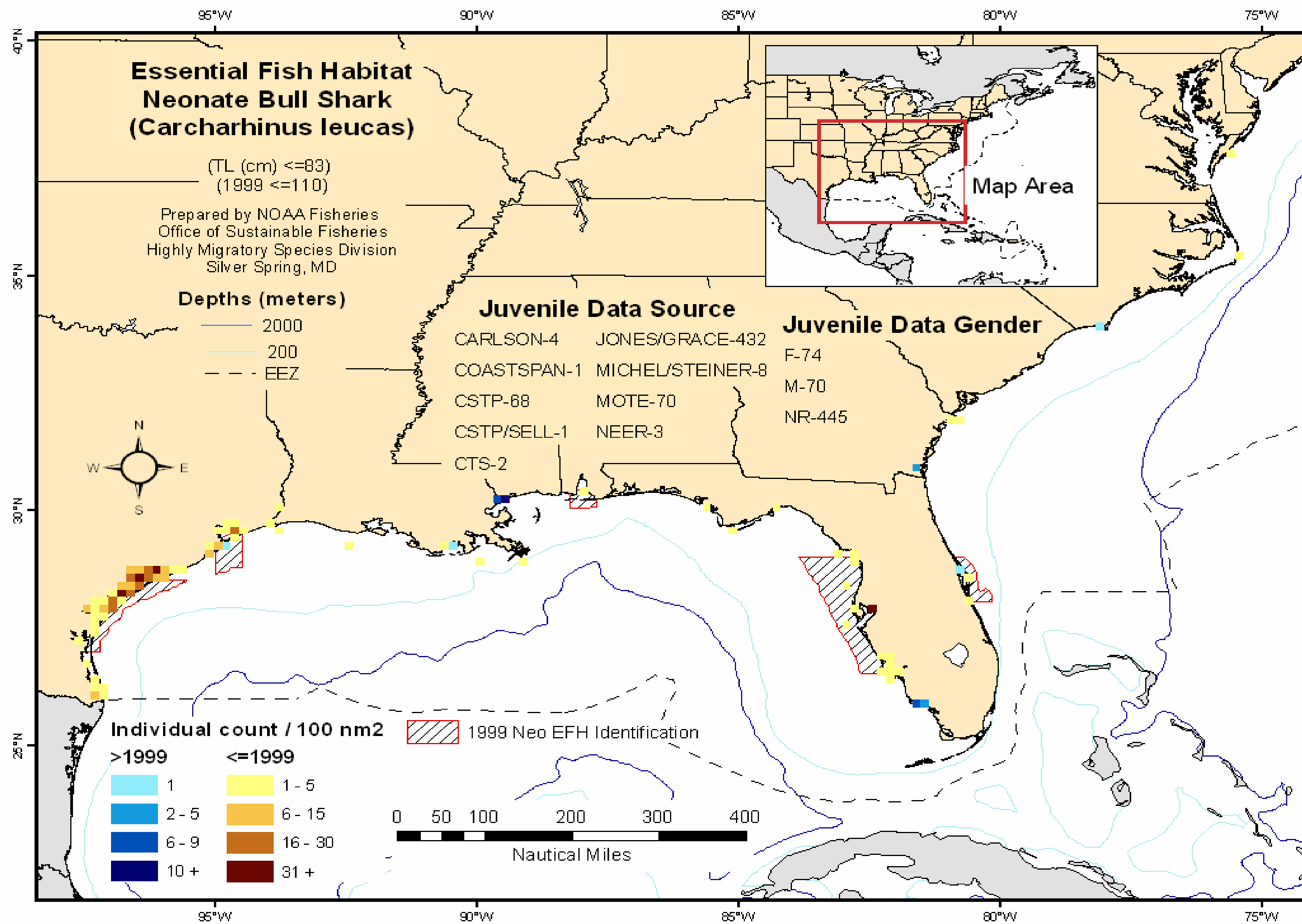


**Figure B.55** **Bull Shark: Neonate.**

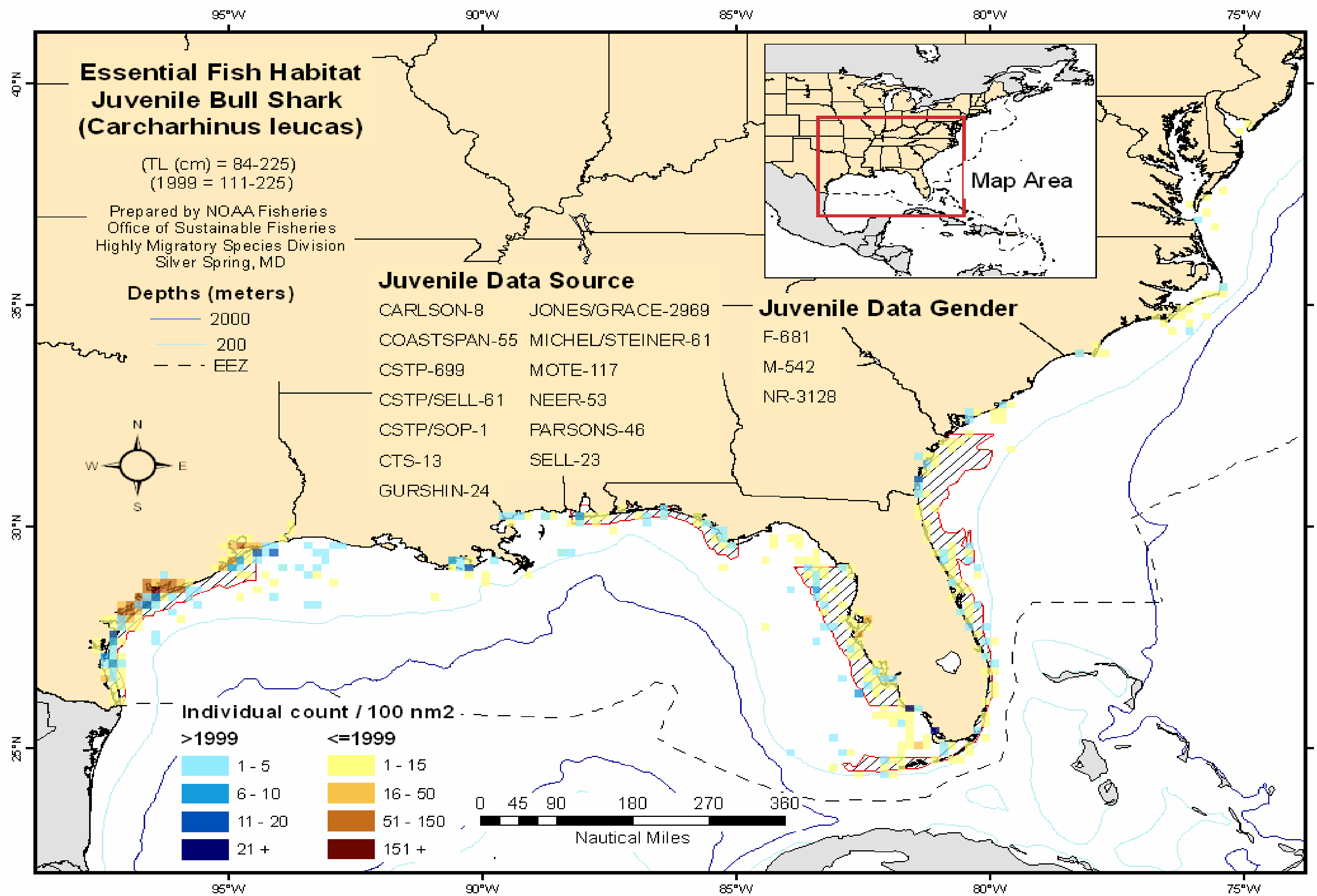


**Figure B.56** **Bull Shark: Juvenile.**

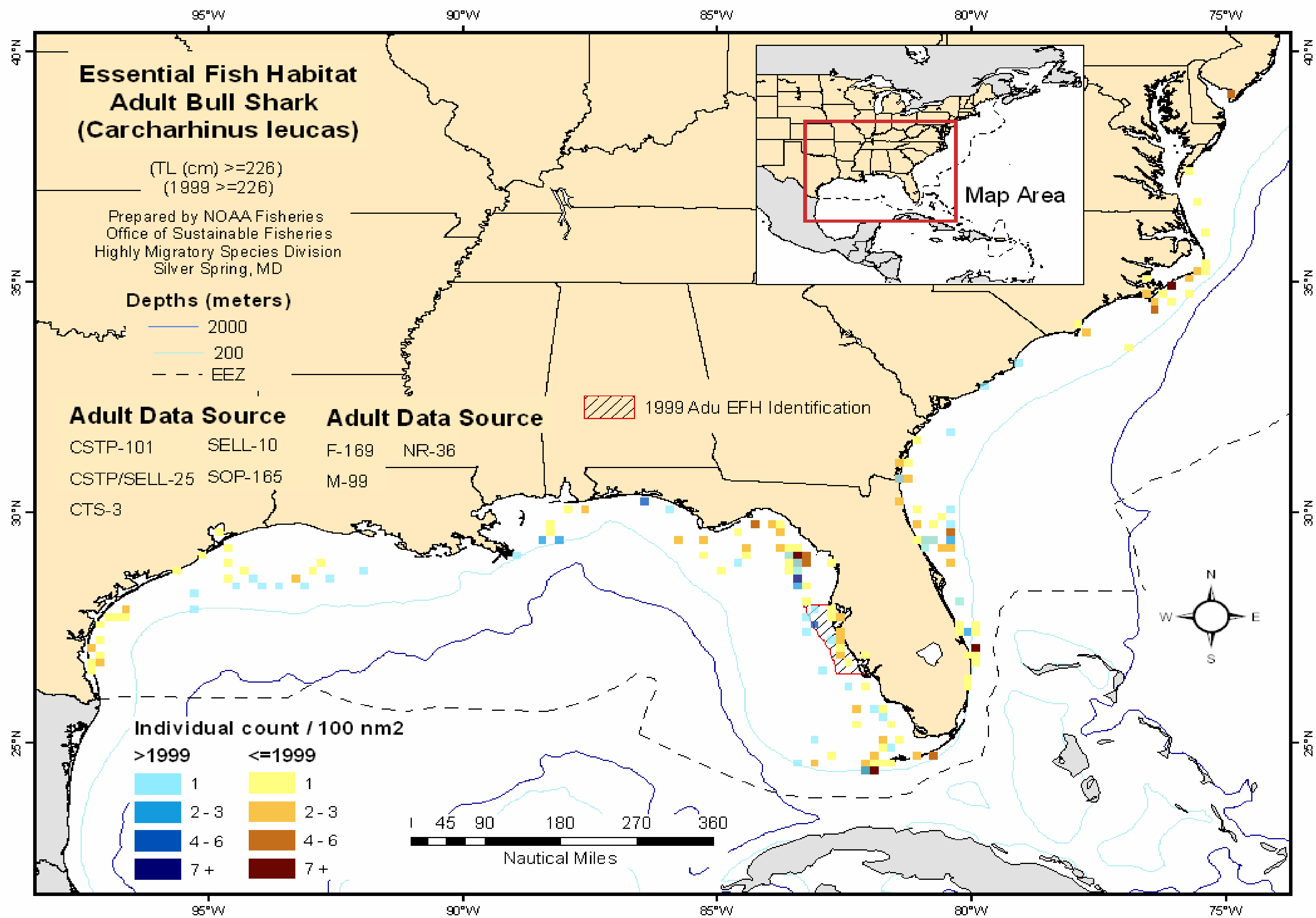


**Figure B.57** Bull Shark: Adult.

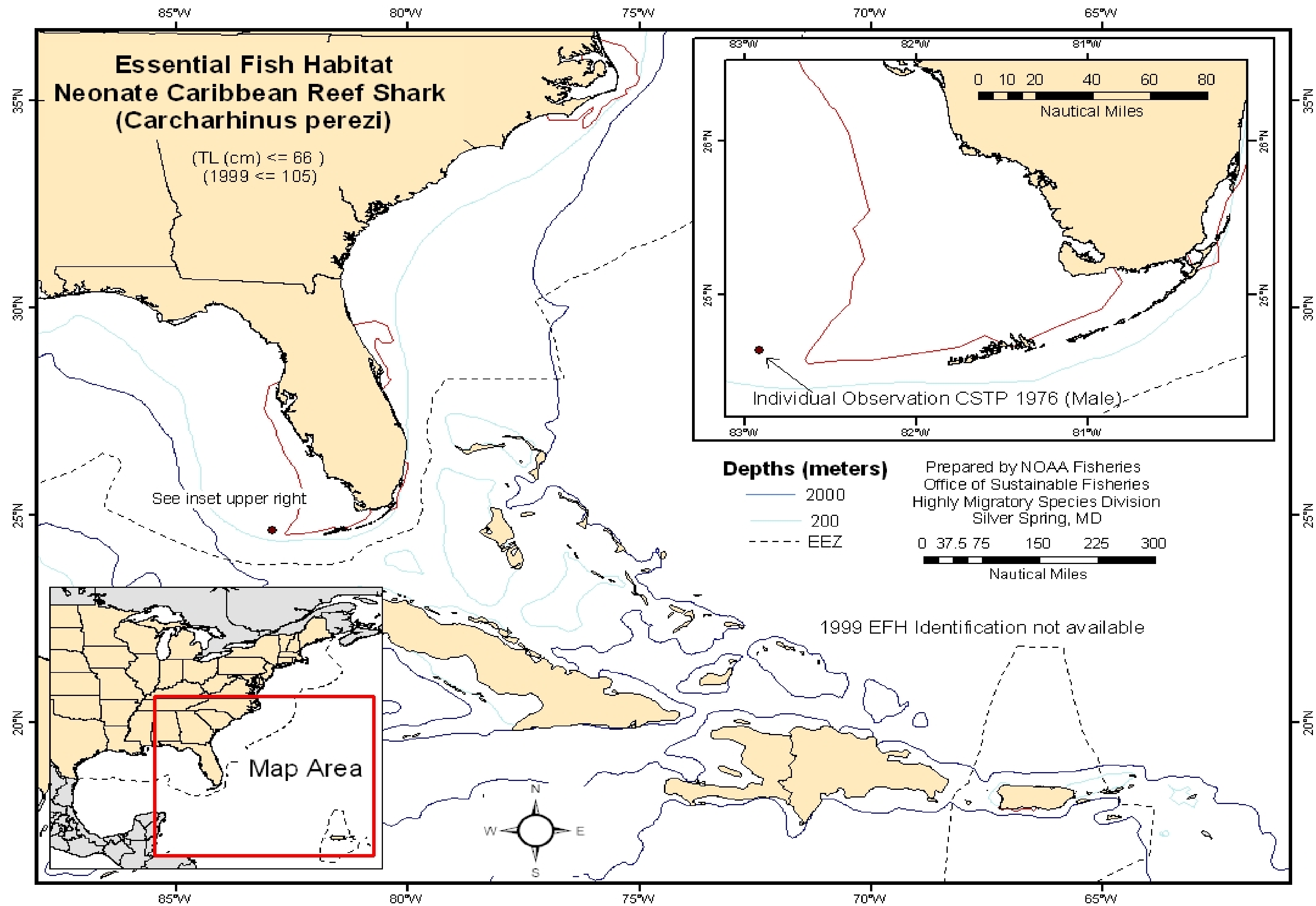


**Figure B.58** **Caribbean Reef Shark: Neonate.**

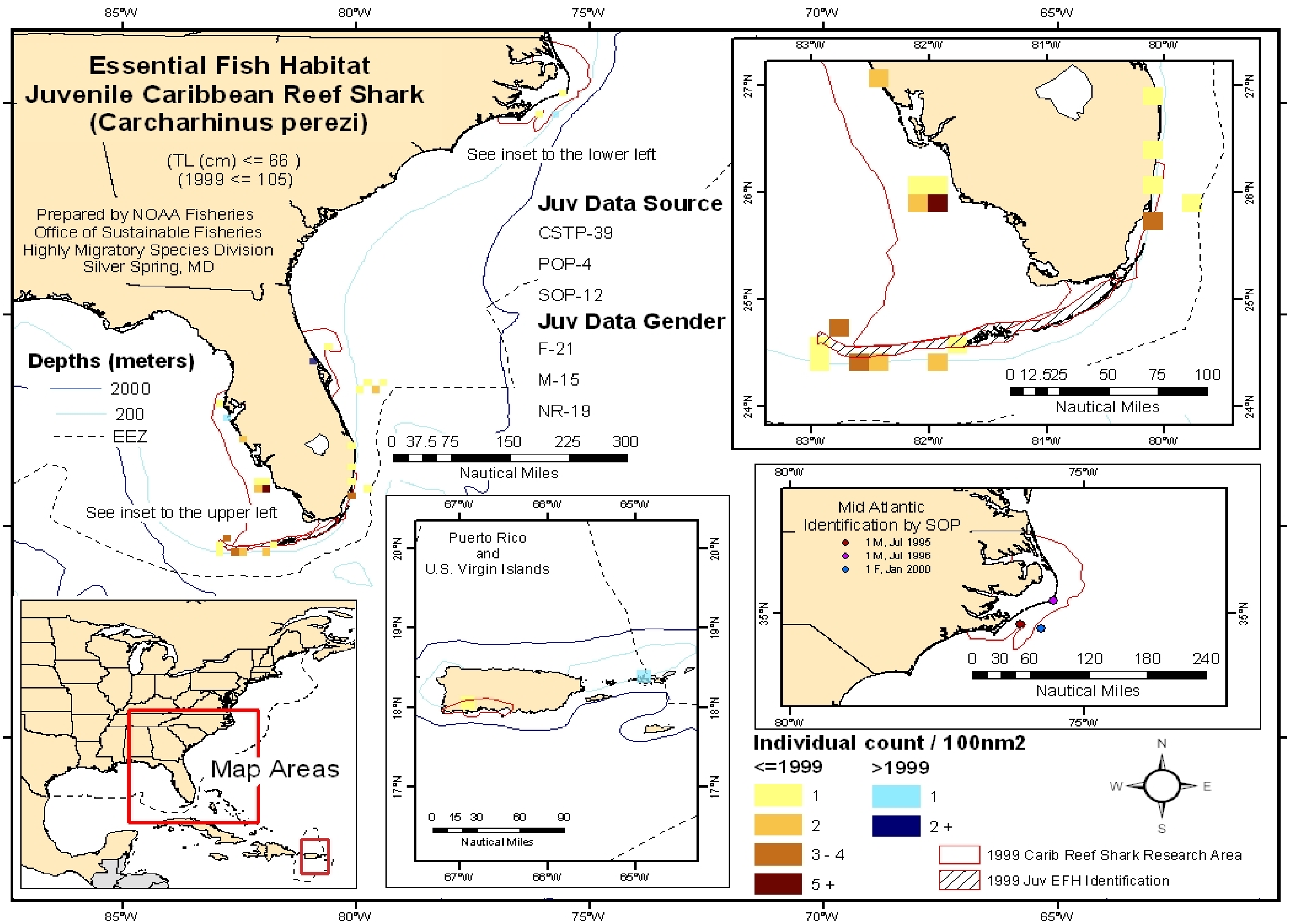


**Figure B.59** Caribbean Reef Shark: Juvenile.

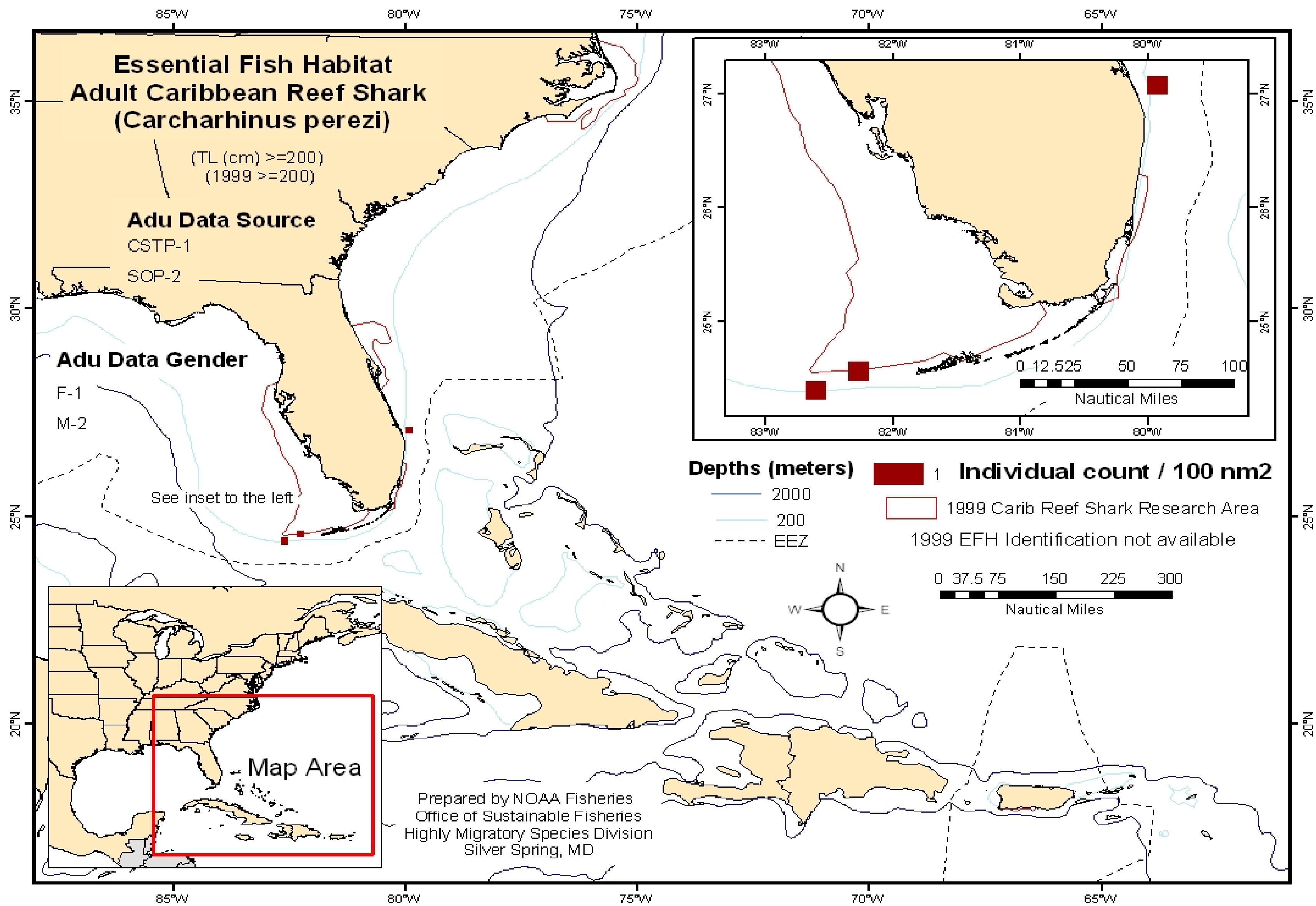


**Figure B.60** Caribbean Reef Shark: Adult.

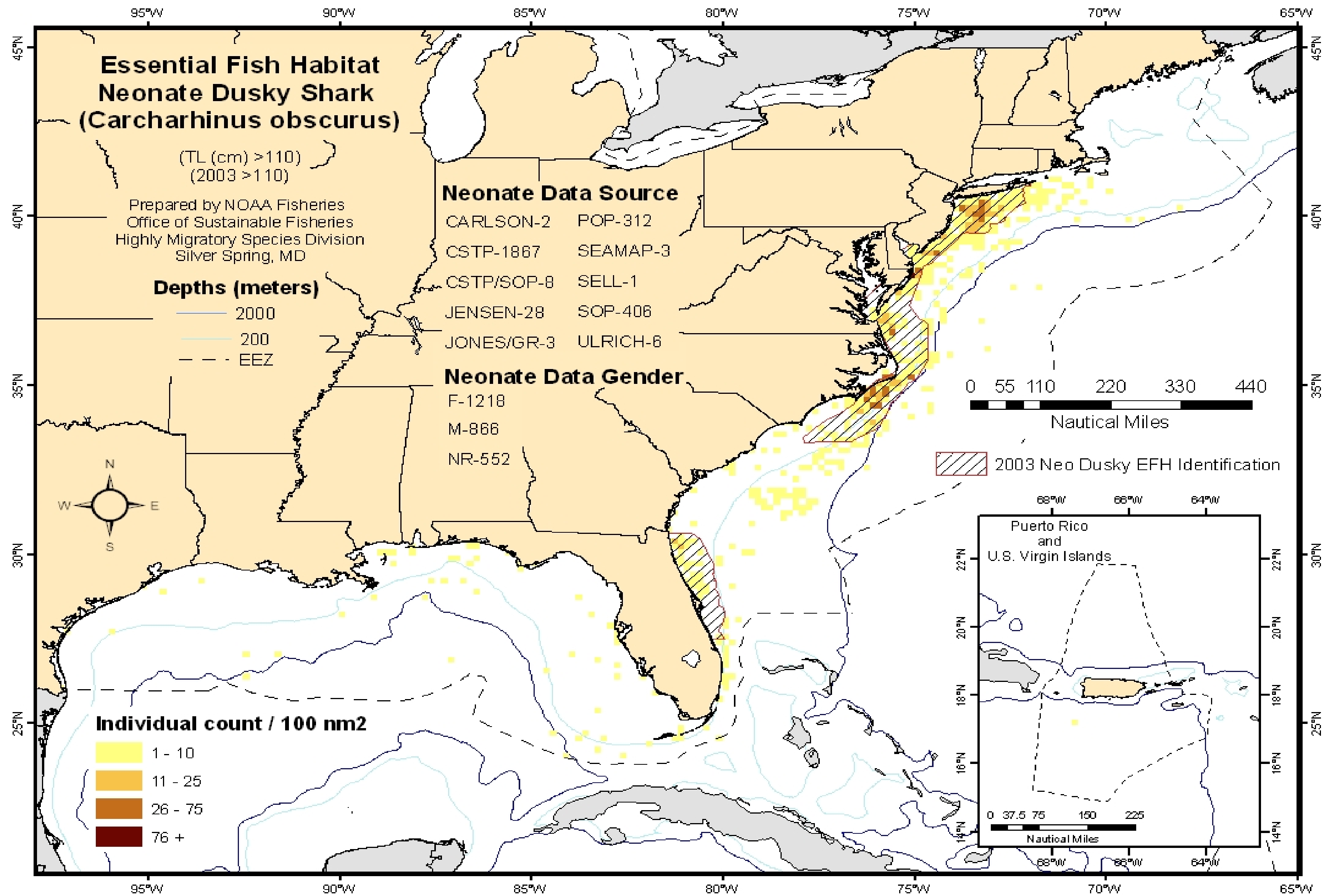


Figure B.61 Dusky Shark: Neonate.

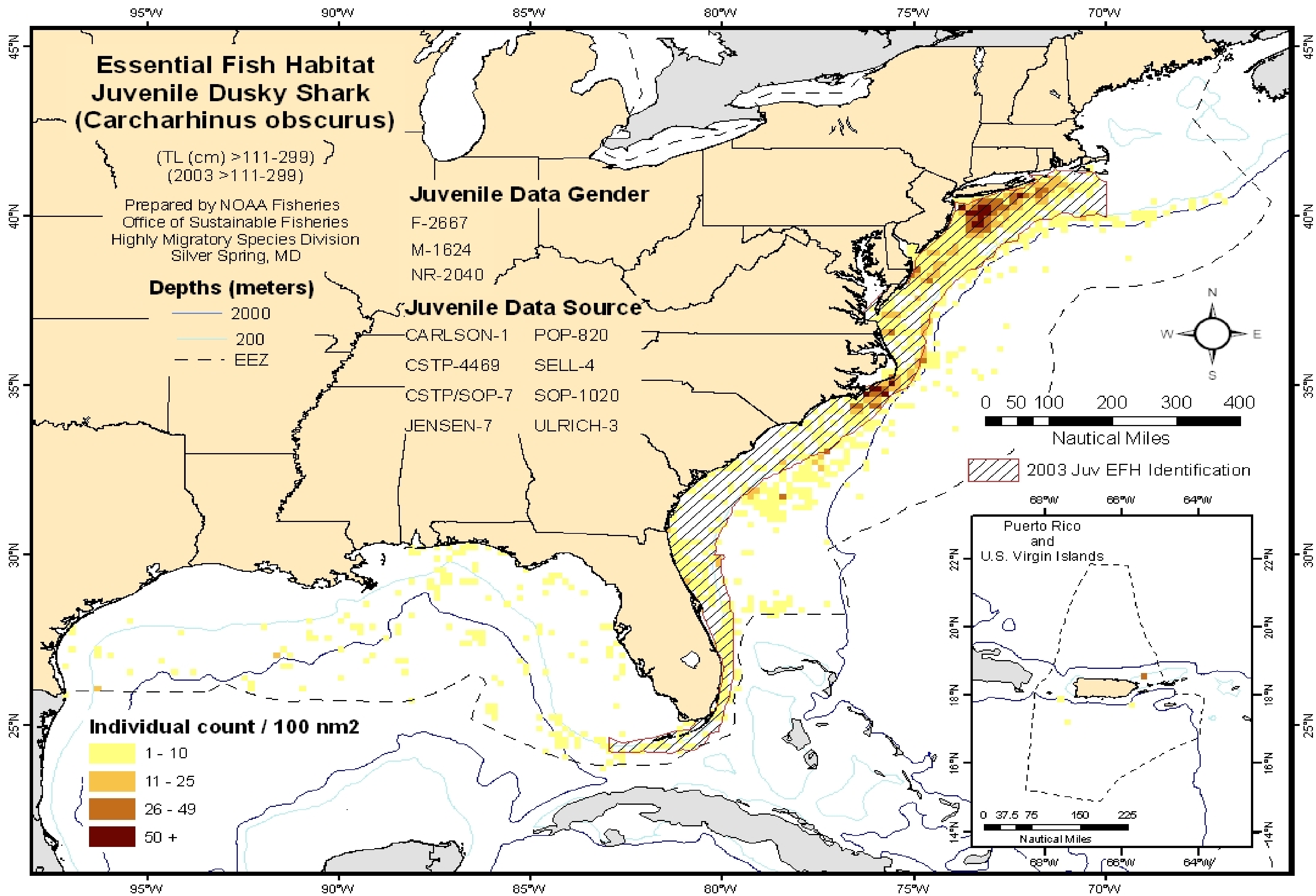


Figure B.62 Dusky Shark: Juvenile.

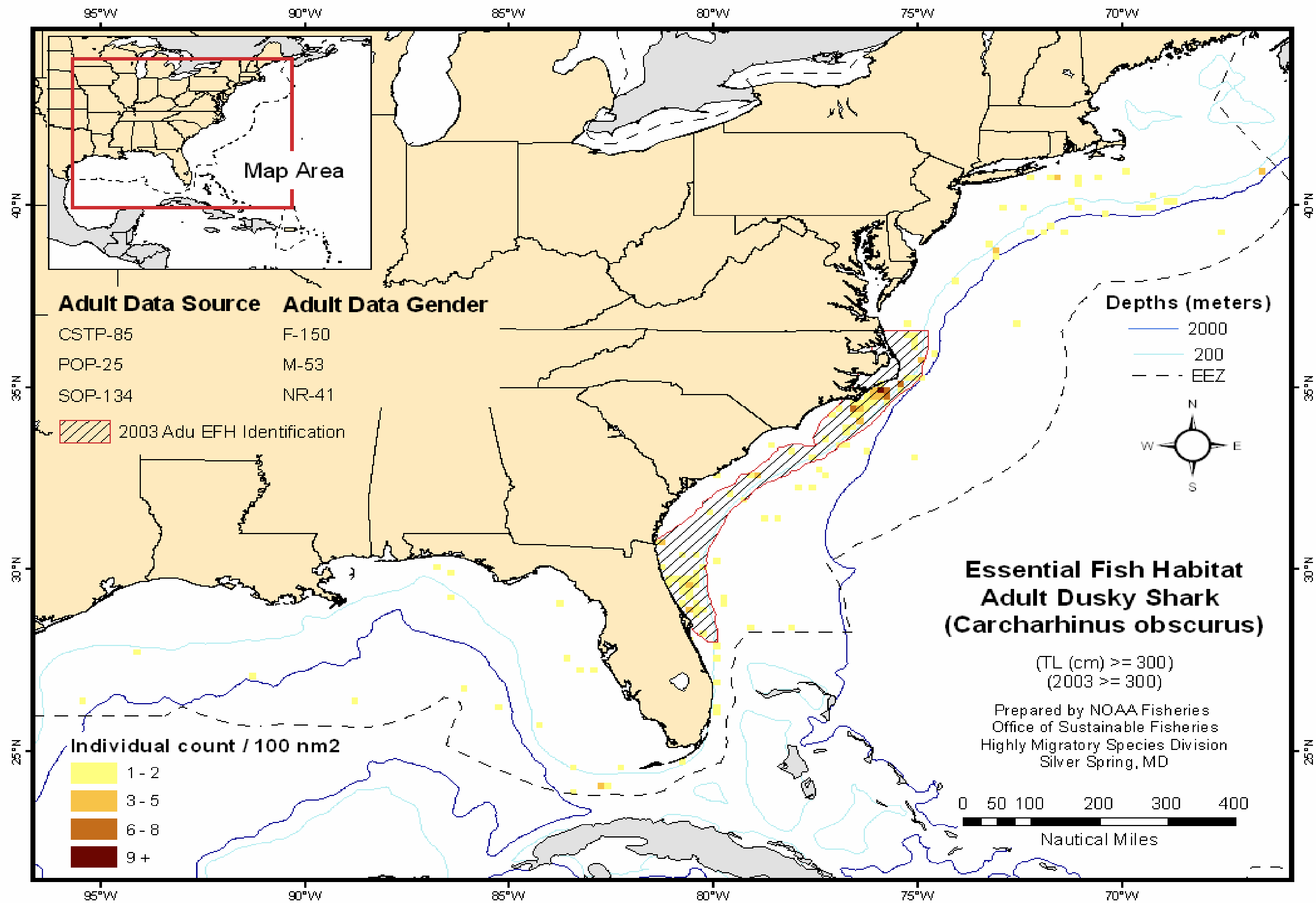


**Figure B.63 Dusky Shark: Adult.**

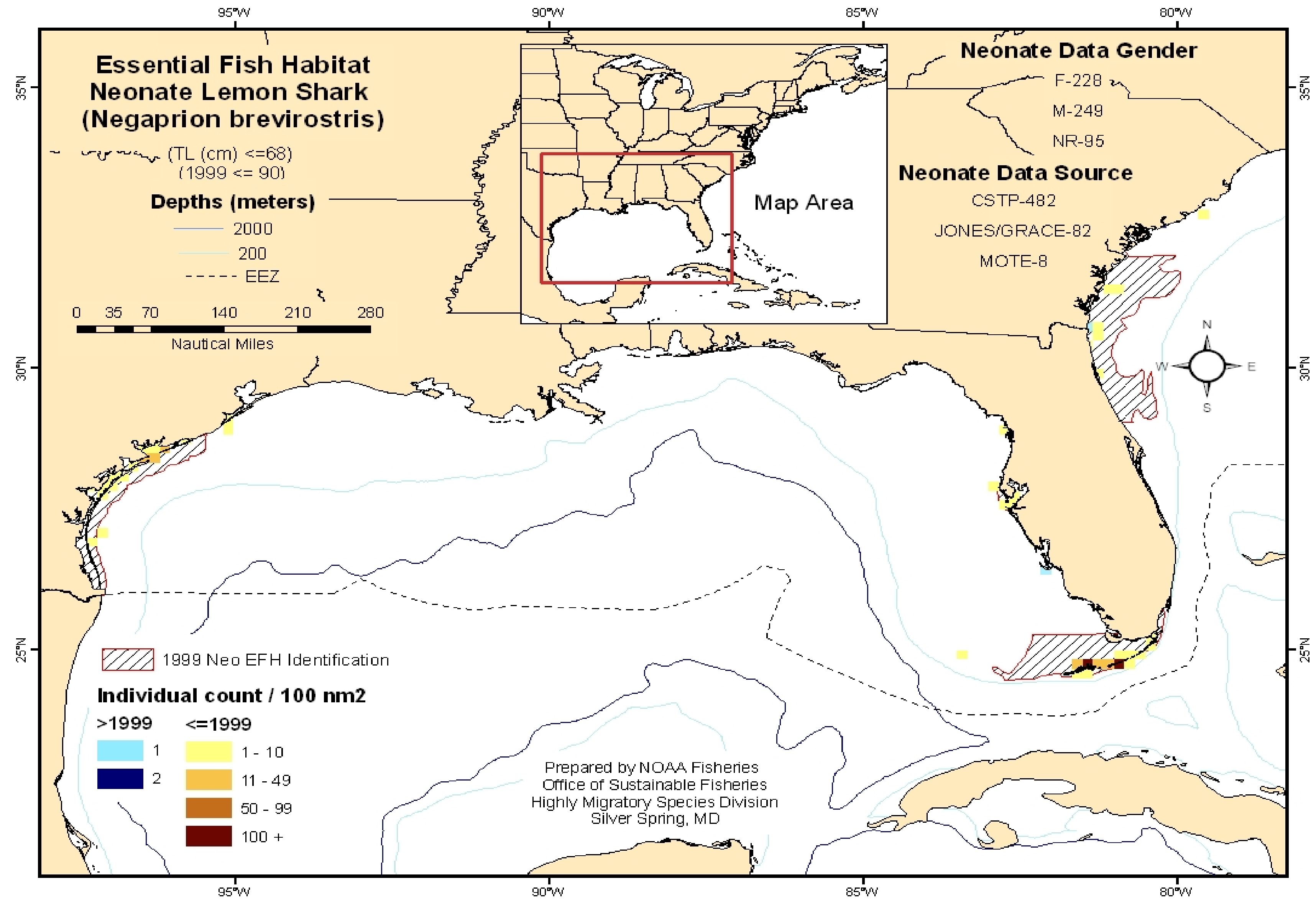


**Figure B.64 Lemon Shark: Neonate.**

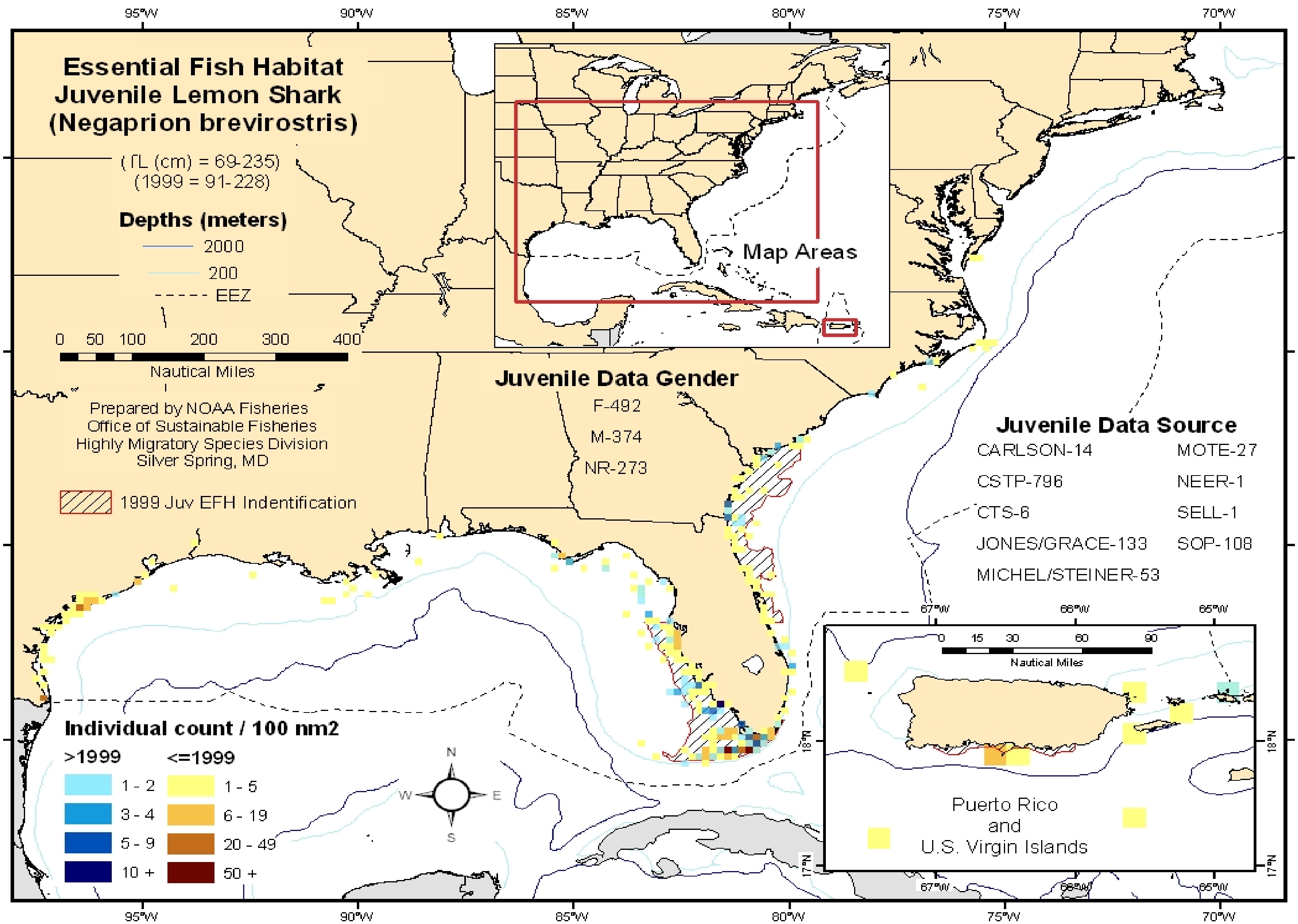


**Figure B.65** Lemon Shark: Juvenile.

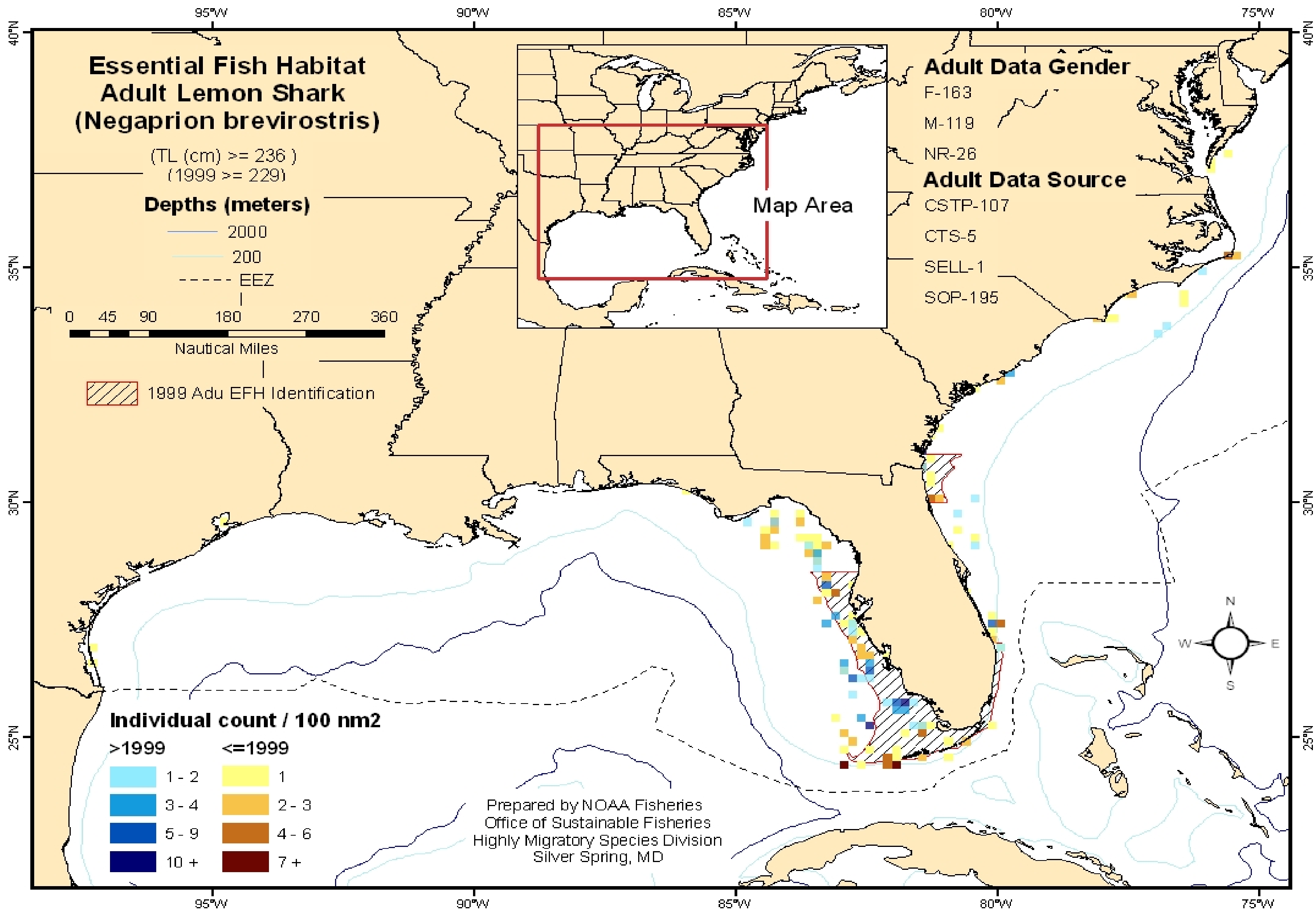


**Figure B.66 Lemon Shark: Adult.**

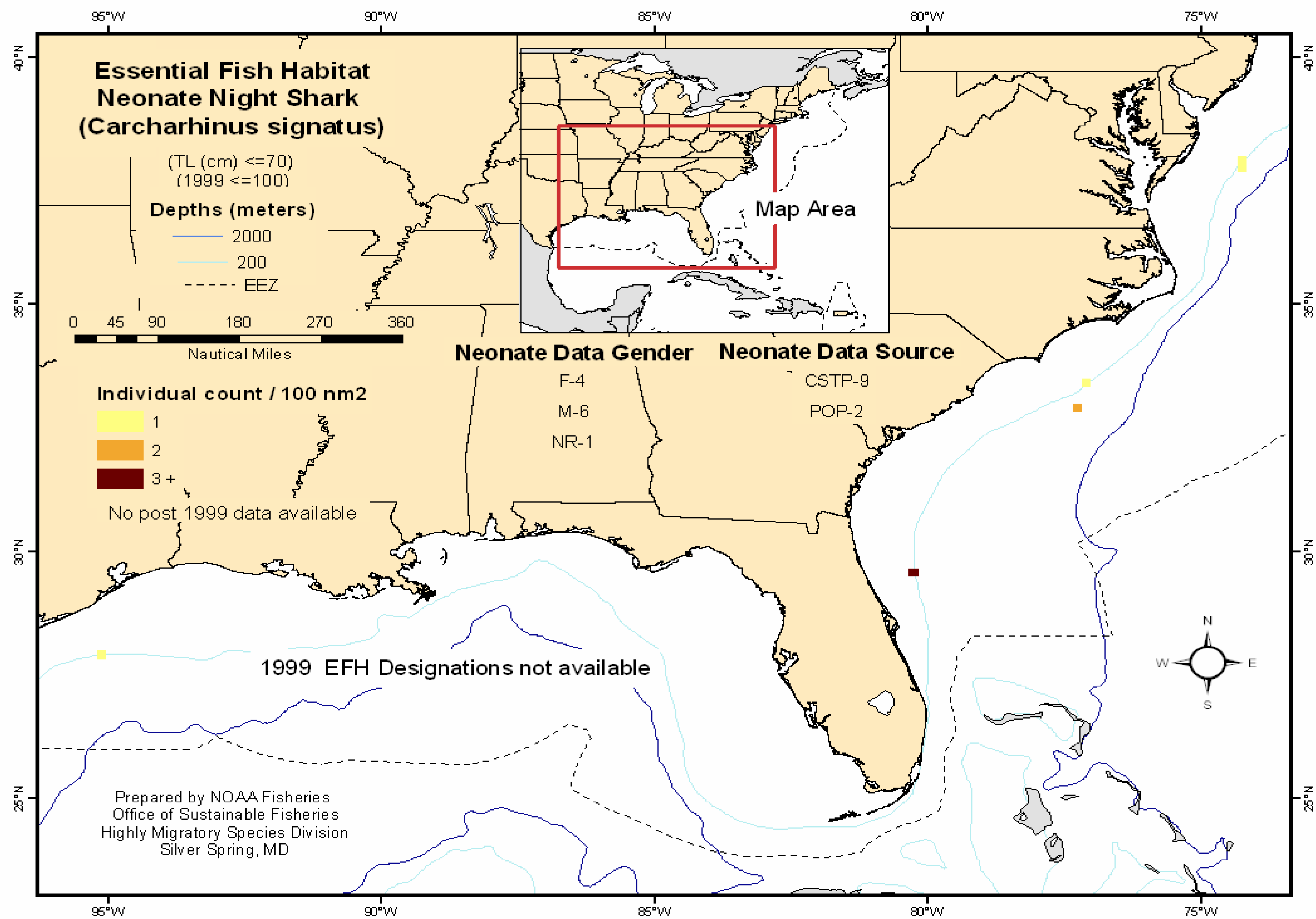


**Figure B.67** Night Shark: Neonate.

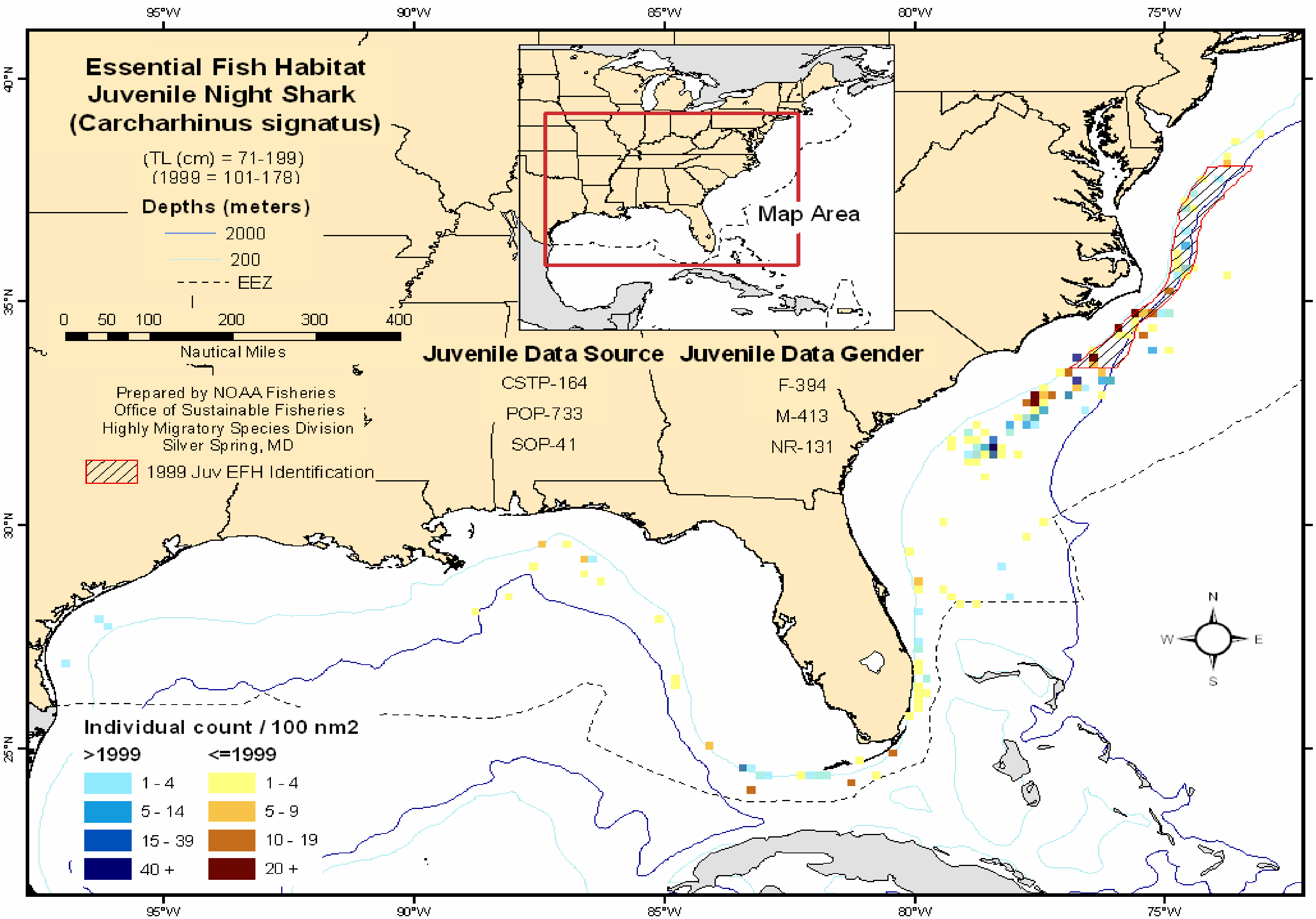


**Figure B.68** Night Shark: Juvenile.

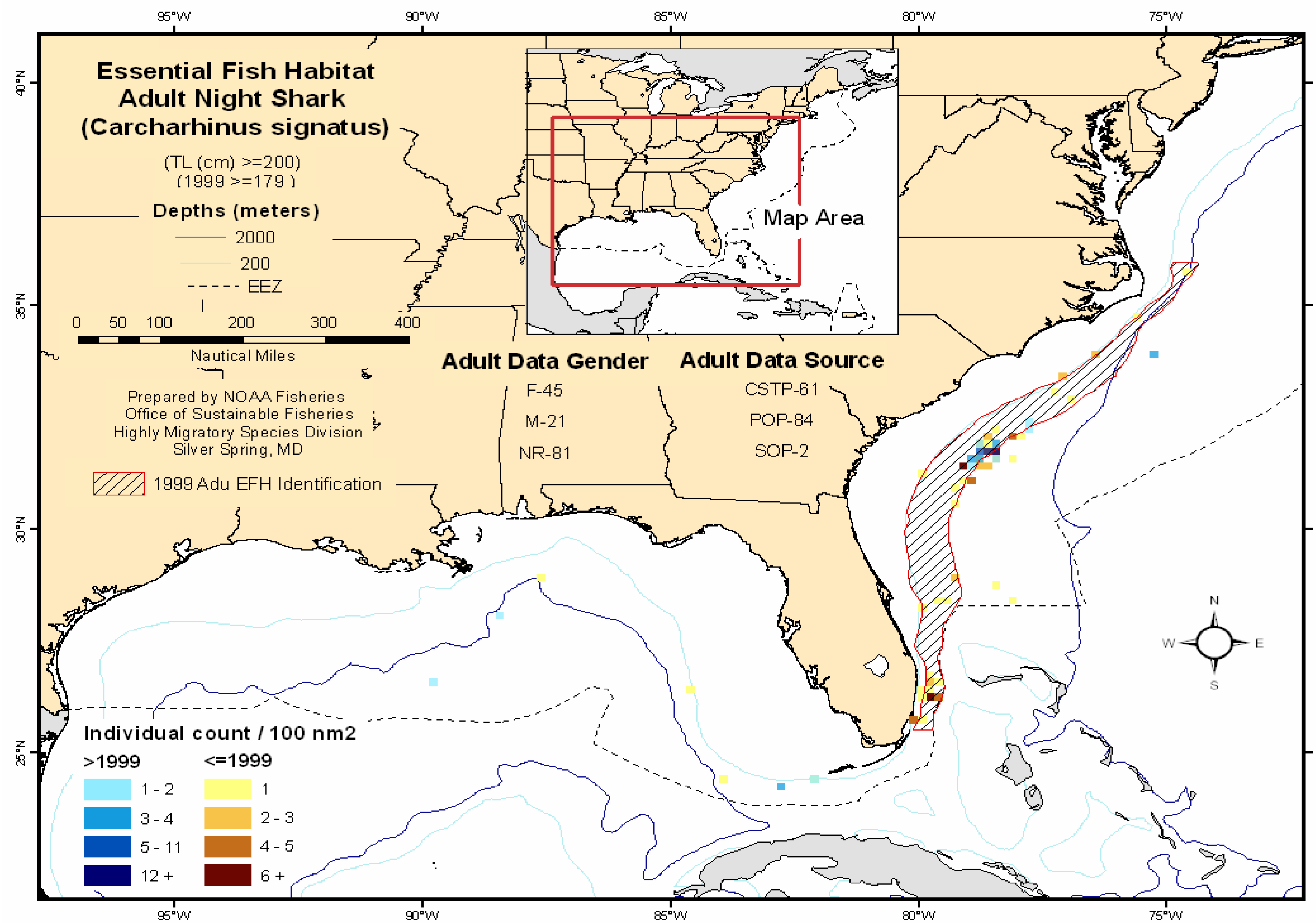


Figure B.69 Night Shark: Adult.

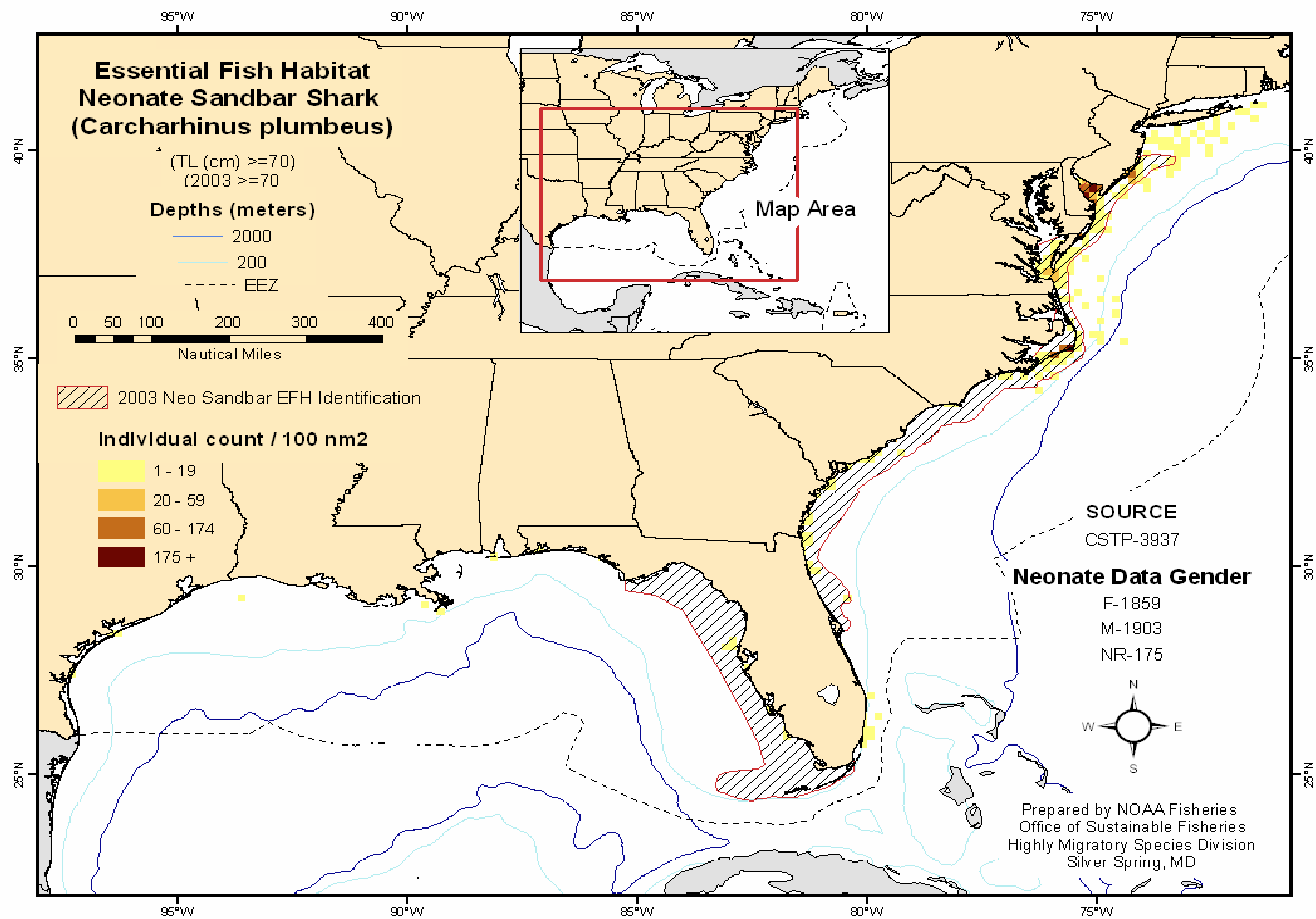


Figure B.70 Sandbar Shark: Neonate.

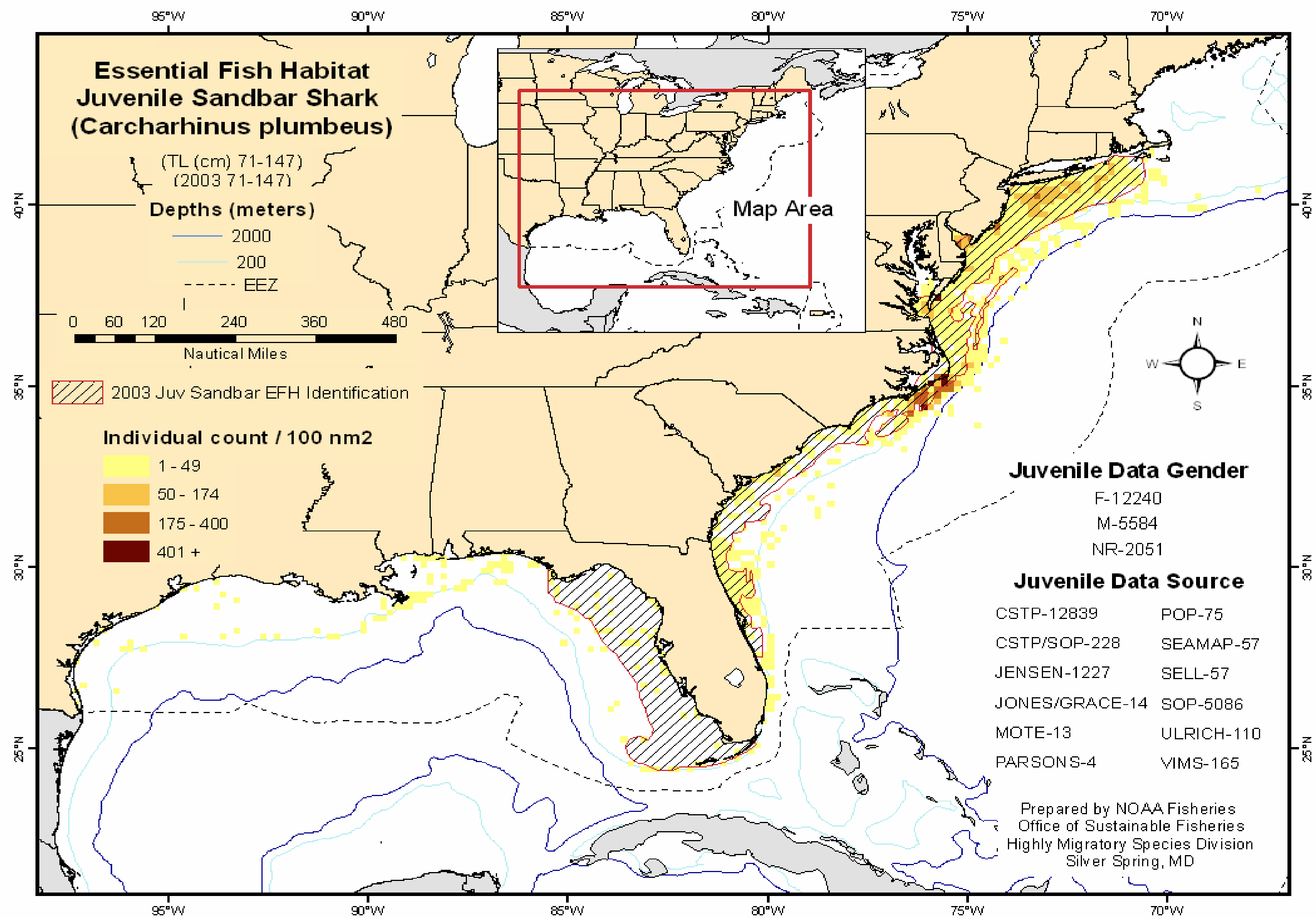


**Figure B.71** **Sandbar Shark: Juvenile.**

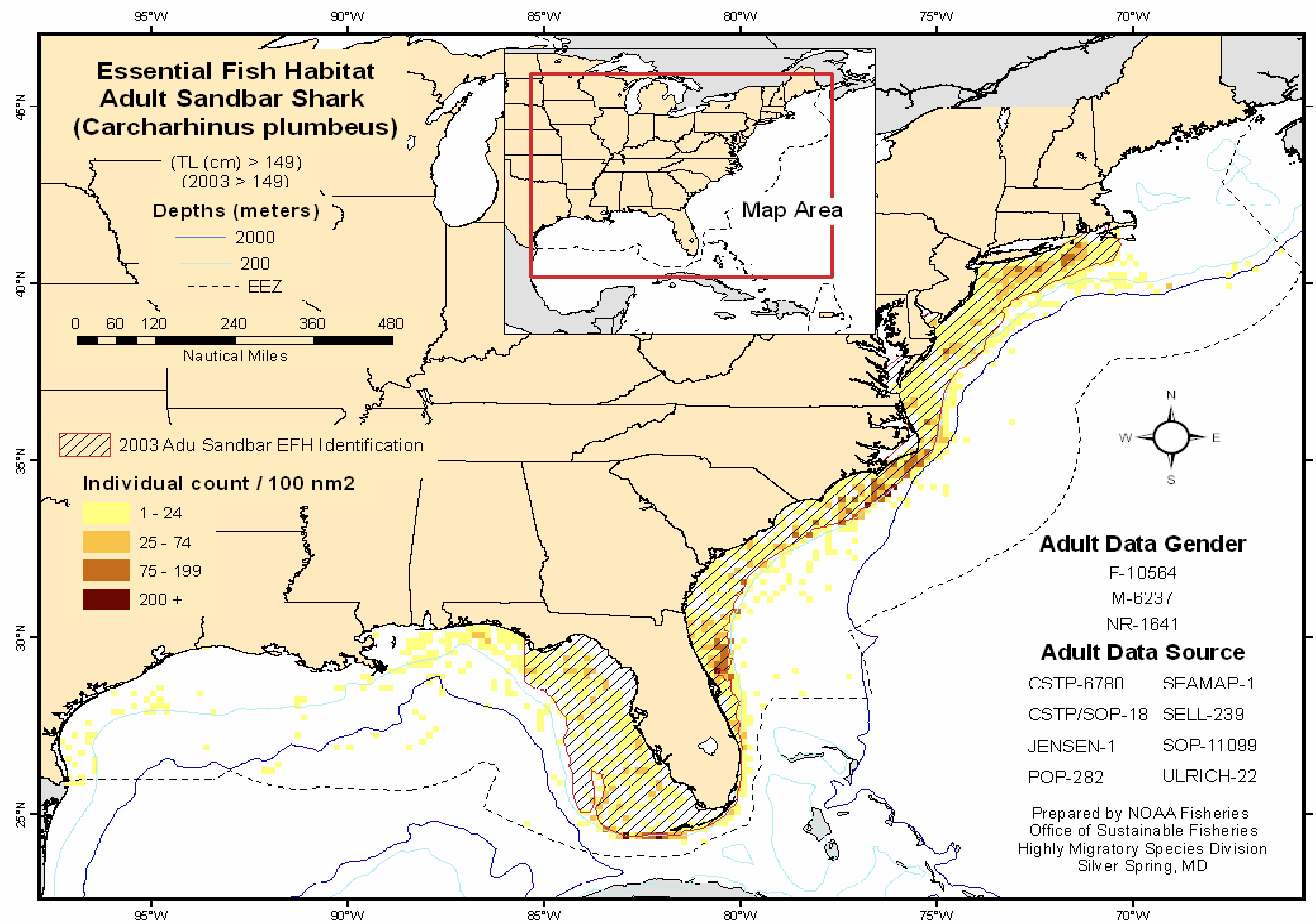


**Figure B.72** **Sandbar Shark: Adult.**

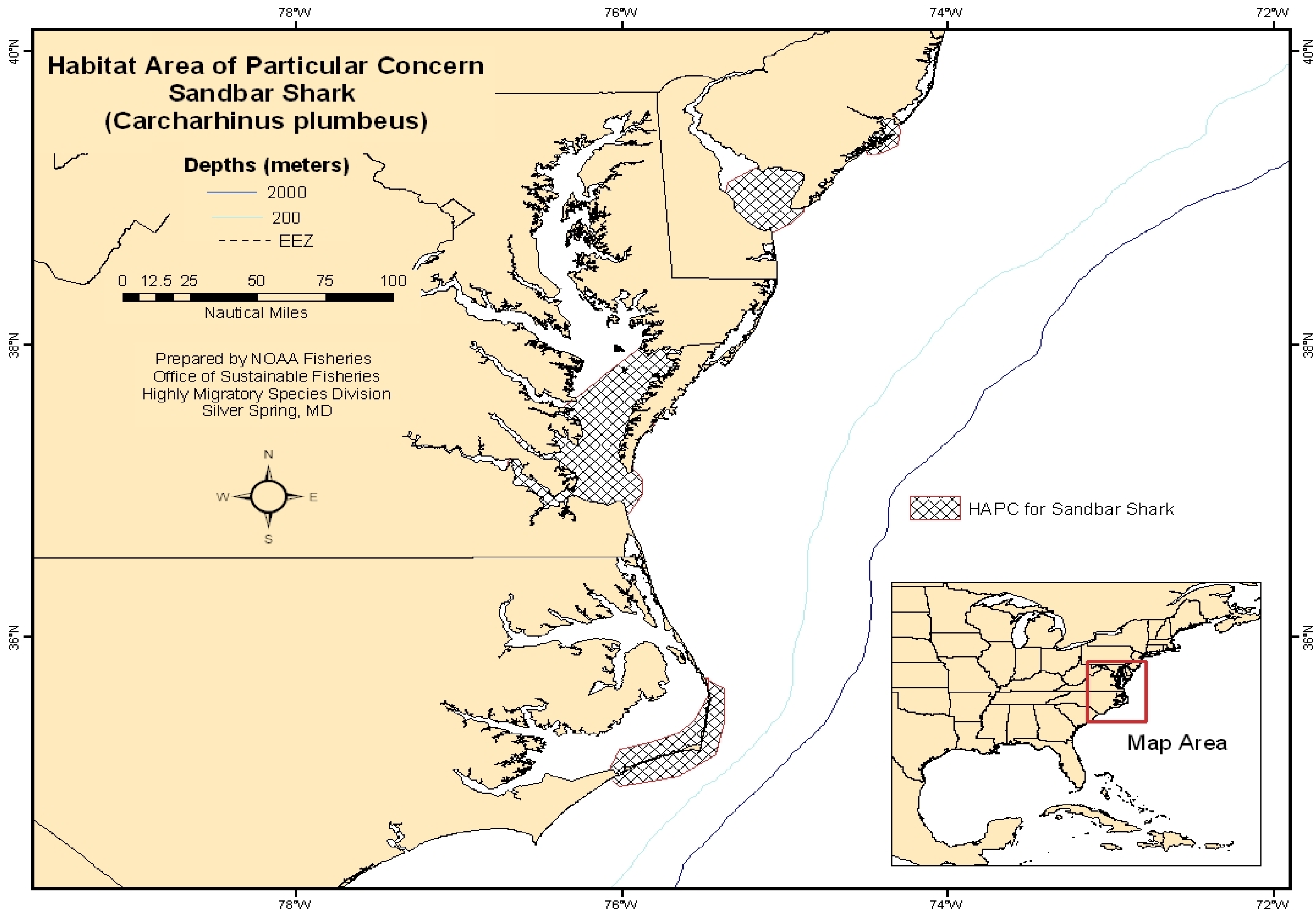


**Figure B.73** **Sandbar Shark Habitat Area of Particular Concern.**

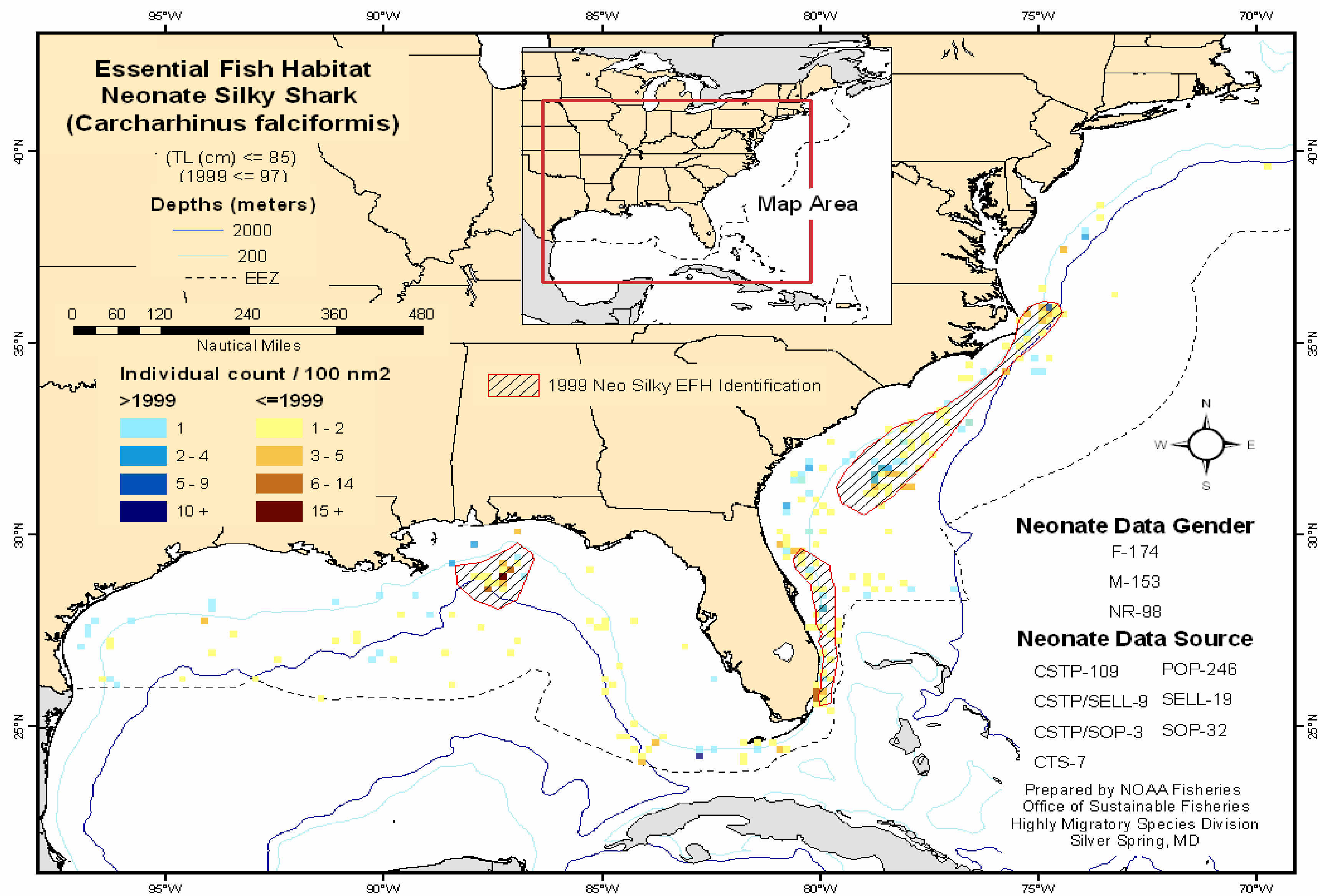


**Figure B.74** Silky Shark: Neonate.

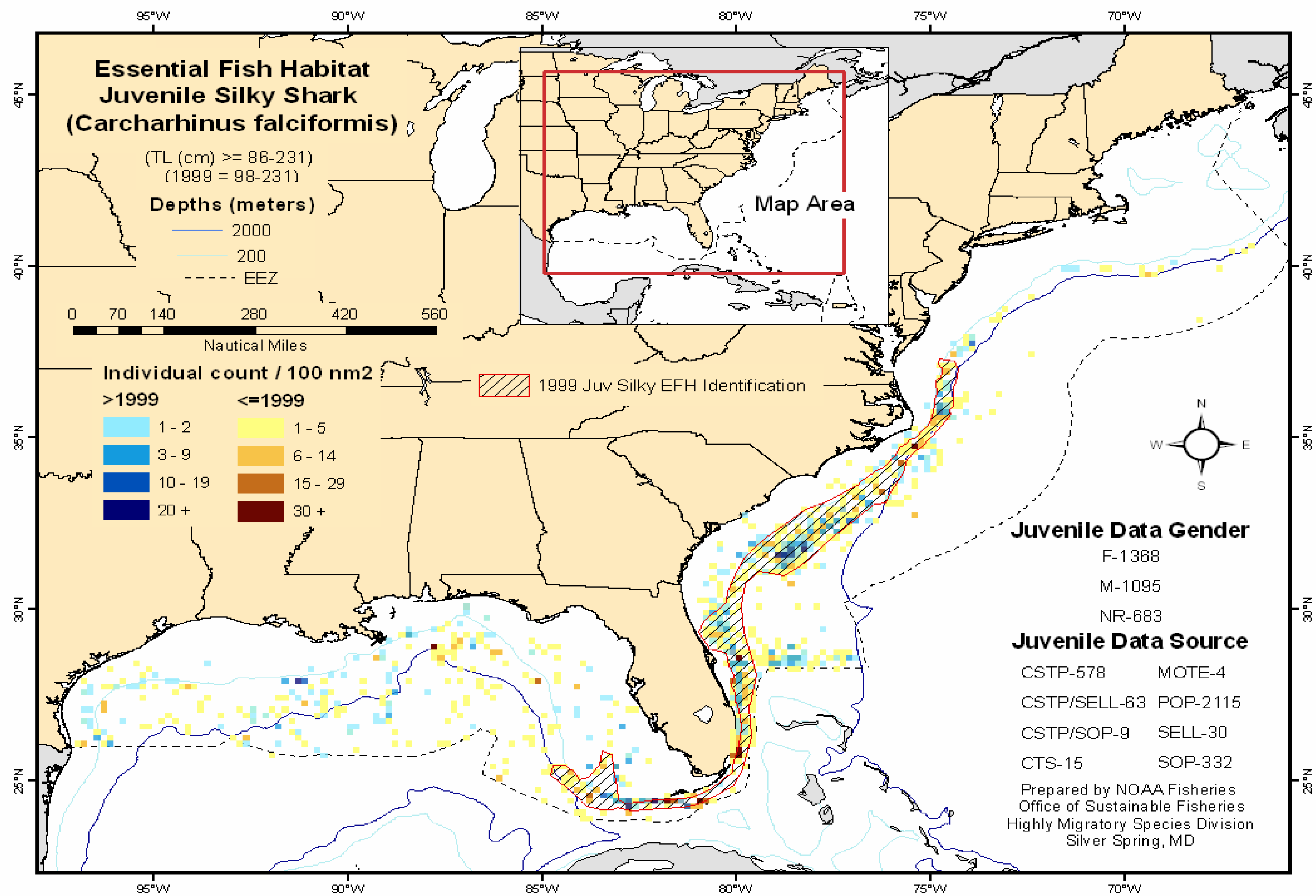


**Figure B.75** Silky Shark: Juvenile.

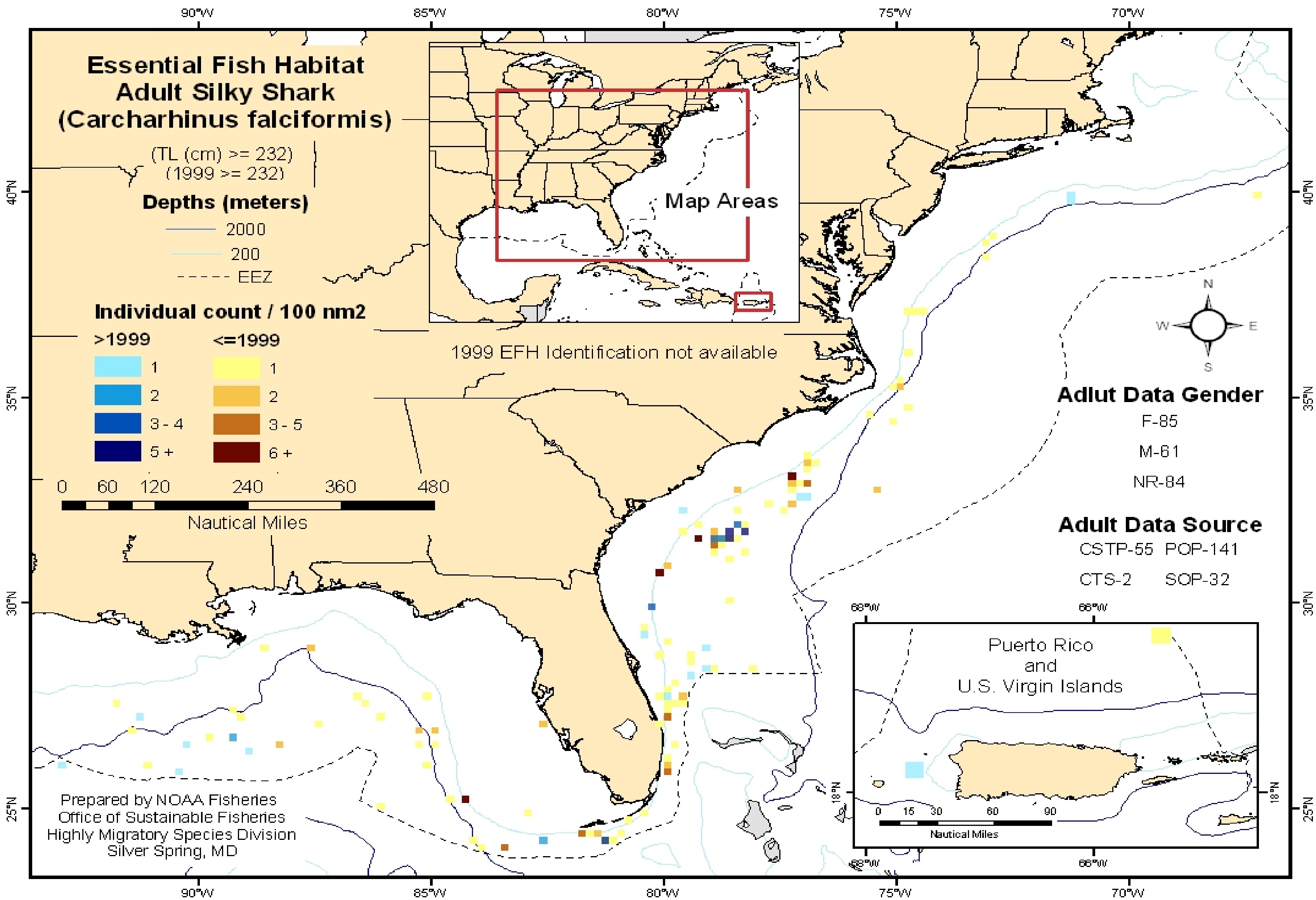


**Figure B.76** Silky Shark: Adult.

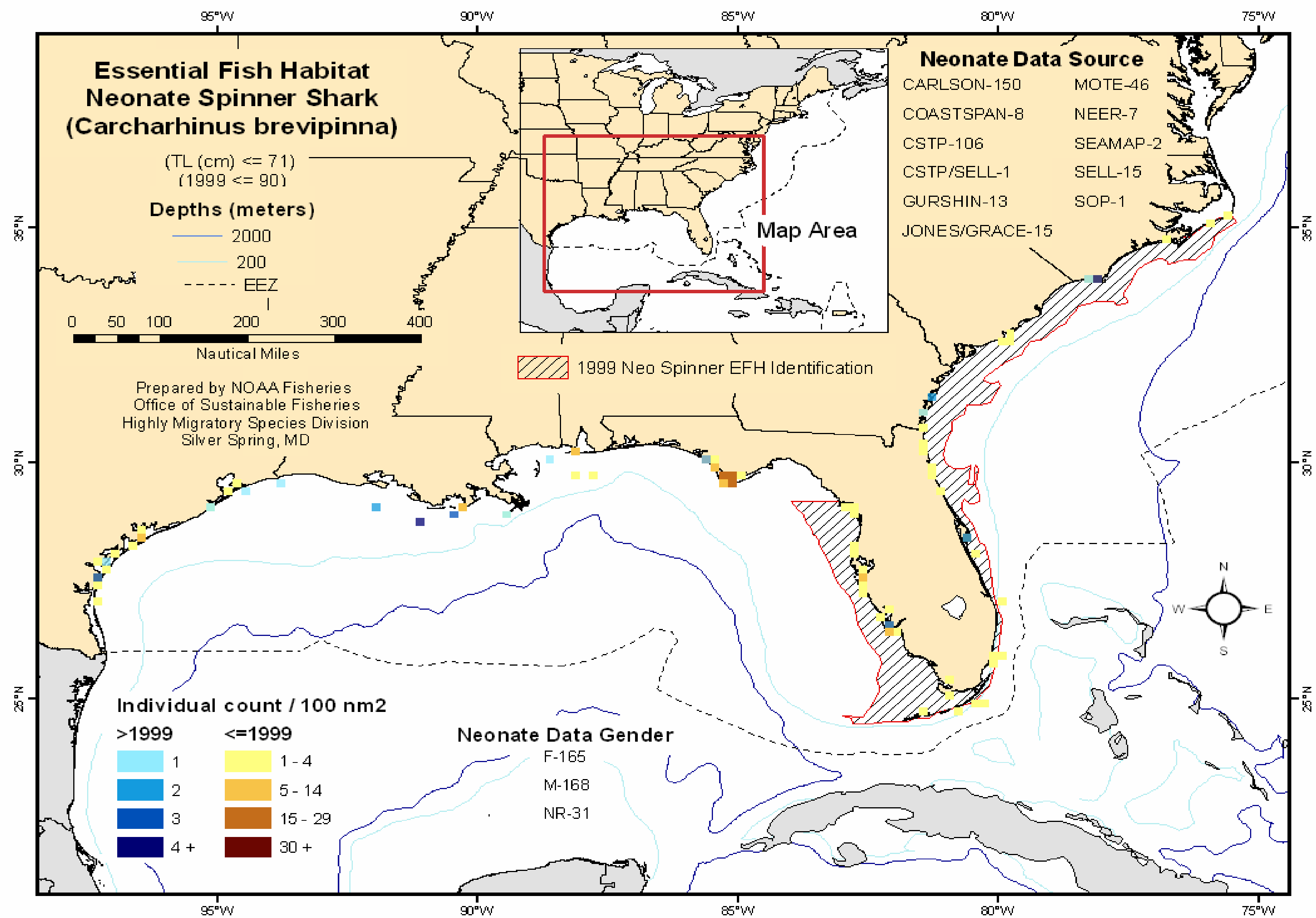


Figure B.77 Spinner Shark: Neonate.

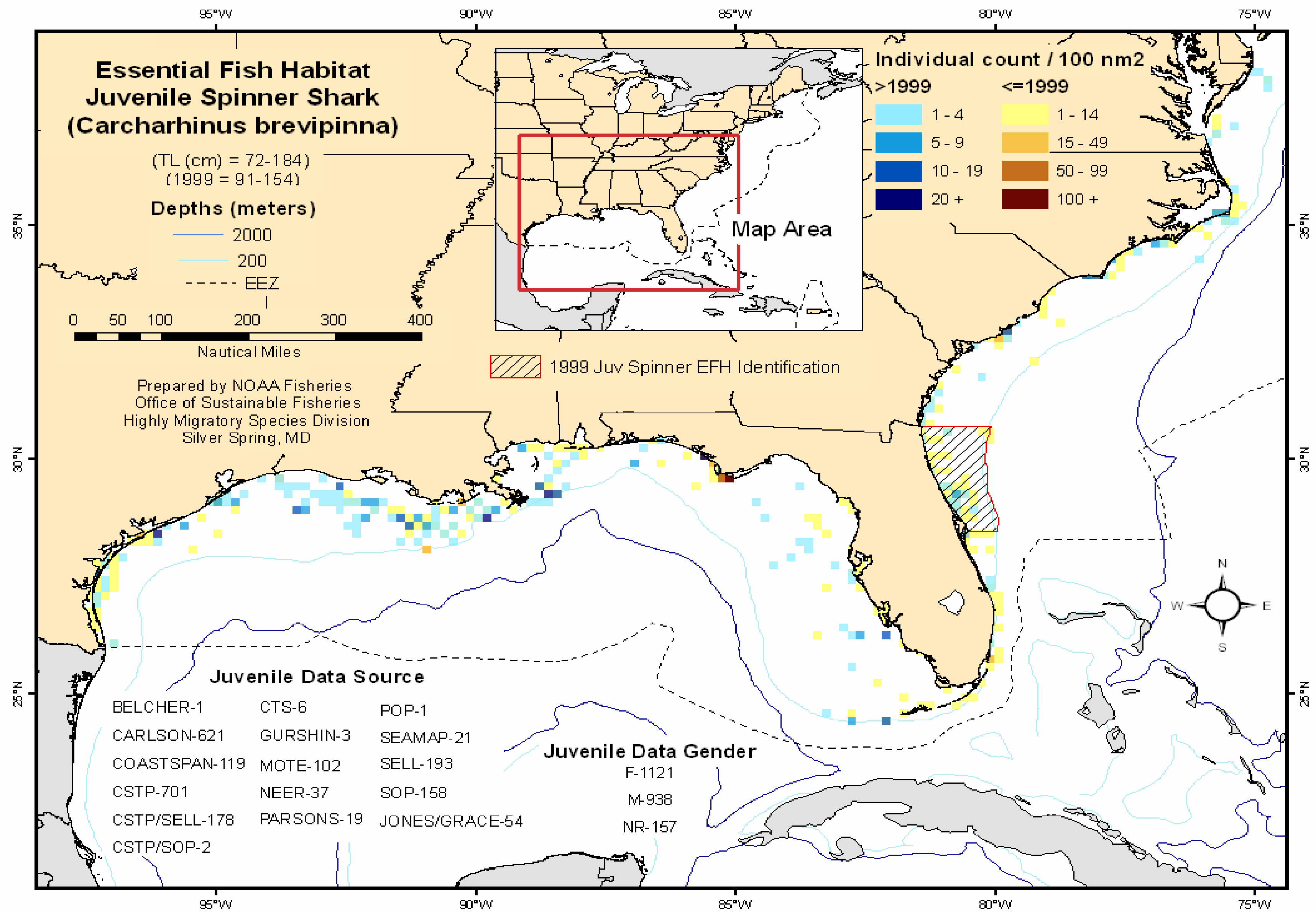


**Figure B.78** Spinner Shark: Juvenile.

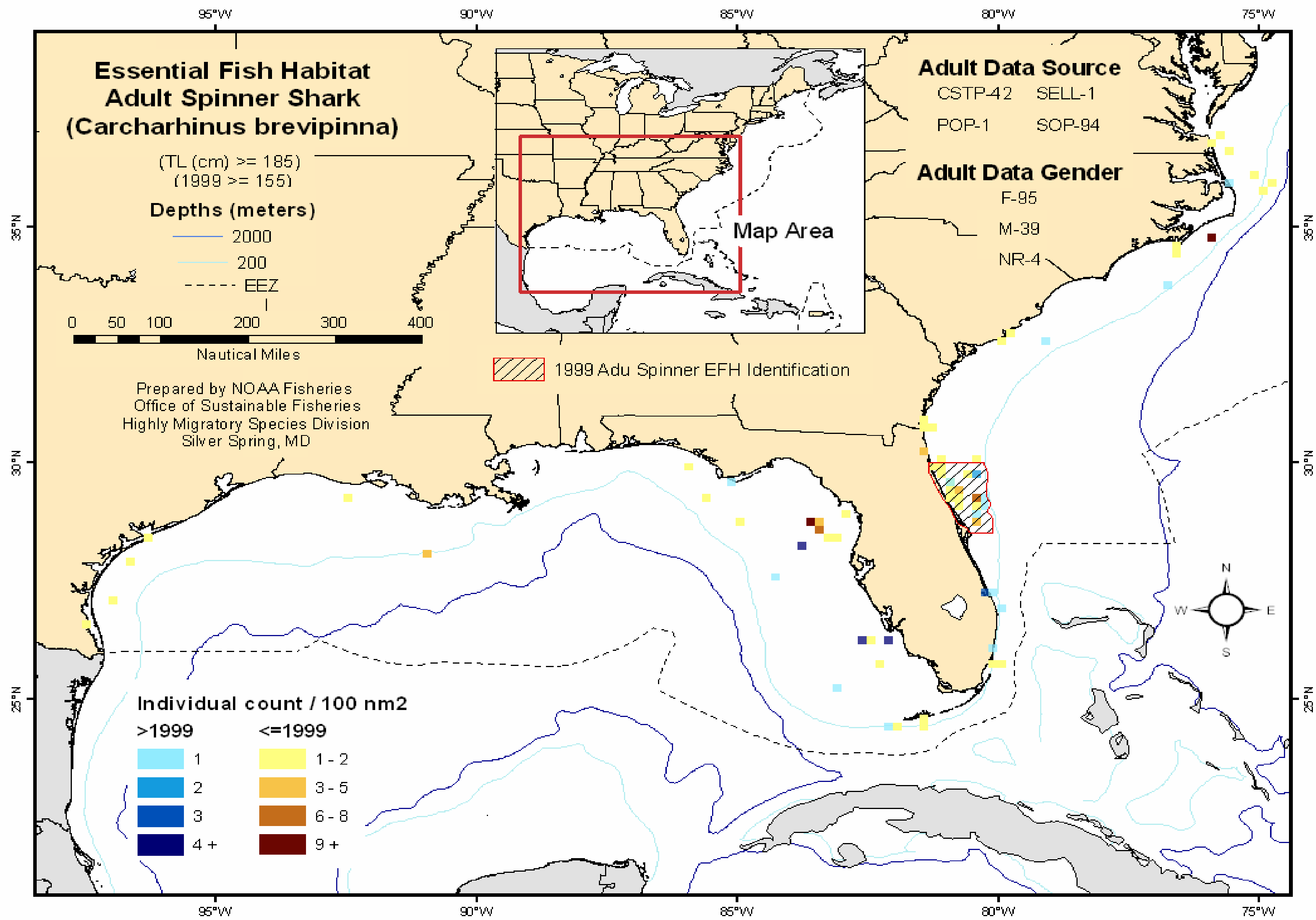


Figure B.79 Spinner Shark: Adult.

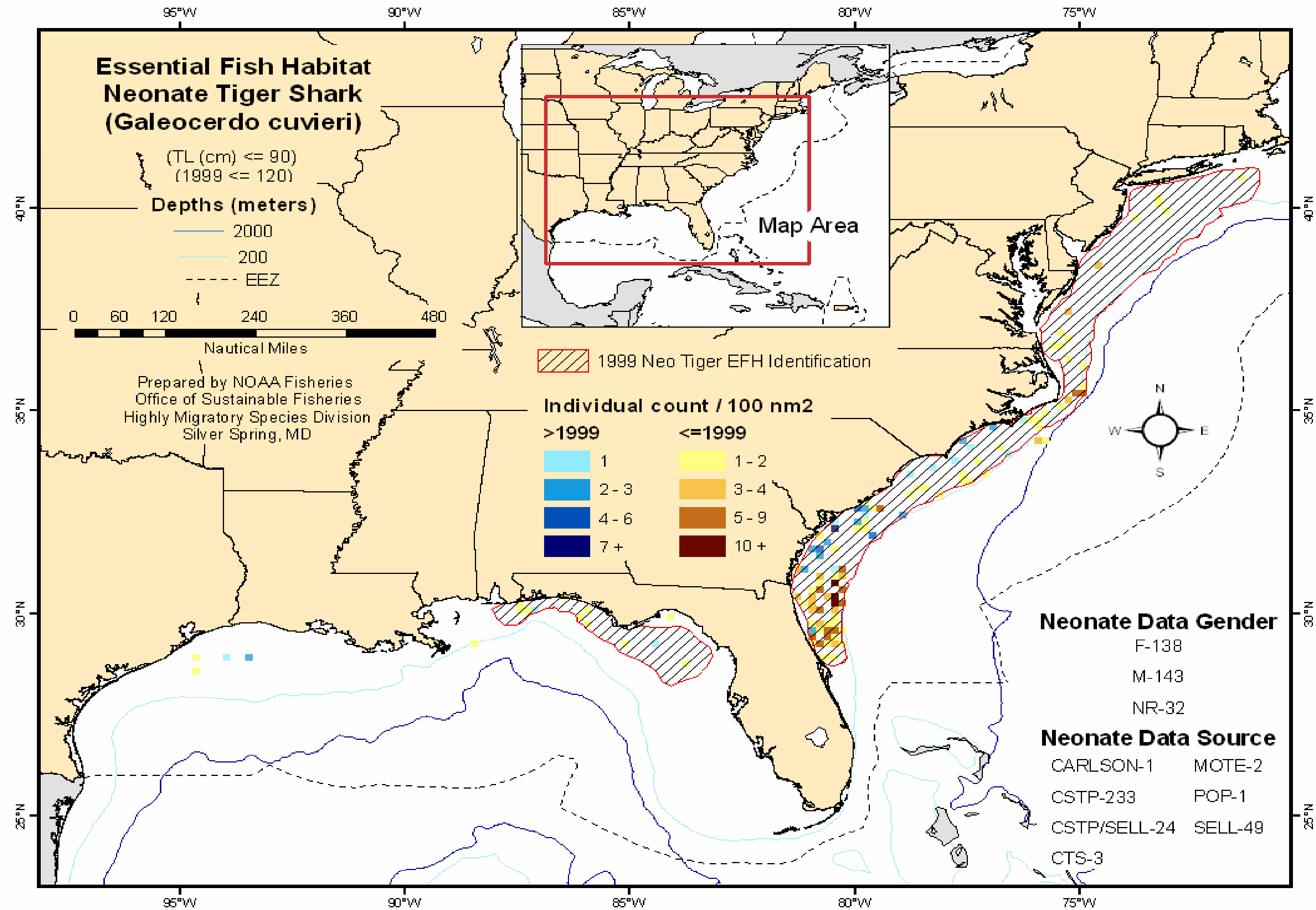


**Figure B.80** Tiger Shark: Neonate.

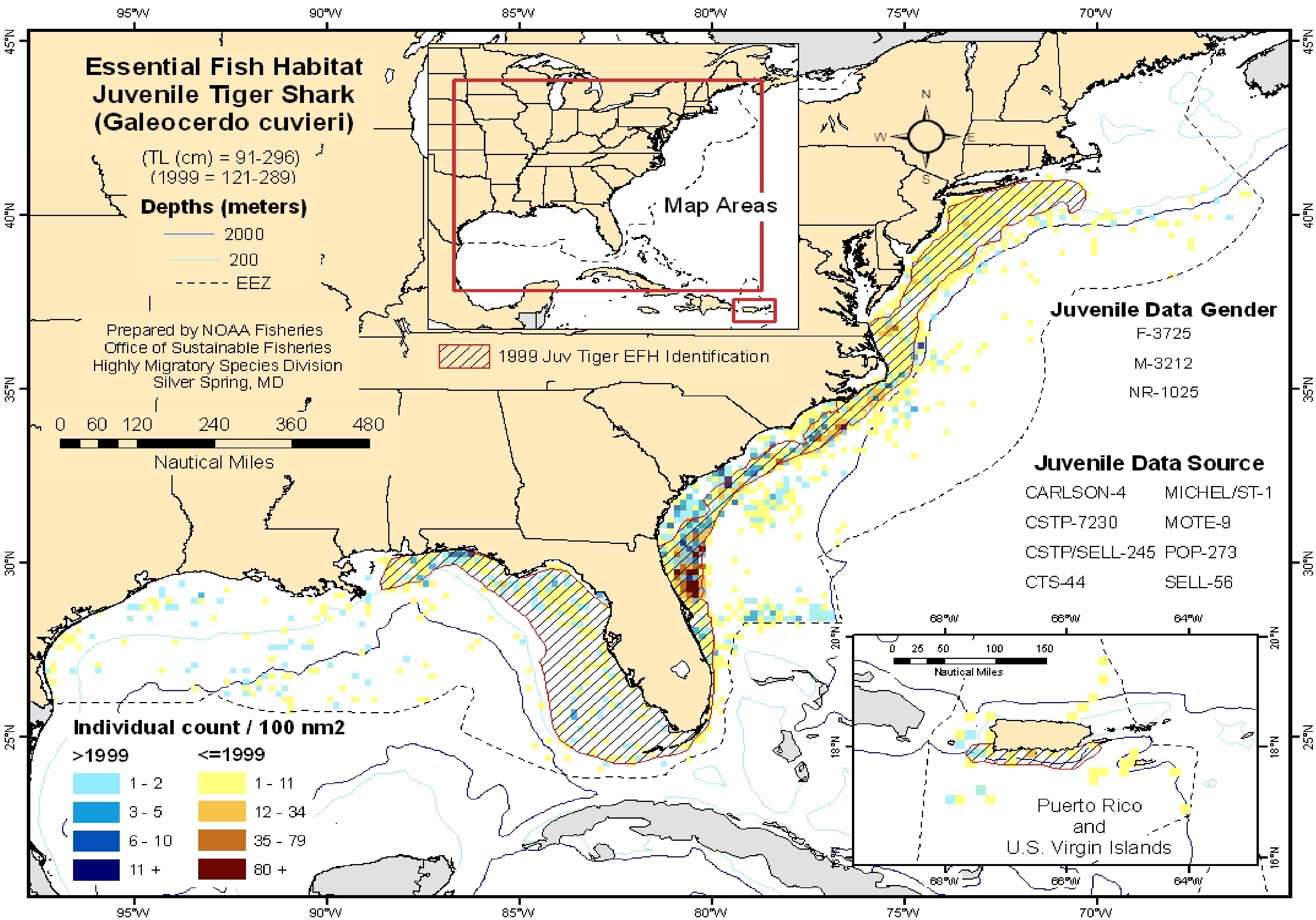


**Figure B.81** Tiger Shark: Juvenile.

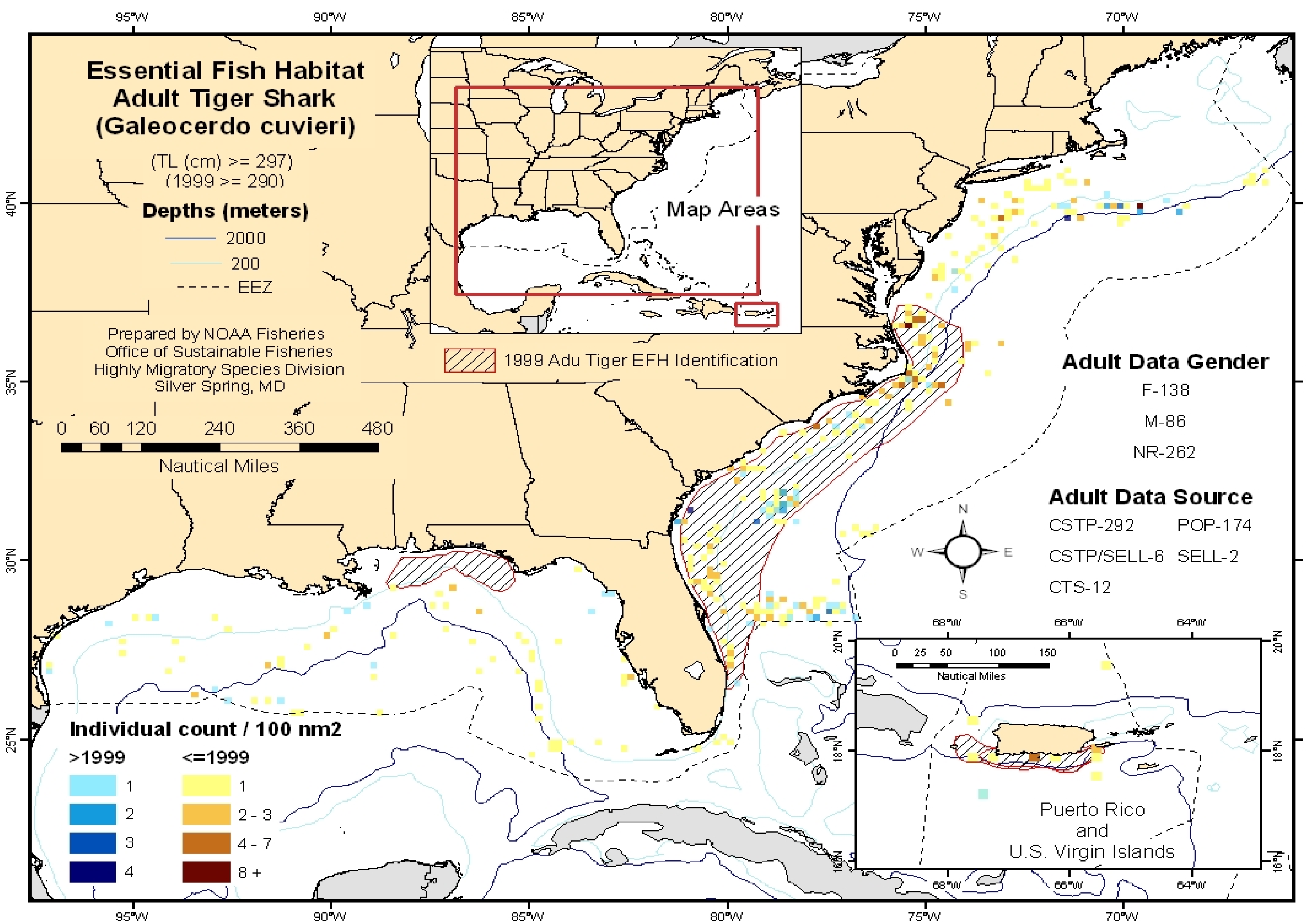


**Figure B.82** Tiger Shark: Adult.

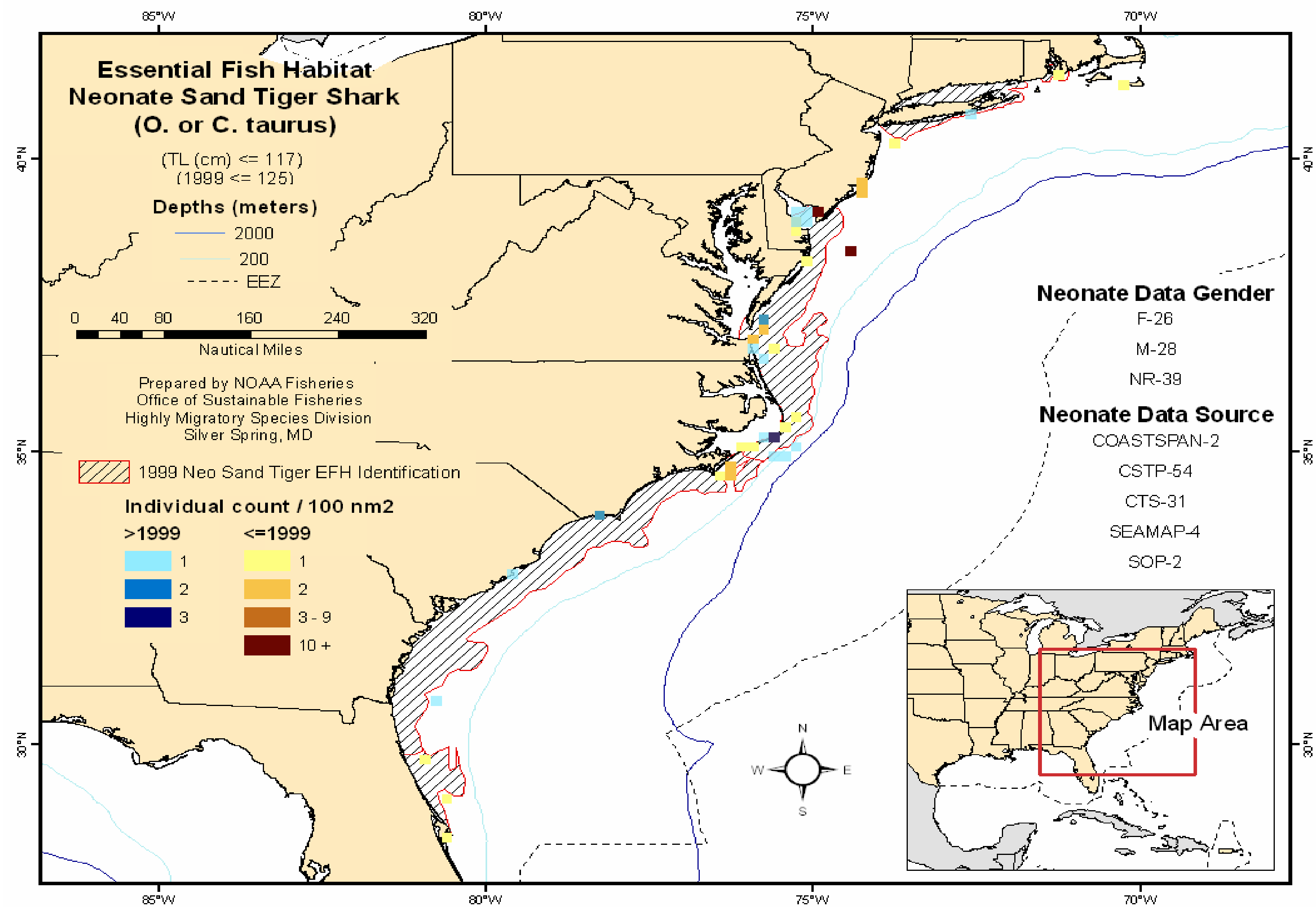


**Figure B.83** **Sand Tiger Shark: Neonate.**

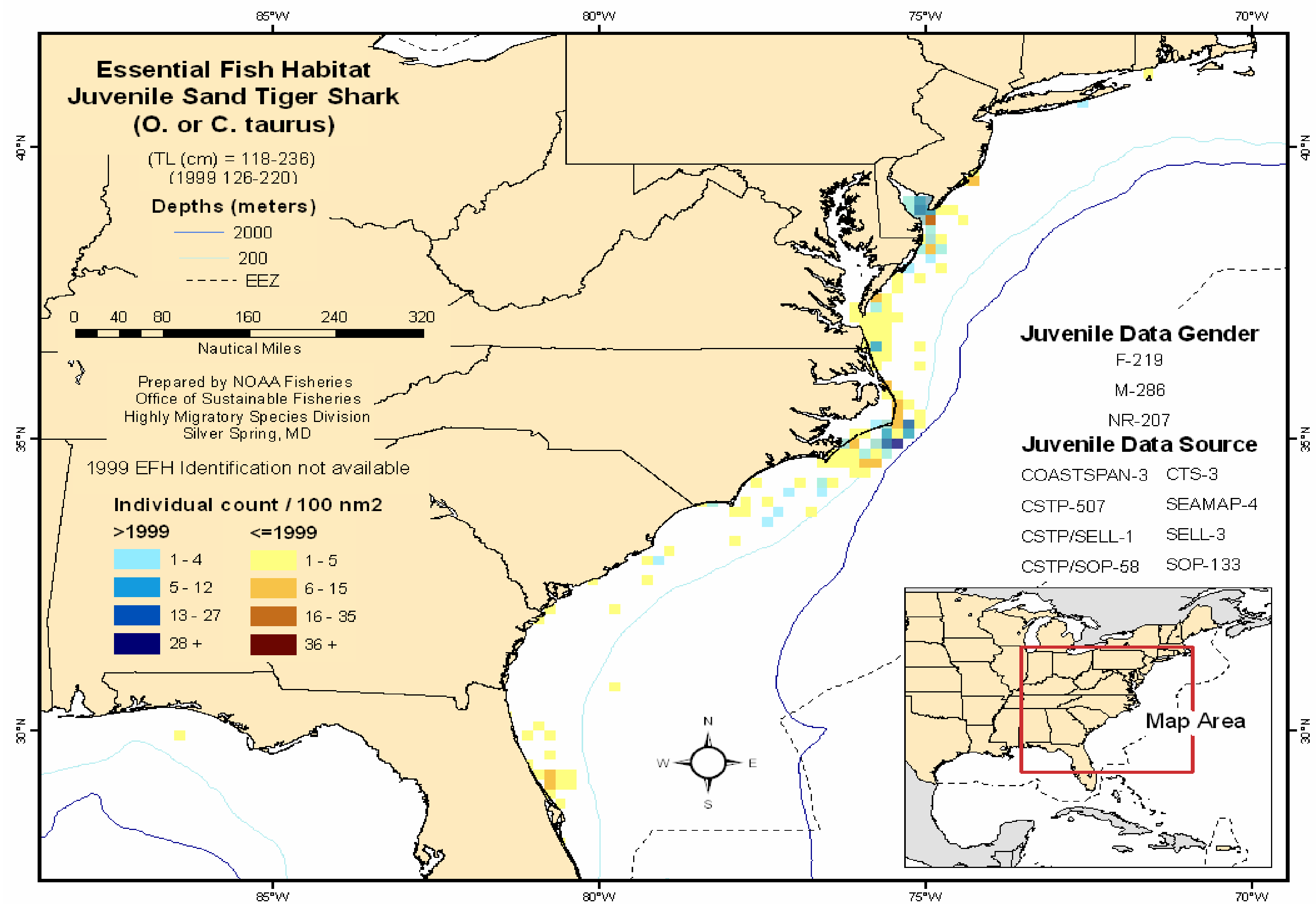


**Figure B.84** Sand Tiger Shark: Juvenile.

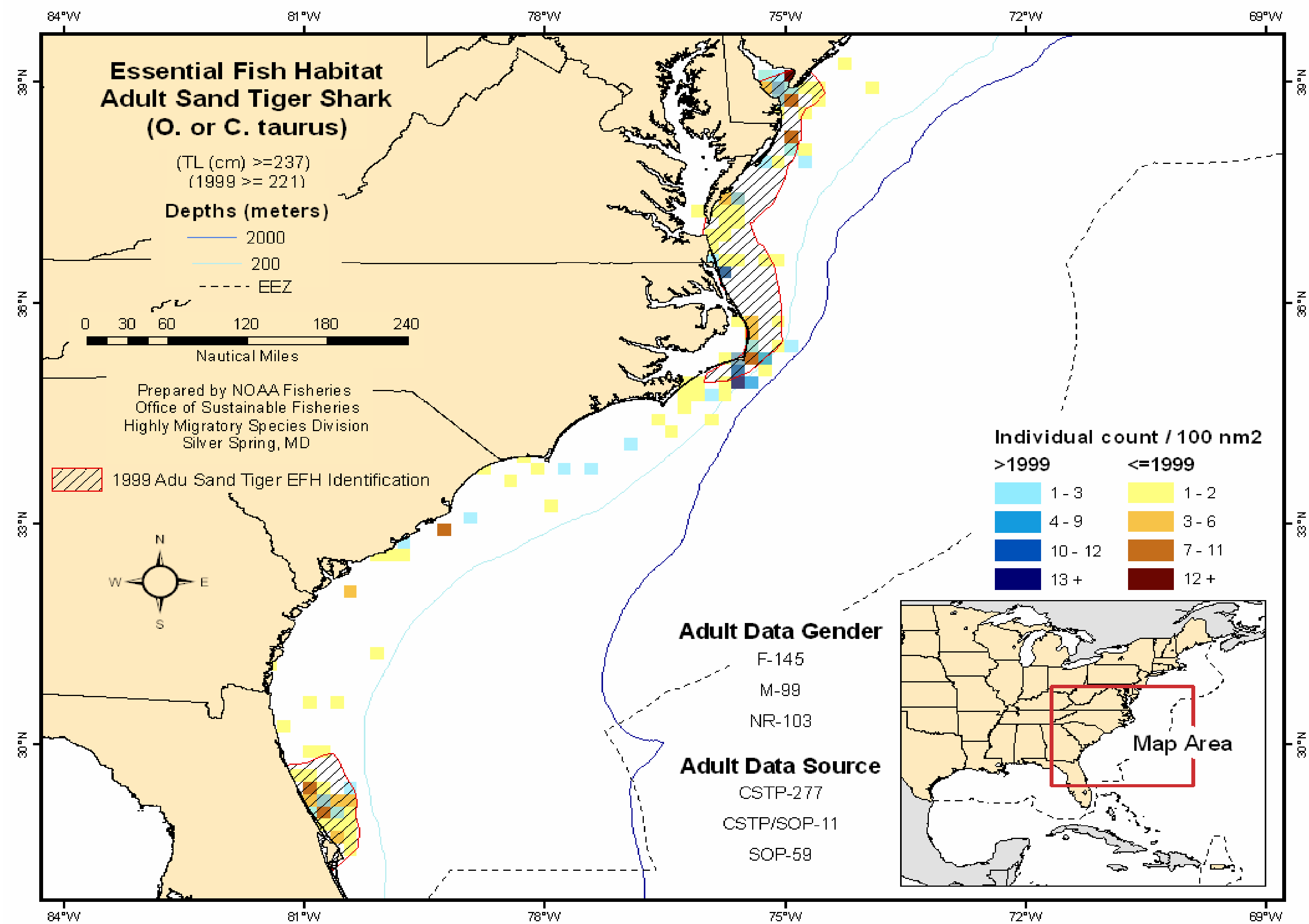


**Figure B.85** Sand Tiger Shark: Adult.

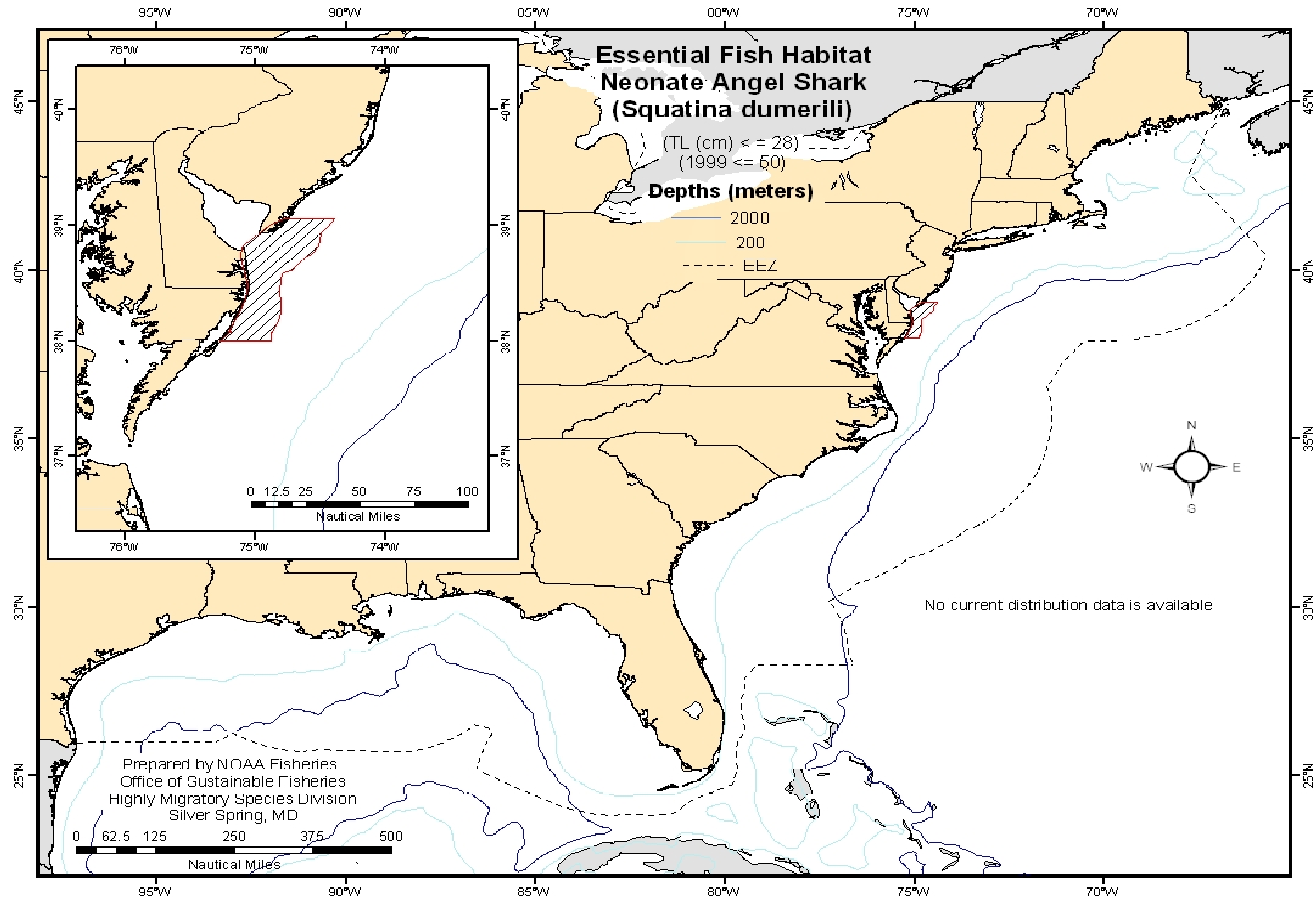


**Figure B.86** Angel Shark: Neonate.

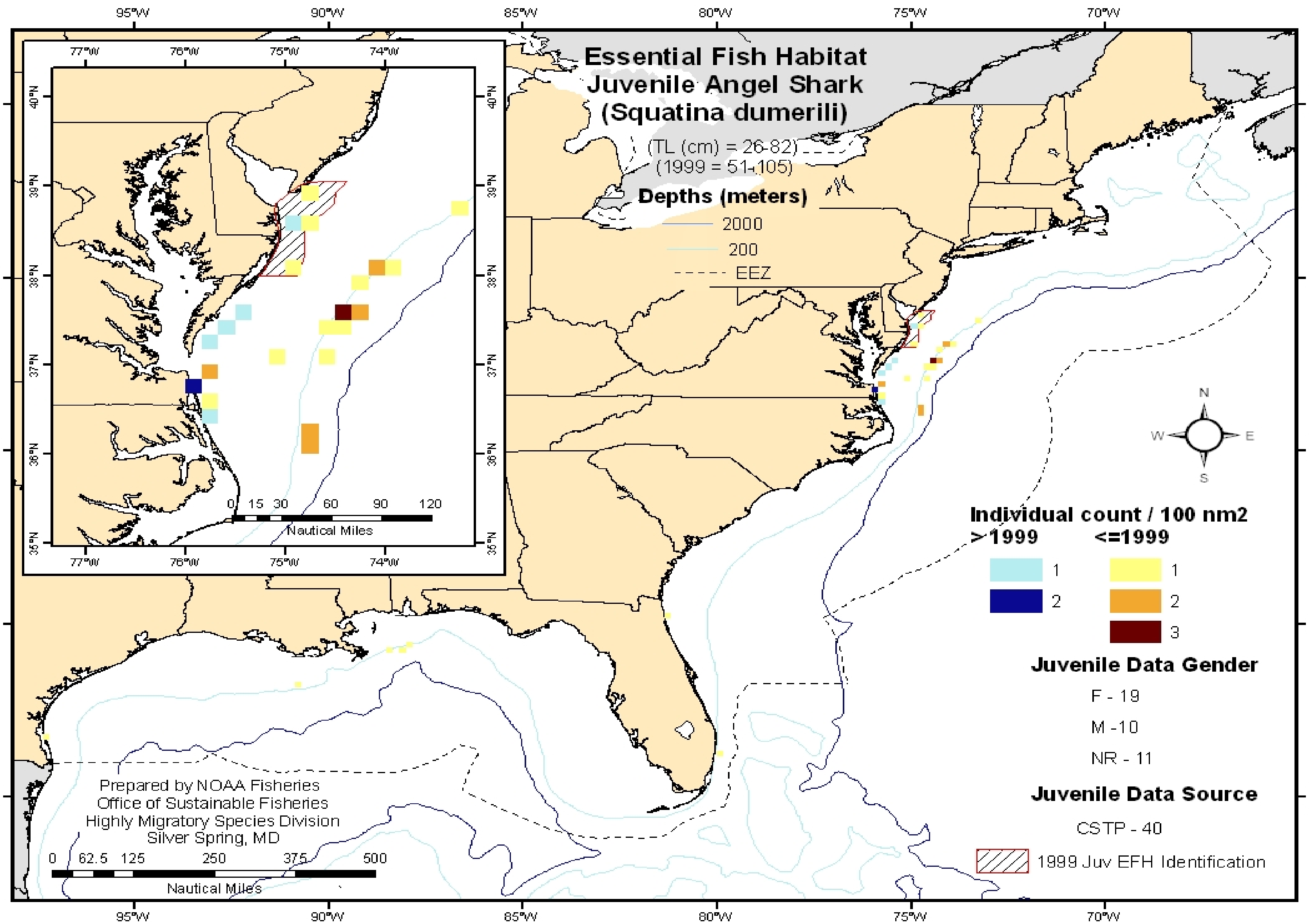


**Figure B.87 Angel Shark: Juvenile.**

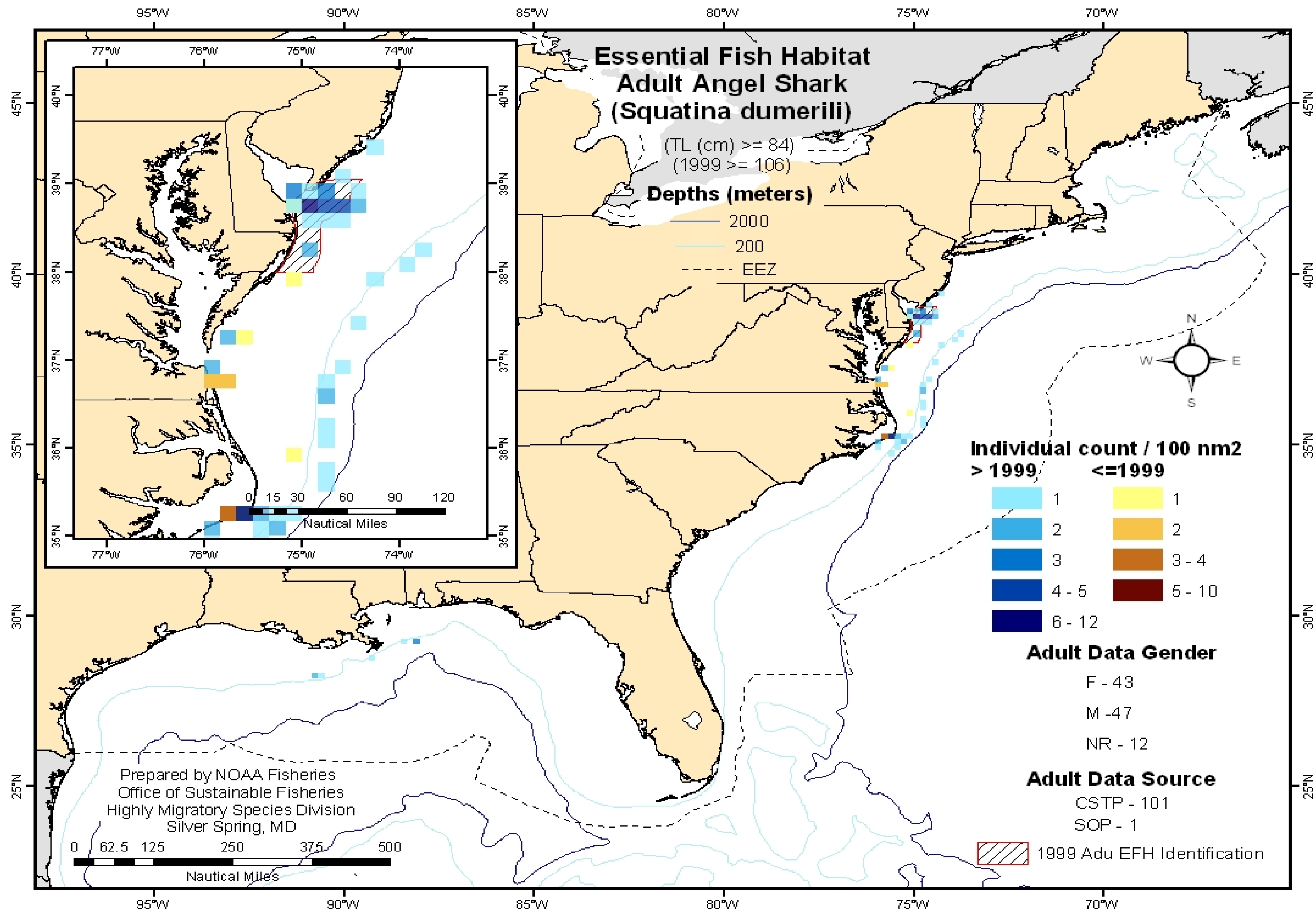


**Figure B.88** **Angel Shark: Adult.**

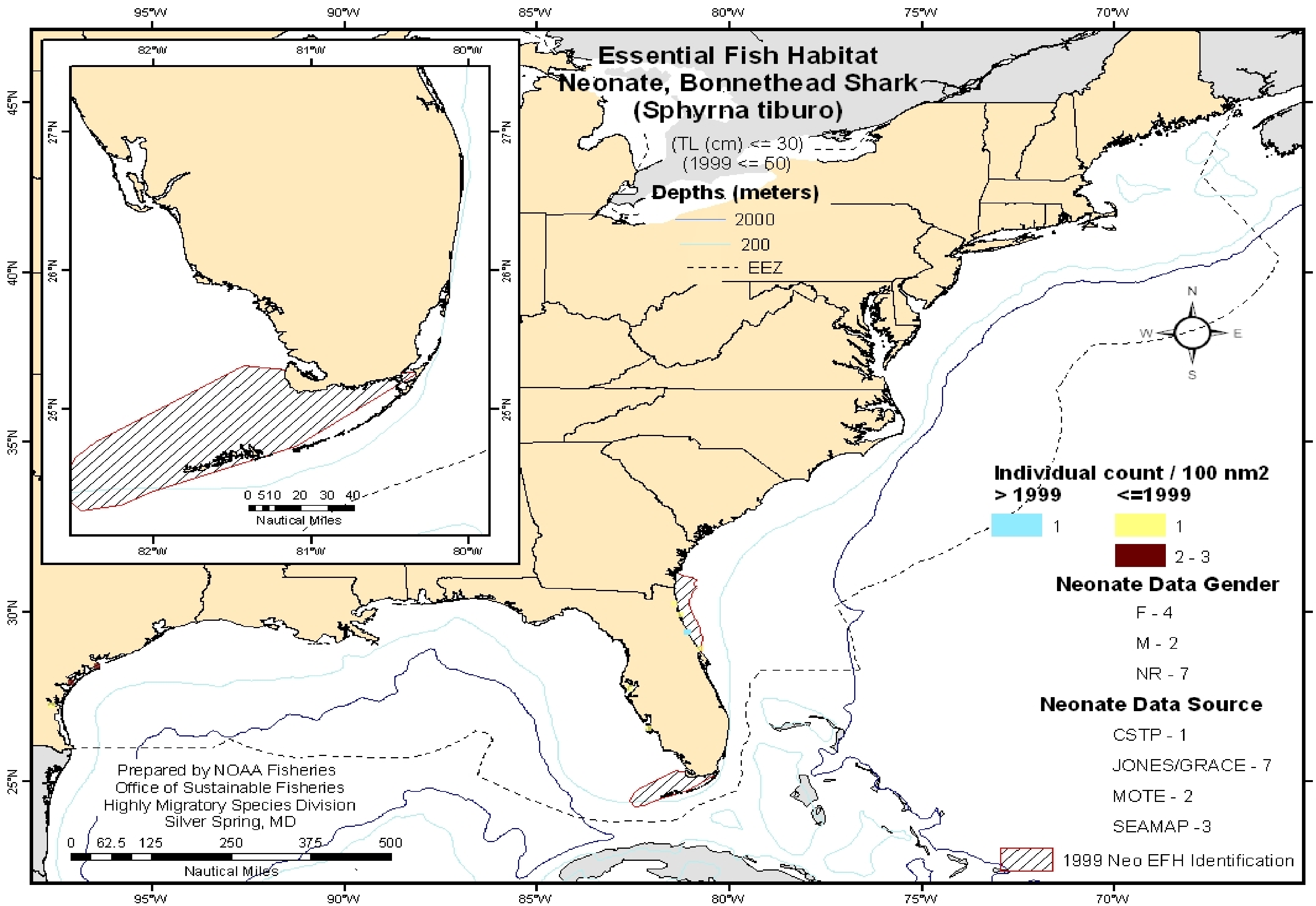


**Figure B.89** **Bonnethead Shark : Neonate.**

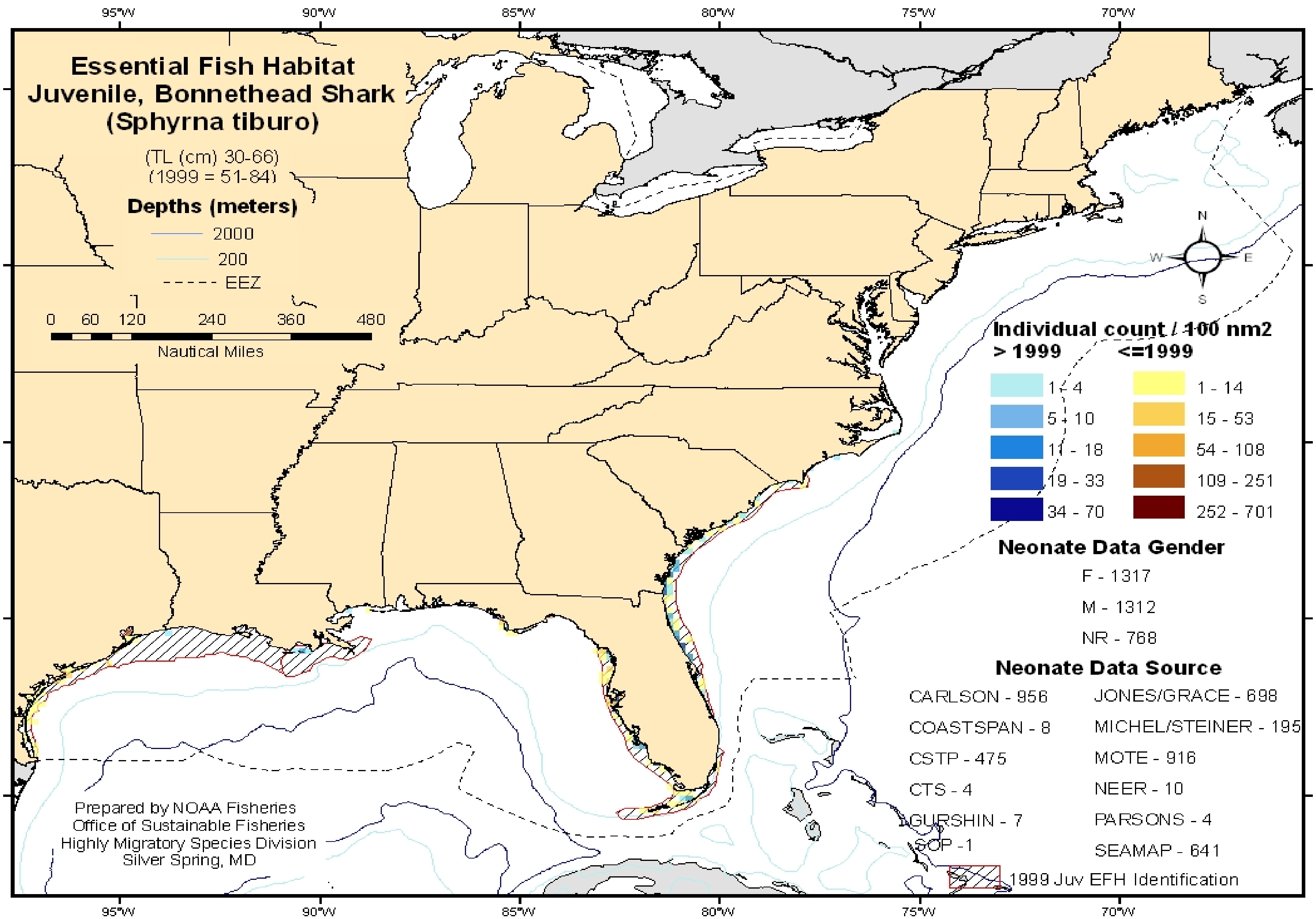


**Figure B.90** **Bonnethead Shark: Juvenile.**

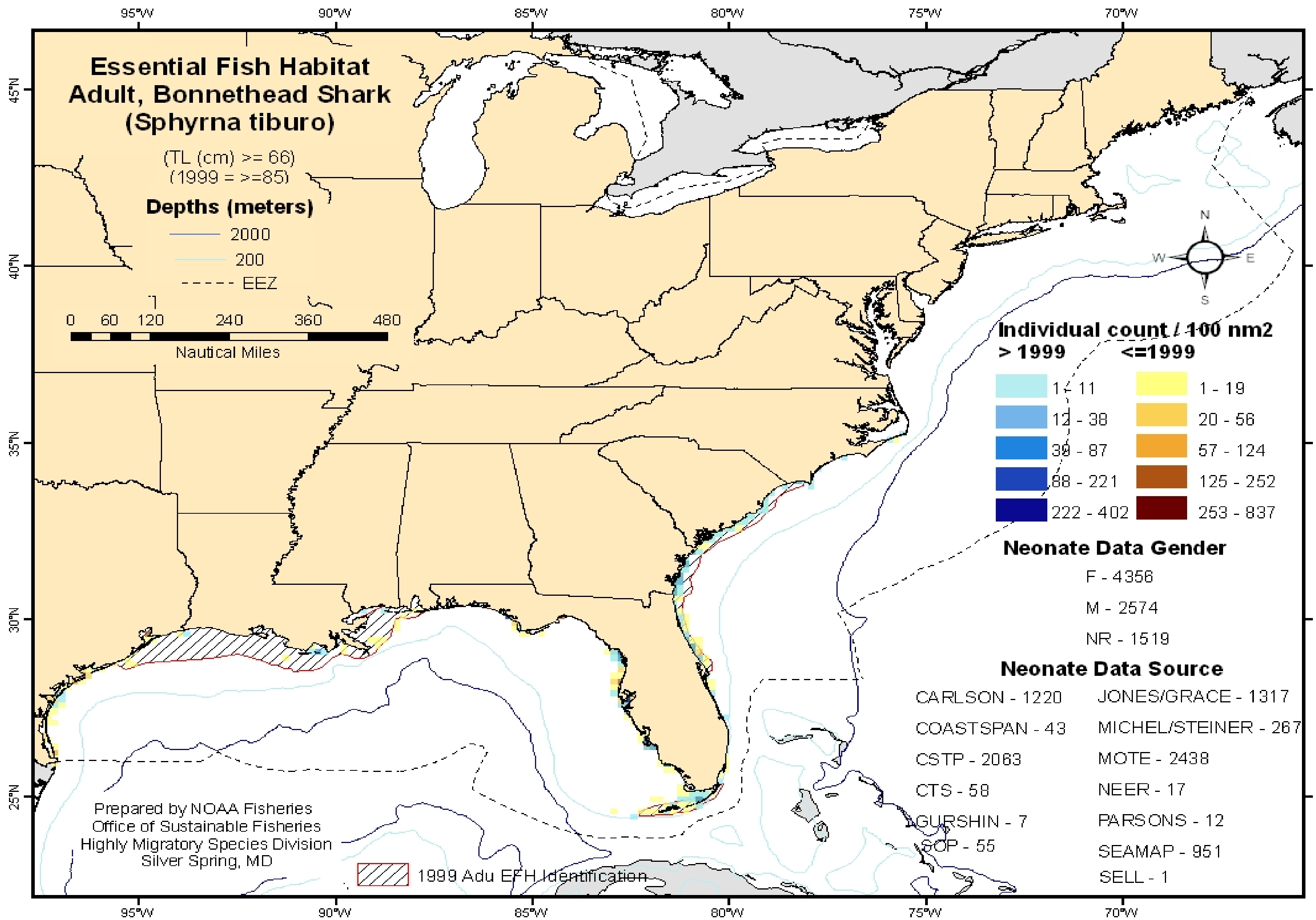


**Figure B.91** **Bonnethead Shark: Adult.**

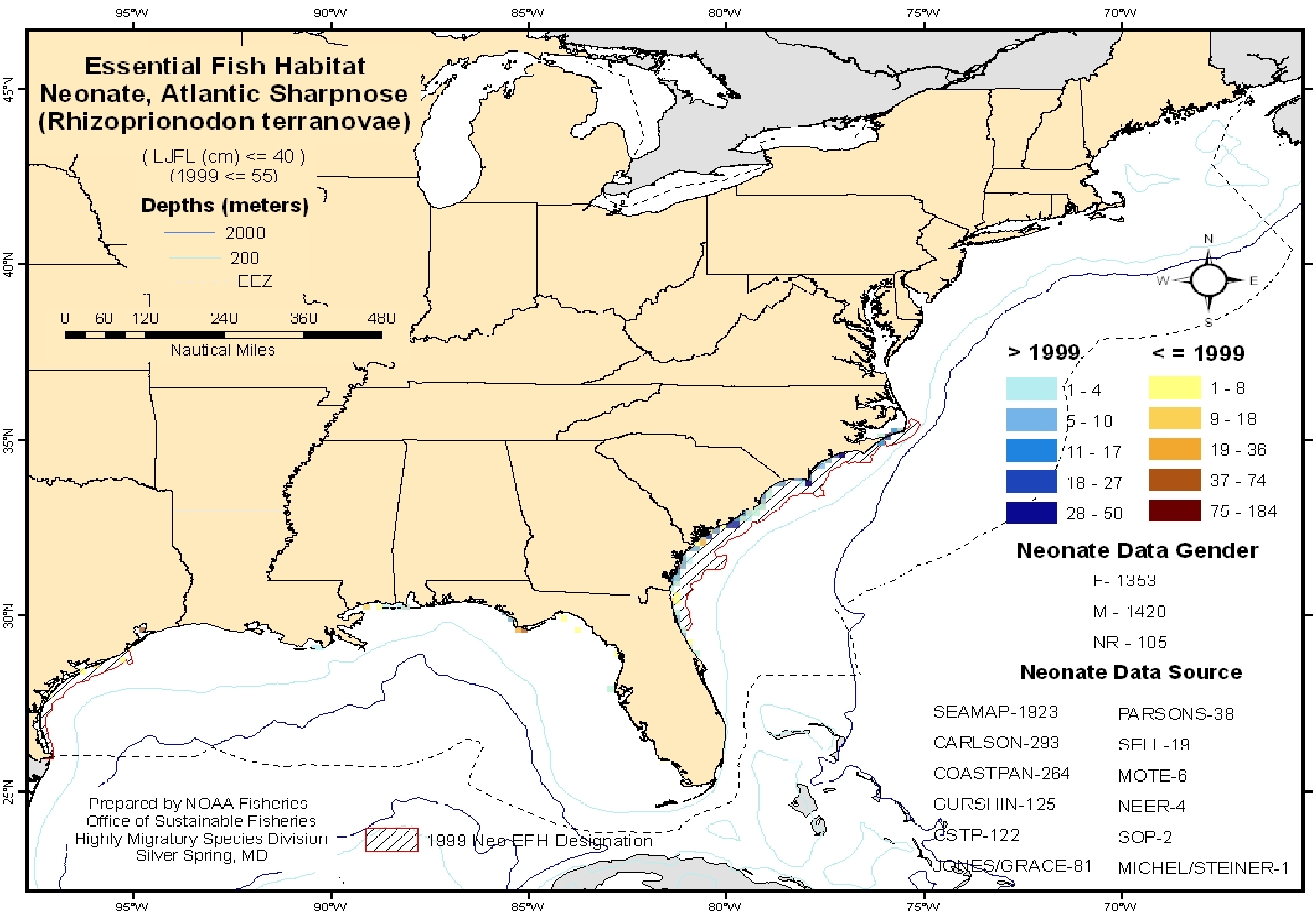


**Figure B.92** **Altantic Sharpnose: Neonate.**

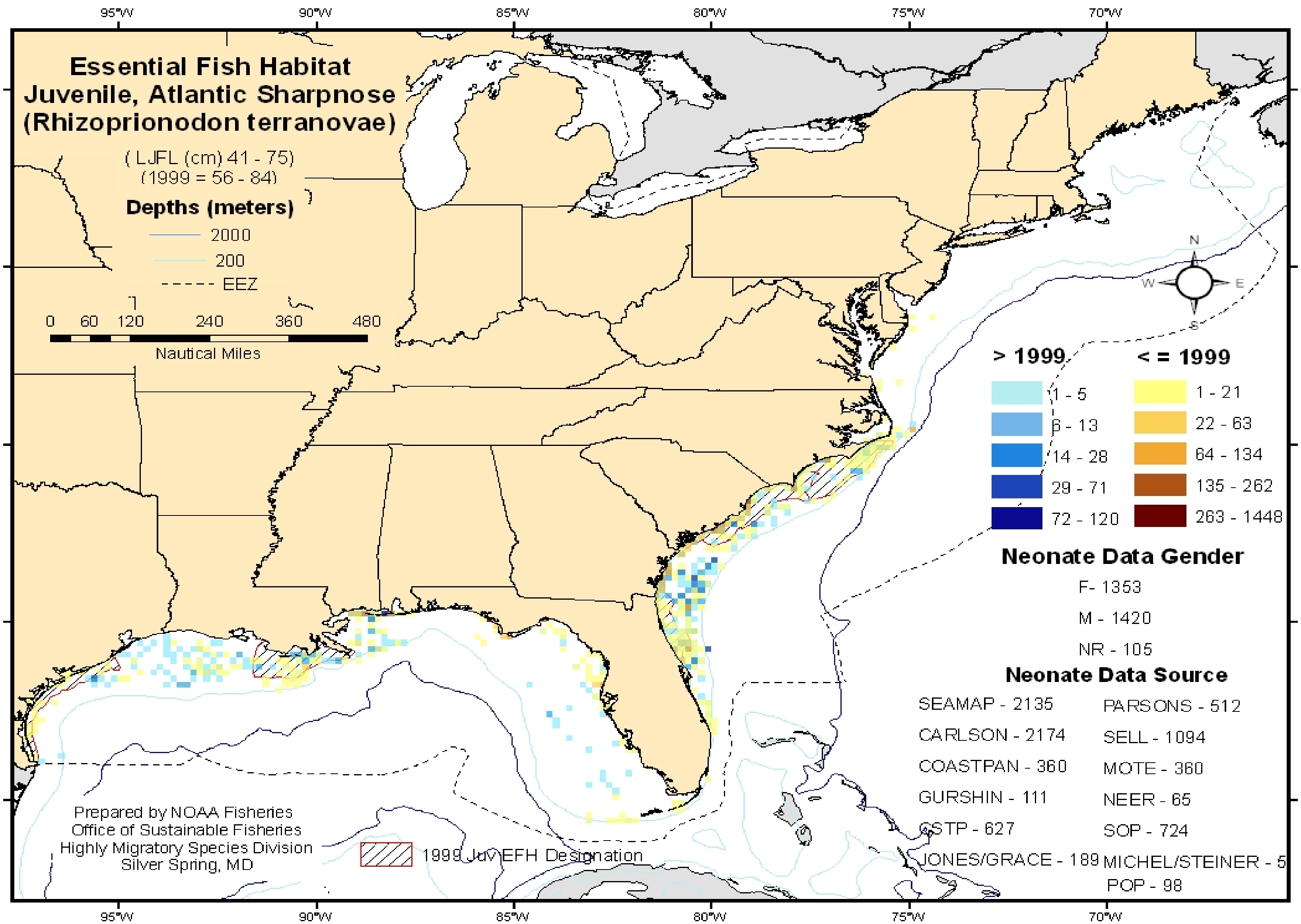


**Figure B.93** **Atlantic Sharpnose: Juvenile.**

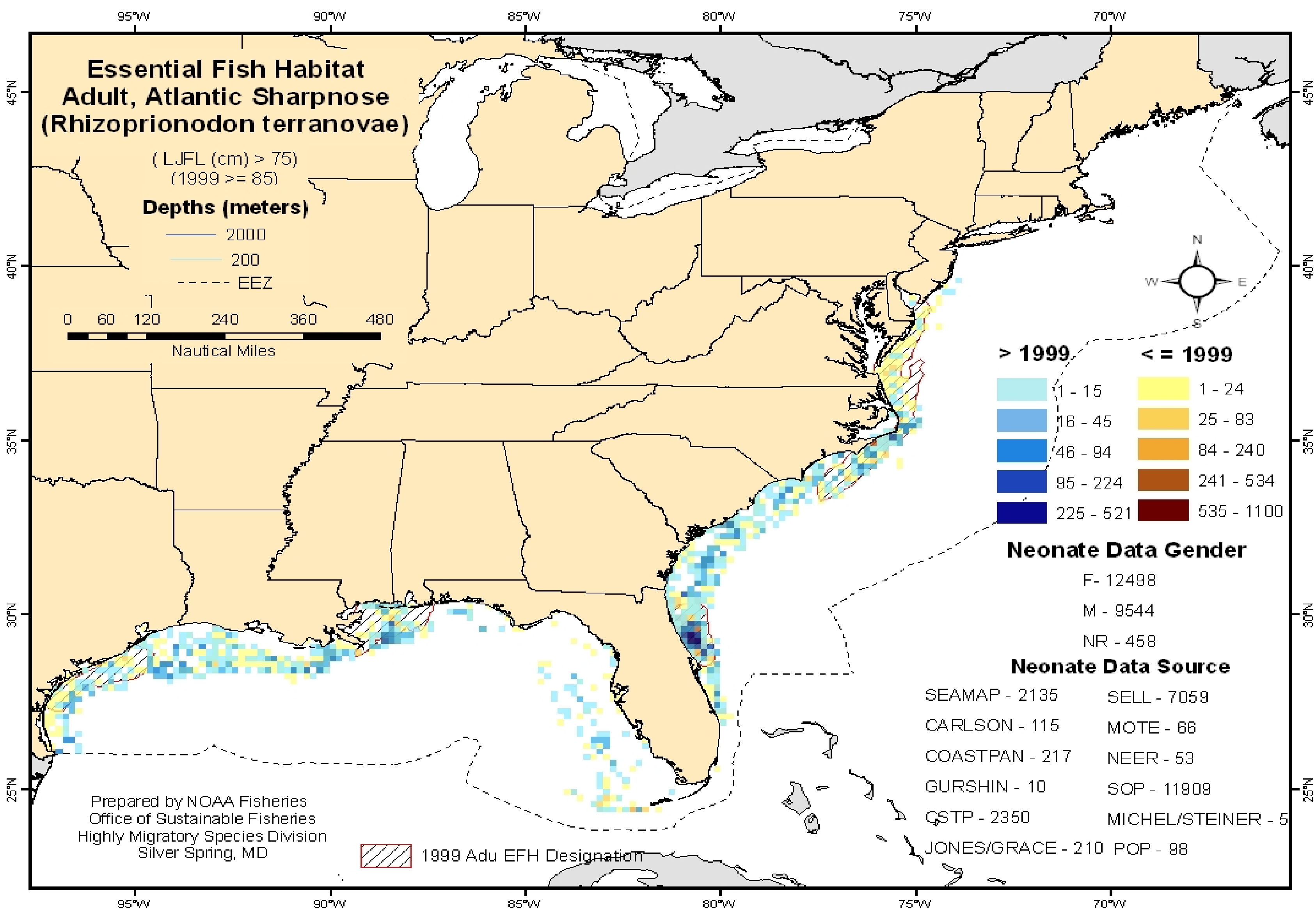


**Figure B.94** **Atlantic Sharpnose Shark: Adult.**

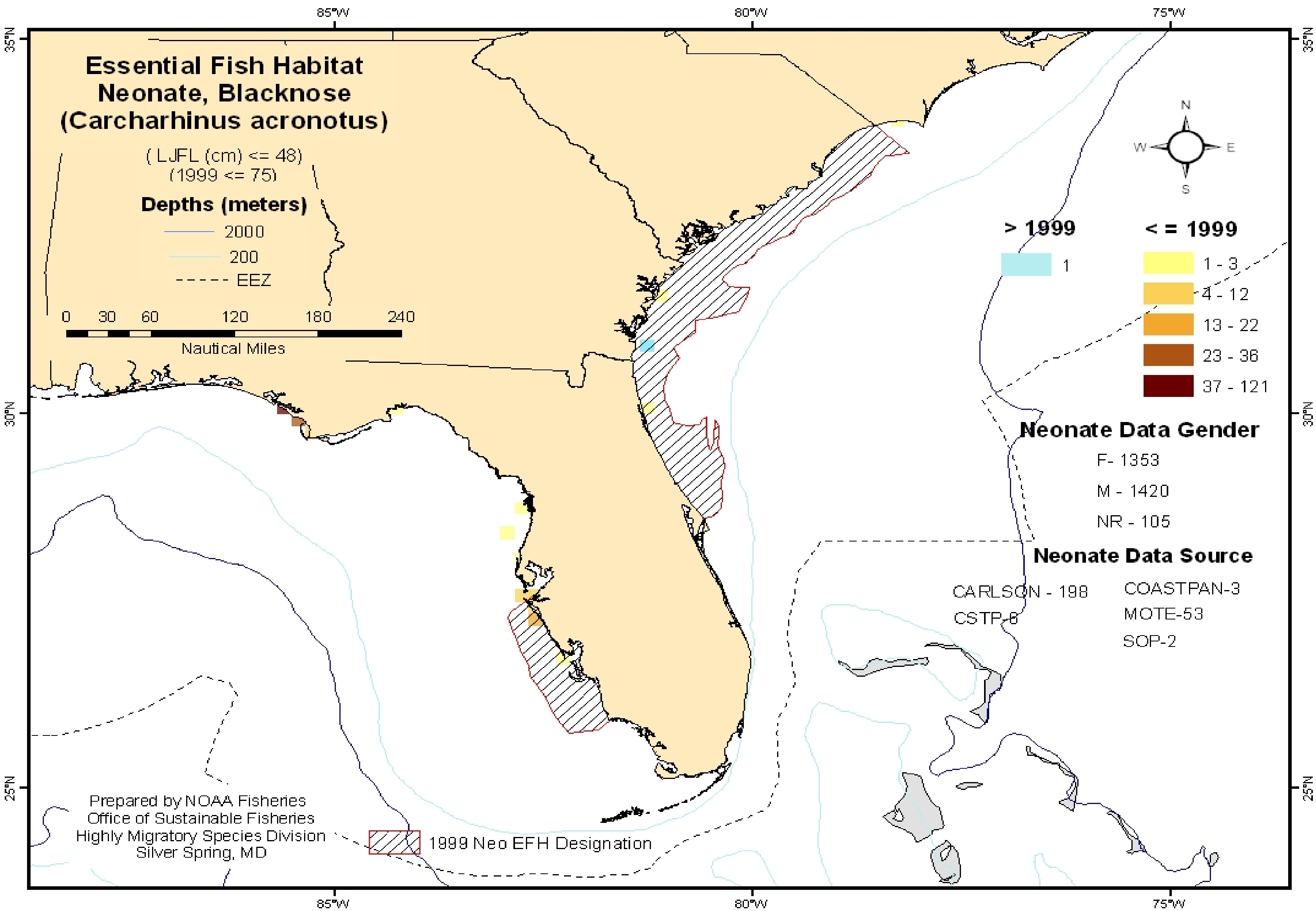


**Figure B.95** **Blacknose Shark: Neonoate.**

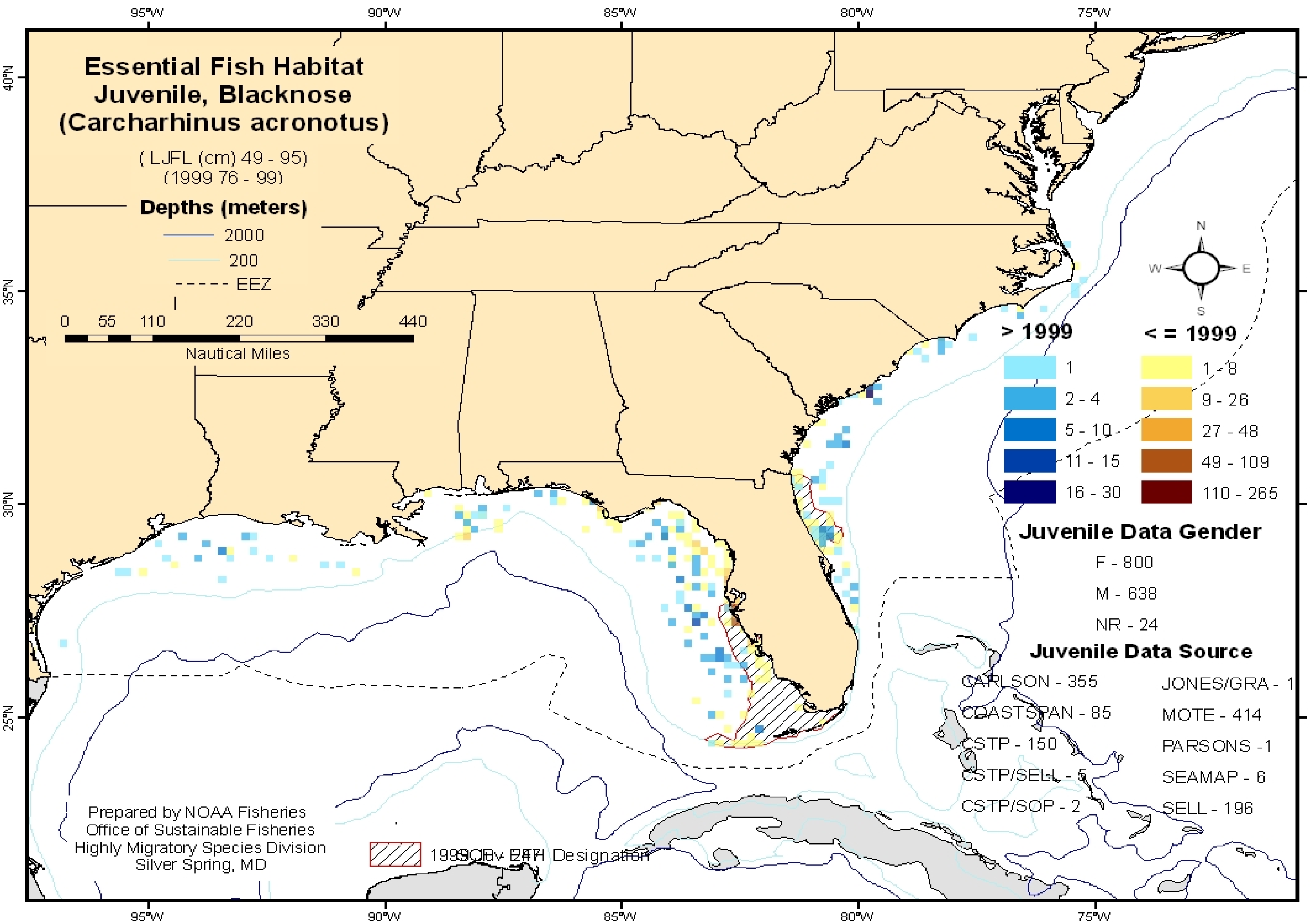


**Figure B.96** Blacknose Shark: Juvenile.

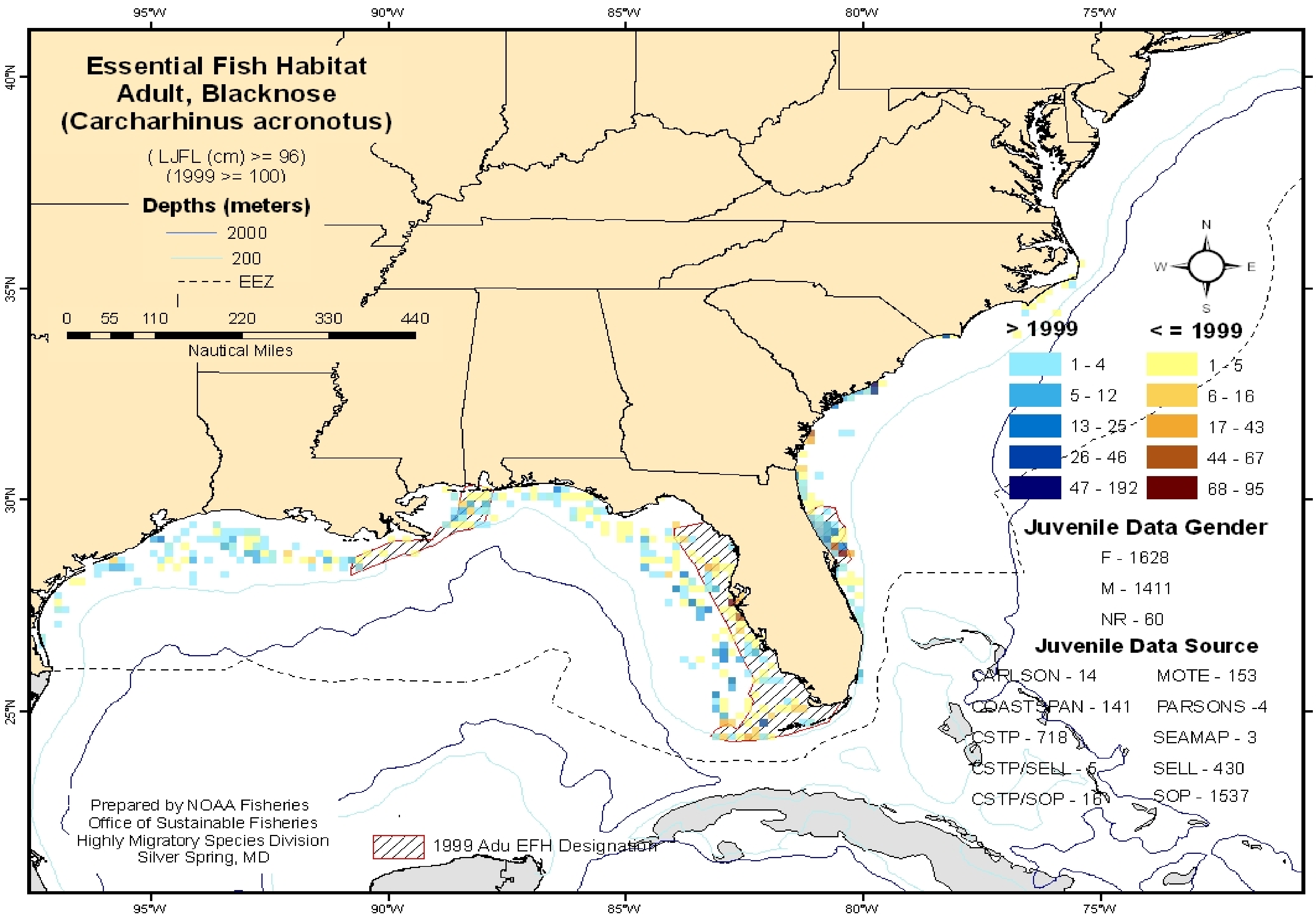


**Figure B.97** **Blacknose Shark: Adult.**

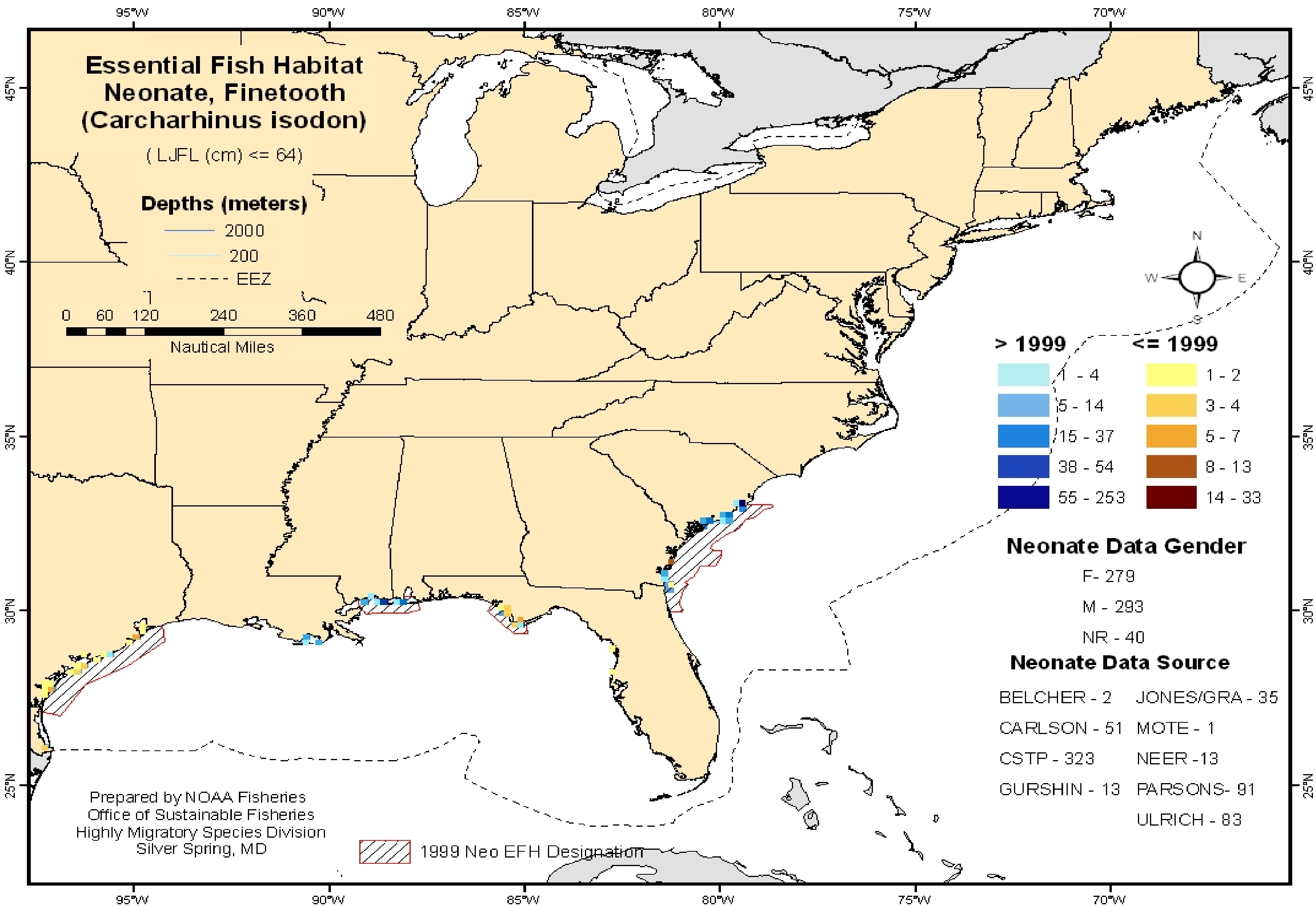


**Figure B.98** **Finetooth Shark: Neonate.**

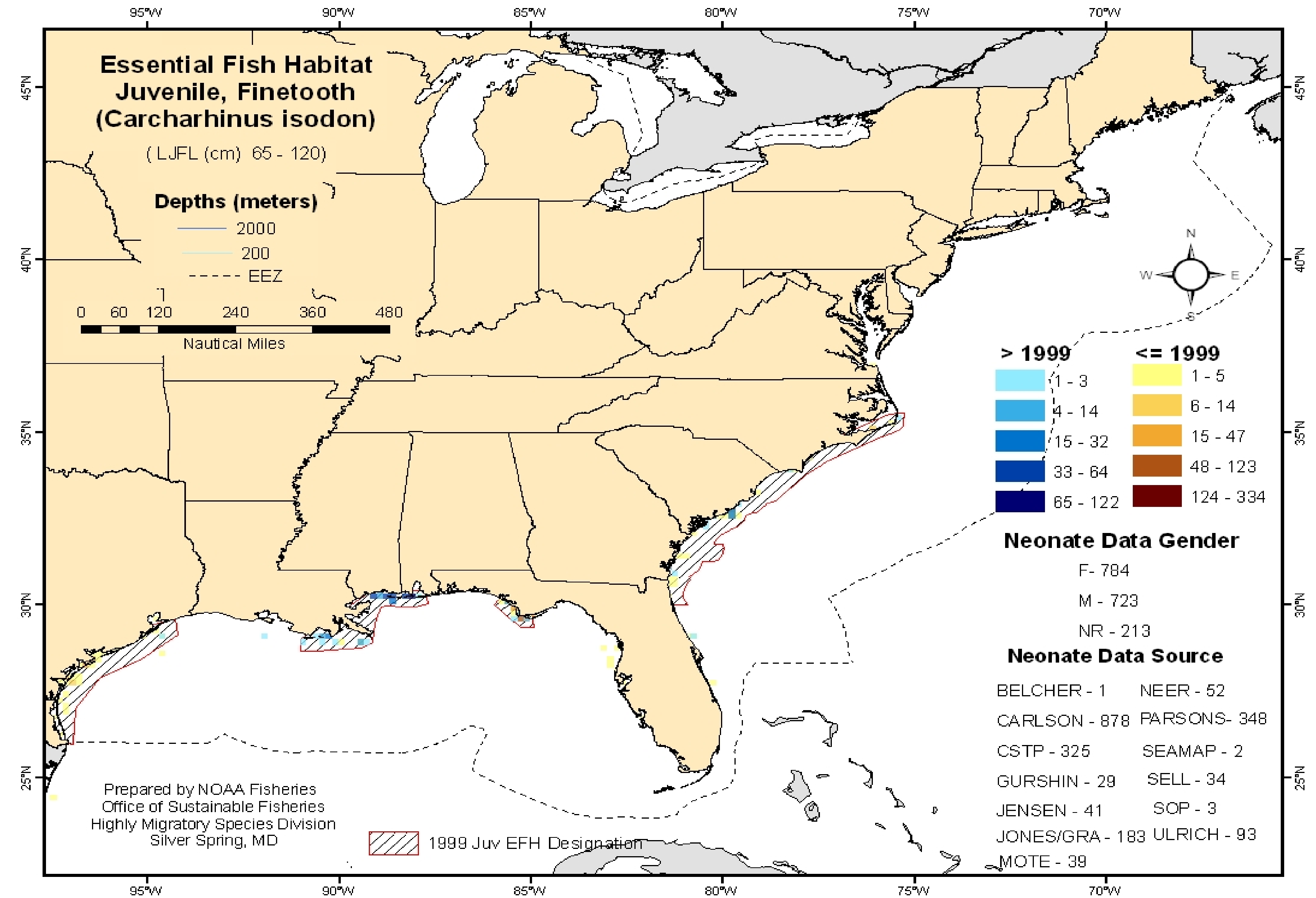


**Figure B.99 Finetooth Shark: Juvenile.**

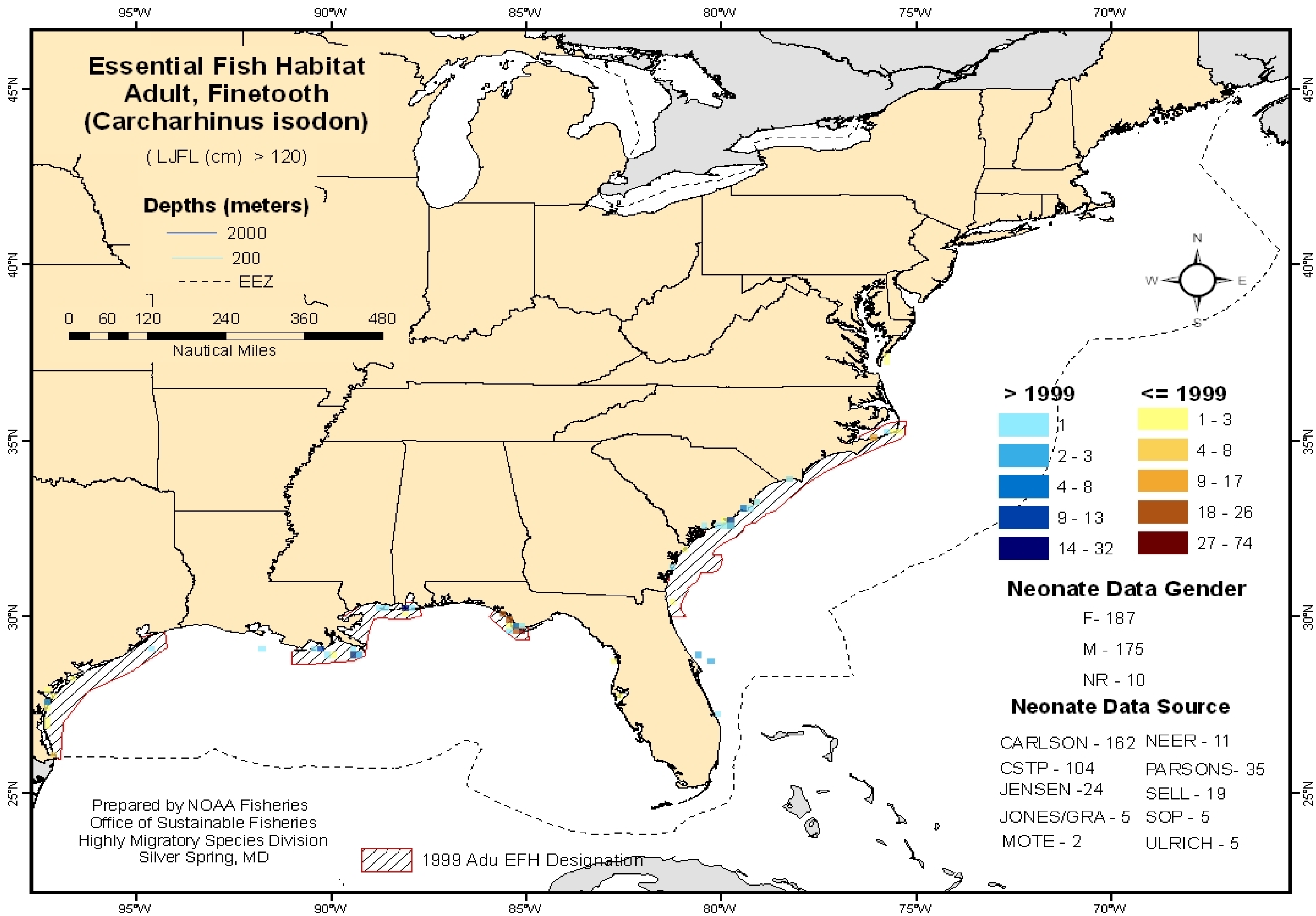


**Figure B.100** **Finetooth Shark: Adult.**

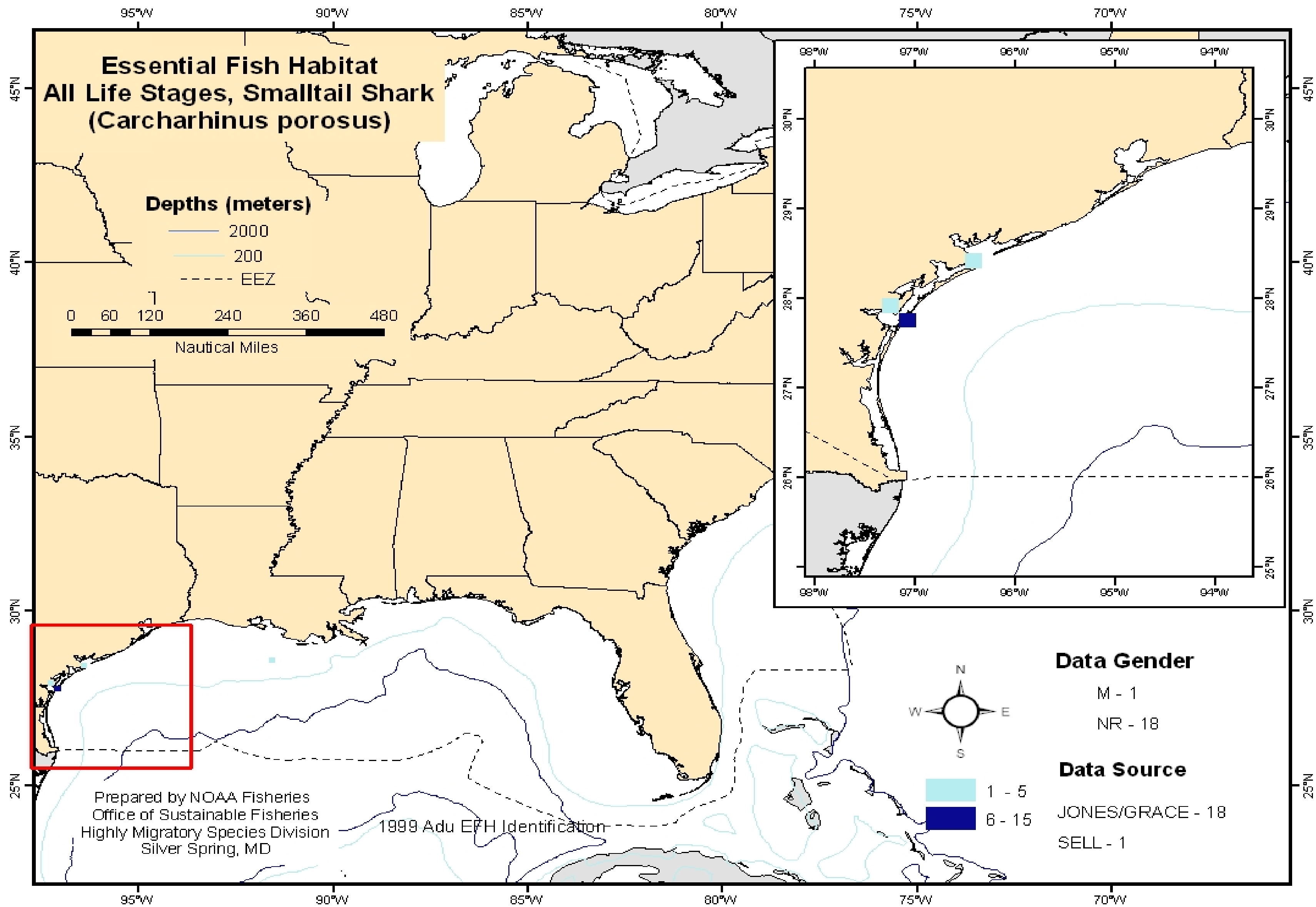


**Figure B.101** Smalltail Shark: All Life Stages.

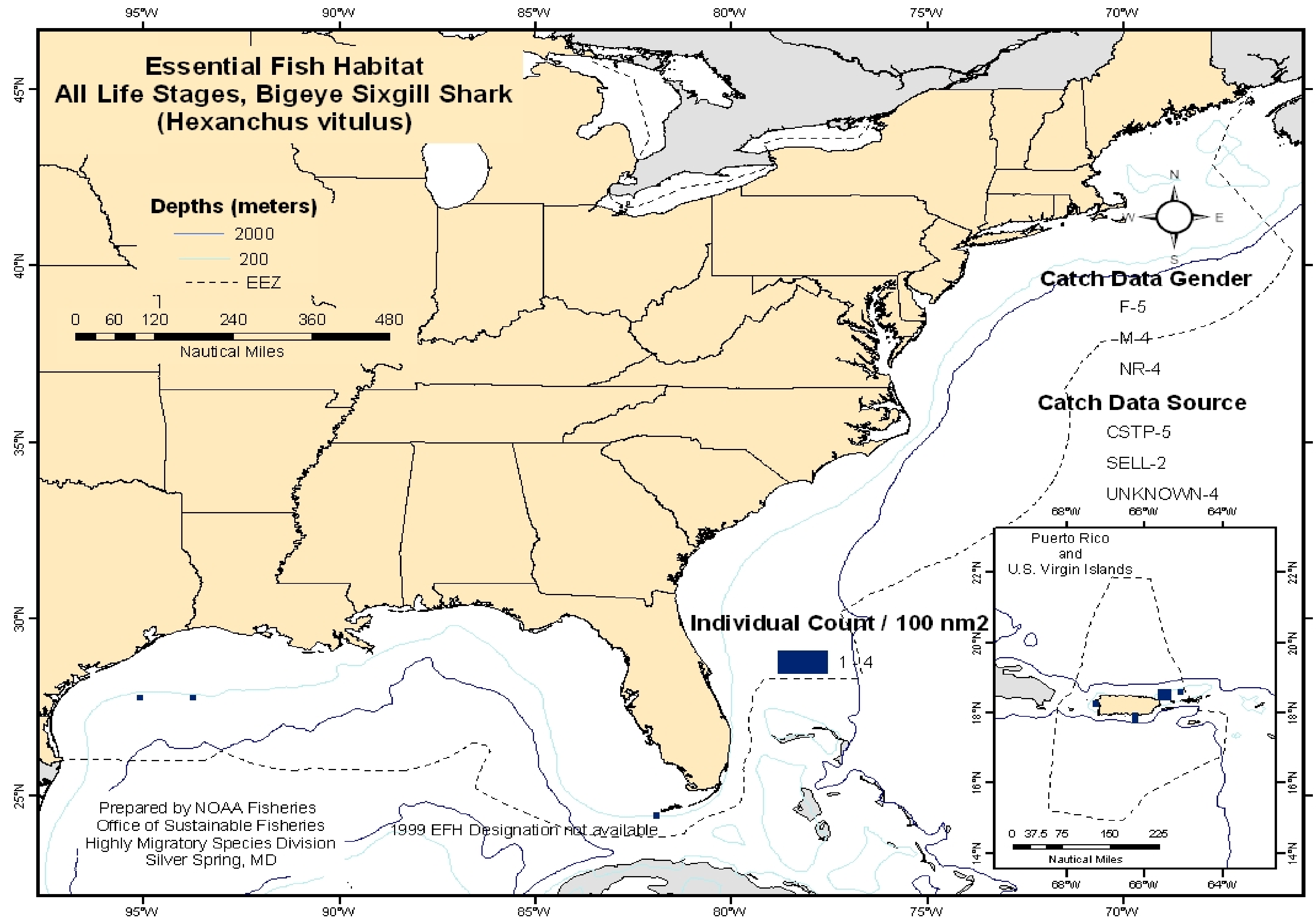


**Figure B.102** Bigeye Sixgill Shark: All Life Stages.

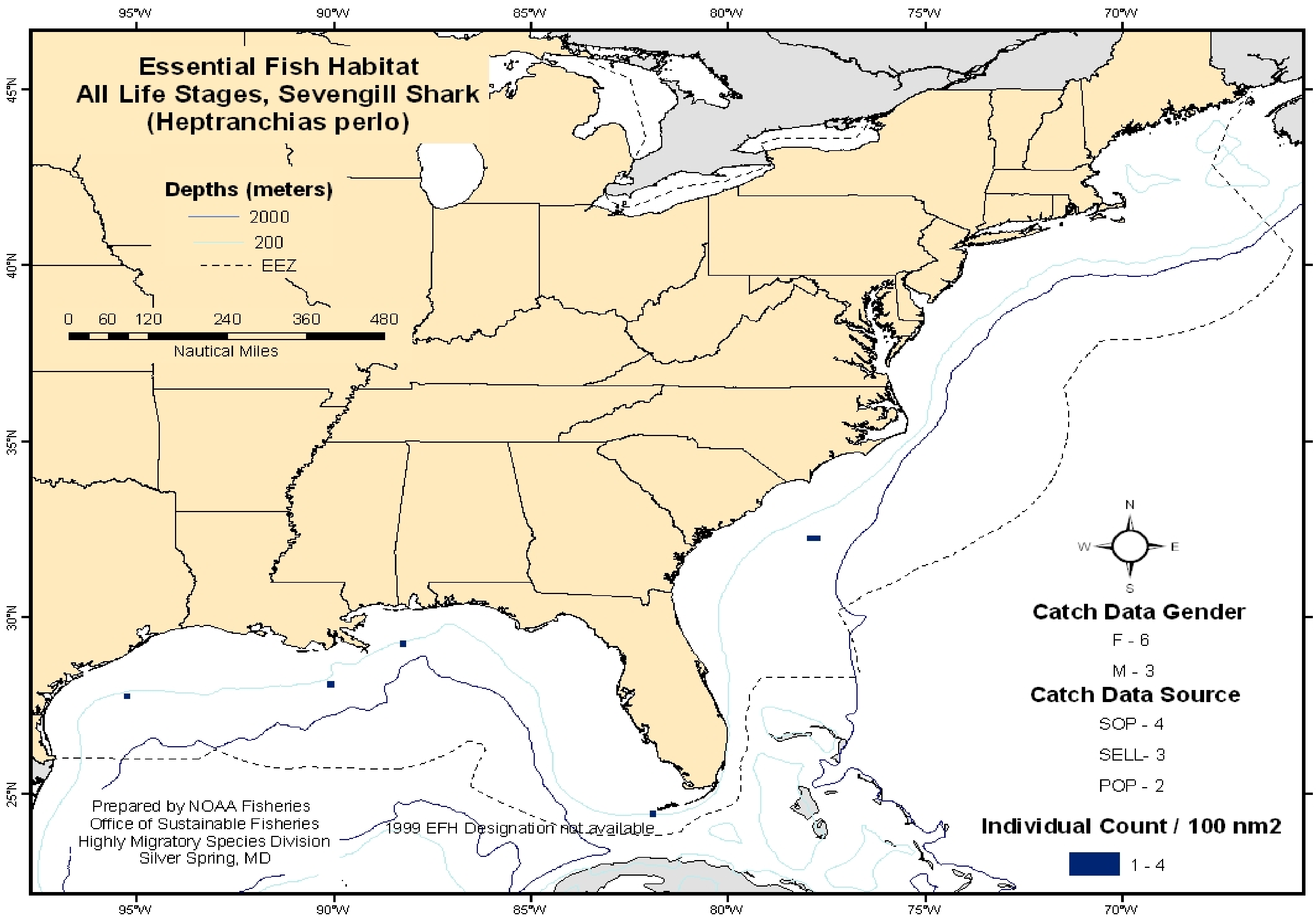


Figure B.103 Sevengill Shark: All Life Stages.

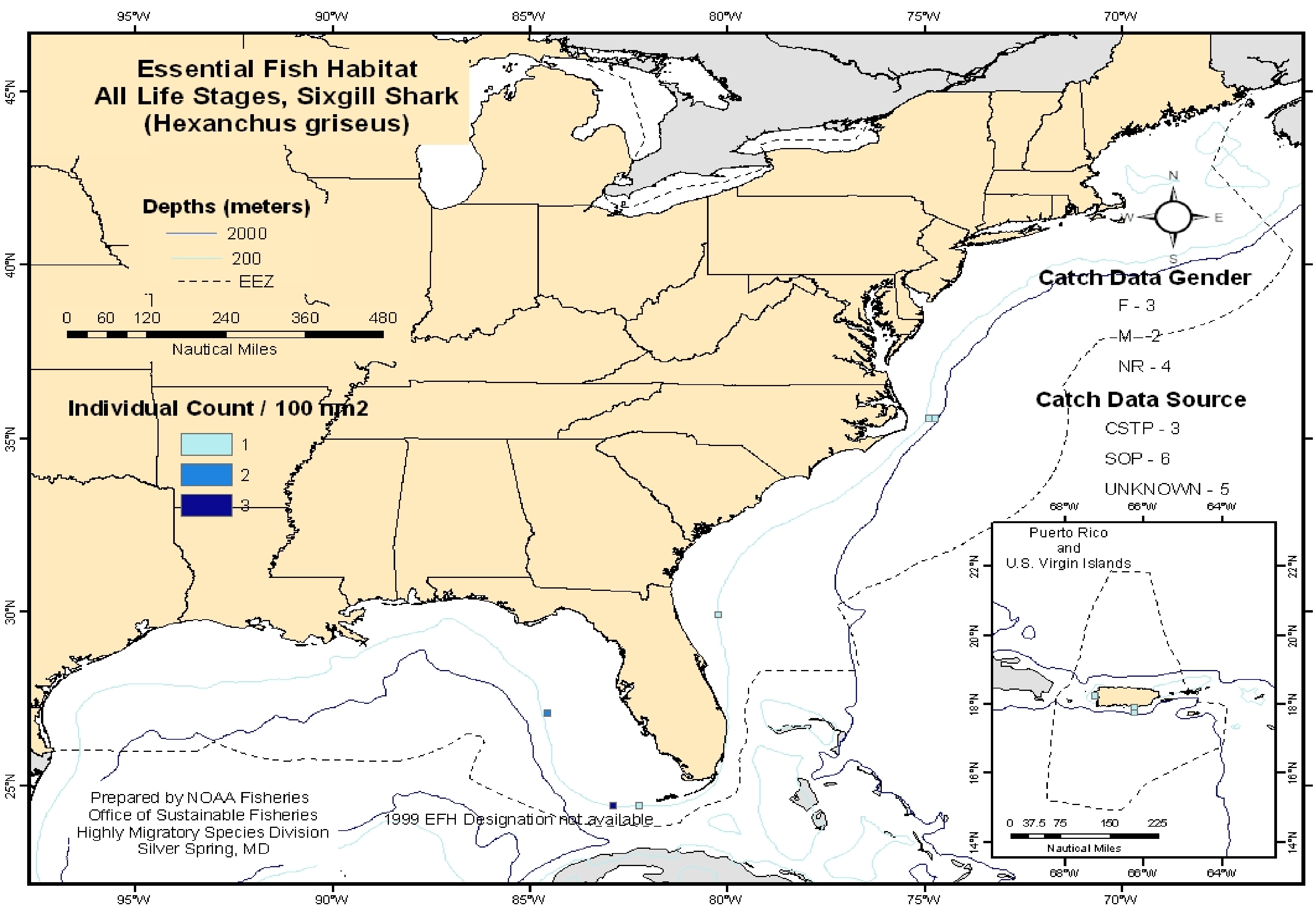


**Figure B.104 Sixgill Shark: All Life Stages.**

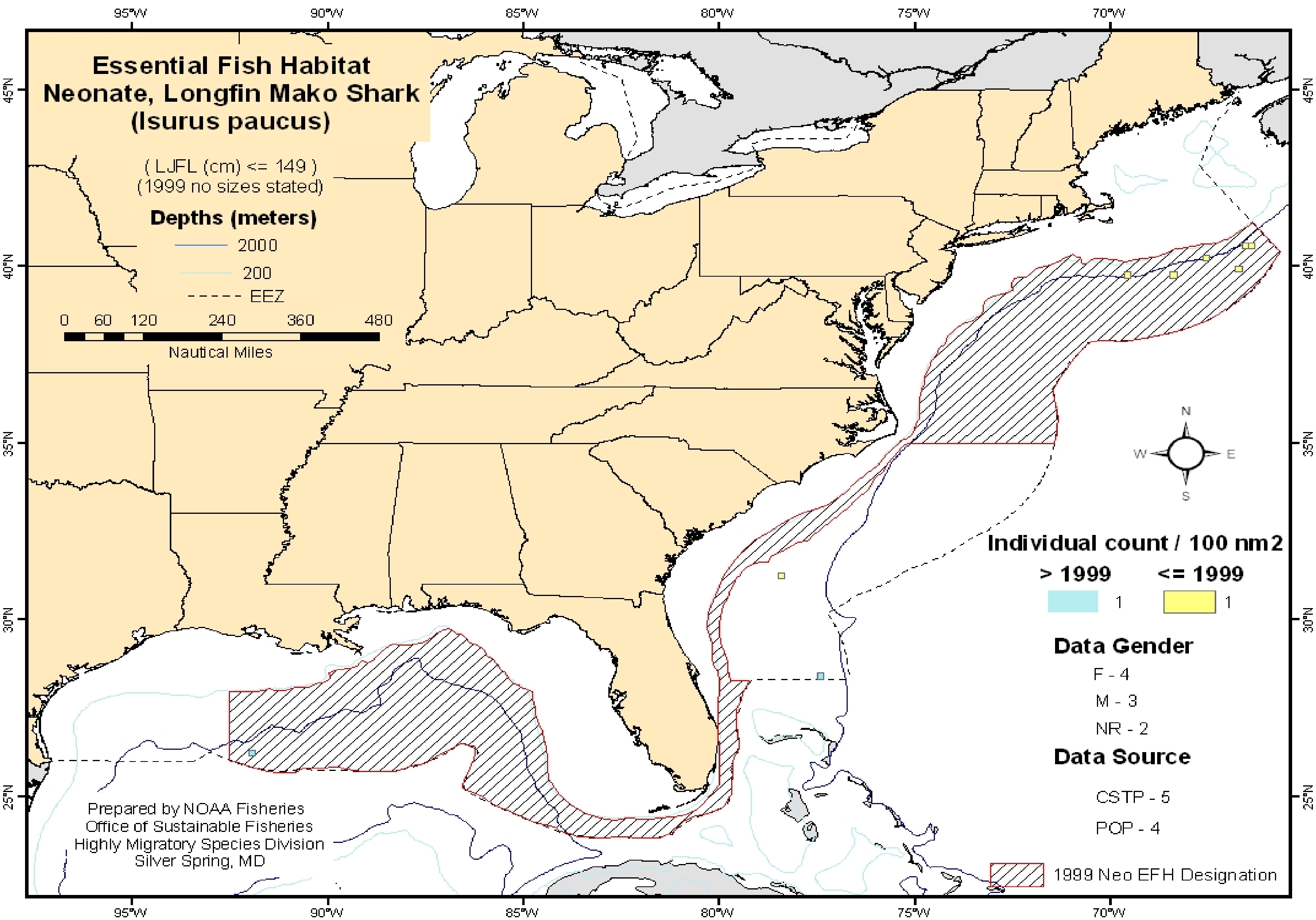


**Figure B.105** Longfin Mako Shark: Neonate.

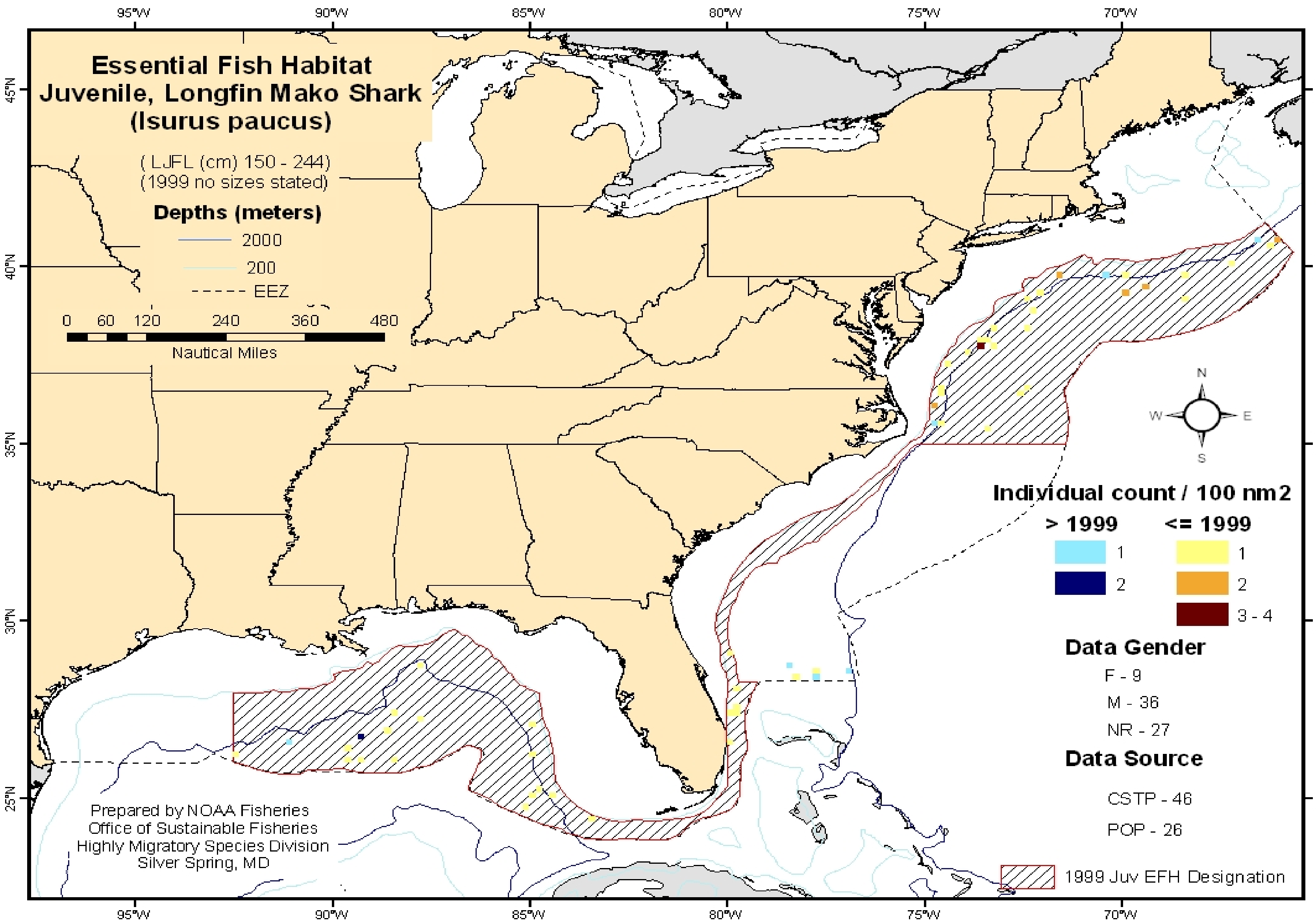


**Figure B.106** **Longfin Mako Shark : Juvenile.**

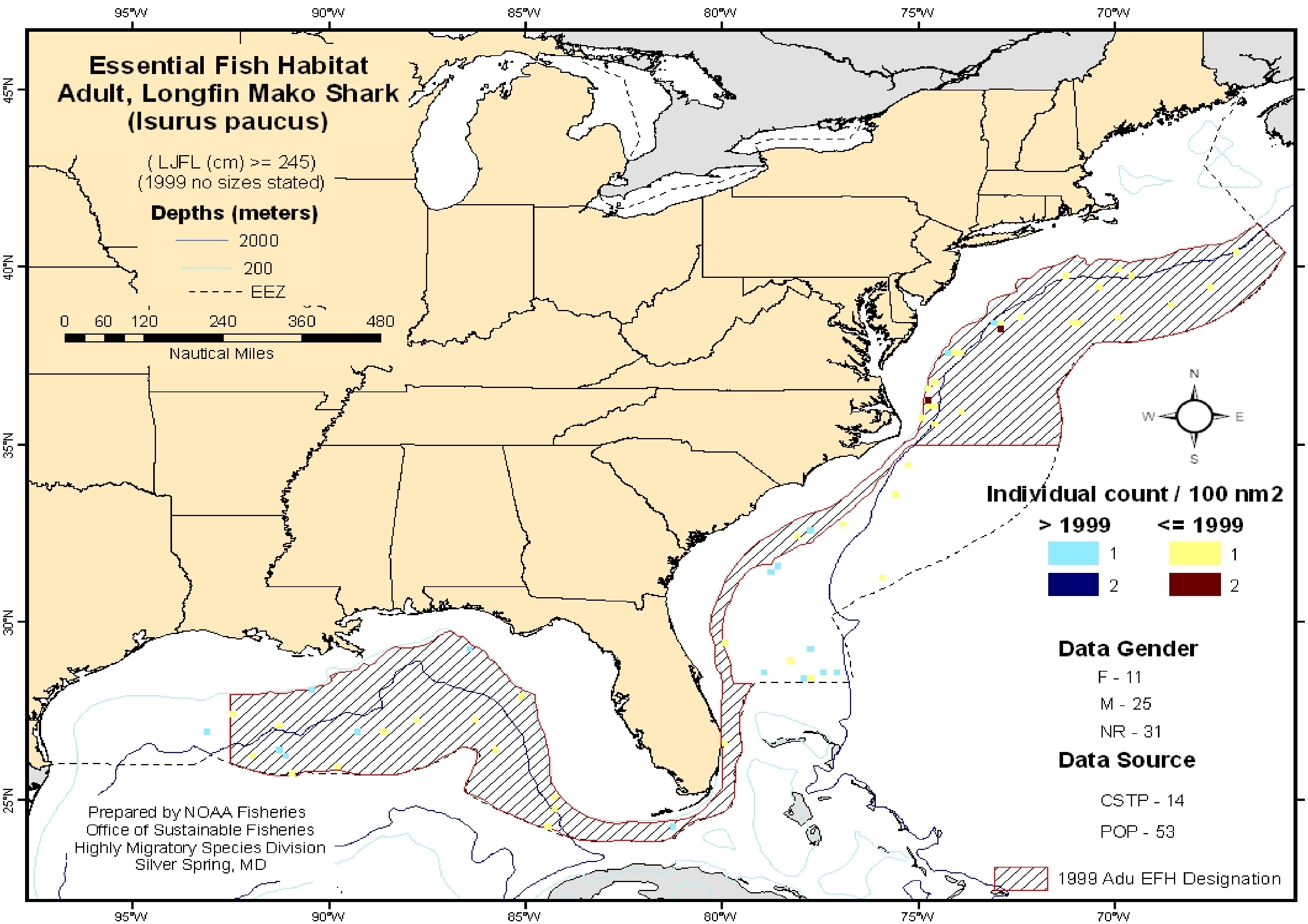


**Figure B.107 Longfin Mako Shark: Adult.**

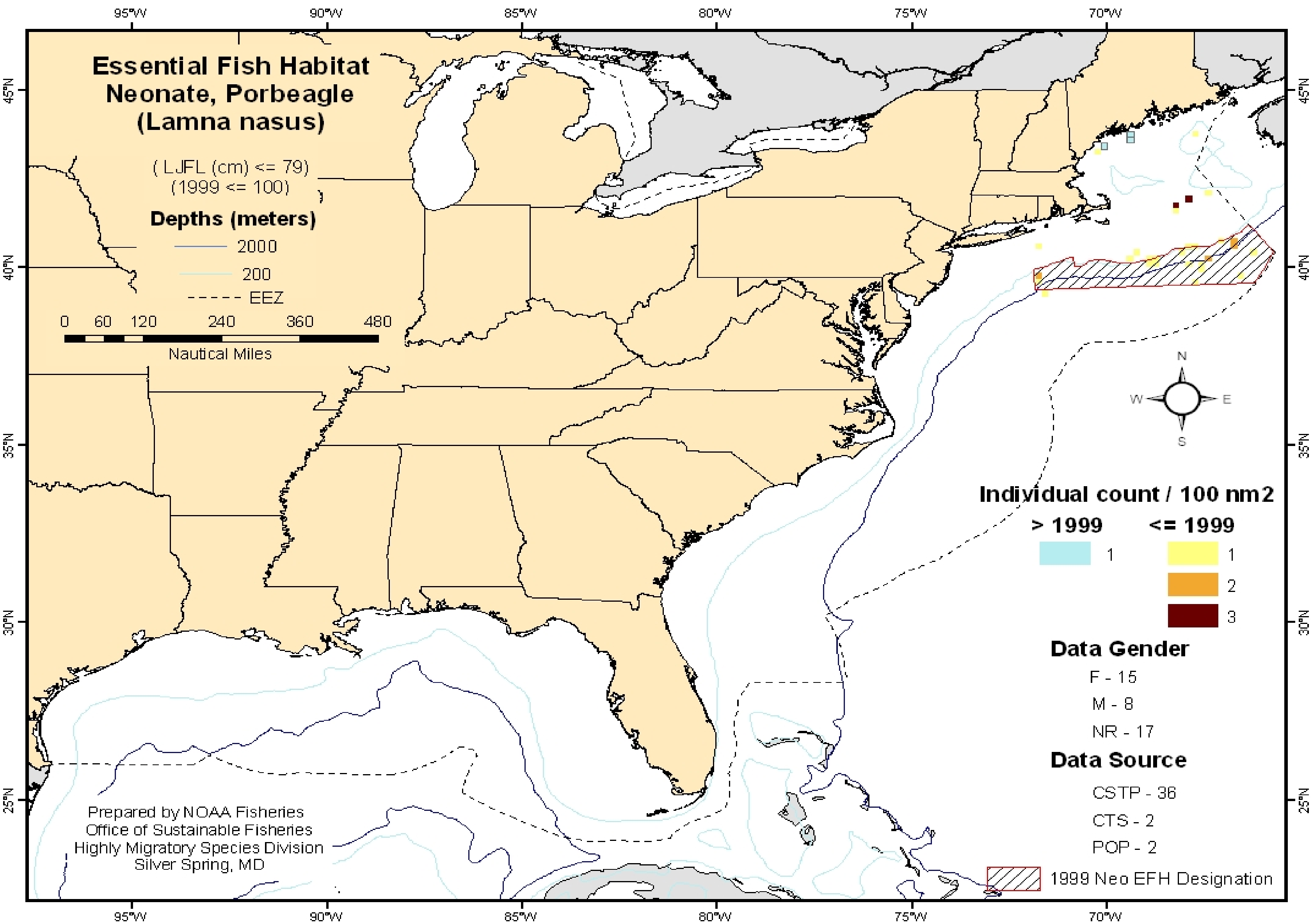


**Figure B.108** **Porbeagle Shark: Neonate.**

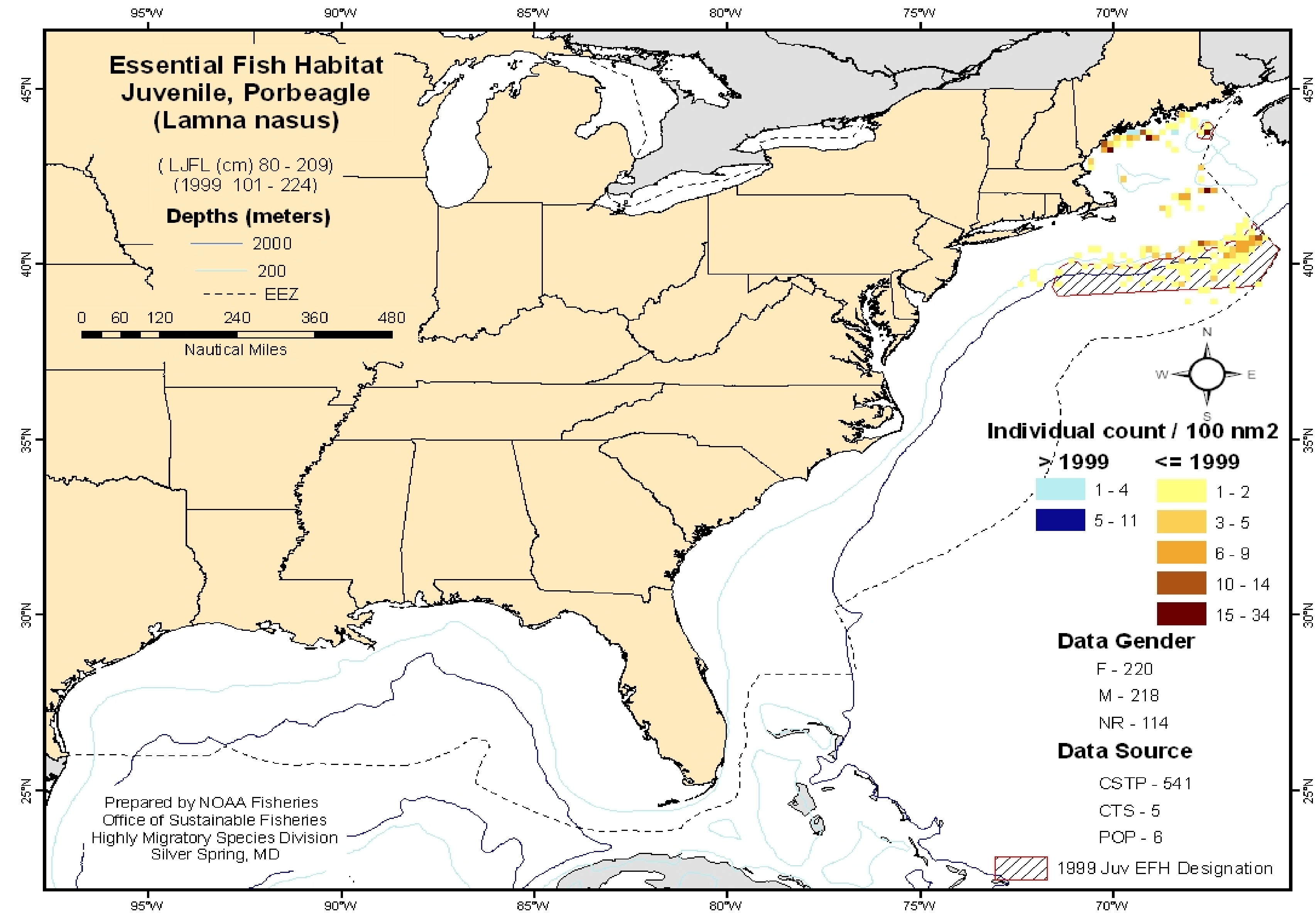


**Figure B.109** **Porbeagle Shark: Juvenile.**

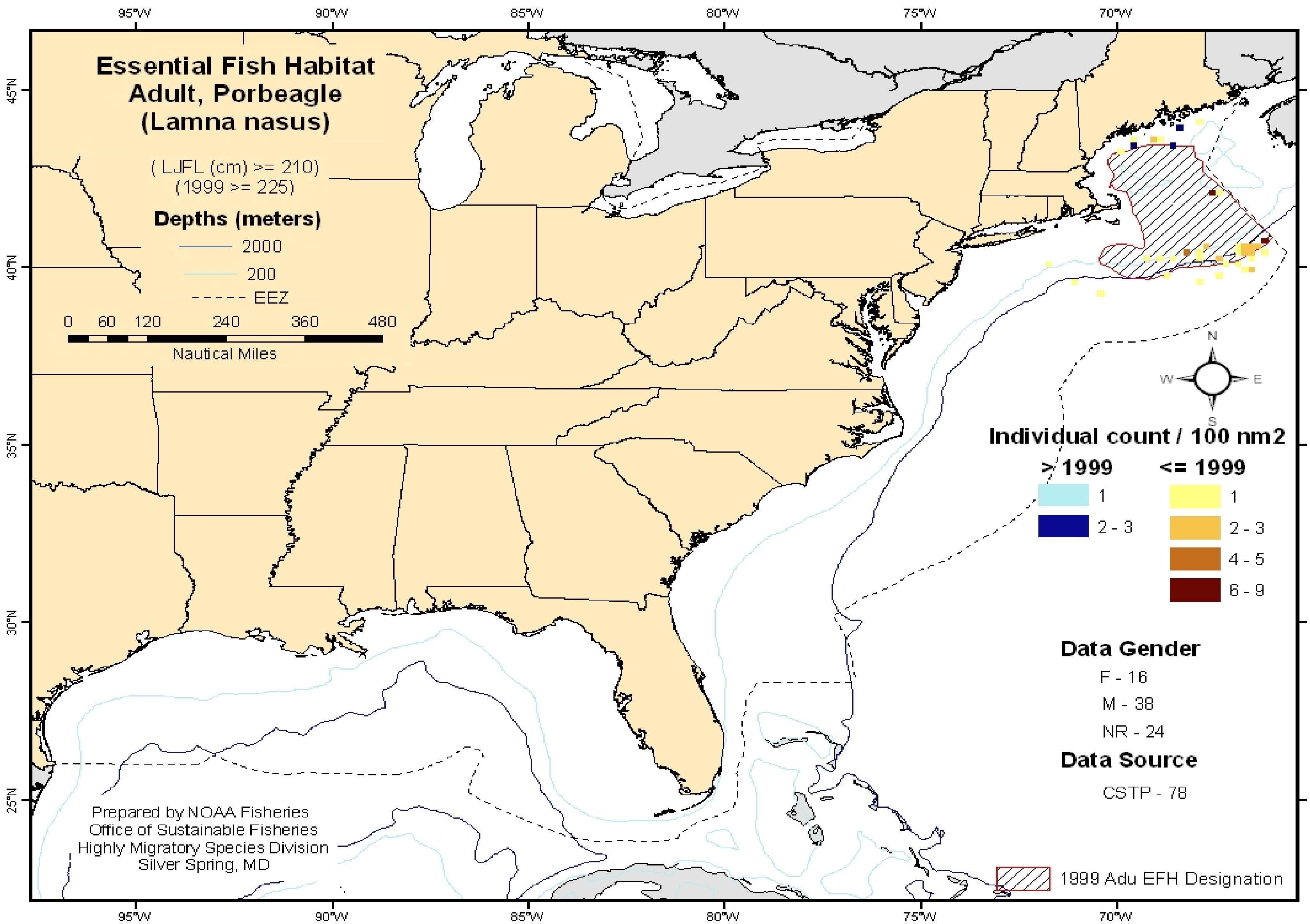


**Figure B.110** **Porbeagle Shark: Adult.**

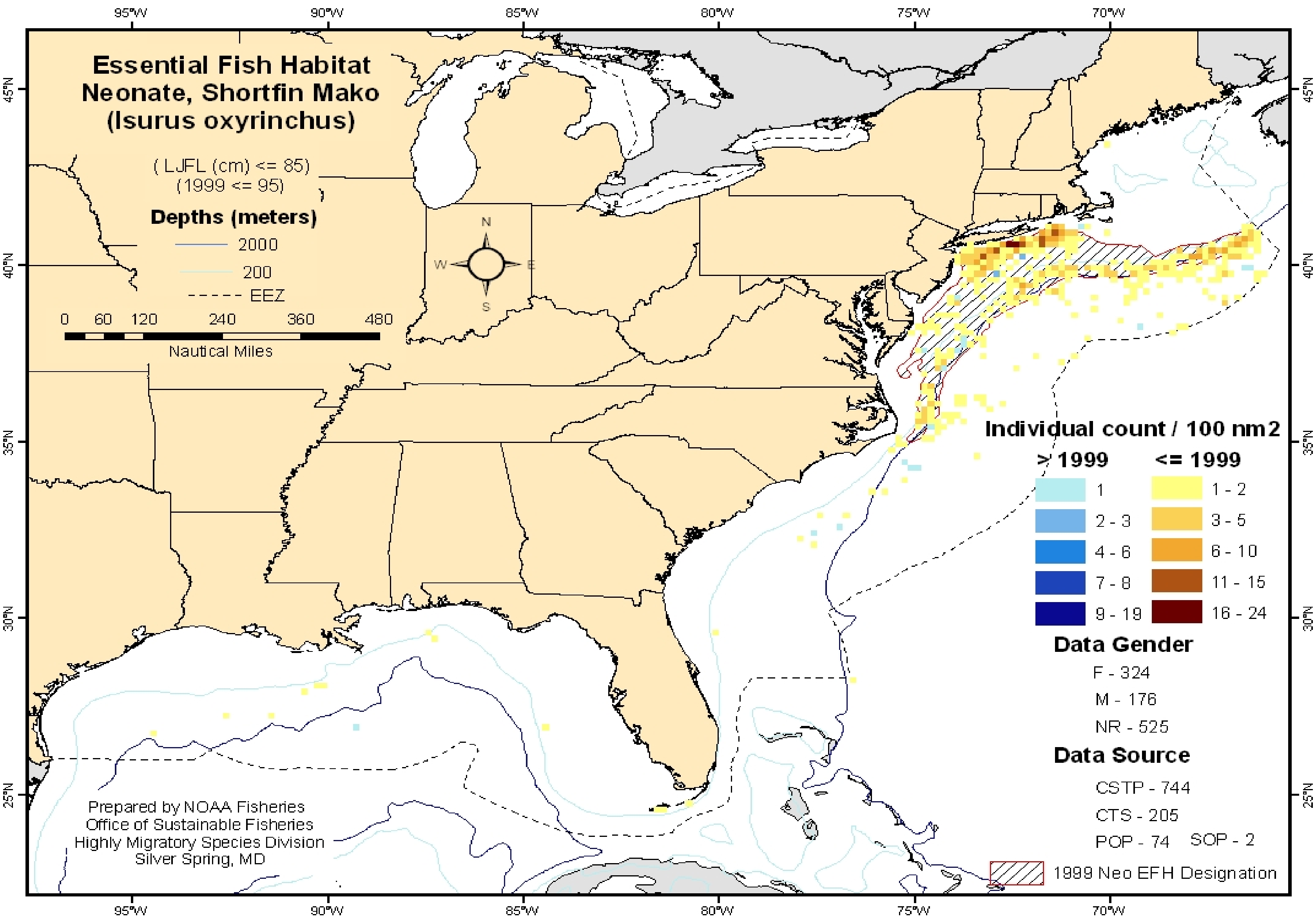


**Figure B.111 Shortfin Mako Shark: Neonate.**

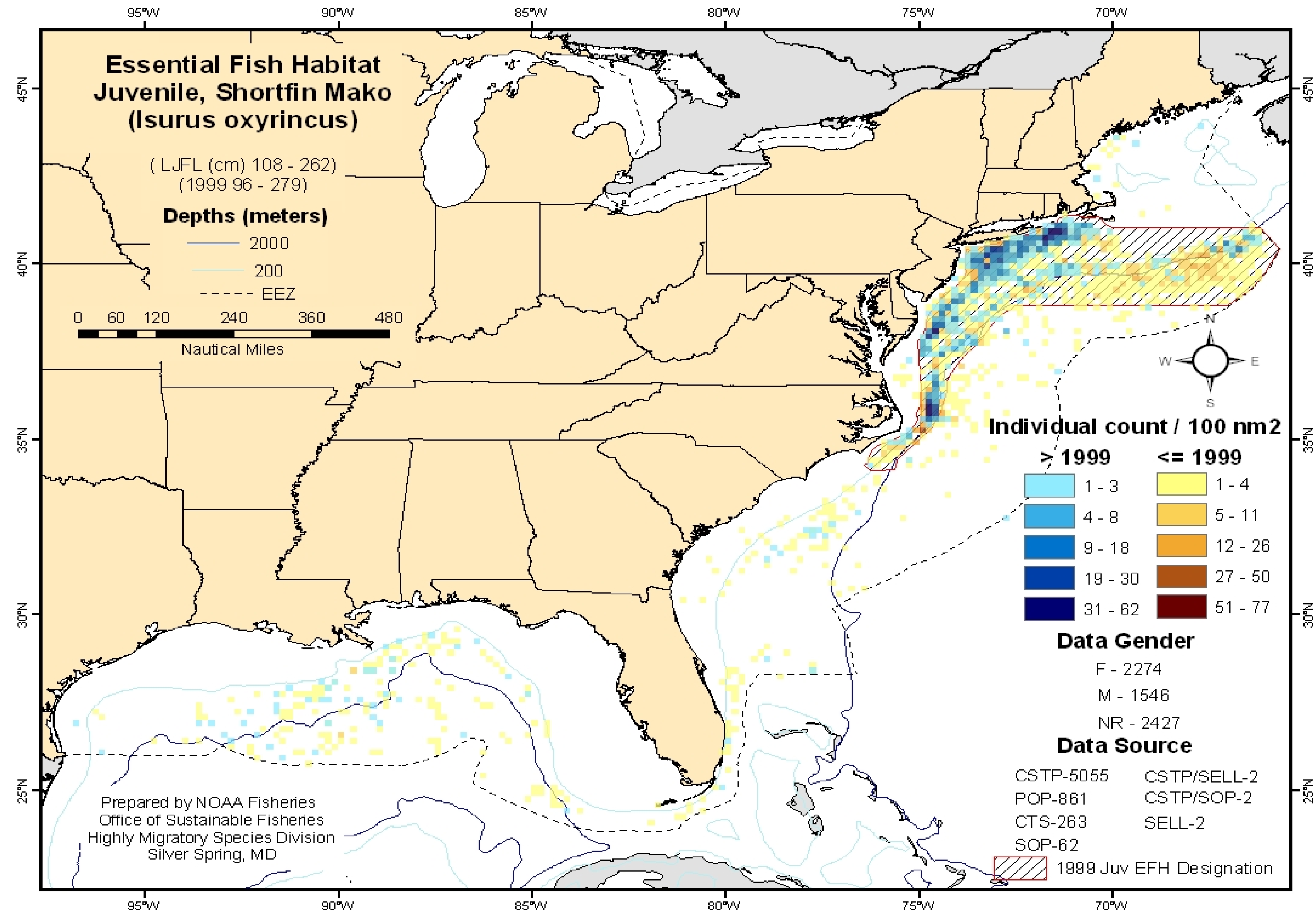


**Figure B.112** **Shortfin Mako Shark: Juvenile.**

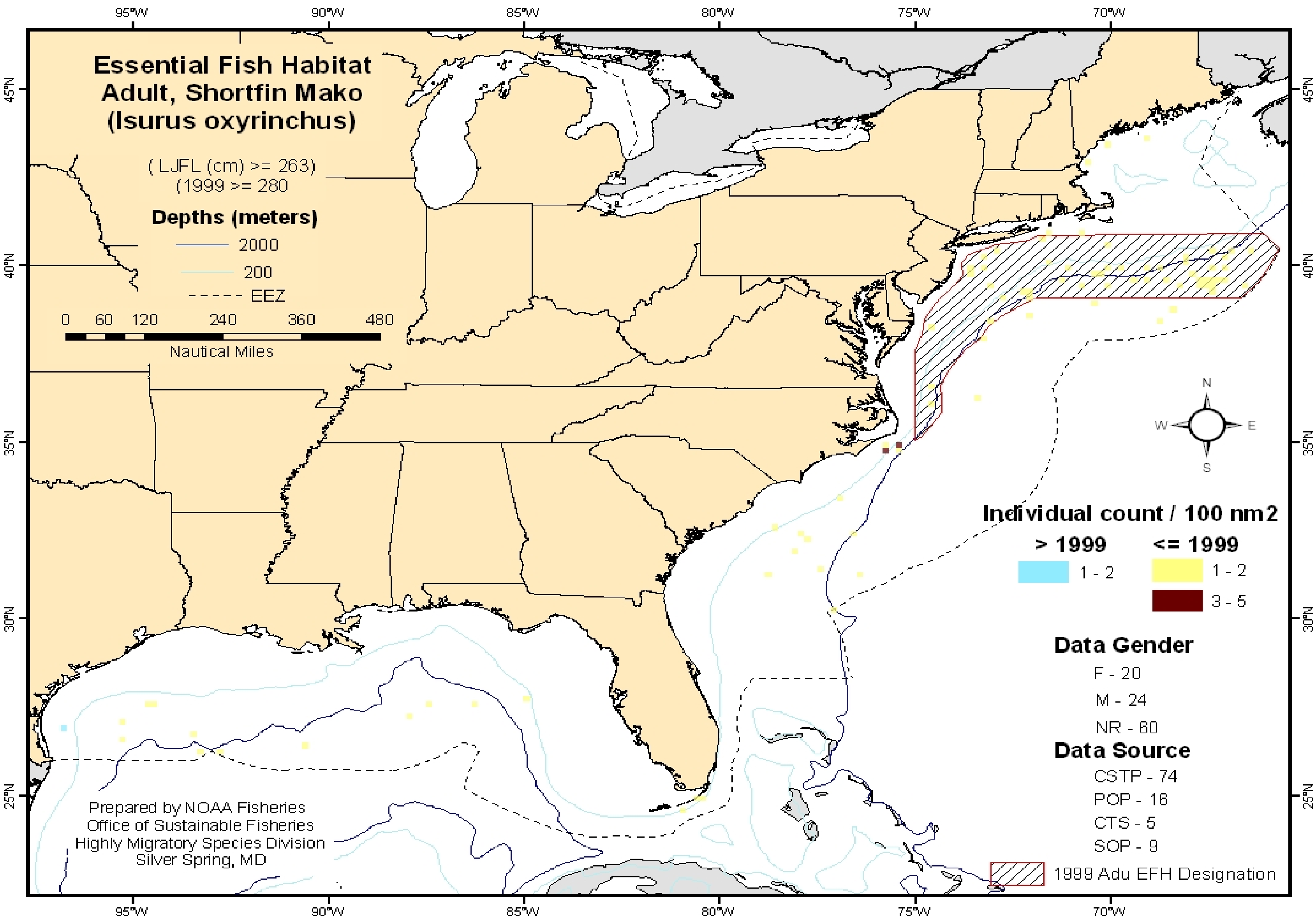


**Figure B.113 Shortfin Mako Shark: Adult.**

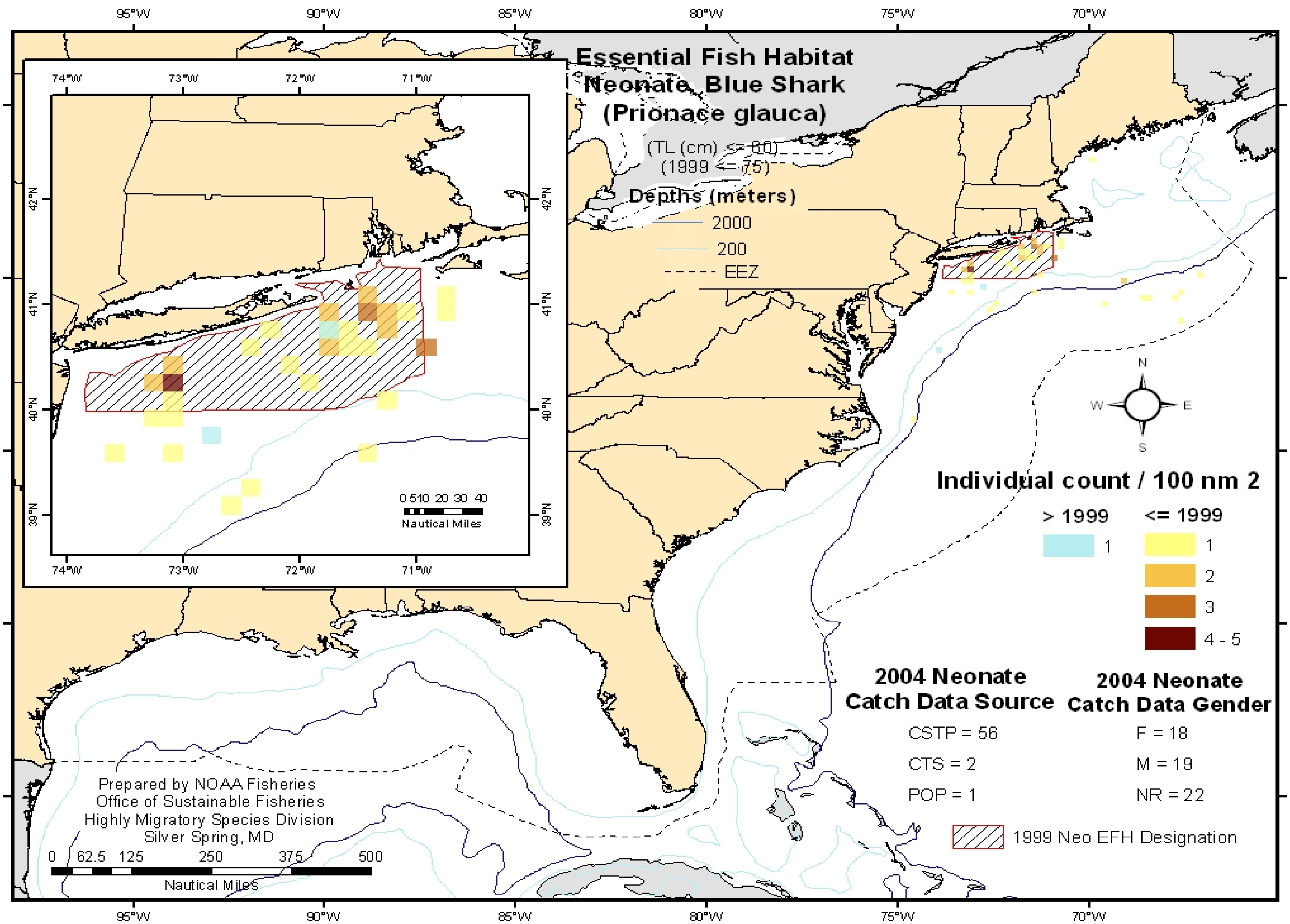


**Figure B.114 Blue Shark: Neonate.**

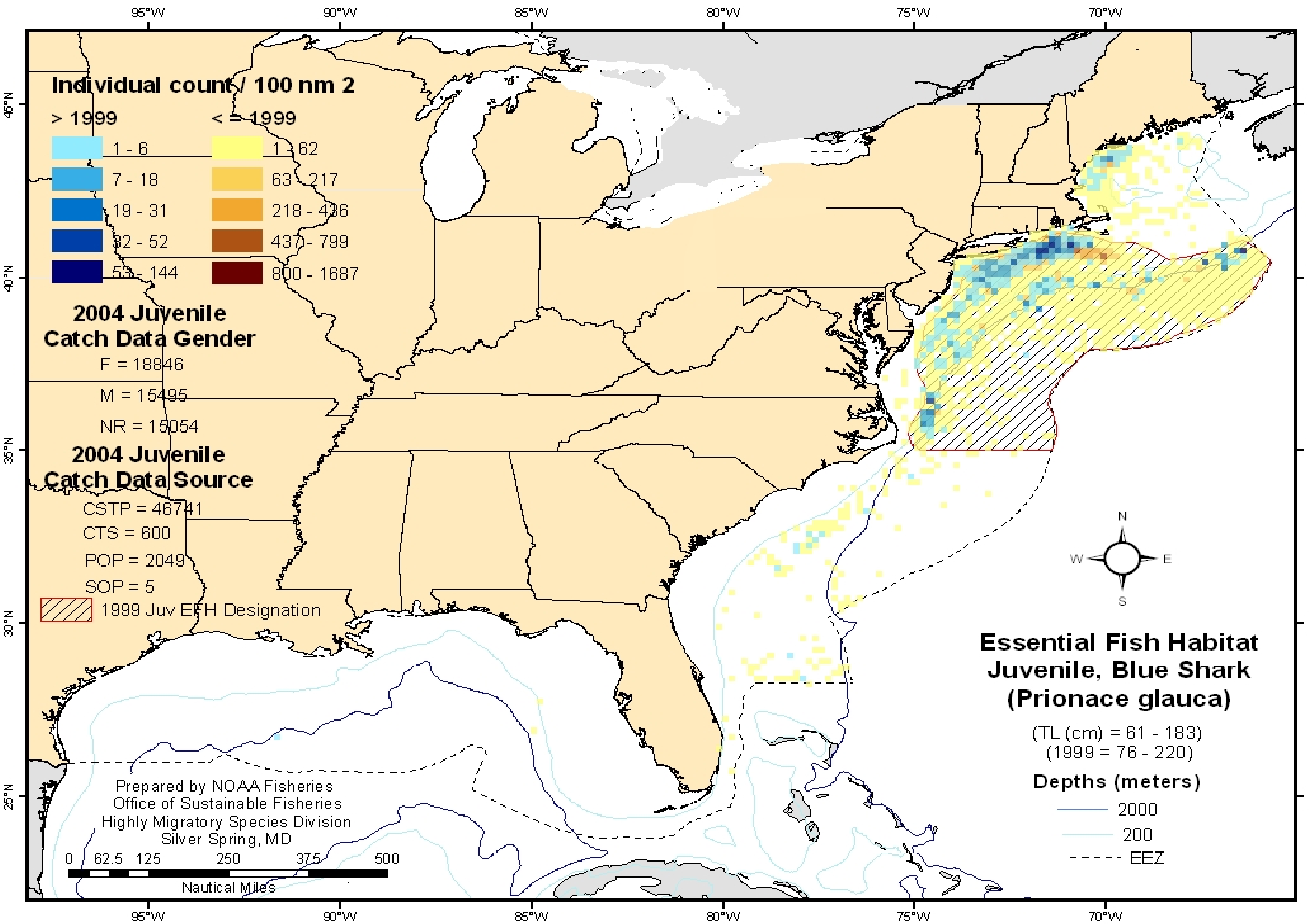


**Figure B.115 Blue Shark: Juvenile.**

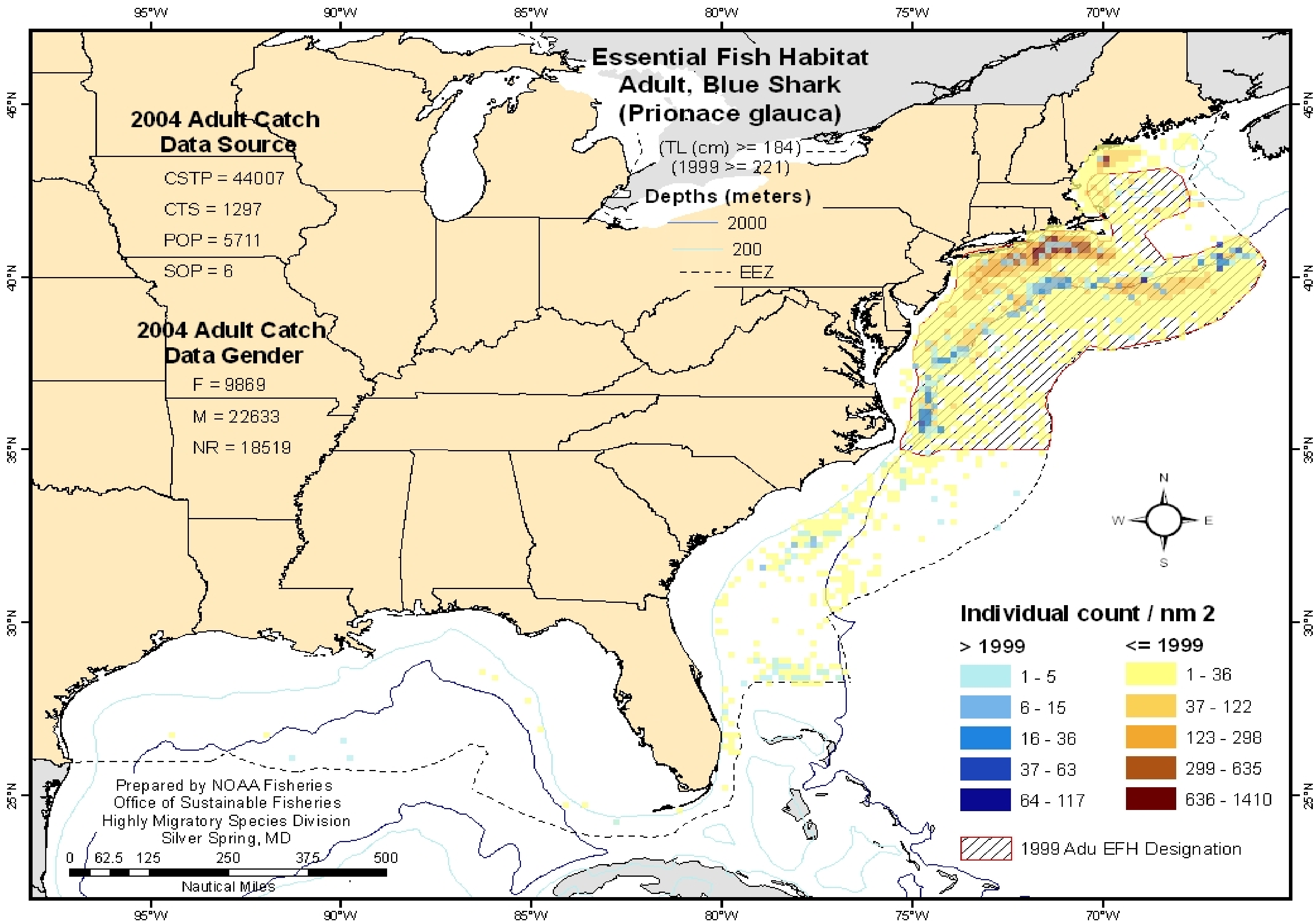


Figure B.116 Blue Shark: Adult.

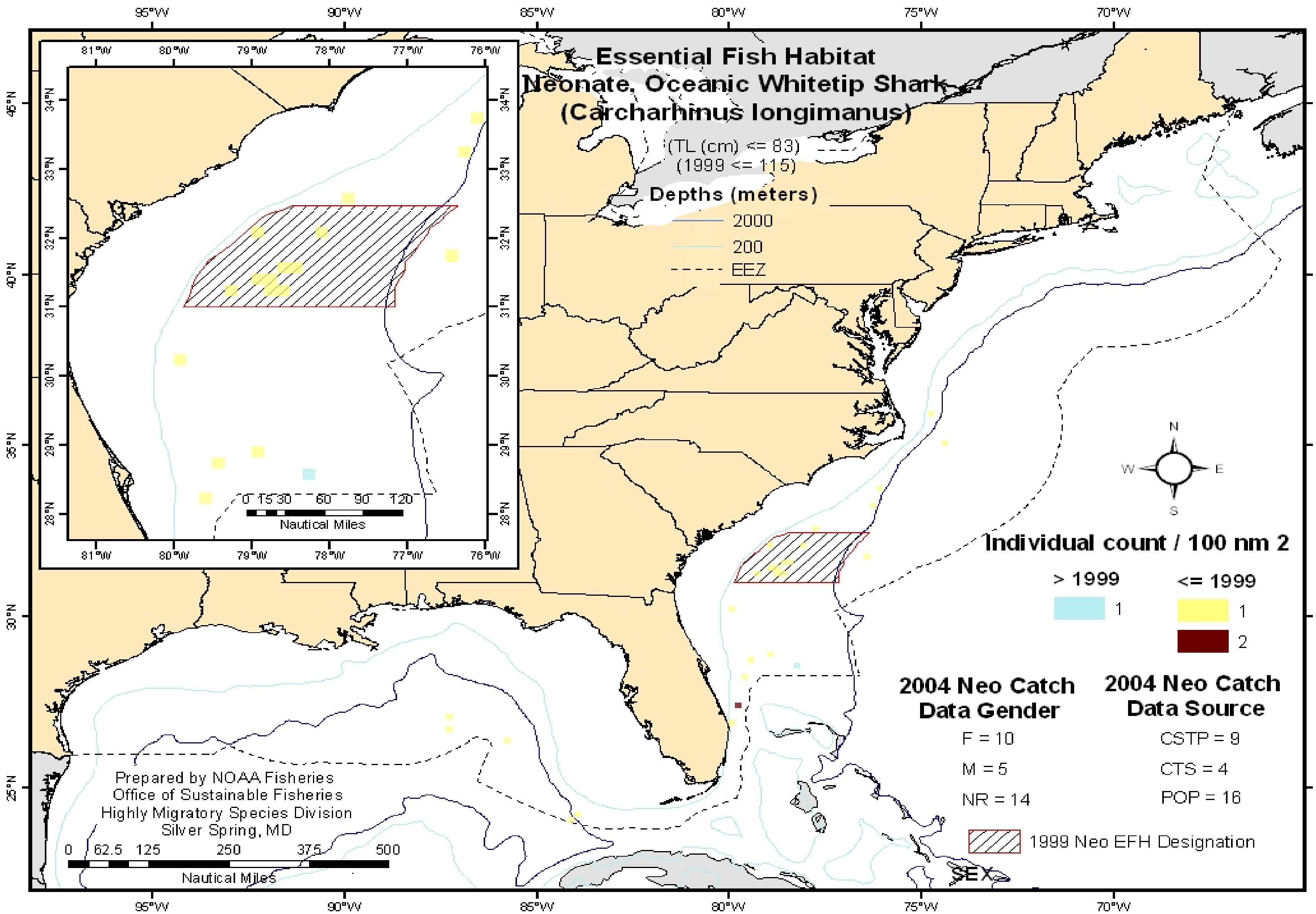


**Figure B.117 Oceanic Whitetip Shark: Neonate.**

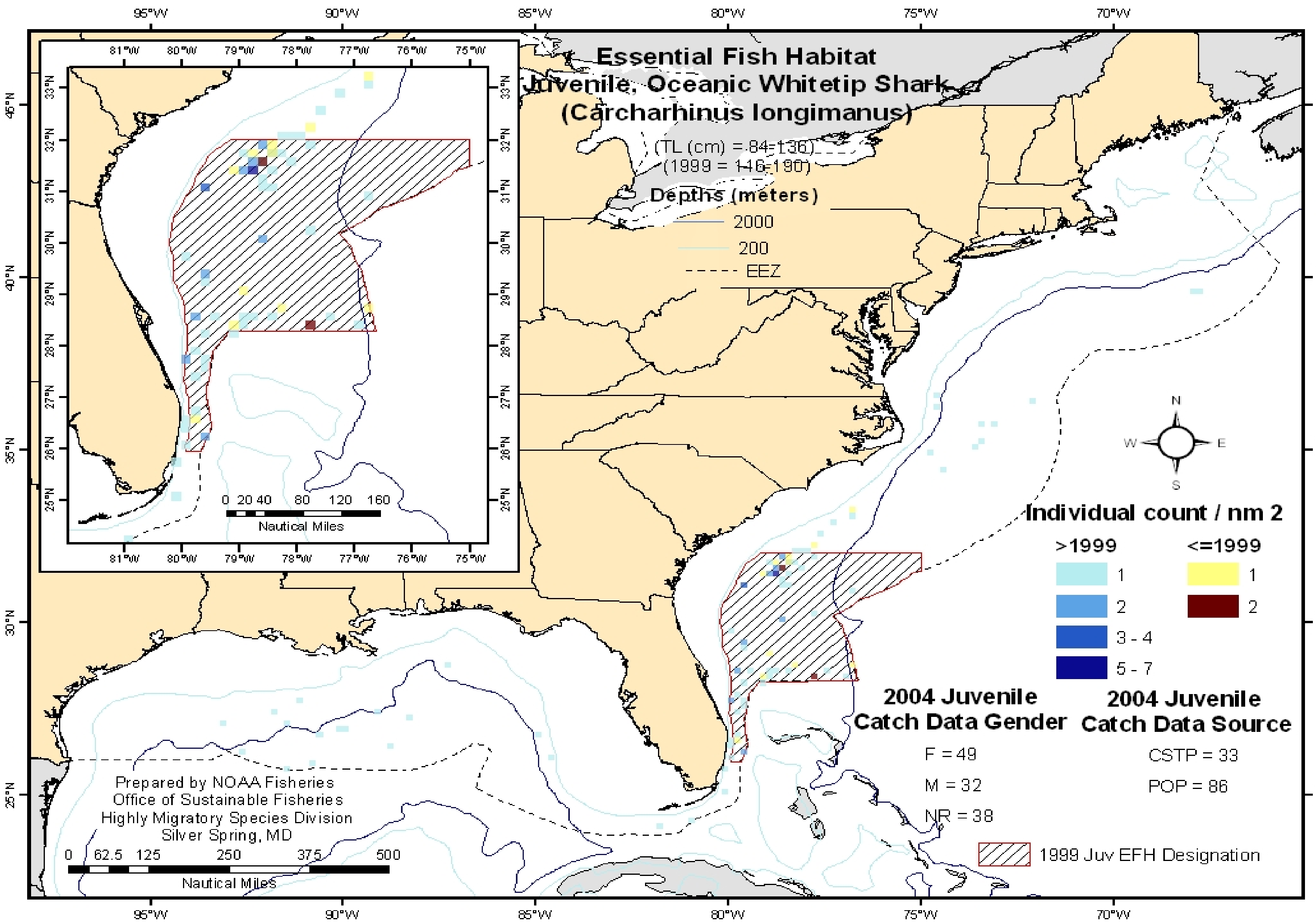


**Figure B.118** **Oceanic Whitetip Shark: Juvenile.**

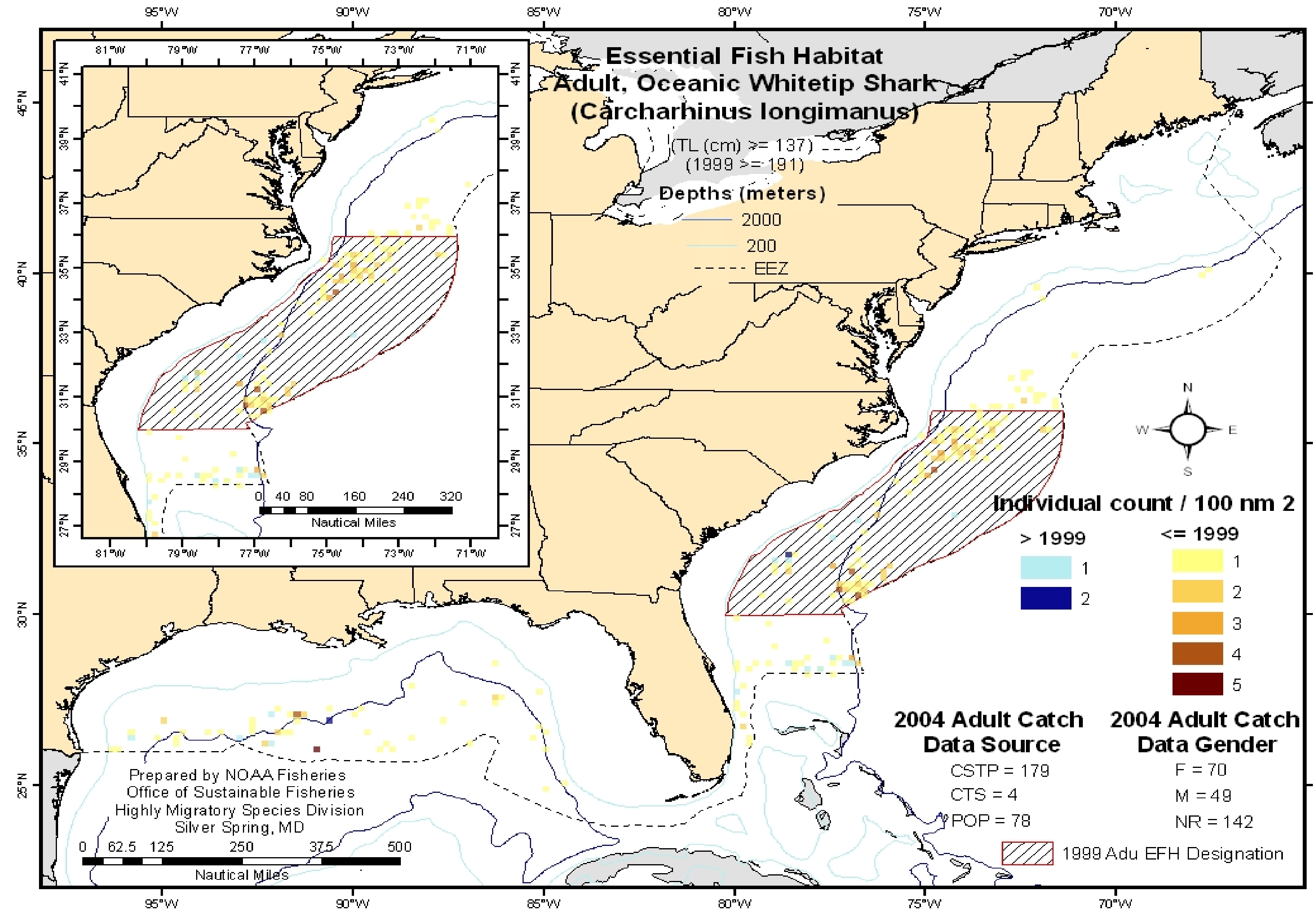


**Figure B.119 Oceanic Whitetip Shark: Adult.**

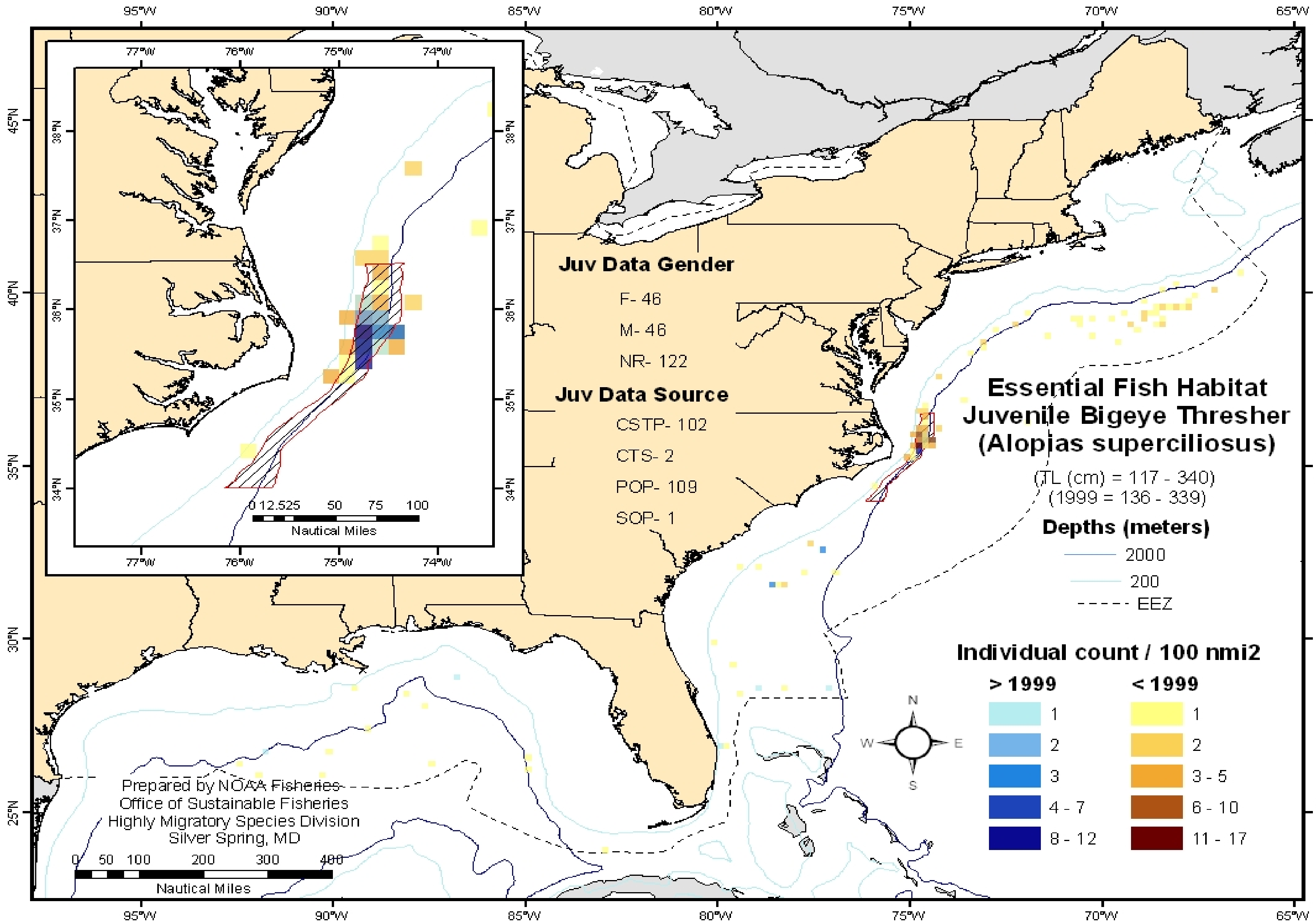


**Figure B.120** Bigeye Thresher Shark: Juvenile.

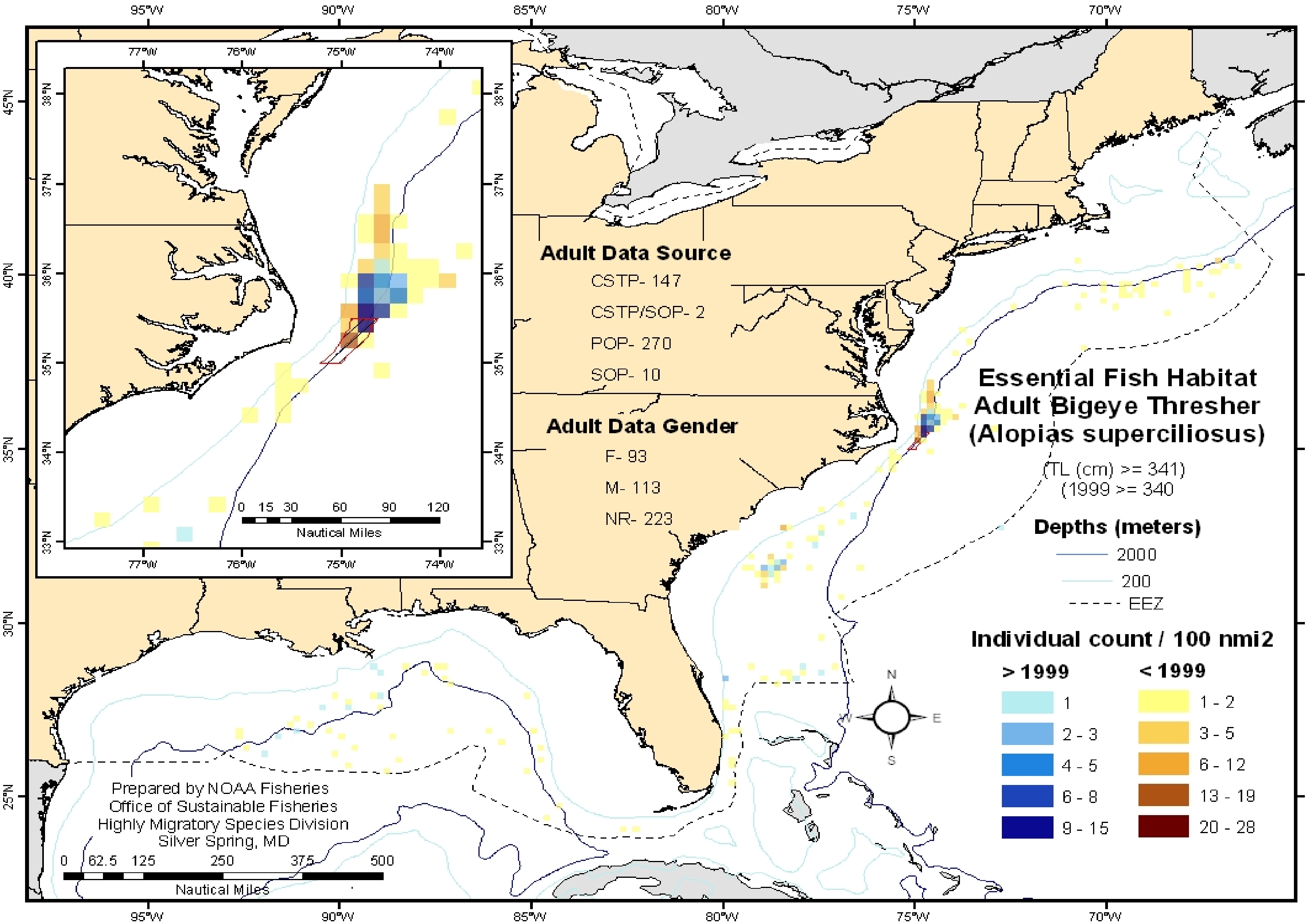


**Figure B.121** Bigeye Thresher Shark: Adult.

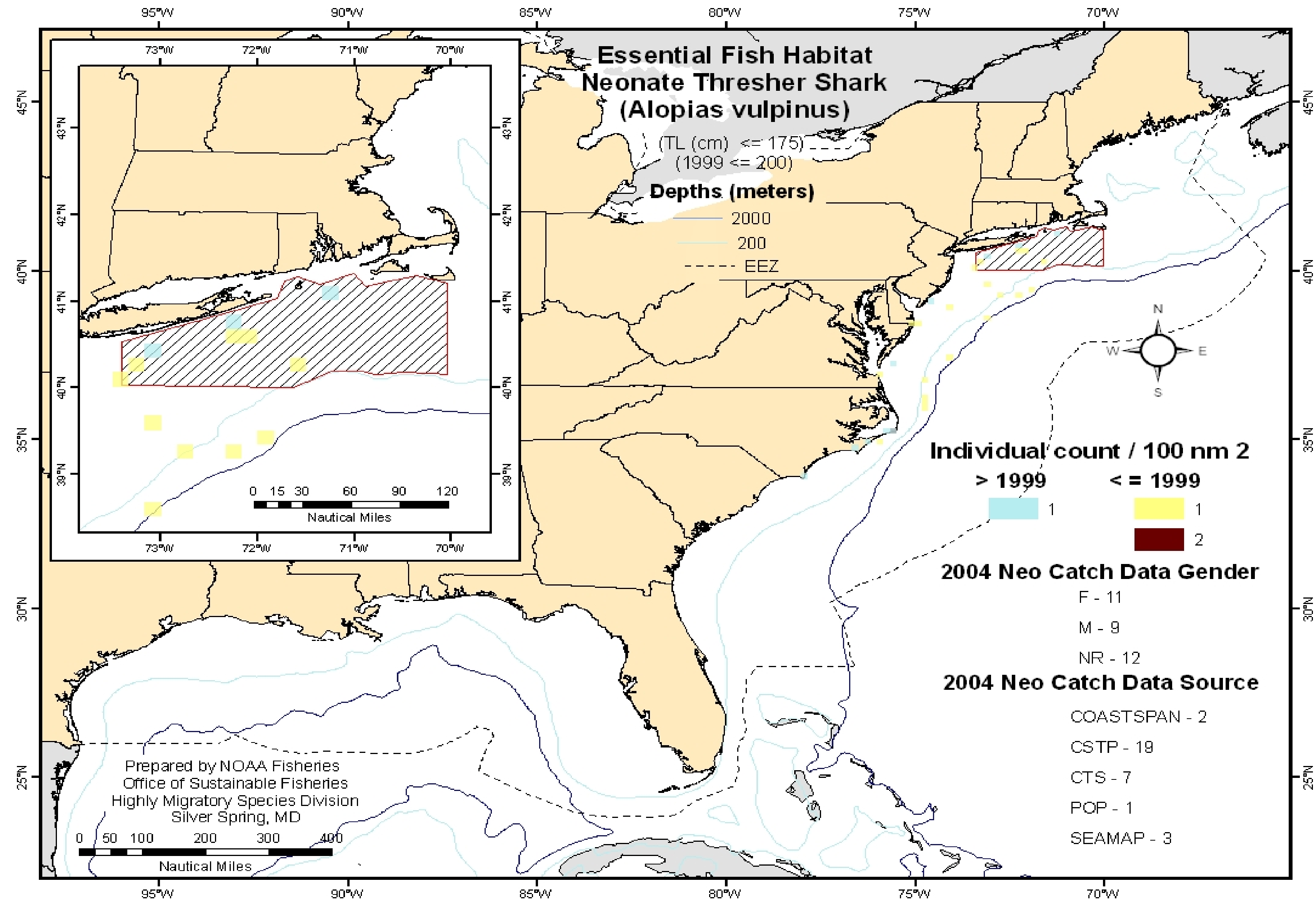


**Figure B.122 Thresher Shark: Neonate.**

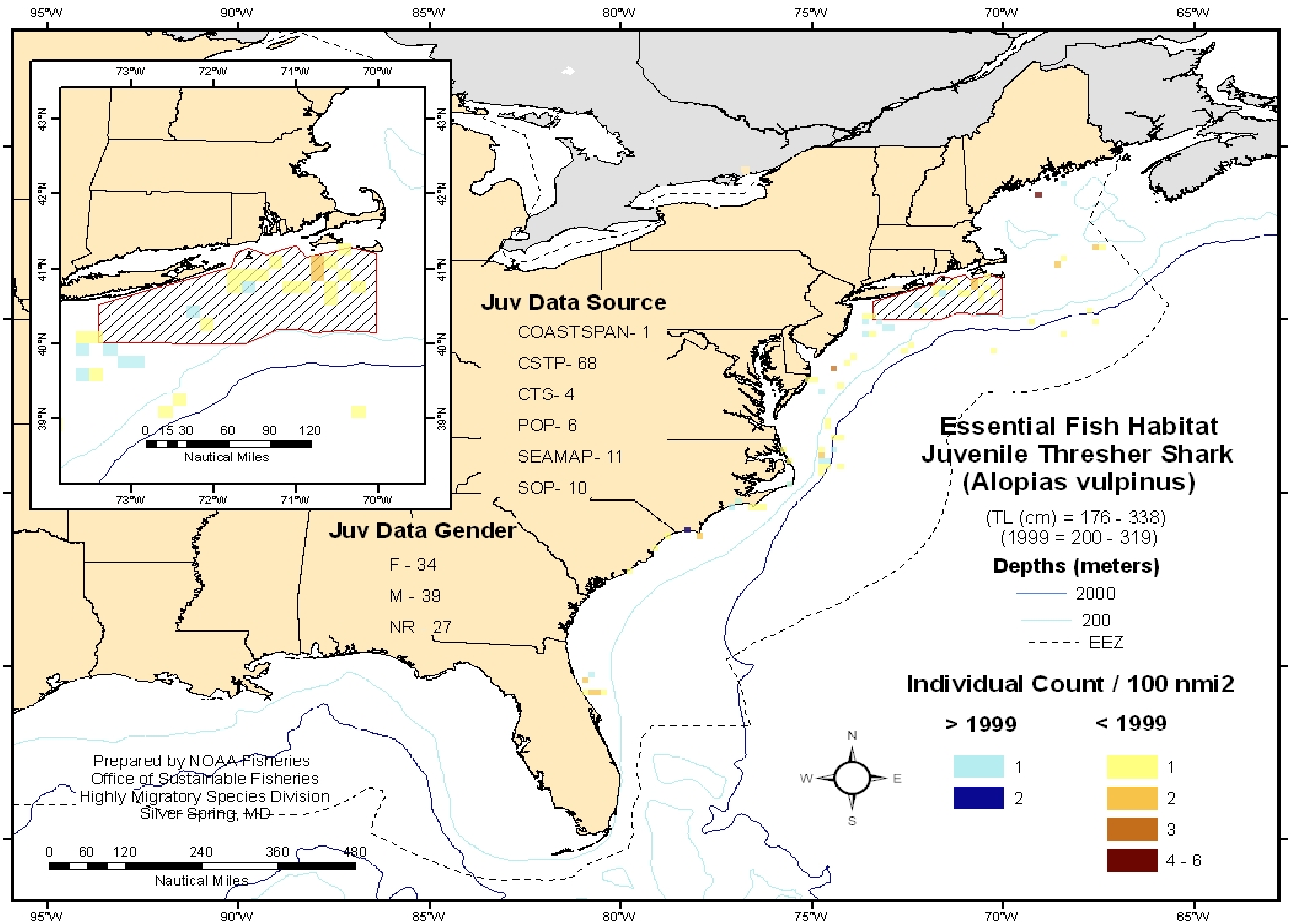


Figure B.123 Thresher Shark: Juvenile.

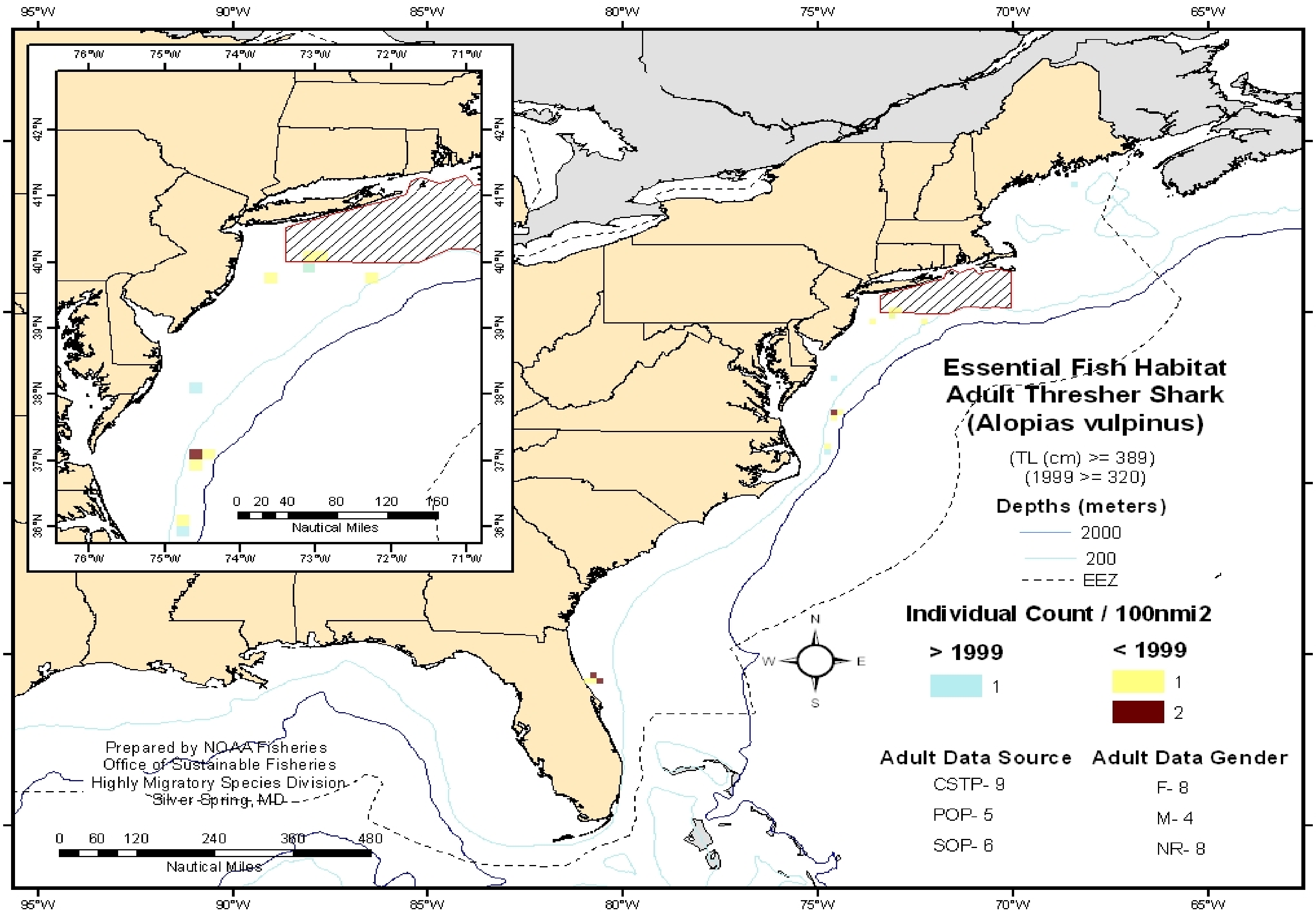


**Figure B.124** **Thresher Shark: Adult.**

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## APPENDIX C LIST OF TABLES

# C APPENDIX: AGGREGATE DOMESTIC PELAGIC LONGLINE AND RECREATIONAL ATLANTIC WHITE MARLIN FISHING MORTALITY ESTIMATES 2001 - 2004

**Table C.1 Estimated Domestic Aggregate Pelagic Longline Atlantic White Marlin Mortalities in Numbers of Fish 2001-2004.** Source: Pelagic Longline Logbook; Kerstetter, 2006

| Year | Reported Atlantic PLL Killed/ Dead Discard | Reported Atlantic PLL Live Releases | Estimated PLL Post-Release Mortalities (PRM)* | Annual Estimate |
|---|---|---|---|---|
| 2001 | 267 | 617 | 343.1 | 610.1 |
| 2002 | 456 | 989 | 549.9 | 1,005.9 |
| 2003 | 275 | 539 | 299.7 | 574.7 |
| 2004 | 305 | 755 | 353.9 | 658.9 |
| Sub-Totals | 1,303 | 2,900 | 1,546.6 | 2,849.6 |
| Estimated Aggregate PLL WHM Mortality | 2,849.6 | | | |
| Estimated Average Annual Aggregate PLL White Marlin Mortality | 712.4 | | | |

* Various post-release mortality rates were applied by hook type (55.6% for J-hook; 27.7% for circle hook per Kerstetter, 2005), area, and time period, as appropriate. J-hook PRM rates were applied to PLL live releases for 2001, 2002, 2003, and January – June (inclusive) 2004. J-hook PRM rates were applied to non-NED PLL live releases for July 2004. Circle hook PRM rates were applied to NED PLL live releases for July 2004. Circle hook PRM rates were applied to PLL live releases for all areas for August – December (inclusive) 2004.

**Table C.2** **Estimated Domestic Aggregate Recreational Atlantic White Marlin Mortalities, in Number of Fish, as Derived from the RBS Database by Combining Retained Fish and Dead Discarded Fish with Estimated Post-Release Mortalities (PRM) (applying a 35% post-release mortality estimate) 2001-2004.** Source: Recreational Billfish Survey; Horodysky, 2005

| Year | RBS Kept | RBS Discarded Dead | RBS Live Releases | RBS Estimated PRM | Estimated Total Annual Recreational White Marlin Mortality |
|---|---|---|---|---|---|
| 2001 | 22.0 | 0.0 | 1,306 | 457.1 | 479.1 |
| 2002 | 33.0 | 0.0 | 2,207 | 772.5 | 805.5 |
| 2003 | 20.0 | 0.0 | 614 | 214.9 | 234.9 |
| 2004 | 25.0 | 0.0 | 1,349 | 472.2 | 497.2 |
| Sub-Totals | 100.0 | 0.0 | 5,476 | 1,916.6 | 2,016.6 |
| Estimated Aggregate Domestic Recreational White Marlin Mortality | 2,016.6 | | | | |
| Estimated Average Annual Aggregate Recreational White Marlin Mortality | 504.15 | | | | |

**Table C.3 Estimated Domestic Aggregate Recreational Atlantic White Marlin Mortalities, in Number of Fish, as Derived from the MRFSS Database by Combining Retained Fish and Dead Discarded Fish with Estimated Post-Release Mortalities (PRM) (applying a 35% post-release mortality estimate) 2001-2004.** Source: Marine Recreational Fishing Statistics Survey; Horodysky, 2005

| Year | MRFSS Kept | MRFSS Discarded Dead | MRFSS Live Releeases | MRFSS Estimated PRM | Estimated Total Annual Recreational White Marlin Mortality |
|---|---|---|---|---|---|
| 2001 | 0.0 | 0.0 | 11,255 | 3,939.3 | 3,939.3 |
| 2002 | 0.0 | 0.0 | 4,633* | 1,621.6 | 1,621.6 |
| 2003 | 0.0 | 0.0 | 339* | 118.7 | 118.7 |
| 2004 | 0.0 | 0.0 | 7,060* | 2,471.0 | 2,471.0 |
| Sub-Totals | 0.0 | 0.0 | 23,287 | 8,150.5 | 8,150.5 |
| Estimated Aggregate Domestic Recreational White Marlin Mortality | 8,150.5 | | | | |
| Estimated Average Annual Aggregate Recreational White Marlin Mortality | 2,037.6 | | | | |

*Data not available from all areas in that year.

**Table C.4 Estimated Domestic Aggregate Recreational Atlantic White Marlin Mortalities, in Number of Fish, as Derived from the LPS Database by Combining Retained Fish and Dead Discarded Fish with Estimated Post-Release Mortalities (PRM) (applying a 35% post-release mortality estimate) 2001-2004.** Source: Large Pelagics Survey; Horodysky, 2005; Large Pelagic Survey; Horodysky, 2005

| Year | LPS Kept | LPS Discarded Dead | LPS Live Releases | LPS Estimated PRM | Estimated Total Annual Recreational White Marlin Mortality |
|---|---|---|---|---|---|
| 2001 | 4.0 | 0.0 | 703 | 246.1 | 250.1 |
| 2002 | 218.0 | 0.0 | 5,616 | 1,965.6 | 2,183.6 |
| 2003 | 365.0 | 0.0 | 3,069 | 1,074.2 | 1,439.2 |
| 2004 | 78.0 | 0.0 | 5,573 | 1,950.6 | 2,028.6 |
| Sub-Totals | 665.0 | 0.0 | 14,961 | 5,236.5 | 5,091.5 |
| Estimated Aggregate Domestic Recreational White Marlin Mortality | 5,901.5 | | | | |
| Estimated Average Annual Aggregate Recreational White Marlin Mortality | 1,475.4 | | | | |

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# D PROPOSED RULE AND DEIS COMMENTS AND RESPONSES

## D.1 Bycatch Reduction

### D.1.1 Workshops

Comment 1: NMFS should have workshops for the recreational fishing industry explaining the use of circle hooks.

Response: NMFS has conducted circle hook outreach in the past and will continue to promote circle hook use in the future. NMFS has disseminated information on circle hooks through informational pamphlets and in person through billfish tournament outreach. At this time, this action would implement shark identification and careful release and disentanglement workshops as required by Biological Opinions. The Agency may consider hosting voluntary workshops to address the use of circle hooks in the recreational fishery and may provide additional outreach targeting billfish tournaments.

*Protected Species Safe Handling, Release, and Identification Workshops for Pelagic Longline, Bottom Longline, and Gillnet Fishermen*

Comment 2: Post-release survival is important to any successful conservation management regime and sustainable fisheries. NMFS needs additional education and outreach workshops, as well as cooperative research initiatives, before significant reductions in post-release mortality can be achieved.

Response: The protected species safe handling, release, and identification workshops are intended to help further reduce the mortality of sea turtles, smalltooth sawfish, and other protected resources and non-target species captured incidentally in the HMS pelagic and bottom longline and gillnet fisheries. Owners and operators of PLL, BLL, and gillnet vessels would receive instruction on techniques for disentanglement, resuscitation, release, and identification of protected resources and other non-target species. The dissemination of this information is an important element in further reducing post-release mortality of protected resources in the PLL, BLL, and gillnet fisheries in compliance with requirements of the 2003 and 2004 BiOps. The goal for these workshops would be to increase fishermen's proficiency with required release equipment and protocols, while reducing the number of protected and non-target species mortalities. Through the NED experiment, NMFS has shown that significant bycatch reductions can be achieved through proper research, education, and outreach. These workshops are intended to disseminated the information learned from the NED experiment, as well as other information for the BLL and gillnet fisheries.

Comment 3: Several comments supported mandatory protected species workshops for captains and owners. Some of those comments include: owners and captains should attend the workshops, but attendance should not be mandatory for the crew because it would not be feasible for crew members, who are not U.S. citizens, to attend a workshop; owners' attendance would discourage hiring green captains who do not know how to handle sea turtles; support for mandatory training to reduce post-release mortality of longline-caught marine mammals and turtles; the GMFMC supports mandatory workshops for captains on pelagic longline vessels; getting their gear off the turtles should be all the incentive fishermen need; industry will benefit from attending these workshops because it will enable them to avoid further regulations; NMFS needs to comply with the BiOp to keep the fishery open; workshops are a good investment for the fishermen; and, EPA supports alternatives A2 and A3 requiring mandatory workshops on handling protected species captured or entangled in fishing gear for all HMS pelagic and bottom longline vessel owners (A2) and operators (A3). EPA also supported preferred alternatives A5 (mandatory workshops/certification for shark gillnet vessel owners/operators).

Response: Under the preferred alternatives, NMFS would require owners and operators, but not crew members, of HMS longline and shark gillnet vessels to attend the protected species safe handling, release, and identification workshops. Owners would be required to attend and successfully complete the workshop before renewing their HMS fishing permit in 2007. Without workshop certification, the vessel's permit would not be renewed. Operators would be required to attend the workshop to ensure that at least one person on board the vessel, who is directly involved with the vessel's fishing activities, has been successfully trained in the proper safe handling, release, and identification of protected species. Without an operator trained in these techniques, the vessel would be prohibited from engaging in HMS PLL, BLL, and gillnet fishing activities. A safe handling, release, and identification workshop certificate would be required on board HMS permitted longline and gillnet vessels during fishing operations. Due to the large universe of HMS longline and shark gillnet crew members, NMFS would not require their attendance at these workshops. Crew members, compared to owners and operators, would incur a higher individual cost to attend the workshops in relation to their income per fishing trip. Additionally, crew member certification would be difficult to monitor and enforce. NMFS would encourage operators to transfer the knowledge and skills obtained from successfully completing the workshops to the crew members potentially increasing the proper release, disentanglement, and identification of protected resources. While crew members are not required to attend the workshops, to the extent practicable, the workshops would be open to anyone who wishes to attend and receive certification.

Comment 4: NMFS received several comments supporting mandatory workshop certification for all HMS commercial and recreational hook and line fisheries. Those comments include: Handling and release workshops should be implemented immediately for all HMS commercial and recreational hook and line fisheries in order to gain the maximum benefit from mitigation technologies and fishing practice; training the greatest number of crew members is the key to protecting these imperiled species. To offset the economic impact, we support a longer interval between required trainings for the rest of the crew, but not a complete exemption; and, all HMS fishermen should complete workshops. Just because something is hard does not mean NMFS should not train the fishermen.

Response: The preferred alternatives would require owners and operators of PLL, BLL, and gillnet vessels to obtain the safe handling, release, and identification workshop certification. Certified operators would be encouraged to transfer the knowledge, skills, and protocols obtained from the workshops to the vessel's crew members. While these workshops would be mandatory for owners and operators, the workshops would be open to other interested parties, including crew members and other HMS fishermen. Crew members that may have an opportunity to serve as an operator on board a vessel would be encouraged to obtain the workshop training and certification. Crew members would not be required to obtain certification in the safe handling and release protocols because the average crew member's individual cost to attend the workshop is greater than the owner and operator. Additional information suggests that turnover is higher with the vessel's crew, making it difficult to continue operating a vessel with a fully certified crew. With at least one individual on board the vessel trained and proficient in the safe handling and release protocols, the likelihood of the safe release and disentanglement of protected species increases significantly. While implementing mandatory workshops for all commercial and recreational HMS fishermen may be a laudable goal, NMFS does not have the resources to train such a large group of individuals at this time. Nearly 30,000 HMS recreational permit holders would need to be trained and certified. The cost and logistics of doing this would be prohibitive. However, NMFS may consider these workshops and other means for educating these permit holders in the future.

Comment 5: NMFS received comments opposed to the protected species workshops. These comments include: handling bycatch correctly wastes too much time on a valuable money-making longline trip; I am opposed to alternative A2 and part of A5, mandatory workshops and certification for all HMS pelagic and bottom longline and shark gillnet vessel owners is unnecessary, unless they are an owner and an operator; owners may not be the vessel operator on fishing trips. The first priority should be the vessel operator onboard while at sea on fishing trips.

Response: NMFS agrees that handling bycatch correctly may take extra time and effort; however, this time and effort will be well spent if it helps to ensure the continued survival of protected species, prevents an exceedance of the incidental take statement (ITS), and prevents a shutdown of the fishery. By taking this necessary training, fishermen would be helping to protected threatened and endangered species, make the fishery less likely to shut down, and therefore, promote economic stability. NMFS realizes that many vessel owners may not operate or be on their vessels during fishing trips. Under the preferred alternative, protected species safe handling, release, and identification workshops would be mandatory for all longline and gillnet vessel operators. NMFS would encourage these operators to disseminate the workshop information to their fishing crews. By certifying vessel owners, NMFS would ensure that the owners are aware of the certification requirement and skills and would hold them accountable for preventing their vessel from engaging in fishing activities without a certified operator onboard. Additionally, the certification requirement would be linked to a vessel's limited access permits and owners would not be able to renew their permits without successful completion of the required workshop. NMFS requires that vessel operators follow safe release and handling protocols when they have interacted with certain protected species. All other non-marketable species should be released in a way that maximizes their chances of survival. NMFS requires vessel owners and operators to meet or exceed the performance standards laid out in the 2004 Biological Opinion.

Comment 6: NMFS received comments suggesting that the operator be required to train the vessel's crew with the safe handling and release protocols. Those comments include: alternative A3 and A5 should include a stipulation that the certified vessel operator train new crew members prior to each trip as is customary for safety drills; and, it should be clarified that a trained and certified owner or operator must be aboard at all times and that this individual is responsible for ensuring that proper release and disentanglement gear is aboard, the crew is informed, and correct procedures are followed.

Response: Owners and operators of HMS permitted longline and gillnet vessels would be required to obtain the protected safe handling, release, and identification workshop certification before the vessel's permit expires in 2007. Operators would be required to be proficient in the safe handling and release protocols to ensure that there is an individual on board the vessel with the necessary skills to disentangle, safely release, and accurately identify any protected species caught in the vessel's gear. Owners and operators would be encouraged to explain and demonstrate the safe handling and release protocols with the vessel's crew members. Owners and operators would not be required to train crew members, as this requirement would be difficult to monitor and enforce. While crew members would not be required to attend the protected species safe handling, release, and identification workshops, to the extent practicable, these workshops will be open to individuals interested in receiving the certification.

Comment 7: NMFS received comments in support of training fishermen in the proper release of prohibited species and billfish, as well as protected species. These comments include: NMFS should include safe release training for sharks and billfishes in these workshops; these workshops should be referred to as "Careful Handling and Release Workshops," rather than protected species workshops because the workshops are appropriate for many species; and, the scope of the protected species workshops should be expanded to include prohibited species.

Response: NMFS agrees that safe handling, release, and identification training may be beneficial to all participants in HMS fisheries, including those that interact with sharks and billfishes. The need for protected species safe handling, release, and identification workshops stems from two Biological Opinions (BiOp) issued for the commercial shark fishery and the pelagic longline fishery. The intent of these workshops is to reduce the post-release mortality of sea turtles (in compliance with these BiOps) that are most frequently caught by participants using either bottom longline to target sharks or pelagic longline to target swordfish and tunas. These workshops would facilitate improved hook removal and safe release of sharks and billfishes because the equipment and protocols, although specific to sea turtles, could be used to safely disengage hooks in other fish and/or mammals that may be encountered. Billfish are often encountered as bycatch in the pelagic longline fishery and the dehooking equipment and protocols could be employed to safely dehook and release billfish, thus increasing their post-release survival rates. The only fisheries authorized to target billfish are recreational rod and reel fisheries. The two BiOps require outreach to the commercial fisheries employing PLL, BLL, and shark gillnet gear on the proper safe handling, release, and identification of protected species. While workshop attendance and certification would not be mandatory for recreational fishermen, these individuals are welcome to attend any of the workshops on safe handling, release, and identification to voluntary become more familiar with these techniques and protocols.

Comment 8: NMFS received comment on grandfathering individuals who attended the industry certified workshops held in Orlando, Florida and New Orleans, Louisiana. Those comments include: the industry should be recognized for holding workshops before NMFS finalized mandatory workshops; the three-year clock should start ticking on January 1, 2007 for those who are grandfathered in, not from when they took the workshop; certification should be given to fishermen and owners who attended previously held workshops; 85 percent of pelagic longline fishermen were trained and industry certified in 2005. The industry was supportive and actively engaged. These workshops should serve as a template for the future workshops; if the industry-certified sea turtle handlers who have already attended and passed the industry mandatory certification classes are required to do something, it should be an online review and should not have to lose additional time at sea and incur additional travel expenses; and, the process should be streamlined for these individuals to receive their initial certification.

Response: NMFS agrees that industry should be recognized for holding voluntary workshops before NMFS finalized the Consolidated HMS FMP. As such, all owners and operators that, as documented by workshop facilitators, attended and successfully completed industry certification workshops held on April 8, 2005, in Orlando, FL, and on June 27, 2005, in New Orleans, LA, would automatically receive valid protected species workshop certificates. For those who participated in the industry-sponsored workshops, the certification must be renewed every three years prior to the expiration date printed on the workshop certificate and would need to be renewed prior to renewing their HMS permit in the third year.

Comment 9: NMFS received several comments requesting careful consideration when scheduling the workshops. Comments include: the lunar cycles should be considered when scheduling the workshops; workshops during closed season can still inconvenience people because shark fishermen also fish for wahoo, dolphin, etc.; NMFS needs to be cognizant of the time burden involved for fishermen; the mandatory workshops should be held only for critical issues because fishermen must be out fishing to be profitable; and, there needs to be flexibility in the process because not everyone will be able to attend the workshops.

Response: NMFS realizes that some HMS fisheries are dependent on the lunar cycle; and therefore, would consider timing the workshops to ensure that most fishermen are able to attend. To the extent practicable, NMFS would consider the lunar cycles and their resultant impacts on availability of HMS participants when scheduling protected species safe handling, release, and identification workshops. Scheduling the shark identification workshops for Federal dealers would not be influenced by the lunar cycles because shark fisheries using bottom longline gear (primary gear used to target large coastal sharks) are not as synchronized with the lunar cycles. However, since the Agency does not know what other fisheries in which fishermen may be participating, the Agency cannot guarantee that all workshops would be held at times to minimize all lost fishing opportunities. The workshops would be held in areas where there is a high concentration of permit holders, according to the addresses provided when applying for an HMS permit. The schedule of these workshops would be made available in advance to allow fishermen to attend the workshop most convenient to them. While a number of workshops could be informative to HMS fishermen, the Agency chose to conduct the protected species workshops required by the Biological Opinions and the recommendation from the Biological Opinion to conduct shark identification workshops. The Agency may provide an opportunity for the industry to schedule one-on-one training at the expense of the individual (*i.e.*, trainer fees), if they are unable to attend any of the previously scheduled workshops.

Comment 10: Some identification training should be provided to the owners and operators during the release and disentanglement workshops.

Response: Species identification is vital for determining how best to handle a de-hooking event, and would also enhance the amount and quality of data available regarding protected species interactions. Accurate species identification is also important for compliance with HMS fishery regulations, including the avoidance of prohibited species, maintaining quota limits, and accurate data collection. NMFS intends to make education a key component of the workshops, and would provide workshop participants with training to safely disentangle, resuscitate, and release sea turtles, as well as identify and release other protected species such as marine mammals and smalltooth sawfish. Sea turtle identification guides are also available on the internet at http://www.nmfs.noaa.gov/sfa/hms/. Some marine mammal identification information can be obtained from the Office of Protected Resources website: http://www.nmfs.noaa.gov/pr/species/mammals/. The HMS website also contains a link (HMS ID Guide) to the Rhode Island Sea Grant bookstore where you may purchase identification guides for marine mammals, sharks, tunas, and billfish.

Comment 11: NMFS received several comments on alternatives A6 and A16, certification renewal timetable. Those comments include: renewal of the workshop certification should occur every three years; NMFS should recertify every three years, but recertification every five years would be better. Recertification held more frequently than three-years would be too much; the workshop certification requirement could be an impediment to someone selling a vessel if one cannot transfer the certification; certification should be tied to the operator, not the vessel; and, EPA supports alternative A6.

Response: Under the preferred alternative, owners and operators of HMS longline and shark gillnet vessels would be required to renew the mandatory protected species safe handling, release, and identification workshop certification every three years. A three-year period for recertification would maintain proficiency in the release, disentanglement and identification protocols, and allow NMFS to update owners and operators on new research and developments related to the subject matter while not placing an excessive burden on the participants (*e.g.*, lost fishing time and travel to attend workshops). NMFS considered recertifying owners and captains every five years, but determined that it allows a more extensive period of time to lapse between certification workshops, possibly impacting maintenance of proficiency and ability to obtain the latest updates on research and development of handling and dehooking protocols. NMFS also considered recertifying owners and operators every two years, but did not prefer the option because it would likely have the greatest economic burden for the participants due to increased frequency. Federally permitted shark dealers would also be required to renew the mandatory Atlantic shark identification workshop certification on a three-year timetable. A renewal frequency of three years ensures proficiency in shark identification and would provide an update on new developments in shark identification and HMS regulations.

The workshop certification would not be transferable to any other person and would state the name of the permit holder on the certificate. If acquiring an HMS LAP from a previous permit holder, the new owner would need to obtain a workshop certification prior to transferring the permit into the new owner's name. This requirement ensures that every HMS LAP owner is fully aware of and accountable for the mandatory protocols that must be followed on board a vessel with longline gear.

The initial operator certification would be linked to the renewal of the vessel's HMS LAP(s) in 2007. If the vessel owner holds multiple HMS LAPs, the operator would need to be certified prior to the earliest expiration date on any of the permits in 2007. After the initial certification, the operator's workshop certificate is no longer linked to the renewal of a vessel's HMS LAP and would need to be renewed prior to the expiration date on the operator's workshop certificate. The workshop certification would not be transferable to any other person and would have the operator's name on the certificate.

<u>Comment 12</u>: PLL, BLL, and gillnet vessel owners may need to be allowed proxies as well as dealers. NMFS should consider a proxy for elderly owners.

<u>Response</u>: NMFS believes that allowing proxies to attend workshops on behalf of longline and gillnet owners would reduce the likelihood that those involved in the operation of individual vessels would be the ones attending the workshops. NMFS is concerned that vessel owners would select proxies that are not involved in the day-to-day operation of their fishing vessel, thus compromising the goal of these workshops. If permit holders were to send proxies involved with the day-to-day activities of the vessel (i.e., crew or operators), the permit holder runs the risk of having no proxy available on the boat due to the high turnover of crew and operators. The proxy may not be employed on permit holder's vessel for the entire three years that the permit is valid. Additionally, NMFS does not have the means to validate a connection between the permit holder and the proxy. It is important for vessel owners that are not actually involved in the day-to-day operations of their vessels to be aware of the regulations and management of the fisheries in which their vessels are participating in order to fully and effectively implement the techniques taught at the workshops. Vessel owners should be aware of the concepts and breadth of material, as well as the tools and techniques, that would be covered in the workshops to understand the requirements for engaging fishing activities with PLL, BLL or gillnets on board the vessel and to understand what is expected of the vessel's crew. By certifying vessel owners, NMFS ensures that the owners are aware of the certification requirement and skills and will hold them accountable for preventing their vessel from engaging in fishing activities without a certified operator onboard. Non-compliance with the requirements of the 2003 and 2004 BiOps could result in additional, more restrictive management measures in the future.

<u>Comment 13</u>: EPA commented that the Draft Consolidated HMS FMP would be improved by providing a more balanced discussion of workshop costs, and noted that in today's society, most trades and professions require practitioners to obtain licenses demonstrating competence. Additionally, without authorized takings procedures, owners/operators might have to defend themselves in courts of law for violating ESA. EPA stated that if one considers the time invested in attending a one-day workshop, this measure seems like a bargain. EPA questioned the assumption inherent in the cost/earnings analysis that accepts the premise that time spent becoming qualified to practice longline fishing is time lost, and of no value.

Response: NMFS acknowledges that most trades and professions require practitioners to obtain licenses demonstrating competence. However, there is still an economic opportunity cost associated with any required activity that would not otherwise be taken voluntarily. In the case of analyzing the economic costs associated with workshop alternatives, NMFS assumed the activity that workshop participants would be engaged in, if they were not attending the workshop, would be fishing. In the economic literature, it is common practice to use wage rates from primary job activities as the opportunity cost of engaging in other activities.

NMFS recognizes that the training provided by workshops is valuable to fishermen and may offset some unquantifiable portion of the opportunity costs that were estimated. The opportunity cost estimates provided in the Draft Consolidated HMS FMP were considered, and should continue to be considered, upper bounds on the potential economic costs associated with attending workshops. Information quantifying the economic value of time spent at the workshops is not currently available to further refine the upper bound cost estimates used in the economic analysis of workshop alternatives.

*Atlantic Shark Identification Workshops*

Comment 14: NMFS received several comments in support of alternative A9, mandatory Atlantic shark identification workshops for all shark dealers. Those comments include: dealers should be required to attend the shark identification workshops. If shark dealers cannot properly identify a fish, their license and ability to be a dealer should be permanently revoked; workshops for species identification are generally unnecessary for commercial fishermen although shark identification workshops may be necessary for dealers or recreational fishermen; NMFS needs to rename the Identification Workshops as being Shark and not HMS, since only shark dealers are expected to be in attendance and certified at identifying sharks, not tunas; NMFS should have two days of training, one mandatory (dealers) and one voluntary (fishermen, public, etc); workshops give the dealer a good housekeeping seal of approval; NMFS should consider prioritizing the certification of shark dealers because the universe is so large. The prioritization could be based on a minimum annual purchase of shark products; and, EPA supported alternative A9, stating that accurate species identification is necessary for compliance with HMS fishery regulations, including avoidance of prohibited species, maintaining quota limits, and also for accurate data collection.

Response: Under the preferred alternative, A9, NMFS would rename the workshops as Atlantic shark identification workshops because only Federally permitted shark dealers would be required to attend the workshops and receive certification. Identification training would be focused on various species of sharks likely to be encountered by the dealer in both whole and dress form. These mandatory identification workshops would improve the ability of shark dealers to identify sharks to the species level and would improve the data collected for quota monitoring, stock assessments, and decision making processes for formulating appropriate fishery management strategies. While mandatory for shark dealers, these workshops would be open to other interested individuals, to the extent possible. Workshop locations would be based on dealer permit addresses. A schedule of workshops would be available in advance to allow dealers to select the workshop most convenient to their schedule. The Agency may provide an opportunity for the industry to schedule one-one-one training at the expense of the individual (*i.e.*, trainer costs), if they are unable to attend any of the previously scheduled workshops.

Comment 15: NMFS received several comments concerned about the effectiveness of the HMS identification workshops for only shark dealers. The comments include: limiting HMS identification workshops to dealers only will mean proper species identification will come too late for prohibited species such as dusky sharks and such a strategy will not address problems with recreational compliance. NMFS should expand the required audience at the HMS identification workshops and/or expand the scope of the protected species workshops to include identification and safe release of prohibited shark species; the identification workshop for dealers only is not enough. It will help with data collection and stock assessments, but it will not help with conservation; and, the Agency should focus their efforts on the directed shark fishermen that are actually landing sharks and dealers with 90 percent of the catch.

Response: Under the preferred alternatives, Atlantic shark identification workshops would be mandatory for Federally permitted shark dealers, but, to the extent possible, these workshops would be open to other interested individuals (*e.g.*, individuals participating in the shark fishery, port agents, law enforcement officers, state shark dealers, and recreational fishermen) on a voluntary basis. Under the preferred alternatives, Federally permitted shark dealers would be required to receive this training in an effort to reduce unclassified shark landings and improve species-specific landings data. Improvements in shark dealer data would improve existing quota monitoring programs as well as improve the accuracy of future stock assessments. With improved dealer identification, dealers would be more accountable for the sharks purchased, potentially discouraging the purchase of prohibited species. If there is no market for prohibited species, fishermen may modify their behavior and safely release any incidental catch of prohibited species. To train and certify the greater than 25,000 anglers that participate in the HMS recreational fishery would exceed the Agency's resources at this time. While commercial and recreational shark fishermen would not be required to attend the Atlantic shark identification workshops, to the extent possible the workshops would be open to anyone who wishes to attend and receive certification. In the future, additional actions may be taken to improve the data collected from the HMS recreational industry.

Comment 16: NMFS received comments on Alternative A15, mandatory attendance at HMS identification workshops for all HMS Angling category permit holders. Those comments include: mandatory attendance for all HMS Angling category permit holders would be a substantial undertaking; HMS identification workshops should be mandatory for all fishermen that land sharks; HMS Angling category permit holders should also have to attend because they are the primary misidentification and non-reporting problem; most commercial fishermen know how to identify species; and, some of the species identification problem is an angler problem.

Response: At this time, HMS identification workshops would not be required for HMS Angling category permit holders. Under the preferred alternative, all Federally permitted shark dealers would be required to attend the Atlantic shark identification workshops. The successful completion of the workshop would be linked to the dealer's ability to renew a Federal dealer permit. The purpose of the Atlantic shark identification workshops is to improve the data collected from the fishery, thereby improving quota monitoring and stock assessments. Dealer reports are an important data source for quota monitoring and management decisions; and therefore, these workshops would have great impact on improving the accuracy of the shark species identification. While the recreational fishery also contributes to shark misidentification, mandatory attendance for the angling community would not resolve the data quality issues associated with commercial vessel logbooks and dealer reports. Thus, quota monitoring and commercial regulatory compliance would not benefit from mandatory angler attendance as they would under mandatory shark dealer certification. Commercial and recreational shark fishermen would not be required to attend the Atlantic shark identification workshops, but to the extent possible, the workshops would be open to anyone who wishes to attend and receive certification. The money and time required to track and link permits to the workshop certification, to hold an appropriate number of workshops to certify all HMS anglers permit holders (over 25,000 individuals), and to enforce the workshop requirement for all HMS angler permit holders currently exceed the Agency's resources. In the future, additional actions may be taken to improve the data collected from the HMS recreational industry.

Comment 17: NMFS received two comments about mandatory workshops for state shark dealers. Those comments are: HMS identification workshops should be held for state dealers to encompass the entire universe of dealers reporting unclassified sharks; and, NMFS needs more information on state shark landings. The Agency is wasting the industry's time requiring the wrong people to attend these workshops.

Response: NMFS does not have any jurisdiction over state permitted shark dealers and cannot require their attendance at Federal workshops. However, to the extent possible, the Atlantic shark identification workshops would be open to other interested individuals, including state shark dealers, on a voluntary basis. To purchase sharks from a Federally permitted vessel, a state shark dealer must also possess a Federal shark dealer permit and, therefore, would be required to attend the workshops.

Comment 18: NMFS should require port agents to attend these workshops to improve their shark identification. Law enforcement needs to learn how to identify sharks.

Response: The Agency would encourage port agents to attend these workshops to improve their identification skills, especially since port agents are often responsible for the collection of biological information on many species that the Agency manages. Furthermore, law enforcement officials also need to identify sharks to the species level to enforce regulations related to seasons, minimum sizes, bag limits, and trip limits. Port agents and law enforcement officials are required to attend rigorous training on the identification of HMS regulated species; however, the material that would be covered in these workshops might provide additional morphological characteristics to facilitate shark identification in various conditions at landing (*i.e.*, no fins, no head, several days since landing, and gutted). As mentioned previously, law enforcement officials and port agents would be notified of workshops in their respective regions and encouraged to attend, to the extent practicable.

Comment 19: It is very difficult to sell 'unknown' sharks in the market and sharks are being listed as unclassified because it is the path of least resistance when they are reporting.

Response: Landings data from 2004 indicate that the number of unclassified large coastal, small coastal, and pelagic shark landings was 19 percent, 0.3 percent, and 53 percent of total shark landings.  These percentages indicate that a significant number of sharks do enter the market as unclassified despite regulations that require species-specific reporting by vessel owners and dealers.  NMFS does not know if sharks are being listed as unclassified because fishermen and dealers are unable to identify them, to circumvent prohibited species restrictions, or because it is the most expeditious manner to process the catch as the commenter suggests. However, NMFS believes that mandatory Atlantic shark identification workshops would improve the ability of shark dealers to identify sharks to the species level.  NMFS anticipates that these workshops would improve the data collected to assess stock status and decision making processes for formulating appropriate fishery management strategies.

Comment 20: NMFS received comment on the workshop materials and the need to hold shark identification workshops.  These comments include:  NMFS will need pictures of all the shark species to teach proper identification.  Those pictures will need to include pictures of dressed fish, whole fish, and fins of each species, especially prohibited species; and, NMFS should consider enlisting members of the industry to help with these workshops.

Response:  NMFS would coordinate with local shark dealers to have some dressed sharks available for each workshop.  If the workshops are held after a closure or in an area where no carcasses are available, NMFS would use other tools, such as photo presentations and dichotomous keys, to present methods for identifying dressed sharks to the species level.  The Agency intends to use a combination of dressed sharks, fins, photo presentations, and dichotomous keys to improve species-specific shark carcass identification.  The success of the Atlantic shark identification workshops will depend upon cooperation between the Agency and the industry.

Comment 21: Please consider Houma as a location to conduct the shark dealer workshops, if selected.

Response: NMFS would not be able to hold workshops at every shark dealer facility; however, the Agency examined the number and location of shark dealers in each region, and would work to provide workshops in areas that are convenient to the greatest number of people. A preliminary evaluation of dealers in the southern Louisiana region shows that Houma proportionally does not land the most sharks in the region, but is central to other locations.  As suggested, the Agency will consider Houma as a potential site for an Atlantic shark identification workshop.

Comment 22: NMFS received several comments on allowing a proxy to attend the Atlantic shark Identification workshops for the shark dealers.  Those comments are:  NMFS should allow a purchase agent proxy to attend instead of the shark dealer permit owner.  NMFS needs to consider all of the truck drivers operating under the single NMFS shark dealer permit who purchase sharks products from satellite locations; if a shark dealer loses their proxy due to unforeseen circumstances, NMFS should have some flexibility on allowing the fishhouse to continue operating until a replacement is found and certified; a trained and certified dealer representative must be present at all times whenever HMS catches are offloaded to be responsible for ensuring that all HMS landings are monitored and properly documented. Therefore, dealers should be allowed more than one proxy if it is requested; "Dockside

Technicians" should be allowed as a proxy for the fish dealer who may not be present during vessel pack-outs; the document has some good ideas for proxies, but you will need to be careful about a lapse between proxies, should the individual leave the business; and, there must be a fast track way to get certified if a proxy leaves, such as online certification.

Response: Under the preferred alternatives, all Federally permitted shark dealers would be required to obtain Atlantic shark identification workshop certification. NMFS encourages shark dealers to send as many proxies as is necessary to train staff members responsible for shark species identification within the dealer's business. Federally permitted shark dealers would be held accountable for ensuring that the appropriate individuals receive the proper training in shark identification. Shark dealer permit holders would be encouraged to share the workshop information and training with individuals that were unable to attend the workshop. Multiple proxies per shark dealer would ensure that the dealer has at least one person on staff with the workshop certification and skills to properly identify sharks if another proxy's employment is terminated. The schedule for Atlantic shark identification workshops would be available in advance to allow dealers and proxies to select the workshop closest to them and most convenient to their schedule. If a dealer and/or proxy is unable to attend a scheduled workshop, NMFS will consider granting one-on-one workshop training at the expense of the individual. These one-on-one training sessions could accommodate the replacement of a proxy whose employment was terminated on short notice.

*Other Workshop Related Comments*

Comment 23: NMFS received several comments on outreach beyond the two workshops. These comments included: regardless of who is required to attend the workshops, the Agency should do at-sea identification; a field guide should be sent out to all HMS permit holders; NMFS should provide waterproof field identification materials; manuals should be developed on the proper billfish and tuna release handling procedures; and, HMS Identification Guide should be required on board permitted vessels and in the office of HMS permitted fish dealers. The Guide could also be made available online.

Response: The HMS website (http://www.nmfs.noaa.gov/sfa/hms/) currently provides a diversity of information on a number of HMS and protected species, including a tutorial on sea turtle identification and handling, and a link to purchase the waterproof HMS identification guide from Rhode Island Sea Grant, as well as the actual safe handling and release protocols and placards in three different languages (English, Spanish, and Vietnamese). Curriculum for the Atlantic shark identification workshops is in development. However, current plans include distributing waterproof identification material at the protected species workshops, as well as distributing and training participants to use a key for distinguishing species-specific features at Atlantic shark identification workshops. NMFS recommends that these materials be readily accessible in dealer offices and onboard fishing vessels, and encourages workshop participants to share knowledge gained with their crew and other employees. While NMFS would like to distribute the HMS guide to all HMS permit holders, the resources to do so are not currently, nor are they likely to be available in the future.

Comment 24: NMFS received several comments about providing an expedited means for receiving the training, certification, and renewal. Those comments include: there should be internet training and certification; can HMS identification workshops and renewals occur online?; certification over the internet might not suffice, however, recertification might be possible; to facilitate normal turnover, review and busy schedules, NMFS could conduct training via the internet and/or by mail; NMFS needs to provide a convenient way for new captains to be certified prior to their first trip. Initial certification for new vessel operators must be conveniently available, such as a self-course over the internet or overnight mail. Vessel operations should not be held up unnecessarily; NMFS needs to make sure to develop a streamlined approach to keeping this certification effort simple and convenient so as to not to be a burden to all folks participating; and, hands-on training is important. The first time going through the training must occur in the workshop.

Response: The Agency's priority is to make the workshops as successful and effective as possible. Due to the nature of workshop subject matter, hands-on training and interaction with the workshop leader is vital for initial skill development and certification for the protected species safe handling, release, and identification workshops, as well as the Atlantic shark identification workshops. Once the first round of certifications are complete, NMFS will explore alternative means for renewing permits, including online or mail-in options. The Agency also hopes to develop an online program that will serve as a medium for providing up-to-date information regarding Atlantic shark identification and protected species handling techniques.

To facilitate coordination between workshops and regular business activities, NMFS plans to do focused mailing to permit holders to ensure that the workshop times and locations are known in advance. This will hopefully allow workshop participants to plan workshop attendance accordingly and prevent lapses in fishing activities.

Comment 25: How did NMFS analyze the economic impacts of attending these workshops?

Response: NMFS conducted an opportunity cost analysis to determine the economic costs associated with attending the various workshop alternatives. This analysis utilized the economic information gathered in the HMS Logbook, and in particular the information in the economic costs section of the logbook that is required to be completed by selected vessels. For the vessels that completed the economic portion of the HMS Logbook in 2004, revenues per trip were estimated by taking the number of fish caught per trip, multiplying the number of fish by average weights for each species harvested, and multiplying the total weights for each species by average prices for each species as reported in the dealer landings system. The costs reported for each trip were then subtracted from the estimated revenue for each trip. Then the number of days at sea as reported in logbooks was used to determine the average net revenue per day at sea for each trip taken. Finally, the information provided on crew shares was used to allocate the net revenue per day at sea to owner, captain, and crew. Information from the HMS permits database was then used to estimate the potential number of participants in each of the workshop alternatives. Since information on the number of captains per permitted vessel was not available, NMFS conservatively estimated that there could be two captains per permit for PLL vessels and one captain for all others. Net revenues per day for owners, captains, and crew were then multiplied by the number of participants expected for each workshop alternative to estimate the opportunity cost for a one day workshop. The economic impacts (*i.e.*, out of pocket cash costs) associated with attending workshops is likely to be less than the economic opportunity costs estimated since NMFS plans on scheduling workshops on less productive fishing days to avoid lost time at sea.

Comment 26: If training and certification is mandated, it is essential that NMFS ensure that adequate funding and personnel resources are dedicated to develop and fully support all program facets.

Response: The Agency agrees and is fully aware of the ramifications of these workshops and the need to implement them successfully. Numerous individuals, with a variety of expertise and backgrounds have been involved in the implementation of the voluntary workshops to date, and will be involved in any future mandatory workshops, including: shark identification and biology, fishing gear technology and deployment, safe release and handling of protected resources, vessel permitting, fisheries law enforcement, and shark carcass identification.

Comment 27: NMFS should consider how to ensure compliance with this requirement and should have a plan to measure the effectiveness of the workshops.

Response: Successful completion of both workshops would be linked to the renewal of the owner's or dealer's HMS permits. Longline and gillnet vessel owners would need to be certified in the safe release and disentanglement protocols before they can renew their limited access permits. Additionally, longline and gillnet vessels would not be allowed to engage in fishing operations without a certified operator onboard, as well as proof of owner and operator certification. Similarly, Federal shark dealers would need to be certified in shark identification, or have a certified employee, to renew their dealer permit. NMFS would gauge the success of these requirements by monitoring compliance with the sea turtle release and disentanglement performance standards established in the 2004 Biological Opinion, as well as by monitoring the amount of unclassified sharks reported by Federal dealers.

Comment 28: NMFS received comment suggesting that the Agency provide the workshop materials in other languages, such as Spanish and Vietnamese, as well as English.

Response: NMFS acknowledges the diversity of HMS fishery participants, and would make workshop materials accessible to as many of its constituents as possible. While workshops would be conducted in English, NMFS hopes to provide workshop materials in other languages for distribution at and outside of the workshops. Placards of sea turtle handling and release guidelines are currently available in English, Spanish, and Vietnamese. To the extent practicable, the Agency will work to develop shark identification materials in these languages as well.

Comment 29: NMFS received several comments related to alternative A17, Compliance with and Understanding of HMS Regulations. Those comments include: compliance and increased understanding of HMS regulations could be addressed by mailing an updated HMS Compliance Guide to each HMS recreational and commercial permit holder each year; workshops on the regulations is unnecessary as long as brochures are available; the proposed workshops should cover new regulatory requirements, such as the new PLL TRT regulations;

there are no alternatives in the Draft Consolidated HMS FMP for workshops on HMS regulations. The GMFMC recommends that an interactive web-based tutorial be available to improve the understanding and compliance with HMS regulations. This training should be mandatory for commercial captains; and, NMFS should consider mandatory recreational compliance workshops because many U.S. regulations are adhered to by commercial vessels while the less emphasis is placed on recreational non-compliance.

Response: During scoping, NMFS explored an alternative that focused on enhancing compliance with and understanding of HMS regulations via Agency sponsored workshops. NMFS received comments noting that mandatory workshops need to be prioritized due to the time and cost to those who must attend. Furthermore, comments received were supportive of continuing the current methods of disseminating information pertaining to HMS regulations (*e.g.*, Annual HMS Compliance Guide) rather than spending Federal dollars to hold workshops on regulations at this time. Advisory Panel members were supportive of focusing on mandatory requirements (*e.g.*, workshops required under Biological Opinions and other mandates) first and then following up with additional hard copy outreach materials to meet regulatory informational needs. Since NMFS already disseminates this type of information and, given that this information can be distributed to participants attending NMFS sponsored workshops, that alternative was not further analyzed in the Consolidated HMS FMP. Compliance guides and brochures can be obtained from on the HMS website (http://www.nmfs.noaa.gov/sfa/hms/). Anyone requesting hard copies of the compliance guides and/or brochures will have the materials mailed to them.

Under the preferred alternatives, NMFS would require owners and operators to attend mandatory protected species release, disentanglement, and identification workshops. Furthermore, shark dealers (or their designated proxy(ies)) would be required to attend shark identification workshops. In doing so, NMFS may consider the use of web-based training as a suitable media for disseminating training information following an initial face-to-face workshop.

### D.1.2 Time/Area Closures

*New Closures*

Comment 1: Alternative B2(a) indicates that there would be ecological benefits to leatherback sea turtles and blue and white marlin, yet this alternative was given cursory treatment.

Response: NMFS disagrees that alternative B2(a) was given cursory treatment. The Draft and Final HMS FMPs comprehensively analyzed this and all other alternatives for ecological and economic impacts. In the Draft HMS FMP, NMFS investigated potential changes in bycatch and discards with and without the redistribution of fishing effort for all the time/area closure alternatives considered. For alternative B2(a), NMFS evaluated a total of three scenarios of redistributed effort, each of which had different assumptions regarding how fishing effort would be redistributed into open areas. The first scenario assumed that fishing effort (*i.e.*, hooks) from alternative B2(a) would be displaced into all open areas. The second scenario assumed all fishing effort would only be redistributed within the Gulf of Mexico. The third scenario assumed that fishing effort would be displaced within the Gulf of Mexico and into an area (*i.e.*, Area 6) where the majority of vessels with Gulf of Mexico homeports have reported fishing during 2001 – 2004.

All three of these scenarios predicted that bycatch and discards would increase for at least one of the species considered. For instance, under the first scenario, NMFS predicted an increase in loggerhead sea turtle interactions (7.9 percent or 14 turtles/over three years; annual numbers may be obtained by dividing by three), bluefin tuna (BFT) discards (10.3 percent or 166 discards/over three years), swordfish discards (4.4 percent or 1,635 discards/over three years), yellowfin discards (3.0 percent or 166 discards/over three years), and bigeye tuna discards (11.6 percent or 117 discards/over three years). Under the second scenario of redistributed effort (effort only redistributed in the Gulf of Mexico), NMFS predicted increases in sailfish discards (1.8 percent or 18 discards/over three years), spearfish discards (3.3 percent or 14 discards/over three years), pelagic shark discards (0.3 percent or 112 discards/over three years), large coastal shark discards (3.6 percent or 598 discards/over three years), swordfish discards (4.4 percent or 1,635 discards/over three years), yellowfin discards (22.3 percent or 1,224 discards/over three years), bigeye tuna discards (0.4 percent or 4 discards/over three years), and BAYS tuna discards (1.0 percent or 91 discards/over three years). Finally, under the third scenario (redistribution in the Gulf of Mexico and Area 6), NMFS predicted increases in sailfish (4.7 percent or 61 discards/over three years), pelagic sharks (4.4 percent or 834 discards/over three years), BFT discards (1.6 percent or 35 discards/over three years), and BAYS tuna discards (0.7 percent or 70 discards/over three years). Given the potential negative ecological impact of B2(a) under all three redistribution of effort scenarios, NMFS is not preferring alternative B2(a) at this time.

Comment 2: NMFS decided against any new closures to protect sea turtles, billfish, and other overexploited species at this time because there is no closure that will benefit all species. Closures should not be rejected because they do not "solve" the bycatch problem on their own. Rather, they should be coupled with other sensible measures to ensure that all species are receiving the protection they need to recover to and maintain healthy populations.

Response: NMFS agrees that closures can be combined with other measures to achieve management objectives. However, NMFS did not reject closures because there was not a closure that benefited all species. To the contrary, NMFS is not preferring the closures because, in part, there were indications that the closures could actually result in an increase in bycatch to the detriment of some species with redistribution of effort. Additionally, NMFS does not prefer implementing new closures at this time, other than the Madison-Swanson and Steamboat Lumps Marine Reserves, for a number of other reasons, including those discussed below. All of the data used in the time/area analyses were based on J-hook data. The Northeast Distant experiment suggested that circle hooks likely have a significantly different catch rate than J-hooks; further investigations are required to determine the potential impact of any new time/area closures. NMFS anticipates that 2005 Highly Migratory Species (HMS) final logbook data will become available in the summer of 2006. In the meantime, the Agency will continue to monitor and analyze the effect of circle hooks on catch rates and bycatch reduction as well as assess the cumulative effect of current time/area closures and circle hooks. NMFS does not prefer to implement new closures as this time until the effect of current management measures, and potential unanticipated consequences of those management measures, can be better understood. Second, NMFS is awaiting additional information regarding the status of the pelagic longline

(PLL) fleet after the devastating hurricanes in the Gulf of Mexico during the fall of 2005. A majority of the PLL fleet was thought to be severely damaged or destroyed during the 2005 hurricane season. The amount of PLL fishing effort, especially within the Gulf of Mexico, will be assessed in the summer of 2006 when data quality control procedures on the 2005 HMS logbook data are complete. Until NMFS can better estimate the current fishing effort and potential recovery of the PLL fleet, it may be premature to implement any new time/area closures at the present time. Third, a number of stock assessments will be conducted during 2006 (LCS, blue marlin, white marlin, north and south swordfish, eastern and western BFT, and large coastal sharks). NMFS is waiting on the results of these stock assessments to help determine domestic measures with regard to management of these species. Once NMFS has this updated information, NMFS will consider additional management measures, potentially for all gear types, to help reduce bycatch and discard rates. NMFS is also trying to assess how protecting one age class at the potential detriment of other age classes will affect the fish stock as a whole. For instance, how will protecting spawning BFT help rebuild the stock if it results in increased discards of non-spawning adults, juvenile, and sub-adult BFT along the eastern seaboard? Therefore, more information is needed to further understand how to manage this species given its complex migratory patterns, life history, and age structure. NMFS is also considering developing incentives that would dissuade fishermen from keeping incidentally caught BFT, particularly spawning BFT, in the Gulf of Mexico. This may involve research on how changes in fishing practices may help reduce bycatch of non-target species as well as tracking discards (dead and alive) by all gear types. In addition, sea surface temperatures in the Gulf of Mexico have recently been thought to be associated with congregations of BFT and putative BFT spawning grounds in the Gulf of Mexico (Block, pers. comm.). NMFS intends to investigate the variability associated with sea surface temperatures as well as the temporal and spatial consistency of the association of BFT with these temperatures regimes. By better understanding what influences the distribution and timing of BFT in the Gulf of Mexico, NMFS can work on developing tailored management measures over space and time to maximize ecological benefits while minimizing economic impacts to the extent practicable.

Comment 3: NMFS received several comments regarding additional closures to consider including: NMFS should consider a time/area closure for longlining from the $35^{th}$ parallel to the $41^{st}$ parallel, from the 30 fathom line to the 500 fathom line, from June $15^{th}$ to September $30^{th}$; NMFS should consider longline closures around San Juan, Puerto Rico and other areas around Puerto Rico; NMFS should pressure the states north of the North Carolina closed area to close their state waters during April through July 31 to protect juvenile sandbar sharks; since the sandbar shark HAPC includes a major U.S. nursery area for this species, NMFS should close the federal waters out to 10 fathoms beginning in April and ending on July 31 each year; NMFS should reevaluate its decision not to close the Northeast Central statistical area proposed as Alternative A14 in the June 2004 SEIS; and, Georgia CRD requests either the closure of the EEZ off Georgia to gillnet gear to facilitate state enforcement and management efforts or the requirement for shark gillnet vessels to carry VMS year-round to facilitate Georgia's cooperative state/Federal enforcement efforts.

Response: While there may always be additional areas that could potentially be considered for time/area closures, NMFS considered a number of different closures that encompassed the major areas of bycatch for the greatest number of species of concern. Most of the areas were initially selected by plotting and examining the HMS logbook and Pelagic Observer Program (POP) data from 2001 – 2003 to identify areas and times where bycatch was concentrated. NMFS also took into account information received in a petition for rulemaking to consider an additional closure (alternative B2(c)) to reduce BFT discards in a reported spawning area in the Gulf of Mexico (Blue Ocean Institute *et al*., 2005; Block *et al*., 2005), and a settlement agreement relating to white marlin, which was approved by the court in Center for Biological Diversity v. NMFS, Civ. Action No. 04-0063 (D.D.C.). Additional closures, including closures for juvenile sandbar sharks and closures for other gear types, including gillnets and/or recreational gear, could be considered in future rulemakings, as needed.

Comment 4: NMFS received several comments in favor of maintaining existing time/area closures. These comments included: time/area closures should be used to promote conservation of all HMS species; marine sanctuaries need to be established for all species of fish; these areas need to remain closed until the fishery is rebuilt to the 1960s levels that existed prior to the overcapitalization of this fishery; as a result of the existing closures, overall discards have declined by as much as 50 percent so NMFS should continue to expand the existing closures; the reductions in bycatch as a result of the existing closures benefit a wide range of species; current closed areas are effective, based upon recent increases in swordfish size and weight in the deep-water recreational swordfish fishery; and suggestions by the industry that the closed area goals have been met because swordfish are rebuilt ignore the broader purpose and benefit of the closures.

Response: NMFS agrees that the existing closures have been effective at reducing bycatch of protected species and non-target HMS and have provided positive ecological benefits, and NMFS prefers to keep existing closures in place at this time. For example, the overall number of reported discards of swordfish, BFT, and bigeye tunas, pelagic sharks, blue and white marlin, sailfish, and spearfish have all declined by more than 30 percent. The reported discards of blue and white marlin declined by about 50 percent, and sailfish discards declined by almost 75 percent. The reported number of sea turtles caught and released declined by almost 28 percent. However, these analyses are based on J-hook data, and the fishery is required to use circle hooks. It is possible that the impact of such closures since implementation of circle hooks may be greater in ecological benefits than expected. If this happens, NMFS may not need to implement new closures and may be able to reduce existing closures. NMFS currently only has final, quality controlled HMS logbook data on the catch associated with circle hooks from July through December of 2004. NMFS anticipates having final, quality controlled 2005 HMS logbook data in the summer of 2006. At that time, NMFS will examine and analyze the effect of circle hooks on catch rates and bycatch reduction. Any changes to the existing closures would occur through a proposed and final rulemaking using the criteria in the preferred alternative B5.

Comment 5: NMFS received a number of comments in opposition to closures including: the effectiveness of time/area closures as a management tool to address bycatch issues has been exhausted; bycatch measures other than time/area closures should be considered; closures are not conservation, but reallocation to prohibit one hook and line gear (especially, circle hook gear) while allowing another hook and line gear (especially, more harmful J-style hook gear and live baiting); these areas were closed to rebuild the now fully rebuilt swordfish stock; an alternative to a full area closure could be to conduct an experimental fishery to test gear modifications - if the modifications do not work then put in a full closure; and the pelagic longline industry cannot withstand additional time/area closures.

Response: NMFS does not believe that the effectiveness of time/area closures as a management tool has been exhausted. The existing closures have been effective at reducing bycatch of protected species and many non-target HMS and have provided positive ecological benefits. For example, the overall number of reported discards of swordfish, BFT and bigeye tunas, pelagic sharks, blue and white marlin, sailfish, and spearfish have all declined by more than 30 percent. The reported discards of blue and white marlin declined by about 50 percent, and sailfish discards declined by almost 75 percent. The reported number of sea turtles caught and released declined by almost 28 percent. Thus, the current time/area closures have had positive ecological impact by reducing the overall bycatch of non-target and protected species. However, NMFS recognizes that the current closures have had an impact on retained species' landings as well. For example, from 1997 to 2003, the number of swordfish kept declined by nearly 28 percent, the number of yellowfin tuna kept declined by 23.5 percent, and the total number of BAYS kept (including yellowfin tuna) declined by 25.1 percent. Such declines in landings have resulted in negative economic impacts for the fleet and may explain the overall decline in effort by the Atlantic PLL fishery from the pre- to post-closure period. Thus, while time/area closures play an important part in resource management, NMFS does not prefer to implement new closures, except for the Madison-Swanson and Steamboat Lumps Marine Reserves, until NMFS can assess the cumulative effect of the current time/area closures and circle hooks. In addition, NMFS is waiting for additional information regarding the status of the PLL fleet after the devastating hurricanes in the Gulf of Mexico during the fall of 2005. A portion of the PLL fleet was thought to be severely damaged or destroyed during the 2005 hurricane season. Until NMFS can better estimate the current fishing effort and potential recovery of the PLL fleet, NMFS believes that it may be premature to implement any new time/area closures, particularly on the PLL fleet.

*BFT/Gulf of Mexico*

Comment 6: NMFS received comments regarding time/area closures to protect BFT spawning areas in the Gulf of Mexico (Alternatives B2(c) and B2(d)). Some of these comments suggested NMFS should consider different months or permutations of months between January and August. Other comments included: NMFS should implement additional measures to protect the Atlantic BFT biomass, especially spawning fish in the Gulf of Mexico; NMFS should consider closing the Gulf of Mexico to protect spawning BFT and analyze different time periods in combination with the northeast closures during months of high discards or high CPUE that might address effects on loggerhead sea turtles; an area south of Louisiana surrounding known BFT spawning areas should be closed to all longline fishing for a reasonable period of time – at a minimum this should include the area identified in Alternative B2(c); the *Nature* study firmly establishes the time and location of the spawning season and affords NMFS the opportunity to close a hot spot based on the best available science; Japan has recommended a longline closure of the entire Gulf of Mexico at ICCAT; NMFS should immediately initiate interim or emergency action to close the longline fishery in the Gulf of Mexico, starting in January of 2006 that would be effective for six months each year from January through June; NMFS should explain why the ecological benefits of closing the longline fishery in the Gulf of Mexico during BFT spawning season, as described in Alternative B2(c), would be minimal; why does NMFS assume that a longline closure in the Gulf of Mexico would cause a redistribution of effort to areas where BFT discards could increase?; what are the positive and negative economic consequences of allowing longline fishing to continue in the Gulf of Mexico during BFT spawning season?

Response: NMFS considered a wide range of alternatives ranging from maintaining existing closures (No Action) to a complete prohibition of PLL gear in all areas in order to reduce the bycatch and bycatch mortality of non-target HMS and protected species, such as sea turtles, in Atlantic HMS fisheries. After comparing the potential bycatch reduction for all of the closures that NMFS initially considered (see Chapter 2), NMFS chose five closures with the highest overall bycatch for further analysis. Alternative B2(c) was chosen for analysis in response to a petition received by NMFS from several conservation organizations requesting consideration of a closure of the "Gulf of Mexico BFT spawning area" (Blue Ocean Institute *et al.*, 2005). The times and areas analyzed for alternative B2(c) were directly from the petition. Alternative B2(d) was chosen for analysis in order to determine if any other closure, or combination of closures, would be more effective at reducing bycatch than some of the other alternatives considered. The analyses indicated that almost all of the closures and combinations of closures considered for white marlin, BFT, or sea turtles would result in a net increase in bycatch for at least some of the primary species considered when redistribution of fishing effort was taken into account. In addition, the predicted reduction in bycatch when redistribution of fishing effort was taken into account was typically less than 30 percent for any given species with overall reduction in the number of individual species being very low.

According to the POP data, alternative B2(c), closing 101,670 $nm^2$ in the Gulf of Mexico from April through June, would reduce discards of all non-target HMS and protected resources from a minimum of 2.3 percent for spearfish to a maximum of 25.0 percent for other sea turtles (comprised of green, hawksbill, and Kemp's ridley sea turtles). Without redistribution of effort, the logbook data indicate that alternative B2(c) would potentially reduce discards of all of the species being considered from a minimum of 0.8 percent for pelagic sharks to a maximum 21.5 percent for BFT. In a more likely scenario that assumes redistribution of effort, however, bycatch was predicted to increase for all species except leatherback and other sea turtles. Even BFT discards, which showed a fairly dramatic decline without redistribution of effort, were predicted to increase by 9.8 percent with redistribution of effort. Alternative B2(d) would prohibit the use of PLL gear by all U.S. flagged-vessels permitted to fish for HMS in a 162,181 $nm^2$ area in the Gulf of Mexico west of 86 degrees W. Long. year-round, thus eliminating an area where approximately 50 percent of all effort (Atlantic, Gulf of Mexico, and Caribbean) and 90 percent of all effort in the Gulf of Mexico has been reported in recent years (2001 – 2003). Without the redistribution of effort, the closure could have resulted in large reductions in all non-target HMS, ranging from a 10.1 percent reduction in loggerheads to 83.5 percent reduction in spearfish discards. With the redistribution of effort, NMFS predicted a decrease in discards of blue marlin (20.3 percent or 497 discards/over three years; annual estimates can be obtained by dividing by three), sailfish (26.8 percent or 276 discards/over three years), and spearfish (73.3 percent or 276 discards/over three years). However, given the size and timing of this closure (*i.e.*, year-round), NMFS also predicted an increase in white marlin discards (0.3 percent or 10 discards/over three years), loggerhead sea turtle interactions (65.5 percent or 117 turtles/over three years), BFT discards (38 percent or 614 discards/over three years), swordfish discards (31.9

percent or 11,718 discards/over three years), and bigeye tuna discards (84.8 percent or 853 discards/over three years).

Other alternatives, such as alternative B2(b), which would close a much smaller area in the Northeastern United States, could have greater benefits in terms of the number of BFT discards reduced. Although alternative B2(b) is not considered a BFT spawning area, data from the POP program indicate that large fish (>171 cm TL) are present in the area. Additionally, there is evidence to indicate that the area is utilized as a feeding and staging area by BFT prior to migrating to the Gulf of Mexico to spawn (Block *et al*., 2005). Hence, while NMFS recognizes that the same proportion of western spawning BFT would not be protected from a closure in the Northeast as one in the Gulf of Mexico, potentially a small proportion of western spawning-size BFT could be protected by a closure like B2(b), especially given the prevalence of larger individuals in Northeast area from the POP data. Therefore, a closure like B2(b) may be able to protect a few spawning-size individuals as well as pre-spawners, or sub-adults, which are also valuable age classes with regard to the stock (although, presumably, there is a mixture of eastern and western origin fish in this area, and a closure in this area may protect sub-adults of western as well as eastern origin). Furthermore, the total proportion of dead discards in the Northeast was similar to the Gulf of Mexico. In the Northeast, 48 percent (219 out of 461) of all BFT discards from 2001 – 2003 were discarded dead, whereas 53 percent (249 out of 470) of all BFT discards from the Gulf of Mexico were discarded dead. Given the high number of BFT discards in the Northeast, a smaller closure there may provide similar ecological benefit compared a closure in the Gulf of Mexico (depending on post-release survival rates in the two areas), and would minimize the economic impacts on the fleet.

NMFS will continue to pursue alternatives to reduce bycatch of spawning BFT. NMFS has currently adopted all of the ICCAT recommendations regarding BFT, a rebuilding plan is in place domestically for this species, and NMFS has implemented measures to rebuild this overfished stock. NMFS is currently trying to assess how protecting one age class at the potential detriment of other age classes will affect the fish stock as a whole. For instance, how will protecting spawning BFT help rebuild the stock if it results in increased discards of non-spawning adults, juveniles, and sub-adult BFT along the eastern seaboard? Therefore, more information is needed to further understand how to manage this species given its complex migratory patterns, life history, and age structure. As described above, NMFS is also considering developing incentives that would dissuade fishermen from keeping incidentally caught BFT, particularly spawning BFT in the Gulf of Mexico.

<u>Comment 7</u>: NMFS received several comments regarding the biology of spawning BFT in the Gulf of Mexico. These comments included: the management measures currently in place do not protect spawning BFT nor create the conditions necessary for BFT to survive, reproduce, and increase their population; current U.S. regulations result in a situation where almost half the BFT landed by longline fishermen come from the Gulf of Mexico when spawning fish are present, resulting in a significant de facto directed fishery; warm water in the Gulf of Mexico poses particular risks to BFT captured on longline gear due to the physiological stress caused in warm, low oxygen waters; and the spawning fish in this time and place are more valuable to the population than at other times of year.

Response: Although NMFS does not prefer alternative B2(c), or any other closure specific to spawning BFT in the Gulf of Mexico at this time, NMFS plans to pursue alternatives to reduce bycatch in the Gulf of Mexico, especially for spawning BFT. Such actions could improve international rebuilding efforts of this species. NMFS is also considering developing incentives that would dissuade fishermen from keeping incidentally caught BFT, particularly spawning BFT, in the Gulf of Mexico. This may involve research on how changes in fishing practices may help reduce bycatch of non-target species as well as the tracking of discards (dead and alive) by all gear types. In addition, sea surface temperatures in the Gulf of Mexico have recently been thought to be associated with congregations of BFT and putative BFT spawning grounds in the Gulf of Mexico (Block, pers. comm.). NMFS intends to investigate the variability associated with sea surface temperatures as well as the temporal and spatial consistency of the association of BFT with these temperatures regimes. By better understanding what influences the distribution and timing of BFT in the Gulf of Mexico, NMFS can work on developing tailored management measures over space and time to maximize ecological benefits while minimizing economic impacts, to the extent practicable.

Comment 8: NMFS should outline the methods and mortality rates used to estimate dead discards as reported to ICCAT, and comment on the likely associated uncertainty. The current regulations are currently failing to implement key provisions of the ICCAT rebuilding plan, in violation of ATCA. The model used by NMFS in its Draft HMS FMP assumes that the reproductive value of western Atlantic BFT caught in the Atlantic Ocean off the northeastern United States later in the year is equivalent to that of BFT caught from March-June in the Gulf of Mexico. This is a faulty and risky assumption. Does the analysis in the Draft HMS FMP take into account the current low stock status of western Atlantic BFT? The draft HMS FMP is flawed when it does not prefer closing BFT spawning grounds because it erroneously analyzes the closure primarily with regard to minimize bycatch to the extent practicable. In fact, the primary legal duty falls under the need to rebuild the western Atlantic BFT population in as short a period of time as possible. Overfishing continues at high rates and the model used for the rebuilding program is unrealistically optimistic.

Response: The estimates of discards used in the analyses include both live and dead discards, as reported by fishermen in logbooks. While NMFS ultimately used logbook data for the time/area analyses, NMFS also compared estimates of discards from the POP data. NMFS did not develop mortality estimates from the data. Rather, NMFS evaluated percent change in total discards as the measure of the effectiveness of potential time/area closures. NMFS disagrees that the current regulations are failing to implement provisions of the rebuilding plan. NMFS has currently adopted all of the ICCAT recommendations regarding BFT, a rebuilding plan is in place domestically for this species, and NMFS has implemented measures to rebuild this overfished stock. The model used by NMFS did not make any assumptions about the reproductive value of BFT. Rather, the intent of examining different closures was to maximize the potential reduction in bycatch for the greatest number of species, while minimizing losses in target catch.

Comment 9: NMFS received a comment that the area in the *Nature* study extends beyond the U.S. EEZ and so should the analyses in the Draft HMS FMP. There is no legal reason to limit the analysis to the U.S. EEZ.

Response: While NMFS has analyzed closures beyond the U.S. EEZ (*e.g.*, the Northeast Distant closed area), except for two relatively small areas, the U.S. EEZ in the Gulf of Mexico abuts the Mexican EEZ. U.S. fishermen are not allowed to fish in the Mexican EEZ, and NMFS does not have the legal authority to regulate foreign fisheries that operate outside of the U.S. EEZ. As such, the analyses were limited to the U.S. EEZ in the Gulf of Mexico utilizing logbook and POP data from the U.S. PLL fishery.

Comment 10: Demographics in the Gulf of Mexico have changed due to last summer's hurricanes. No one knows what the impacts of that will be. NMFS should not rush into changes in the Gulf of Mexico that are not necessary.

Response: NMFS is aware that there have been significant impacts in the Gulf of Mexico as a result of the 2005 hurricanes, which may take time to be fully realized. After carefully reviewing the results of all the different time/area closures analyses, and in consideration of the many significant factors that have recently affected the domestic PLL fleet, NMFS does not prefer to implement any new closures, except the complementary measures in the Madison-Swanson and Steamboat Lumps closed areas at this time. As described above in the response to Comment 2 in this section, this decision is based on a number of reasons including the potential impacts of the hurricanes on the PLL fleet.

*White Marlin*

Comment 11: NMFS received several comments in support of additional time/area closures to protect white marlin. Comments included: NMFS should consider a closure for white marlin in the mid-Atlantic; NMFS has never implemented a time/area closure for PLL fishing specifically to reduce blue and white marlin, or sailfish bycatch even though exceedingly high levels of bycatch occur; and NMFS must reduce marlin bycatch by closing areas to longline fishing when and where the most bycatch continues to occur to avoid a white marlin ESA listing.

Response: While NMFS has never implemented a closure to specifically reduce bycatch of blue and white marlin, current closures (the Northeastern U.S. closure, the DeSoto Canyon closure, the Charleston Bump, the East Florida Coast closures, and the Northeast Distant closed area) have resulted in large decreases in blue and white marlin discards from PLL gear, and billfish were considered in the analyses of these closures. Percent change in discards from the HMS logbook data before (1997 – 1997) versus after (2001 – 2003) the closures were implemented showed an overall 47.5 percent decrease in white marlin discards and an overall 50.3 percent decrease in blue marlin discards. In addition, NMFS implemented a ban on live bait in the Gulf of Mexico on August 1, 2000 (65 FR 47214), for PLL vessels to help reduce billfish bycatch. In the Draft HMS FMP, NMFS considered areas specifically for white marlin, per a settlement agreement relating to white marlin (Center for Biological Diversity v. NMFS, Civ. Action No. 04-0063 (D.D.C.)). Based on the HMS logbook and POP data from 2001 – 2003, other potential time/area closures were predicted to result in larger ecological benefits for all the species, including white marlin, rather than the areas outlined in the settlement agreement. Ultimately, NMFS chose to further analyze time/area closure boundaries that included the areas of highest interactions for a number of species. However, based on the results of these analyses and for the reasons discussed under the response to Comment 2, NMFS chose not to implement any new closures at this time beside the complementary measures in the Madison-Swanson and Steamboat Lumps Marine Reserves.

Comment 12: NMFS received a number of comments on alternative B2(c) including: Alternative B2(c) corresponds to the location of significant incidental catches of white marlin and leatherback sea turtles - NMFS should consider that area for closures, effort restrictions, or stricter gear requirements rather than allow itself to be paralyzed in the search for a single time/area closure that will address all bycatch reduction needs for more than a dozen species; NMFS should consider closed areas in the western Gulf of Mexico because that is where marlin are being killed; Alternative B2(c) should be closed from June through August to protect the greatest abundance of billfish in the Gulf of Mexico; the draft HMS FMP does not propose a closure big enough or long enough to generate a meaningful reduction in billfish bycatch; U.S. and Japanese data shows that bycatch of billfish is higher in the Gulf of Mexico than in any other part of the commercial fishery, and the closures to protect blue and white marlin in the Gulf of Mexico could save more of these species than any other closure in the entire United States, yet NMFS did not consider that there would be enough positive impact to consider implementing a closure.

Response: As described above in Comment 6 of this section, NMFS examined alternative B2(c) specifically in response to a petition for rulemaking regarding protection of spawning BFT. Under the full redistribution of fishing effort model for B2(c) (fishing effort distributed to all open areas), NMFS predicted an increase in white marlin discards (7.0 percent or 221 discards/over three years; annual estimates can be found by dividing by three), blue marlin discards (2.0 percent or 50 discards/over three years), sailfish discards (4.4 percent or 45 discards/over three years), loggerhead sea turtle interactions (23.5 percent or 42 turtles/over three years), BFT discards (9.8 percent or 158 discards/over three years), swordfish discards (6.0 percent or 2,218 discards/over three years), and bigeye tuna discards (1.7 percent or 18 discards/over three years). Under the second scenario of redistributed effort (redistribution in the Gulf of Mexico and Area 6), NMFS predicted increases in blue marlin discards (0.7 percent or 20 discards/over three years), sailfish discards (21.7 percent or 283 discards/over three years), spearfish discards (2.0 percent or 10 discards/over three years), large coastal sharks (12.8 percent or 2,454 discards/over three years), swordfish tuna discards (5.0 percent or 2,109 discards/over three years), and bigeye tuna discards (0.6 percent or 7 discards/over three years). Although white marlin discards were predicted to decrease under the second scenario evaluated (by 2.6 percent or 98 discards/over three years), there were potential negative ecological impacts of B2(c) for other species considered under the different scenarios of redistributed effort. Therefore, NMFS decided to not prefer alternative B2(c) at this time.

Based on a submission by the Japanese at ICCAT on BFT management (Suzuki and Takeuchi, 2005), the proposed closures and subsequent ecological benefits were based on closing the entire Gulf of Mexico and did not considered redistribution of fishing effort. As described above in Comment 9 of this section, NMFS has no jurisdiction to close the Mexican EEZ, and U.S. PLL vessels are prohibited from fishing in the Mexican EEZ. NMFS also believes it is critical to consider the redistribution of fishing effort before implementing management measures, such as time/area closures, because potential increases in discards and bycatch can result from time/area closures as effort is moved to remaining open areas. Additionally, as described above, NMFS is considering future management measures to minimize bycatch of non-target HMS in the Gulf of Mexico.

Comment 13: Longlining should be banned off the East Coast from June to September when white marlin are present in this area.

Response: NMFS currently has several closures along the eastern seaboard specifically for pelagic and bottom longline. These consist of the Northeastern United States closed area, which is closed to pelagic longlining during the month of June; the mid-Atlantic Shark Closure, which is closed during January through July to bottom longline gear; the Charleston Bump closed area that is closed to PLL gear from February through April; and the East Florida Coast closure that is closed year-round to PLL gear. The Florida East Coast (FEC), the Mid-Atlantic Bight (MAB), and the Northeastern Coastal (NEC) statistical reporting areas cover the extent of the U.S. Atlantic PLL logbook reporting areas along the East Coast. Comparing the number of discards for the months of July through December between the pre-closure period 1997 – 1999 and the period 2001 – 2003, when closures were in effect, reported landings of white marlin decreased by 95.4 percent in the FEC, 53.4 percent in the MAB, and 77.8 percent in the NEC. Therefore, while NMFS has not implemented a closure for white marlin specifically along the East Coast, data show a substantial decrease in white marlin discards likely resulting from the current time/area closures along the eastern seaboard.

*Current Closed Areas*

Comment 14: NMFS received several comments regarding the East Florida Coast closed area. These comments are: NMFS should prohibit all commercial fishing for swordfish in the East Florida Coast closed area; NMFS should eliminate all commercial shark fishing in the East Florida Coast closed area; NMFS should impose a 20-mile limit for the entire East Florida Coast that would prohibit commercial fishing in the area; NMFS should set a policy for the East Florida Coast closed area that allows for recreational swordfish hook and line fishing for a three to four month period or adopt management measures that allow for recreational swordfish hook and line fishing only on an every other year basis; NMFS needs to protect the Florida east coast because it is a nursery area for juvenile swordfish; NMFS should readjust the offshore border of the East Florida Coast Closed Area to allow PLL vessels a reasonable opportunity to harvest its ICCAT quotas; and NMFS should reopen the offshore border - the inshore and Straits of Florida portions that will remain closed afford adequate ongoing protections for undersized swordfish and other bycatch.

Response: NMFS closed the East Florida Coast closed area to PLL gear effective in 2001 (August 1, 2000, 65 FR 47214) in order to reduce bycatch of HMS and other species by PLL gear. One reason NMFS closed that area was because it is a swordfish nursery area and many of the swordfish being caught by PLL fishermen were undersized and therefore discarded dead. However, the goal of the closures was to reduce bycatch in general in the PLL fishery, and analyses conducted for that rulemaking also indicated that closing the area to PLL gear would reduce bycatch and discards of other species as well. The closure was not intended to be for all commercial fishing or to be permanent. Nor was the closure meant to allow only recreational fishing in that area. Because the area is a swordfish nursery area, it is likely that any fishing gear in that area, particularly those fishing for swordfish, will catch undersized swordfish that must be discarded, as well as juvenile swordfish that meet the legal minimum size. The preferred alternative that establishes criteria should allow NMFS to consider closing the East Florida Coast to other gears to reduce bycatch or for other reasons or to modify the closed area to PLL gear to either expand or reduce it, as needed. NMFS considered modifications to the closed area to allow PLL fishermen into an area that they claimed had swordfish larger than the minimum size. The analyses for this rulemaking concluded that swordfish in the potential re-opened area are significantly larger than those in the remaining closed area; however, the analyses also indicated potential increases in marlin bycatch. For this reason and others, NMFS did not prefer any alternative that would modify the East Florida Coast closed area at this time. NMFS may consider changes to that area or to the gears allowed to fish in that area in future rulemakings.

*Modifications to Current Closed Areas*

Comment 15: NMFS received comments supporting and opposing modifications of the existing HMS time/area closures to allow additional fishing effort into these areas. Comments in support of modifying the existing closures include: the existing time/area closures to protect small swordfish are no longer needed and should be reduced in size and/or duration or eliminated all together; NMFS inaction to adjust the offshore closure borders prevents U.S. fishermen from having a reasonable opportunity to harvest its ICCAT quota share, contrary to ATCA and the Magnuson-Stevens Act; NMFS needs to re-examine the area closures and provide immediate modifications to at least some areas. Other areas may require a period of heightened monitoring to determine the effects of new circle hook gear and careful handling/release procedures; NMFS should continuously monitor whether the existing closed areas are having the desired effect to determine whether modifications can occur; NMFS should reevaluate the PLL gear time/area closures for their necessity and effectiveness and redevelop these closures to include prohibiting all HMS hook and line fishing if the biological justification warrants retaining any such closures; NMFS should consider modifying the offshore borders of existing closures in several areas where the deeper depth contours provide relatively clean directed fishing; NMFS should have considered modifying the Desoto Canyon; opening the area offshore of the 250 fathom curve in the Desoto Canyon could benefit YFT fishermen; and if NMFS allows vessels into closed zones by using Vessel Monitoring Systems (VMS), then VMS should also be used to implement and enforce additional new closures that follow oceanic bottom contour lines. Comments opposed to modifying the existing HMS closures include: NMFS should not rely on old logbook data to modify existing closures; the existing closures should not be modified; NMFS should not consider areas that may serve as nursery areas for North Atlantic swordfish; NMFS should not consider opening the DeSoto Canyon areas to longlining because this would adversely affect the health of the fisheries ecologically and would prove detrimental to the economic interests of the commercial fleet; and the figures in this section show longline sets after the 2000 closure of the Desoto Canyon and the harvest of BFT dead discards - if this is illegal, how do these individuals make the sets and record them in the logbooks?

Response: NMFS considered making modifications to the current time/area closures, including modifications to the DeSoto Canyon, and is continuously monitoring the effect of current closures. As described above, an analysis of pre-closure and post-closure data indicate that the existing closures have been effective at reducing bycatch of protected species and non-target HMS, and have provided positive ecological benefits. The analysis also indicated that none of the modifications considered would have resulted in a large enough increase in retained catch to alleviate concerns over uncaught portions of the swordfish quotas. Specifically for the DeSoto Canyon, NMFS considered modifying the existing DeSoto Canyon time/area closure boundary to allow PLL gear in areas seaward of the 2000 meter contour from 26º N Lat., 85º 00' W Long., to 29º N Lat., 88º 00' W Long (alternative B3(d)). However, the average swordfish size was significantly smaller in the area to be reopened (average size = 108 cm LJFL) compared to the area to remain closed (average size = 116 cm LJFL; $P = 0.03$). Both average swordfish sizes are smaller than the minimum size limit of 119 cm LJFL. Therefore, NMFS believes that modifying the Desoto Canyon closure could result in increased swordfish discards. In addition, new circle hook management measures were put into place in 2004, and NMFS is still assessing the effects of circle hooks on bycatch rates for HMS. Until NMFS can better evaluate the effects of circle hooks on bycatch reduction, especially with regards to protected species interaction rates, the Agency is not preferring to modify the current time/area closures, at this time. Furthermore, as described in the response to Comment 14 above, the current time/area closures were established to reduce bycatch of more than just swordfish. Nonetheless, if the upcoming ICCAT swordfish stock assessment indicates the species is rebuilt, NMFS may reconsider modifying the existing closures taking into consideration things such as the impact of circle hooks and protected species interaction rates. Finally, while VMS allows fishermen to travel through the closed area, oceanic bottom contours are often irregularly shaped lines that despite VMS, may be more difficult to enforce. Geometric coordinates greatly aid in enforcement of time/area closures.

The baseline that NMFS has used to calculate bycatch reduction associated with current time/area closures is the U.S. Atlantic HMS logbook data just prior to the implementation of the closures (1997 – 1999). NMFS feels this best reflects the status of the stocks at the time of the closures. More current data is not available because PLL gear has been prohibited in these areas since 2000 or 2001, depending on the closure. The figures referred to by the commenter (Figures 4.3 and 4.8 in the Draft FMP) incorrectly showed all of the 1997 – 1999 reported sets rather than the intended 2001 – 2003 reported sets. The figures have been corrected. Very few, if any, sets have been reported in the Desoto Canyon since 2000. The figures in the Final HMS FMP only show where BFT discards occurred for PLL vessels from 2001 through 2003. NMFS also implemented the use of a vessel monitoring system (VMS) for all PLL vessels on September 1, 2003 (68 FR 45169). This monitoring system helps track where PLL vessels are placing sets, and NMFS has been able to track whether or not PLL vessels are placing sets in closed areas. VMS has helped alert enforcement of illegal activities occurring in closed areas under real time conditions, which has led to prosecution for illegal fishing in closed areas.

Comment 16: We support a modification of the area described in alternative B3(a) (modifications to the Charleston Bump closed area). While the analysis shows a negligible amount of bycatch, there is an opportunity for catching marketable species for boats that are struggling and need access to this area.; We also support a modification of the area described in alternative B3(b) (modifications to the Northeastern U.S. closed area), this area should never have been closed in the first place. The entire June BFT closure area should be reevaluated in light of all the mandatory bycatch reduction measures and the inability to harvest the U.S. BFT quota in recent years.

Response: NMFS analyzed both alternatives B3(a) and B3(b). The analyses indicate that alternative B3(a) would result in an increase in swordfish catch of 1.1 percent and yellowfin tuna catch of 0.16 percent. However, it could result in an increase of bycatch for sailfish (3.0 percent), spearfish (2.4 percent), and white marlin (2.0 percent). Alternative B3(b) would result in a minimal increase in bycatch and retained catch (*i.e.*, 3 swordfish, 1 BFT, and 1 BAYS tuna would be expected to be caught based on 1997 – 1999 data). As described above, NMFS is not preferring to implement any new or to modify any existing closures, except for Madison-Swanson or Steamboat Lumps, at this time for the reasons stated in the response to Comment 2, and with regard to alternatives B3(a) and B3(b) because neither of the modifications considered would have resulted in a large enough increase in retained catch to alleviate concerns over uncaught portions of the swordfish and BFT quotas. NMFS may consider changes to the current time/area closures depending on the results of the circle hook analyses, the 2006 ICCAT stock assessments (BFT, swordfish, and billfish), and protected species interaction rates, and criteria preferred in a future rulemaking.

*Madison-Swanson/Steamboat Lumps*

Comment 17: NMFS received contrasting comments regarding preferred alternative B4 (implement complementary HMS management measure in Madison-Swanson and Steamboat Lumps Marine Reserves*)* including: I support preferred alternative B4 and the maintenance of the existing closures; the Agency appears to be acting positively on the Gulf of Mexico Fishery Management Council's request for complementary closures; I support this alternative even though this will have virtually no significant impact on HMS fisheries because the area is so small; I support alternative B4 because it will make enforcement easier; we support alternative B4 with the following edit, "Maintain existing time/area closures and implement complementary…November through April (6 months) – Preferred Alternative"; and we do not support complementary closures with Madison-Swanson and Steamboat Lumps - the PLL industry has had to withstand numerous stringent measures in recent years and cannot withstand any additional closures.

Response: NMFS is implementing alternative B4, complementary HMS management measures for the Madison-Swanson and Steamboat Lumps Marine Reserves, at the request of the Gulf of Mexico Fishery Management Council. These closures were designed primarily to provide protection for spawning aggregations of gag grouper and other Gulf reef species. Similar management measures are already in effect for holders of southeast regional permits. The complementary HMS management measures would close any potential loopholes by extending the closure regulations to all other vessels that could potentially fish in the areas. As a result, this action is expected to improve the enforcement of the Madison-Swanson and Steamboat Lumps Marine Reserves. Only minor impacts on HMS fisheries, including the PLL fishery, are anticipated because the marine reserves are relatively small, and little HMS fishing effort has been reported in these areas. The suggested edit to the title of this alternative is appreciated, but is not necessary because the existing closures will remain in effect by default, absent additional action to remove or modify them.

*Criteria/Threshold/Baseline*

Comment 18: NMFS received several comments on using the criteria on current closures including: NMFS should have created these criteria when establishing the closed area off NC - NMFS then could have modified the economic impacts to the NC directed shark fishermen by having flexibility to reduce the time and area of the current closed area; and all existing closed areas should be immediately re-evaluated in terms of the new criteria.

Response: NMFS used many of the criteria when establishing the current time/area closures. NMFS currently prefers the criteria alternative in order to clarify the process and allow constituents to see what NMFS would consider before implementing new or modifying current time/areas closures. In addition, in this rulemaking, NMFS evaluated the impacts of most of the current time/area closures in the No Action alternative, B1, and the impacts of modifying four current time/area closures. Thus, NMFS has already re-evaluated some of the current time/area closures using the criteria. Once the criteria are implemented, NMFS would continue using them in future rulemakings. The only time/area closure that was not re-evaluated during this rulemaking was the mid-Atlantic shark closure off North Carolina. NMFS did not re-evaluate this closure because, as described in the response to a petition for rulemaking from the State of North Carolina (October 21, 2005, 70 FR 61286), the closure became effective in January 2005, and NMFS did not have any additional information on which to reevaluate the conclusions of the rulemaking that established the closure (December 24, 2003, 68 FR 74746). However, when NMFS established the mid-Atlantic shark time/area closure, the Agency considered the social and economic impacts on directed shark fishermen, while also balancing reductions in the catch of juvenile sandbar sharks, the bycatch of prohibited dusky sharks, and the quota throughout the entire large coastal shark fishery. As described in this rulemaking and in previous rulemakings, the primary goals of time/area closures are to maximize the reduction of bycatch of non-target and protected species while minimizing the reduction in the catch of retained species. NMFS believes that the mid-Atlantic shark closure should accomplish these goals even though there may be negative economic impacts as a result of that closure. Once the results of the ongoing LCS and dusky shark stock assessment are finalized, NMFS may consider if changes in any management measures regarding LCS, including dusky sharks, are appropriate, and may reconsider the mid-Atlantic closed area using the criteria listed in the preferred alternative.

Comment 19: NMFS received several comments regarding research and closed areas including: NMFS should support additional research to determine where other closed areas should be placed; research to collect data for use in establishing such criteria should be done in open areas to the maximum extent possible; and there must be overwhelming reason to pay fishermen to use illegal gear in a closed area in the name of research (while still being able to sell their catch) when such studies could just as easily be performed in vast areas of the oceans where it is legal to fish in that manner.

Response: NMFS supports research to determine how changes in fishing gear and/or fishing practices can reduce bycatch. Research in closed areas to test how changes in fishing gear and/or fishing practices may reduce bycatch is particularly important. Due to the spatial and temporal variability of HMS and species that HMS interact with, the results of experiments in open areas may not be applicable to closed areas. Oftentimes, these areas are "hot spots" and were closed because they are areas where there are high congregations of HMS or other species.

The congregations usually occur along bathymetric contour lines or areas where currents interact. In order to scientifically test if a certain change in the gear would result in a significant reduction in bycatch, scientists may need to be in areas where there is a high degree of certainty that the gear will interact with the bycatch species. Testing for bycatch reductions in areas where there is little to no bycatch likely would require more resources, in terms of money, fishermen, and time than in areas that are considered "hot spots." Scientists do conduct preliminary tests in open areas to ensure that the change in gear or fishing method could work but may need to be allowed access to the closed areas at some point in order to be certain that the change works. Therefore, in order to understand how technological advances in bycatch reduction would operate in closed areas, research would likely need to be conducted in closed areas. Otherwise, NMFS could reopen such areas in light of technological advances in bycatch reduction and not see the expected reduction rates in bycatch, or potentially see an increase in bycatch rates in these once closed areas.

Comment 20: NMFS received comments regarding the specific criteria that NMFS should consider when examining potential area closures including: the criteria should include the status of the stock in each area under consideration; the set of criteria should include bycatch baselines, targets, reduction timetables, and consider impacts on all HMS, with an emphasis on overfished species; what percent reduction in discards is required to implement a time/area closure, and on what basis is this threshold determined? What is the threshold the Agency is trying to achieve? There are no standards. Was a target bycatch reduction level identified? The Agency should quantitatively use an optimization model to combine areas to achieve the optimum benefit; these criteria should be developed in a workshop of managers, scientists, and stakeholders to ensure their success; the discussion of how specific criteria would be developed, reviewed, and authorized is vague; and the criteria seem overall to restrict NMFS' use of discretion in using closed areas as part of a comprehensive strategy to reduce bycatch and ensure sustainable ecosystems. NMFS should preserve the availability of the greatest range of options to address its fisheries management, protected resources, and marine ecosystem conservation responsibilities.

Response: NMFS already considers the status of the stocks when implementing time/area closures. Closed areas like the Northeastern United States closed area, the mid-Atlantic shark closed area, and the Northeast Distant closed area were all implemented to address specific overfished or protected species. The other closed areas, while implemented to reduce bycatch in general, also considered the status of the stocks before implementation. Establishing pre-determined thresholds or target reduction goals for specific species, as requested in the comment, is inappropriate because it does not consider the impact on the remaining portion of the catch. NMFS stated this in response to comments on the rulemaking that implemented the East Florida Coast, the DeSoto Canyon, and the Charleston Bump closures, and continues to believe the statement is valid. Consideration of the overall catch is critical when implementing a multispecies or ecosystem-based approach to management. Furthermore, while the Magnuson-Stevens Act provides NMFS the authority to manage all species, NMFS must balance the impacts of management measures on all managed species and may not choose protections for one species to the detriment of protected and overfished species (*e.g.*, NMFS may not choose to protect BFT even if sea turtle interactions or bycatch of overfished species may increase substantially). National Standard 1, which requires NMFS to prevent overfishing while achieving on a continuing basis, the optimum yield from each fishery for the United States fishing industry, clearly applies to all species and all fisheries. Similarly, National Standard 9, which requires NMFS to minimize bycatch and bycatch mortality to the extent practicable, applies to all species and fisheries. By not choosing a specific threshold or establishing a decision matrix, NMFS retains the flexibility to balance the needs of all the species encountered and the fishery as a whole. If NMFS is given a specific goal (*e.g.*, a jeopardy conclusion regarding the PLL fishery and leatherback sea turtles), this flexibility allows NMFS to close certain areas or take other actions to protect that specific species while also protecting, to the extent practicable, the other species and the rest of the fishery. Without this flexibility, NMFS might potentially have to implement more restrictive measures to protect one species causing potential cascade effects (*e.g.*, closing one area may increase the bycatch of another species, which could result in closing another area, etc.). This approach also provides NMFS with the flexibility to re-examine the need for existing closures and modify them appropriately based on the analyses rather than the attainment of a specific goal (*e.g.*, NMFS would not have to wait for 30 percent reduction in bycatch to be met; it could open the closure at 25 percent, depending on the result of reducing bycatch of other species or other considerations, as appropriate). The present criteria do not preclude NMFS from considering the establishment of a decision matrix in the future if such a matrix could be designed that would provide for the flexibility to consider all the species involved. This may be more appropriate when NMFS has a longer temporal dataset on the simultaneous effect of circle hooks and the current time/closures. At this time, NMFS believes that the criteria contained in the preferred alternative B5 would provide the guidance needed, consistent with the Magnuson-Stevens Act and this FMP, to help NMFS make the appropriate decisions regarding the use of time/area closures in HMS fisheries. NMFS developed such criteria as a way to help make the overall process of implementing and/or modifying current time/area closures more transparent, not more vague. The criteria themselves are a list of the issues that NMFS would consider when devising or modifying time/area closures. The criteria listed in the preferred alternative are what NMFS would consider for new or modified time/area closures. While NMFS did not hold a workshop on these criteria, these criteria were considered by multiple stakeholders during the scoping and public comment period for this rule and refined, as appropriate.

<u>Comment 21</u>: NMFS received many comments regarding the use of criteria to open or modify closed areas. These comments included: criteria are needed to allow for modifications of the closed areas; I cannot support the preferred alternative B5, area closure framework alternative, because it could allow NMFS to open existing closures; changes to existing closed areas must, at a minimum, be conservation neutral; we need a mechanism to open or modify closed areas. The present closures appear to be larger or different from necessary. To go through an entire regulatory process to change or eliminate them takes too long and is too costly to both the government and the fishery.

<u>Response</u>: NMFS already has the authority to modify current closed areas once NMFS determines that a closed area has met its original management goal. The existing time/area closures were not meant to be permanent closures. Rather, each closure was implemented with a specific management goal(s) in mind. Once those goals are met, NMFS may decide to modify or remove the time/area closure. Through the implementation of the criteria, and using the appropriate analyses, NMFS would be able to modify current time/area closures in a more timely

manner and transparent process. No changes were made to existing time/area closures at this time because such modifications could potentially result in bycatch of non-target HMS and protected resources, such as sea turtles. However, once NMFS better understands the effects of circle hooks, which were implemented fleet-wide in mid-2004, on all species, NMFS may consider modifying the current time/area closures. Such modifications would need to be either conservation neutral or positive.

Comment 22: Since the East Florida Coast, Charleston Bump, and DeSoto Canyon closures went into effect, bycatch and fishing effort has been reduced. Those three closures achieved a greater than predicted reduction in bycatch. NMFS should use the year before the closures went into effect as a baseline to determine what the existing management measures have produced, rather than taking additional actions and expecting the bycatch to continually diminish. NMFS could modify closures and allow increases in bycatch up to the reductions expected as a result of the analyses that closed those areas. This would reduce the economic impacts on fishermen.

Response: NMFS agrees that the current closures reduced bycatch of most species to levels greater than those predicted by the analyses in the rulemaking that closed the areas. NMFS used data just prior to the implementation of these closures (*i.e.*, logbook data from 1997 – 1999) because the Agency felt this time series best represented the status of the stocks at the time the closures were implemented. NMFS considered modifications to these areas in this rulemaking. However, the current analyses indicated that bycatch of some species, such as marlin and sea turtles, could increase as a result of those modifications. Given the status of marlin and the jeopardy finding on leatherback sea turtles, NMFS believes that increases in bycatch of those species is not appropriate. Additionally, the analyses in this rulemaking are based on mostly J-hook data, which are no longer in use in the fishery. NMFS will continue to monitor the effectiveness of the closures and may consider modifications in the future, particularly as the amount of circle hook data increases.

*Fleet Mobility/Redistribution of Effort*

Comment 23: NMFS received several comments regarding the mobility of the fleet. These comments included: I do not believe that effort will move to the Atlantic from the Gulf of Mexico - commercial fishermen would rather stay home and move to fishing for another species; longline vessels are tied to communities; given rising fuel prices, an increase in long distance relocation seems unlikely; NMFS states that Vietnamese fishermen are reluctant to fish outside the Gulf of Mexico and uses this statement to conduct a separate analysis specific to the Gulf of Mexico. This thought process was inexplicitly applied to the analysis for only one alternative for the Gulf of Mexico. It should be applied to all; how does the 2001 NMFS VMS study support conducting a fleet-wide analysis when the majority of effort is in or adjacent to the homeport fishing area?

Response: To determine fleet mobility, NMFS relied on a 2001 report submitted to the U.S. District Court in response to a lawsuit filed by the fishing industry against NMFS for implementing the vessel monitoring system (VMS) requirement. That document indicated that fishermen were as likely to fish in areas away from their homeport as in areas immediately adjacent to their homeport, even without the added pressure of a closure in an area adjacent to their homeport. In addition, in the Draft HMS FMP, NMFS conducted a separate analysis for alternative B2(a), which limited the redistribution of effort in the Gulf of Mexico only because B2(a) was the smallest of the three closures considered in the Gulf of Mexico and represents the most likely case in which fishermen would stay in the Gulf of Mexico. Since there would still be open areas left to fish in the Gulf of Mexico during this period (May through November), fishermen may turn to those areas rather than move out of the Gulf and into the Atlantic. In addition, NMFS recognized that Vietnamese fishermen are reluctant to fish outside of the Gulf of Mexico, especially for a small time/area closure. Such limited redistribution of effort was not appropriate for other closures in the Gulf of Mexico based on their size and temporal duration.

However, NMFS further analyzed fleet mobility in the current rulemaking by examining logbook data from 2001 – 2004 (this included only the first six months of 2004 to include only J-hook data) to determine the amount of movement of vessels along the Atlantic coast and in the Gulf of Mexico. The data indicated that there was movement of vessels out of the Gulf of Mexico, and that vessels sometimes fished as far away as the central Atlantic. Similarly, in the Atlantic, there were vessels that fished in areas far from their homeports, although movement from the Atlantic into the Gulf of Mexico was minimal. Additionally, there were no physical differences in terms of length or horsepower between vessels that fished inside or outside the Gulf of Mexico. Thus, NMFS concluded that HMS vessels continue to be highly mobile, are capable of fishing in areas distant from their homeports, and that the closure analyses would need to take into account the potential for redistribution of fishing effort, particularly for a potentially large closure such as B2(c) in the Gulf of Mexico. Based on this additional analysis of fleet mobility, NMFS considered different scenarios of redistributed of effort for alternatives B2(a), B2(b), and B2(c), where each scenario had different assumptions regarding where effort would be redistributed based on the current fleet's movement. However, NMFS recognizes that the cost of fuel and other supplies may limit the movement of the pelagic fleet.

Comment 24: NMFS received comments regarding the redistribution of fishing effort model used to analyze the time/area closure alternatives. Comments included: Does the model assume random distribution to other fishing grounds?; how does the redistribution of effort model result in more bycatch?; how does the redistribution of effort model work with circle hooks?; the model is based on discard rates, which implies some mortality.

Response: NMFS considered a broad range of time/area closure alternatives that estimated potential bycatch with and without redistribution of fishing effort. Considering the impacts of closures with and without redistribution of effort provides NMFS with the potential range for which changes in catch could occur as a result of the closure(s). One end of the range assumes that all fishing effort within a given closed area would be eliminated (*i.e.*, fishermen who fished in the closed area would stop fishing for the duration of the closure). Thus, the number and percent reduction in catch of both non-target and target species in these analyses represents the highest possible expected reduction. This would also represent the greatest negative social and economic impact that is anticipated for the industry. The other end of the spectrum assumes that all fishing effort in a closed area would be distributed to open areas (*i.e.*, fishermen would continue fishing in surrounding open areas, move their business, or sell their permits).

Rather than random redistribution, the full redistribution model calculates resulting catch of target and non-target species by multiplying the effort that is being redistributed due to the closure by the CPUE for each species in all remaining open areas. This amount is then subtracted from the estimated reduction inside the closed area (for a complete description of the methodology used for redistribution of effort, please see Appendix A of the Final HMS FMP.) This end of the continuum would be expected to provide the least amount of bycatch reduction for a given closure, depending on the CPUE of each species in all remaining open areas. Often times, this model provides mixed results regarding the ecological, economic, and social impacts because HMS and protected species are not uniformly distributed throughout the ocean and tend to occur in higher concentrations in certain areas. Therefore, a closure in one area might reduce the bycatch of one or two species, but may increase bycatch of others. An increase in bycatch for a particular species occurs if that species is more abundant or more frequently caught (*i.e.*, higher CPUE) in areas outside of the closed area. For example, the analyses indicate that a closure in the central Gulf of Mexico could reduce BFT and leatherback sea turtle discards because CPUE for those species is higher in the Gulf of Mexico than along the eastern seaboard. However, such a closure result in an increase in sailfish, spearfish, and large coastal shark discards because the CPUE for those species is higher outside the Gulf of Mexico. In reality, the actual result is expected to be between the results obtained from these two different considerations of redistributed effort. In addition, NMFS combined dead and live discards in these analyses, so mortality is accounted for in terms of discards. Given the number of species that NMFS had to consider, there was no single closure or combination of closures that resulted in a reduction of bycatch of all species considered. The data analyzed in the Draft FMP (2001 – 2003) and additional analyses in the Final FMP (2001 – 2004, including the first six months of 2004 only) did not include circle hook data. The implementation of the circle hook requirement in June 2004 resulted in a change to the baseline. NMFS needs to fully analyze the circle hook data to determine the extent of bycatch reduction and the effects of post-release mortality resulting from this new gear requirement.

Comment 25: How is NMFS going to address the peer review comments that found fault with the effort redistribution model?

Response: Not all of the peer reviewers found fault with the redistribution of effort analysis. For example, one peer reviewer made the following comment:

The time area closure model is based on generally accepted principles in fisheries science. In general such models rely on a set of assumptions related to static patterns of relative abundance at some temporal and spatial resolution, limited consideration of fish movements, and incomplete understanding of the effects of closure areas on redistribution of fishing effort. Nonetheless, such models can provide useful insights for comparisons of alternative management strategies. This is the approach taken within this Draft EIS. Twelve combinations of seasonal and spatial closures are evaluated in Section 4.1.2. Without such a model there would be no pragmatic way of comparing the proposed closed areas. In general it is probably safe to assume that the limitations of the model will be comparable across alternatives. Thus the rankings of each alternative should be relatively insensitive to the assumptions.

However, in response to another peer reviewer's comment that NMFS test assumptions and consider other plausible alternatives to the random effort redistribution model, NMFS evaluated different scenarios of redistributed effort that had different assumptions regarding where effort would be redistributed in the Final FMP, including redistribution of effort in the Gulf of Mexico only for closures in the Gulf of Mexico, redistribution of effort in the Atlantic only for a closure in the Atlantic, and redistribution of effort in the Gulf of Mexico and the Atlantic for closures in the Gulf of Mexico. These scenarios were based on an analysis of the movement of fishing effort out of the Gulf and into the Atlantic. In order to perform this last analysis, NMFS examined logbooks from 2001 – 2004 and tracked the movement of vessels out of the Gulf of Mexico into different areas of the Atlantic. By examining the movement of effort between the Gulf of Mexico and the Atlantic, NMFS was able to modify the existing full redistribution of effort model and apply different proportions of effort to the average CPUEs of species in the different areas. Using these additional analyses, NMFS could ask different questions about the assumptions of the existing model (*e.g.*, should all fishing effort from a closed area be distributed to all open areas or redistributed only within remaining open areas of the Gulf of Mexico?).

Comment 26: The random redistribution of effort model weighs nearby and distant areas equally. This may artificially emphasize distant areas where bycatch rates are higher, and may result in unlikely assumptions about how the effort will shift. This model suggests that Gulf of Mexico vessels are mobile and might fish as far away as Florida but does not suggest that effort is distributed randomly or that significant effort would be displaced to the Northeast. To close or not close an area based on random redistribution of effort is not reasonable. We are concerned about the model given the fact that the data clearly show where concentrations of marlin are caught.

Response: As described above, the method used to calculate redistribution of effort and the resulting catch of target and non-target species is to multiply the effort that is being redistributed by the average catch rate (CPUE) for each species in all remaining open areas, and subtract it from the estimated reduction inside the closed area (for a complete description of the methodology used for redistribution of effort, please see Appendix A of the Final FMP.) In some cases, depending upon the average CPUE in open areas, this approach may emphasize distant areas where bycatch rates may be higher. However, in other cases, low bycatch rates in distant areas would not be a factor. For example, a small closure such as B2(a) in the central Gulf of Mexico might result in fishing effort being displaced into areas immediately adjacent to and surrounding the closed area. NMFS tried to take this into account by analyzing redistribution of effort only in the Gulf of Mexico for alternative B2(a). For larger closures in the Gulf of Mexico such as alternative B2(c), NMFS considered redistribution of effort in the Gulf of Mexico and Atlantic based on known movement of fishing vessels and effort into areas of the Atlantic. Finally, for a closure such as B2(b) located in the Atlantic, NMFS considered redistribution of effort in open areas of the Atlantic only. In all cases, NMFS considered the results of both no redistribution of effort and the full redistribution of effort model and assumed that the actual result of the closure would be somewhere between the results of the two scenarios.

Comment 27: NMFS needs a probabilistic model for effort redistribution that considers things such as the history of effort.

Response: NMFS is aware of other models that have investigated redistribution of effort as a result of time/area closures (*i.e.*, random utility models (RUMs) used for the Hawaiian PLL fishery, and a closed area model used by the New England Fishery Management Council (NEFMC) to evaluate closures for the groundfish fishery). These types of models are econometric models, which predict where fishermen will reallocate effort based on maximizing revenues and/or profits. However, these models were not designed to be used for the current HMS PLL fishery, and in order for either framework to be applicable to a time/area analysis for the Atlantic HMS PLL fishery, NMFS would have to develop a specific model for the PLL fleet based the current economics, fishing grounds, and fishing effort of the Atlantic HMS PLL fleet. Development of such a model would require considerable additional investment, time, and effort. At present, NMFS has not developed a probabilistic model that considers the history of effort or other complicating factors (*i.e.*, trip costs, revenues or profits). Prior to developing such a model, NMFS would need to consider the limitations of the Agency, both financially and logistically, to build such a model and the approach the Agency should take. For example, despite the fairly straightforward model used in this rulemaking and previous time/area rulemakings, to calculate redistribution of fishing effort, many commenters found the procedure confusing or misunderstood the approach and results. This confusion could become even worse if a more complicated model were used. Some models require substantial capital investment for the Agency, years to develop, and years of testing before they can be used. Nevertheless, NMFS sees the benefits to improving the models used to analyze the impacts of time/area closures and is considering different options.

Comment 28: NMFS has applied the redistribution model beyond its usefulness because the model does not describe where the vessels are likely to go. NMFS places an overemphasis on the dangers of redistribution of effort instead of making balanced recommendations based on both the lower and upper estimates of the model.

Response: NMFS disagrees that the redistribution model has been applied beyond its usefulness. It is highly unlikely that NMFS could develop a perfect model that accurately predicts fishing behavior. The redistribution of effort model is useful in providing one end of a range of potential outcomes resulting from new closures. NMFS does not overemphasize the dangers of redistribution of effort, but rather considers it likely that fishing effort may be displaced into open areas and that there may be some increase in bycatch as a result. This is not highly speculative, but rather based on quantitative assessments of fishing effort, bycatch rates, and resulting ecological impacts. For instance, there was an increase in fishing effort in the open areas in the Gulf of Mexico after the implementation of the existing closures, which suggests that fishing effort will be displaced to other areas. Furthermore, NMFS does not believe that fishing effort that occurred historically within an area would be completely eliminated with a new closure.

Comment 29: NMFS received comments regarding effort shifts in the Gulf of Mexico including: effort shifts have not occurred in the Gulf of Mexico as predicted for other species; vessels may be offloading in different ports but still in the Gulf of Mexico; and the assumption that vessels would move out of the Gulf of Mexico and catch BFT, particularly spawning western BFT, is unlikely.

Response: While there has been an overall decrease in fishing effort since implementation of the closures in 2000 – 2001, NMFS has seen evidence of an increase in effort in the Gulf of Mexico during 2001 – 2004, possibly as a result of the East Florida Coast closure implemented in 2001, which forced fishermen who originally fished in the east coast of Florida into the Gulf of Mexico. The difference between closures implemented in 2000 and the closures being considered in this FMP is that many of the areas of high bycatch were targeted for closures in 2000 and remain closed today. NMFS is now analyzing an additional series of closures that may not produce the same tangible results that occurred after the first round of closures. Additionally, as the areas open to fishermen become more restricted, fishing effort will tend to become more and more concentrated in smaller and smaller areas where even low bycatch rates may result in increases in bycatch due to the high effort levels. Some of the closures considered in this rulemaking such as alternatives B2(c) and B2(d) would close very large portions of the Gulf of Mexico where approximately 90 percent of the historic fishing effort in the Gulf has occurred. Closing such a large area in the Gulf of Mexico would be unprecedented, and predicting the outcome would likewise be difficult. It should be noted that while the NED closure was just as large as some of the closures proposed in this rulemaking, the closures proposed in this rulemaking are closer to land and more accessible to vessels. However, NMFS disagrees with the comment that vessels would be unlikely to move out of the Gulf of Mexico in response to such an unprecedented large closure. The analyses indicate that fishermen currently homeported in the Gulf of Mexico move out of the Gulf of Mexico into the Atlantic even without the added incentive of a closure. Even in the highly unlikely event that fishermen did not move out of the Gulf of Mexico in response to a closure, the economic impact could force them to sell their permits to fishermen in the Atlantic, thereby increasing fishing effort in those areas. The redistribution of effort analysis in the FMP would take this into account.

Comment 30: NMFS received many comments regarding where effort would be redistributed including: the model fails to consider redistribution of effort from one fishing gear to another (*e.g.*, longline to gillnet); the model inappropriately predicts spatially heterogeneous increases in regional fishing effort and bycatch; NMFS should acknowledge the limitations of the model when selecting the final alternatives and base predictions about redistribution of effort on credible, transparent sources and peer-reviewed literature or on comparisons to the outcomes of previous time/area closures; and NMFS initially argued that there would not be a displacement of effort if closures were implemented, but now is arguing the opposite.

Response: While the redistribution of effort model does not explicitly take into account the potential for fishermen to shift from one gear to another, NMFS has discussed a number of unintended consequences that could result from new closures, including fishermen selling their permits, moving to other areas, and possibly switching gears to target other species. However, given the limited access restrictions of permits for other fisheries, NMFS predicts that it would be difficult for fishermen to switch to a different gear and different fisheries unless they currently possess other permits. NMFS continues to acknowledge the limitations of the redistribution of effort model, and has made an attempt to consider and analyze other plausible alternatives to the current redistribution scenario. NMFS considered both the redistribution of effort model and results from considering no redistribution of effort since the first closure for HMS fishermen was implemented in 1999. In none of the rules that implemented time/area closures did NMFS argue that there would be no displacement of effort. To the contrary, NMFS has consistently taken both scenarios into account when considering new or additional closures.

*Data Concerns*

Comment 31: Does the recent article in the journal "Nature" regarding BFT spawning, which indicated that discards are being underestimated, affect NMFS assumptions about the benefits (and costs) of the proposed time/area closures? Does NMFS have any data indicating that bycatch rates are significantly lower than those recorded by the scientific observers?

Response: NMFS is aware that discards may be underreported in the HMS logbook data compared to the POP data. However, NMFS tested to see if there were any differences in underreporting for different species between different regions. If no differences in underreporting occurred between regions, then the relative effect of each closure on bycatch reduction for each species should be comparable across alternatives. Cramer (2000) compared dead discards from HMS logbook and POP data. In her paper, Cramer used POP data to estimate dead discards of undersized swordfish, sailfish, white and blue marlin, and pelagic sharks from the PLL fishery operating in the U.S. Atlantic, Caribbean, and Gulf of Mexico. She also provided the ratio of catch estimated from the POP data divided by the reported catch in the HMS logbooks. This ratio indicates the amount of underreporting for different species in a given area. NMFS analyzed these ratios to test whether underreporting varied for different species in different parts of the Atlantic, Caribbean, and Gulf of Mexico. NMFS found that there was no statistical difference in the ratio of estimated catch versus reported catch for undersized swordfish, pelagic sharks, sailfish, or white or blue marlin in the Atlantic, Caribbean, or Gulf of Mexico. Based on the available information, NMFS believes HMS logbooks may underestimate the amount of bycatch, however, the relative effect of each closure for each species should be comparable across alternatives. While the data used in the Cramer (2000) study represented an earlier time period (1997 – 1998) compared to the 2001 – 2003 data used here, it gives some indication that the use of HMS logbook data over POP data should not invalidate or bias the results of the time/area analyses. NMFS will continue to investigate potential differences in reporting between HMS logbook and POP data for all discarded species as well as potential biases in reporting between geographical areas for different species.

Comment 32: NMFS should use the observed sea turtle CPUE by season for each region and multiply it by the amount of effort anticipated to return to that particular area in order to obtain a more accurate assessment of changes to sea turtle bycatch.

Response: NMFS chose to use HMS logbook data for all the analyses to maintain consistency among the alternatives and species. If NMFS were to have used the POP data for all of the species, NMFS would have had to calculate extrapolated takes for all the species considered. This extrapolation would have introduced more assumptions and uncertainty than using HMS logbook data to analyze the potential impacts of time/area closures. As mentioned in the response to Comment 31, NMFS found that HMS logbooks may underestimate the amount of bycatch, however, the relative effect of each closure for each species should be comparable across alternatives. The analyses conducted in this rulemaking (and described in the response to Comment 31) give some indication that the use of HMS logbook data over POP data should not invalidate or bias the results of the time/area analyses. NMFS will continue to investigate potential differences in reporting between HMS logbook and POP data for all discarded species.

Comment 33: How did NMFS conduct the overlap analysis comparing effects of bycatch on BFT, marlin, and sea turtles?

Response: NMFS analyzed the distribution of white marlin, BFT, leatherback and loggerhead sea turtles, as well as a number of other species from the 2001 – 2003 HMS logbook and POP data using GIS. Data for each of the species were mapped and compared spatially to one another in order to select the areas of highest concentration of bycatch. The areas of highest concentrations of bycatch for all species were then selected for further analysis. NMFS provided maps of bycatch for individual species in the Draft HMS FMP, and has provided a map showing the overlap of BFT, white marlin, and sea turtles in the Final HMS FMP. NMFS combined the bycatch data from the HMS logbook for BFT, white marlin, and sea turtles into one combined dataset, and then joined them to a 10 x 10 minute grid (which is equivalent to approximately 100 $nm^2$) to get the number of discards for all species combined per 100 $nm^2$. A color scale is included to show the number of observations per 100 $nm^2$. The maps show the areas of highest bycatch for the three species combined. Monthly interactions for the different species (*i.e.*, temporal variability) were considered in the redistribution of effort analyses.

Comment 34: NMFS should consider increasing observer coverage throughout the longline fleet to document unintended bycatch.

Response: NMFS' target for PLL observer coverage is eight percent. This is based on the recommendation from the National Bycatch Report that found coverage of eight percent would yield statistical analyses of protected resources that would result in coefficient of variance estimates that were below 30 percent.

Comment 35: Available evidence suggests that leatherbacks, loggerheads, and BFT may share similar hot spots in the Gulf of Mexico, thus closures could be beneficial to all species – despite the opposite conclusion in the Draft HMS FMP.

Response: Pelagic logbook data also showed areas in the Gulf of Mexico where leatherbacks, loggerheads and BFT have been present. NMFS considered closures in the Gulf of Mexico for white marlin, blue marlin, sailfish, spearfish, leatherback sea turtles, loggerhead sea turtles, other sea turtles, pelagic and large coastal sharks, swordfish, BFT, bigeye, albacore, yellowfin, and skipjack tunas (BAYS). However, no single closure or combination of closures would reduce the bycatch of all species considered, and in certain cases resulted in increases of bycatch for some species with the consideration of redistribution of effort.

*Pelagic longline*

Comment 36: NMFS received several comments regarding alternative B7, the prohibition of PLL gear. These comments included: we oppose any rule that would allow the further use or experimentation of such gear, and support alternative B7, prohibit the use of PLL gear in HMS fisheries and areas (this alternative would save the fishery if buoy gear was also prohibited);

NMFS needs to look at data prior to the introduction of PLL gear in relation to the decline of billfish; and this should be about the gear, not the fishermen - PLL gear does not work.

Response: NMFS has not preferred alternative B7 at this time because while prohibiting the use of PLL gear would eliminate bycatch associated with that gear, it would also eliminate retained catch of swordfish and tuna. Elimination of this retained catch would result in substantial negative social and economic impacts. Under ATCA, the United States cannot implement measures that have the effect of raising or lowering quotas, although NMFS has the ability to change the allocation of that quota among different user groups. The swordfish fishery is confined, by regulation, to three gear types: harpoon, longline, and handlines. Under preferred alternative H5, the commercial swordfish fishery would also be authorized to use buoy gear. Since it is unlikely that the handgear sector would be able to catch the quota given the size distribution of the stock, prohibiting longline gear may reduce the ability of U.S. fishermen to harvest the full quota. It may also have the effect of reducing traditional participation in the swordfish fishery by U.S. vessels relative to the foreign competitors because the United States would harvest a vastly reduced proportion of the overall quota.

In addition, any ecological benefits may be lost if ICCAT reallocates U.S. quota to other countries that may not implement comparable bycatch reduction measures as the United States. The PLL fishery has undergone many management measures to reduce bycatch including circle hooks implementation, live bait restrictions in the Gulf of Mexico, no targeted catch of billfish and BFT, time/area closures, and safe handling and release protocols for protected resources. These restrictions have been successful. Methods that have been employed and designed by U.S. PLL fishermen, such as circle hooks and safe handling and release protocols for protected resources, are being transferred around the world to reduce bycatch world-wide. Therefore, this alternative could ultimately provide support for the fisheries of other countries that do not implement or research conservation and bycatch reduction measures to the same extent that the United States does.

Comment 37: NMFS needs to consider the adverse economic impact of existing time/area closures on the commercial longline fishery. The PLL fleet was reduced to approximately 88 vessels due to existing restrictions. The current high cost of fuel is severely impacting the PLL fleet, and recent hurricanes may have further reduced the fleet.

Response: NMFS evaluated the effect of current time/area closures on the PLL fleet in the No Action alternative, B1. While the closures have had a positive impact on bycatch, they have also had a negative impact on retained species landings. For example, from 1997 to 2003, the number of swordfish kept declined by nearly 28 percent, the number of yellowfin tuna kept declined by 23.5 percent, and the total number of BAYS kept (including yellowfin tuna) declined by 25.1 percent. Overall effort in the Atlantic PLL fishery, based on reported number of hooks set, declined by 15 percent during the pre- to post-closure period. NMFS acknowledges that one reason for this decline may be that fishermen left the fishery as a result of time/area closures. In addition, NMFS realizes that other factors, which are out of NMFS' control, such as hurricanes and fuel prices, have negatively impacted the PLL fishery. This is one reason why NMFS is not preferring any new time/area closures, except for Madison-Swanson and Steamboat Lumps, at this time. Rather, NMFS intends to continue to estimate the current fishing effort and potential recovery of the PLL fleet while also considering protected species and other takes.

Comment 38: Why is NMFS considering additional closures for the PLL fishery when analyses indicate that the original goals of the closures have been met or exceeded? NMFS does not react this way for the BFT fishery. NMFS protects spawning or pre-adult swordfish, exceeding the ICCAT standards, yet promotes full utilization of the BFT angling quota. NMFS must realize that the PLL fishery is not always the highest contributor to mortality, and that other fisheries continue to hide behind their lack of data. NMFS should show recreational data and analyze closures for other gears. The issue is fishing mortality, regardless of where it comes from. NMFS must consider all forms of fishing mortality including post release mortality from catch and release fishing.

Response: As part of its annual review process, NMFS evaluates the effectiveness of existing time/area closures. Analysis of the change in effort and bycatch after implementation of existing closures indicates that reduction in bycatch may have been greater than predicted with redistribution of effort, and in some cases, without redistribution of effort. There are several possible explanations for the higher than predicted decline in bycatch and effort resulting from time/area closures that may have ecological impacts as well as economic repercussions on fishing behavior and the PLL fishing industry: (1) stocks may be declining; (2) time/area closures may have acted synergistically with declining stocks to produce greater declines in catch than predicted; (3) fishermen may have left the fishery; and (4) fishing effort may have been displaced into areas with lower CPUEs. With regard to the last point, the redistribution of effort model is incapable of making predictions based on a declining CPUE. Instead, the model assumes a current CPUE that remains constant in the remaining open areas when estimating reductions. Modifications to the existing closures such as alternatives B3(a) and B3(b) were also considered as ways to refine existing closures so as to provide additional opportunity to harvest legal-sized swordfish while not increasing bycatch. NMFS, however, is currently not preferring any modifications to the current closures for the reasons discussed in response to Comment 15. NMFS agrees that all sources of fishing mortality should be considered in evaluating new and existing management measures. For this reason, circle hooks would be required with natural baits in all billfish tournaments (preferred alternative, E3). Estimated mortality contributions of the domestic PLL and recreational sectors toward Atlantic white marlin can be seen in Appendix C of the Consolidated HMS FMP. NMFS will consider additional information on post release mortality as it becomes available.

Comment 39: NMFS must consider safety. Overly restrictive closed areas force small vessels to stretch beyond their offshore capabilities.

Response: NMFS agrees that safety concerns should be considered when developing any new management measures, consistent with National Standard 10. After carefully reviewing the results of all the different time/areas closures analyses, and in consideration of the many significant factors that have recently affected the domestic PLL fleet, NMFS has decided, at this time, not to prefer any new closures, except the complementary measures in the Madison-Swanson and Steamboat Lumps Marine Reserves. This decision is based primarily upon the analyses indicating that no single closure or combination of closures would reduce the bycatch of all species when the redistribution of effort was considered. Furthermore, the economic impacts of each of the alternatives may be substantial, ranging in losses of up to several million dollars annually, depending upon the alternative, and displacement of a significant number of fishing vessels.

*Bottom Longline*

Comment 40: We support the prohibition of bottom longline gear in the southwest of Key West to protect smalltooth sawfish (alternative B6). This alternative can provide a head-start in reducing sawfish bycatch during the lengthy process of review and implementation of the Smalltooth Sawfish Recovery Plan (SSRP). NMFS should coordinate closely with the Panama City Laboratory and Mote Marine Laboratory to ensure full funding of their proposed research into sawfish critical habitat and act promptly on their recommendations regarding additional time/area closures for the species.

Response: The alternative to close an area off of Key West relied upon a limited amount of Commercial Shark Fishery Observer Program (CSFOP) data, thus making it difficult to determine whether the area being considered would result in overall reduction in interactions, or whether sawfish exhibit a higher degree of mobility, and are as likely to be caught in other areas. Recent information indicates that additional sawfish interactions have occurred outside the proposed area, thus necessitating further review of the most appropriate location for a potential closure. In addition, the Smalltooth Sawfish Recovery team is currently in the process of identifying sawfish critical habitat, which may be helpful in determining an appropriate closure area in the future. NMFS supports this and other efforts to further delineate critical habitat for this endangered species.

Comment 41: NMFS received several comments regarding the bottom longline closed area off North Carolina including: NMFS should comprehensively examine and assess the effectiveness of closures and have the confidence that alterations would not reduce protection for dusky and sandbar sharks; I recommend removing the NC BLL closure and re-analyzing the impacts in the same manner as was done for this document. Displacement was not considered for that closure; and NMFS should change the NC closed area to only be closed out to 15 fathoms maximum depth, and change the time to begin April and continue until July 31 each year. These changes protect juvenile sandbar sharks, keep protections in place for the peak “pupping season,” and balance the needs of the directed shark fishermen whose economic livelihood has been hurt by the Amendment 1 measures.

Response: The bottom longline closed area off North Carolina was implemented in Amendment 1 to the FMP in December 2003, and became effective on January 1, 2005. The time/area closure has only been in place for one complete management period from January 1 to July 31, 2005 (January 1, 2006, marked the start of the second year for the closure). The final, quality controlled 2005 logbook data will become available in early summer 2006, and NMFS will evaluate the impacts of the first period of this closure once this data is available. Otherwise, NMFS does not have any other new information to support removal or modification of the closure to include only those areas inside 15 fathoms along the North Carolina coast. Furthermore, NMFS does not have any data to support the assertion that such a modification or removal of the closure would attain the management goal of protecting prohibited dusky and sandbar sharks. NMFS will consider new information, such as the results of the LCS stock assessment and the newly completed dusky shark stock assessments, to determine whether changes to the time/area closure are appropriate. In addition, NMFS will continue to monitor changes to shark regulations by coastal states and will continue to work with the Atlantic States Marine Fisheries Commission (ASMFC) to develop an interstate shark plan, which may warrant a review of existing Federal regulations and consideration of further changes to the time/area closure. NMFS considered redistribution of fishing effort for the time/area closure off North Carolina in Amendment 1. The redistribution of fishing effort analysis indicated that, despite an increase in fishing effort outside the time/area closure, the overall catch of juvenile sandbar and dusky sharks would be reduced by the time/area closure. The analysis showed that the number of juvenile sandbar and prohibited dusky sharks outside the time/area closure was low compared to the number being caught inside the time/area closure.

*Hook Types*

Comment 42: NMFS received several comments regarding hook types and time/area closures, including: the time/area closure analyses are based on J-hook data, which the Agency has admitted is obsolete. The analyses do not take into account new CPUE or PRM rates based on circle hooks; the impact of the area closures will be larger than predicted because the PLL industry is already using circle hooks; all of NMFS analyses are based on J-hook data and a much larger fleet. Bycatch and bycatch mortality will be further reduced due to the exclusive use of circle hooks in the PLL fishery; NMFS should consider banning all J-hooks and live bait fishing in all areas that are currently closed to PLL fishing.

Response: NMFS used the best scientific information available to analyze the various time/area closure alternatives. Circle hooks were not required in the PLL fishery until July 2004, and all of the data used in the time/area analyses were based on J-hook data. The approach NMFS will take regarding the evaluation of the effects of circle hooks is discussed in the response to Comment 2. An important component of the rationale supporting the Agency's decision not to prefer new time/area closures (notwithstanding Madison-Swanson and Steamboat Lumps) is based upon absence of information regarding the effects of circle hooks on bycatch rates in the PLL fishery.

Similarly, there is an absence of information to analyze the effects of a ban on all J-hooks and live bait fishing in areas that are currently closed to PLL fishing. Some studies are available documenting the effects of circle hooks on certain species (*i.e.*, white marlin), and NMFS is preferring specific, targeted hook requirements in these fisheries to reduce bycatch mortality. However, the effect of circle hooks on other HMS species (*i.e.*, swordfish and sharks) and fisheries is largely unknown. As additional information becomes available, NMFS will assess the need to require circle hooks or to prohibit live bait in other HMS fisheries in areas that are closed to PLL fishing.

*General Time/Area Comments*

Comment 43: NMFS chose to combine some of the closures in the analyses. How were those areas chosen?

Response: NMFS analyzed the combination of areas that had the highest bycatch of certain species in the Gulf of Mexico and the Atlantic to maximize potential bycatch reduction, and to take into account high bycatch for the same species in different areas as described in response to Comment 33. For example, there is high bycatch for BFT in both the Gulf of Mexico and in areas of the Northeast. By combining these two areas, NMFS took into account the fact that, if effort were redistributed, it would not be redistributed into the areas of highest bycatch in a different geographic region.

Comment 44: What is the new process for establishing/modifying closures?

Response: NMFS is not implementing a new process for establishing or modifying HMS time/area closures. Rather, the Agency would identify specific criteria to consider for regulatory framework adjustments to implement new time/area closures or to modify existing time/area closures in the future. These criteria, or combinations of them, have always been considered in establishing time/area closures. The preferred alternative, however, should provide for greater transparency and predictability in the decision making process by clarifying exactly what the Agency is looking for or considering during its analyses. The same criteria would be used for both establishing new closures and modifying existing closures. The preferred alternative to establish criteria to consider would not change the ability of the public to submit a petition for rulemaking to NMFS if they believe that modification to an existing time/area closure or the establishment of a new time/area closure is warranted.

Comment 45: The proposed time/area closure alternatives do not achieve the conservation objectives of the FMP.

Response: NMFS disagrees. There are many objectives in the HMS FMP. All of the objectives must be balanced and considered in their entirety and in consideration of the Magnuson-Stevens Act and other domestic laws when implementing management measures. Some of the objectives are especially relevant to this particular comment. The first objective is to prevent or end overfishing of Atlantic tunas, swordfish, billfish and sharks and adopt the precautionary approach to fishery management. The second objective is to rebuild overfished Atlantic HMS stocks and monitor and control all components of fishing mortality, both directed and incidental, so as to ensure the long-term sustainability of the stocks and promote Atlantic-wide stock recovery to the level where MSY can be supported on a continuing basis. The third objective is to minimize, to the extent practicable, bycatch of living marine resources and the mortality of such bycatch that cannot be avoided in the fisheries for Atlantic HMS or other species, as well as release mortality in the directed billfish fishery. Finally, another objective that is relevant to this comment indicates that NMFS should minimize, to the extent practicable, adverse social and economic impacts on fishing communities and recreational and commercial activities during the transition from overfished fisheries to healthy ones, consistent with ensuring achievement of the other objectives of this plan and with all applicable laws. These objectives clearly indicate that the biological impacts on all HMS species must be considered, as well as the bycatch of all other living marine resources. In addition, NMFS must minimize, to the extent practicable, adverse social and economic impacts on fishing communities and fisheries, while remaining consistent with the other objectives. In selecting the preferred time/area closure alternatives, NMFS has accomplished these objectives.

In this rulemaking, NMFS does not prefer any new closures, except for complementary measures in the Madison-Swanson and Steamboat Lumps Marine Reserves. This decision is based primarily upon the analyses described in the Final HMS FMP indicating that no single closure or combination of closures would reduce the bycatch of all species when considering redistribution of effort. Furthermore, the economic impacts associated with each of the new closure alternatives may be substantial, ranging in losses of up to several million dollars annually, depending upon the alternative, and could result in the displacement of a significant number of fishing vessels. Even when the time/area closure alternatives were combined in an attempt to maximize bycatch reduction, the ecological benefits were minimal at best, with increases in discards of some species. NMFS considered a number of closures based upon analyses with and without the redistribution of fishing effort. The Agency believes it is important to consider redistribution of fishing effort because HMS and protected species are not uniformly distributed throughout the ocean, and they tend to occur in higher concentrations in certain areas. Fishing vessels, which are mobile, can move from one location to another, if necessary, when a closure is implemented. Therefore, a closure in one area might reduce the bycatch of one or two species, but may increase the bycatch of others. NMFS additionally considered alternative approaches to effort redistribution for closures to protect BFT in spawning areas in the Gulf of Mexico. Even using this revised approach, which is described in the Final HMS FMP, it was found that closures in the Gulf of Mexico could still result in an increase in bycatch for some of the species being considered. Based upon these results, and in consideration of other recent significant developments in the PLL fishery (mandatory circle hooks, rising fuel costs, devastating hurricanes, etc.), NMFS believes that not preferring new time/area closures is appropriate and is fully consistent with the objectives of the Consolidated HMS FMP and all applicable law.

Comment 46: If species identification is questionable how can the impacts of closures be analyzed?

Response: NMFS agrees that species identification can be problematic when it comes to large coastal sharks, especially at the dealer level. However, this should not be a problem for evaluating the potential impacts of various time/area closures as large coastal sharks were combined into a single group for the analyses. Identification of other species which achieve legal minimum sizes may be less problematic. Nevertheless, NMFS has used the best available scientific data in this analysis as required by law.

Comment 47: NMFS must consider the turtle take and gear removal data from the first two years of the pelagic longline fishery's three-year ITS. Pursuant to the BiOp, annual take estimates based on POP and effort data are required to be completed by March 15$^{th}$ of each year. Additionally, NMFS should take this opportunity to provide a framework to take corrective actions as recommended by the BiOp

Response: NMFS agrees that changes may have occurred in the PLL fishery since implementation of the circle hook requirement and safe handling and release guidelines in July 2004. Fishery data collected in 2005 will represent the first full year under these requirements. NMFS will continue to evaluate the effectiveness of existing management measures based on current fishing practices. NMFS currently only has finalized logbook data on the catch associated with circle hooks from July through December of 2004. Because circle hooks likely have a significantly different catch rate than J-hooks, further investigation is required to determine the potential impact of any new time/area closures. NMFS anticipates that 2005 HMS final logbook data will become available in the summer of 2006. The Agency will continue to monitor and analyze the effect of circle hooks on catch rates and bycatch reduction as well as assess the cumulative affect of current time/area closures and circle hooks. NMFS has also completed its annual take estimates of sea turtles for both 2004 and 2005 and both loggerhead and leatherback interactions have decreased substantially. During 2005, the first full year under the circle hook requirement, a total of 282 loggerhead and 368 leatherback sea turtles were estimated to have been taken. This represents decreases of 64.8 and 65.8 percent compared to the annual mean for 2000 – 2003 for loggerheads and leatherbacks, respectively. In regard to the framework mechanism recommended by the BiOp, NMFS requested comments on this mechanism and other ways to reduce unanticipated increases in sea turtle takes by the PLL fishery (August 12, 2004, 69 FR 49858). NMFS is considering the comments received and notes that the preferred alternative to establish criteria is a step towards allowing for such proactive measures.

## D.2 Rebuilding and Preventing Overfishing

### D.2.1 Northern Albacore Tuna

Comment 1: NMFS received comments opposed to alternative C2, unilateral reduction in albacore fishing mortality, which indicated such restrictions would only create unnecessary waste and discards. Commenters remarked that the U.S. only weakens its negotiating position by taking unilateral steps prior to ICCAT action. Even prohibiting retention of albacore by all U.S. vessels would have negligible conservation effects. Some commenters stated that the U. S. should go forward ahead of ICCAT and not negotiate our position.

Response: NMFS recognizes the costs associated with imposing restrictions on albacore tuna landings for U. S. fisheries, and at the present time believes that the costs are greater than potential ecological benefits the northern albacore stock as a whole. Restrictions that affect U.S. fishermen solely are not expected to be of significant ecological value to the Atlantic albacore stocks as a whole, as U.S. albacore landings account for less than two percent of the international landings. Furthermore, albacore stock assessment data has been updated but not re-evaluated since 2000. It would not be consistent with ATCA to impose fishing restrictions on this stock in the absence of current data supporting such an action. The Agency therefore prefers to move forward with alternative C3, which would allow the U.S. to build a foundation with ICCAT contracted parties to develop a comprehensive management plan for albacore.

Comment 2: NMFS received comments in opposition to the preferred alternative, including: “the Gulf of Mexico Fishery Management Council is concerned that regulations to rebuild the northern albacore could impact other Gulf fisheries and recommends that no action be taken in the Gulf as part of the United States foundation for the ICCAT rebuilding program, since there is not a substantial albacore catch in the Gulf”; I am leery about any regulations relating to albacore since albacore is an important fishery in Aug-Sept off Long Island; NMFS should set a bag limit of three albacore per person and a minimum size of 27 inches curved fork length now, and perhaps enact a seasonal catch limit as well.

Response: As noted by the SCRS in 2003, trends for CPUE of albacore are stable and possibly increasing for the PLL fleet; however, in the absence of more recent stock assessment data, the Agency believes that no action, or moving forward with a unilateral reduction in U.S. fishing mortality are not consistent with ATCA and are therefore inappropriate alternatives at this time. In alternative C2, NMFS considered the ecological, social and economic impacts of unilateral action. Restrictions that affect U.S. fishermen solely, including the implementation of bag and size limits, or catch limits, are not expected to significantly benefit the Atlantic albacore stocks as a whole, as U.S. albacore landings account for less than two percent of the international landings. NMFS prefers to work with ICCAT to develop an international rebuilding plan for albacore. No immediate restrictions will be imposed on fisheries in the Gulf or elsewhere as NMFS develops the appropriate foundation for such a plan as described in alternative C3. Upon adoption of an ICCAT rebuilding plan, domestic management would be developed in separate rulemaking and Gulf regulations options would be considered at that time.

Comment 3: NMFS received support for the preferred alternative, which entails establishing a foundation at ICCAT for developing an international rebuilding program for albacore. These comments included: The management approach for Northern Albacore is favorable and NMFS should apply this approach to many other domestic fisheries; and we support alternative C3, which would actively encourage ICCAT to develop and implement an international rebuilding plan for albacore tuna. While we support an albacore-rebuilding plan, we do not believe that the U.S. should implement reductions on its albacore fishermen. For meaningful and effective rebuilding of albacore to take place, U.S. managers must be willing to put significant pressure on countries with high fishing mortalities; and, EU countries have felt compelled to ban gillnets in this fishery.

Response: To prevent an ineffective approach to management and impose a unilateral economic burden on U.S. fisheries, and to ensure that international efforts are taken to regulate albacore fishing mortality in attempts to provide a sustainable fishery, the Agency plans to work with ICCAT to develop a rebuilding program for albacore. As current international catch rates exceed the levels needed to produce MSY, NMFS believes that international cooperation is essential and would result in long-term positive ecological impacts on the stock.

Comment 4: NMFS received a number of comments in regard to data that is used to determine the U.S. catch and status of Atlantic albacore, including: We are concerned about the use of survey data for the for-hire sectors of this fishery. A study by Loftus and Stone showed that the LPS data was often a significant underestimate of recreational catches of northern albacore tuna, which supports the need for increased recreational data collection; there is a directed fishery for longfin tuna that catches albacore; this fishery is not important to the GOM but it could affect other GOM fisheries. I think it is important to get data straightened out now rather than after the fact; and, we need better recreational data. The draft FMP did not pay adequate attention to data issues, including looking at a census approach rather than sampling. We need to work with ACCSP to create census data with good quality control.

Response: Adequate data collection is an ongoing concern for successful management of Highly Migratory Species. NMFS funds the Large Pelagic Survey (LPS) which is a sampling based catch data collection program for HMS species. In three states, ME, VA, NC, catch-card and tail-wrap tagging programs are part of the LPS which is making an effort to use the census approach to catch data collection. NMFS is working with managers to include data collection for all HMS species, including Atlantic albacore, through the ACCSP program. In addition the Gulf Council has asked the Gulf Commission to look into statistic and census based data collection programs for HMS in the Gulf of Mexico.

Comment 5: NMFS received comments asking to explain what "establish the foundation with ICCAT…" means in terms of a specific plan. One commenter suggested that the plan needed to be fully developed and explained in the proposed FMP.

Response: If the stock is determined to be overfished during the 2007 assessment, the United States would work with ICCAT to develop a comprehensive international rebuilding plan to be adopted by ICCAT, and that would comply with the Magnuson-Stevens Act. Implementation of the selected alternative would include a thorough analysis of the ICCAT Rebuilding Program to ensure that it includes a specified recovery period, biomass targets, fishing mortality rate limits, and explicit interim milestones expressed in terms of measurable improvement of the stock. Each of these components is necessary to support the objectives of this FMP and the intent of the Magnuson-Stevens Act. An Atlantic-wide TAC for northern albacore tuna, along with other conservation and management measures, would be adopted by ICCAT to rebuild the stock. Upon adoption by ICCAT, domestic management and conservation measures for the United States would be developed in a separate rulemaking.

Comment 6: One commenter asked how the 607 mt quota is to be divided between the commercial and recreational fisheries.

Response: Currently, the U.S. does not have domestic quota for recreational albacore catches, nor are there restrictions on the number of albacore that may be landed by commercial vessels issued an Atlantic tuna permit. Allocation of the quota between commercial and recreational fisheries has not been of concern during recent years as the U.S. harvest has been below the quota allocated by ICCAT. During the last eight years (1997 to 2004), an average of 161.4 mt and 311.4 mt of northern albacore were caught on longlines and rod and reel respectively.

Comment 7: NMFS received a comment that a lot of albacore tuna are seen off New York. The commenter wanted to know how it is that NMFS can conclude they are overfished.

Response: During the last 20 years, the spawning stock biomass of albacore has declined significantly, according to the SCRS. The most recent SCRS stock assessment (reviewed in 2004, using catch at age data from 2003 to update the 2000 assessment) for albacore, indicates that the spawning stock biomass is 30 percent below maximum sustainable yield. A new assessment is anticipated in 2007. According to the MSFCMA, a stock is overfished if the level of fishing mortality is greater than the capacity of that fishery to produce the maximum sustainable yield on a continuing basis. The presence of fish therefore, does not necessarily mean that a stock is not overfished. However, NMFS recognizes the seasonal nature of the albacore fisheries and would take this into account in developing management measures as needed.

### D.2.2 Finetooth Sharks

Comment 1: NMFS received several comments in support of seasonal commercial gillnet fishing restrictions to reduce finetooth shark fishing mortality, including one from the South Atlantic Fishery Management Council. These comments included: If seasons of high finetooth shark landings can be identified from the observer program, landings, or other data, then we suggest closing the small coastal shark fishery during that season for gillnetters, or having shark fishermen move offshore into deeper waters away from where finetooth sharks are typically found; fishing on these schools during pupping season may have significant biological implications; and, the seasonality of finetooth shark pupping should be investigated to determine whether some finetooth shark bycatch is more biologically significant than others.

Response: Seasonal closures of commercial gillnet fisheries landing finetooth shark were not analyzed as part of alternative D2, however, these closures may be considered in the future, as necessary, to reduce fishing mortality. Closing the small coastal shark fishery would not prevent dead discards, or account for finetooth that are landed in other fisheries such as Spanish mackerel. In the Final Consolidated HMS FMP, trips that landed finetooth sharks between 1999 - 2004, according to the Coastal Fisheries Logbook data, were analyzed by gear and month. These data indicate that the number of trips landing finetooth sharks increases in October and November. This could be attributed to finetooth sharks moving in schools southward from the Carolinas to warmer waters off Florida in these months leading to an increase in finetooth landings. Furthermore, there is an expansion of fishing effort targeting Spanish mackerel as these fish are also moving south to Florida in October and November each year, which might also lead to increased landings during this period.

Commercial shark gillnet fishermen are already subject to stringent regulations during October and November including: prohibitions on fishing in state waters of FL, GA, and SC with gillnets longer than 100’, the directed shark gillnet fishery in Federal waters is subject to 100 percent observer coverage and the use of VMS in the vicinity of the Southeast U.S. Restricted Area for north Atlantic right whales between Savannah, GA and Sebastian Inlet, FL; and all gillnet fishermen are prevented from deploying shark gillnets (stretched mesh >5”) in the Southeast U.S. Restricted Area between November 15 and March 31 every year. Since most states in the region already have bans on gillnet gear, and seeing that most of the fishing pressure on finetooth sharks occurs after they have already dropped their pups in the coastal waters (2-7 m water depth), it is difficult to use protection during pupping season as a justification for seasonal closures. Fishermen are not able to target finetooth sharks when fishing with gillnets. Any management measures that are solely directed at fishermen using gillnet gear and in possession of a commercial shark permit, could easily be circumvented as gillnets are also an authorized gear for Spanish mackerel or are used by fisheries pursuing currently unregulated species. Furthermore, closures may result in increased fishing effort in other areas or seasons, which could lead to increased dead discards of finetooth sharks.

Comment 2: NMFS received several comments in support of the proposed preferred alternative for finetooth shark management, including: identifying sources of finetooth shark fishing mortality to target appropriate management actions is appropriate; the occurrence of overfishing is a function of data deficiency; I agree with the preferred alternative; we need clarification about the landings information in the SCS assessment; I support the preferred alternative and the stock assessment; I applaud NMFS for taking the approach with the level of uncertainty; NMFS scientists cautioned the reader about conclusions made for finetooth and blacknose shark; ASMFC is trying to address these issues; we need to know which fishery is catching these fish; I know that under the law we are supposed to reduce mortality, but I think that we need more information; we support alternative D4 because it is critical to improve the assessment for finetooth sharks in 2007; NMFS should wait on the updated assessment results for finetooth sharks before attempting a quota reduction on the commercial shark fishermen; the March 2002 SCS assessment did not have bycatch estimates to include with the short catch and catch per unit of effort (CPUE) series, as well as no catch for finetooth and blacknose sharks, which may have effected the results; if the majority of mortality occurs in non-HMS fisheries, why should HMS fishermen have to solve the problem; and if there is little connection to HMS, and if we want to get to fishing mortality, we need to collect information.

Response: NMFS agrees that implementing a plan for preventing overfishing of finetooth sharks is necessary, and that appropriate measures are included in preferred alternative D4. The majority of finetooth sharks are landed in the South Atlantic region (primarily Florida) by vessels deploying a non-selective gear type (gillnet gear) and in possession of both a Spanish mackerel permit and a commercial shark permit and/or targeting species that are currently unmanaged (kingfish). Thus, any management measures that are solely directed at fishermen using gillnet gear and in possession of a commercial shark permit, could easily be circumvented as gillnets are also an authorized gear for Spanish mackerel or are used by fisheries pursuing currently unregulated species. NMFS continues to explore which vessels may be engaged in fisheries that harvest finetooth sharks and intends to conduct a new SCS stock assessment following the Southeast Assessment, Data, and Review (SEDAR) process starting in 2007. Reducing finetooth shark fishing mortality via regulations targeting commercial shark permit holders is further confounded by the fact that finetooth sharks are within the SCS complex, which is not currently overfished or experiencing overfishing, and commercial fishermen have only caught, on average, 20 percent of the SCS quota between 1999-2004. The highest landings of SCS reached 74 percent in 2003. Measures directed at the shark gillnet fishery would result in an increased number of dead discards of finetooth sharks and removing gillnets from the authorized gear list for the shark fishery (closing the shark gillnet fishery). Fishermen do not appear to selectively target finetooth sharks and these sharks have a tendency to roll upon contact with gillnets. Observer data from the five vessels targeting sharks indicate that they are only responsible for a small portion of the commercial finetooth shark landings. Most of the gillnet vessels in the South Atlantic region have permits for both HMS and non-HMS species. If gillnets were no longer an authorized gear for harvesting HMS, vessels would continue to discard dead finetooth sharks caught as bycatch in pursuit of other non-HMS species. Furthermore, a fishery closure could lead to adverse economic impacts and unknown ecological impacts as this displaced fishing effort would likely shift to other fisheries or increase fishing pressure on LCS using bottom longline gear. Recreational landings of finetooth sharks only comprise 10 percent of annual finetooth shark landings on average. Recreational landings of finetooth sharks are approximately 1.5 percent of the landings within the SCS complex.

In 2002, NMFS conducted a stock assessment for all SCS, including finetooth sharks. These catch rate series data were combined with life history information for finetooth sharks and evaluated with several stock assessment models. The lack of bycatch data in the catch series data led to low values of MSY predicted for finetooth sharks in the SCS stock assessment (especially those obtained through the SPM models). This lack of bycatch data and shorter catch and catch per unit effort (CPUE) series, coupled with no catches reported in some years, led to some uncertainty in the stock assessment for finetooth sharks. In the case of finetooth sharks, model estimates of recent F levels are above $F_{MSY}$, indicating that recent levels of effort directed at this species, if continued, could result in an overfished status in the relatively near future. The preferred alternative may increase the amount of available catch series and bycatch data by expanding existing observer programs and contacting state and Federal fisheries management entities to collect additional landings data, which may be available for the upcoming stock assessment starting in 2007.

ASMFC is in the initial steps of developing an interstate FMP for coastal sharks. ASMFC staff has drafted a Public Information Document (PID), equivalent to Scoping Document drafted prior to initiating a fishery management plan. The PID is currently available online at www.asmfc.org. The deadline for submitting public comment is July 14, 2006.

Comment 3: NMFS received several comments either opposing the preferred alternative (alternative D4), or expressing concern over the fact that more progress has not already been made to prevent overfishing of finetooth sharks, including: NMFS acknowledged finetooth shark overfishing three years ago and the current preferred alternative simply collects more data on sources of mortality for the species; it has already taken three or more years to amend this plan; NMFS should reconsider proposing more specific management measures in this Draft HMS FMP to conserve finetooth sharks; we have a species that is in trouble, and under the law, you need to do something; we are disappointed that you are picking an alternative that won't do anything for the mortality; you need to change the preferred alternative to something more conservation-oriented; NMFS has not done anything in the past 4 years and finetooth has overfishing occurring; we support alternative D4, but note our disappointment that NMFS has not already directed the appropriate Regional Council to take action to end the overfishing of finetooth sharks; NMFS should contact states directly as they should be more than willing to provide information; NMFS has made some steps forward in collecting more information, however, you are going to have to work harder to get more data; and, NMFS needs to develop and pursue specific management measures to end finetooth shark overfishing.

Response: The preferred alternative implements an effective plan to prevent overfishing. Based on our present knowledge of the fisheries that interact with finetooth sharks, management actions that affect only HMS fisheries will not adequately address finetooth shark overfishing. The majority of finetooth shark landings occur in commercial fisheries deploying a non-selective gear (gillnets) in a region (south Atlantic) where other non-HMS fisheries also deploy gillnets. Thus, measures that prohibit the use of gillnets for landing sharks (alternative D2), if aimed exclusively at the commercial shark gillnet fishery, would not prevent overfishing of finetooth sharks. Most of the five vessels that comprise the commercial shark gillnet fishery also possess Spanish mackerel permits. If gillnets were not allowed for the harvest of sharks the vessels could continue to deploy gillnets to catch other species, including Spanish mackerel, catch finetooth sharks incidentally, and then discard dead finetooth sharks. Finetooth sharks are caught in a wide range of gillnet mesh sizes and are often dead at haulback, rendering trip limits and/or gear modifications (alternative D2) ineffective at preventing overfishing because dead sharks would continue to be discarded. Mortality of finetooth sharks in fisheries outside the jurisdiction of HMS (state waters) or in unregulated fisheries in Federal waters (*i.e*, kingfish) would also be unaffected. The preferred alternative will provide additional information on finetooth shark landings to allow enactment of comprehensive, collaborative measures that effectively reduce finetooth shark fishing mortality.

The preferred alternative would not simply collect more data. NMFS has sent a letter to the South Atlantic Fishery Management council and attended a recent meeting in Coconut Grove, FL (June 13-15, 2006) to request consideration of joint management initiatives. Without cooperative measures vessels may be able to circumvent any additional regulations that would be enacted for the commercial shark fishery when pursuing Spanish mackerel. The Agency has attained, and will continue to evaluate, landings of finetooth sharks by non-HMS fisheries in state and Federal waters. Furthermore, the Agency has analyzed Federal logbook data to better understand what non-HMS fishermen are catching when they land finetooth sharks, has determined seasonality of landings by Federally permitted fishermen, has analyzed the Federal permits of vessels that land finetooth sharks, and has analyzed the Florida trip ticket data to better understand the seasonality, extent of landings, and what permits vessels possess that are landing finetooth sharks in the state of Florida. The Agency has expanded the directed shark gillnet fishery observer program to include observer coverage on vessels using alternative types of gillnet gear (sinknet) or targeting non-HMS species to determine the extent of finetooth shark landings in these fisheries and added finetooth sharks to the select species list for bycatch sub-sampling in the Gulf of Mexico shrimp trawl fishery to monitor bycatch of finetooth sharks in this fishery. These activities will form the basis for selecting additional management measures, either analyzed in the Final Consolidated HMS FMP, or otherwise, to ensure that overfishing of finetooth sharks is prevented.

Comment 4: There should be a cap on the number of vessels allowed into the directed shark gillnet fishery and a limited entry program that only allows the five vessels that are currently participating in the fishery**.**

Response: NMFS does not currently employ a gear based permit endorsement for shark fisheries; rather, permit holders possess either directed or incidental permits and both permits are valid for any of the authorized gears for sharks (gillnet, bottom and pelagic longlines, handline, rod and reel, or bandit gear). NMFS did not consider specific permit endorsements or gear-based permits in this rulemaking, but may consider options to limit vessel participation in the shark gillnet fishery in the future. Logbook and permit data does not indicate that there has been a significant increase in recent years in the number of vessels targeting sharks with gillnet gear. The majority of shark fishermen deploy bottom longline gear for LCS; however, directed shark gillnet fishermen most frequently target SCS and blacktip sharks. As blacktip sharks and the SCS species complex are not overfished or experiencing overfishing, capping the number of vessels allowed into the fishery may not be justified.

Comment 5: NMFS received several comments in favor of banning gillnets for the directed harvest of sharks, including: banning gillnets might help reduce finetooth shark mortality; in the absence of removing gillnets from the authorized HMS gear list, there should be a requirement for year-round use of VMS on gillnet boats; drift gillnets should be prohibited; the

State of Georgia supports the prohibition of gillnet gear to target finetooth sharks to prevent overfishing; and, I suggest that this fishery be banned in the South Atlantic and GOM until we determine the status of finetooth sharks and get things straight with the Right whale calf that was caught with gillnet gear.

Response: NMFS considered the prohibition of gillnet gear within Alternative D2 (implement commercial management measures to reduce fishing mortality of finetooth sharks). A similar alternative was also considered in Amendment 1 to the Fishery Management Plan for Atlantic, Tunas, Swordfish, and Sharks. NMFS agrees that banning the use of gillnets for the five vessels that comprise the directed shark drift gillnet fishery may reduce fishing mortality of finetooth sharks. However, other gillnet fisheries in the South Atlantic that target non-HMS (Spanish mackerel and kingfish) would continue to catch finetooth sharks, and other species of sharks. Observer data indicate that the five vessels targeting sharks in the South Atlantic region are only responsible for a small portion of the commercial finetooth shark landings. Since most of the gillnet vessels in the South Atlantic have permits for both HMS and non-HMS (Council-managed) species, if gillnets were no longer an authorized gear for harvesting HMS, these vessels would continue to land, and discard dead, finetooth sharks caught as bycatch in pursuit of other non-HMS species. If gillnet gear were banned for HMS, fishermen in other fisheries would continue to catch finetooth sharks but without coordination with management entities and possibly without observer coverage. Furthermore, the current regulations in place for the Southeastern U.S. Restricted Area currently prohibit the use of shark gillnet gear in the water between Savannah, GA and Sebastian Inlet, FL. Shark gillnet gear is defined as a gillnet with stretched mesh greater than 5". Gillnets that are less than 5" stretched mesh could still be deployed if the directed shark gillnet fishery were banned, and finetooth sharks would continue to be landed as a result. Gillnets are already banned in Georgia and Florida and restricted to less than 100 feet in length for recreational fisheries in South Carolina.

Generally, VMS is required to aid in enforcement of time/area closures. Because no gillnet closures were fully analyzed in the Draft HMS FMP, the requirement to use VMS on gillnet vessels year-round was not considered as an alternative in this rulemaking. The existing requirement was originally implemented in 2003 by Amendment 1 to the FMP for Atlantic Tunas, Swordfish, and Sharks, and requires that all vessels with gillnet gear onboard and a commercial shark permit have a functioning VMS unit onboard and that the unit is operational during all fishing activities, including transiting, between November 15$^{st}$ and March 31$^{st}$ each year. This requirement applies to all areas between November 15-March 31 and not just in the vicinity of the Southeastern U.S. Restricted Area. If additional time and area closures were implemented outside of the right whale calving season, it may be prudent to reevaluate the need for a year-round VMS requirement for all shark drift gillnet vessels.

The Atlantic Large Whale Take Reduction Team (ALWTRT) met in St. Augustine, FL, on April 10-11, 2006, to determine what course of action should be taken to prevent future interactions between right whales and gillnet gear. The ALWTRT did not reach consensus on all the management measures that were being considered at the meeting and are still deliberating on how to address the co-existence of gillnet fisheries and right whales on their calving grounds in the Southeastern U.S. Restricted Area. NMFS will work with the team to minimize mortality of these endangered marine mammals.

Comment 6: Identification of finetooth sharks is difficult because they are often confused with blacktip sharks.

Response: The Agency agrees that finetooth sharks are difficult to identify, especially for dealers who are required to positively identify sharks to species based on a log (carcass that has been gutted and finned). The preferred Alternative A9, mandatory HMS identification workshops for all shark dealers, would provide shark dealers with tools and instruction that they could employ to prevent mis-identification of finetooth sharks and minimize the likelihood of confusion between *Carcharinid* species of sharks.

Comment 7: Spanish mackerel fishermen catch finetooth sharks intermixed with blacktip sharks.

Response: An analysis of Federal logbook data from 1999-2004 indicates that 17 vessels landed finetooth sharks with gillnet gear and possessed both a Spanish mackerel and commercial shark permit. Since gillnets are a not selective gear and finetooth sharks, blacktip sharks, and Spanish mackerel have similar temperature and habitat preferences, it is not unreasonable to assume that there are some gillnet sets where all three species are landed. The Federal logbook data indicated that Spanish mackerel were the most abundant non-HMS reported on trips that landed finetooth sharks and accounted for approximately 13.6 percent (by weight) of landings.

Comment 8: NMFS states that 80 percent of finetooth sharks are caught in gillnets, and the majority is landed in FL and GA, but gillnets are banned in these states. So finetooth sharks must not be all that coastal if they are being caught outside of state waters (> 3 miles).

Response: Generally speaking, finetooth sharks inhabit shallow coastal waters of the western Atlantic Ocean from North Carolina to Brazil. Finetooth sharks travel north to waters adjacent to South Carolina when the surface temperature of the water increases to approximately 20ºC then returns south to off the coast of Florida when temperatures fall below 20ºC. Finetooth seem to prefer water temperatures in this range, and they feed primarily on menhaden, which are also generally found closer to shore. However, finetooth sharks are opportunistic and will likely inhabit more coastal state waters or locales offshore in Federal waters as oceanographic and feeding conditions allow. Finetooth sharks would not be allowed to be harvested with gillnets within State waters of Flordia, Georgia, or South Carolina, however; they would still be vulnerable to fishing mortality resulting from interactions with gear in other fisheries and may be landed in Florida if they are caught in gillnets deployed in Federal waters.

Comment 9**:** There are only five vessels are in the fishery- where do all the catches come from?

Response: The five gillnet vessels that target sharks with drift gillnet or strikenet gear are responsible for less than 10 percent of the commercial finetooth shark landings. The majority of finetooth sharks may be landed either in state waters, or by fishermen pursuing other species, such as those managed by the Gulf of Mexico or South Atlantic Fishery Management Councils (*i.e.*, Spanish mackerel) or species that are not currently managed (*i.e.*, kingfish). Since these fishermen hold directed shark permits, they can opportunistically keep all finetooth sharks;

however, because their harvest of finetooth sharks is incidental to landing of other non-HMS species, these vessels have not been selected for HMS observer coverage.  Vessels fishing sink gillnet gear on the bottom and targeting other non-shark species are some of the same vessels in the shark drift gillnet fishery.

A recent analysis of landings data submitted via the Fishing Vessel Logbook/Gulf of Mexico Reef Fish/South Atlantic Snapper-Grouper/King and Spanish Mackerel/Shark (Coastal Fisheries Logbook) from 1999 - 2004, indicate that a total of 46 vessels reported landings of finetooth sharks.  Of these, 17 vessels had only a shark limited access permit, 17 vessels had both a shark and a Spanish mackerel permit (managed under the Coastal Pelagics FMP and its amendments by the South Atlantic Fishery Management Council), and 12 vessels had neither permit.  In 2003, 15 vessels reported landings of finetooth sharks and all of these vessels had both a shark directed permit and a Spanish mackerel permit.  Furthermore, since approximately 29 vessels are either targeting other non-HMS species and keeping finetooth sharks opportunistically, or are not covered under existing management regimes, these vessels would likely continue to contribute to finetooth shark fishing mortality by participating in coastal gillnet fisheries within the finetooth shark's range.

Comment 10:  NMFS received several comments questioning the 2002 SCS stock assessment, including: in 1995, 95 percent of finetooth came from PLL and not gillnets, in 1996-2000 there was this shift to gillnet, and I don't understand why; the document says that less than 1 percent came from the commercial fishery in the GOM- how can shrimp trawls not catch finetooth?; and, 100 percent of recreational landings came from the GOM, it just does not make any sense.

Response:  NMFS analyzed landings data from 1999-2004 for the analysis of alternatives to prevent overfishing of finetooth sharks in this rulemaking.  It is possible that there are inconsistencies between more recent data analyzed for this rulemaking and those data employed for the 2002 stock assessment.  This could be a result of misidentification or misreporting of finetooth sharks, general lack of data for the 2002 SCS stock assessment, or changes in fishing effort that may have occurred.  The commenter does not provide specific examples of which data set they are referring to that was used in the 2002 SCS assessment; therefore, it is difficult to explain any potential inconsistencies.  Alternative D4 would include finetooth sharks as a select species for bycatch sub-sampling in the Gulf of Mexico shrimp trawl observer program which will provide additional bycatch and landings information from this fishery.  In the past, finetooth sharks were not identified in the bycatch associated with shrimp trawls, however, they may have been present.  The Marine Recreational Fisheries Statistics Survey (MRFSS) and the Texas Parks and Wildlife Service estimated that 14,811 finetooth sharks were landed between 1999 and 2005.  The data used for the 2002 SCS stock assessment indicate that there were several years where all of the recreational landings of finetooth shark occurred in the Gulf of Mexico.  However, there are also years where the majority of recreationally caught finetooth sharks were caught in both the South Atlantic and Mid-Atlantic regions.  This could be attributed to changes in oceanographic conditions and/or fishing effort.

Comment 11: NMFS should investigate bycatch in other areas and consider the suite of management measures by other states that may be affecting finetooth shark mortality.   In the

State of Texas, there are bag limits but no commercial fisheries. Sharks can only be caught on rod and reel. They may be sold, but only one fish per boat. There are also some shrimp trawl closures (seasonal) that may provide some indirect benefits for finetooth and other sharks.

Response: Since this comment was received, NMFS has contacted the Regional Fishery Management Councils and discussed possible fisheries where finetooth sharks may be harvested incidentally. The Agency has also compiled a list of state and Council regulations that affect gillnet and bottom longline fisheries and therefore may impact finetooth fishing mortality either directly or indirectly. Creel surveys from Texas Parks and Wildlife indicate that on average, nine finetooth sharks are landed a year, with 193 landings documented since 1984. Shark specific landing restrictions similar to those imposed by Texas and other states, while helpful, may not significantly reduce finetooth landings as the majority of finetooth landings are from commercial fisheries in the South Atlantic that use non-selective gear. Successful management of this species will likely only be attained through cooperative efforts between the fishermen, States, Regional Fishery Management Councils, the Atlantic States Marine Fisheries Commission, and NMFS.

Comment 12: NMFS received several comments expressing concern about the fact that the Agency did not know exactly where all finetooth shark landings are coming from, including: how is it that NMFS has catch data coming from dealers, but does not know which vessels are catching finetooth?; NMFS should call the dealers and find out which types of boats are offloading/selling the finetooth; in 1999, you changed the criteria for boats that could get a directed shark permit so that the smaller croaker boats, etc. catch sharks, and they have to report to the Federal dealer, so you should be able to get the dealer information; and dealers should be required to provide vessel information with all shark landings.

Response: General canvass data submitted by Federally permitted shark dealers does not include information pertaining from which vessel that fish were purchased. These reports are submitted every two weeks. NMFS agrees that the General Canvass data should be linked to the individual vessel from which those fish were purchased. NMFS has also been contacting states between Texas and North Carolina to determine whether or not they had any records of finetooth sharks being landed. Many states maintain trip ticket programs that can be linked to individual vessels from which seafood products were purchased. This information was analyzed for the Florida trip ticket program because that is where the majority of finetooth shark landings are occurring. Starting in 2000, some of the Florida trip tickets reporting finetooth sharks included the vessel identification. Of the vessels that were associated with these landings in the Florida trip ticket data, six vessels had only a Federal shark permit, eight had both a Federal shark and Spanish mackerel permit, and three vessels had neither permit. The fact that vessels possess multiple permits reiterates the need for collaborative management efforts between HMS, the Regional Fisheries Management Councils, and individual states.

Comment 13: NMFS received a comment based on the 2005 observer report for the Directed Shark Gillnet Fishery that stated that in the shark gillnet fishery, five vessels used three different fishing methods. Of the three methods, the strikenet gets the most finetooth sharks. This is a fishery that is targeting finetooth sharks. The average size is 123 cm for finetooth sharks, which is smaller than what the recreational fishery can take.

Response: The 2005 observer report indicated an increase in the observed landings of finetooth sharks with strikenet gear. This gear is generally used to target schools of blacktip sharks, which are located from the air using a spotter plane. Historically, most observed landings of finetooth sharks occur in the drift gillnet segment of the fishery. 2005 may have been an anomalous year with regard to prey abundance or distribution, thereby, making finetooth sharks more vulnerable to strikenet gear. Strikenet fishermen are subject to the same restrictions as other shark gillnet gear. The average size of finetooth sharks landed in 2005 was 123 cm, based on measurements obtained from 38 individuals.

Comment 14: NMFS received a number of comments opposed to Alternative D2, implement commercial management measures to reduce fishing mortality of finetooth sharks, including: A subquota for finetooth sharks is not necessary; I oppose alternative D2 unless the fishery is harvesting its entire commercial quota; and, we are opposed to alternative D2 because it appears that the allocated quota is not being overharvested.

Response: The quota for SCS is not currently, and has never been, fully utilized. Observer data indicate that finetooth sharks are not the primary shark species harvested in the directed shark gillnet fishery. Since finetooth sharks have a tendency to roll upon contact with gillnet gear, prohibiting landings of finetooth sharks would not reduce fishing mortality, as most of these fish would then be discarded dead. Additional dead discards may encourage fishermen to make more trips to replace lost revenues, leading to more dead discards and an increase in fishing mortality level. Since the rest of the SCS complex is not experiencing overfishing and is not overfished, reducing the overall SCS quota was not considered in this FMP.

Comment 15: NMFS received several comments in support of alternative D3, implement recreational management measures to reduce fishing mortality of finetooth sharks, including: I support alternative D3 because between 2000 and 2003, 6,732 and 5,742 finetooth sharks were reported to MRFSS. What is the expansion? What are the Post-Release Mortality estimates?; recreational landings of finetooth sharks looks like they may potentially be the majority of mortality for yet another HMS species; mandatory circle hooks would reduce mortality; it appears that the actions described in the preferred alternative only intend to pursue commercial mortality and ignore recreational mortality; I would suggest getting into the MRFSS system because there is a problem with shark reporting and MRFSS; no one reports finetooth sharks to the Councils; and MRFSS does not have sharks listed, but that is where I would suggest looking for information.

Response: NMFS is not preferring recreational measures to reduce fishing mortality of finetooth sharks at this time because the vast majority of finetooth sharks are landed commercially, most recreational fisheries for finetooth sharks are likely in state waters, and there is not conclusive evidence that circle hooks would reduce post hooking release mortality of finetooth sharks. Between 1999 and 2004, average landings of finetooth sharks in recreational and commercial fisheries were 11.2 (10 percent) and 93.6 (90 percent) mt dw/year, respectively. MRFSS data would include landings of finetooth sharks in state waters, which is where most finetooth sharks are found, however, NMFS can not directly implement regulations in state waters. A study by Gurshin and Szedlymayer (2001) estimated that only 10 percent (1 of 10 captured) of sharpnose sharks, a similar species, died as a result of capture on hook and line.

Post release mortality depends on water temperature, hook used, whether or not live bait is used, and the overall condition of fish at hooking. MRFSS lists sharks and estimates of finetooth shark landings were obtained from this program and included in this rulemaking. NMFS also does not prefer recreational measures at this time because there is already a conservative bag limit in place and a minimum size well above the size at first maturity. Recreational measures may be considered in the future as necessary. NMFS will continue to explore all sources of finetooth sharks fishing mortality, both recreational and commercial, and will consider further exploration of the landings reported to NMFS and individual states.

Comment 16: Due to the lack of progress towards ending overfishing, finetooth sharks should be added to the prohibited species list while means to reduce mortality are investigated.

Response: NMFS considered, but did not analyze, an alternative that included adding finetooth sharks to the prohibited species list for Atlantic sharks. Presently, finetooth sharks do not meet any of the four criteria defined under 50 CFR Part 635.34 (c) for inclusion of species to the prohibited species list. The existing criteria are: (1) there is sufficient biological information to indicate the stock warrants protection, such as indications of depletion or low reproductive potential or the species is on the ESA candidate list; (2) the species is rarely encountered or observed caught in HMS fisheries, (3) the species is not commonly encountered or observed caught as bycatch in fishing operations, or (4) the species is difficult to distinguish from other prohibited species (*i.e.*, look alike issue). With regards to these criteria, finetooth sharks are not currently overfished, are commonly encountered and observed in HMS fisheries, are commonly caught as bycatch in non-HMS fisheries, and upon capture (prior to dressing), are distinguishable from prohibited species. As new biological and fishery data becomes available, NMFS may make adjustments to the prohibited species list, as needed in the future.

### D.2.3 Atlantic Billfish

*ICCAT Landing Limits*

Comment 1: NMFS received a number of basic questions pertaining to the history, data, U.S. actions, and the requirements of the ICCAT marlin recommendations. The comments included: Where did the 250 marlin limit come from? What was the biological data used to limit the recreational harvest of blue and white marlin to 250 fish?; has the 250 white marlin limit ever been exceeded?; what is the harvest quota for the commercial harvest of blue and white marlin?; what is the breakdown of white and blue marlin bycatch compared to the recreational catch?; and, where does NMFS get the authority to establish a quota (250-fish marlin limit)?

Response: The annual landing limit of 250 recreationally caught blue and white marlin, combined, stems from ICCAT Recommendation 00-13. ICCAT recommendations are binding instruments that the United States, as a contracting party to ICCAT, is obligated to implement. Recommendation 00-13, was proposed by the United States and established a number of additional stringent conservation measures intended to improve the stock status of Atlantic marlin. The 250 marlin number was the result of a dynamic international negotiation at ICCAT that included, and was supported by, the U.S. recreational, commercial, and government commissioners. Considerations in the U.S. negotiating position included, but were not limited to, data from the Recreational Billfish Survey and the Marine Recreational Statistics Survey, and intentionally included a buffer to account for changes in the fishery and improved monitoring. The Atlantic Tunas Convention Act provides NMFS the regulatory authority to implement ICCAT recommendations by authorizing the promulgation of regulations as may be necessary and appropriate to implement binding recommendations adopted by ICCAT. The 250 marlin limit is for both blue and white Atlantic marlin combined, and was exceeded for the calendar year 2002, when the U.S. reported 279 recreationally landed marlins. This exceedance was the result of methodological change that was applied to U.S. recreational landings retroactively. Further, while the United States exceeded its landing limit in that one year, the United States remained in compliance with Recommendation 00-13 because, as allowed by ICCAT Recommendation 00-14, the U.S. underharvest from 2001 was applied to the "negative" 2002 balance and was of sufficient magnitude to allow the United States to remain in compliance with the recommendation. The United States does not have a commercial quota or allowable level of landings for Atlantic billfish. Commercial possession and sale of Atlantic billfish have been prohibited since 1988 in the United States. Internationally, commercial quotas vary by country. Foreign pelagic longline and purse seine vessels, the gear types that dominate commercial Atlantic billfish landings, are restricted to 50 percent and 33 percent of Atlantic blue and white marlin landings, respectively, from the years 1996 or 1999, whichever is greater. The breakdown of domestic commercial and recreational harvests varies considerably by year and are presented in detail in Chapter 4 of the Final Consolidated HMS FMP. For the period 1999 - 2004, pelagic longline dead discards and recreational harvests of Atlantic blue marlin averaged 44.2 metric tons (mt) and 22.9 mt, respectively; Atlantic white marlin averaged 31.8 mt and 2.3 mt, respectively; and Atlantic sailfish averaged 24.5 mt and 81.6 mt, respectively. These numbers do not necessarily reflect the true mortality contributions of each sector to the fishery. Recent data on post-release mortality indicates that the aggregate domestic recreational white marlin mortality contribution may be equal to, or greater than, the aggregate domestic pelagic longline white marlin mortality contribution, in some years, and may be the result of the substantial difference in the scale of these fisheries.

Comment 2: NMFS received public comment both endorsing and opposing preferred alternative E6, Implement ICCAT Recommendations on Recreational Marlin Landings Limits, for widely varying reasons, and with varying qualifiers. Comments in support of this preferred alternative included: We endorse alternative E6; I support alternative E6 because it has been five years since the ICCAT recommendation and we need stricter regulations; NMFS has to implement alternative E6 to comply with international obligations; NMFS must codify the 250-fish marlin limit because it came as a *quid pro quo* with other countries agreeing to measures. If the U.S. does not codify the 250-fish limit, it will result in loosening of restrictions in other countries, which we don't want; if something is not done now, ESA will take all the fisheries away from us. We should show we are doing all we can to stop the killing of marlin. NMFS should implement the 250 marlin limit and the calendar year; I'm not opposed to the 250-fish limit (alternative E6), but somehow the U.S. got into a bad deal and is stuck with it; and I support alternative E6 only if the original accounting system (RBS data) is used to count U.S. landings.

Response: NMFS agrees that the United States is obligated to implement the 250 recreationally caught Atlantic marlin landing limit and that more needs to be done to reduce fishing mortality levels on these species if they are to recover. The U.S. landing limit was part of a comprehensive plan to begin the process of rebuilding Atlantic marlins and which obligated other nations to make substantial sacrifices on behalf of their fishing interests. NMFS shares concerns that a failure of the United States to fully implement an ICCAT recommendation may allow other nations to rationalize non-compliance on their behalf. NMFS further acknowledges that domestic implementation of the 250 Atlantic marlin landing limit has taken longer than anticipated. The United States has led international conservation efforts on Atlantic marlin and other species and will maintain its credibility and leadership role on these issues by fully implementing its international obligations through the adoption of the preferred alternatives.

NMFS believes that adoption of ICCAT recommendation 00-13 was an important step toward stemming long-term declines in Atlantic marlin populations and rebuilding their populations. Under this agreement, the U.S. was limited to landing 250 recreationally caught blue and white marlin combined on an annual basis, as previously discussed. The U.S. has reported marlin landings below the 250 fish limit in three of the previous four years. Other ICCAT nations whose fishermen catch and sell Atlantic marlin were obligated to reducing their pelagic longline and purse seine landings of blue marlin by 50 percent and white marlin by 67 percent. The recommendation also required release of live marlins brought to the vessel along with other various restrictions. As conditions in the fishery change, NMFS will continue to review the appropriateness of measures contained in the ICCAT recommendations and seek changes as appropriate.

NMFS acknowledges concerns of anglers regarding the use of a different accounting methodology for compliance purposes than was originally used to contribute to the negotiation 250 marlin limit. However, as discussed in the response to Comment 1, the 250 marlin number was based, in part on RBS and MRFSS data, but also intentionally included a buffer to account for changes in the fishery and improved monitoring. The number was the result of a negotiation and not a specific scientific methodology. Under the recommendation, the United States is obligated to report all verifiable recreational landings of Atlantic blue and white marlin for compliance purposes. New sources of data on domestic recreational landings have been developed since the 2000 negotiation, including catch-card programs in North Carolina and Maryland as well as the billfish and swordfish reporting line, which provide a small number of additional marlin each year. These sources of data have represented a very limited number of verifiable fish in any given year, with tournaments representing the majority of landings.

<u>Comment 3</u>: Comments opposing preferred alternative E6, Implement ICCAT Recommendations on Recreational Marlin Landings Limits, included: We cannot comprehend why NMFS, knowing of our small percentage of the harvest would even consider establishing severe restrictions on the recreational harvest; this alternative A6 is unnecessary and arbitrary and should be eliminated, especially since the fishery is mostly catch and release; it should be removed at the 2006 ICCAT meeting; from a conservation and negotiating standpoint, the 250 landing cap is neither needed nor of any value to the United States; mandating this cap when low marlin landings are already driven by a strong, voluntary conservation ethic will do little or nothing to reduce overall marlin mortality; why implement increased size limits to avoid reaching the 250 mark, when the existing regulations seem to work?; there should be a provision for underages and overages; the 250 marlin limit derives only from tournament landings and is not an appropriate limit for the fishery as a whole; if NMFS restricts landings of marlin species to 250 fish and prohibits white marlin catches for five years, tournament fishing will take a

massive economic hit. Towns that host tournaments would have to rely on an alternative form of tourism; I oppose Alternative E6 because it will cause economic harm, unless anglers switch to blue marlin; 250 fish are insignificant compared to longline bycatch mortality; and alternative E6 is problematic considering the unknown landings in the Caribbean. The large landings of blue marlin in Puerto Rico can be addressed through enforcement of existing management measures (minimum size, no sale, etc.); and, we must address the foreign sources of billfish mortality at ICCAT if we are to achieve the recovery of billfish stocks.

Response: NMFS disagrees that alternative E6, implement the ICCAT established recreationally caught marlin landing limit, is unnecessary or arbitrary in any way. This alternative would implement U.S. obligations negotiated as part of a key international agreement that has the potential to dramatically reduce fishing mortality of Atlantic marlins. As discussed in the response to Comment 1, the United States is obligated to implement ICCAT recommendations under the Atlantic Tunas Convention Act. Further, to maintain credibility and leadership on international billfish conservation issues, and limit opportunities for foreign nations to rationalize potential non-conformity with billfish conservation measures, the United States must abide by its international obligations. Unilateral elimination of the 250 marlin landing limit is not an option available to NMFS or even the United States. However, should ICCAT choose to do so during a future Commission meeting, it could remove the restriction thereby allowing the United States to follow suit. NMFS acknowledges that, in and of themselves, the 250 fish allocated to the United States may not dramatically impact stock status, however, the implementation of U.S. international obligations is critical to a credible negotiating position and reduces the ability of other nations to rationalize potential non-conformity with international billfish conservation measures. Under the preferred alternative, potential increases in size limits would only occur if the United States were approaching its 250 marlin limit. The intent of potential in-season minimum size limit increase would be to minimize impacts to the fishery by slowing landings and allowing the fishery to continue until the 250 fish limit is reached but not exceeded. Allowing landings to continue at a slower pace over a longer period in the fishing year is anticipated to have reduced socio-economic impacts as compared to a shift to catch and release only fishing earlier in a given year. Consistent with ICCAT Recommendation 00-14, the preferred alternative would mandate carry-over of overharvest and would allow for carry-over of underhavest. Contrary to some comments received, and as discussed more fully in the responses to Comments 1 and 2, the 250 marlin number did not stem from only tournament landings. Consistent with those previous responses, NMFS does not believe that the 250 fish limit is inappropriate for the U.S. directed billfish fishery at this time. NMFS disagrees that implementation of the 250 marlin limit would cause substantial adverse economic impacts. As discussed in the response to Comment 2, the United States has landed 75 percent of its landing limit, on average, over the past four years and in half of the years reviewed, the United States has been 40 percent below the allowable landing limit for recreationally caught Atlantic marlin.

Further, preferred alternative E6 was specifically designed in a way to minimize economic impacts should fishing or retention patterns change and result in the United States approaching the 250 marlin limit. Should the 250 marlin limit be achieved, NMFS believes that it would occur relatively late in the fishing season, thereby impacting a limited number of fishery participants and resulting in relatively minor impacts to the fishery as a whole. There could potentially be heightened localized impacts in a small number of communities, where, for instance, tournament participation may be reduced or a tournament cancelled. However, based on the significant level of catch and release fishing practiced in the Atlantic billfish fishery (75 to 99 percent), NMFS believes any reductions in participation would be minor as fishermen could still catch and release Atlantic marlin.

Based on public comment that indicated more substantial concerns over potential adverse economic impacts to the fishery if catch and release only fishing for Atlantic white marlin were required, as well as a number of other factors including, but not limited to, the impending receipt of a new assessment for Atlantic white marlin, upcoming international negotiations on Atlantic marlin, and a somewhat limited ecological benefit, NMFS does not prefer the alternative to allow catch and release only fishing for Atlantic white marlin. NMFS acknowledges that the 250 recreational marlin allocated to the United States represent a small portion of total billfish mortality from the full ICCAT pelagic longline fleet. However, from a domestic perspective, if the full allocation of 250 marlin were landed by the recreational sector, it would represent approximately one-third (35 percent) of the annual number of Atlantic marlin (blue and white combined) discarded dead from the domestic pelagic longline fleet, on average, over the four year period 2001-2004. Of more importance to the overall health of the stock than landings or dead discards, is total mortality inflicted upon the stock. As noted in the response to Comment 1, recent estimates and data on post-release mortality indicate that the aggregate domestic recreational white marlin mortality contribution may be equal to or greater than the aggregate domestic pelagic longline white marlin mortality contribution, in some years. This appears to be a result of the substantial difference in the scale of these fisheries. NMFS acknowledges that there is some uncertainty associated with marlin landings statistics from the U.S. Caribbean, and the Agency is working to improve these statistics by increasing enforcement of existing permitting and reporting requirements, including those for tournaments. Finally, NMFS agrees that foreign sources of billfish mortality must be addressed at ICCAT if we are to achieve the recovery of Atlantic billfish stocks. As such, the United States will continue its efforts to champion billfish conservation at ICCAT and in other appropriate fora.

Comment 4: NMFS received a number of comments asking for clarification of authority and the regulations pertaining to the potential implementation of alternative E6, Implement ICCAT Recommendations on Recreational Marlin Landings Limits, including: Would the "priority" be given to tournaments in catching the 250 fish limit?; if 20 tournament boats catch-and-release 10 fish in the season, what are the rest of the private and recreational anglers and thousands of boats to do? Can the unharvested portion of the 250 fish limit be carried over into the next year? Once the quota is established, which we have never approached, except for the year NMFS counted differently, then what happens?; and, does the U.S. have the authority to reduce the 250-fish limit? It goes against ICCAT. In every other case, the U.S. must give fishermen a reasonable opportunity to catch fish.

Response: The 250 recreationally caught marlin landing limit applies to the Atlantic recreational billfish fishery as a whole. NMFS has no intent to assign Atlantic marlins that are available for landing to any particular sector or component of the recreational fishery in this rulemaking. NMFS appreciates the concern expressed by some anglers regarding the opportunity to land a fish when one looks at the large number of participants in the fishery.

However, the United States has been bound by the 250 recreationally caught Atlantic marlin landing limit since June of 2001, and only in one year has that 250 fish number been achieved, as previously discussed. Under the preferred alternative (E6), if the landing limit is approached, regardless of whether those fish are landed by a small number of vessels or by many individual vessels, the Agency would consider the appropriateness of an inseason minimum size increase or prohibition on retention based on the criteria identified in the discussion of preferred alternative E6 in Chapter 4 of the Final Consolidated HMS FMP. Even if all retention were prohibited for the remainder of a given fishing year, anglers would be permitted to continue catch and release fishing for Atlantic marlin, and Atlantic sailfish would be available for landing. As previously discussed, 75 to 99 percent of all billfish are currently released on a voluntary basis, so NMFS anticipates little disruption in the fishery, should either a minimum size increase or all release fishery become necessary. As discussed in the response to Comment 3, consistent with ICCAT Recommendation 00-14, the preferred alternative would mandate carry-over of overharvest and would allow for carry-over of underhavest into the next management period. The Agency would monitor recreational landings of Atlantic blue and white marlin and would make decisions as appropriate regarding in-season management actions based on the decision criteria identified in the preferred alternative. NMFS is not proposing to reduce the 250 recreationally caught marlin landing limit.

Comment 5: NMFS received a number of suggestions for substitute alternatives to preferred alternative E6, including: Spread the 250 fish limit over 12 months so that all areas get to land marlin (spatial and temporal); divide the 250 fish limit up by state. Let the states exchange billfish for bluefin tuna quota until each state can support the tournaments they need to; white and blue marlin should have separate limits because they are such different animals; and, not landing the 250 marlin recreational landing limit and eliminating the entire commercial billfish harvest could not solve any of the problems. To solve the problem, the United States should prohibit the importation of billfish, swordfish, and tuna from other countries.

Response: NMFS appreciates these comments and suggestions, however, these options were not analyzed in the Draft Consolidated HMS FMP and as such are beyond the scope of this Final Consolidated HMS FMP. The Agency may consider these and other options as needed, if necessary and appropriate, in a future rule making.

Comment 6: I am opposed to counting fish that are caught by U.S. vessels fishing abroad against the United States' quota.

Response: The United States is obligated to account for all recreational landings of Atlantic marlin by U.S. citizens. If a U.S. citizen is fishing in the waters of an ICCAT contracting party or cooperating entity or on the high-seas on a vessel flagged by that nation, it is assumed that that nation has a reporting mechanism. If the nation in whose waters and upon whose flagged vessel the angler is fishing does not report to ICCAT, then the U.S. citizen is considered to be participating in an illegal, unregulated, and unreported (IUU) fishery. If a landing occurs on a U.S. flagged vessel fishing in foreign waters or on the high-seas, then the angler is required to report that fish to the National Marine Fisheries Service, and the United States must report that landing. If the angler is aboard a U.S. flag vessel and is fishing in the waters of a foreign nation that is not party to nor cooperating with ICCAT, and the angler fails to report the landing to the United States National Marine Fisheries Service, then that angler is deemed to be participating in an IUU fishery.

Comment 7: The British Virgin Islands (BVI) have separate regulations from the United States. International coordination on HMS management is critical. In 15 minutes time, we can be out of the United States Virgin Island waters. For us, the importance is the coordination of international HMS management. The BVI folks can catch and sell their billfish. What is being done on the international front to resolve these types of conservation concerns? The Draft Consolidated HMS FMP does not include anything that addresses international coordination efforts.

Response: NMFS appreciates the frustration felt by anglers in the Caribbean regarding the current differences in regulations between the United States and the British Virgin Islands. The Agency also agrees that Atlantic billfish management requires international cooperation to be successful. However, international relations are beyond the scope of this domestic rule making, and, as such, this Final Consolidated HMS FMP does not address relations between the United States and the British Virgin Islands or any other nation on any subject. International management issues are handled jointly between Department of Commerce staff, including NOAA and NMFS staff, and the Department of State.

Comment 8: Will the ICCAT landing limit be placed under "Quotas" in the Code of Federal Regulations (CFR), so that it will be easy to update annually as with tuna and swordfish quotas?

Response: The majority of regulatory text associated with ICCAT landing limits would likely be placed in 635.27 (d) because it is the most appropriate place for it in the regulations. That is the same section that includes the tuna and swordfish quotas.

Comment 9: NMFS received a number of comments on the potential impacts of the 250 marlin limit in combination with the possible shift to only catch and release fishing for Atlantic white marlin, including: the United States will catch the 250-fish limit if white marlin landings are prohibited, because redistribution will occur between different species. When you ban white marlin, people will fish for blue marlin. The bigger Northeast tournaments will fish harder on blue marlin; it's not desirable to make all of the fish under the limit be blue marlin; with the proposed change in the fishing year, some tournaments could be penalized if they take place after the 250-fish limit is exceeded.

Response: Based on public comment expressing deep concern over the ratio of potential adverse economic impacts relative to estimated ecological benefits, the prospect of a new international assessment, an impending international negotiation, and other factors, NMFS is not preferring to implement catch and release only fishing for Atlantic white marlin at this time. NMFS disagrees with the characterization that some tournaments may be penalized if they take place after the 250 fish limit is exceeded. The United States has been bound by the 250 fish limit since it went into effect at ICCAT in June of 2001. At that time, the only mechanism the Agency had available to address fulfillment of the 250 marlin landing limit was an emergency closure of the fishery. Thus, any tournament that would have occurred after the 250 fish limit had been reached, even prior to this action, would have been required to operate on a catch and release basis only. However, they would have had little warning. The preferred alternative was specifically designed to minimize the likelihood of a shift to catch and release only fishing for Atlantic marlin. The preferred alternative would provide the Agency with the ability to slow landings by quickly implementing a minimum size increase for the specific purpose of avoiding a mandatory shift to catch and release only fishing for Atlantic marlin, if possible, to minimize adverse impacts. If the ICCAT recreationally caught marlin landings limit is still achieved, despite the minimum size increase, then the Agency would retain the ability to quickly mandate catch and release only fishing. Thus, any tournament that occurs, or would have occurred, after the 250 fish limit is/was achieved, either prior to implementation of this action or after, would have to operate under an all release scenario. Tournaments actually gain an advantage with implementation of the preferred alternative because it would provide the ability to implement in-season minimum size increases, and thereby reduce the likelihood of exceeding the 250 limit, which would force a shift to an all release fishery. Further, the preferred alternative would also include a 14-day delayed effective date which would further allow tournament operators and billfish anglers to adjust to any possible in-season management actions.

Comment 10: NMFS received a number of comments regarding carry over of underharvest and overharvests, including: if NMFS intends to go forward with the 250-fish landing limit, underages should be added to the next years limit and fishermen should not be penalized if the limit is exceeded; the U.S. should mandate that underages be carried-over like every other quota; codifying the 250-fish limit is not a problem, but the proposed regulations with respect to overages and underages is unacceptable. Rulemakings to deal with underages should not be necessary.

Response: As previously discussed in the response to Comment 3, the preferred alternative would mandate carry-forward of overharvest and would allow for carry-forward of underharvest, consistent with ICCAT Recommendation 00-14. A failure to account for overharvest, as suggested by one commenter, would be inconsistent with ICCAT Recommendation and result in non-compliance by the United States. The United States has pledged to its ICCAT partners not to carry forward underharvest until uncertainty surrounding landings of marlin in the Commonwealth of Puerto Rico and the U.S. Caribbean is reduced. To decrease or increase the annual 250 marlin landings limit as a result of carrying forward future over or underharvest of Atlantic marlins the Agency will publish a notice in the Federal Register. To increase or decrease the 250 marlin recreational landing limit as a result of a new ICCAT recommendation, would require rulemaking under the preferred alternative.

Comment 11: NMFS received several questions, comments, and suggestions on billfish monitoring and reporting, including: how comprehensive or adequate is the monitoring of recreational billfish landings?; how would the public know when 250 fish are landed? Marlin recreational data collection methods are not accurate. Ninety percent of fish caught now are not reported. NMFS should implement mandatory logbooks for all permitted HMS fisheries, commercial and recreational, and require that trip reports be submitted because MRFSS interviews are not effective; enforcement is lacking. That is why people do not report their billfish landings. NMFS should develop a better system to account for marlin landings, such as tail tags; and, NMFS is not receiving all non-tournament marlin landings. There are clubs that land marlin and do not report them. NMFS should instead require each club to report their marlin landings, just like tournament are currently required to do. Penalties should be imposed on fishing clubs that do not report.

Response: NMFS has a comprehensive system in place to capture billfish landings which includes the Recreational Billfish Survey, the Atlantic HMS Non-tournament Billfish and Swordfish Reporting system, the Large Pelagics Survey (including dockside intercepts), and the Marine Recreational Fishing Statistics Survey (including dockside intercepts), as well as cooperative agreements to access landings tag/card data from the states of North Carolina and Maryland. NMFS is always looking to improve its data collection systems, and this may or may not include future tagging programs, log book reporting programs, improvements to the MRFSS, LPS and other systems, among other efforts. If the 250 marlin landing limit is achieved, NMFS would likely notify the public via a number of mechanisms, including: publication of a notice in the Federal Register, issuance of a fax notice to interested stakeholders, notification of the HMS consulting parties, telephone contact with recreational constituent leaders, posting information on the HMS website, placing information on the HMS Information telephone line, and working with popular sportfishing magazines and websites to notify constituents, along with other means, as appropriate. NMFS encourages the public to continue to suggest potential improvements. It should be noted however, that most any reporting system relies on the willingness of anglers to accurately report, and when this does not occur the veracity of the data is compromised. NMFS acknowledges that recreational landings data pertaining to Atlantic billfish do not account for every billfish landed, and thus some level of uncertainty surrounds billfish landings estimates. NMFS has undertaken efforts to improve enforcement of reporting requirements, has improved the MRFSS and LPS, and has recently received a report from the National Research Council that may allow for improvements to be made to some data collection systems.

Comment 12: NMFS received contrasting comments on the proposed five-day minimum notification period for in-season billfish management actions intended to ensure compliance with the ICCAT 250 marlin landing limit. Comments opposing a minimum five-day notification window included; we support E(6), establish the 250 recreationally caught marlin landing limit. However, 21 days would be the minimum acceptable notice period; we support implementation of the 250 marlin landing limit. If an additional increase in minimum size becomes necessary, a notice for an inseason adjustment should be given at least 30 days in advance. This will give tournament directors ample time to notify participants of a size change; tournament directors will need more than a few days (about a month) to make changes to their regulations, minimum sizes, and brochures if the United States approaches the 250-fish marlin limit; and, five days is not enough time to make changes to the Atlantic billfish regulations and to inform the public of such changes, as specified in Preferred Alternative E6, which would implement ICCAT Recommendations regarding recreational marlin landings. NMFS will probably just shut down tournaments. Most HMS tournaments print their information packets long before their start date. To the extent that in-season marlin adjustments can be avoided, they should be. Comments supportive of a minimum five day notification period for in-season management action included: A five-day notice should provide sufficient time for in-season billfish management actions. Bluefin tuna has a shorter notice period. Especially with the Internet, five days is sufficient time for billfish regulatory notification for changes in size limits or closures.

Response: NMFS appreciates the concerns expressed by tournament operators and fishery participants that a five-day minimum delay in effective date may present difficulties with regard to potential rule changes just prior to or during a tournament. In selecting a period for notification and implementation of potential in-season regulatory changes to ensure compliance with ICCAT recreational marlin landings limits, NMFS sought to balance the need to act quickly to ensure compliance, if necessary, while providing an appropriate period of time to adequately notify the public of any such regulatory changes. If too short of a period were selected, anglers and tournament operators may not have time become aware of the regulatory changes. If too lengthy of a period were selected, restrictions may be enacted too late to ensure compliance with ICCAT recommendations or stave off more stringent in-season management measures. Based on public comment requesting additional notice period, a review of the estimated time necessary to collect and analyze landings information and project the date at which regulatory action may become necessary, the National Marine Fisheries Service now prefers to alter the minimum delay in effective date from five to 14 calendar days, inclusive of the date of publication in the Federal Register, for in-season billfish management actions. NMFS has determined that providing more than a 14 calendar day minimum delay in effective date would not provide the Agency sufficient control over the fishery if landings rates were high. NMFS believes that this 14 day period would still allow the agency to implement regulatory changes in a timely manner, thus ensuring compliance with ICCAT recommendations or staving off more stringent in-season management measures and would provide anglers and tournament operators an improved ability to adapt to any potential in-season changes. NMFS also believes that there is a substantial misunderstanding of this provision. The minimum 14 day delay in effective date means that upon publication, any in-season action to increase the minimum legal size of Atlantic marlin or requirement to shift the fishery to catch and release only cannot become effective in less than fourteen days. It does not mean that no more than 14 days advanced notice can be provided to the public, tournament operators, and anglers. The Agency will seek to project potential regulatory action as far ahead as reasonably possible to aid in mitigating any potential adverse impacts to the extent practicable.

*Landing Restrictions*

White Marlin

Comment 13: NMFS received a number of comments in support of alternative E7, Allow Only Catch and Release Fishing for Atlantic White Marlin from January 1, 2007 to December 31, 2011. Comments in support of this alternative included the need for NMFS to do all it can to avoid having Atlantic white marlin placed on the Endangered Species Act List of Threatened and Endangered Species, the need to reduce fishing mortality to the greatest extent possible to help rebuild overfished populations; statements that there is no reason to land Atlantic white marlin in tournaments because there are techniques to verify releases, including the use of video and still cameras; it makes sense to prohibit all landings, if not all directed fishing for white marlin, since they are in severe decline; we support alternative E7, the Agency has the authority to remove the requirement earlier than five years if the assessment shows that the stock is improving; and, there is strong support for prohibiting the landing of white marlin in Florida and the Gulf.

Response: The Agency appreciates these comments, however, based on public comment indicating more significant concerns over potential adverse economic impacts to the fishery if catch and release only fishing for Atlantic white marlin were required, as well as a number of other factors, including but not limited to, the impending receipt of a new stock assessment for Atlantic white marlin and upcoming international negotiations on Atlantic marlin, NMFS prefers not to prohibit landings of Atlantic white marlin, at this time. The implementation of circle hook requirements is an important first step in reducing mortality in the directed billfish fishery. NMFS may consider catch and release only fishing options for Atlantic white marlin as well as other billfish conservation measures in future rulemakings, as necessary and appropriate. In regard to the Atlantic white marlin ESA listing review, any management measures in place at the time of the review would be considered during deliberations of the listing review team. NMFS cannot forecast the impacts of any particular management action on the outcome of the anticipated ESA listing review.

Comment 14: NMFS received a number of comments opposing alternative E7, Allow only catch and release fishing for Atlantic white marlin from January 1, 2007 to December 31, 2011. Those comments include: allowing only catch and release recreational fishing for Atlantic white marlin would have substantial adverse economic impacts on the recreational fishing community, including charter boat operators, shoreside facilities, and entire communities that host white marlin tournaments; NMFS underestimated the negative economic impacts of prohibiting landings of Atlantic white marlin; prohibiting landings of white marlin would do little to improve the population status of the species, the landings prohibition is unnecessary given the strong conservation ethic among U.S. anglers and as evidenced by the high release rate in the U.S. recreational fishery; the entire U.S. recreational fleet landing a few white marlin each year has little or no impact on billfish stocks; what is the rationale for prohibiting recreational landings of white marlin given the small number of recreational landings and the large economic impact generated by fishing for white marlin?; and, I don't believe in mandatory catch and release. It doesn't work and the public won't support it.

Response: In the Draft Consolidated HMS FMP, the Agency preferred a catch and release only alternative for Atlantic white marlin as well as a circle hook requirement for the tournament billfish fishery to maximize the mortality reduction and associated ecological benefits from the directed billfish fishery. NMFS received strong public comment opposed to the Atlantic white marlin catch and release alternative. As discussed under the response to Comment 13, NMFS prefers not to prohibit landings of Atlantic white marlin at this time, however, the Agency believes the implementation of the circle hook requirement is an important first step in reducing mortality in the directed billfish fishery. NMFS appreciates these comments and will consider catch and release only options as well as other billfish conservation measures in future rulemakings, as necessary and appropriate.

Comment 15: NMFS received a number of comments specifically pertaining to the potential impacts of alternative E7 (which would allow only catch and release fishing for Atlantic white marlin from January 1, 2007 to December 31, 2011) on tournament operations. Those comments include: the proposed rule would unfairly impact white marlin tournaments along the United States mid-Atlantic coast; NMFS should not prohibit tournament landings of Atlantic white marlin because few white marlin are landed in tournaments; NMFS should not prohibit landings of Atlantic white marlin in tournaments because they are the only cost and personnel effective means to scientifically sample Atlantic white marlin; alternative E7 would change the dynamic of fishing tournaments from contests where an anglers' luck or skill may prevail (biggest fish) to one where only skill would prevail (most fish) and would thus decrease participation; alternative E7 would create operational problems for tournament operators pertaining to verification of released fish; a fish killed and discarded as bycatch in the pelagic longline fishery has no direct economic impact. However, a fish killed as a tournament trophy or through release mortality contributes to a multi-million dollar industry and benefits the local economy and the nation as a whole; if alternative E7 is implemented, people will not go to tournaments to see the results; my concern for tournaments is that people like to see the result on the docks. If NMFS is going to full catch and release for white marlin, I do not believe that people will look at tournament videos of catches. The social aspect and behavior of tournament participants will be negatively impacted; decreasing numbers of tournament participants are participating in the White Marlin Open under the catch and release category; Maryland has the most to lose by prohibiting landings of white marlin. Ocean City is the white marlin capital of the world. Ocean City doesn't think that they should suffer the loss of the White Marlin Open; and, alternative E7 is unnecessary, will accomplish nothing for conservation, and would have a significant impact on billfish tournaments in the mid-Atlantic areas.

Response: As stated above, NMFS is not preferring the catch and release alternative for Atlantic white marlin in the Final Consolidated HMS FMP. Based on overwhelming public concerns for the social and economic impacts resulting from a shift to catch and release only fishing for white marlin, as well as the recognition of the limited ecological benefits relative to the potentially adverse social and economic impacts to billfishermen, tournaments, and other shore side businesses, as well as other reasons discussed under the response to Comment 13, the Agency has determined that it may be premature to implement this measure at this time. The Agency will, however, consider catch and release only options as well as other billfish conservation measures in future rulemakings, as necessary and appropriate.

Comment 16: NMFS received comment requesting that the Agency modify alternative E7 to allow for some tournament landings of white marlin. Those comments include: if the Agency cannot go with zero landings, then implement a cap for tournaments that already have a history of landing white marlin. Do not throw out the whole proposal; and, if NMFS prohibits landings of white marlin, the Agency should allow retention of recreationally caught white marlin in tournaments or when prominent billfish tournaments are scheduled.

Response: NMFS appreciates these comments and suggestions to address mortality in the directed billfish fishery. At this time, the Agency does not believe that only allowing Atlantic white marlin to be landed in tournaments is the most appropriate solution, as nearly all Atlantic white marlin reported as retained are landed in tournaments. Further, as some of these suggestions were not analyzed in the Draft Consolidated HMS FMP, they and are beyond the scope of this rulemaking. The Agency will, however, consider catch and release only options as well as other billfish conservation measures in future rulemakings, as necessary and appropriate.

Comment 17: The U.S. only lands less than 1% of the white marlin, so why do we worry about mortality?

Response: The United States is responsible for approximately 4.5 percent of white marlin catches in the Atlantic. Fishing mortality rates are a concern regardless of the size of the U.S. contribution because the current fishing mortality rate is more than eight-times the level that the species can sustain. As a steward of the fishery, it is appropriate for the United States to work toward reducing and limiting both domestic and international fishing mortality rates. The United States will continue its efforts to reduce billfish mortality domestically and through ICCAT at the international level.

Comment 18: NMFS received comment concerned with fishermen shifting target species if white marlin landings are prohibited. Those comments include: it's not desirable to make all of the fish under the ICCAT 250 marlin limit be blue marlin, which is what would happen if white marlin landings are prohibited; I would not support a prohibition on landing white marlin because we will kill more white marlin converting to targeting blue marlin; and, I oppose alternative E7 because fishing effort will be redistributed to different species.

Response: As stated above, NMFS does not prefer to prohibit landings of Atlantic white marlin, at this time. NMFS understands the concern over potential increases in Atlantic blue marlin mortality, given the species' overfished status. The preferred circle hook measure and measures to codify and ensure compliance with the ICCAT marlin landings limit would address mortality of both Atlantic blue and white marlin in the directed billfish fishery. The Agency may consider catch and release only options, as well as other billfish conservation measures, in future rulemakings, as necessary and appropriate.

Comment 19: Tournament spectators can still be involved in release tournaments if you use large viewing screens playing movie clips showing the fight and release of marlins. Dead fish on the dock doesn't allow for this type of participation.

Response: NMFS applauds the innovative efforts of some tournament organizers in working to limit marlin mortality. The Agency urges tournament organizers to be creative and to work to create formats which maximize the social and economic benefits from tournament operations while minimizing impacts to billfish resources.

Comment 20: NMFS received comment recommending that the Agency should implement measures to further reduce marlin mortality in other fisheries. Those comments include: NMFS should implement additional regulations on the pelagic longline fishery, which is responsible for the majority of marlin mortality, not impose landings restrictions on recreational fishermen; alternative E7 places a restriction on recreational fishermen without addressing the real issue; I am opposed to alternative E7 because recreational landings are not the problem; and, the billfish fishery was supposed to be managed for the recreational sector and NMFS has failed to make any meaningful reductions to the longline bycatch issue since 1997.

Response: In recent years, the Agency has undertaken multiple rulemakings intended to reduce bycatch and bycatch mortality in the pelagic longline fishery. Since implementing the 1999 FMP, NMFS has closed multiple areas to pelagic longline fishing, prohibited the use of live bait in the Gulf of Mexico, required the use of circle hooks, as well required the possession and use of dehooking devices. The closed areas and live bait restriction were implemented, in part, to reduce the bycatch of billfish in commercial fishing operations. Circle hook and release gear requirements were implemented to reduce sea turtle bycatch and bycatch mortality, however, these measures likely contribute to reductions in billfish release mortality as well. Further, as discussed in more detail under the response to Comments 1 and 3, recent data and estimates on post-release mortality indicate that the aggregate domestic recreational billfish mortality contribution may be equal to or greater than the aggregate domestic pelagic longline billfish mortality contribution, in some years.

Comment 21: NMFS received comment relating to the ESA listing review of white marlin. Those comments include: Would a prohibition on landings of Atlantic white marlin influence the potential listing of Atlantic white marlin under the Endangered Species Act?; and, selecting alternative E7 will not necessarily prevent an ESA listing of white marlin.

Response: In regard to the Atlantic white marlin ESA listing review, any management measures in place at the time of the review would be considered during deliberations of the listing review team. NMFS cannot forecast the impacts of any particular management action on the outcome of the anticipated ESA listing review.

Comment 22: The white marlin settlement agreement between NMFS and Turtle Island Restoration network does not preclude further regulation of billfish catches under the Magnuson-Stevens Act, but does require a complete reassessment of white marlin by the United States no later than 2007.

Response: The Agency intends to complete the Atlantic white marlin ESA Listing Review on or before December 31, 2007, as per the settlement agreement. NMFS realizes that it has the authority to impose additional restrictions on fisheries which interact with Atlantic white marlin, including the directed billfish fishery; however as discussed under the response to Comment 13, NMFS does not prefer a prohibition on landings of Atlantic white marlin at this time. The Agency believes that the implementation of circle hook requirements is an important first step in reducing billfish mortality in the directed billfish fishery. NMFS will consider catch and release only options as well as other billfish conservation measures in future rulemakings, as necessary and appropriate.

Comment 23: NMFS received comment inquiring about the Agency's legal authority to prohibit landing of white marlin. Those comments include: NMFS does not have the legal authority to restrict landings of Atlantic marlin to levels below ICCAT landings limits; I am opposed to alternative E7 because it is contrary to giving fishermen a reasonable opportunity to catch fish as required by ATCA.

Response: NMFS disagrees. The ICCAT 250 marlin landings limit could apply to both species combined, or one species alone, if landings of the other species were to be prohibited domestically. ICCAT Recommendation 00-13, and the subsequent recommendations that modified it, did not include species specific landings limits or any references to particular landings ratios of between Atlantic blue and white marlin. The ICCAT recommendations simply provided an aggregate annual landing limit that is not to be exceeded. Thus, if the landings of one marlin species were prohibited domestically, anglers would have 250 of the other marlin species available for landing, thereby providing a reasonable opportunity for anglers to fulfill their ICCAT landing limit.

Comment 24: Why is there a timeframe associated with alternative E7? The target should be MSY. The proposed timeframe seems political. A biological threshold seems more appropriate.

Response: NMFS felt that a five-year time frame would allow for adequate time to gauge the potential impacts of such measures on marlin stocks and determine, at that point, if the measures achieved the objectives of the fishery management plan. Additionally, NMFS is required to consider factors beyond biology in making management decisions. However, as noted in the response to Comment 13, NMFS does not to prefer this alternative in the Final Consolidated HMS FMP, but may consider landings prohibitions for Atlantic marlins and other species in future rulemakings, as necessary and appropriate.

Comment 25: Recreational fishermen would release all billfish if they thought it would do any good. However, it will not. The United States has always said that its catch is an insignificant piece of the Atlantic-wide take. The Draft FMP throws this concept out the window and directs its regulatory muscle at a tiny number of recreational billfish landings. It is as if NMFS is deciding to make them a prohibited species before the ICCAT stock assessment or the ESA status review.

Response: NMFS believes that the majority of recreational fishermen understand the value of catch and release fishing for Atlantic billfish as supported by the 75 to 99 percent release rate in this fishery. NMFS believes that catch and release fishing significantly reduces the domestic mortality contribution to the Atlantic-wide stock. The implementation of circle hook requirements for this sector of the fishery is anticipated to further reduce mortality by significantly reducing post release mortality. The Agency recognizes that other ICCAT nations kill significantly more billfish than the United States. In comparison to other nations, the U.S. landings and dead discards represent approximately 2.4 and 4.5 percent of total Atlantic landings of Atlantic blue and white marlin, respectively. Recent information suggests that the U.S. mortality contribution for Atlantic billfish may be significantly higher than previous estimates, given new studies on recreational post-release mortality. This rulemaking acknowledges the U.S. billfish mortality contribution and seeks to minimize this mortality in an appropriate manor.

Comment 26: The entire U.S. recreational fleet and charter/headboats are landing very few white marlin each year, approximately 227 total fish over the last three years. These landings have little or no impact on the stock, but generate tremendous social and economic benefits for coastal communities particularly where tournaments are held.

Response: NMFS acknowledges the significant social and economic benefits that the recreational billfish fishery provides to coastal communities. Additionally, NMFS acknowledges the limited conservation benefit that could be realized from a prohibition on the landings of Atlantic white marlin. This measure was preferred in the Draft Consolidated HMS FMP in addition to a circle hook requirement for tournament billfish fishermen. The Agency preferred these alternatives together in an attempt to maximize reductions in total Atlantic white marlin mortality resulting from the directed billfish fishery. However, as noted in the response to Comment 13, NMFS does not prefer this alternative in the Final Consolidated HMS FMP, but may consider landings prohibitions for Atlantic marlins and other species in future rulemakings, as necessary and appropriate. In the Final Consolidated HMS FMP, the Agency has preferred a non-offset circle hook requirement for HMS permitted vessels participating in billfish tournaments. This measure is anticipated to achieve a substantial reduction in mortality without the potential adverse economic impacts associated with a prohibition on white marlin landings.

Comment 27: NMFS received comment in support of alternative E8, which would allow only catch and release recreational fishing for Atlantic blue marlin. Additionally, one commenter added that alternative E8 may be needed if overfishing cannot be addressed.

Response: As a steward of the fishery, it is appropriate for the Agency to investigate potential options to reduce domestic mortality rates for blue marlin. This alternative was analyzed but not preferred in the Draft Consolidated HMS FMP or Final Consolidated HMS FMP due, in part, to potentially severe negative social and economic impacts, and for other reasons. The United States will continue its efforts to reduce billfish mortality both domestically and at the international level. Additionally, the Agency may consider catch and release only options for Atlantic blue marlin as well as other billfish conservation measures in future rulemakings, as necessary and appropriate.

Comment 28: NMFS received comment opposed to alternative E8, which would allow only catch and release fishing for Atlantic blue marlin from January 1, 2007 to December 31, 2011. Those comments include: we are vehemently opposed to alternative E(8), catch and release only for blue marlin. This is not a conservation issue, this is a socio-economic issue and to implement alternative E8 would be economic suicide; and, this alternative exceeds the ICCAT Recommendations for this species. NMFS should focus on compliance with ICCAT's recommendations. The U.S. directed billfish fishery should be allowed to harvest their allocated quota.

Response: The Agency did not prefer this alternative in the Draft Consolidated HMS FMP, however, it remains a valid management tool available to NMFS if warranted by stock status or other factors. NMFS' preferred alternative E6 would fully implement U.S. international obligations as per ICCAT Recommendation 00-13 and subsequent amendments to it. Additionally, the Agency has preferred other domestic measures in the Final Consolidated HMS FMP to reduce post-release mortality of billfish stocks.

Comment 29: By itself, alternative E8, which would allow only catch and release fishing for Atlantic blue marlin from January 1, 2007 to December 31, 2011, will not substantially reduce blue marlin fishing mortality unless 100 percent circle hook use, careful handling/release tools, procedures, and training are also required. Even then, unless such responsible actions are taken by foreign fisheries, especially in the directed fisheries, reducing the U.S. blue marlin fishing mortality is unlikely to have substantial conservation gains.

Response: NMFS agrees that improved handling and release skills may reduce domestic post-release mortality of billfish and that foreign fishing nations reducing total mortality through reductions in post-release mortality or other measures is critical to improving stock status of Atlantic billfish. NMFS did not consider the other measures suggested in Comment 29, such as careful handling and release tools, and thus, they are beyond the scope of the Final Consolidated HMS FMP, but may consider them in future rulemakings as necessary and appropriate. NMFS also agrees that international cooperation is essential to rebuilding Atlantic billfish populations and, as such, will continue to pursue international billfish conservation through ICCAT.

Comment 30: NMFS should not impose any new restrictions on HMS tournaments until after 2006.

Response: To provide Atlantic billfish tournament operators and participants time to acclimate to new regulations requiring the use of non-offset circle hooks when natural baits and or natural bait/artificial lure combinations are deployed from HMS permitted vessels that are participating in billfish tournaments, NMFS prefers January 1, 2007, as the effective date for these requirements. Barring unforeseen circumstances, no new restrictions would be imposed on HMS tournaments during 2006.

Comment 31: NMFS should consider a limited entry system for tournaments with a specific white marlin quota. Tournaments should be issued a permit and a quota for white marlin kills. Outside of tournaments, recreational vessel owners should be required to have a permit and to abide by a catch-and-release only policy. This would allow for the continuation of HMS tournaments, which provide the largest economic benefits. It would also facilitate more accurate counting of marlin, and provide some fish for biologists to conduct scientific research.

Response: NMFS appreciates the suggestions submitted to the Agency regarding potential additional tournament regulations and other management suggestions for the directed billfish fishery, and asks commenters to continue to submit innovative ideas to improve billfish management. While these suggestions are beyond the scope of this rulemaking because as they were not considered for analysis in the Draft Consolidated HMS FMP, they may be considered in future rule makings, as necessary and appropriate.

Comment 32: How many Atlantic white marlin are brought to the dock in tournaments each year?

Response: Between 1999 and 2004, inclusive, a total of 144 Atlantic white marlin were reported to the Recreational Billfish Survey as landed in tournaments. According to RBS data, landings of Atlantic white marlin in tournaments ranged from a low of eight in 2000, to a high of 36 in 1999, and averaged 24 annually for the six year period under discussion.

Comment 33: All fishing tournament participants should be required to use circle hooks, not just billfish tournament participants.

Response: NMFS believes that the current severely overfished stock status of Atlantic blue and white marlin and the proven ability of circle hooks to reduce post-release mortality support the preferred alternativeto require use of non-offset circle hooks in billfish tournaments. However, NMFS believes that the collection and analysis of more data on the impacts of circle hooks with regard to non-billfish species and fisheries is preferable prior to proposing additional hook and bait requirements for all HMS tournaments. NMFS may consider additional hook and bait requirements for other segments of the HMS recreational fisheries in future rulemakings, as appropriate.

Comment 34: I spend $3,000.00 a year on the White Marlin Tournament in Ocean City, Maryland. There are five fishermen on the boat pumping $15,000 into the Ocean City, Maryland economy on our boat alone. I do not want this tournament to end.

Response: NMFS is interested in seeing a healthy HMS tournament industry continue operations and continuing to provide benefit to the nation. The preferred alternatives regarding Atlantic billfish, implementation of non-offset circle hook requirements under certain conditions in billfish tournaments, and the ICCAT recreational marlin management measures, have been crafted in a way to minimize and mitigate potential adverse socio-economic impacts and are not expected to have significant impacts on billfish tournaments. Please refer to Chapter 4 of the Final Consolidated HMS FMP for additional detail regarding the estimated impacts of the preferred alternatives.

Comment 35: NMFS received several comments, including one from the Gulf of Mexico Fishery Management Council, in favor of increasing the minimum size limits for white and/or blue marlin, including: even a limited benefit is worth implementing; people interested in a smaller size limit are trying to make loopholes so they can catch and keep smaller fish; NMFS should increase the size limit of blue marlin because the Puerto Rico Game fish association has only taken 15 marlin all year in tournaments; increasing the size by approximately 40 percent, we would not have to apply the 250 fish cap; I support E4(b), increasing the minimum size of blue marlin because length and weight are correlated for blue marlin; increase the minimum size for blue marlin to 105” LJFL because most tournaments have a minimum weight of 400 pounds; increasing the minimum size for blue marlin would reduce the number of legal fish landed by one third; there should be at least a 106 inch minimum size limit to allow them to live for three more years and at least two years of spawning; and, I support a minimum size of 104 inches for blue marlin.

Response: The Agency does not prefer to implement an increase in minimum size for blue or white marlin at this time for several reasons. There are limited conservation benefits that might be attained by increasing the minimum sizes for white marlin because relatively few blue and white marlin are landed on an annual basis. In 2004, there were 118 blue marlin and 18 white marlin reported to ICCAT, comprised mainly of tournament landings, but also including North Carolina and Maryland catch card landings, and non-tournament landings reported to HMS. Since the majority of landings occur in tournaments and numerous tournaments already have a minimum size greater than the current minimum size, increasing the minimum size may not have any significant ecological benefits. The Agency has also received information that white marlin might not display a consistent length-weight relationship, meaning that very few of these fish would even attain the minimum size if it were increased.

As indicated above, the United States is currently well under its 250 fish limit imposed by ICCAT and therefore does not need to reduce landings to maintain compliance with international obligations at this time. Lastly, other management measures preferred in this action (mandatory use of circle hooks when using natural bait by HMS angling permit holders in tournaments that have a billfish prize category (alternative E2) and implementation of ICCAT recommendations that establish an in-season adjustment framework to increase minimum sizes or catch and release, if necessary (alternative E6)) should result in the desired conservation benefits by reducing landings if the ICCAT landings limit is approached in the future and reducing post release mortality of billfish caught in tournaments. The Agency may consider permanent modifications to the minimum size in the future as necessary to ensure compliance with international obligations and facilitate rebuilding of blue and white marlin stocks.

Comment 36: NMFS received numerous comments opposing the implementation of a minimum size for white and/or blue marlin as described in Alternative E4 (a), increase the minimum legal size for Atlantic white marlin to a specific size between 68 - 71" LJFL and Alternative E4 (b), increase the minimum size of blue marlin to a specific size between 103-106" LJFL, including: many tournaments already have a larger minimum size than what NMFS has implemented (*i.e.*, 110 inches or 400 lbs), therefore, no benefits will be realized from increasing minimum sizes; NMFS had already established minimum size limits for white and blue marlin and these limits should not be increased; because of the differences in growth patterns between white and blue marlin, an increased size limit for white marlin would be ineffective because these fish grow to size and then put on additional weight and not necessarily length; for white marlin weight and length are not closely correlated for fish above 62 inches LJFL; there is no rationale for increasing minimum sizes, because requiring circle hooks will accomplish the same thing; and, why implement increased size limits to avoid reaching the 250 mark, when the existing regulations seem to work?

Response: NMFS is not preferring an increased minimum size for white or blue marlin at this time, however, may consider modifications to minimum sizes in the future, as necessary. NMFS is unaware of the exact number of billfish tournaments that currently require a minimum size greater than the current Federal regulations, however, they are numerous. Since this is where the majority of reported landings occur, increasing the minimum size may not result in significant positive ecological benefits. In 2004, all but 3 of the 149 billfish reported to ICCAT were landed in tournaments. The United States has been well under its ICCAT allocated quota of 250 billfish/year every year (except 2002) and preferred alternative E6 would implement an increase in the minimum size for white and blue marlin if there is a possibility of approaching the landings limit in the future, mitigating the need to permanently increase minimum sizes to comply with the ICCAT landings limit. NMFS is also preferring an alternative mandating the use of non-offset circle hooks in billfish tournaments by HMS anglers when deploying natural baits to reduce post hooking mortality of released fish. Furthermore, because the majority of billfish are caught and released and catch rates are low (1.03 and 1.13 white and blue marlin per 100 hours angling, respectively), conservation benefits of increasing the minimum size may be minimal.

Comment 37: NMFS received comments both opposing and supporting alternatives E4(a) and E4(b) on the basis that a larger size limit would result in fishermen targeting larger, more fecund females and that NMFS should consider a slot limit to protect these larger, more fecund, marlin.

Response: Generally speaking, the likelihood of landing a more fecund female may increase if NMFS implemented a larger minimum legal size for blue marlin. For white marlin, the correlation between length and age or fecundity is less certain as current information indicate that white marlin may first put on length, and then weight. The fishery is generally opportunistic in nature, with a low CPUE, and with little ability for fishermen to "target" a large or small billfish. Further, the recreational billfish fishery is an overwhelmingly catch and release fishery. As such, while a larger legal minimum size may result in larger fish being landed, it is unlikely that anglers could successfully "target" larger billfish. NMFS appreciates the suggestion of analyzing a slot limit, and encourages anglers to continue to submit suggestions to the Agency, however that is beyond the scope of this rulemaking. As discussed in the response to comment 35, NMFS does not prefer this alternative at this time for the reasons discussed above, however the Agency may consider minimum size changes in the future.

Comment 38: NMFS received a comment asking what data were used to determine the billfish size limits.

Response Size distributions from Atlantic billfish tournaments held from 1995-1997 were used to analyze minimum size alternatives contained in Amendment One to the Billfish FMP (1999), which resulted in the current minimum legal sizes for Atlantic billfish. Minimum size ranges analyzed for this rulemaking were based on RBS landings of white and blue marlin in tournaments between 1999-2004.

Comment 39: NMFS received several comments in support of Alternative E5 (bag limit of one billfish/vessel/day), including: the fact that the United States is under such a limited quota for white and blue marlin (250 fish/year combined for both species); a bag limit might result in some high grading, but it should not be much of a problem; and, if the United States recreational sector is limited to 250 blue marlin and white marlin, it is inappropriate to let one boat come back with more than a single fish on any given day.

Response: NMFS recognizes the concerns of anglers regarding allocation of fish, particularly given the strict marlin landings limits placed upon the United States. As discussed in Chapter Four of the Final Consolidated HMS FMP, the United States is limited to 250 white and blue marlin, combined, on an annual basis, per ICCAT recommendation (00-13). Since 2001, the United States has only exceeded its annual 250 fish limit one time (2002) and that was because of a modification to the accounting methodology for compliance with ICCAT. Alternative E6 would implement ICCAT Recommendations on Recreational Marlin Landings Limits and is a preferred alternative in the Final Consolidated HMS FMP. At this time, there is little evidence that individual anglers are landing excessive numbers of marlin and potentially depriving other anglers of the opportunity to land a marlin. No multiple marlin trips have been reported to the Atlantic billfish and swordfish non-tournament landings system. However, NMFS may consider implementation of a bag limit in the future as necessary and appropriate.

Comment 40: NMFS received several comments objecting to alternative E5 (bag limit of one billfish/vessel/trip) for varied reasons, including: it would encourage the culling of fish; landing a few fish is not the issue; and, a bag limit will not reduce post-release mortality of billfish unless careful handling and release guidelines are followed.

Response: As discussed in the response to Comment 39, there is little evidence, at this time, that individual anglers are landing excessive numbers of marlin on individual trips and potentially depriving other anglers of the opportunity to land an Atlantic marlin. Further, overall landings of Atlantic marlin by U.S. recreational fishermen are low and well below the U.S. marlin landing limit. This is due, in large part to the conservation ethic of the anglers who choose not to land marlin that are legally available for landing. NMFS is always concerned about the potential for increases in culling and discards which may result from regulation. NMFS acknowledges the limited conservation benefit that a bag limit may produce and agrees that a bag limit alone would not reduce post-release mortality. NMFS is preferring a circle hook alternative (E3) in the Final Consolidated HMS FMP that is expected to reduce post-release mortality of Atlantic billfish.

***Gears and Gear Restrictions***

Comment 41: NMFS received comment in support of non-preferred alternative E2, which would require the use of circle hooks in all HMS recreational fisheries when using natural bait, including: only a fraction of the offshore recreational effort occurs in tournaments and that there would be a larger conservation benefit if circle hooks were required in all offshore fisheries. This alternative would facilitate enforcement by requiring that all HMS fishermen use circle hooks; NMFS should require circle hooks, careful handling/release tools and training for all HMS hook and line fisheries that interact with white marlin. This may be the only way for NMFS to prevent an ESA listing for white marlin. It cannot be ignored that the directed recreational fishery is likely the majority of domestic white marlin mortality, which is a minute percent. Unfortunately, even such a sacrifice may not be successful, unless adopted by other foreign fisheries, especially directed fisheries that interact with white marlin. Circle hooks are needed for all HMS fisheries, not just in tournaments. If an HMS fishery interacts with billfish, then it needs to use circle hooks.

Response: NMFS agrees that Atlantic billfish tournaments represent a subset of total fishing effort targeting Atlantic billfish and that there would be a greater conservation gain if circle hooks were required in all offshore recreational fisheries. NMFS is interested in all potential means of further reducing the post-release mortality of all HMS. However, NMFS believes that the collection and evaluation of additional data regarding the impacts of circle hook requirements on non-billfish species and fisheries prior to potentially mandating circle hooks for all HMS fisheries is preferable at this time. Other possible methods of reducing post-release mortality of all HMS could include the use of careful handling and release guidelines, release equipment and training, and may consider the feasibility of additional circle hook and other requirements in the future, as suggested by the commenter. NMFS also agrees that uniform fishery-wide circle hook requirements would likely facilitate enforcement. However, NMFS believes that the requirements for the use of circle hooks by permitted HMS fishermen when natural bait and natural bait/artificial lures are deployed in billfish tournaments, can be adequately enforced by NOAA Enforcement. NMFS further believes that given the conservation ethic of billfish anglers and the vested financial interests of billfish tournament participants in ensuring that all tournament participants compete under the same rules and conditions, that there would be significant self-enforcement of tournament circle hook requirements. The impacts of all regulations in effect, including circle hook requirements, when the Atlantic white marlin ESA Listing Review panel undertakes its deliberations would be taken into consideration by the panel when making its recommendations. NMFS cannot predict the outcome of these deliberations or the direct impact that any particular regulation may have on the outcome of such deliberations. Data indicates that the domestic directed fishery for Atlantic white marlin is responsible for a significant proportion of total domestic white marlin mortality, and may, in some years, exceed the level of mortality inflicted by the domestic pelagic longline fleet. NMFS also agrees that the directed fishery for Atlantic white marlin and the bycatch of this species in other fisheries, represent only a small portion of total Atlantic-wide on both an individual and a collective basis. NMFS also agrees that the recovery of this severely depleted fishery is dependant upon the cooperation of the international community. To this end, the United States has, and continues to aggressively pursue marlin conservation at the international level through ICCAT.

Comment 42: NMFS received conditional support for alternative E2, Effective January 1, 2007, limit all participants in Atlantic HMS recreational fisheries to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations, including; I support the use of circle hooks with natural baits in all HMS fisheries, only if no J-hooks are allowed on board the vessel.

Response: Public comment during the scoping phase of this rulemaking was nearly unanimous on the need to allow the use of J-hooks with artificial lures when fishing for Atlantic blue marlin given the feeding behaviors of this species. Additionally, during analysis of circle hook requirements, NMFS found that the post-release mortality rate of Atlantic blue marlin caught recreationally on J-hooks appears to be comparable to post-release mortality rates of Atlantic white marlin caught recreationally on circle hooks. As such, the preferred alternative, which would require the use of non-offset circle hooks by permitted HMS fishermen when natural bait and natural bait/artificial lures are deployed all billfish tournaments, but would allow J-hooks to be used with artificial lures would reduce mortality in the directed billfish fishery by providing a significant and appropriate conservation benefit.

Comment 43: NMFS received comment opposing Alternative E2, including: I do not support alternative E2; I am concerned about requiring circle hooks in all HMS fisheries because dolphin, wahoo, king mackerel, and inshore fisheries could be impacted; how would NMFS determine who is in the HMS fishery?; I strongly oppose requiring the use of circle hooks in all HMS fisheries because circle hooks do not work on swordfish and the catch rate goes down; and there may be a problem in terms of enforcement with making circle hooks mandatory in all HMS fisheries (alternative E2), but it could work in Atlantic billfish tournaments (preferred alternative E3).

Response: NMFS acknowledges that requiring circle hooks in all HMS fisheries could have impacts on secondary fisheries, including dolphin, wahoo, king mackerel, and other inshore fisheries. As previously acknowledged, NMFS would prefer to collect additional data on the impacts of fishery-wide circle hook requirements. Such data collection would include HMS fisheries and may also include some non-HMS species and fisheries. The NED circle hook study indicated that deployment of circle hooks in the commercial pelagic longline fishery can result in a decrease in the number of swordfish caught under some oceanographic conditions. However, NMFS has only limited data on the impact of circle hooks in the recreational swordfish fishery. With regard to enforcement, NMFS believes that given the conservation ethic of billfish anglers and the vested financial interests of billfish tournament participants in ensuring that all tournament participants compete under the same rules and conditions, there would be significant self-enforcement of tournament circle hook requirements.

Comment 44: NMFS received comment on the adequacy of data and assumptions made in support of non-preferred alternative E2, which would require all HMS fishermen to use circle hooks when using natural bait and preferred alternative E3, which would require the use of non-offset circle hooks in billfish tournaments when using natural bait, including: NMFS cannot justify alternatives E2 or alternative E3. We do not believe that there is data to support the preferred alternative to require circle hooks in tournaments; and, the assumptions made to support the use of circle hooks are not specified in the text and leads one to believe that there are another set of assumptions, which would not support the use of circle hooks. Where the '23 percent overall' figure comes from is not discoverable in the text. It is one of those derived from assumptions that are not spelled out. The "65.7 percent" figure is right from the Horodysky and Graves study which, as argued, is simply insufficient to support any of the proposals.

Response: NMFS disagrees. The significant potential reductions in post-release mortality of recreationally caught Atlantic billfish that are anticipated to be achieved through the shift from J-hooks to non-offset circle hooks in the directed fishery provide ample support for implementing these measures. A potential reduction by two-thirds in the post-release mortality of Atlantic white marlin would be a landmark achievement in efforts to reduce fishing mortality. The shift to circle hooks in the directed Atlantic billfish fishery would be the most effective single management tool known to the Agency at this time to control post-release mortality, and would have the added benefit of having minimal impacts on the fishery. NMFS has relied on publicly available peer-reviewed scientific papers and available recreational data sets in developing its analyses. The assumptions made to support the use of circle hooks are clearly articulated in Chapter 4 of the Draft Consolidated HMS FMP. The reference to 23 percent overall reduction simply represents another statistical perspective on the anticipated reduction. It represents the change in absolute terms of reducing the estimated post-release mortality of Atlantic white marlin from 35 percent overall on J-hooks to approximately 12 percent overall on circle hooks (35 percent – 12 percent = 23 percent). The 65.7 percent figure represents the relative decrease in post-release mortality between J-hook and circle hook caught Atlantic white marlin (23 percent / 35 percent = 65.7 percent).

Comment 45: NMFS received a number of comments opposing preferred alternative E3, which would require the use of non-offset circle hooks by HMS permitted fishermen participating in billfish tournaments when using natural baits, including: we support the voluntary use of circle hooks and oppose mandating use of circle hooks in tournaments when using natural baits; if NMFS lets the recreational and charter/headboat fleet implement circle hooks on a voluntary basis, there will be 90% or better compliance at using circle hooks in a year or two; all south Florida tournaments have already voluntarily converted to circle hooks because they work, NMFS should ask tournament directors to add 5 extra points to anglers who used circle hooks to catch their fish; the number of fish saved will be ten times greater with the voluntary use of circle hooks rather than mandatory use, because the public does not like to be forced into doing things; individual tournaments should be allowed to determine which type of hook is most appropriate for their own needs; we agree with NMFS that promoting their use in tournaments will result in non-tournament anglers using them also, however it should not be required by regulation. Anglers will ignore the circle hook requirement at tournaments and will choose the best tackle to win. The blue marlin fishery is a mixed fishery and circle hooks do not work well on other tournament species such as wahoo; enforcing circle hook requirements will be difficult or impossible, especially at tournaments; circle hooks need to be phased in through angler education, because they are not enforceable at this time with no proposed specifications; NMFS should educate anglers on the use and benefits of circle hooks. NMFS needs to provide specifications on circle hooks (offset, circularity, shank length, size, gap, etc.) before requiring them; I don't want NMFS to advocate one hook manufacturer over another; NMFS needs written specifications that are clear to everyone in order to encourage compliance; Circle hooks could potentially have huge negative economic impacts on tournaments. They may decrease anglers' ability to catch non-billfish species that are landed for food or tournament winnings and as such may decrease willingness to participate in tournaments. This commenter also noted that the transition to circle hooks may require angler to invest between $15,000 and $20,000 in the way they fish tournaments; potential adverse economic impacts of implementing circle hooks may outweigh the conservation benefits derived from anticipated decreases in post-release mortality and as such other areas of conservation should be explored; anglers need to use J-hooks with artificial lures because of the way marlin feed; circle hooks do not work well for species that are trolled for at higher speeds; fish do not get gut hooked with J-hooks and artificial bait. Anglers need natural bait with circle hooks because the use of circle hooks for marlin fishing with lures will not work. Marlins smack the live bait with circle hooks and will get hooked in the mouth or bill so there is very little chance of gut hooking anything; the best way to catch them [blue marlin] is to slow troll natural bait with no drop back. Circle hooks may not work without a drop back; and, I oppose Alternative E3 because it falls short of what is needed.

<u>Response</u>: NMFS disagrees that there will be significantly greater use of circle hooks by anglers in the Atlantic billfish fishery if circle hook use remains voluntary, as opposed to being required under certain circumstances. Circle hook use has always been voluntary, and yet significant portions of the fishery continue to use J-hooks. Further, NMFS has been actively encouraging the use of circle hooks in HMS Fisheries since 1999. NMFS advocated circle hook use through placement of articles on circle hooks, held discussions with industry leaders to encourage their use and educate anglers on their benefits, recommended their use during public hearings and elsewhere, and encouraged circle hook use in tournaments by affording monetary support to provide incentives to anglers for their use. While there has been some progress in sectors of the fishery, anecdotal evidence suggest that substantial portions of the fishery continue using J-hooks as the standard hook. With the substantial conservation benefit associated with the use of circle hooks, recent information suggesting that the post-release mortality rate of Atlantic white marlin caught recreationally on J-hooks is substantially higher than previous estimates, data indicating that the mortality contribution of the recreational community toward Atlantic marlin may equal or exceed that of the pelagic longline fishery in some years, and the fact that circle hook requirements are already in place in the pelagic longline fishery, NMFS prefers to require non-offset circle by HMS permitted vessels participating in billfish tournaments when deploying natural baits at this time.

As discussed in the response to Comment 41 regarding enforcement of circle hook use in tournaments, NMFS believes that given the conservation ethic of billfish anglers and the vested financial interests of billfish tournament participants in ensuring that all tournament participants compete fairly under the same rules and conditions, there would be significant self-enforcement of tournament circle hook requirements. A general definition of circle hooks is included in the current Federal regulations governing Atlantic HMS, and NMFS understands the desire of tournament operators for additional circle hook specifications. However, as there are no industry standards with regard to hook specifications, NMFS is not prepared to provide an index of detailed hook specifications for each size circle hook that could be used in the recreational billfish fishery at this time. NMFS is continuing to work on various definitions of circle hooks that could be applied in future rule makings. Further, to ease concerns of anglers and simplify hook choice, NMFS is considering undertaking efforts to work with hook manufacturers to ensure that all hooks marketed as circle hooks are true circle hooks. NMFS disagrees that implementation of circle hooks requirements would cause large adverse economic impacts. NMFS has not seen evidence that participation in the fishery would decrease as a result of circle hook use. Further circle hooks have been shown to increase catch rates of some billfish and are, on average, slightly less expensive than J-hooks. Many commenters suggested that if circle hook use were left voluntary that compliance rates would be very high. The implication of commenters is that mandatory circle hook use, where all anglers are subject to the same regulations and conditions, would create some significant artificial cost or economic losses, while universal voluntary use of circle hooks would not create such costs, or that such costs would be somehow reduced or more acceptable to anglers. NMFS agrees that circle hooks may impact the catches of some non-HMS species, but cannot predict whether these catches may increase or decrease. However, to clarify, it should be noted that circle hooks would only be required to be deployed on HMS permitted vessels participating in billfish tournaments when natural baits or natural bait/artificial lure combinations are deployed. Based on public comment during scoping and an examination of post-release mortality data of blue marlin caught on J-hooks, NMFS would allow anglers on HMS permitted vessels in billfish tournaments to continue to use J-hooks with artificial lures. NMFS remains convinced that implementing non-offset circle hook requirements in Atlantic billfish tournaments when natural baits or natural bait/artificial lures are deployed from permitted HMS vessels would be an important and productive first step that would noticeably reduce mortality in the U.S. directed billfish fishery.

Comment 46: I am concerned that alternative E3 specifies circle hooks for "all Atlantic billfish tournament participants" rather than "HMS-permitted vessels in all Atlantic billfish tournaments."

Response: NMFS agrees. NMFS has made a technical clarification to the wording of the alternative to correct any misperceptions. NMFS did not intend, nor mean to imply, that regulations governing 50 CFR part 635 would apply to fisheries under the jurisdiction of the regional fishery management councils. It should be noted that NMFS analyzed this alternative from the perspective of applying circle hook requirements to only HMS-permitted vessels. To clarify, recreational circle hook requirements would apply only to Atlantic HMS permitted vessels participating in Atlantic billfish tournaments when deploying natural baits or natural bait/artificial lure combinations.

Comment 47: NMFS received a number of comments in support of preferred alternative E3, Effective January 1, 2007, limit all Atlantic billfish tournament participants to using only non-offset circle hooks when using natural or natural bait/artificial lure combinations, including: I support alternative E3, which would require circle hooks in Atlantic billfish tournaments; the results of recent circle hook studies are very compelling; NMFS should make a tough decision and implement circle hooks because they work; circle hooks can help with catch and release by reducing post-release mortality; NMFS must reduce mortality on marlin and should require circle hooks; limiting tournaments to circle hooks should reduce post-release mortality and provide additional conservation to billfish in the recreational fishery. Mandatory use is viable in the tournament setting. Outside of tournaments, NMFS needs an aggressive education program to promote the use of circle hooks; it is easy to get a circle hook back, and circle hooks have the benefit of not leaving any gear on the fish; circle hooks do work, save fish, and result in less hooking trauma; I support the use of circle hooks, but they may not work with combination baits; Our club adopted the use of circle hooks exclusively for all our tournaments, and we generally have a short ten to 15 minute release time on sailfish and white marlin, which minimizes stress on the animal; we support alternative E3, non-offset circle hooks with dead or live natural baits in tournaments, but a circle hook needs to be clearly defined; circle hooks should be mandatory for billfish tournaments; I support the mandatory use of circle hooks in billfish tournaments because it is enforceable. Tournament directors can give out hooks or inspect them; Tournaments are a good place to start implementing circle hooks; there is an international movement to use circle hooks; the U.S. needs to put circle hook requirements on paper to show ICCAT our commitment and credibility, rather than doing this voluntarily; the international focus needs to be on improving the post-release mortality of Atlantic billfish and requiring circle hooks in U.S. fisheries will help with this effort; and, the recreational sector claims they are not ready for circle hooks, but the commercial sector was forced to move to circle hooks. Anything that can be done to reduce mortality is good. The commercial fishing sector has stepped up to the plate, so the recreational community should do the same.

Response: NMFS agrees with comments suggesting that implementing circle hook requirements in tournaments would likely reduce post-release mortality of billfish caught in tournaments, and should help reduce the overall fishing mortality rate of Atlantic marlins. Recent data indicates that switching to circle hooks could reduce post-release mortality rates for individual fish by approximately two-thirds. NMFS also agrees with comments indicating the mandatory circle hook use in tournaments would be viable and enforceable for the reasons discussed in the response to Comment 41. NMFS also concurs with the need to continue educational efforts to better educate anglers in the use and benefits of circle hooks, as noted by some commenters, and encourages anglers to minimize fight times, release fish quickly, and to release fish in a manner the maximize the probability of survival to further minimize billfish mortality. NMFS agrees with commenters who suggest that there is growing international momentum to use circle hooks in various fisheries. However, NMFS sees a need for continuing pressure on the international community to implement circle hook use more rapidly. As discussed, in the response to Comment 46, a general definition of circle hooks is included in the current Federal regulations governing Atlantic HMS, and NMFS understands the desire of anglers and tournament operators for additional circle hook specifications. However, an index of detailed hook specifications for each size circle hook that could be used in the recreational billfish fishery is not available at this time. NMFS is continuing to work on various definitions of circle hooks that could be applied in future rule makings. Further, to ease concerns of anglers and simplify hook choice, NMFS is considering undertaking efforts to work with hook manufacturers to ensure that all hooks marketed as circle hooks are true circle hooks. Implementing circle hooks requirements in portions of the domestic recreational billfish fishery would provide a means of applying additional pressure to the international community on this issue, and further demonstrating the commitment of the United States to billfish conservation. Improving post-release mortality in both the commercial and recreational fisheries is a critical component of halting the current decline of Atlantic marlin populations. NMFS agrees that the commercial fishing sector is subject to a significant number of restrictions to reduce bycatch and bycatch mortality, however, the Agency is cognizant of the fact that recreational and commercial sectors are unique and need to be managed in ways most appropriate for each of them, as well as for the health of the fish stocks under consideration. In some instances, this may mean implementing comparable measures between sectors of the fishery, but in other cases, such actions may not be appropriate. With regard to circle hook requirements analyzed in this rulemaking, the data overwhelmingly indicate that circle hooks can substantially reduce post-release mortality in the recreational billfish fishery.

Comment 48: NMFS received a number of comments conditionally supporting implementation of circle hooks in billfish fisheries, including: the use of circle hooks should be voluntary until NMFS develops a specification on the off-set and shank length; we support alternative E3, circle hooks in tournaments, provided it includes provisions to conduct cooperative scientifically valid research, determine and specify minimum design specifications for circle hooks, require the handling and release equipment be on board, and allow for voluntary participation in handling and release workshops. The current definition for a circle hook is not adequate. Rather, NMFS needs to outline minimal design specifications as was done in the NED experimental design; and, if voluntary conversion to circle hooks is low, then I would support their mandatory use.

Response: As discussed fully in Chapter 4 of the Final Consolidated HMS FMP and in the response to Comment 45, NMFS believes it is appropriate to implement particular circle hook requirements for HMS permitted vessels participating in Atlantic billfish tournaments at this time, despite a lack of detailed circle hook specifications. NMFS is continuing to work on development of more detailed circle hook specifications, but believes that the conservation benefits derived from implementation of circle hook requirements at this time outweigh any possible adverse impacts that may result from a lack of detailed circle hook specifications. NMFS has not considered or proposed implementing any restrictions on scientific research in this Final Consolidated HMS FMP. Interested parties would be able to conduct scientific research as appropriate under the preferred circle hook alternative. Should the design of such scientific research call for utilizing gears or undertaking activities prohibited by regulation, interested parties may apply for either an Exempted Fishing Permit or Scientific Research Permit, whichever type of permit would be most appropriate. Requiring handling and release equipment and workshops for the recreational sector is beyond the scope of this rule making, but may be considered in a future rule making, if appropriate. NMFS is preferring mandatory shark identification workshops for Federally permitted shark dealers, as well as mandatory protected resources identification and release and disentanglement workshops for longline and gillnet vessel owners and operators. However, to the extent possible these workshops would be open to other interested parties, including recreational fishery participants. As previously discussed, NMFS is unable to determine what percentage of billfish trips deploy circle hooks. However, the Agency believes that the data clearly demonstrate significant conservation benefits can be derived from the use of circle hooks in the portions of the recreational billfish fishery.

Comment 49: NMFS received comment regarding the timing of implementing possible circle hook requirements suggesting the need for a short phase-in of circle hooks into tournaments and the recreational fishery and advance notice of impending circle hook regulations to allow for changes in the production of rules and advertising, and to inform tournament participants of potential circle hook requirements. Commenters also suggest that increased educational efforts should be undertaken to promote and enhance the growing recreational awareness and use of circle hooks.

Response: NMFS agrees. NMFS surveyed a number of tournament operators in the Atlantic, Gulf of Mexico, and Caribbean to better understand various aspects of tournament operations. NMFS determined that a delayed date of effectiveness of between four and six months would likely provide adequate time for tournament operators and participants to adjust tournament rules, formats, and advertising, as necessary, as well as to notify anglers of changes, and allow anglers to adjust fishing practices and take other steps, as appropriate, to minimize any potential adverse impacts stemming from preferred circle hook requirements. As such, given the anticipated publication date for the Final Consolidated HMS FMP of July 2006, and the anticipated publication date for the Final Rule of August 2006, NMFS prefers to maintain the effective date of January 1, 2007, for preferred alternative E3. This effective date would be consistent the effective date proposed for preferred alternative E3 as contained in the Draft Consolidated HMS FMP. NMFS has also had a public circle hook public education program in place for a number of years to educate anglers and encourage the use of circle hooks in recreational fisheries.

Comment 50: Why would the recreational fishery not be allowed to have offset hooks, while the PLL fishery can have a 10% offset?

Response: Pelagic longline circle hook and bait requirements were developed to specifically address bycatch and bycatch mortality of Atlantic sea turtles, while the preferred circle hook requirements for Atlantic HMS permitted fishermen participating in Atlantic billfish tournaments are intended to reduce post-release mortality of Atlantic billfish. In other words, they were developed to address different issues. The pelagic longline fishery may only possess circle hooks offset up to 10 degrees if they are 18/0 or larger in size. The offset was determined to be necessary to allow the use of large baits (*e.g.* whole Atlantic mackerel), which can act as a shield to the hook. The recreational billfish fishery typically uses significantly smaller hooks (sizes 8/0 and 9/0), which, if offset, may diminish the conservation benefit of circle hook requirements by resulting in higher rates of deep hooking and soft tissue damage to vital organs.

Comment 51: NMFS received comments on the potential applicability of circle hook requirements of preferred alternative E3, which would require billfish tournament participants to use non-offset circle hooks when deploying natural baits, including: would participants in tournaments that offer prizes for both billfish and non-HMS species be required to use circle hooks for the non-HMS species; and would the circle hook requirement apply to vessels fishing in U.S. waters, or to all U.S. flagged vessels everywhere?

Response: HMS permitted vessels participating in Atlantic billfish tournaments would be required to use non-offset circle hooks when deploying natural baits and natural bait/artificial lure combinations. However, HMS permitted vessels participating in Atlantic billfish tournaments would be able to deploy J-hooks on artificial lures. Circle hook requirements would pertain to U.S. flagged vessels possessing an HMS permit and participating in an Atlantic billfish tournament regardless of where that vessel was fishing.

Comment 52: NMFS received a number of comments and suggestions on potential gear and bait restrictions or policy programs beyond those analyzed in the Draft Consolidated HMS FMP, including: there should be no live bait fishing; prohibit the use of "live bait" in all HMS J-style hook fisheries and areas known to have billfish interactions; the use of kites and offset circle hooks may be more damaging than J-hooks; NMFS should allow only one hook per lure to reduce foul hooking and injuries to the fish and anglers; NMFS should implement minimum line test requirements during the season or in tournaments; and, NMFS should create a buyback program for J-hooks; and, it would be useful to convene a summit of HMS tournament directors to work on a protocol to get anglers to switch to circle hooks.

Response: NMFS appreciates the thoughtful and creative suggestions made by commenters to address billfish issues. However, these ideas were not considered in the Draft Consolidated HMS FMP and, as such, are beyond the scope of this rulemaking. These issues may be may be considered in a future rulemaking if appropriate.

Comment 53: NMFS received a number of questions specific to tournaments landings of billfish in South Carolina, including: how many billfish are caught annually in South Carolina tournaments? What is the number harvested for weigh-in versus number released? What is the estimated mortality for those released? What is the financial gain to the state and does this offset the number of fish kept or lost?

Response: An examination of the Recreational Billfish Survey, which records tournament landings, indicates that there were an average of four Atlantic billfish (blue marlin, white marlin, and sailfish) landed in South Carolina in tournaments annually for the period 1999 – 2004, inclusive. There was a high of seven (blue marlin) landed in tournaments in South Carolina in 1999, with a low of one (blue marlin) landed in 2002. In total, for the period 1999 - 2004, there were 25 billfish retained and 73 released in tournaments, as reported through the RBS. According to RBS data, there were between seven and eight (7.6) tournaments per year conducted in South Carolina. Rounding-up to an estimate of eight tournaments per year, and applying an average value of $1,375,481 per tournament, the estimated impact to coastal South Carolina equates to $11,003,848. NMFS does not understand the implication of the question "does this [value] offset the number of fish kept or lost." If the commenter is suggesting that the preferred alternatives to address billfish mortality would result in the cancellation of South Carolina's tournaments and the loss of the estimated $11 million dollars to the state, NMFS disagrees with this suggestion. First, circle hook requirements would not likely result in decreased tournament participation, given the high catch and release rate practiced by billfish anglers, the fact that all tournament anglers would have to abide by the same circle hook requirements from Maine to Texas to the U.S. Caribbean, the already low number of marlins landed in South Carolina, and the fact that marlin are available for landing. Further, NMFS does not believe that South Carolina tournaments are likely to realize any impacts from the 250 recreationally landed marlin landing limit, because with the switch to the calendar year fishing year management cycle, South Carolina tournaments all occur before the date at which estimated impacts may occur, under the assumptions made in Chapter four of the Final Consolidated HMS FMP.

***Circle Hooks And/Or Post-Release Mortality Data***

Comment 54: NMFS received several comments on the adequacy of some of the studies cited in development of the Draft Consolidated HMS FMP, including: the Horodysky and Graves study is flawed because it is based on a sample size of only 40 fish and because they landed the fish in 30 - 40 minutes which is unreasonable. Most anglers will land their fish much more quickly in 5 - 10 minutes thus reducing stress on the fish and increasing survival rates; the Horodysky and Graves study concludes that there is a 35 percent greater likelihood that a white marlin will survive release if taken on a circle hook, rather than a J-hook. Other factors resulting in post-release mortality must come into play; *e.g.*, no one would expect fish fought for 83 minutes ((DR02-04) or 46 minutes (VZ03-11) to survive and it has nothing to do with the type of hook used. Yet, the study takes into consideration nothing but the type of hook used to conclude that hook type alone results in a lower mortality rate; I have problems with one of the circle hook studies cited because one of the authors was sent to a Guatemalan fishing lodge, and the captains on these vessels were required to use offset circle hooks only versus non-offset circle hooks. The study was done in the Pacific Ocean. The methods in the study do not represent how fishermen fish. This study does not have a comparison of circle hooks with J-hooks.

Response: NMFS appreciates the concerns expressed over the methods and or validity of the studies cited in the Final Consolidated HMS FMP. Nevertheless, the studies cited in Final Consolidated HMS FMP have been peer-reviewed and constitute the best available science regarding the topics under discussion. NMFS would appreciate receipt of additional relevant peer-reviewed studies on these subjects of which commenters may be aware. NMFS is always searching for, interested in applying, and required to utilize the best available science on relevant issues.

Comment 55: NMFS received a number of comments which provided research and data collection recommendations or asking about the availability of certain data, including: we recommend research to determine the impacts of circle hooks on catch rates, not only of billfish, but other species such as dolphin, wahoo, and tuna; NMFS should conduct studies on the post-release mortality of sailfish with circle versus J-hooks in the Atlantic Ocean. Do not rely on studies from the Pacific Ocean because the sailfish are different between the oceans; more data via PSAT tagging and angler experience is needed to provide a foundation for any drastic change in regulations pertaining to marlins; has there been any research on exhaustion mortality, *e*.g., fighting fish for different times on different gear (drop back, hook type, etc) and the resultant impacts on mortality?; we see big blue marlin occasionally and are wondering about post-release mortality and catch-and-release rates. Predation should be considered in estimating post-release mortality; NMFS should conduct additional studies to identify more effective ways for the pelagic longline fishery to reduce bycatch of marlin and sharks; NMFS should evaluate the impacts of using “live bait” and circle-style hooks as well as careful handling and release tools and procedures; and, NMFS should further investigate how the feeding and behavior of Atlantic blue marlin may affect catch rates with circle hooks.

Response: NMFS appreciates these research recommendations as a way to help guide future research efforts and funds. The Agency is always looking for, and appreciative of, relevant research suggestions and additional data that can benefit the management of Atlantic HMS. While these suggestions are beyond the scope of this rule making, the answers to many of the research suggestions could potentially benefit management. Some of the research suggestions contributed by commenters are currently under investigation by either NMFS or private sector entities. NMFS will consider these suggestions in the future, as appropriate.

Comment 56: Off-set circle hooks show less mortality than non off-set circle hooks.

Response: NMFS is unaware of data showing off-set circle hooks result in a lower mortality rate than non-offset circle hooks. NMFS would appreciate being supplied with any such data that may support this contention, and will consider it in future rule makings, as appropriate.

Comment 57: The Agency has not published specifications for circle hooks and I am requesting clarification of the definition of non-offset circle hooks by NMFS because, in part, each manufacturer creates its own definition for non-offset circle hooks.

Response: A general definition of circle hooks is included in the current Federal regulations governing Atlantic HMS, and NMFS understands the desire of tournament operators for additional circle hook specifications. The current definition of a circle hook, as per, 50 CFR Part 635 is: "A circle hook means a fishing hook originally designed and manufactured so that the point of the hook is turned perpendicularly back toward the shank to form a generally circular or oval shape." NMFS is continuing to work on various definitions of circle hooks that may lead to a more refined hook definition in the future. At this time, however, an index of detailed hook specifications for each size circle hook that could be used in the recreational billfish fishery is not available. There are no industry standards with regard to hook specifications. As detailed under the discussion of preferred alternative E3, in Chapter 4 of the Final Consolidated HMS FMP, NMFS finds that it is appropriate to require the use of non-offset circle hooks in portions of the recreational billfish fishery at this time in an effort to reduce post-release mortalities in the recreational billfish fishery. Further, to ease concerns of anglers and simplify hook choice, NMFS is considering undertaking efforts to work with hook manufacturers to ensure that all hooks marketed as circle hooks are true circle hooks.

Comment 58: The Maryland Department of Natural Resources submitted a comment indicating that they would be willing to work with NMFS to teach voluntary use of circle hooks, noting that anglers must learn how to fish these hooks and that education for the offshore fishermen is necessary.

Response: NMFS appreciates the State of Maryland's willingness to work with the Agency to reach out to anglers and educate them on the use of circle hooks. Circle hooks have been to shown to effectively reduce post-release mortality of many species and while having little impact on rates of catch. The Agency hopes that the offer by the State of Maryland will remain open if the preferred alternative to implement circle hook requirements is finalized.

Comment 59: NMFS' statement in the Draft Consolidated HMS FMP that increases in recreational fishing effort and stable fishing mortality indicate that white marlin are decreasing in number is incorrect. Fishing mortality has not increased, the recreational fishing community is releasing more of them.

Response: NMFS was unable to locate this statement in the Draft Consolidated HMS FMP. However, NMFS believes that the commenter may have intended to state that increases in recreational fishing effort and stable landings of white marlin indicate that white marlin may be decreasing in number. The number of recreationally landed Atlantic white marlin reported to ICCAT between 2001 and 2004 varied considerably, ranging from a high of 191 in 2002 to a low of 23 in 2003. The number of Atlantic white marlin reported to NMFS via the Recreational Billfish Survey has remained relatively stable over the same period. However, the release rate of live Atlantic white marlin in the recreational fishery has also remained stable. In the face of increased effort, a lack of increases in landings, when coupled with stable release rates implies decreased angler success. Decreased angler success could be attributable to a number of factors, and one legitimate assumption, given that the fishing mortality rate of Atlantic white marlin is more than eight times higher than the population can sustain, is that it could be the result of diminished populations. Furthermore, as discussed in Chapter 4 of the Final Consolidated HMS FMP, the current estimate of recreationally caught Atlantic white marlin post-release mortality is now significantly higher than previous estimates, so an increase in the number of releases would be anticipated to result in additional mortalities.

Comment 60: Six to ten thousand white marlin are caught each year by U.S. fishermen, both commercial and recreational. I have data showing that commercial mortality is higher than recreational mortality in general, but in the past 6 years, the recreational mortality has exceeded the commercial mortality.

Response: New post-release mortality estimates allowed NMFS to examine total mortality contributions of the commercial and recreational sectors regarding Atlantic white marlin over the past four years. Mortality varies greatly by year and data set. In some years, using some data sets, the recreational mortality contribution appears to exceed the commercial mortality contribution and in some years the reverse appears to be true. Please see Appendix C in the Final Consolidated HMS FMP for more detailed information by year and fishery sector. Appendix C provides a ranges of mortality estimates, but does not attempt to definitively identify mortality contributions, rather, the estimates provided in that table are intended to provide reference points for discussion. NMFS will continue to examine this issue as new and refined data become available.

***Elimination of the 'No Sale' Exemption***

Comment 61: The "no sale" exemption for Atlantic billfish should be removed. The sale of all billfish in the United States should be prohibited.

Response: NMFS agrees that the exemption to the no sale provision for Atlantic billfish should be removed and prefers to do so. However, NMFS does not agree that the sale of all billfish, including those from Pacific stocks should be prohibited. Stock status of Pacific billfish is currently unknown, and as such a nation-wide ban on the sale of billfish may not be appropriate. The Certificate of Eligibility program in place for Atlantic billfish is designed to ensure that no Atlantic billfish enter the stream of commerce, while allowing Pacific billfish to legally be sold. However, the Agency may reconsider a prohibition on the sale of Pacific billfish in the future, as necessary and appropriate.

Comment 62: The potential ecological impact of billfish sales from fishermen in Puerto Rico would be minimal because the individuals who may sell Atlantic billfish take only 10 – 15 fish a year, and only keep fish that come to the boat dead in an effort to minimize waste.

Response: NMFS has little data on the extent of illegal sales of billfish in Puerto Rico, and as such cannot verify the veracity of the commenter's claims. As such, the Agency cannot assess their impact. NMFS has received a significant number of anecdotal reports of sales of Atlantic marlin in Puerto Rico. The number of these anecdotal reports suggests that a sizable number of Atlantic marlin may be illegally sold and implies that more than just those fish that come to the boat dead are illegally entered into commerce.

Comment 63: The sale of billfish is legal outside of the United States. Do foreign vessels fishing in waters of the United States need to obtain U.S. fishing permits and abide by U.S. regulations?

Response: The sale of Atlantic billfish is legal in most ICCAT nations. Foreign commercial vessels are not allowed to fish in waters of the United States without explicit permission from the Secretary of Commerce and the Secretary of State, and being provided a Total Allowable Level of Foreign Fishing (TALFF). Such vessels would be subject to strict regulation, and a number of conditions that would not ordinarily apply to U.S. vessels. Foreign flagged recreational vessels may obtain an HMS Angling category permit. In such cases, the U.S. recreationally permitted foreign flagged vessels would be subject to U.S. regulations.

Comment 64: How many comments were received from Puerto Rico on the proposed removal of the no sale exemption for billfish?

Response: No comments from Puerto Rico directly addressed removal of the no sale provision. However, one commenter from Puerto Rico requested increased law enforcement at establishments that may illegally sell Atlantic billfish, such as restaurants. NMFS interprets this comment to be supportive of prohibiting sale of Atlantic marlin. Further, the Caribbean Fishery Management Council adopted a motion supporting elimination of the exemption to the no-sale provision in August of 2005.

***General Billfish Comments***

Comment 65: The proposed Atlantic billfish alternatives are in direct conflict with the 1988 Billfish FMP and the 1999 Billfish FMP Amendment's stated objective of "Maintaining the highest availability of billfishes to the United States recreational fishery by implementing conservation measures that will reduce fishing mortality."

Response: NMFS disagrees. The preferred Atlantic billfish alternatives are consistent with the stated objective of maintaining the highest availability of billfishes to the United States recreational fishery by preferring conservation measures that would reduce fishing mortality. Recent studies by Cramer (2005) and Kerstetter (2005-in press) and analyses in the Final Consolidated HMS FMP indicate that recreational fishing activities contribute significantly to Atlantic billfish mortality. Because biomass levels of both Atlantic blue and white marlin are currently very low, it is imperative for NMFS to implement conservation measures on the domestic recreational Atlantic billfish fishery to reduce post-release mortality and better ensure the highest, long- term availability of these important species to the United States recreational fishery. The preferred management measures, specifically the requirement to utilize non-offset circle hooks when deploying natural bait in billfish tournaments, would be an important step towards accomplishing this objective.

Comment 66: NMFS must determine the sustainable biomass for spearfish and sailfish independently, as soon as possible.

Response: Due to the highly migratory nature of these species, stock assessments are conducted by the Standing Committee on Research and Statistics (SCRS) of ICCAT. The last assessment for sailfish was conducted in 2001. The SCRS expressed concern about the incomplete reporting of catches, lack of sufficient reports by species, and evaluations of new methods used to split the sailfish and spearfish catch and to index abundance. The SCRS recommended that all countries landing sailfish/spearfish, or having dead discards, report these data to the ICCAT Secretariat. The SCRS also indicated that it should consider the possibility of a spearfish "only" stock assessment in the future.

Comment 67: I support decreasing the mortality on Atlantic billfish as much as possible; the focus of billfish management has to be on post-release mortality.

Response: The preferred management measure alternative E3, which would require the use of non-offset circle hooks with natural bait in billfish tournaments, is intended to reduce the post release mortality of Atlantic billfishes. A recent study by Horodoysky and Graves (2005) has shown that circle hooks can reduce post-release mortality on white marlin by as much as 65 percent, when compared to J-hooks.

Comment 68: Billfish conservation is an international problem, and the focus has to be international.

Response: NMFS agrees that billfish conservation is an issue that must be addressed at the international level. Nevertheless, given the very low biomass levels of Atlantic blue and white marlin, and the importance of these species to the domestic recreational fishery, it is prudent, and consistent with the precautionary management approach, to implement measures to reduce post-release mortality to the extent practicable in the domestic recreational Atlantic billfish fishery. The United States will continue to vigorously pursue international agreements at ICCAT to reduce billfish mortality levels caused by foreign fishing vessels.

Comment 69: NMFS should designate all marlin, spearfish, sailfish, and sharks as catch-and-release species, and allow fishing for these species only with rod and reel and circle hooks.

Response: In the Draft Consolidated HMS FMP, NMFS proposed a prohibition on landings of Atlantic white marlin. Although there was some support for this measure, many commenters indicated that a white marlin landings prohibition was unnecessary, and that it would produce significant adverse social and economic impacts. After much consideration, NMFS does not prefer this alternative at this time. Many HMS recreational anglers have a strong conservation ethic, and already practice catch and release fishing for white marlin and other species. Furthermore, the commercial sale of Atlantic billfish is prohibited, landings of longbill spearfish are prohibited, and several shark species may not be landed. Strict quotas and other management measures based upon the best available scientific information govern commercial landings of most other shark species, while the recreational sector is required to adhere to shark bag limits and minimum size restrictions. As a result, mandatory catch and release in the recreational sector may not be necessary at this time and prohibiting all commercial shark landings is not necessary. Domestically, the most important factor in conserving billfish is to improve their survival after the catch and release experience. NMFS prefers alternative E3 in the Final Consolidated HMS FMP, which requires HMS permitted fishermen to use non-offset circle hooks when using natural baits in billfish tournaments. This measure would complement existing circle hook requirements in the commercial PLL fishery by reducing post-release mortality and contributing to the rebuilding of Atlantic billfish stocks.

Comment 70: The economic effects associated with the proposed billfish measures go far beyond the initial impacts that were analyzed in the Draft Consolidated HMS FMP.

Response: NMFS appreciates this comment. Economic impacts are a fundamental consideration in the Agency's decision making. Oftentimes, however, the data are not sufficient to predict, for example, how recreational anglers might react to proposed management measures. If the measures change, would anglers switch to other species, quit fishing altogether, take fewer trips, or travel shorter distances? Each of these potential behavioral reactions would impart different economic impacts. One of the primary reasons for conducting public hearings and soliciting public comment is to obtain supplemental information on the analyzed impacts associated with proposed management measures. All written comments, as well as those received verbally at public hearings, were considered by the Agency in the selection of preferred management alternatives. NMFS will continue working to improve available social and economic data and analyses.

Comment 71: NMFS should require a Billfish Certificate of Eligibility to help improve compliance, facilitate enforcement and improve information on billfish shipments coming into the United States.

Response: A Certificate of Eligibility for Billfishes is required under 50 CFR 635.31(b)(2)(ii), and must accompany all billfish, except for a billfish landed in a Pacific state and remaining in the state of landing. This documentation certifies that the accompanying billfish was not harvested from the Atlantic Ocean management unit, and identifies the vessel landing the billfish, the vessel's homeport, the port of offloading, and the date of offloading. The certificate must accompany the billfish to any dealer or processor who subsequently receives or processes the billfish. The certificate of eligibility helps to maintain the recreational nature of Atlantic billfish fishery, with no commercial trade.

Comment 72: NMFS received a number of comments pertaining to pelagic longline fishing, its impact on billfish, and suggestions for new management measures that should be researched or implemented. The comments included: new data shows that just under 65 percent of all white marlin caught as bycatch on pelagic longline vessels are dead, or die soon after being released alive; it makes absolutely no sense to close fishing to the group that kills less than one percent of the fish they catch while allowing the other group that kills almost 100 percent of the billfish they catch to continue doing so. The major source of billfish mortality (pelagic longlining) has still not been satisfactorily regulated to offer these fish adequate protection; the commercial pelagic longline fishery is causing the decline in billfish abundance; billfish were making a comeback until longline fishing of their prey species, dolphin and wahoo, was allowed. Our club used to tag and release 35 to 40 marlins per year. Now we see only five to six marlin tags and most of them are from the other side of the Gulf Stream; NMFS should limit the length of pelagic longlines; and, limit the number of hooks that pelagic longline fishermen are allowed to set, and require that pelagic longline vessels retrieve their gear every three hours to reduce billfish mortality.

Response: Many commenters stated that the recreational HMS fishery has only a minor impact on billfish populations relative to the commercial PLL fleet, and that additional management measures should be imposed upon the commercial PLL fleet rather than upon the recreational sector. To confirm the veracity of this long-held assumption, NMFS examined data from the pelagic longline logbook program and the RBS, MRFSS, and LPS databases. New information on recreational and commercial post-release mortality rates (Horodysky, 2005, and Kerstetter, 2006, respectively), when combined with information from these data bases, indicates that in some years, the total mortality contribution of the domestic recreational billfish fishery may equal or exceed the total mortality contribution of the domestic pelagic longline fleet with regard to Atlantic white marlin. As described in Appendix C of the Final Consolidated HMS FMP, estimates of total annual recreational white marlin mortality, which combines landings, dead discarded fish, and estimated post-release mortalities, vary greatly by data set and year. MRFSS and LPS databases indicate that for the period 2001 – 2004, inclusive, that the aggregate level of recreational mortality was approximately three times and two times higher, respectively, than aggregate mortality contributions (dead discards and estimated post-release mortality) of the domestic pelagic longline fleet. Using RBS data, a known subset of recreational effort, estimated aggregate domestic recreational mortality with regard to white marlin appears to be about 71 percent of estimated total domestic pelagic longline mortality for the same period. When taken in combination, and in consideration of the limitations and uncertainties associated with each data base involved, two general conclusions can be drawn: (1) The aggregate domestic recreational fishing mortality contribution is higher than previously thought with regard to Atlantic white marlin; and, (2) there is more parity between the mortality contributions of the domestic recreational and domestic pelagic longline fleets than previously thought. Cramer

(2005) and Kerstetter (2006) also examined this same issue to varying degrees. Both papers support the same basic conclusion drawn in this Final Consolidated HMS FMP, that in some years, the domestic recreational billfish fishery may impose equivalent or even greater levels of mortality on Atlantic white marlin populations than the domestic pelagic longline fishery. This finding, which is contrary to the widely held beliefs, appears to be a result of new data indicating higher post-release estimates for the recreationally released white marlin and the size differential between the two fisheries. Presently, the domestic commercial PLL fleet is regulated by a limited access permit program; observers; vessel upgrading restrictions; year-round and seasonal closed areas; ICCAT-recommended quotas; minimum size restrictions; circle hook requirements; bait restrictions; careful release protocols; mandatory logbooks; and a VMS requirement, among others. The recreational HMS sector is governed by an open access permit program; minimum size restrictions; reporting requirements for swordfish, BFT, and billfish; gear restrictions; a no-sale provision; and possession limits for swordfish, sharks and tunas, among others. The preferred billfish management measures are intended to reduce recreational post-release mortality of white marlin, because current estimates are substantially higher that previously thought. NMFS will continue to evaluate the need for additional management measures for both the domestic PLL fleet and the recreational HMS fishery. NMFS also recognizes that foreign commercial longline vessels contribute significantly to Atlantic billfish mortality, and will continue to vigorously pursue international agreements at ICCAT to reduce these levels.

Comment 73: NMFS would be negligent not to require mandatory tournament registration at this time. Registration should include all contests in which any prize, award and/or monetary exchange is made relating to the capture of Atlantic HMS.

Response: NMFS requires that all tournament operators register any tournament awarding points or prizes for HMS with the HMS Management Division, at least four weeks prior to the commencement of the tournament. In the Regulatory Housekeeping section of Chapter 2 of the Final Consolidated HMS FMP, a clarification would be added to the regulations specifying that tournament registration is not considered complete unless the operator has also received a confirmation number from NMFS. This clarification is expected to improve the HMS tournament registration process.

Comment 74: NMFS received some comment on the alternative E9, implement a mandatory Atlantic HMS tournament permit, which was considered but not fully analyzed. I support alternative E9, which would implement a mandatory HMS tournament permit, because monitoring and enforcement of HMS tournaments is necessary; HMS tournaments need to be permitted because we need reporting from them.

Response: As mentioned above, a clarification would be added to the regulations specifying that HMS tournament registration is not considered complete unless the operator has also received a confirmation number from NMFS. In the Draft Consolidated HMS FMP alternative E9 was considered, but not further analyzed, because improvements to tournament registration, data collection, and enforceability can be achieved with significantly less burden to the public and government by instead requiring a tournament confirmation number. Because HMS tournaments frequently change operators, names, and dates, a tournament permit would be burdensome to administer and enforce. NMFS believes that requiring a tournament confirmation number, issued by the HMS Management Division, would accomplish the same objective (*i.e.*, increased compliance) as would a tournament permit.

## D.3 Management Program Structure

### D.3.1 Bluefin Tuna Quota Management Measures

Comment 1: NMFS received a number of comments on the management of the purse seine sector of the Atlantic BFT fishery. These comments consisted of: BFT fisheries need every opportunity to harvest the quota and not addressing the large medium tolerance limits imposed on the purse seine sector in this rule is disappointing; the Purse Seine category should be allowed to fish throughout the year provided quota is available; and the purse seine BFT fishery needs to become a "true" individual transferable quota (ITQ) fishery and thereby not addressing the ability to transfer purse seine quota outside the category is disappointing. Some comments stated that the Purse Seine category should be eliminated from the BFT fishery or purse seine vessels should be limited in the areas they fish to minimize any potential gear conflicts with commercial and recreational handgear vessels.

Response: During this rulemaking, NMFS heard many comments regarding management issues in the BFT fishery in general and the purse seine sector in particular that are beyond the scope of this action. Many of these comments arise from recent issues regarding the status of BFT, underharvests in recent years, and current size and trip limits. ICCAT is conducting a stock assessment this summer that should provide additional information regarding the status of BFT and the current rebuilding plan. In November 2006, ICCAT may recommend new management measures for BFT. In addition to any future ICCAT recommendations for BFT, NMFS intends to conduct a rulemaking regarding all HMS permits that could include, among other things, further rationalizing some segments of the HMS fisheries, streamlining or simplifying the permitting process, restructuring the permit process (gear-based, species-based, or both), reopening some segments of the limited access system to allow for the issuance of additional permits, modifying when permits are renewed (fishing year or birth month), and considering dedicated access privileges (*e.g.*, individual transferable permits). This future rulemaking may be better suited to address the entire range of purse seine comments above.

Comment 2: NMFS received a few comments regarding PLL in general and the incidental catch of BFT by PLL including: the effectiveness of the June PLL closure should be reevaluated in light of circle hook catch data; the PLL fishery should be afforded a greater opportunity to catch its targeted species of swordfish, allowable tunas, and sharks, especially considering the existing protections for BFT in the GOM and Florida East Coast, as well as 100 percent circle hooks, careful handling and release tools, and certified training; NMFS should take incremental steps to ensure that the Incidental Longline category fully utilizes its domestic BFT allocation in order to reduce dead regulatory discards to the maximum extent feasible within this category’s allocation; due to the overall underharvest of U.S. Atlantic BFT quota, NMFS should cautiously relax the incidental catch criteria to reduce/eliminate regulatory discards and effectively utilize this category’s quota.

Response: NMFS thoroughly analyzed the incidental catch requirements of BFT by PLL vessels and published a Final Rule on May 30, 2003 (68 FR 32414), that substantially revised the management scheme for this incidental bycatch of BFT. NMFS continues to gather information regarding the effectiveness of incidental harvest restrictions, as well as the effectiveness of all bycatch reduction measures that have been implemented in the PLL fishery. In addition, as more information becomes available, NMFS will reevaluate which measures, if any, it may be appropriate to add, modify, reduce, and/or remove all together, as appropriate.

Comment 3: NMFS received two comments regarding rebuilding of the Western Atlantic BFT stock. These comments consisted of: Agency efforts should be more focused on the international BFT issues to be effective in rebuilding the stock; and, BFT stocks should be rebuilt by preventing the commercial interests from overfishing.

Response: NMFS agrees that international cooperation is critical to rebuilding the BFT stocks. The United States has been at the forefront of efforts to develop appropriate rebuilding plans that balance biological and socio-economic imperatives and will continue to press the international community to implement appropriate measures to rebuild Atlantic BFT stocks. ICCAT recommended the current U.S. BFT TAC based on the 1998 stock assessment for the Western Atlantic BFT stock and the rebuilding plan with the goal of achieving maximum sustainable yield within 20 years. Under the current rebuilding plan, the United States needs to maintain its allocation to prevent overfishing and contribute to rebuilding the stock. Allocation of the U.S. quota to the commercial or recreational sector is conducted in accordance with the international rebuilding plan. In the past few years, all the commercial BFT categories have landed fewer fish than their allocations would allow for. Further, ATCA requires that no regulation promulgated under ATCA may have the effect of increasing or decreasing any allocation or quota of fish or fishing mortality level to which the United States agreed pursuant to a recommendation of ICCAT.

Comment 4: Are herring issues addressed in this document in terms of the impacts they are having on BFT?

Response: Atlantic herring are currently managed under a separate fishery management plan by the New England Fishery Management Council (NEFMC). The Atlantic herring fishery management plan is being amended. During a NEFMC meeting on January 31, 2006, the NEFMC approved a seasonal purse seine/fixed-gear-only fishery for the Western Gulf of Maine (Area 1A) from June 1 through September 31. The NEFMC's action recognizes the importance of herring in the Gulf of Maine ecosystem. In addition, NMFS recognizes the importance of considering ecosystem interactions in fishery management planning, and addresses ecosystem management as one of the goals of the NMFS Strategic Plan. The Agency continues to work toward integrating an ecosystem approach into fishery management practices.

Comment 5: Yellowfin tuna should not take a "back seat" to BFT, and NMFS needs to put more resources into yellowfin tuna data collection, analyses, and regulation.

Response: NMFS acknowledges the importance of yellowfin tuna to the U.S. fishing industry. The latest SCRS report indicates that the current fishing mortality rate may be higher than that which would support maximum sustainable yield on a continuing basis. NMFS has chosen to take the precautionary approach managing YFT since they are considered fully-exploited by taking a number of actions during, and since, the implementation of the 1999 FMP to address the management of the YFT fisheries (*e.g.*, imposing limited access on the longline and purse seine sectors of the fleet and implementing a recreational retention limit). By taking initiatives for conservation measures, the United States will have a stronger negotiating position at ICCAT should additional management measures be necessary. NMFS currently has reporting programs in place to collect commercial and recreational YFT data. This information, in turn, is then provided to ICCAT and the SCRS to be compiled with other information from member nations to be used in assessing the YFT stock. Therefore, NMFS maintains that no further action regarding the YFT fisheries is necessary at this time. However, NMFS will continue to monitor the status of the YFT fisheries as SCRS has indicated that the yellowfin tuna stock is fully-exploited and will pursue future actions if warranted.

Comment 6: Does NMFS have the authority to close an area or region to BFT fishing via an inseason action?

Response: NMFS has the regulatory authority to provide for maximum utilization of the BFT quota by conducting various types of inseason actions. The inseason actions may consist of: increasing or decreasing the General category daily retention limits; adding or waiving RFDs; increasing or decreasing the recreational retention limit for any size-class BFT or change a vessel trip limit to an angler limit and vice versa; conducting quota transfers to/from any fishing category or to the Reserve; closing domestic quota categories based on when that quota is reached, or is projected to be reached; and, closing/reopening the Angling category BFT fishery by accounting for variations in seasonal distribution, abundance, or migration patterns of BFT, or catch rates in one area, which may have precluded anglers in another area from a reasonable opportunity to harvest a portion of the Angling category quota. The Angling category BFT fishery or part of the fishery may be reopened at a later date if it is determined that BFT migrated into the other area. NMFS must consider specific sets of criteria prior to conducting each type of inseason action. Currently, NMFS has multiple sets of criteria, each one designed for a specific type of inseason action, that are used in making a determination, however in this action NMFS prefers to consolidate those lists to assist in making the inseason action determination process more transparent as well as consistent.

The end results of some inseason actions may be perceived as a geographic closure. For instance, if NMFS were to implement a number of consecutive RFDs in the General category it would suspend fishing activities for that time period. NMFS also has the ability to conduct an interim closure in the Angling category as described above. An area closure for any other BFT category or a multi-year area closure for any BFT category would require a regulatory amendment, including public comment.

Comment 7: The SAFMC supports alternative F3(c), which accommodates the opportunity for a winter BFT fishery. Further, the Council supported an equitable BFT quota allocation for the South Atlantic region (North Carolina southward), as well as any other actions that would ensure fishermen in all the South Atlantic states (North Carolina, South Carolina, Georgia, and Florida's East coast) have an opportunity to participate in this fishery. The SAMFC is concerned about the proposed January 1 starting date for BFT fishing because it will prevent underages from being carried over into the following January of the new fishing year.

The ability to carry these underages forward can keep the fishery open through the month of January, which is critical to the fisheries south of North Carolina, off South Carolina, Georgia, and Florida.

Response: Currently, the last General category time-period spans the winter BFT fishery which usually begins in November and runs through the end of the General category season (at the latest on January 31). Under the preferred alternative (F3(c)), the current time-period of October through January and the associated subquota would be adjusted so that the later portion of the fishery would consist of three separate time-periods; October through November, December, and January. With the implementation of the preferred alternative in the CY/FY section, the December and January time-periods would fall in separate fishing years. The situation of having an active fishery occurring across fishing years did not occur prior to the 1999 FMP, which originally adjusted the BFT fishery from a calendar year to a fishing year that spans two calendar years. Under the preferred alternative, the January time-period would be allocated 5.3 percent of the coastwide General category quota as and annual baseline quota. As indicated in Section 4.3.1.1, there are several options that may be used to address the disposition of carryover of any under or overharvest during the December time-period. In the first alternative, any under or overharvest could be entirely rolled over into January of the following fishing year and added to the baseline 5.3 percent allocation. Under this scenario, the entire underharvest would be added to the January time-period subquota, or the entire overharvest would be subtracted from the time-period subquota. In another potential alternative, 5.3 percent of the under or overharvest may be applied to the January time-period in addition to the baseline 5.3 percent allocation. In a third alternative, no under or overharvest may be applied in addition to the January time-period subquota. NMFS will work with the affected constituents through the annual BFT specification process to determine the most appropriate approach based on constituent needs and Federal regulatory requirements.

Comment 8: The allocations between domestic quota categories should be adjusted, specifically increasing the quota for the Angling category.

Response: The Agency did not consider a modification to the sector allocations in this action; therefore, a separate rulemaking and FMP amendment would be needed to consider an increase in the allocation to the Angling category. The original allocations are a reflection of the sector's historical share of the landings during the 1983 through 1991 time period and were codified as part of the 1999 FMP process. The Agency would need to initiate an amendment to the FMP to modify the sector allocations for BFT.

Comment 9: NMFS received numerous comments for and against the adjustment of the General category time-periods and associated subquotas. Those comments in support of an adjustment include: September through December have been the strongest months for BFT fishing and should have their allocations increased; General category time-period subquota allocations should allow for a dependable winter BFT fishery according to the percentages in the NCDMF Petition for Rulemaking; General category time-period and subquota allocations should reflect the migration of the fish through a particular area; there needs to be a balance between flexibility and predictability; the General category should be split across 12 months of equal portions and any arbitrary closure date should be removed to allow full harvest of the quota; is there a biological reason we do not allow the General category BFT fishery to be prosecuted in the months of February through May; all preferred alternatives should allow for the full utilization of the available quota so the United States can prove we have a stake in these fisheries. Vessels need to be able to catch fish and then make money off those fish to reinvest into the fishery in the following years as this is a sign of a healthy fishery; catching wild BFT throughout the year is in the best interests of U.S. fishermen and the United States should remove any arbitrary controls (*e.g.*, seasonal closures) to allow for the harvest of U.S. quota; and, regardless of which alternative is preferred, when the fishery converts back to the calendar year, a methodology needs to be developed to allow quota to carry forward from December into January, *i.e.*, across years, in a timely fashion. In addition, there was broad support at the March 2005 AP meeting for revising the General category time-periods and subquotas to allow for a winter fishery, due to the slight increase in quota as well as on informal agreements between user groups and the Agency.

Comments in opposition of an adjustment include: the Agency needs to manage the BFT fishery in the traditional manner; and changing the General category time-periods and subquotas will have negative impacts on the traditional New England fishermen.

Response: The preferred subalternative to amend the coastwide General category time-periods and their associated subquota allocations would strike a balance between formalizing a winter fishery, acknowledging recent trends in the BFT fishery, as well as recognizing the traditional patterns of the fishery. The preferred alternative would also allow for proper business planning throughout the entire General category season. In light of recent underharvests in the General category, NMFS is acutely aware of the need to provide reasonable opportunities to harvest the General category quota, and how this relates to requests to extend the fishery throughout the year. However, as catch rates in the BFT fishery can increase quite dramatically in a short time period, there are concerns in allowing a fishery to emerge that may be unsustainable or cause overcapitalization on a species that is currently designated as overfished.

Comment 10: NMFS received comments both in favor of and opposed to the preferred alternative to establish General category time-periods, subquotas, and geographic set-asides via annual framework actions. The comment in favor stated the preferred alternative allows for a balance between flexibility and predictability in the General category BFT fishery. The comment opposed stated the overall BFT management program should not be modified.

Response: Annual regulatory framework actions would be used to establish and adjust the General category time-periods, subquotas, and geographic set-asides. This procedural change to the management of this category would expedite the process, providing the agency with greater flexibility to adapt to changes in the fishery and the industry with greater predictability in the management of the General category's upcoming fishing year. The General category would have consistent time-periods and subquota allocations from one year to the next unless ICCAT provides a new recommendation for the U.S. BFT TAC.

Comment 11: NMFS received a number of comments opposing the removal of the Angling category North/South dividing line and one comment supporting its removal. The comments include: the BFT North/South dividing line should be maintained as it was created to provide "fair and equitable" distribution of the BFT quota; it appears that the reason for removing the North/South line is not due to a lack of real time data, but because of participant noncompliance with the current call-in system; NMFS should maintain the North/South line and devise a reliable real-time data collection system for recreational BFT landings; the North/South line should be maintained and the funds used to support the current LPS program should be reallocated to implement tail tag programs at the state level, similar to North Carolina and Maryland; and, the agency should develop more recreational set-asides to further ensure that recreational participants are provided an equitable opportunity to harvest a portion of the Angling category quota.

Response: NMFS has modified the preferred alternative, F4, from the Draft HMS FMP by removing the proposal to eliminate the North/South Angling category dividing line and thereby maintaining the status quo regarding this recreational management tool.
NMFS acknowledges the recreational fishery supports the North/South line for a variety of socio-economic reasons. Based on the social and economic impacts associated with the status quo alternative, NMFS has opted to prefer retaining the North/South line at this time. However, for this management tool to be most effective, NMFS requires real-time BFT landings data from the recreational sector. To date, compliance with the recreational Automated Landing Reporting System (ALRS) has been low, thus hindering the real-time effectiveness of this management tool. If compliance with the ALRS requirements increases or, as recreational catch monitoring programs are improved over time, the effectiveness of this management tool may increase.

Comment 12: NMFS received two comments regarding the clarification of the school size-class BFT tolerance calculation. One comment supported the preferred alternative which would calculate the school size-class tolerance amount prior to accounting for the NED set-aside quota because it brings the calculation more in line with the ICCAT recommendation regarding school size-class BFT tolerances. The second comment stated there was no recreational input when the tolerance limit was implemented, and the tolerance limit should be 15 or 16-percent of the total quota.

Response: The preferred alternative would clarify the procedure NMFS uses to calculate the ICCAT recommended eight percent tolerance for BFT under 115 cm (young school and school BFT), thus implementing the ICCAT recommendation more accurately based on the specific language contained in the recommendation. Regarding the comment stating a lack of recreational input in developing the eight percent tolerance limit for the smaller size classes of BFT, ATCA authorizes domestic implementation of ICCAT- adopted management measures, and provides that no U.S. regulation may have the effect of either increasing or decreasing the quota or fishing mortality level adopted by ICCAT. ATCA also provides that not more than three Commissioners shall represent the United States in ICCAT. Of the three U.S. Commissioners, one must have knowledge and experience regarding recreational fishing in the Atlantic Ocean, Gulf of Mexico, or Caribbean Sea. In addition to having a recreational commissioner, the U.S. Commissioners are required to constitute an Advisory Committee to the U.S. National Section to ICCAT. This body, to the maximum extent practicable, consists of an equitable balance representing the interests of various groups concerned with the fisheries covered by the Convention, including those of the recreational community.

Comment 13: NMFS received a number of comments for and against implementing a rollover limitation for each domestic quota category. Those in support of the limitation include: a rollover cap should be implemented, but the cap should be set lower because a rollover of up to 100 percent of a category's baseline allocation could be harmful to the fishery in future years as it would lead to unsustainable overcapitalization; and NMFS must develop a way to track size classes of BFT entering the Reserve category as a result of this cap, so there are no conflicts with overall mortality estimates.

Comments in opposition of the rollover limitation include: rollover of quotas should be eliminated to increase conservation; limiting the amount of quota that categories can roll over is not appropriate at this time; NMFS should not get ahead of ICCAT as it compromises the U.S. delegations' ability to negotiate multilateral implementation in the future; long term ramifications of lost quota have not been fully explored on both domestic and international fronts; and the United States should not ask any more of its citizens while quota is not harvested, and international conservation measures are not equivalent.

Other comments NMFS received regarding this issue include: when there is surplus quota in commercial categories, recreational anglers should be permitted to take part of this surplus; categories should not be punished or rewarded for not harvesting the quota until all arbitrary regulations have been removed; the Agency needs to proceed cautiously with rolling over quota in case there is a stock issue; however, the United States needs to maintain control of the underharvests due to the lack of conservation of other member nations; rollovers from the previous fishing year should be accessible in January time period if the preferred alternative to change back to a calendar year is implemented; uncaught sub-period quota should be rolled forward to allow for year-round General category landings. If the fishing year is changed to January 1, then any prior year's uncaught quota should be allowed to be caught between February 1 and May 31; implementing a domestic rollover limitation would adversely affect our ability to negotiate at ICCAT as the bottom line remains the same regardless of which domestic category the underharvest resides in; rollover limitations are helpful, however this item should be addressed at ICCAT; and, the Agency needs to be aware of the ripple effects quota rollovers have on business planning late in the season.

Response: The preferred alternative would grant NMFS the authority to limit the amount of BFT quota that may be carried forward from one fishing year to the next. By establishing a limitation that may be imposed on each domestic quota category, except the Reserve, NMFS would be better equipped to address quota stockpiling situations if they arise. The implementation of the preferred alternative would not preclude the use of inseason quota transfers to any of the domestic quota categories if warranted. Due to the different size classes that each category may target, the number of BFT per metric ton may differ; therefore the origin of the quota entering the must be noted, to ensure mortality levels are consistent with those accounted for in the stock assessment. NMFS is also aware that the preferred alternative would have minimal if any conservation benefits on the Western Atlantic BFT stock as a whole. NMFS supports an international discussion on the use of rollover caps, as well as their pros and cons. Implementing the potential use of a cap domestically should not adversely affect the U.S. delegation's ability to negotiate and play a strong role on this issue as U.S. BFT quota levels will remain consistent under this alternative.

Comment 14: NMFS received comments supporting the consolidation of the inseason action determination criteria. These comments consisted of: revising and consolidating the criteria for BFT management actions improves the agencies flexibility and consistency in making determinations; and the preferred alternative should be preferred, however, it needs to be clarified if the criteria have a different ranking of importance.

Response: Consolidating and refining the criteria that NMFS must consider prior to conducting any inseason, and some annual, actions would assist in meeting the consolidated HMS FMP's objectives in a consistent manner, providing reasonable fishing opportunities, increasing the transparency in the decision making process, and balancing the resource's needs with users' needs. The criteria listed are in no particular order of importance and would be fully considered, as appropriate, in making a determination; however, in some circumstances, not all criteria will be relevant to the decision making process.

Comment 15: NMFS received a number of comments that did not directly speak to actions being proposed in the Consolidated HMS FMP, but are more general in nature or are more pertinent to the recently proposed 2006 Atlantic BFT Quota Specification and effort controls. These comments consist of: the maximum three fish per day General category bag limit should be eliminated. Flexibility to set it higher may be needed as the fishery evolves and to allow for the possibility of a distant water General category fishery; NMFS should relax the "tails on tuna" requirement. The tail is not necessary for species identification. This requirement prevents higher quality cleaning and storage at sea. Many years of data confirm that prohibited undersized tunas are either not encountered or are extremely rare in this fishery. ICCAT has eliminated the minimum size for some Atlantic tunas. The tails on requirement is an unnecessary and costly burden that should be removed; NMFS is using RFDs to deny fishermen a reasonable opportunity to catch the quota and to make U.S. fishermen do more to conserve BFT than fishermen from other countries with ICCAT BFT quotas. NMFS should not implement RFDs unless the General category quota is in immediate danger of being exceeded. NMFS should remove every domestic restriction that denies U.S. fishermen a reasonable opportunity to catch the quota.

Response: This action does not address these specific items, however, the 2006 Atlantic BFT quota specifications and effort controls address retention limits, as well as the use of RFDs in the coastwide General category. The final initial 2006 specifications published on May 30, 2006 (71 FR 30619). Regarding the removal of tuna tails, NMFS has received past comments and from the industry, particularly the HMS CHB sector, to investigate this possibility. However, it remains a concern that the proposal to process HMS at sea would compromise enforcement of domestic size limits. To date, NMFS has been able to enforce the domestic size limits for HMS through curved measurements. This has been an efficient and effective way of enforcing size limits.

Comment 16: NMFS received comments requesting changes in the allowable use of harpoons on CHB vessels. These comments include: NMFS should authorize the use of harpoons as primary gear to target giant BFT from the pulpit of CHBs to allow maximum flexibility. With the cost of doing business rising daily and the fishery changing dramatically over the past few years, this antiquated prohibition needs to be modified to allow CHB operators the opportunity and versatility to harpoon BFT on days that they are not carrying paying passengers. This rule was originally written to curb the sale of undersized BFT, which is no longer an issue.

Response: In 1993, NMFS created a recreational Atlantic tunas permit that was required for those CHB or privately operated vessels targeting any of the regulated Atlantic tuna species. This rulemaking also established a list of allowable gears that can be used to harvest tunas. In 1995, NMFS removed the ability for vessels to hold more than one permit at a time. In that 1995 rulemaking, NMFS proposed, collected comment on, and finalized a list of authorized gears for the CHB sector of the fishery. Harpoons were not proposed as an authorized gear, nor were any comments received requesting this gear type be authorized for CHB vessels at that time; therefore, harpoon gear was not listed as an authorized primary gear type at that time. As NMFS has conducted a number of rulemakings regarding permits, permissible gears, and targeted species, NMFS intends to conduct a comprehensive rulemaking regarding all HMS permits that could include, among other things, further rationalizing some segments of the HMS fisheries or restructuring the permit process (gear-based, species-based, or both). This future rulemaking may be better suited to address further revisions to authorized gears and the permitting structure for managed HMS. The issue of allowing the use of various gears to subdue HMS caught on authorized primary gears was analyzed in the Final Consolidated HMS FMP. Please refer to discussions of Authorized Fishing Gear.

### D.3.2 Timeframe for Annual Management of HMS Fisheries

Comment 1: Support and opposition for administratively adjusting all HMS fisheries to a calendar year were expressed in public comments. Commenters asked the following: what has changed since fisheries were originally shifted from a calendar year; Is the United States in compliance with ICCAT reporting requirements using a fishing year? Several commenters stated that use of a fishing year was not a disadvantage at ICCAT.

Response: The preferred alternative would adjust tuna, swordfish, and billfish fisheries so that all HMS fisheries occur on a calendar year. The previous shift from a calendar year to a fishing year (1996 for swordfish, 1999 for tuna and billfish) accommodated domestic markets for swordfish and provided additional time for rulemaking to implement ICCAT recommendations, since ICCAT traditionally meets in November of each year. Use of a fishing year is allowed by ICCAT. Since the fishing year was implemented for these species, several aspects of the fisheries and their management have changed. For the past several years, the United States has not fully harvested its swordfish quota, and has carried-over quota underharvest from one year to the next. Because of this underharvest, summer swordfish markets have not been limited by the amount of quota available, and starting the fishing year in early summer to avoid quota shortfalls has been unnecessary. In addition, after several years of experience with ICCAT negotiations since the United States implemented the fishing year, NMFS and the United States' ICCAT delegation have found that it is difficult to be assertive in pursuing international enforcement of ICCAT recommendations when the catch data the United States submits is misunderstood and/or suspect because of the confusing fishing year reporting schedule. NMFS has determined that adjusting tuna, swordfish, and billfish fisheries to a calendar year would increase transparency in U.S. data and statistics, and help focus on achieving domestic and international fishery management objectives such as reducing/eliminating IUU fishing.

Comment 2: Commentors expressed concern about the timely implementation of ICCAT recommendations under a calendar year, the potential disadvantage to U.S. fishermen if ICCAT recommendations were not implemented in a timely fashion, and the need for fishery specifications to be available prior to the start of calendar year fisheries.

Response: NMFS recognizes that switching back to a calendar year would reduce the amount of time between the adoption of ICCAT recommendations in November and the start of calendar year fisheries on January 1. This HMS FMP would adjust the process for issuing annual BFT specifications by consolidating the analysis in the FMP itself, and thus reducing the annual burden and associated amount of time necessary for promulgation of the annual specifications. NMFS anticipates that BFT specifications would usually be issued on time using these newly adopted procedures. Although ICCAT recommendations that can adjust quotas may be adopted at any time, usually such adjustments occur after stock assessments, which are performed at several year intervals. Thus, on average, more complex rulemakings are anticipated to occur less frequently. NMFS notes that rulemakings that adjust quotas or implement other significant changes in fishery management programs usually require more than the amount of time (e.g. seven months) that would have been available between adoption of a recommendation at ICCAT and start of the fishing year, if fisheries had been maintained on a fishing year schedule rather than adjusted to a calendar year.

Comment 3: Commentors expressed opposition to the adjustment to a calendar year because of potential socio-economic impacts of a shift to calendar year in combination with the proposed ICCAT 250 marlin limit, particularly for billfish tournaments. Commenters stated the following: a basic analysis demonstrating the economic importance of billfish tournaments should be included, and millions of dollars of prize money is missing from the current analysis; what is the impact if a large tournament that happened later in the year was restricted to catch and release fishing only; and, it appears that adjusting all HMS fisheries to a fishing year would socio-economically benefit most HMS fisheries.

Response: The HMS FMP identifies that the potential for reaching the ICCAT marlin 250 limit is low and subsequent prohibition of marlin landings unlikely. Over the past several years, U.S. billfish landings have only been attained in a single year. In addition, the FMP includes a measure that would allow increases in size limits as a means of reducing landings to avoid attaining the limit and implementation of catch and release fishing only. Despite the limited potential for reaching the limit, the Consolidated HMS FMP analyzes potential impacts should the limit be attained, using the worse case scenario that tournaments would be cancelled if the limit were attained. This analysis indicates that socio-economic impacts could be higher under a calendar year scenario. These impacts could be mitigated if tournaments implemented a requirement for catch and release. On balance, NMFS anticipates that the benefits provided by switching to a calendar year and other regulatory adjustments set forth in the Consolidated HMS FMP will outweigh potential negative impacts. NMFS did not identify, nor did commenters provide, any positive socio-economic impacts for switching the shark fishery to a fishing year. Impacts of concern for ICCAT managed fisheries (e.g. tuna, swordfish, and billfish) are discussed above.

Comment 4: Several commentors questioned the effect of a change to calendar year on the January General category BFT fishery, particularly the disposition of quota underages that may have occurred in the previous calendar year. Commentors stated the following: I oppose a shift to calendar year because of the potential negative impacts to southeastern fishermen; and, I support a roll-over provision from December to January similar to the rollover provision that exists between sub-periods during a fishing year.

Response: The HMS regulations at 50 CFR 635.27(a)(1) divide the General category quota into three subperiods including June through August, September, and October through January. These regulations further state that NMFS will adjust General category subperiod quotas based on under- or overharvest during the previous subperiod. Currently, the last subperiod spans the winter south Atlantic BFT fishery which usually begins in November until the General category closes (at the latest on January 31). Under the Consolidated HMS FMP, these subperiods would be adjusted so that the winter fishery would include separate subperiods in December and January, each of which occur in a separate fishing year. The situation of having an active fishery occurring across the change of quota years did not occur prior to the 1999 FMP, which originally adjusted the BFT fishery to a fishing year. In addition, prior to 2003, the BFT fishery rarely experienced underharvest and roll-over of unharvested quota. Under this Consolidated HMS FMP, the January subperiod would be provided with a quota of 5.3 percent of the annual ICCAT allocation. In consideration of a potential underharvest and rollover of General category quota from one calendar year to the next (i.e., December to January), NMFS has explored various ways to manage this situation. A preferred approach would depend upon the magnitude of the underharvest and the needs of the fishery at the time. Several potential alternatives regarding the disposition of carryover of any under or overharvest during the December subperiod are discussed in Chapter 4 of the Consolidated HMS FMP. In the first alternative, any under or overharvest could be fully rolled over into January of the following fishing year in addition to the baseline 5.3 percent. Under this scenario, the entire underharvest would be added to the January subperiod quota, or the entire overharvest would be subtracted from the subperiod quota. In another potential alternative, 5.3 percent of the under- or overharvest would be applied to the January subperiod in addition to the baseline 5.3 percent. In a third alternative, no under- or overharvest would be applied in addition to the January subperiod 5.3 percent allocation. NMFS will work with the affected constituents through the annual BFT specification process to determine the most appropriate approach based on constituent needs and Federal requirements.

### D.3.3 Authorized Fishing Gear

Comment 1: NMFS received several comments in support of and opposed to the introduction of new gear. Comments supporting the introduction of new gears include: expansion of authorized gears would be acceptable in underexploited fisheries. Gears without bycatch problems could improve the availability of swordfish to the American public; and, gear innovations should not be stymied. Comments opposed to the introduction of new gears include: I am opposed to the introduction any new commercial fisheries; do not allow new effective gears in fisheries that are undergoing rebuilding; do not allow any new gear types, especially for BFT; why should NMFS authorize new gears?; NMFS has reported that all HMS fisheries are fully harvested or overfished. NMFS's proposal to legalize new commercial gear violates National Standard 1, which is to prevent or end overfishing of tuna, swordfish, billfish, and sharks; this will not permit overfished stocks to rebuild. Additional new commercial gear can only result in fully harvested HMS becoming overfished; we do not support allowing new gears into overfished fisheries except for use as experimental fishing permits; NMFS proposes to authorize new commercial gear types that can only increase the harvest of HMS; and, there is a lot of resistance to new gears in the Gulf of Mexico.

Response: As current or traditional gears are modified and new gears are developed, NMFS needs to be cognizant of these advances to gauge their potential impacts on target catch rates, bycatch rates, and protected species interactions, all of which can have important management implications. While new and innovative gears and techniques need to be evaluated by NMFS to increase efficiency and reduce bycatch in fisheries for Atlantic HMS, the Agency does not prefer any new fishing gears for the HMS commercial fisheries at this time. Further, this action would not authorize any new gears for the bluefin tuna commercial or recreational fisheries.

In this action, NMFS considered the definition and authorization of speargun gear, green-stick gear, and buoy gear, as well as the clarification of the allowable use of handheld cockpit gears. At this time, NMFS prefers to authorize only one new gear for the HMS fisheries, recreational speargun fishing for Atlantic BAYS tunas. BFT are excluded from the list of allowable target species for speargun gear due to the recent declining performance of the existing BFT fishery, recent quota limited situations within the BFT Angling category, and ongoing concerns over stock status. All sale of tuna harvested with this gear type would be prohibited in order to clarify the intent of authorizing this gear type, which would allow a small group of fishermen an opportunity to use spearguns to recreationally target BAYS tuna. Relative to the current number of participants in the recreational Atlantic tuna fishery, and taking into account the estimated low encounter rates for target species, the additional anticipated effort from spearfishermen would likely result in minimal increased landings compared with the landings by current Angling and CHB category participants. A limited number of additional individual fishermen would be expected to use this gear type, and spearfishermen may actually fish for months or years without having an opportunity to spear a tuna.

The preferred buoy gear alternative would not authorize a new gear; rather, it would rename the handline fishery for commercial swordfish and limit the number of gears deployed in this fishery. Defining buoy gear was necessary because the Final Consolidated HMS FMP would also modify the handline definition to require that the gear be attached to a vessel. Therefore, under the preferred alternative, the commercial swordfish handgear fishery would be the only fishery where free-floating handlines, now referred to as buoy gear, would be authorized. Under the preferred alternative, buoy gear fishermen would be limited to possessing or deploying no more than 35 floatation devices, with no more than two hooks or gangions attached to each individual gear. Prior to this action, buoy gear had been utilized with no limit on the number of gears deployed, as long as each gear had no more than two hooks attached and it was released and retrieved by hand. Also, both recreational and commercial fishermen were able to use this gear in areas closed to PLL gear. Under the preferred alternative, buoy gear would be prohibited for use by all commercial fishermen without a swordfish handgear or directed limited access permit and by all recreational fishermen. Additionally, when targeting swordfish commercially, the number of individual gears a vessel may possess or deploy would be limited to no more than 35. Vessels with directed swordfish or swordfish handgear LAPs may use this gear type to capture swordfish in pelagic longline closed areas, provided all longline gear has been removed from the vessel. While buoy gear would be allowed in the Gulf of Mexico, the swordfish handgear fishery does not appear to be widespread and operates primarily off the East Coast of Florida, according to public comment.

Based on public comment, the Agency prefers to clarify the authorized configuration of green-stick gear, rather than proceed with authorization and definition of the gear-type that may further add to the confusion and have unintended negative consequences to the fishery and resource. Public comments were opposed to and supported authorizing green-stick gear for the commercial harvest of Atlantic BAYS tunas; expressed considerable confusion over the current regulatory regime; were concerned about the need for better reporting, monitoring, and overall data collection for this gear-type; and expressed a need to further understand the gear's technical nature.

Comment 2: Commercial HMS handline gear, buoy gear, and green-sticks should be prohibited in the closed areas.

Response: The current HMS closed areas were specifically developed for a particular gear type (*e.g.*, PLL or BLL) to reduce bycatch and discards. There are no time/area closures for buoy and handline gear. If a green-stick is configured with more than two hooks, then it would meet the definition of longline, and thus, would also be prohibited from certain closed areas.

Comment 3: NMFS received comment from individuals concerned about the bycatch associated with the introduction of new gears. Those comments include: small tuna fisheries, like NMFS is trying to promote with the handline, buoy, and green-stick fisheries will negatively impact marlin stocks because they target marlin prey species; and, were any bycatch analyses conducted for the proposed authorized gears?

Response: This action would not change the currently allowed and authorized use of green-stick gear in any HMS commercial fishery. This action would make a distinction between handlines and buoy gear, such that handlines must be attached to the vessel and buoy gear would be allowed to float freely; however, both handlines and buoy gear were authorized and used in HMS fisheries commercially and recreationally prior to this action. The preferred alternative would limit buoy gear use to the commercial swordfish fishery for individuals with a swordfish handgear or directed limited access permit. No HMS other than swordfish could be harvested with buoy gear. Because swordfish is not a marlin prey species, the Agency does not believe buoy gear will have a negative impact on marlin stocks. No bycatch analyses are available for handline or buoy gear, but data from the logbooks were reviewed. The HMS logbook does not distinguish between attached and unattached handlines, so specific information on unattached handline (or buoy gear) catch is limited. In general, the HMS commercial handline fishery has relatively few discards. While there are no bycatch analyses available for recreational speargun fishing, public comment suggests that the number of individuals using this gear would be small and those that do use the gear, expect low encounter rates with target species. According to public comment, this fishery is highly selective and the gear has been designed to retain speared fish and reduce fish loss. With the authorization of this gear for the recreational harvest of BAYS tunas only, information about speargun catch will be captured via the MRFSS and LPS.

Comment 4: NMFS should clarify the HMS authorized gear regulations to allow for gear stowage provisions. Such provisions would enable vessels to diversify, and would also provide vessels with the ability to operate in other fisheries. The Northeast gear stowage provision needs to be acknowledged in the HMS regulations.

Response: A gear stowage provision for HMS permitted vessels was not considered in this action and, therefore, is not authorized at this time. NMFS has concerns about the enforceability of such a provision in HMS closed areas. The Agency would appreciate additional comments on situations where gear stowage provisions are necessary, as well as for which particular gears and areas. A gear stowage provision may be considered in a future rulemaking, if appropriate.

Comment 5: NMFS received comment from individuals concerned about the use of gillnets in HMS fisheries. These comments include: the Georgia Coastal Resources Division supports the removal of shark gillnet from the list of authorized HMS gear; and, gillnets should not be an authorized gear, particularly sink gillnets due to interactions with protected resources and other bycatch. If NMFS is going to continue to allow gillnets, the vessels should be required to use VMS year round.

Response: NMFS considered prohibiting the use of shark gillnet gear as part of a range of commercial management measures to prevent overfishing of finetooth sharks, but did not pursue this option because finetooth sharks would continue to discarded dead in other non-HMS fisheries, and thus, would not likely prevent overfishing. In this action, NMFS is preferring an alternative that would require shark gillnet vessel owners and operators to obtain the protected species safe handling and release workshop certification. The goal for this workshop would be to reduce the mortality of sea turtles, smalltooth sawfish, and other protected species. At this time, vessels issued a directed shark LAP with a gillnet on board that are away from port during the right whale calving season must have VMS on board. This action did not consider expanding this condition to require VMS on shark gillnet vessels year round.

Comment 6: There is a lot of confusion regarding the proposed gears. The process needs to slow down, and we need to make sure we understand what our goal is. We should be encouraging innovation. Each gear needs to be reviewed to determine where each gear appropriately fits; the public is going to need more education on the proposed gears and associated requirements. The Agency needs to clarify before authorizing; and, the language in the alternatives needs to be looked at, it appears some alternatives are allowing use to continue and others are allowing its entry.

Response: While NMFS encourages the use of clean and efficient gears, this action would authorize the use of only one new gear type due to the stock status of several HMS. Speargun fishing gear would be authorized in the HMS Angling category and users would be allowed to target Atlantic BAYS tunas recreationally. It would not be authorized for BFT, or any other HMS. The preferred alternative for buoy gear would not be an introduction of new gear, rather a clarification of an existing gear and a restriction on the number of floatation devices used in the existing commercial swordfish handgear fishery. In an effort to reduce confusion and increase compliance, NMFS will modify the HMS compliance guide and other outreach materials to reflect these changes to the HMS authorized gears.

Comment 7: NMFS must clarify that a longline vessel is allowed to use the following fishing gears when not longline fishing: handgear including, harpoon, handline, and rod and reel (plus the green-stick method, if authorized).

Response: The HMS regulations at § 635.21(e)(1) state that if an Atlantic BFT is retained or in possession, the vessel may employ only the gear authorized for the particular Atlantic tunas or HMS permit category issued to the vessel. In other words, with a BFT on board and an Atlantic Tunas Longline permit issued to the vessel, only longline gear may be possessed or employed. When fishing for Atlantic BAYS tunas, the vessel may employ fishing gear authorized for any Atlantic Tunas permit category. The two exceptions are that purse seine gear may be used only on board vessels permitted in the Purse Seine category and pelagic longline gear may be used only on board vessels issued an Atlantic Tunas Longline category tuna permit as well as LAPs for both swordfish and sharks. When targeting Atlantic BAYS tunas with an Atlantic Tunas Longline permit, a vessel may use handgear (*i.e.*, harpoon, handline, rod and reel, and bandit gear) provided BFT are not in possession or retained on board the vessel. However, the vessel must possess all applicable and valid Federal permits, possess the safe-handling and release placard and equipment, and abide by the longline gear restrictions (*e.g.*, closed areas and circle hooks). If a vessel is fishing in a closed area and has longline gear on board, it is a rebuttable presumption that longline gear was used to catch any fish on board that vessel. Green-stick and rod and reel gear may be utilized on a pelagic longline vessel, so long as all other PLL management measures are adhered to, including the use of circle hooks.

*Spearfishing*

Comment 8: NMFS received numerous comments supporting the authorization of speargun gear in the recreational Atlantic tuna fishery, specifically alternative H2, which would authorize speargun fishing gear in the recreational Atlantic tuna fishery. The comments include: authorizing speargun fishing gear for Atlantic tunas would provide very high economic benefits and produce very low ecological impacts; the impact of tuna spearfishing would be minimal and the number of participants would be low; spearfishermen were left out of the List of Fisheries for tunas and sharks when initially established; and, a speargun fisherman can choose his target, assess his chances, and be more discriminate in his hunting, which is not something a hook and line fisherman can do. Comments received in support also stated affirmation that recreational divers would be allowed to be transported to the site by a charter dive boat; and, the tuna regulations would allow the taking of tuna in the Atlantic with handheld, rubber band or pneumatic power spearguns by recreational fishermen while underwater.

Response: The preferred alternative would authorize the use of spearguns in the recreational Atlantic BAYS tuna fishery. Holders of recreational HMS Angling and HMS CHB permits would be allowed to carry spearguns and fish for, retain, and possess any of the BAYS tunas using speargun gear. Speargun gear would not be authorized under any other HMS or Atlantic tuna vessel permit or for any other HMS species. Speargun gear would not be authorized to fish for, retain, or land Atlantic BFT. BAYS tunas killed and landed with the use of speargun gear may not be sold under any circumstances, including by owners, operators, or participants on HMS CHB vessels. Fishermen using speargun fishing gear would be allowed to freedive, use SCUBA, or other underwater breathing devices, and would be required to be physically in the water when they fire their speargun. Only free-swimming fish, not those restricted by fishing lines or other means, could be taken. The use of powerheads, or any other explosive devices, would not be allowed to harvest or subdue BAYS tunas with this gear type. In addition, spearfishermen would be required to abide by all existing recreational management measures under the Angling category regulations when recreationally fishing for BAYS tunas (*i.e.*, minimum size requirements of 27 inches curved fork length for BET and YFT, three YFT retention limit per person per day, as well as all current state and Federal reporting requirements).

Comment 9: NMFS received several comments that supported spearfishing gear but requested allowing its expansion beyond recreational tuna fishing while other comments supported additional restrictions. Comments in support of expansion include: adding spearguns as an allowed gear for sharks; and, all HMS fisheries should eventually open to spearfishing. The GMFMC specifically supported spearfishing as an approved gear for all HMS fisheries, including sharks, and recommended that the gear be authorized for recreational and commercial harvest. In contrast, other comments supported restricting the use of spearguns as proposed, stating no sale should be allowed for anyone when a tuna is harvested with a speargun under any circumstances, and speargun fishermen should not be allowed to sell tuna catches from CHB vessels as proposed. A commenter stated his concern that the ability to sell fish might be viewed as an impediment to allow participation in this fishery and, thus, NMFS should not allow sale of fish to avoid jeopardizing any chance of authorizing recreational use of speargun fishing gear. NMFS also received comment to further restrict the use of speargun fishing gear to allow only freedivers to harvest tuna (*i.e.*, not allow SCUBA gear) consistent with original public comment on use of this gear-type.

Response: The preferred alternative would authorize the use of spearguns in the HMS recreational fishery only for Atlantic BAYS tunas. This alternative would provide speargun fishermen an opportunity to use this gear-type and would increase the social and economic benefits for this user-group. While providing this opportunity, NMFS is also balancing concerns of introducing a new gear type in fisheries with considerable numbers of existing fishermen participating in severely exploited fisheries. Since publication of the list of authorized gears and fisheries and the 1999 FMP, spearfishermen have consistently argued for access to HMS fisheries. Spearfishermen have argued in particular for recreational access to the Atlantic tuna fishery to target big tuna for the social and recreational opportunity rather than the desire for economic gain. The preferred alternative would prohibit the sale of Atlantic BAYS tunas captured by speargun to minimize the possibility of additional expansion of the user-group to those interested in commercial gain from the activity and inconsistent with intent of the preferred alternative. Spearguns would not be allowed to target BFT, primarily due to the severely depleted status of the western Atlantic stock, uncertainty over the status of the stock, and continuing poor performance of the fishery. The use of spearguns in HMS fisheries other than the Atlantic tuna fishery, (*i.e.*, shark, billfish or swordfish fishery) was not considered in the Draft Consolidated HMS FMP, although as these stocks improve some additional fishing opportunities for new and efficient gear-types may be considered in the future. NMFS considered further restricting speargun activity to only free-divers, (*i.e.*, no SCUBA gear or other types of underwater breathing apparatus) to further limit the universe of participants. Free-divers were the original group of speargun fishermen who had requested the opportunity to participate in the recreational tuna fishery. However, it was determined that not allowing SCUBA gear would have raised additional safety concerns.

Comment 10: NMFS received several comments regarding aspects of speargun fishing that would keep participation and catch low. Those comments include: technical knowledge barriers for a novice and inexperienced individual that wish to engage in this activity; harvesting two or three tunas in a lifetime would be lucky because a speargun fisherman needs to know what they are doing and where to go fishing; there are not a lot of opportunities to learn how to spear BAYS tuna; the cost of the equipment including the initial cost of upgrading spearfishing gear (*e.g*., larger gun, shafts, spearpoints, floats, lines, and safety items) will exceed $3,000 and that is before chartering a vessel; and, the need to use a boat to access BAYS fishing grounds.

Response: NMFS acknowledges that the number of participants using spearguns in a recreational BAYS tuna fishery is likely to be low and the number actually encountering and successfully striking a BAYS tuna lower still. NMFS understands that the primary intent of allowing the use of spearguns in the recreational BAYS tuna fishery is to allow participants the opportunity and access to the fishery for the recreational and social benefits it affords. Successful participation would still mean adequate preparation and/or possible training (*e.g.*, dive certificate) and the correct equipment. However, willing participants would no longer be prohibited by regulation from using spearguns in the recreational BAYS fishery.

Comment 11: NMFS received comments related to the level of bycatch associated with speargun fishing. Those comments include: most recreational fishermen practice catch-and-release fishing, but speargun fishermen practice release-and-catch fishing; speargun fishermen are very selective about the fish being targeted and use one shot, usually resulting in no bycatch; and spearfishermen can see the fish and do not take unwanted species or undersized fish; and they leave no lines or other gear on the bottom to snag other fish, lobster, or turtles. A few comments stated concerns that some spearguns under this gear type may not have the capability to land large HMS, resulting in a source of unreported mortality and that spearing a fish that dies without being harvested would be considered bycatch.

Response: There are minimal data available to support or refute concerns regarding bycatch by spearguns in the BAYS fisheries. It is evident that the nature of the gear-type can be highly selective and targeted to specific fish, unlike traditional hook-and-line fishery. Spearfishermen are unlikely to injure other species such as HMS, sea turtles, or marine mammals as they can selectively target their catch. However, it remains unknown how many strikes of targeted BAYS may result in mortality and retention versus wounding and subsequent escape with some unknown proportion mortally wounded. Public comment by spearfishermen states that it is possible to accurately identify species and size class before firing the spear and thus the bycatch and mortality of incorrect species (*e.g.*, BFT) or undersized tuna (*i.e.*, less than 27 inches) should be minimal.

Comment 12: NMFS received several comments regarding potential gear and user conflict that may arise with the authorization of speargun gear such as: nothing prevents divers from dropping a dive flag in the middle of a group of rod and reel vessels or on a specific wreck, and driving rod and reel vessels off the fish/wreck. In contrast, other commenters noted that spearfishermen and diver interactions with boat traffic should not be an issue in offshore fisheries, as it can be in inshore waters, that the spearfishing community has taken as many precautions as possible, and that no accidents have occurred in New Hampshire or Rhode Island where speargun fishing gear is currently allowed in state waters when targeting striped bass.

Response: Speargun users and rod-and-reel recreational fishermen would need to respect each other's activities and safety when sharing the same fishing grounds to avoid gear and user conflicts. Speargun fishermen would likely choose fishing areas and tuna hunting grounds away from other rod-and-reel vessels to maximize the diver's recreational opportunity and minimize safety concerns. Likewise, under existing vessel safety regulations, recreational vessels must give adequate berth to dive-flags in the water and vessels flying diver-down signals.

Comment 13: NMFS received several comments on the economic benefits associated with speargun fishing. These comments include: allowing recreational speargun fishing for tuna would create an economic boost to coastal communities. When spearfishing, one would usually fill up the car with gas, have lunch, buy souvenirs or gear, and sometimes pay for a boat ride and not spear many fish; and, at the 4th Annual Hatteras Blue Water Open this year, there were 50 entrants from all over the world and eight charter vessels generating $60-$75,000 in revenue to the area in four days and that there would have been more participants if tunas were included.

Response: It is expected that allowing spearguns into the recreational tuna fishery would provide an economic benefit to the fishery even though the actual sale of landed BAYS tuna would be prohibited. Recreational speargun fishermen are likely to invest in fishing stores and dive-shops for appropriate gear and contribute to local economies by renting hotel rooms and chartering vessels or renting equipment, *etc*.

Comment 14: NMFS received comments stating that if spearfishing gear is allowed to harvest Atlantic tunas, then the Agency must devise and implement mandatory permitting, reporting, monitoring, and enforcement. One comment specifically stated that if NMFS cannot guarantee this, there should not be an additional uncontrollable fishery.

Response: All HMS recreational spearfishing activity must be conducted from a Federally permitted HMS Angling or HMS CHB category vessel. NMFS currently requires mandatory reporting of all recreational landings of BFT, swordfish, and billfish via automated telephone systems. Although the Agency does not currently have similar requirements for recreational landings of BAYS tunas, NMFS monitors HMS recreational effort and landings through Federal recreational surveys, such as the MRFSS and LPS in addition to State monitoring programs. NMFS enforcement works in cooperation with local and State enforcement programs to ensure compliance with management measures in both recreational and commercial fisheries. NMFS will monitor compliance with reporting requirements and may consider modifications to requirements, as appropriate, in the future.

Comment 15: NMFS received a comment stating that there are fishermen currently using spearguns to harvest YFT that do not realize it is illegal to use the gear to target Atlantic tunas. Spearfishing has been included as a category in some of the tournaments.

Response: Until the final rule authorizing recreational speargun fishing for BAYS tunas takes effect, any use of spearguns to fish for any HMS is illegal. The list of authorized gears has been published since the end of 1999 (Dec 1, 1999, 64 FR 67511) and numerous brochures and guides that have been published since that date clearly list the authorized gears for HMS with valid permits. Currently, speargun gear is not an authorized gear for any HMS. After the effective date of the final rule implementing this preferred alternative, speargun gear may be legal for BAYS tunas, but not for other HMS.

Comment 16: NMFS should not allow another directed commercial fishery (*e.g.*, speargun fishing gear) for giant BFT.

Response: None of the preferred alternatives would authorize another directed commercial fishery for giant BFT. The preferred alternative H2 would not authorize the use of spearguns to fish for, retain, or land any Atlantic BFT, in either the recreational or commercial fishery.

Comment 17: Speargun fishermen would want to target the largest fish available due to the difficulty in taking smaller fish, the trophy nature of the fishery itself, and the largest take for time and money invested in the opportunity.

Response: NMFS recognizes that a prime motivation for spearfishermen to enter the Atlantic BAYS tuna fishery is the opportunity to recreationally fish for a big fish. Spearfishermen would need to abide by all existing recreational management measures, including the minimum size for YFT and BET of 27 inches curved fork length and retention limits. There is no minimum size for albacore or skipjack tuna. Blackfin tuna are not Federally regulated.

*Green-Stick Gear*

Comment 18: NMFS received several comments supporting the preferred alternative to authorize green-stick gear for the commercial BAYS tuna fishery. These comments include: green-stick gear is much better than longlines and could be an alternate gear; green-stick gear is the most environmentally sound way to harvest tuna; if green-stick gear is a viable U.S. HMS fishery, then NMFS needs to be flexible in allowing its use; and, the use of green-stick gear for directed fishing by pelagic longline vessels when targeting BAYS should be approved. In contrast, NMFS received several comments opposed to authorizing green-stick gear for tunas. The GMFMC commented that green-stick gear is classified as longline gear in the Gulf of Mexico and if it is authorized, it is likely to become very abundant and could have a negative impact on stressed and overfished stocks; green-stick gear is an excuse for more longline fishing using a slightly different method; and, green-stick gear is similar to longline gear and therefore should not be allowed into closed areas.

Response: The preferred alternative would not provide a regulatory definition of green-stick gear as a separate authorized gear and as differentiated from already authorized forms of handgear (rod-and-reel or handline) and longline gear. This is a change from what was proposed. Under existing regulations, green-stick gear is already authorized depending on how it is configured and how many hooks are on each line. Due to the current confusion over what is already allowed and how the draft preferred alternative may or may not have changed current uses of green-stick gear, NMFS is not modifying the list of authorized gears for green-stick gear at this time. In addition to the existing confusion and the potential to exacerbate the situation by changing the regulations, there is conflicting opinion and little data to support or refute its efficiency and impact on target and non-target stocks. NMFS intends to publish a brochure clarifying acceptable configuration of green-stick gear under the existing HMS regulations. In the meantime, NMFS will also work with current logbook and monitoring programs to examine ways to collect additional information on the use of green-stick gear and its impact on the environment as well as its social and economic benefits and consequences.

Comment 19: NMFS received numerous comments in support of authorizing green-stick gear for targeting BFT, as well as BAYS. These comments include: green-sticks are permanently attached to the vessel, so why do the proposed regulations state that a vessel could never possess a BFT onboard if green-stick gear is onboard; green-stick gear is the same as the trolling fishery, meaning the same boats, same gear, and same permits are used as those used to target BFT; the Japanese use this gear to harvest BFT because minimal lactic acids build during the fight; green-stick gear should be allowed for all Atlantic tunas provided there are mandatory permitting, reporting, monitoring, and enforcement of this fishery; BFT have been harvested using green-stick gear in the past and should be allowed to be continued; in North Carolina, green-stick gear has been used to catch BFT; past BFT landings using this gear type have been reported as rod-and-reel therefore a group of individuals are going to be adversely impacted if BFT are not allowed; this rule will make it even harder to catch the BFT quota; and, curiosity as to what conservation benefits are to be had by not allowing BFT to be retained as there are other management measures in place for BFT such as size and retention limits as well as quotas. One comment stated support for General category fishermen to target BFT with green-stick. The same commenter only supported the authorized use of green-sticks by longline permitted vessels as an allowed gear for directed YFT fishing and did not support the use of green-sticks by pelagic longline fishermen to target BFT while aboard a permitted pelagic longline vessel.

Response: Throughout the development of the Draft Consolidated HMS FMP, most of the analysis and comment from scoping led the Agency to determine that green-stick gear was primarily used to target BAYS tunas and that the methods of fishing with the gear were not conducive to targeting BFT. In addition, due to the current severely depleted status of the BFT stock, the introduction of a new gear-type and adding fishing pressure in this already heavily capitalized fishery is not appropriate at this time. Thus, it was determined in the Draft HMS FMP that it was possible to consider the use of green-stick gear, in a modified manner to the status quo, for a BAYS only fishery. Furthermore, it was determined that excluding BFT from the allowed list of target species would still provide marginal positive economic and social impacts to the BAYS fishery with neutral biological impacts to the BFT stock. However, at several public meetings on the Draft Consolidated HMS FMP and in written comment, particularly from the mid-Atlantic area, it was made evident that there is an active interest in using the gear to target BFT. The preferred alternative in the Draft Consolidated HMS FMP could have eliminated this opportunity allowed under the status quo, provided the gear is configured to conform to the current regulations. For BFT fishing, these conditions exist generally when commercial fishing for BFT in the General category (or with an HMS CHB permit) using handgear (rod-and-reel, handline, or bandit gear) with two hooks or less. These conditions also exist when recreationally fishing for BFT in the Angling category (or with an HMS CHB permit) using handgear (rod-and-reel or handline) with two hooks or less. The limit on the number of hooks for both recreational and commercial handgear has helped limit effort in currently overcapitalized fisheries targeting species with weak stock status (*i.e*., either overfished or approaching overfishing). Furthermore, the incidental retention of BFT by green-stick gear, trailing more than two hooks, is authorized under a Longline category permit so long as all other corresponding management measures are adhered to such as target catch restrictions, use of circle hooks, avoidance of closed areas, *etc*.

Since the publication of the Draft Consolidated HMS FMP in August 2005, NMFS received data on the performance of both the recreational and commercial BFT fishery, which exacerbated concerns over the ecological health and management of this stock. In the case of the commercial fishery, landings were low throughout the 2005 fishing season. The 2005 season was also marked by a noticeable lack of availability of commercial sized BFT throughout their traditional fishing range and, in particular, BFT were largely absent off southern states during the winter of 2005/2006. Although there is a high magnitude of available quota in the commercial size classes, scientists continue to be concerned over the status of this stock, especially the abundance of these larger fish that represent the potential spawners for future recruitment, particularly in the Gulf of Mexico. An international stock assessment on the current status, and future prognosis, of BFT is scheduled this year by the SCRS and new recommendations, if any, by ICCAT would not be available until November 2006. NMFS will continue to analyze potential impacts of authorizing green-stick gear and may consider modifications in the future, as appropriate.

Comment 20: NMFS received several comments regarding the technical nature of green-stick gear including comments comparing and contrasting the gear type to longline gear and commercial or recreational handgear such as handline and rod-and-reel. Comments included: green-stick gear is very different from longline gear in that when deploying green-stick gear the greatest distance the hooks are from the boat is 500 feet, whereas PLL gear has one hook a football field length away from one another; longline gear is set in the water column with many hooks while green-stick is trolled at a high speed with the artificial baits suspended above or skipping across the waters surface; this gear is trolled and is not set out to drift, which makes it very different from the definition of a longline gear; green-stick is similar to longline gear therefore it should be prevented from entering into closed areas; this gear is still a longline because of the use of hydraulics and several hooks; there are two distinct types of green-stick fishing and each should be carefully defined separately; the commercial green-stick method uses multiple hooks with artificial baits on a single line to catch Atlantic tunas, including BFT; the recreational green-sticking is an "angling" method primarily using rods-and-reels to catch Atlantic tunas, including BFT; some recreational gear is being pulled with more than two hooks per line; teasers without hooks should be allowed; the definition should include using no more than two hooks per any single line attached to the green-stick that basically acts as a vertical outrigger; green-stick gear should be restricted to hand powered reels; green-stick gear is also appropriate for use in the Angling and General category fisheries; and, recreational fishermen using green-stick gear could open up illegal commercial sale opportunities.

Response: NMFS notes that there are considerable similarities between the use of green-stick gear and recreational and commercial handgear as well as longline gear depending on how green-stick gear is configured and used under current definitions at 50 CFR part 600 and 635 and in accordance with all gear operation and deployment restrictions at 50 CFR 635.21. Longline means fishing gear that is set horizontally, either anchored, floating, or attached to a vessel, and that consists of a mainline or groundline with three or more leaders (gangions) and hooks, whether retrieved by hand or mechanical means. Any hook and line gear with three or more hooks is considered to be a longline. In addition to the use of rods and reels, handline gear means fishing gear that consists of a mainline to which no more than two leaders (gangions) with hooks are attached, and that is released and retrieved by hand, rather than by mechanical means. Finally, the use of bandit gear and downriggers is also an authorized means of deploying and retrieving the hook and line. Bandit gear means vertical hook and line gear with rods that are attached to the vessel when in use. Lines are retrieved by manual, electric or hydraulic reels. A downrigger is a piece of equipment attached to a vessel and with a weight on a cable that is in turn attached to hook-and-line gear to maintain lures or bait at depth while trolling. In addition to the above definitions and gear restrictions, specific additional management measures may apply to the use of gear depending on the targeted fishery and HMS or tuna vessel permits (*i.e.* 50 CFR 635 Subpart C as well as general permitting, recordkeeping, and monitoring requirements at 50 CFR 635 Subpart A).

Comment 21: NMFS received several comments and questions noting the level of confusion regarding what constitutes the technical nature of 'green-stick' gear, and how it can already be used versus modified by the proposed alternative. Comments include: the definition of longline gear is the problem, not green-stick gear; over one hundred green-sticks have been sold and you need to change the definition; it is not the stick that is the most important part of this gear, rather the suspended bait attracts the fish, not the number of baits; fishermen can use only one rod due to tangling; green-sticks are permanently attached to the vessel; green-stick gear is used to catch larger tuna, and that the gear is set-up vertically allowing the bait to fish further from the vessel; we support the use of green-stick gear by commercial vessels, but only if restricted to hand powered reels, but not if used with electric or hydraulic reels; this trolling method does not require any large device and is easy to set up on a small vessel and it is used to catch BFT and YFT around the world; the name “green-stick” comes from the original color of the pole, but today it is available in a variety of colors; and, as green-stick gear is permanently attached to the vessel there could be enforcement issues as the gear can be configured either as commercial or recreational. Questions include: what permit would be required to use this gear; would live bait be allowed with this gear; will configuration of the gear use rods and reels or hydraulic drum, how would one know the type of gear used to catch the fish if different gear types are allowed on the same vessel but not authorized to land the same species; is there a length limit on a rod and reel to distinguish it from green-stick gear; what does it matter how many hooks are on the line when operating under a General category permit; If we have longline and incidental BFT permits can we use green-stick gear; how do the incidental limits apply to longline vessels using green-stick gear; under the current regulations, what permit would be required for someone who fishes with green-stick gear for YFT; which will have more hooks - green-stick gear versus recreational gear; can green-stick gear fish in the closed areas; do the reporting requirements for General category permit holders call for reporting the gear employed; would green-stick fishermen be able to use live bait as it is proposed currently; in which fishery can the gear be authorized; is green-stick gear currently used in the Gulf; and can it be used at all in the Gulf of Mexico where BFT cannot be targeted since it is a spawning area?

Response: NMFS acknowledges that there is considerable confusion over the status of green-stick in the HMS fisheries under current management measures. NMFS intends to publish a brochure to clarify the current situation. The preferred alternative would maintain the current definitions for use of longline gear in the longline fishery and handgear in the commercial General category, the recreational HMS Angling, and the HMS CHB fishery. Thus, the use of green-stick gear is still allowed as in the past and in conformance with the appropriate management measures and existing reporting requirements for these HMS fisheries. No new regulatory definitions or permits are preferred at this time. Green-stick gear can be used in any configuration so long as it conforms to current definition of the use of longline or hook-and-line handgear as currently defined in the regulations and as listed above.

Comment 22: NMFS received several comments regarding the need for additional data regarding this gear-type. One comment stated the fishery needs further analysis on the use and configuration of green-stick gear and one commenter questioned what information would NMFS need collected to conduct a more detailed analysis of the impacts of using this gear. A comment stated that there needs to be some accommodation of this gear type, even if it is through an EFP to collect further information. A comment stated that the information used from the North Carolina Sea Grant paper referenced in the Draft Consolidated HMS FMP is out of date and that the gear has been altered as individuals have gained experience using it.

Response: NMFS agrees that the Agency and the fishery could benefit from additional data on the use of green-stick gear and its impact on both the recreational and commercial constituencies, HMS stocks, and any bycatch. In the past, green-stick gear was identified as a unique gear type on HMS Vessel Pelagic Logbook reports, but was discontinued as it was not a uniquely identified and defined gear. It also appears that fishermen had already been reporting green-stick HMS landings under either hook and line gear or longline gear. As a first step, NMFS intends to publish a brochure to clarify current allowable uses of the gear and how existing vessel and dealer permit and reporting requirements apply. NMFS also intends to examine whether or not existing monitoring programs should be modified to understand more adequately the uses and impacts of this gear or whether some additional program is necessary, including potential use of the EFP program. Finally, it would be helpful to the Agency to know how many fishermen use, or have used, this gear and in what configurations that conform with or differ from the current definitions. In addition, it would be valuable to know the locale and distribution of its use, preferred target species, efficiency over other gear-types, amounts and rates of bycatch, and social and economic costs and benefits of using the gear, among other research questions. Some useful historical and background data on green-stick gear is available in the North Carolina Sea Grant paper published by Westcott that was especially helpful defining and graphically laying out different ways to configure the gear. More recent updates and publications would be helpful to assist with the development of the planned brochure.

Comment 23: NMFS received comment on the bycatch associated with green-stick gear. Those comments include: almost all tuna are hooked in the mouth and could be released relatively unharmed, there are no turtle interactions, and other bycatch is limited because billfish and shark species have difficulty reaching bait that spends so much time in the air; and, that green-stick gear is a gear that minimizes the interactions of billfish with commercial handgear and should be promoted. Other comments noted a need to be cautious about potential bycatch issues and that NMFS needs to confirm the level of bycatch associated with this gear type; NMFS needs to prohibit this gear's use in the Gulf of Mexico due to potential bluefin tuna bycatch; the description of green-stick gear sounds like longline gear, which could mean greater bycatch and there should be no additional gear used in the Gulf of Mexico; and, we are opposed to green-stick gear because it appears to be a trolled longline and the biggest bycatch of marlin is in the yellowfin tuna fishery.

Response: The preferred alternative would not modify the regulations to define green-stick gear and thus NMFS does not expect the levels of bycatch to change as a result of implementing the No Action alternative. Trolled green-stick gear, configured as a version of rod-and-reel handgear, is likely to have few bycatch issues. Minimal data are available to analyze the bycatch issues associated with green-stick gear deployed as a form of handgear or as a longline, however, data from Pacific green-stick fisheries indicate that increases in billfish bycatch are possible. Under the current regulations, the use of green-stick gear is allowed (as clarified above) in the Gulf of Mexico although it remains prohibited to target BFT with any gear in this area to protect spawning BFT. NMFS continues to be concerned about levels of bycatch in HMS fisheries as well as in other fisheries that encounter HMS as bycatch. Overall, the Agency has continued to address bycatch issues in Federally managed fisheries and, consistent with National Standard 9, to implement management measures that minimize bycatch. Since 1999, NMFS has implemented a number of time/area closures to reduce bycatch to the extent practicable and, in the Draft Consolidated HMS FMP, examined numerous alternatives to determine if the closures were still meeting their original goals. Many of these measures, but not all, were designed to reduce bycatch in the pelagic longline fleet. In addition, the Draft Consolidated HMS FMP examined alternatives to train and certify fishermen in the safe handling, release, and disentanglement of protected resources from pelagic and bottom longline and gillnet gear. With the addition of new measures in the Final Consolidated HMS FMP, NMFS expects to continue minimizing bycatch throughout HMS fisheries.

*Buoy Gear*

Comment 24: NMFS received several comments supporting alternative H5, which would authorize the use of buoy gear only in the commercial swordfish handgear fishery. Some of those comments include: buoy gear should be for commercial use and handlines for recreational use; there are currently more recreational fishermen using buoy gear than commercial fishermen; buoy gear should be used to target swordfish because it is an effective gear; I do not support the use of recreational buoy gear, but it should be a commercial subcategory; buoy gear should be allowed, but not where it will have conflicts with recreational vessels/gear; and, this alternative is trying to establish a commercial fishery. Pelagic longline vessels could remove their longline gear and set buoy gear in closed areas.

Response: Free-floating buoyed lines are currently in use in many areas; however, they are being fished as handline gear, as defined by current HMS regulations. Currently, there are no limits on how many handlines a vessel may deploy, as long as each gear has no more than two hooks attached. The preferred alternatives would change the definition of handline gear to require that the gear be attached to a vessel and allow free-floating handlines, renamed as buoy gear, to be utilized in the swordfish handgear fishery only. The preferred alternative takes steps to limit the number of individual gears a vessel may possess or deploy when targeting swordfish commercially and would eliminate their use in all other HMS fisheries, both recreational and commercial. Vessels with directed swordfish or swordfish handgear LAPs would be authorized to utilize this gear type to capture swordfish in pelagic longline closed areas as long as the longline gear had been removed from the vessel.

Comment 25: NMFS received several comments opposed to alternative H5, which would authorize buoy gear for the commercial swordfish handgear fishery and limit vessels to possessing or deploying no more than 35 individual buoys, with each gear deployed consisting of one buoy supporting a single mainline with no more than two hooks or gangions attached. The comments include: buoy gear is needless and would be harmful to recreational interests; recreational fishermen are concerned about the use of this gear type; buoy gear would increase fishing effort on swordfish when it is still overfished; opening up the buoy fishery to fill the quota is a mistake; buoy gear is indiscriminate and destructive and has no place in a sustainable, viable fishery; buoy gear is nothing more than a vertical longline and we need reductions in bycatch or bycatch mortality. We are opposed to any fishing that allows unattended gear; buoy gear should not be allowed in the HMS fisheries for numerous reasons, including: a hazard to navigation; an indiscriminate killer like longlines; and deployment of the gear with live baits will increase discards and dead discards of numerous species; if buoy gear use continues, it is probable that the gear will interact with marine mammals in the U.S. EEZ; and, it is morally incomprehensible that NMFS is going to shut down the recreational white marlin fishery and yet allow thousands of hooks to be deployed with live baits on buoy gears.

Response: As discussed in Chapter 2 of the Consolidated HMS FMP, this gear type is currently in use as handline gear and anecdotal information suggests that it is being used by both commercial and recreational fishermen to target swordfish as well as other species. The preferred alternative would re-name the gear to buoy gear, limit its use to only those vessels permitted to participate in the limited access commercial swordfish handgear fishery, and significantly limit the number of individual gears that vessels could possess or deploy (from an unrestricted number to a maximum of 35). Consistent with the current definition of handline gear, each buoy gear would be limited to having no more than two hooks or gangions attached. Vessels deploying buoy gear would be allowed to use live or dead baits and may only retain swordfish captured on the gear. All tunas, sharks, marlins, or sailfish captured on buoy gear must be released in a manner that maximizes their probability of survival. This gear differs significantly from longline gear, which is defined as having three or more hooks or gangions attached. The preferred alternative would allow vessels deploying this gear type to use multiple floatation/gear marking devices, including but not limited to, buoys, floats, lights, radar reflectors, reflective tape, and high-flyers, to minimize any hazards to navigation. Logbook data from 2004 show that 68 percent of swordfish captured on commercial handline trips were retained. These same data show that over 75 percent of swordfish discarded from these trips were released alive. NMFS monitors gears for interactions with marine mammals and sea turtles and would continue to monitor buoy gear catch, bycatch, and any interactions with protected resources though the HMS logbook program.

Comment 26: If handgear must be attached to the vessel, how do the buoy gear requirements impact alternative H5, which authorizes buoy gear in the commercial swordfish handgear fishery, and limits vessels employing buoy gear to possessing and deploying no more than 35 individual buoys, with each buoy having no more than two hooks or gangions attached?

Response: Handgear (handline, harpoon, rod and reel, and bandit gear) are not all currently required to be attached to a vessel. A preferred alternative would modify the definition of handline to require that handlines be attached to a vessel. The buoy gear alternatives would not be impacted by the handline definition change as the preferred buoy gear alternative defines buoy gear as a separate gear type.

Comment 27: NMFS received a few comments opposed to alternative H6, authorize buoy gear in the commercial swordfish handgear fishery and limit vessels to no more than 50 individual buoys, each supporting a single mainline with no more than 15 hooks or gangions attached. These comments include: we do not support alternative H6; and, alternative H6 is mini-longlining and should be limited to vessels with all three permits (Directed or Incidental Swordfish, Atlantic Tunas Longline, and Directed or Incidental Shark).

Response: The Agency is not preferring alternative H6. In this action, the Agency is preferring a modification of alternative H5 which would authorize buoy gear for the commercial swordfish handgear fishery and limit vessels to possessing or deploying no more than 35 floatation devices, with each gear consisting of one or more floatation devices supporting a single mainline with no more than two hooks or gangions attached. This gear differs significantly from longline gear, which is defined as having three or more hooks or gangions attached. Fishermen deploying buoy gear must possess a commercial swordfish handgear or a swordfish directed limited access permit.

Comment 28: NMFS received a number of comments regarding buoy gear capturing undersized swordfish, including: 35 individual buoys fished at one time is in direct conflict with the HMS FMP objective to reduce bycatch and to minimize mortality of juvenile swordfish; this alternative will produce dead juvenile swordfish that are hooked and not successfully released due to lost gear or gear that cannot be checked in a timely manner; what studies show the successful release of juvenile swordfish when using 35 individual buoys with two hooks?; buoy gear fishermen currently catch approximately 25 - 30 percent juvenile swordfish (< 33 inches); circle hooks can reduce post–release mortality of juvenile swordfish and non-targeted species, they should be considered for this gear; and, about 50 percent of fish caught on well tended buoy gear can be released.

Response: In response to public comment, the Agency has modified the preferred alternative to allow buoy gear fishermen the option of deploying multiple floatation devices on individual buoy gears. The modified alternative would maintain the maximum limit of 35 floatation devices possessed or deployed. Under the modified alternative, fishermen who opt to fish three floatation devices per gear would be limited to deploying approximately 11 individual buoy gears. Similarly, fishermen using four floatation devices per gear would be limited to deploying approximately eight buoy gears. Logbook data from 2004 show that 68 percent of swordfish captured on commercial handline trips were retained. These same data show that over 75 percent of swordfish discarded from these trips were released alive. Commenters requested the ability to use several floatation devices per gear to allow for the use of a "bite indicator" float, which will let fishermen know when a fish is captured by the gear. This modification could allow fishermen to easily identify those gears that have captured fish and may allow fishermen to release any undersized swordfish or non-target species more quickly and with a greater probability of survival. Additionally, the modification to allow multiple floatation devices per gear may reduce the number of gears deployed and may minimize lost gear by making the gears more buoyant and visible. Although the Agency received public comment supporting the use of circle hooks with buoy gear, a circle hook option was not included in the alternatives in the Draft Consolidated HMS FMP. NMFS may analyze a circle hook requirement for buoy gear in a future rulemaking.

Comment 29: NMFS received a few comments related to the monitoring requirements for buoy gear. Such comments include: can fishermen use additional locating devices in addition to the single buoy required (*e.g.*, high flier to locate the buoy in bigger seas) to improve monitoring?; all four methods of marking buoy gear are needed to avoid lost fish and gear; there should definitely be a requirement for marking and monitoring; a visual radius or reasonable area a fisherman could fish with buoy gear should be defined; buoy gear "tending" requirements should be defined, like in the shark gillnet fishery, to prevent fishermen from tending buoys that belong to others; it would be impossible to monitor all 35 buoys that are free floating in rough weather conditions; while the handgear operator is retrieving a buoy that has hooked a swordfish of sustainable size, the other 34 buoys will not be attended; there are no minimum requirements for flags, radar reflectors, radio beacons, or strobe lights; and, is there any information about the loss of buoys?

Response: In response to public comment, the Agency has modified the preferred alternative to allow buoy gear fishermen the option of deploying multiple floatation devices on individual buoy gears. The modified alternative would maintain the maximum limit of 35 floatation devices possessed or deployed. Under the modified alternative, fishermen who opt to fish three floatation devices per gear would be limited to deploying approximately 11 individual buoy gears. Similarly, fishermen using four floatation devices per gear would be limited to deploying approximately eight buoy gears. If a gear monitoring device used by a fisherman were positively buoyant, it would be included in the 35 floatation device vessel limit. Consistent with current regulations, each floatation device attached to a buoy gear must be marked with either the vessel's name, registration number, or permit number. At this time, NMFS is not requiring any specific gear tending requirements for vessels deploying buoy gear; however, the Agency recommends that fishermen remain in the general area where they have set their gear and monitor each gear as closely as possible. NMFS realizes that different vessels and crews will have varying abilities to monitor gear and that weather and sea condition may also impact their ability to monitor gear closely. The Agency cautions fishermen to limit the number of gears they deploy to a reasonable number that they can realistically monitor and retrieve safely. At this time, the Agency does not possess any data regarding gear loss in this fishery. The Agency may conduct additional rulemaking in the future, if additional data indicates that gear tending requirements or other bycatch reduction measures are needed.

Comment 30: NMFS received a number of comments regarding the definition of buoy gear, including: consider modifying the definition of buoy gear because one buoy and all the line fished vertically will make it difficult to keep visual contact with the gear; without some way of knowing when a small fish is hooked, it may be several hours before the gear is retrieved; consider allowing a maximum of 20 feet of horizontal line on the surface for the purpose of identifying and monitoring buoy gear allowing space for "bite indicator" float and an identification buoy/hi-flier; additional equipment may be necessary to prevent large swordfish from sounding; allow additional gear at each buoy for retrieval and to determine if a fish is on the line; why is there no length or distance specified between buoys for the commercial buoy gear?; do the regulations stipulate how far apart the buoy gear can be spaced?; are buoy gears allowed to be attached to a hydraulic drum when being used commercially?; circle hooks, VMS, light sticks, live bait, and Careful Handling/Release training and certification should be mandatory; could you require the use of Global Positioning Systems (GPS) on the buoy gear?; there should be a prohibition on using live bait; an electronic monitoring system must be required for each buoy; there is no data to justify limitations on the number of buoys and/or hooks at this time; and, there is no criteria for what would constitute an acceptable buoy for this type of gear.

Response: As discussed above, NMFS has modified the preferred alternative in response to public comment and included a definition of floatation device. The modified alternative would allow fishermen deploying buoy gear to attach multiple floatation devices to each buoy gear, including "bite indicator floats," however the alternative would maintain the limit of 35 floatation devices possessed or deployed. A floatation device would be defined as any positively buoyant object rigged to be attached to a fishing gear. Buoy gear would be required to be released and retrieved by hand. If gear monitoring devices used by fishermen are positively buoyant and rigged to be attached to a fishing gear, they would be included in the 35 floatation device vessel limit and would need to be marked as per the gear marking regulations. Additionally, if more than one floatation device is used, no hook or gangion could be attached to the mainline or a floatation device on the horizontal portion of the gear. At this time, NMFS is not specifying any maximum or minimum length of horizontal line at the surface. However, to limit any hazard to navigation and potential gear loss by ship strike, NMFS recommends that fishermen set only the amount of gear that is needed at the surface. Similarly, NMFS is not preferring an alternative to specify a minimum or maximum distance between deployed buoy gears. NMFS urges fishermen to be responsible in their fishing activities and to only fish gear over a distance that they can realistically monitor. NMFS would not require GPS, electronic monitoring equipment, circle hooks, light sticks, live bait, or Careful Handling/Release training and certification for buoy gear fishermen at this time. NMFS may investigate some of these options for the buoy gear fishery in future rulemakings.

Comment 31: NMFS received a few comments regarding permit requirements for using buoy gear and comments supporting a limit on the number of vessels using buoy gear. These comments include: buoy gear should be limited to current permit holders only and no increase in its use should be allowed in future permit considerations; what kind of permit do you need for buoy gear?; buoy gear users should have the three permits that PLL needs; approximately 10 boats have used buoy gear in the past, however, it is now likely that only about three vessels use this gear type; how many participants are actively using buoy gear?; and, how many swordfish permits are there? Effort is going to increase.

Response: The preferred alternative would only authorize buoy gear in the commercial swordfish handgear fishery. Vessels deploying buoy gear must have a commercial swordfish handgear limited access permit or a swordfish directed limited access permit. As of February 2006, there were 88 commercial swordfish handgear permits and 191 directed swordfish permits. In 2004, seven vessels reported using handline gear in the HMS logbook. The logbook does not differentiate between trolled handlines, free-floating handlines, or attached handlines; however, some of those seven vessels likely fished free-floating handlines (buoy gear) and targeted swordfish. Based on historic participation and new restrictions, NMFS does not anticipate large increases in participation in this sector of the swordfish fishery.

Comment 32: NMFS received two comments inquiring about 35 buoys as the appropriate limit for buoy gear. These comments are: what is the basis for selecting 35 buoys as the limit?; and, how did the Agency select 35 buoys?

Response: NMFS selected the 35 buoy limit based on support from public comment and because the Agency identified this number as the manageable upper limit for the commercial sector that would prevent excessive amounts of unattended floating gear from being lost while allowing vessels to possess spare gear onboard.

Comment 33: NMFS received a number of comments on the proposed limit of 35 buoys, including: tending 35 buoys will be inefficient, taking 2 - 2.5 hours to set 35 buoys and 3 - 3.5 hours to check each one; no more than 12 buoys should be allowed when operating alone; with two crew members, up to 20 buoys could be fished; can the number of permissible buoys be linked to people onboard the vessel; participants currently cannot fish 35 buoys but may be able to in the future; 35 buoys with two hooks a piece is almost like hauling a 30 mile longline with the current; define and allow this gear type for swordfish commercial harvest, but limit the number of buoys to a more manageable number for protection of juvenile swordfish, allowing no more than 10 buoys makes the gear maintainable and produces a high quality product with minimal impact on juvenile fish; 35 buoys are unmanageable and are tended exactly like a short pelagic longline with overnight soak time violating the intent of the area closure; 10 to 12 buoys with a maximum of two hooks is the most that should be allowed, a prudent skipper and crew could not manage more than 10 buoys at a time and that would be under ideal sea conditions; The regulations should allow a maximum of 10 to 12 buoys, otherwise bycatch cannot be prevented; 35 buoys with two hooks each is not considered "handgear"; and, 35 buoys are far too many and may allow bigger vessels from the NED to move in and use this gear in closed areas, this shift could create tension between user groups and, displace the smaller vessels that pioneered this type of gear. This already happened in the FEC area with a boat using 20 - 25 radio buoys; 35 buoys are unmanageable; more than 12 buoys are unmanageable. The definition of this gear should be by the drop line, not the number of buoys; pelagic longline fishermen would need more than 35 buoys to make a go of the buoy fishery; and, there is no data that shows a limit on buoy gear is needed.

Response: In response to public comment, the Agency is preferring a modification of alternative H5 which would authorize buoy gear for the commercial swordfish handgear fishery and limit vessels to possessing or deploying no more than 35 floatation devices, with each gear consisting of one or more floatation devices supporting a single mainline with no more than two hooks or gangions attached. As discussed above, the modified alternative would allow fishermen deploying buoy gear to attach multiple floatation devices to each buoy gear, including "bite indicator" floats, however the alternative maintains the limit of 35 floatation devices possessed or deployed. This alternative gives greater flexibility in the gear configuration by allowing fishermen to alter the gear depending on weather or sea conditions, crew size, and characteristics of different fishing vessels. If gear monitoring devices used by fishermen are positively buoyant and rigged to be attached to a fishing gear, they would be included in the 35 floatation device vessel limit and would need to be marked as per the gear marking regulations. Additionally, if more than one floatation device is used, no hook or gangion could be attached to the mainline or a floatation device on the horizontal portion of the gear. Under the modified alternative, fishermen who opt to fish three floatation devices per gear would be limited to deploying approximately 11 individual buoy gears. Similarly, fishermen using four floatation devices per gear would be limited to deploying approximately eight individual buoy gears. NMFS realizes that different sized vessels and crews will have varying abilities to monitor gear and that weather and sea conditions may also impact their ability to monitor gear closely. The Agency cautions fishermen to limit the number of buoy gears they deploy to a reasonable number that can be realistically monitored and retrieved safely. NMFS realizes that the limits on buoy gear would likely reduce the chances that large distant water vessels could make profitable trips with buoy gear. During the scoping process, the Agency received comment indicating that the swordfish handgear fishery does not appear to be widespread and appears to operate off the East Coast of Florida. The preferred alternative was developed in an attempt to maintain positive economic benefits for the commercial sector currently utilizing the gear type.

Comment 34: NMFS received a number of comments opposed to authorizing buoy gear and the use of buoy gear in pelagic longline closed areas. Those comments include: the proposed buoy gear would operate in a manner similar to longline gear. Do not reopen the longline fishery to further commercial exploitation in our waters; buoy gear is proposed for use in areas currently closed to longline gear; this commercial gear violates the intent and purpose of closed areas and the basic reason these areas were originally created; how do these new proposed gears mesh with the current closed areas?; longline fishermen are by far the most indiscriminate killers of the very species that recreational fishermen and conservation groups try to protect. Yet, they are being allowed back into closed areas and are allowed to continue using longline tackle that has been renamed; these areas were closed to PLL and allowing buoy gear in will eliminate any benefits that the closures had; and, all the issues for PLL seem to be there for buoy gear. Bycatch issues are still there.

Response: The preferred buoy gear alternative would re-name free-floating handline gear as "buoy gear," limit vessels deploying the gear to possessing or deploying no more than 35 floatation devices, and would limit its use to commercial swordfish handgear fishermen. This alternative represents a limitation on the handgear fishery over the status quo, and is not modifying any current restrictions on longline fishing. This gear has been utilized with no gear limits by both recreational and commercial fishermen in areas closed to pelagic longline fishing in the past and would be prohibited for use by recreational fishermen and all commercial fishermen not possessing a swordfish handgear or swordfish directed limited access permit. The continued use of this gear by a limited number of fishermen would not violate the intent and purpose of the East Florida Coast closed area (or other PLL closed areas), which was to minimize bycatch in the PLL fishery while maximizing the retention of target species.

Comment 35: NMFS received several comments expressing concern over the authorization of buoy gear in the East Florida Coast PLL closed area, including: pelagic longline vessels once contributed to a vast amount of dead discards of juvenile swordfish in the East Florida Coast area and buoy gear will have the same effect; the East Florida Coast closed area is a vital nursery area that needs to be protected; there should be no free-floating gear allowed in the Florida Straits; buoy gear is like longline gear, and NMFS should ban longlining for swordfish in the Florida Straits; to fish buoy gear in the Straits of Florida the handgear operator must ensure 100 percent release of juvenile swordfish; and, a limit might be necessary off Florida, but there might be possibilities in other areas where limits are not needed.

Response: As discussed in the response above, the preferred alternative would restrict the number of unattached handlines or buoy gear that may be deployed and would limit the number of permit holders authorized to utilize the gear type relative to the status quo. This gear is currently authorized for use with no limitations on numbers of buoy gears deployed by both recreational and commercial fishermen in the East Florida Coast closed area. The preferred alternative would prohibit all recreational fishermen and commercial fishermen not possessing a swordfish handgear or swordfish directed limited access permit from utilizing the gear type. According to 2004 logbook data, 64 commercial handline trips were reported with 404 swordfish reported caught. Of those 404 swordfish captured, 67.8 percent (274 fish) were retained, 24.3 percent (98 fish) were released alive, and 7.9 percent (32 fish) were discarded dead.

Comment 36: NMFS received several comments concerned about allowing buoy gear to operate in the Gulf of Mexico. Those comments include: buoy gear should not be allowed in the DeSoto closures area, nor should it be allowed in the Southern Canyon area. There should be no free floating gear because it could get entangled with oil rigs; buoy gear may need greater restrictions in the Gulf. I am worried about excessive gears and bycatch with the currents and weather; concerns on how buoy gear will be deployed in the Gulf of Mexico with free floating drilling barges and their multiple thrusters, may lead to pollution issues; future generations will suffer and only one group will benefit from allowing 30 - 50 hook sets with no radar reflectors into the DeSoto area south of Destin. After the buoy fishermen have moved on, there will never be another blue marlin, swordfish, tuna, or shark in the Gulf of Mexico; the De Soto Canyon pelagic longline closure has been successful over the past five years with more tuna, dolphin, swordfish, and wahoo; and, buoy gear should be banned completely from the Gulf of Mexico.

Response: During the scoping process, the Agency received comment indicating that the swordfish handgear fishery does not appear to be widespread and appears to operate off the East Coast of Florida. As discussed under Comment 34, the preferred alternative would restrict the number of unattached handlines or buoy gear that may be deployed and the number of permit holders authorized to utilize the gear type relative to the status quo. In addition, the preferred requirement to affix gear monitoring equipment is intended to reduce the likelihood of gear loss.

Additionally, under the preferred alternative, buoy gear would only be authorized to harvest swordfish, no other HMS species may be targeted with buoy gear. All other HMS species captured must be released in a manor that maximizes their probability of survival. NMFS will monitor bycatch and gear loss, and may make adjustments, as needed, in the future.

Comment 37: NMFS should consider geographic limitations for buoy gear to minimize negative gear conflicts in a future action.

Response: During the scoping process, the Agency received comment indicating that the swordfish handgear fishery does not appear to be widespread and appears to operate off the East Coast of Florida. However, if circumstances warrant changes, the Agency may consider making adjustments to minimize negative impacts in the future, if necessary.

Comment 38: There is no penalty for clipping the buoy gear together to create a longline.

Response: Under the current regulations, lines with three hooks or more are longlines. Vessels clipping buoy gears together and having more than two hooks on any combination of lines would need the appropriate permits allowing the operators to harvest HMS with longline gear. Additionally, these vessels could only set this type of gear in areas not closed to longline fishing. The preferred alternative would prohibit linking buoy gear together.

Comment 39: Buoy gear exponentially increases the footprint of the vessel because it is not attached to the vessel. It will become entangled in offshore oil platforms and dynamic positioning vessels, and other oilfield related facilities and will result in more stand-off regulations for the recreational and commercial fisheries from these structures, not to mention the additional expense to the oil companies of removing this gear and repairing damage caused by it.

Response: As discussed under Comment 34, the preferred alternative would restrict the number of unattached handlines or buoy gear that may be deployed and the number of permit holders authorized to utilize the gear type relative to the status quo. In addition, the requirement to affix gear monitoring equipment is intended to reduce the likelihood of gear loss.

*Secondary Cockpit Gear*

Comment 40: NMFS received comments on the types of cockpit gears that would be authorized under the proposed Consolidated HMS regulations. Those comments include: what are the primary cockpit gears included for authorization?; will the regulations have a list of acceptable cockpit gears because that list is going to be extremely long to cover all the methods currently used?; people are going to need to provide NMFS with a list of gears currently used to be sure they are included; do not allow dart harpoons and other secondary gears to be used as primary authorized gears; mechanical harpoons should not be used as secondary cockpit gear; and, if there is choice between a gaff, flying gaff, and cockpit harpoon, I am going for a cockpit harpoon every time to kill fish and protect myself.

Response: Under the preferred alternative, the regulations would not list specific acceptable secondary cockpit gear; rather, secondary gears would be authorized for assisting in subduing an HMS already brought to the vessel with an authorized primary gear. Primary authorized gears are listed in the current HMS regulations at 50 CFR § 635.21(e). This action would clarify the regulations to state that secondary cockpit gears would not be allowed to capture undersized or free-swimming HMS, but only to gain control of legal-sized HMS brought to the vessel with an authorized primary gear with the intent of retaining the HMS. This measure would acknowledge and account for the current HMS regulations at 50 CFR § 635.21(a), which state that an Atlantic HMS harvested from its management unit that is not retained must be released in a manner that will ensure maximum probability of survival, but without removing the fish from the water.

Comment 41: NMFS received comments supporting the use of secondary gears. Those comments include: I support alternative H7, clarify the allowance of hand-held cockpit gears used at boat side for subduing HMS captured on authorized gears; hand darts need to be authorized as secondary gear so that the people in Florida's swordfish recreational fishery are not fishing illegally; and, this action is necessary to avoid enforcement conflicts over what gear is legal for subduing HMS.

Response: The preferred alternative would authorize the use of hand-held cockpit gears to aid anglers in subduing large HMS captured by authorized primary gear types to reduce the loss of fish at the side of the boat, increase safety when subduing large HMS, minimize enforcement problems, and respond to requests from fishery participants to clarify the regulations. This action would not specify acceptable secondary cockpit gears, rather it would clarify the HMS regulations to state that secondary cockpit gear may be used to aid in the landing or subduing of HMS after they are brought to the vessel using a primary authorized gear type only. Secondary hand-held cockpit gears may also reduce the loss of fish at boat side, increasing retention rates. Primary authorized gears are listed in the current HMS regulations at 50 CFR § 635.21(e).

### D.3.4 Regulatory Housekeeping

*Issue 1: Definitions of Pelagic and Bottom Longline*

Comment 1: NMFS received comments in support of the no-action alternative to maintain the current PLL and BLL gear definitions, and a comment in support of the two alternatives that were preferred in Draft HMS FMP. These included: I support Alternative I1(a) – no action. The other alternatives tend to micromanage directed shark fishermen out of the closed areas, in particular the NC BLL time/area closure, by reducing profits and causing unnecessary economic impacts; if fishermen can tell the difference between BLL and PLL gears, they should be able to teach NMFS enforcement agents the difference; it is still clear that there is a problem with the BLL and PLL definitions. NMFS should reexamine this issue with some fishing industry assistance; and, NMFS is making a big deal and creating potential additional economic impacts for enforcement's convenience. It is not an enforcement necessity; and, PLL and BLL gears should be differentiated by the number of floats (alternative I1(b)) as well as the types of species landed (alternative I1(c)).

Response: NMFS believes that the existing regulations defining pelagic and bottom longline gear at § 635.21(c) and (d), respectively, are generally sufficient. However, there could be situations where it is difficult for law enforcement to differentiate between the two gear types while enforcing the closed areas or VMS regulations. Difficulties could arise, for example, in determining whether the weights and/or anchors are capable of maintaining contact between the mainline and the ocean bottom in the case of bottom longlines, or whether the floats are capable of supporting the mainline in the case of pelagic longlines. These difficulties could result in lengthier boardings at sea by law enforcement, temporary curtailment of fishing activities, and potential legal proceedings. For these reasons, NMFS sought to reexamine the current PLL and BLL definitions in this amendment to ascertain whether improvements were warranted. Based upon public comment and consultations with law enforcement, NMFS found that the current PLL and BLL definitions could be strengthened by establishing limits on the types of species that could be possessed when fishing in HMS closed areas with these gears. However, in order to maintain operational flexibility for the HMS longline fleet, and in recognition of the impracticality of defining and limiting the number of "fishing floats" possessed or deployed, gear-based alternative I1(b) is no longer preferred. The overall objective of this issue, preserving the integrity of the HMS time/area closures, can effectively be achieved by implementing preferred alternative I1(c) alone, species composition of catch. This alternative addresses the crux of the issue, which is to discourage catches of pelagic species in PLL closed areas (and vice versa), without the adverse economic impacts associated with additional gear restrictions. This alternative is expected to accommodate the majority of commercial fishing operations, yet still provide a quantifiable method to differentiate between PLL and BLL vessels. As a result, the ecological benefits associated with HMS closed areas are expected to remain intact, including reductions in discards of swordfish, bluefin tuna, dusky sharks, sandbar sharks, other HMS, other finfish, and protected species. By implementing preferred alternative I1(c) alone, NMFS anticipates that HMS longline vessel operators will be prudent when fishing in the HMS closed areas and catch predominantly pelagic species in BLL closed areas, or demersal species in PLL closed areas. However, the establishment of quantifiable gear-based criteria to differentiate between PLL and BLL gear could still potentially offer an effective method to further eliminate ambiguities between the two gear types. The Agency intends to continue to assess the need for, and potential effectiveness of, gear-based criteria. If needed, such criteria could be developed in consultation with the fishing industry to further improve the monitoring of, and compliance with, HMS closed areas.

Comment 2: NMFS received several comments indicating that HMS longline vessel operators need to maintain their operational flexibility. These comments include: Longline vessels need to maintain their ability to change between PLL and BLL gear in order to ensure versatility. For economic survival and efficiency, vessels often conduct both PLL and BLL sets on a single trip. This is especially true for PLL vessels that fish with BLL gear during rough weather days on a PLL trip. There will be an economic loss if NMFS restricts this flexibility; definitions for PLL and BLL gear should be developed to facilitate identification by law enforcement, while not precluding fishermen from choosing between gear types; and, in order to allow flexibility to conduct both PLL and BLL sets, the final regulations may need to specify differences between active gear and gear onboard the boat and not in use, because there have been some enforcement errors.

Response: NMFS recognizes that HMS longline vessels need to maintain their ability to change between PLL and BLL gear in order to ensure versatility. The reason for addressing the gear definition issue in this amendment was not to impose additional economic costs on longline vessels, but rather to preserve the conservation benefits associated with the HMS time/area closures. The HMS longline closed areas were implemented to provide important protection to a variety of HMS and other protected species. This protection could be compromised if HMS longline vessels are catching large amounts of pelagic species in the PLL closed areas, while under the guise of BLL fishing, and vice-versa. The critical factor in maintaining the integrity of the HMS time/area closures is, therefore, to ensure that the proper species are hooked. This could potentially be accomplished in a variety of ways. NMFS believes that establishing a limit on the species composition of the catch when fishing in the HMS closed areas (preferred alternative I1(c)) is an efficient method to discourage illegal fishing activities in these areas, without imposing additional gear requirements that could restrict operational flexibility. As long as a vessel is in compliance with the current PLL or BLL definitions when fishing in the HMS closed areas, the operator will retain the flexibility to choose how to comply with the catch limits specified in preferred alternative I1(c). Importantly, however, these catch limits must be adhered to if any portion of a trip is in an HMS closed area. NMFS believes that it is not unreasonable, or unduly burdensome, for HMS longline vessels to adhere to the intent of the HMS closed areas and to avoid pelagic or demersal species, especially when legally fishing in these areas with BLL or PLL gear, respectively. Because NMFS is implementing a species-based, rather than a gear-based, alternative to differentiate between pelagic and bottom longlines, a gear stowage provision is not necessary at this time.

Comment 3: Comments were received indicating that vessel monitoring systems (VMS) could be used to help differentiate between PLL and BLL vessels. These comments included: Since VMS are already required for the closed areas, NMFS should establish a declaration system allowing the VMS monitors to know what gear type is being utilized and why. Law enforcement and/or observers could verify compliance, and impose penalties for non-compliance; and, it has been suggested that vessels "call-in" and declare their intentions prior to engaging in fishing in a closed area. This would be an unnecessary burden, but it is feasible.

Response: This comment was also raised by both the public and the Office of Law Enforcement during scoping hearings, and was considered during the development of alternatives for the DEIS. However, NMFS decided against including an alternative with a VMS declaration because it would not alleviate the need for a quantifiable method to differentiate between PLL and BLL gear. Although a vessel operator could declare to be fishing with PLL or BLL gear, it would still be necessary to verify compliance. Nevertheless, there may be a potential benefit to a VMS declaration system, and NMFS will continue to assess the need for such a system.

Comment 4: Comments opposed to alternative I1(b), defining BLL or PLL gear based on the number of floats onboard, included: We are strongly opposed to alternative I1(b); defining BLL and PLL gear by the number of floats will not work; and, alternative I1(b) would impose an unnecessary additional economic and logistic burden on already over-regulated fisheries.

Response: Although the analysis in the Draft HMS FMP indicated that relatively few HMS longline vessels would be impacted by the float requirement in alternative I1(b), this alternative is no longer preferred in the Final HMS FMP. As discussed above, several commenters stated that a float requirement would diminish the flexibility of vessel operators to participate in different fishing activities, depending upon the circumstances. Also, consultations with NMFS Law Enforcement indicated that defining "fishing floats" and limiting the number that could be possessed or deployed would not be practical. In light of these concerns, NMFS believes that the overall objective of this issue, preserving the integrity of the HMS time/area closures, can effectively be achieved by implementing preferred alternative I1(c) alone, species composition of catch. By not preferring alternative I1(b), any potential adverse economic impacts associated with restricting the allowable number of floats should be mitigated.

Comment 5: NMFS received many comments regarding the float requirement in alternative I1(b), and suggestions for developing other gear-based methods to better differentiate between PLL and BLL. These comments include: There is some confusion in preferred alternative I1(b) between the terminology that the industry is accustomed to using versus what NMFS is using; how do the proposed regulations define PLL and BLL gear and floats?; floats are used for recovery and monitoring sections of the gear. The types of mainline and anchor are related to where the gear is fishing in the water column. The mainline and anchors onboard a vessel would be better indicators of what type of longline gear is onboard a vessel; if NMFS proceeds with alternative I1(b), it is important to make sure that an anchor ball is accounted for in the float enumeration; there is no critical need for BLL vessels to possess "bullet" type floats. Such floats can be replaced with polyballs on BLL vessels at minimum costs. On the contrary, PLL vessels must carry large quantities of both polyball and "bullet" floats, this difference would enable enforcement officers to differentiate between PLL and BLL vessels while underway and/or fishing. NMFS could allow PLL vessels to retain the necessary flexibility if they required all "bullet" type floats to be stowed below deck and/or completely covered before engaging in BLL fishing in a PLL closed area. It would be awkward but it is feasible; NMFS enforcement should not require an adjustment to the definition. A PLL vessel is easy to spot by the amount of "bullet" floats and balls. While deployed, the gear is easy to determine by the consecutive "bullet" floats along the line. When a PLL vessel is engaged in BLL fishing, there is no consecutive string of "bullet" floats and a BLL vessel does not require hundreds of bullet floats; and, on the Grand Banks, fishermen use polyballs, bullet floats and radio buoys, but I do not know the exact number of each; Radio buoys are probably used more with PLL than with BLL gear.

Response: NMFS appreciates these comments. The proposed regulations did not contain new definitions for PLL and BLL gear, and did not define "fishing floats." Rather, comments were specifically requested on potential definitions for "fishing floats." While differences between PLL and BLL gear might be readily apparent, these comments highlight the difficulties associated with developing definitions that are quantifiable, understandable, practical, enforceable, and can accommodate a variety of different fishing techniques. These limitations greatly restrict the ability to develop practical, quantifiable definitions for PLL and BLL gear that are improvements over the existing definitions. For these reasons, as discussed above, NMFS believes that the current PLL and BLL definitions do not require significant modification, but can be strengthened by establishing limits on the types of species that can be possessed when fishing in HMS closed areas. In order to maintain operational flexibility for the HMS longline fleet, and in recognition of the impracticality of defining and limiting the number of "fishing floats" possessed or deployed, gear-based alternative I1(b) is no longer preferred. Nevertheless, the establishment of quantifiable gear-based criteria to differentiate between PLL and BLL gear using the recommendations contained in this comment could help to eliminate ambiguity between gear types in the future, if necessary. NMFS will continue to assess the need for, and potential effectiveness of, gear-based criteria. If needed, such criteria could be developed in consultation with the fishing industry to further improve the monitoring of, and compliance with, HMS closed areas.

<u>Comment 6</u>: Comments regarding the numbers of floats specified in alternative I1(b) included: The number of floats proposed for the PLL/BLL designation in alternative I1(b) (*i.e.*, 71 or more floats for PLL) is appropriate, but fishermen could run into trouble with enforcement during test sets. These are sets fishermen use to determine what fish, if any, are in the area. Test sets are usually shorter and have fewer floats; NMFS is proposing too many floats to differentiate between BLL and PLL gear in alternative I1(b). BLL gear would have far fewer floats. Most BLL may have two to four floats with maybe a 12 to 15 maximum; and, a fisherman may do a short PLL set that would have less than 71 floats when fishing in closed areas and might be able to catch demersal fish, like sandbar sharks, on PLL gear.

<u>Response</u>: Based upon an analysis of the HMS logbook in the Draft HMS FMP, NMFS believes that the number of floats specified to differentiate between PLL and BLL gear in alternative I1(b) is appropriate. The analysis indicated that at least 90 percent of all reported BLL sets in 2002 and 2003 possessed fewer than 70 floats, and approximately 95 percent of all reported PLL sets in 2002 and 2003 possessed more than 70 floats. However, public comment indicated that, in some instances, the float requirement could adversely impact operational flexibility. For this reason and the others discussed above, the float requirement in alternative I1(b) is no longer preferred. NMFS believes that the concern expressed in this comment regarding catching demersal fish on PLL gear in BLL closed areas would be adequately addressed by alternative I1(c), which would limit the amount of species (either pelagic or demersal, as appropriate) that may be possessed or landed from HMS closed areas.

<u>Comment 7</u>: Alternative I1(b) may assist in defining greenstick gear by specifying the numbers of floats for pelagic and bottom longlines.

<u>Response</u>: The issues involved in defining greenstick gear are addressed in the Authorized Fishing Gear section of the Final HMS FMP (see Section 4.3.3). NMFS is no longer preferring alternative I1(b), which would specify the number of floats for PLL and BLL gear. If needed in the future, NMFS may consider distinguishing between greenstick and longline gear based upon the number of floats.

<u>Comment 8</u>: NMFS received comments in opposition to alternative I1(c), including: I vehemently oppose preferred alternative I1(c) which differentiates between BLL and PLL gear based upon the species composition of the catch. There is no difference between PLL and BLL gear. BLL gear takes so long to set and retrieve that it can kill pelagic species while the hooks are being retrieved. Enforcement will be ineffective on this alternative. What is a vessel considered to be, PLL or BLL, after it has just switched from one mode to the other prior to harvest in the second mode?; and, I am opposed to this alternative because it will limit the abilities of the directed shark fishery.

Response: There is a difference between PLL and BLL gear. PLL gear fishes for pelagic species in the water column, while BLL gear fishes for demersal species and is in contact with the seafloor. Although the gears can each catch both types of species, the catch rates of demersal and pelagic species are very different between the gears. This fact is evident in the Coastal logbook where, on average, from 2000 – 2004, over 95 percent of the reported landings were demersal "indicator" species, as measured relative to the total amount of "indicator" species. Similarly, in the PLL logbook, from 2000 – 2004, on average, over 95 percent of the reported landings were pelagic "indicator" species, as measured relative to the total amount of "indicator" species. For this reason, a 5-percent threshold of pelagic and demersal "indicator" species would be established for BLL and PLL gear, respectively, in preferred alternative I1(c). NMFS recognizes that a small percentage of species caught on BLL and PLL gear will be the unavoidable bycatch of pelagic and demersal species, respectively. Also, the logbook data indicate that the five-percent threshold would have been exceeded on a fishery-wide basis in 2004, whereas both fisheries (PLL and BLL) would have been well below the threshold from 2000 – 2003. If necessary, both the 5-percent threshold and the list of indicator species can be modified in the future based upon a review of current and historic landings and the effectiveness of the regulation. Presently, the Agency does not expect that preferred alternative I1(c) would significantly limit the abilities of either fishery. NMFS further believes that it is not unreasonable, or unduly burdensome, for HMS longline vessels to adhere to the intent of the HMS closed areas and to avoid pelagic or demersal species, especially when legally fishing in these areas with BLL or PLL gear, respectively. If any portion of an HMS longline trip occurs within a BLL or PLL closed area, then that vessel would be required to adhere to the 5-percent threshold for pelagic or demersal species, respectively. This management measure is readily enforceable, either through dockside verification of landings or by at-sea boardings. If difficulties arise in determining whether a vessel is fishing with PLL or BLL gear in a closed area using the existing definitions, the species composition of catch methodology described in the alternative provides a quantifiable method to verify fishing technique.

Comment 9: Comments specifically referencing the five-percent species composition threshold for differentiating between gears include: In order to differentiate between PLL and BLL gear, NMFS should prevent fishermen with BLL gear from landing any pelagic species in preferred alternative I1(c). This prohibition would eliminate the profit incentive and motive for violating closed areas and manipulating set time, depth at which gear is set, and the number of buoys; I am opposed to the 5-percent tolerance for species because there is too much variability in the catch. This ratio could also be problematic when combined with the alternative addressing dealers and vessels buying and selling fish in excess of retention limits, because there is no room for error and no way to dispose of catch that is useful; NMFS must make sure that the species composition lists in preferred alternative I1(c) are complete enough to allow for gear definitions based on species; and, tilefish should be added to the list of demersal indicator species.

Response: NMFS appreciates these comments. As discussed above, both types of gear can occasionally catch both types of "indicator" species, pelagic and demersal. The establishment of a zero-tolerance for pelagic "indicator" species when fishing in PLL closed areas with BLL gear could create a situation where regulatory discards occur, due to the unavoidable bycatch of pelagic species. Alternative I1(c) would strike an appropriate balance by establishing a 5-percent tolerance, which should discourage directed fishing on pelagic species by BLL vessels and vice-verse, but not increase regulatory discards. Data from the Coastal and HMS logbooks indicate that, on average, vessels remained below this threshold from 2000 – 2004, although it would have been exceeded in 2004. Based upon public comment, NMFS has modified the list of demersal "indicator" species by removing hammerhead and silky sharks, and by adding tilefish to the list. If necessary, both the 5-percent threshold and the list of indicator species could be modified in the future based upon a review of current and historic landings.

Comment 10: More enforcement time should be spent at the docks rather than spending resources on investigating boats at sea. At-sea enforcement of alternative I1(c) could initiate unnecessary de-icing of fish in the hold while at sea, which has a substantial economic impact.

Response: As discussed above, preferred alternative I1(c) is readily enforceable, either through dockside verification of landings or by at-sea boardings. If difficulties arise in determining whether a vessel is fishing with PLL or BLL gear in a closed area using the existing definitions, the species composition of catch methodology described in the alternative provides a quantifiable method to verify fishing technique.

Comment 11: The Gulf of Mexico Fishery Management Council and others have recommended that the preferred alternative be changed from I1(b) to I1(e): Base HMS time/area closures on all longlines (PLL and BLL); alternative I1(e) would be the easiest alternative to enforce. This is the only way to achieve a meaningful reduction in bycatch; billfish feed throughout the water column. To provide the proper protection needed, both types of longline gear should be prohibited from closed areas; alternative I1(e) should also prohibit buoy gear from the closed areas; alternative I1(e) is the only way to reduce bycatch and facilitate enforcement; and, how deep must BLL gear be set before it does not adversely affect pelagic species?

Response: NMFS agrees that alternative I1(e) would be the easiest to enforce, but believes that preferred alternative I1(c), which would implement limits on bycatch, can be effective at preserving the conservation benefits associated with the closed areas while simultaneously mitigating adverse economic impacts on longline vessels fishing in the areas. When deployed and fished properly, available logbook information suggests that BLL and PLL gear can be set and retrieved with only minor impacts on pelagic and demersal species, respectively. Closing these areas to all gears, therefore, would impose economic costs while achieving only minimal ecological benefits. NMFS anticipates that HMS longline vessels will continue to be prudent, especially when fishing in the HMS closed areas by catching predominantly pelagic species in BLL closed areas, and demersal species in PLL closed areas. NMFS does not agree that closures for PLL or BLL gear also need to be closed to buoy gear. As described earlier, NMFS prefers to authorize buoy gear in the commercial swordfish handgear fishery with gear marking requirements and limits on the number that may be deployed. Those measures would prevent the uncontrolled future expansion of this gear sector, while simultaneously providing a reasonable opportunity for the U.S. to harvest its ICCAT swordfish quota.

*Issue 2: Shark Identification*

Comment 12: We support alternative I2(a) which would retain the current regulations regarding shark landing requirements (No Action) because the preferred alternative, I2(b), could have a negative economic impact on the fish houses due to degradation of the product. The sharks could be overexposed to heat after unloading and weighing, instead of going directly into the ice vats after weighing. It costs time and money to stop and try to cut off all the secondary fins, particularly small ones after the boat has docked and the fish house has began the unloading efforts.

Response: In an effort to improve data collection, quota monitoring, and stock assessments of shark species, the Agency prefers alternative I2(b). While initial adjustments may have to be made to the offloading and processing procedures, NMFS believes that efforts to improve shark identification and enforcement of regulations would improve the overall status of the shark fishery. Alternative I2(b) would be an intermediate action (relative to I2(a) and I2(d)) in terms of economic impacts, in that the second dorsal and anal fins are typically the least valuable and are usually sold as the lowest quality grade. Either the dealer or the fishermen can remove these fins after landing. If removing the fins at the dock becomes problematic, it is possible that fishermen could pre-cut fins, so that they are only partially attached, to decrease processing time. Alternatively, dealers could remove the fins later when processing the rest of the carcass.

Comment 13: NMFS received the following comments supporting the preferred alternative: I support preferred alternative I2(b) which requires fishermen to retain the second dorsal and anal fins on sharks; these measures will greatly enhance species-specific shark landing data and improve identification; retention of the second dorsal fin and anal fins of landed sharks, including nurse and lemon sharks, will improve quota monitoring, prohibited species enforcement, and species-specific identification of sharks; and, lemon sharks and great hammerheads have valuable fins- they should be ok to remove after landing.

Response: NMFS agrees. The preferred alternative, I2(b), is expected to generate ecological benefits by enhancing and improving species identification and data collection, particularly in coordination with the preferred alternative for dealer identification workshops, thereby leading to improved management and a sustainable fishery.

Comment 14: Maintaining the second dorsal fin in alternatives I2(b) and I2(c) will do little to improve shark identification.

Response: The second dorsal and anal fins of sharks vary in color, shape, and size (relative to the body). While retaining these fins may not allow for all shark species to be distinguished from each other, NMFS believes that it would aid identification at landing, which, in conjunction with HMS species identification workshops, should reduce the number of unclassified sharks reported. While retaining these fins is expected to enhance identification, non-preferred alternative I2(c) could confuse identification by allowing some sharks to be completely finned, and could have adverse ecological impacts compared to either the no action or the preferred alternative.

*Issue 3: HMS Retention Limits*

Comment 15: NMFS received the following comment in support of the no action alternative I3(a): Proceeds from fish caught in excess of a vessel's trip limit should be donated to NMFS to help fund the observer program up to a certain limit, such as five percent, and fishermen should get fined for anything above that percentage.

Response: For each of the regulated HMS, specific trip limits have been developed based upon a number of biological, social, and/or economic reasons, such as the nature of the trip (commercial or recreational), the gear types used to harvest the fish, or the status of the stock in question. Thus, tolerance limits need to be developed for each individual species on a fishery-by-fishery basis, and may not be appropriate for all regulated species. Also, even with tolerance limits, the likelihood of exceeding these limits would still exist and NMFS would likely continue to receive comments to adjust the limit or tolerance limit. The suggestion to fund the observer program through proceeds from fish landed above the trip limit raises a number of practical and legal concerns. If these can be satisfactorily resolved, NMFS may consider this suggestion in the future, as needed.

Comment 16: Does the inclusion of alternative I3(b) mean that we are currently allowed to exceed the retention limits?

Response: No. Currently all vessels fishing for, retaining, or possessing Atlantic HMS, with the intent to sell that catch, must abide by the commercial retention limits as stated in §§ 635.23 and 635.24. The current prohibitions located in § 635.71 reinforce the applicability of these commercial limits. This alternative would implement a new prohibition, not a new regulation, making it illegal for any person to, "Purchase any HMS from an individual vessel in excess of the commercial retention limits." As such, dealers or buyers of HMS in excess of commercial retention limits would be held responsible for their actions. This prohibition is intended to improve compliance with HMS retention limits by extending the regulations to both of the parties involved in a transaction. It would reinforce and clarify other existing regulations regarding landings of HMS in excess of commercial retention limits.

Comment 17: NMFS received comment both in support of and opposition to alternatives I3(b) and I3(c). Those comments in support stated that NMFS needs to make all parties involved in violating the intent of the fishery regulations accountable, both vessel owners and dealers regardless if they are commercial or recreational. Those comments opposed stated: Alternatives I3(b) and I3(c) eliminate flexibility when it comes to shark landings. As scales are not used on small boats vessel owner/operators can only estimate a trip limit at sea based upon a carcass count and an estimated average weight; and, concerns exist regarding the five-percent shark fin/body ratio. The ratio is not correct as it was based on one species. Thus, we need to have species-specific ratios for these alternatives to be fair.

Response: The final action is intended to improve compliance with HMS retention limits by extending the regulations to both of the parties involved in a transaction where HMS exceeding trip limits are sold or purchased. It would also reinforce and clarify other existing regulations regarding landings of HMS in excess of commercial retention limits. As with any limitation on catch, vessel owner/operators must use their experience and professional judgment in determining where their harvest stands in regard to catch/possession/trip limits to ensure that they do not exceed those limits. Regarding the five-percent tolerance limit on shark fins, this limit is currently dictated by the Shark Finning Prohibition Act. NMFS does not have the ability to alter this limit.

Comment 18: In addition to the selected alternatives, NMFS should enforce the existing prohibition on the sale of recreationally caught HMS. NMFS should levy heavy fines and permanent permit sanctions on the fishermen, vessel owner, and buyer if any bag limit fish are sold, traded, or bartered. NMFS should make additional provisions in the Final HMS FMP to prevent the illegal sale of recreational catches.

Response: The current suite of regulations and prohibitions contained in 50 CFR § 635 address the illegal sale, trade, and bartering of recreationally landed HMS. As the range of violations regarding these types of activities can vary greatly, the current penalty schedule provides enforcement agents and prosecutors with the flexibility to determine a suitable fine, based on information pertaining to each specific infraction.

*Issue 4: Definition of East Florida Coast Closed Area*

Comment 19: NMFS received contrasting comments on preferred alternative I4(b), which would modify the outer boundary of the East Florida Coast Closed Area so that it corresponds with the EEZ. These comments include: I support alternative I4(b), which amends the coordinates of the Florida East Coast closure; and, I am opposed to expanding any of the existing closed areas, including the East Florida Coast closed area described in preferred alternative I4(b). The PLL fleet needs every inch of available fishing grounds.

Response: NMFS does not expect a reduction in HMS catches associated with the preferred alternative because the geographic size increase is very small (0.5 nm) and, according to the PLL logbook data, there have not been any recent catches or PLL sets in this area. Fishing effort that would have occurred in this area would likely relocate to nearby open areas with similar catch rates. Therefore, overall fishing effort is not expected to change under this alternative. NMFS is correcting the coordinates to reflect the original intent of the East Florida Coast closed area to extend to the outer boundary of the EEZ.

*Issue 5: Definition of Handline*

Comment 20: I support preferred alternative I5(b), which requires that handlines be tied to the boat. If it is tied to the boat it is a handline, if it is not, it is a longline.

Response: NMFS prefers to implement alternative I5(b), which would require that all handlines be attached to, or in contact with, a vessel. However, by authorizing buoy gear in the commercial swordfish handgear fishery (see section 4.3.3), unattached lines would not, by default, automatically be considered longline gear. Buoy gear would be authorized only in the commercial swordfish handgear fishery with gear marking requirements, hook limitations, and limits on the number that may be deployed. Both handlines and buoy gear would still be limited to no more than two hooks per line.

Comment 21: We support alternative I5(c), which would require fishermen to attach their handlines to their vessels, because handlines should remain as recreational gear (attached to the vessel) and buoy gear should be designated as commercial gear. However, there are times when fishermen need to detach their handlines, particularly when a large captured fish has spooled several reels, in order to retrieve the gear. Is that now going to be prohibited?

Response: Buoy gear would be authorized only for the commercial swordfish fishery. However, handlines are, and will continue to be, authorized in both the commercial and recreational fisheries. The preferred alternative I5(b) would require that handlines be attached to the vessel. It does not change which fisheries the gear is authorized for. The situation where a large fish spools several reels and must be "tethered-off" to retrieve the gear and/or the fish is an uncommon, but not rare, occurrence. The important factor in determining if this is an allowable practice is whether or not the handline was attached to the vessel when the fish was first hooked. Primarily to facilitate safety at sea, the handline could be "tethered-off" if it was attached to the vessel when the fish was hooked. NMFS anticipates that these situations would need to be examined on a case-by-case basis, in consideration of the circumstances affecting the decision to detach the handline.

Comment 22: How is the definition of handline gear different from buoy gear?

Response: Under the preferred alternatives, the main difference between the two gears would be whether or not the gear is attached to the vessel. If the gear is attached, it would be considered handline and could be used, with the appropriate permits, in any of the tunas, swordfish, or shark fisheries. If the gear is not attached, it would be considered buoy gear and could be used only in the commercial swordfish handgear fishery. Specifically, preferred alternative I5(b) would define handline as fishing gear that is attached to, or in contact with a vessel; that consists of a mainline to which no more than two hooks or gangions may be attached; and that is released and retrieved by hand rather than by mechanical means. Preferred alternative H5 would define buoy gear for the commercial handgear fishery as a fishing gear consisting of one or more floatation devices supporting a single mainline to which no more than two hooks or gangions are attached. Buoy gear would be required to be constructed and deployed so that the hooks are attached to the vertical portion of the mainline. Flotation devices may be attached to one, but not both ends of the mainline, and no hooks or gangions may be attached to any horizontal portion of the mainline. If more than one floatation device is attached to a buoy gear, no hook or gangion would be allowed to be attached to the mainline between them. Individual buoy gears may not be connected together in any way. All buoy gears would be required to be released and retrieved by hand. Fishermen using buoy gear would be required to also affix monitoring equipment to each individual buoy gear. Gear monitoring equipment may include, but would not be limited to, radar reflectors, beeper devices, lights, or reflective tape. If only reflective tape is used, the vessel deploying the buoy gear would be required to possess an operable spotlight capable of illuminating deployed flotation devices. Additionally, a floatation device would be defined as any positively buoyant object rigged to be attached to a fishing gear.

Comment 23: Are floating handlines being used to catch juvenile swordfish in the East Florida Coast closed area?

Response: Available HMS logbook data from 2000 to 2004 indicates that the "handline-only" fishery grew significantly in 2004, and that catches and discards of swordfish in the "handline-only" fishery increased as well. However, the HMS logbook does not differentiate between "attached" and "unattached" handlines, and recreational data are limited. Given these limitations, it is not possible to determine conclusively if floating handlines are being used to catch juvenile swordfish in the East Florida Coast closed area. However, given that the legal minimum size is below the size of maturity, the average size of swordfish caught across all fisheries is below the size of maturity, and because the area off the east coast of Florida is a known nursery ground for swordfish, it is likely that any fishing gear, including rod and reel or handlines, used to catch swordfish off the east coast of Florida catches juvenile swordfish, to at least some degree.

*Issue 6: Possession of Billfish on Vessels Issued HMS Commercial Permits*

Comment 24: What types of permits would be affected by preferred alternative I6(b), which prohibits vessels issued commercial permits and operating outside of a tournament from possessing or taking Atlantic billfish?

Response: Under the preferred alternative I6(b), only persons issued an HMS Angling or HMS Charter/Headboat, or who have been issued an Atlantic Tunas General Category permit and are participating in a registered HMS tournament, would be allowed to possess or take an Atlantic billfish. Persons only issued Federal swordfish, shark, or Atlantic Tunas permits (including General Category permits outside of registered HMS tournaments) would not be allowed to possess or take an Atlantic billfish. Persons issued both commercial and recreational HMS permits could take billfish, but only if the HMS species possessed onboard the vessel do not exceed the HMS recreational retention limits.

Comment 25: NMFS needs to make sure that the language in preferred alternative I6(b) is very clear in specifying that a commercial permit refers to HMS commercial fisheries.

Response: The regulations would be clear that only persons issued an HMS Angling or HMS Charter/Headboat, or who have been issued an Atlantic Tunas General Category permit and are participating in a registered HMS tournament, would be allowed to possess or take an Atlantic billfish. Persons issued non-HMS commercial permits may possess or take Atlantic billfish only if they have also been issued the appropriate HMS permits.

Comment 26: NMFS received several comments in support of, or in opposition to, the preferred alternative I6(b) including: I support preferred alternative I6(b) until Atlantic billfish stocks are rebuilt; we support prohibiting commercial vessels from possessing, retaining, or taking Atlantic billfish (alternative I6(b)); I support preferred alternative I6(b), because it would help to eliminate gillnet fisheries that kill billfish and other non-target species; I am opposed to preferred alternative I6(b) because all commercial vessels should be able to retain recreational bag limits; and, the preferred alternative I6(b) would have more negative impacts than NMFS has listed presently in the DEIS.

Response: The preferred alternative I6(b) would clarify that commercial HMS vessels cannot possess or take Atlantic billfish. The preferred alternative would also clarify that the current Atlantic billfish fishery is a recreational fishery and that Atlantic billfish should only be possessed or retained when taken recreationally by rod and reel. The preferred alternative would not eliminate any existing fisheries, but it would mean that commercial fishermen onboard gillnet or bottom longline vessels could not retain a billfish taken with rod and reel for personal use, unless the vessel possessed both the recreational and commercial permits (*e.g.*, a commercial shark limited access permit and an HMS Charter/Headboat permit) and if the other HMS onboard did not exceed the HMS recreational retention limits. Furthermore, General Category fishermen fishing for Atlantic tunas with rod and reel would not be allowed to possess billfish outside of registered HMS tournaments. To the extent that some fishermen with commercial HMS permits may take billfish, there could be minimal impacts in terms of commercial fishermen taking fish off the vessel for personal use. Current regulations do not allow commercial HMS fishermen to take recreational limits of HMS. NMFS believes that few commercial HMS fishermen take billfish, this alternative would clarify the regulations, and this alternative reinforces the recreational nature of the Atlantic billfish fishery. Once Atlantic billfish are rebuilt, NMFS may consider alternatives that would allow persons issued HMS commercial permits to possess a limited number of Atlantic billfish for personal use.

*Issue 7: Bluefin Tuna Dealer Reporting*

Comment 27: I support preferred alternative I7(b), which provides tuna dealers with an option to submit their required reports using the Internet; NMFS should move towards alternative I7(c), which would require mandatory internet reporting, as soon as possible.

Response: Due to the importance NMFS places on reporting, the Agency wants to ensure that reporting is both convenient and fair for all user groups. Mandatory Internet reporting would not be enacted until NMFS is confident that such an action would not impede the reporting process.

*Issue 8: "No-Fishing", "Cost-Earnings", and "Annual Expenditures" Reporting Forms*

Comment 28: I support preferred alternative I8(b), which requires the submission of "no-fishing" forms. Is there latitude with logbooks coming in from different countries? If you do not have all the parts of the logbook submission, should you send in what you have or wait until you have everything? For instance, I often do not have the offload tally by the time the logbook is due (seven days after offloading).

Response: As specified in the Atlantic HMS regulations 50 CFR §635.5, owners of vessels issued an HMS permit must submit a fishing record that reports the vessel's fishing effort, and the number of fish landed and discarded. This information should be entered in the logbook within 48 hours of completing that day's activities on a multi-day trip, or before offloading on a single day trip. Additionally, if HMS are sold, the vessel owner must acquire copies of the weigh out slips for submittal with the logbook forms. All forms must be postmarked within seven days of offloading HMS, regardless of offloading location. The preferred alternative I8(b) would not change these requirements.

*Issue 9: Non-Tournament Recreational Landings Reporting*

Comment 29: Vessel owners should not have to report their recreationally-caught fish because they are often too busy (*e.g.*, absentee boat owners that fly into Florida from New York City for the weekend).

Response: Because vessel owners are issued HMS permits, the recreational non-tournament reporting requirement should logically, and for compliance purposes, be incumbent upon vessel owners. Furthermore, since vessel owners are the permit holders, they are more likely to be familiar with the regulations governing their fishery than non-permitted anglers who might be onboard, possibly for just a day on a charter trip. The preferred alternative would achieve better consistency with other HMS recreational reporting requirements, and could also enhance the accuracy of, and compliance with, non-tournament HMS recreational data collection. However, in response to this comment and other comments, NMFS will slightly modify the preferred alternative to allow an owner's designee to report non-tournament recreational landings of Atlantic billfish and swordfish. The vessel owner would still be held responsible for reporting, but the owner's designee could fulfill the requirement.

*Issue 10: Pelagic Longline 25 mt NED Incidental BFT Allocation*

Comment 30: NMFS should clarify whether "carryover" provisions would apply to the underharvest of the 25 mt NED BFT quota set-aside described in alternative I10(b).

Response: The alternative that was formerly preferred in the Draft HMS FMP, I10(b), would have clarified that carryover procedures apply to the NED set-aside, and that any under/overharvest of the 25 mt (ww) NED set-aside would be carried forward into, or deducted from, the subsequent fishing year's set-aside allocation. This alternative was originally preferred in the Draft HMS FMP, but after subsequent analysis of the recommendation and in response to comments seeking clarification, the Agency has determined that the ICCAT recommendation provides the flexibility to avoid some of the potential negative consequences associated with alternative I10(b). Alternative I10(c) is now the preferred alternative.

Comment 31: NMFS received a comment in support of alternative I10(b), which would allocate 25 mt (ww) for PLL incidental catch in the NED each year.

Response: This alternative was originally preferred in the Draft HMS FMP, because NMFS believed that its interpretation would provide consistency between the regulations and operational practices regarding rollovers and final set-aside quotas in excess of 25 mt (ww). However, since publication of the Draft HMS FMP, additional analysis of the ICCAT recommendation indicated that the previously preferred alternative, I10(b), might have some potential negative consequences that could be avoided. Thus, under alternative I10(b), incidental BFT landings from the NED Statistical area would be accounted for in this specific set-aside quota and any under/overharvest of the set-aside quota would be added to, or deducted from, the following year's baseline quota allocation of 25 mt (ww). The under/overharvest accounting procedures contained in this alternative may have some potentially adverse ecological impacts. Specifically, if the NED set-aside was not attained in multiple successive years, this set-aside quota could increase quite dramatically and, as the wording in the ICCAT recommendation specifically allocates this quota to the longline sector of the U.S. fleet, NMFS would not have the flexibility to transfer this quota to the Reserve or to another domestic user group, to avoid a 'stockpiling' situation from occurring. An unrestrained build-up of the incidental NED set-aside quota may eventually undermine the intent of the set-aside itself by leading to additional effort being deployed in the NED, and potentially providing an incentive to direct additional effort on BFT. For example, this set-aside could increase to a level that makes it more attractive for pelagic longline vessels to target BFT, which could possibly result in negative impacts to BFT stocks. Therefore, this alternative is no longer preferred and, instead, alternative I10(c) is preferred. Alternative I10(c) would not carry forward any under/overharvest, until such time as further ICCAT discussions regarding quota rollovers are conducted.

*Issue 11: Permit Condition for Recreational Trips*

Comment 32: NMFS received comments in support of preferred alternative I11(b), a permit condition in the regulations for recreational trips, including: We support preferred alternative I11(b) because it will enhance Atlantic shark conservation efforts while ASMFC develops an interstate FMP; and, I support the presumption that an HMS onboard a vessel was caught in Federal waters because the current regulations cause enforcement problems.

Response: NMFS agrees that the recreational permit condition would enhance HMS conservation efforts and would improve enforcement of HMS regulations. Currently, in many states, fishermen are able to bypass both Federal and state regulations by stating they were fishing in state waters, rather than Federal, or vice versa. With the permit condition, recreational fishermen fishing in Federal waters, who have a Federal permit, would agree to abide by the more restrictive regulation just by obtaining a Federal permit. Recreational fishermen who do not have a Federal permit will continue to have to abide by only state regulations. Thus, under the preferred alternative, enforcement officers would no longer need a statement from a fisherman with a Federal permit regarding where the fish was caught. Rather, they could take action under the more restrictive regulations. This permit condition has been in place for a number of years for shark and swordfish commercial fishermen and has been useful in enforcing commercial regulations.

Comment 33: Will NMFS consider the full suite of regulations implemented by states with regards to HMS or will it simply look at each regulation individually? How does NMFS intend to define "strict?"

Response: Each situation would need to be examined on a case-by-case basis; however, it is likely that the regulations would be enforced individually rather than as a suite. For instance, if a state has a larger bag limit and larger minimum size than the Federal regulations, the fishermen would be limited by both the Federal bag limit and the state minimum size.

Comment 34: NMFS could say that all HMS vessels with Federal permits (instead of just recreational-permitted vessels) should comply with Federal regulations when in Federal or state waters.

Response: NMFS already has the permit condition in place for commercial shark and swordfish fishermen. NMFS also already has the authority, under the Atlantic Tunas Convention

Act (ATCA), to manage Atlantic tunas all the way to shore for most states. The preferred alternative would improve the enforcement of the remaining fisheries (recreational shark, swordfish, and billfish) without superseding the regulations of the states. Thus, the preferred alternative would allow states to establish their own regulations for shark, swordfish, and billfish fishermen who are fishing only within state waters (Maine and Connecticut can also establish their own regulations for Atlantic tunas). NMFS has the authority to pre-empt states regarding HMS under both the Magnuson-Stevens Act and ATCA. However, NMFS prefers to work with states and the Atlantic and Gulf States Marine Fisheries Commissions towards consistent regulations that meet both international and domestic goals, because each state is different and the fishermen in each state prefer to fish for different HMS and use different gears. If necessary to ensure rebuilding under the HMS FMP or under an ICCAT Rebuilding Program, NMFS may consider pre-empting state authority for specific HMS. Under this scenario, NMFS would provide states and the public adequate time to comment and adjust regulations per the appropriate process.

Comment 35: NMFS received related comments from the South Atlantic Fishery Management Council (SAFMC) and the State of Georgia. These comments are summarized here. The preferred alternative I11(b) for state/Federal regulations does not implement the correct intent as previously requested by the SAFMC and the State of Georgia, which is to have the more restrictive requirements, whether they are Federal or state, apply in each area. For example, if a state has a retention prohibition, then the adjacent Federal waters should also have a retention prohibition. The SAFMC does not understand why the "more restrictive" clause was not more simply stated, as in other FMPs. The permit condition should be a two-way street where more restrictive state regulations should apply in adjacent federal waters. The specific language should be: For allowable Atlantic billfish (and other HMS that can legally be included), if a state has a catch, landing, or gear regulation that is more restrictive than a catch, landing, or gear regulation in the HMS FMP, a person landing in such state Atlantic Billfish (and other HMS to be included) taken from the U.S. EEZ must comply with more restrictive state regulation.

Response: NMFS does not agree. In many cases, the regulations are established based on ICCAT recommendations (*e.g.*, the billfish size limits). Under ATCA, the United States is bound to implement the ICCAT recommendation. Extending a more restrictive state regulation into Federal waters would be inconsistent with ATCA. Similarly, if the more restrictive regulation is not part of or consistent with the HMS FMP, the regulations may also be inconsistent with the Magnuson-Stevens Act.

Comment 36: HMS needs to check with the Regional Fishery Management Councils to make sure they are not running afoul of one another. The preferred alternative I11(b) could create more confusion if there is not a consistent policy for all federal fishery regulations.

Response: While NMFS agrees that consistent policies across fisheries regulations are often appropriate, NMFS disagrees that a permit condition in the regulations would cause confusion if it were not consistent across the different Regional Fishery Management Councils. The regulations across state and Federal boundaries depend upon the species involved. For many HMS, the majority of the fishing opportunities are in Federal waters. For instance, a fisherman is more likely to catch a billfish in Federal waters than fishing off a dock.

Additionally, HMS are managed both domestically and internationally unlike many of the species that the Regional Fishery Management Councils manage. While Councils often manage species jointly, in some cases, such as spiny dogfish, the fisheries in states are just as, if not more, predominant than those in the Federal waters. Thus, a permit condition that is appropriate for HMS may not be appropriate for a species managed by a Council or even by the Atlantic States Marine Fisheries Commission. In all cases, fishermen need to be aware of and follow the regulations of the specific permits they hold, just as they need to be aware of different laws as they travel between states (e.g., speed limits, hunting laws, etc).

Comment 37: Texas Parks and Wildlife opposes the preferred alternative I11(b), which would establish a permit condition on recreational permit holders. The alternative would increase confusion because it applies only to HMS and not to the many other species in state waters. Second, Texas regulations require that recreational landings in Texas meet Texas bag and size limits regardless of where the fish was caught unless the regulations in the waters where they were caught are more restrictive. Third, the preferred alternative applies only to Federal permit holders and would therefore create a scenario where different regulations apply in the same location. Lastly, the alternative does not simplify already confusing and complex regulations.

Response: NMFS does not agree that the preferred alternative would increase confusion. The preferred alternative would decrease confusion by clarifying that fishermen who decide they want the opportunity to fish for HMS in Federal waters must abide by Federal regulations regardless of where they are fishing, and that if they are fishing in state waters they must abide by the more restrictive regulation. Without this regulation, fishermen may need to abide by one regulation while fishing in Federal waters and another regulation while fishing in state waters. The preferred alternative would especially clarify issues if the fishermen were fishing in both state and Federal waters on the same trip. In regard to the second point, it appears that the State of Texas has implemented the same regulation as the preferred alternative but in regard to state waters. The preferred alternative would not change this and could complement the regulation by ensuring that Federally permitted fishermen do not exceed either the Federal or Texas bag and size limits when fishing in or near Texas waters. NMFS agrees that the preferred alternative would mean that different regulations could apply to Federally permitted fisherman fishing in state waters next to a state-only permitted fisherman. This should not be an issue since the more restrictive regulation would apply. It may appear to be unfair to the Federally permitted fisherman if the Federal regulations for that species are more restrictive than the state regulations for that species. However, the Federally permitted fisherman also has the opportunity to fish for HMS outside of state waters. If the Federally permitted fisherman decides that the opportunity is not worth the additional restrictions, then that fisherman could decide not to obtain the permit. The preferred alternative would not change the regulations for the state-only permitted fisherman, who restricted to fishing within state waters and must abide by state, not Federal, regulations.

Comment 38: While the South Carolina Department of Natural Resources understands the importance of consistent protection for HMS in state and Federal waters, we do not believe it was the intent of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to regulate fisheries in state waters except under unusual circumstances. We request that preferred alternative I11(b) be deleted from the plan, and that HMS caught within state waters be regulated through complementary state legislation and regulations, or through provisions already existing in the Act that address special cases.

Response: NMFS does not agree that the permit condition is regulating fisheries in state waters. The Magnuson-Stevens Act does give the Secretary of Commerce the authority to manage HMS fisheries to ensure their conservation and achievement of optimum yield throughout their range, both within and beyond the exclusive economic zone (16 U.S.C. 1812 section 102). Implementing a permit condition on recreational fishermen to abide by Federal regulations regardless of where they are fishing, unless a state has more restrictive regulations, allows NMFS to manage these fisheries in a more effective manner. Additionally, the permit condition only applies to those fishermen who obtain a Federal permit and who, presumably, fish in Federal waters at least some of the time. The permit condition would not change state regulations. Thus, states still have the opportunity to establish their own regulations for fishermen who fish in their waters and not in Federal waters. Fishermen still have the opportunity not to obtain a Federal permit and to abide only by state regulations. NMFS could follow the process that would pre-empt states rights under either the Magnuson-Stevens Act or under ATCA. However, as stated above, NMFS would prefer to work with states as each state has different needs and fishermen.

*Proposed Regulatory Changes that Do Not Need Alternatives*

Comment 39: We support the regulatory changes that do not have alternatives.

Response: NMFS appreciates this comment. The regulatory changes that do not need alternatives include corrections, clarifications, minor changes in definitions, and modifications to remove obsolete cross-references. It is occasionally necessary to make these types of regulatory changes as dates expire, or as minor issues are brought to the Agency's attention.

Comment 40: NMFS received a comment regarding the changes to clarify the definition of shark and the shark management unit: I am concerned about any item that lessens conservation on deepwater sharks; and, deepwater sharks should be added to the prohibited list rather than removed from the management unit in Regulatory Housekeeping.

Response: The minor changes to the shark definition and management unit would not lessen the conservation of deepwater sharks. Deepwater sharks were previously removed from the management unit in Amendment 1 to the HMS FMP. The referenced changes clarify the regulations by linking the definition of "shark" more directly to the definition of the shark "management unit." NMFS will continue to collect information on deepwater sharks and may add them to the management unit or implement additional management measures in the future.

Comment 41: The proposed changes to the HMS tournament registration process appear to complement proposed improvements to HMS tournament registration, data collection, and enforcement described in Alternative E9. Data collection should be mandatory for all tournaments, just as it has been for all non-tournament landings since 2003. There must be more accurate estimates of billfish mortality.

Response: These regulatory changes, which would specify that HMS tournament registration is not complete unless the tournament operator receives a confirmation number from the HMS Management Division, would serve a very similar purpose to non-preferred alternative E9, which would implement a mandatory HMS tournament permit. HMS tournament registration is already mandatory, so the issuance of a confirmation number would provide verification that the process is complete in a manner that is much less burdensome on the public than the issuance of a tournament permit. Currently, NMFS has the authority to select all registered HMS tournaments for mandatory reporting. Data obtained from HMS tournament reporting is used for a variety of purposes.

## D.4 Essential Fish Habitat

Comment 1: NMFS should look at recent *Sargassum* research that suggests that *Sargassum* is essential fish habitat for juvenile billfish. The United States should pursue all appropriate opportunities to ensure that this unique EFH is protected in international waters from excessive harvest and degradation.

Response: NMFS is aware of recent research on *Sargassum* regarding the role of *Sargassum* as EFH for certain species, including HMS. However, NMFS does not have the authority to identify and describe EFH in international waters. Furthermore, NMFS is not modifying the current descriptions or boundaries of EFH in the Consolidated HMS FMP. Rather, NMFS gathered all new and relevant information and presented it in the Draft FMP to determine whether changes to EFH may be warranted. If NMFS determines that EFH for some or all HMS needs to be modified, then that would be addressed in a subsequent rulemaking, at which point *Sargassum* could also be considered as potential EFH. With regard to harvest, the final South Atlantic Fishery Management Council FMP for Pelagic *Sargassum* Habitat in the South Atlantic Region was approved in 2003 and implemented strict restrictions on commercial harvest of *Sargassum*. The approved plan includes strong limitations on future commercial harvest. Restrictions include prohibition of harvest south of the boundary between North Carolina and South Carolina, a total allowable catch (TAC) of 5,000 pounds wet weight per year, limiting harvest to November through June to protect turtles, requiring observers onboard any vessel harvesting *Sargassum*, prohibiting harvest within 100 miles of shore, and gear specifications.

Comment 2: The U.S. proposal at ICCAT to identify *Sargassum* as EFH was met with absolute resistance. NMFS has to be careful in dealing with this subject in an international forum. It can undermine what NMFS is trying to do.

Response: NMFS is aware that there are many issues to consider with regard to identifying and describing *Sargassum* as EFH for HMS species. In addition, there are potential international concerns, as expressed at ICCAT, regarding *Sargassum* as sensitive and valuable habitat. NMFS will continue to examine these issues carefully, and work to improve our understanding of the role of *Sargassum* as valuable habitat for HMS.

Comment 3: Does NMFS have data to justify not designating the entire northern Gulf of Mexico as EFH, where the "Nature" paper shows the presence of adult BFT from January to June?

Response: As described in response to comment 1, NMFS is not currently changing any of the EFH areas identified for HMS, including EFH for BFT through this FMP. However, it should be noted that large portions of the Gulf of Mexico are already identified as EFH per the original EFH descriptions in the 1999 FMP for several life stages of BFT, including adult and larval BFT.

Comment 4: The HMS regulations should acknowledge and comply with Gulf of Mexico EEZ EFH and Habitat Areas of Particular Concern (HAPC) designation and regulations, including any future designations that the Gulf of Mexico Fishery Management Council may make when conducting the subsequent rulemaking mentioned in the Draft HMS FMP.

Response: NMFS agrees that any future modifications to EFH or new HAPC areas in the Gulf of Mexico, or any region for that matter, should be coordinated with appropriate Regional Fishery Management Council designations and regulations. the EFH guidelines require NMFS to consider fishing and non-fishing impacts of other fisheries on HMS EFH, as well as the impact of HMS fishing activities on EFH for other Federally managed species.

Comment 5: What process did NMFS use to identify shark EFH areas north of Cape Hatteras? EFH boundaries appear to follow bathymetric contour intervals. Is this deliberate or just a coincidence?

Response: EFH areas north of Cape Hatteras were identified and described in the 1999 FMP through a combination of fishery dependent and independent surveys and data collection, research, and the input of fishery managers and scientists. References to peer-reviewed scientific publications that were used to help identify important spawning and nursery habitat for sandbar and dusky shark are included in the 1999 FMP as well as the Consolidated HMS FMP. As described in the 1999 FMP, in some cases bathymetric contours were used to help delineate EFH boundaries because they can mirror the observed distributions of HMS and important areas for spawning, feeding, and growth to maturity.

Comment 6: NMFS should not use the same process the Gulf of Mexico Fishery Management Council did in identifying EFH and impacts to EFH. The Gulf of Mexico Fishery Management Council managed areas are completely different, and people fish differently here (in the Atlantic) than in the Gulf of Mexico.

Response: The species managed by each of the Regional Fishery Management Councils are unique, with characteristics that require different approaches and methodologies for identification and description of EFH, including addressing both fishing and non-fishing impacts. Similarly, HMS have unique habitat requirements that require a unique approach to identification of EFH. However, EFH guidelines require NMFS to consider fishing and non-fishing impacts of other fisheries on HMS EFH, as well as the impact of HMS fishing activities on EFH for other Federally managed species. Therefore, NMFS must coordinate with the relevant Regional Fishery Management Councils as part of the process of modifying EFH.

Comment 7: Does HMS EFH include liquefied natural gas (LNG) facilities?

Response: NMFS has not specifically identified the structures associated with LNG facilities as EFH, however, these structures may be located within waters that have been identified as HMS EFH. For example, there are energy production facilities off the coast of Louisiana and Texas that may fall within EFH identified and described for BFT, yellowfin tuna, swordfish, and other HMS species.

Comment 8: NMFS received several comments regarding BFT EFH in the Gulf of Mexico including, NMFS must identify the Gulf of Mexico spawning area as EFH for BFT and consider appropriate measures to minimize the impact of fishing on this EFH, and if NMFS identifies the Gulf of Mexico BFT EFH, then NMFS should include the rest of Atlantic and Mediterranean also.

Response: Portions of the Gulf of Mexico, Florida east coast, and Atlantic were identified and described as adult and larval BFT EFH in the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks, and the areas remain in effect to this day. NMFS is reviewing new and existing information, including data on potential BFT spawning areas, and will take that information into account if any modifications to EFH areas are proposed in a future rulemaking. NMFS does not have the authority to identify and describe EFH outside of the U.S. EEZ.

Comment 9: NMFS is to be commended for substantial progress in development of the HMS EFH Plan. NMFS has come a long way in identifying EFH and should be congratulated on the work completed in the EFH review and the review of fishing impacts. However, there is still a disconnect between the available data, especially with sharks, and what is in the Draft Consolidated HMS FMP. NMFS should do a better job of including data from research institutions and grants. NMFS should include individual researcher's names that have contributed toward identifying EFH.

Response: NMFS appreciates the favorable comment, while acknowledging that there is considerable work left to do in order to accurately identify and describe EFH for HMS. As described in the Final Consolidated FMP, there are significant hurdles that must be overcome and NMFS is attempting to address these. For example, NMFS is continually working with NMFS scientists and other experts to update relevant data regarding HMS EFH as it becomes available. NMFS will also include the names of researchers responsible for collecting the data. Where possible and appropriate, NMFS has already included the names of individual researchers in the text, maps, and tables.

Comment 10: NMFS needs to update EFH for sandbar sharks, all age groups, by including a nursery area in the western Gulf of Mexico off the Texas coast, which is a straddling stock with Mexico. It gets into the straddling stock issue instead of the closed stock scenario. NMFS needs to recognize the reality of the straddling stock. This area is referred to in Stewart Springer's "The Natural History of the Sandbar Shark."

Response: NMFS is aware of research done by Springer (1960) who proposed the existence of two breeding populations of sandbar sharks, one off the mid-Atlantic coast, and one in the Gulf of Mexico. One of the research recommendations of the 2005 LCS Stock Assessment was to identify nursery areas of sandbar sharks in the northern Gulf of Mexico, and

NMFS will consider this information in any subsequent updates or modifications to sandbar shark EFH. Although the Springer research showed a few neonates in the Gulf of Mexico, there may not have been enough to consider this area a primary nursery habitat like the Mid-Atlantic.

Comment 11: NMFS has identified HAPCs off of North Carolina and other areas further north. Since NMFS has implemented a closure off North Carolina, NMFS should also bring Virginia into compliance to discourage shark fishing during pupping periods.

Response: NMFS agrees, and has asked Virginia to implement state regulations that complement the Federal regulations. Recently Virginia implemented a 4,000 lb trip limit consistent with the Federal regulations. NMFS is continuing to work, through ASMFC and the development of a coastwide state fishery management plan, with Virginia and other states to implement similar regulations as the Federal fishery.

Comment 12: NMFS should consider differences between monofilament and cable bottom longline when it comes to gear and impacts to coral reefs and sponges. Bottom longline gear would not much damage on mud bottoms.

Response: NMFS agrees that the type of gear used to fish in sensitive habitat areas may make a considerable difference in terms of the overall impacts. NMFS will also be looking at overall fishing effort in sensitive coral reef areas to determine whether fishing impacts are more than minimal and not temporary. If NMFS finds that the adverse fishing effects on EFH are more than minimal and not temporary in nature, then NMFS will have to consider alternatives to reduce fishing impacts.

Comment 13: Most HMS gears such as pelagic longline would not have an impact on HMS EFH.

Response: NMFS agrees that pelagic longline along with all other gears used to fish for HMS, with the possible exception of bottom longline gear, would have little or no impact on HMS EFH.

Comment 14: NMFS should look at sink gillnets and possible impacts on EFH. Fishermen may not want to fish on live bottom and reefs, but they do hit them as evidenced by the catch, which includes various reef species that they catch incidentally. These may include HMS forage species as well. NFMS should investigate the possible impacts of sink gillnet gear on offshore hard bottoms and reefs. This gear is being deployed on sensitive sponge-coral areas.

Response: The full extent of sink gillnet impacts on benthic habitat is not known at this time. NMFS agrees that the primary adverse impact of sink gillnets to sensitive habitat would be to areas containing coral reefs or soft sponges. Sink gillnets set on sandy or mud bottom would be less likely to have an adverse effect, as there would be little vertical structure that could be damaged. NMFS will continue to gather information to assess whether sink gillnets are having adverse effects on EFH and whether actions to minimize adverse impacts should be taken in a future rulemaking.

Comment 15: Will NMFS be documenting where the prey species are found?

Response: Similar to what was done in the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks, NMFS will document areas that are important to HMS for spawning, feeding, breeding, and growth to maturity. This will require identification of prey species and the degree to which they overlap both temporally and spatially with HMS in a given area.

Comment 16: NMFS should consider EFH designation for forage species for BFT in the Gulf of Maine. By removing prey species such as herring, mid water trawling has been destroying BFT in the Northeast. Fish are moving to Canada, and Canada would be happy to take our fish. Mid-water trawling is banned in Canadian waters, and they have a booming BFT fishery right now. We have seen in the past that the BFT will modify their migrations, and we would not want to see that happen now. We are disappointed to see that this has not been addressed at all in the FMP. The New England Fishery Management Council is taking Amendment 7 under consideration, and we would like to see an emergency rule take place to ban mid-water trawling gear.

Response: In the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks, NMFS identified and described large portions of the Gulf of Maine as EFH for adult BFT, and smaller portions of the Gulf as EFH for juvenile BFT. As set forth in the EFH guidelines, loss of prey species may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat. Therefore, actions that reduce the availability of a major prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat that are known to cause a reduction in the population of the prey species, may be considered adverse effects on EFH if such actions reduce the quality of EFH. However, as described in the FMP, BFT are opportunistic feeders that prey on a variety of schooling fish, cephalopods, benthic invertebrates, including silver hake, Atlantic mackerel, Atlantic herring, krill, sandlance, and squid. Thus, NMFS needs to determine the extent to which herring or other prey species contribute to BFT EFH, and whether the removal of a portion of herring in the Gulf of Maine constitutes a negative effect on BFT EFH prior to taking any action. The EFH areas identified and described as EFH for adult BFT in the Gulf of Maine may overlap with a number of different prey species in the area in addition to Atlantic herring. These types of analyses would be part of a follow up rulemaking in which any changes to EFH boundaries, as well as any measures to minimize adverse effects, would be proposed. NMFS will continue to examine the importance of forage species on BFT and other HMS EFH.

Comment 17: NMFS should implement measures taken by the New England Fishery Management Council recommendations. Even though herring are not an HMS species, HMS is part of sustainable fisheries, and NMFS has an interest at stake. HMS should speak up for NMFS when NMFS is considering what to do with the herring plan.

Response: NMFS is aware that the New England Fishery Management Council has proposed several measures for the Atlantic herring fishery in the Gulf of Maine, including limited access permits, a mid-water trawl restricted area, area specific total allowable catches, and vessel monitoring systems, among others. NMFS is following the development of the FMP and will provide comments on the plan as appropriate.

Comment 18: EFH designations are intended to address the physical habitat and not forage species. EFH is not an appropriate forum to address forage issues. For example, herring fishermen could say that they cannot catch herring because the BFT are eating them all. The timing and location of harvest is a management issue, not a habitat issue. This is a question about access.

Response: The EFH guidelines state that FMPs should list the major prey species for the species in the fishery management unit and discuss the location of prey species habitat, and that loss of prey may be considered an adverse effect on EFH. Thus, NMFS considers it appropriate to examine the presence of Atlantic herring and their role as a forage species for BFT.

Comment 19: NMFS should not draw too many conclusions on less than complete data. HMS species are ocean-wide. NMFS needs to get the international forum involved. They have done some research utilizing very progressive techniques. Predator-prey relationships are important to every species.

Response: NMFS has been cautious in the interpretation of data based largely on presence or absence (level 1). While there is a great deal of ongoing research to identify and describe EFH, in many instances the research is localized or regional in nature, whereas HMS exhibit trans-regional movement and migrations. This makes identifying and describing EFH for HMS particularly challenging. For example, even though researchers may identify an area in the Gulf of Mexico as EFH for a particular species, those habitat characteristics may not necessarily constitute EFH for the same species in other regions.

Comment 20: The definition of EFH for Atlantic HMS should be modified to include the geographic range of the species and to add the availability of forage for HMS in critical areas, in time and space.

Response: The EFH guidelines require EFH to be distinguished from the geographic range of the species. The principle of the EFH provisions in the Magnuson-Stevens Act was to identify only those areas that are essential for feeding, breeding, or growth to maturity, and not all areas where a particular species is present. For example, if only level 1 information is available, distribution data should be evaluated to identify EFH as those habitat areas most commonly used by the species. Level 2 through 4 information, if available, should be used to identify EFH as the habitats supporting the highest relative abundance, growth, reproduction, or survival rates within the geographic range of a species. The geographic range for HMS is extremely large and would likely result in identifying all areas in the EEZ as EFH. Due to the vastness of such an area, it would be difficult to propose effective conservation measures. Narrowing or refining the extent of EFH can improve NMFS's ability to focus its conservation and management efforts on those habitats most important to the health of the managed species. NMFS agrees that forage species may be an important component of HMS EFH and has taken steps to identify those areas.

Comment 21: Shark pupping and nursery areas remain unprotected. Conserving shark habitat is closely linked with state cooperation. NMFS should continue to fund and encourage research into shark EFH and to publish and distribute the results of such studies.

Response: NMFS disagrees that shark pupping and nursery areas remain unprotected. In 2005, NMFS implemented a time/area closure off North Carolina in shark pupping and nursery areas to reduce the bycatch and mortality of neonate and juvenile sandbar sharks as well as all life stages of prohibited dusky sharks. While there are many other areas that may not have the same level of protection, NMFS currently closes the large coastal shark (LCS) fishing season from April through June to reduce impacts on pregnant females who may be moving into coastal areas for pupping. Many states have implemented a similar closure of state waters for LCS shark fishing during these months consistent with the Federal regulations. Finally, most HMS gears have little or no impact on HMS EFH. Bottom longline gear is the only HMS gear that may have impacts on hard bottom habitat such as corals and sponges, but many shark pupping and nursery areas are located outside of these habitat types. NMFS continues to fund shark research, such as surveys conducted through the Cooperative Atlantic States Shark Pupping and Nursery Areas (COASTSPAN) and a similar survey in the Gulf of Mexico (GULFSPAN), and will continue to distribute the results of such studies.

Comment 22: NMFS must continue to recognize that these HMS must be conserved through out their range internationally. Assumptions made on partial information may not necessarily be valid Atlantic-wide.

Response: NMFS agrees that it is important to consider habitat conservation measures throughout the range of HMS which may include international waters, particularly for tunas, swordfish, billfish, and pelagic sharks. NMFS has taken steps in the past to raise the level of awareness of the importance of certain habitats such as *Sargassum* at ICCAT, and will continue to try to lead the effort in promoting conservation of HMS EFH. However, as discussed in an earlier response, NMFS is only authorized to identify and describe EFH within the U.S. EEZ pursuant to the Magnuson-Stevens Act.

## D.5 Economic and Social Impacts

Comment 1: The high fuel costs are having a tremendous negative economic impact on all U.S. commercial fisheries. While prices for fuel and fuel products have dramatically risen, the price of fish has nearly collapsed our markets far below the levels necessary for profitable operations, due in part to a flow of imports from largely unregulated sources.

Response: NMFS recognizes that fuel prices have recently risen to above average levels and continue to fluctuate. The Agency is monitoring the impacts of high fuel costs and other expenses as part of ongoing cost and earnings data collection efforts in the HMS fisheries. The Agency encourages fishermen to participate in this data collection effort on a voluntary basis in order to improve the quality of information available on HMS commercial fisheries. The trend in ex-vessel prices for HMS fish has varied by species and is detailed in Chapter 3 of the Final HMS FMP. The flow of imports of many HMS products are managed by international agreements, include ICCAT and the supply of imports will vary based on market forces. Details regarding information concerning imports are also detailed in Chapter 3 of the Final HMS FMP.

Comment 2: Holding workshops for just owners and captains could have an impact on the market. A number of captains coming in at the same time to the workshop means they will end up fishing at the same time and bringing fish to the market at the same time.

Response: NMFS acknowledges that holding workshops that bring together owners and captains at the same time could have an impact on local markets. As discussed in Chapter 4 of the Final HMS FMP regarding workshops, the Agency plans to minimize these impacts by timing workshops to coincide with closed seasons, moon phases, and other events that normally are down times for local HMS fishing operations where workshops will be held. Fishermen will also have the option of attending workshops in other neighboring regions on different dates.

Comment 3: NMFS received comments emphasizing the economic importance of recreational fishing for HMS and concern regarding the economic impacts additional regulations could have on the recreational sector of local economies. Comments include: fishing is a key part of the whole coastal economy and NMFS should take care not to over-regulate; tourists have many options, and may choose not to fish if the regulations are too burdensome and decrease enjoyment; Mid-Atlantic $500,000 tournament brings over 2,000 people to Cape May County who will eat, sleep, and shop in this tourism dependent area for the length of the tournament spending an estimated $450,000 in lodging alone and this event is very important to this tourism driven economy, providing jobs for year-round residents and students who earn college money during the summer months; and the economic value of recreational fishing is much greater than that of commercial fishing, and according to a 2001 United States FWS report, the value of the recreational fishery is $116 billion.

Response: NMFS recognizes the economic importance of recreational fishing for HMS, including its impact on tourism, lodging, and local employment. Chapters 3 and 4 of the Final HMS FMP have sections regarding billfish that provide extensive information regarding the economic importance of recreational anglers and tournaments.

Comment 4: We are disturbed by the lack of any economic data or references for the recreational sector. This indicates a lack of concern for the recreational sector and ignores the enormous economic impact of this sector.

Response: NMFS has taken measures to improve the amount of economic data and references regarding the recreational sector of the HMS fishery. This information is detailed in Chapters 3 and 4 regarding billfish, and Chapter 4 regarding authorized gear. Direct measures in this HMS FMP regarding the recreational sector include, but are not limited to, the authorization of speargun fishing for Atlantic BAYS tunas, improving BFT quota management, and improving information gathering by requiring vessel owners to report non-tournament recreational landing of swordfish and billfish. The speargun authorization was designed specifically to enhance economic opportunities associated with HMS recreational fishing sector.

Comment 5: The Draft HMS FMP does not discuss the socioeconomic impact to the recreational fishing sector. The fishing and boating industry is essential. Nationally, it generates $34 billion annually, which is more than the longliners. The Destin Charterboat fleet has a study that it generates $134 million annually to the local economy. A 2003 article in the Destin Log quotes a Haas Center for Business Research and Economic Development at the University of West Florida study, which says that the Charter boat fleet alone has a $349 million economic impact on Okaloosa and Walton counties.

Response: The HMS FMP assesses the impacts of regulatory alternatives on the HMS recreational fishery. Chapter 3 provides a detailed discussion of the socioeconomic impacts of the recreational HMS fleet. A full assessment of the total economic impacts of all recreational fishing is beyond the scope of this FMP.

The Agency notes the Destin Charterboat fleet study on the impacts of that fleet on the local economy. However, the impact of the HMS portion of the Destin Charterboat fleet is not discernable from that study and thus only represents a portion of the $134 million total annual impact of recreational fishing on the local economy.

Comment 6: In 1989, the SAFMC documented the HMS commercial fisheries above the $100 million threshold. NMFS has a range of values in various documents but certainly below $40-45 million ex-vessel value. Who is responsible for the economic losses over $100 million from unnecessary and cumulative regulatory discard policies?

Response: A combination of long-term market forces, biological changes to species populations and necessary regulatory activities have had an impact on the ex-vessel value of the HMS fisheries. In Chapter 3 of the Final HMS FMP, the Agency notes that the ex-vessel value of the HMS fisheries has been estimated to be between $44 and $92 million over the past six years.

Comment 7: The information in the community profiles is so dated that they do not present an accurate current portrayal, at least concerning the HMS fisheries, which has very rapidly declined since the implementation of the 1999 HMS FMP measures, especially the time/area closures implemented in 2000.

Response: While information in community profiles included in this document are now several years old, it represents the best available information and includes the latest U.S. Census data from 2000. However, NMFS intends to update this information regarding community profiles. Chapter 9 documents a list of communities that need to be further examined. The Agency recently published a solicitation to update these profiles.

Comment 8: In terms of social and economic issues, the data need to be standardized to recent dollars. I am troubled by NMFS staying with limited knowledge. There is additional work that can be done to understand social and economic changes. There are lots of other things that can be done to understand how people are impacted. Recreational data is a whole area lacking data. The cumulative impacts section is the soft underbelly of this plan. You need to work on this section. It characterizes the impacts without providing much evidence of assessment. NMFS uses soft language. NMFS does not know much about the people that are being regulated, and that is a problem.

Response: Economic data was standardized to 2003 dollars in the Draft HMS FMP and to 2004 dollars in the Final HMS FMP using the Consumer Price Index (CPI-U). NMFS has taken measures to enhance the information available regarding social and economic changes. The Agency has added information regarding charter boat rates for HMS trips and angler expenditure data. Other research projects throughout the Agency regarding the impacts of the 2005 hurricanes and a recreational fishing survey currently being conducted will further enhance the Agency's knowledge of the characteristics of the regulated community.

## D.6 Consolidation of the FMPs

Comment 1: NMFS received comments in support and in opposition to the consolidation of the FMPs. Those in support included: we support consolidation of the FMPs contingent on preserving the objectives of the Atlantic billfish plan and the original objectives pertaining to swordfish and traditional swordfish handgear (harpoon and rod-and-reel) fisheries; and we had concerns that several of the most important objectives from the billfish FMP had been left out, but we are pleased that NMFS has addressed those concerns by including them in this draft. As a result, we now support the consolidation. Those comments opposed to the consolidation include: The GMFMC and others recommend that the HMS and Billfish FMPs and APs be kept separate; the GMFMC and others noted that the Billfish FMP is primarily a recreational FMP whereas the Atlantic Tunas, Swordfish and Sharks FMP is both recreational and commercial; the U.S. billfish fisheries are unique and recreational only while swordfish, tunas, and sharks are managed to utilize country-specific quotas; the billfish fishery is the only HMS fishery to practice catch-and-release; those whose efforts have saved and conserved these species should govern it; Atlantic billfish fishery is the most valuable fishery in the country and ought to retain its distinct and separate status; I have some concerns regarding the consolidation of FMPs and managing billfish for maximum sustainable yield, when it is primarily a catch-and-release fishery, as no social or economic impacts are assessed; Puerto Rico Game Fish Association opposes the consolidation due to the recreational nature of the billfish fishery and because they do not fish for shark or tunas in tournaments. They are concerned that by combining plans, billfish will be viewed as a bycatch species; tuna and other offshore "meat fish" species should not be "consolidated" with billfish in regulatory legislation; tunas have been traditionally treated as fish to be harvested, not as a "catch-and-release" species, and they should have the issues which concern them addressed separately from the unique circumstances concerning marlin and sailfish; economic expenditures involved in the bluefin tuna fishery are just as important as that in the marlin fishery; I favor more micro-management rather than one FMP because it takes so long for changes to occur if everything is consolidated. This way, any particular species will need an entire FMP to take regulatory action; combining fishery management plans is an example of how you prejudice your research and analyses. The longline fishermen come in and take the bait that the billfish seek reducing the number of billfish coming in to areas that were once critical to their life history. A billfish FMP approach would have been to look at bait removal or spawning and nursery areas.

Response: NMFS agrees that commercial fisheries aim to fully utilize a quota and many recreational fisheries practice catch-and-release fishing. NMFS also agrees that the billfish fishery is unique in many aspects, and notes that the individual tunas, swordfish, and shark fisheries also have many unique aspects. NMFS believes that these differences between the commercial and recreational fisheries, and the different aspects of the individual recreational fisheries, can be accommodated in a consolidated FMP just as those differences are already accommodated in the existing Atlantic Tunas, Swordfish, and Shark FMP. Given the interconnected nature of the billfish fishery with other HMS fisheries, both on the water and in the regulatory and policy arenas, as well as the current permitting structure, changes in any of the non-billfish fisheries are likely to have impacts on the billfish fishery. Combining the FMPs should allow those changes to be analyzed more holistically with clearer links among the impacts and issues between fisheries. For example, the Billfish FMP has only directed billfish measures while the FMP for Atlantic Tunas, Swordfish, and Sharks has bycatch reduction measures for billfish caught in the swordfish and tuna fisheries. Combining the FMPs will present the whole suite of billfish management measures in one document. NMFS believes that the decision in 1999 to combine the FMPs for tunas, swordfish, and sharks and to consolidate the actual regulations for all HMS, while a challenge at first, has led to a more holistic view of the fishery. This view has allowed the impacts of management measures on all sectors of tunas, swordfish, and shark fisheries to be fully analyzed whereas before, the links between these fisheries may not have been seen or analyzed so readily. By combining both FMPs now, NMFS is moving toward an ecosystem-based approach to the management of HMS. Such an approach could ultimately benefit the resource and the people involved. As an example of potential links, at public hearings and in written comments, recreational billfish fishermen have noted that using circle hooks while trolling for blue marlin is impracticable. Similarly, at public hearings and in written comments, recreational tuna fishermen have asked for the use of circle hooks on rod and reel. In many cases, these fishermen fish for tunas and billfish, sometimes on the same trip. While NMFS could implement different regulations for recreational tuna trips and recreational billfish trips, more effective and appropriate management can only be done by considering the implications on all recreational HMS trips. Combining the FMPs will not change the composition of the APs in terms of representation by states and sectors (commercial, recreational, academic, or conservation). Also, combining the FMPs will not change the priorities of managing HMS, which are dictated by the Magnuson-Stevens Act and other domestic law. Combining the regulations should not affect the length of time it takes to amend or change the regulations. NMFS has not experienced any delays in changing the regulations for a specific species or gear since combining the tunas, swordfish, and shark FMPs. To the extent that combining the FMPs will allow NMFS and the public to see links between the fisheries easier, combining the FMPs should allow for more efficient and effective regulations.

Comment 2: NMFS received a number of questions regarding the consolidation including: How will the consolidation change HMS management? How is this FMP easier to comprehend? I understand NMFS needs to consolidate, but how does this improve management?

Response: Consolidating the FMPs will not change the existing regulations since they are already consolidated. Rather, consolidating the FMPs should change how HMS fisheries are viewed and the ecological and economic impacts analyzed. Having two separate FMPs can give the impression that the billfish fishery does not affect the tunas, swordfish, and shark fisheries and vice versa. This impression is incorrect. The same fishermen fish for and/or catch all HMS, often on the same trip. Thus, changes in the regulations need to be analyzed and considered across all HMS fisheries. For example, regulations that limit the recreational catch of one species or the gear that can be used could result in changes in recreational effort on other species or on social and economic impacts on the entire recreational community. As described above, consolidating the FMPs should allow NMFS to take a more holistic view of HMS fisheries and analyze these links. Those analyses should also be more apparent to the affected and other interested parties. Together the analyses and the public comment on the analyses of the impacts and the potential alternatives to a regulation should lead to more efficient and effective management.

Comment 3: NMFS received comments regarding the combination of the APs. These comments included: the number of people on the Billfish AP should not decline; we support combining the APs; it is redundant, confusing and inefficient to have separate APs; the customary joint meetings of the HMS and Billfish APs over the past six years ensured an imbalance of representation by the recreational fishing sector and the result has been lopsided and ineffective advice; and the combined AP should be fair in representing the various user groups.

Response: NMFS is not expecting to change the composition of the APs as a result of consolidating the FMPs. Once this document and its final rule are finalized, NMFS intends to combine the APs in their entirety. Over time, NMFS will adjust the number of people on the AP and/or representing each group as needed to ensure a balanced representation of all interested sectors and regions.

## D.7 Objectives of the FMP

Comment 1: The proposed objectives of the Consolidated HMS FMP are acceptable, including all suggested deletions and revisions, but it is not possible to continuously reduce bycatch and mortality. Logically, as the status of stocks improve, these numbers will likely increase. At some point, NMFS must recognize that incidental catches and mortality will occur and set practical and reasonable levels of allowable incidental catch.

Response: Consistent with National Standard 9, NMFS aims to minimize bycatch to the extent practicable, and to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. As described in the time/area section above, NMFS continues to examine the impact of closures and other bycatch reduction measures to ensure the goals are met. Consistent with protected species incidental take statements, the results of the stock assessments, and the impact of circle hooks on bycatch rates, NMFS may consider modifying the existing time/area closures or changing existing trip limits of the incidental limited access permits.

Comment 2: Regarding Objective 2, “Atlantic-wide” is a more appropriate term than using “management unit” because even a total prohibition on any domestic fishing effort would not recover the fish stock for most ICCAT species.

Response: NMFS agrees.

Comment 3: We are concerned about Objective 3, to reduce landings of Atlantic billfish in directed and non-directed fishery. It is completely unnecessary to reduce directed landings which only come from the recreational sector.

Response: Objective 3 does not address landings of Atlantic billfish. Rather, Objective 3 addresses bycatch in all HMS fisheries and post-release mortality of billfish in the directed billfish fishery.

Comment 4: Objective 4, establish a foundation for international negotiation of conservation and management measure, sounds as though the intent would be to propose the creation of additional international management entities, other than ICCAT, creating a tremendous amount of unnecessary bureaucracy that ultimately weakens the efficient management of these important species. This objective needs to be clarified before final approval.

Response: Objective 4 states that NMFS would establish foundations to work with other international organizations to manage Atlantic HMS. NMFS already works with, and intends to continue working with, several international organizations regarding Atlantic HMS including ICCAT, NAFO, FAO, and CITES.

Comment 5: Regarding Objective 4, the old practice of "the United States goes farthest first" simply does not work and often results in the United States being diminished in its capabilities and influence within ICCAT.

Response: Objective 4 does not state that the United States should work unilaterally to rebuild or maintain Atlantic HMS stocks. Rather, Objective 4 builds in the concept that NMFS would work with international bodies, such as ICCAT, to rebuild or maintain sustainable fisheries.

Comment 6: Objective 7 calls for the management of Atlantic HMS to achieve optimum yield and to provide the greatest benefit to the Nation, including food production. Atlantic billfish should not be managed with the intent to increase food supply and the 250 marlin landing limit is not managing in terms of optimum yield. This landing limit is not based on maximum sustainable yield, nor does it take into account relevant social, economic, or ecological factors. This objective should be reworded to say that Atlantic billfish will be managed to provide the greatest benefit to the nation with respect to recreational opportunities, preserving traditional fisheries to the extent practicable, and taking into account protection of marine ecosystems.

Response: NMFS agrees that Atlantic billfish should not be managed with the intent to increase food supply. NMFS did not mean to imply that in the proposed change to Objective 7. NMFS has reworded this objective to clarify its intent.

Comment 7: Objective 12 calls for the promotion of live release and tagging of Atlantic HMS. We do not believe it is in the Nation's best interest to promote live release for all HMS of legal size and those caught within a legal season because any HMS poundage under the quota resulting from live release stands the likely fate of being transferred to a country that will harvest the difference, ultimately reducing the U.S. ICCAT quota. This objective should be reworded to state that NMFS would promote live release and tagging of Atlantic billfish and sub-legal HMS.

Response: NMFS agrees and has reworded the objective to address this issue.

Comment 8: Regarding Objective 12, all hook and line fishing post-release mortality should be addressed.

Response: NMFS believes that this concern is already addressed in Objective 12.

Comment 9: NMFS should make the proposed deletions to Objectives 13 and 14; however, if NMFS does not make these deletions, it must reevaluate its proposed revisions to Objectives 2, 4, 5, and 7.

Response: While NMFS did suggest removing these objectives at the Predraft stage, NMFS did not proposed removing them in the Draft HMS FMP due to the concern expressed by the recreational billfish community. NMFS does not believe that these objectives conflict with objectives 2, 4, 5, and 7. Therefore, no changes to those objectives are needed.

Comment 10: Please eliminate the word "almost" from Objective 14: "Optimize the social and economic benefits to the nation by reserving the billfish resource for its traditional use, which in the continental United States is almost entirely a recreational fishery."

Response: The word almost has been removed and the objective clarified to refer only to Atlantic billfish.

Comment 11: Objective 16 needs to be rewritten or eliminated because there is no method for measuring over capitalization in the recreational fleet. Recreational fisheries should not be managed by fleet capacity and over capitalization.

Response: NMFS has decided to delete Objective 16 for this and other reasons, as explained in response to comment 12 below.

Comment 12: Objective 16, the consideration of fishing effort, should not be explicit to commercial fisheries. Latent effort is only a problem in overcapitalized fisheries and the U.S. pelagic longline fishery is undercapitalized. NMFS needs to encourage latent pelagic longline effort to become active or reopen the "directed" swordfish permit category in a measured, incremental manner to allow new entrants.

Response: NMFS has deleted Objective 16. While Objective 16 was an important part of the limited access program established in the 1999 FMP, it does not apply to all HMS commercial fisheries. Instead, NMFS has reworded Objective 17, create a management system to make fleet capacity commensurate with resource status, in order to express more fully NMFS' intent.

Comment 13: Regarding Objective 18, NMFS should not condone a reallocation that is contrary to the intent of the Magnuson-Stevens Act.

Response: Objective 18 does not address reallocation contrary to the Magnuson-Stevens Act.

## D.8 Comment Period/Outreach

Comment 1: NMFS received several comments regarding the length of the comment period as a result of hurricanes. These comments are: due to the impacts of Hurricane Katrina on the fishing fleets in the Gulf of Mexico and the lack of communication with people in that area, NMFS should consider a substantial extension of the comment period and consideration of suspending the scheduled public hearings; a large portion of the longline fleet is damaged and without communications - they cannot respond to the proposal at this time; we are sensitive to extension of comment period to accommodate the Gulf of Mexico Area, but we do not want to see an overly lengthy delay in the process.

Response: NMFS agrees that Hurricanes Katrina and Rita severely impacted the fishermen, infrastructures, communication, and the communities in the Gulf of Mexico region. As a result, NMFS extended the comment period on the Draft HMS FMP and proposed rule from October 18, 2005, to March 1, 2006. NMFS also rescheduled three public hearings in the area from September/October to January and February. NMFS believes that this extension in the comment period and rescheduling of public hearings gave affected entities an opportunity to review and comment on the Draft HMS FMP and its proposed rule without delaying the implementation of the management measures significantly.

Comment 2: NMFS received a number of comments about the advertisement of public hearings and the Draft HMS FMP including: many of the public hearings are not well publicized, which leads the Agency to miss a lot of key people at those hearings; a lot people at the fish pier did not know about this hearing; NMFS should hold additional hearings in the same areas; without better publication to increase participation, NMFS is not going to get enough comment from the people who are going to be impacted by this rule; NMFS should improve their outreach to magazines; NMFS needs to buy mail and email lists of anglers from publicly available sources and send them meeting notices to ensure adequate public participation; NMFS should use the mailing and email addresses provided when applying for permits to notify the industry; NMFS has adequately informed us through various sources (e.g., internet, facsimile, and public hearing notices) of all germane and relevant issues, options, and comment deadlines; your notices are all fuzzy, full of Federal Register type language - they should be earlier in the process, more widely distributed, and focused on the user groups in simple language.

Response: NMFS agrees that public participation and outreach regarding proposed or final management measures is critical to the management of HMS. NMFS attempts to notify all interested parties of all actions using a variety of methods. The official notification is through the Federal Register. The Federal Register is available on the web at http://www.gpoaccess.gov/fr/index.html. Alternatively, interested parties can go to http://www.regulations.gov to review and comment on all proposed rules and documents open for public comment throughout the Federal government. Documents can be searched by Agency, topic, and date. NMFS also releases information regarding proposed and final rules and fishing seasons for HMS through the HMS fax network. NMFS intends to develop an email system that would allow anyone to sign up to receive these information packages. These information packages are also usually published on Fishnews, an electronic newsletter produced weekly by NMFS. To sign up for this newsletter, go on the web to http://www.nmfs.noaa.gov. NMFS releases Press Releases, which the media can publish in local fishing magazines and newspapers, regarding public hearings and proposed rules. However, NMFS cannot require these sources of information to publish information regarding proposed rules or public hearings. NMFS has tried using the email addresses included in the permit application to provide HMS fishermen with information about their permits. Often times, the email addresses have proved incorrect and the information was not delivered. Nonetheless, NMFS is working to improve communication with constituents and is open to additional suggestions on how to improve outreach.

Comment 3: I found the public hearing presentations completely frustrating with biomass, metric tons, and other words and numbers used as if I were in a marine biology class. At the end of the presentation, the billfish and tuna changes were slipped in as if to lull us into sleep so that the changes slip by unnoticed. It appeared as if the intent of the presentation was to confuse the average angler with statistical data.

Response: NMFS agrees that information regarding stock status and quotas can be confusing. However, this information is the basis for many of the management measures that were proposed and will be the basis of many of the final management measures. Without an understanding of the basic information regarding life history, stock status, maximum sustainable yield, and other concepts, the reasons and impacts of all the alternatives considered cannot be explained. NMFS did not present the information to confuse anyone; rather, NMFS presented the information to explain the basis of any proposals or decisions and why one alternative was preferred over another. NMFS welcomes any specific comments on the presentations that would improve the clarity of the presentations.

Comment 4: If NMFS accepts comments by email, the Agency should implement a requirement for using Digital Certificates to authenticate that the comments were from the identified party and was not contaminated in transit.

Response: NMFS accepts comments by email. To date, NMFS has not had any problems regarding authenticating the sender of the comment. However, NMFS will continue to examine this and other technological issues.

Comment 5: Please limit your future rulemakings to fewer topics. Large documents like this one are too difficult for many of your constituents comprehend.

Response: NMFS agrees that large documents with many issues are difficult to understand. To the extent that rulemakings can be limited, NMFS will attempt to simplify and reduce the issues in the future. However, to some extent, rulemakings are dictated by priorities and the need to act on certain issues. Thus, some rulemakings may have more issues than others.

## D.9 General

Comment 1: NMFS received several comments on how the overall rulemaking process works. These comments include: NMFS needs to clarify if we have a choice or if the decision on these proposed actions is already made?; what agency is pushing for these changes?; there is an overriding opinion that NMFS does not listen during these comment periods; it is difficult for us to know how and where to get involved; during scoping, it would be nice to know that the information we provide is helping to form future regulations.

Response: NMFS relies on public comment and participation at all stages when conducting rulemaking. The comments received during scoping were crucial for defining the scope of this rulemaking and the alternatives considered. The issues explored in the rulemaking were not pushed by any particular agency. Rather they were considered as a result of the comments received during scoping and management needs as dictated by the Magnuson-Stevens Act and other domestic laws. Public comment at the proposed rule stage is critical in helping NMFS decide to implement certain measures or not. Often, as a result of public comment, NMFS decides not to implement one or more of the proposed management measures or to redesign how to implement some of the management measures. For example, in this rulemaking NMFS is not implementing several of the proposed measures including removal of the Angling Category North/South line and clarifying the commercial definition of greenstick. When considering public comments, NMFS does not look at the quantity of public comments received but the quality and issues raised in each individual comment. Every written comment and every statement made at a public hearing is considered. In every final rule, NMFS responds to the comments received during the public comment period. At that time, interested parties can see how their comments affected the decisions of the Agency.

Comment 2: NMFS would have more cooperation from fishermen if managers got out on the water instead of sitting at a desk all the time.

Response: While fishery managers do spend much of their time behind a desk writing regulations and related documents, NMFS staff try to go out on the water and interact with fishermen as possible.

Comment 3: I am opposed to management via Petition for Rulemaking. It undermines the role of the Advisory Panels and the International Advisory Committee.

Response: The public may petition an agency for rulemaking. NMFS is required to respond to any petition that is filed. This process does not undermine the role of the Advisory Panel or the ICCAT Advisory Committee as these parties can comment on the adequacy of the Petition for Rulemaking, as appropriate, or any rulemaking that results from the Petition.

Comment 4: NMFS received several comments regarding the relationship of the FMP to the Magnuson-Stevens Act including: Will this FMP be consistent with the revisions/reauthorization of the Magnuson-Stevens Act?; NMFS is not following its own rules in regard to National Standard 4 of the Magnuson-Stevens Act (fair and equitable distribution of fishing privileges).

Response: The Final HMS FMP will be in full compliance with the current Magnuson-Stevens Act, including the National Standards. In regard to National Standard 4, none of the preferred alternatives discriminate between residents of different states. While NMFS is tracking congressional actions to reauthorize the Magnuson-Stevens Act, it cannot predict the outcome of these efforts. If needed, NMFS would make the appropriate changes in a future rulemaking.

Comment 5: What management measures are applicable to the Caribbean?

Response: All management measures for HMS are applicable to fishermen fishing in the Atlantic, including the Gulf of Mexico and the Caribbean.

Comment 6: NMFS is allowing so much overfishing of one species after another that our children have no expectation of there being fish in the ocean when they grow up.

Response: NMFS disagrees. While overfishing does continue to happen for some species, other species have formal rebuilding plans and are being rebuilt. In the case of HMS, since the 1999 FMP, blacktip sharks have been rebuilt and other species such as bigeye tuna and Atlantic sharpnose sharks are still considered healthy. NMFS continues to monitor the status of all HMS and take appropriate action, consistent with the Magnuson-Stevens Act and ATCA, to prevent overfishing, rebuild overfished stocks, and maintain optimum yield.

Comment 7: For any HMS management program to be effective, fair, and reasonable to U.S. fishermen and anglers, international transference and comparable compliance of management mitigation measures must be adopted by the global HMS fishing community. Our fishermen practice and embrace the most effective and stringent conservation measures in the world and U.S. fishermen and anglers suffer economic hardships and fishing days due to these measures. However, few international partners practice any conservation at all. The United States needs to continue to lead the conservation initiative but it is unfair to assume that other countries will follow our example if we only put our fishermen out of business or deny them the opportunity to fish for quota.

Response: NMFS agrees that effective management of HMS requires international cooperation and compliance to management measures. NMFS also agrees that the United States needs to indicate that U.S. fishermen can meet conservation goals while also remaining economically viable. To that end, NMFS and the Department of State continue to work through ICCAT to enforce compliance of existing management measures and an end to illegal, unreported, and unregulated fishing. Additionally, in this rulemaking, NMFS either allows for additional opportunities for U.S. fishermen to take the quota (*e.g.*, changing the time periods and subquotas for the General category) or provides the groundwork for future opportunities (*e.g.*, establishes criteria to modify existing time/area closures).

Comment 8: Remove "including landings" from the third bullet on the bottom half of page 1-40 of the Draft Plan. The emphasis is properly on reducing mortality and post-release mortality.

Response: This comment refers to one of the specific goals of this rulemaking, not one of the objectives of the FMP. NMFS agrees and has reworded the goal accordingly.

Comment 9: In the Management History (section 1.1), include ATCA provision, "shall not disadvantage U.S. fishermen relative to their foreign counterparts."

Response: That provision (evaluate the likely effects of conservation and management measures on participants and minimize, to the extent practicable, any disadvantage to U.S.

fishermen in relation to foreign competitors) is not a requirement of ATCA. It is a requirement under the Magnuson-Stevens Act (16 U.S.C. §1854 (g)(1)(B)). A description of this provision is included in the description of the management history in Chapter 1 and the requirements of the Magnuson-Stevens Act in Chapter 11 of the HMS FMP.

Comment 10: In the section of Chapter 1 regarding the pre 1999 Atlantic tunas management section, NMFS needs to clarify that the longline fishery does not seek a directed fishery on the currently overfished stock of bluefin tuna.

Response: This section has been moved to Chapter 3 in the Final HMS FMP. Together, this section along with the other sections in Chapter 3 regarding the landings by gear and the status of the stocks indicate that the pelagic longline fishery is prohibited from targeting bluefin tuna.

Comment 11: The HMS longline fishery was unaware of NMFS's "technical revisions" following completion of the HMS FMP in 1999, which changed the Atlantic Tunas longline permit to a "limited access" status. NMFS should create an opportunity for longline vessels with valid swordfish and shark permits to obtain an Atlantic Tunas longline permit. This will help to reduce or eliminate unnecessary discarding and encourage the return of pelagic longline fishing effort.

Response: As described in the 1999 Atlantic Tunas, Swordfish, and Shark FMP, NMFS made the Atlantic tunas longline permit a limited access permit, along with the swordfish and shark permits, at the request of the fishing industry in order to close a potential loophole in the regulations. The technical revisions to the rule implementing the 1999 FMP clarified that intent and did not make any substantial changes. Nonetheless, NMFS intends to conduct a rulemaking to reform certain aspects of the HMS permitting system and may consider changes based on this concern in that rulemaking.

### D.9.1 Recreational

Comment 12: NMFS received general comments related to recreational fishing including: I will not stand for the over-regulation of recreational fishing; and, NMFS has done nothing for the recreational fisherman but give him table scraps and ruined fishery resources.

Response: NMFS recognizes the value and important contribution of recreational fishermen throughout HMS fisheries. The Agency continues to take numerous steps to recognize this critical sector of the fishery, while ensuring that recreational effort is properly accounted for and managed to assist stock recovery. Comments from the recreational sector, and others, were fully considered in deciding upon the management measures in the Final Consolidated HMS FMP. For example, NMFS no longer prefers the alternative that would have prohibited landings of white marlin based, in part, upon comments indicating that this alternative could produce sizeable adverse social and economic impacts upon recreational fishermen. NMFS believes, however, that the preferred alternative to require circle hooks when using natural baits in billfish tournaments is appropriate, and is not overly burdensome. Many HMS recreational anglers already possess a strong personal conservation ethic and practice catch and release fishing for white marlin and other species. However, the mortality rate associated with these releases is now estimated to be substantially higher than previously thought. The use of circle hooks when deploying natural bait in billfish tournaments is an important step towards reducing billfish fishing mortality, and will help to maintain the highest availability of billfishes to the United States recreational fishery. Billfish tournament anglers must comply with the new circle hook requirement so that these species may better survive the catch and release experience. NMFS strongly disagrees with the comment that recreational fishermen have been given table scraps and ruined fishery resources. Numerous examples could be cited to demonstrate the balanced consideration that is given to recreational HMS fishery interests. Foremost, the recreational sector is, and will continue to be, prominently represented on the HMS Advisory Panel. Additionally, several large areas are closed year-round or seasonally to commercial HMS longline vessels, whereas recreational anglers retain full access to these areas. The recreational sector has benefited greatly from this access, and is currently enjoying the resurgence of recreational fishing for swordfish and other species in these areas. Also, the commercial sale of Atlantic billfish has been prohibited since 1988. To reinforce the recreational nature of this fishery, a preferred alternative in the Final Consolidated HMS FMP would prohibit the possession or retention of any Atlantic billfish for vessels issued a commercial permit and operating outside of a tournament. Another preferred alternative in the Final Consolidated HMS FMP would prohibit fishing for HMS in the Madison-Swanson and Steamboat Lumps Marine Reserves, with the notable exception that high-speed trolling is allowed during the prime recreational summer fishing months. NMFS believes that these comments are not supported factually, and are inappropriately directed at the Agency in response to recreational management measures that are currently necessary to reduce recreational fishing mortality in the directed billfish fishery and to rebuild other HMS.

Comment 13: Recreational fishing should be truly recreational fishing. A CHB vessel operator knows where to go fishing, so it gives the recreational fisherman onboard an advantage. CHB vessel operators use this expertise to sell the catch from the recreational fishery. This practice gives access to the recreational fishery where only the commercial fishermen typically go. The CHB vessel is already getting paid to go out there, he does not need to also get money from selling the tunas. NMFS should decrease bag limits on charter/headboats to avoid incentive to sell recreationally caught fish.

Response: NMFS regulates and manages HMS CHB permit holders differently than HMS recreational or commercial permit holders due to the unique characteristics of the CHB sector. These vessels may be both recreational and commercial, so the regulations governing them are necessarily different. For instance, some CHB captains may fish commercially for tunas on one trip, and then fish under recreational retention limits when carrying paying passengers the next day. NMFS believes that the regulations governing the sale of HMS from CHB vessels are appropriate. CHB vessels that also possess commercial limited access permits are subject to recreational catch limits when engaged in for-hire fishing, but may sell tunas (except for BFT caught under the recreational angling category regulations, i.e. BFT between 27 inches and 73 inches CFL or trophy fish greater than 73 inches) on non for-hire trips. CHB vessels may sell sharks and swordfish only if the appropriate commercial shark and/or swordfish permits have also been issued to the vessel.

### D.9.2 Commercial Fishery

Comment 14: The United States should inflict penalties and tariffs on countries that do not follow similar rules as the United States; push to stop longlining worldwide; stop all longlining in the United States now; and make it illegal to import any fish from other countries that longline, do not follow conservation limits, and do not require longlines to only use circle hooks.

Response: The United States has been a leader internationally in promoting fishing practices that reduce bycatch and promote conservation of HMS and other fish stocks. Pelagic longlining gear is not being prohibited at this time due to reasons discussed in the response to Comment 36 of the Time/Area Closures section. NMFS believes that international cooperation, including sharing science and technology such as circle hooks and bycatch reduction gears, is the primary and most effective means to achieve conservation goals. The United States will continue to promote these types of measures both domestically and internationally, and will encourage efforts by other countries to implement similar measures.

Comment 15: Are fish that are caught by commercial permit holders and retained for personal use counted against the quota?

Response: NMFS is preferring an alternative that would prohibit vessels issued commercial permits and operating outside of a tournament from possessing, retaining, or taking Atlantic billfish from the management unit. Under this alternative, only fishermen issued either an HMS Angling or Charter/headboat permit could take or possess Atlantic billfish. Additionally, General category fishermen fishing in a registered tournament could take and possess Atlantic billfish. In the case of General category fishermen participating in a tournament, the tournament operator must report any billfish landed in the tournament. Charter/headboat vessel owners are required to report billfish under the recreational reporting requirements. Atlantic marlin landings are counted against the 250-fish landing limit. All landings from commercial shark or swordfish vessels must be reported in the HMS logbook, if selected for reporting, regardless of whether the fish are retained for personal use. Sharks landed by commercial permit holders are counted against commercial quotas. A swordfish from the North Atlantic stock caught prior to a directed fishery closure by a vessel with a directed or handgear swordfish permit is counted against the directed fishery quota. A North Atlantic swordfish landed by a vessel issued an incidental swordfish permit or a Charter/headboat permit or landed after the directed swordfish fishery is closed is counted against the incidental catch quota. Owners of Atlantic Tunas vessels must also report landings in the HMS logbook, if selected for reporting. There are no quotas for bigeye, albacore, yellowfin, or skipjack tunas. BFT landed but not sold must be reported and are applied to the quota category according to the permit category of the vessel from which it was landed.

Comment 16: All commercial vessels that have not landed a fish in the past three years should be "retired."

Response: NMFS does not necessarily agree with this statement for HMS. Commercial fishermen can take time away from fishing for certain species for numerous reasons including repairs or replacement of vessels, a desire to help rebuild the stocks, or more opportunities in another fishery. In the current situation, many PLL or shark fishermen have stopped fishing for HMS due to current restrictions such as the time/area closures and short shark seasons. Additionally, for some commercial fisheries, such as the BFT General category fishery, the quota does not allow for every permit holder to land a fish in every year. Thus, some vessels may not land a BFT for several years. In some fisheries, such as those that are severely overfished, such a measure may be needed to ensure that latent permit holders cannot re-enter the fishery and increase effort. NMFS may conduct a rulemaking in the future to reform the current permit structure. At that time, NMFS may consider measures such as this one, as necessary.

Comment 17: NMFS heard two opposing comments related to commercial vessels impacted by the hurricanes last fall. These comments were: NMFS needs to provide buyout programs for the commercial fishery, especially now that vessels active in this fishery have been impacted by hurricane Katrina; and NMFS should not subsidize the replacement of commercial vessels impacted by hurricane Katrina.

Response: NMFS is still analyzing the impacts of Hurricanes Rita and Katrina on fishermen and communities in the Gulf of Mexico. At this time, NMFS does not know the extent of lasting damage or the most appropriate measures needed to rebuild the affected fisheries, either commercial or recreational. NMFS would take the appropriate actions in the future, as needed.

### D.9.3 Longline

Comment 18: Why are there no proposed measures for the commercial PLL fishery in the Draft HMS FMP?

Response: Many measures in the HMS FMP could have ancillary impacts on PLL fishery such as going to ICCAT regarding a rebuilding plan for northern albacore tuna and the change in fishing years. There are also alternatives that specifically consider the PLL fishery. All of the alternatives in the time/area section, except for alternative B6, were considered for the PLL fishery in the Draft HMS FMP. NMFS is not preferring, at this time, to implement any new closures, except the complementary measures in the Madison-Swanson and Steamboat Lumps Marine Reserves, which would prohibit fishing for and possessing all HMS by all HMS gears in the marine reserves from November through April (except when transiting and the gear is stowed). The possession of Gulf reef fish in these areas is already prohibited year-round (except when transiting and the gear is stowed). From May through October, surface trolling would be the only HMS fishing activity allowed. No new measures were proposed at this time because there are already a number of restrictions, including time/area closures, gear requirements, VMS, observers, and a host of other measures required to reduce bycatch in the PLL fishery. However, NMFS would continue to examine the issue of targeted time/area closures to further reduce bycatch in the future. Other alternatives that could affect specifically PLL fishermen include workshops, changes to the definition of PLL gear, modifications to the definition of the East Florida Coast closed area, and the decision regarding the 25 mt BFT available in the NED.

Comment 19: NMFS should allow the practice of using live baits on PLL gear again.

Response: The Agency is aware of the concern expressed in this comment. Currently in the Gulf of Mexico, vessels with PLL gear onboard are prohibited from deploying or fishing with live bait, possessing live bait, or setting up a well or tank to maintain live bait. This prohibition was implemented in lieu of closing the western Gulf of Mexico through a final rule published on August 1, 2000 (65 FR 47214), and became effective on September 1, 2000. It was established to reduce the bycatch of billfish on PLL gear and this remains an important priority. However, given the recent mandatory requirement for PLL vessels to possess and deploy only large circle hooks and to carry release and disentanglement gear, a reexamination of the live bait prohibition may be warranted. Before this issue could be considered in a future rulemaking, it would be beneficial to obtain additional gear research information, such as bycatch rates and post-release mortality rates of billfish on PLL gear deploying large circle hooks with both live and dead baits.

Comment 20: Without a relaxation of the restrictions, the longline fishery will continue to fail – not due to stock declines but due to over-restrictions.

Response: NMFS acknowledges that the PLL fishery has decreased in size over time possibly due to current time/area closures but also due to other factors, which are out of NMFS control (*i.e.*, hurricanes, fuel prices, etc.). NMFS is not preferring, at this time, to implement any new closures, except the complementary measures in the Madison-Swanson and Steamboat Lumps Marine Reserves. The United States has not been able to catch its swordfish ICCAT quota allocation. While NMFS considered modifications to current time/area closures, none of the modifications considered would have resulted in a large enough increase in target catch to alleviate concerns over uncaught portions of the swordfish quota. NMFS is investigating ways to revitalize the swordfish fishery and is waiting on the results of the ICCAT stock assessments to help determine domestic measures with regard to management of these species.

### D.9.4 Swordfish

Comment 21: NMFS received comments regarding the trade of swordfish including: Is there anything in the Draft HMS FMP regarding the import of swordfish from countries that have exceeded their ICCAT quota? This exceedance has been a perennial problem at ICCAT Advisory Committee Meetings and it is annoying when fishermen say that this type of fishing encroaches on "our" fishery when it is the fishery as a whole, not only the U.S. swordfish fishery; U.S. swordfish fishermen should be provided reasonable opportunity to harvest quota - United States has a high demand that U.S. fishermen should have an opportunity to fill; NMFS should prohibit all imports on swordfish and tuna.

Response: ICCAT is an international organization that addresses quota overages and penalties associated with those overages through a process that requires the adoption of recommendations and then implementation of those recommendations by contracting parties. The United States is a contracting party at ICCAT and participates in the evaluation of compliance with quotas. Quota compliance is an important issue right now for the United States during ICCAT negotiations. However, ICCAT would be the lead in imposing trade sanctions or other appropriate penalties on a particular country if found to be violating ICCAT agreements. Such actions have been taken by ICCAT in the past. Also, NMFS agrees that overharvests of ICCAT quotas impact the entire swordfish fishery and not just the U.S. allocation, and it is important to manage the fishery as a whole and not to become too focused on just the U.S. quota.

NMFS is currently working on different ways to revitalize the U.S. swordfish fishery. An SCRS stock assessment is scheduled for 2006, and the results from this stock assessment will help determine domestic measures for this species.

Comment 22: NMFS received comments regarding the need to revitalize the PLL and/or swordfish fishery including: in the face of our consistently rolled-over quota and fully-rebuilt swordfish stock, why are there no provisions to allow for U.S. fishermen to get newer, more efficient, and safer vessels?; NMFS should eliminate the vessel upgrading restrictions to help revitalize the PLL fishery; what is there in the draft HMS FMP that would allow the U.S. ICCAT Delegation to convince foreign ICCAT Delegations that the United States is serious about revitalizing its swordfish fishery in order to utilize the full United States ICCAT swordfish quota?; NMFS should make reasonable adjustments to the offshore borders of existing closed areas; eliminate the limited access upgrading criteria; re-evaluate the use of "live bait" for circle hooks only; provide a more reasonable trip limit for incidental PLL to eliminate wasteful and unnecessary regulatory discarding; re-open the swordfish handgear fisheries, especially in light of the inability of the United States to land its current ICCAT quota; the United States is looking at a stockpile for swordfish and BFT; if the United States does not have any quota it will be difficult to have a voice in international negotiations; $86 million of swordfish was not caught; this domestic fleet is so over restricted that it cannot harvest the quota; count recreational swordfish live and dead releases as well as commercial catches when negotiating the United States quota at ICCAT; eliminate the recreational bag limit to be replaced with a higher minimum size of 47 inches LJFL and authorize anyone holding a general category tuna permit to land swordfish; increase the number of swordfish that may be kept by swordfish incidental permit holders in the Gulf of Mexico or convert all Gulf of Mexico incidental permits to directed permits.; adjust the existing PLL time/area closures within the U.S. EEZ in consideration of a fully rebuild North Atlantic swordfish stock and the U.S. swordfish fishery's ability to harvest its ICCAT quota share; longline fishermen made great sacrifices to rebuild this fish stock and have been the world's leading innovators of "bycatch friendlier" pelagic hook and line fishing – NMFS must take action to revitalize this fishery.

Response: For the past several years, the swordfish fishery has been unable to catch the full quota. This is a change from the fishery in the 1990s where the quota was usually taken. In 1997, the quota was overharvested and the fishery was closed. There are a number of possible explanations for the inability of the fleet to harvest the quota including time/area closures to PLL (the primary gear used to harvest swordfish), the reduction in permit holders through limited access, the restrictions on vessel upgrading, the incidental take limits, and the paucity of reporting from the recreational sector. Given the anticipated rebuilt status of swordfish (the next stock assessment is scheduled for September 2006), a number of fishermen and others have asked NMFS to revitalize this fishery. Many people are concerned that without a plan to revitalize the fishery, the quota would be taken from the United States and given to other countries, many of which do not view conservation as the United States does. NMFS is also concerned about the status of this fishery and its quota. While this rulemaking was not intended to revitalize the swordfish fishery, many of the actions would allow for actions to be taken in the future. For example, NMFS does not prefer to modify any existing closures at this time but the preferred criteria would allow for modifications to the closed areas and/or experiments to test gears or other fishing methods in the closed areas. Additionally, NMFS is defining a "new" swordfish commercial gear type (i.e., buoy gear) and clarifying the difference between this commercial gear and the primarily recreational gear of handline. Depending on the stock assessment and the upcoming ICCAT recommendations, NMFS expects to do rulemaking in the near future that could help revitalize the swordfish fishery. Any effort to revitalize the fishery must take care not to increase sea turtle takes (the PLL fishery has a jeopardy conclusion under ESA for leatherback sea turtles), marine mammal interactions (there is a PLL Take Reduction Team that is considering methods of reducing interactions under the Marine Mammal Protection Act), and catches of marlin, BFT, and other overfished species. Over time, consistent with the objectives of this FMP, the Magnuson-Stevens Act, Marine Mammal Protection Act, and the ESA, NMFS intends to revitalize the fishery so that swordfish are harvested in a sustainable and economically viable manner and bycatch is minimized to the extent practicable.

Comment 23: NMFS received comments regarding the trip limit for swordfish incidental limited access permit holders. These comments included: NMFS must reevaluate the incidental swordfish trip limits in order to reduce or eliminate unnecessary discards by valid permit holders; there was an allowance of five swordfish in the squid fishery. If a swordfish comes aboard in a trawl, it is dead. Mid-water trawls are not directing or targeting swordfish. So, can there be an allowance for 15 swordfish in a mid-water trawl? It seems to be a waste to throw dead swordfish overboard.

Response: The current trip limits for incidental permit holders and permit holders using mid-water trawls were implemented in 1999 as part of the limited access program for swordfish. At that time, swordfish were overfished, there were a number of latent permit holders, and the quota was being landed. Thus, the limited number of swordfish that could be landed by incidental permit holders or permit holders using mid-water trawls (an unauthorized gear) was appropriate and was aimed at reducing swordfish mortality by fishermen not targeting swordfish, to the extent practicable. The situation has now changed and, depending on the results of the upcoming 2006 stock assessment, NMFS may reconsider these limits in a future rulemaking.

Comment 24: U.S. recreational fishermen should be allowed to sell their swordfish.

Response: Under current HMS regulations, recreational fishermen are not allowed to sell HMS. If fishermen wish to sell their swordfish, they can obtain a commercial swordfish limited access permit from commercial fishermen who are leaving the fishery. Anecdotal information indicates there are a number of commercial swordfish permits available. However, depending on the type of swordfish permit obtained, these permits may limit fishermen to the commercial suite of permits and they would not be able to obtain either an HMS Angling or HMS Charter/Headboat permit. All recreational landings are counted against the domestic quota for swordfish (300 mt dw of the quota are allocated for recreational landings). Comments in the past have indicated concern to the public health regarding the quality of recreationally-caught swordfish. These commenters have noted that while commercial fishermen are trained and have the facilities to maintain fresh swordfish, recreational fishermen generally keep the swordfish in a cooler. Nevertheless, as discussed above, fishermen have requested NMFS to revitalize the swordfish fishery. The suggestion in this comment may be one potential option for such a goal.

### D.9.5 Tunas

Comment 25: The draft HMS FMP does not consider the uncertainty associated with estimates of recent BFT recruitment in recent years, the probable outcomes for BFT under different estimates, or the impact on rebuilding of the current high mortality in the Gulf of Mexico. The draft HMS FMP needs to consider this while also keeping in mind the feasibility of changing ICCAT management measures and quotas at the upcoming ICCAT meeting.

Response: The ecological impacts of this final action on BFT are at most, minimal. The overall quotas for each domestic fishing category are not changed, nor are the size classes of BFT that each domestic category targets. The preferred alternatives for BFT comply with the ICCAT BFT rebuilding plan, which considers the uncertainty associated with BFT stock assessment analyses. The preferred alternatives also continue the prohibition on directed fishing for BFT in the Gulf of Mexico, and review the efficacy of additional management options to reduce BFT bycatch in the Gulf of Mexico. The West Atlantic BFT stock is scheduled to be re-assessed by ICCAT in June 2006, and the assessment will be evaluated at the upcoming annual ICCAT meeting in November 2006. Any changes to the rebuilding plan would be implemented by NMFS as required under ATCA.

Comment 26: Filleting tunas at-sea should be acceptable on HMS CHB vessels. By allowing filleting at-sea, the catch can be prepared and put on ice much sooner than if cleaning occurs upon returning to the dock; it will be better for public safety because tuna deteriorate quickly in warm summer and fall months; and preparing tuna sooner also improves the quality of the meat, and ultimately, angler satisfaction. The season is relatively short, so filleting at-sea allows for a quicker turn around time between trips. It will not compromise enforcement of size limits, retention limits, and species identification. Retaining the racks can facilitate enforcement.

Response: Under current regulations at 50 CFR 635.30(a), "persons who own or operate a fishing vessel that possesses an Atlantic tuna in the Atlantic Ocean or that lands an Atlantic tuna in an Atlantic coastal port must maintain such Atlantic tuna through offloading either in round form or eviscerated with the head and fins removed, provided that one pectoral fin and the tail remain attached." Eviscerated is defined as a fish that has only the alimentary organs removed. The regulations are intended to aid in enforcing the minimum size limit, retention limits, and species identification. Over the past several years, the HMS CHB industry, more specifically the headboat sector, has requested that it be exempt from the current regulations and allowed to fillet Atlantic tunas at sea. While authorizing filleting at-sea may have social and economic benefits for the industry as set forth above, waiving the current regulations could render enforcement of size limits, retention limits, and species identification difficult.

### D.9.6 Sharks

Comment 27: NMFS has placed sharks as the lowest priority. NMFS has not adequately addressed persistent overfishing, population depletion, and the need for a precautionary approach with regard to a number of exceptionally vulnerable, coastal, and pelagic shark species. The draft HMS FMP lacks goals, timetables, and milestones toward conserving sharks and their habitats.

Response: NMFS disagrees that sharks are the lowest priority. The implementing regulations for Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks (December 24, 2003, 68 FR 74746) included management measures to address overfishing and population depletion of sharks. These management measures included, but were not limited to: aggregating the LCS shark complex, using MSY as a basis for setting commercial quotas, implementing a 4,000 lb trip limit in the commercial LCS fishery, establishing regional commercial quotas and trimester seasons, establishing gear restrictions to reduce bycatch, and establishment of a time area closure in the mid Atlantic region from January to July each year to reduce interactions with sandbar and prohibited dusky sharks. There are also several preferred shark management measures in the Final Consolidated HMS FMP that would address overfishing of finetooth sharks, improve shark dealer identification of commercially harvested shark species, and require fishermen to leave the second dorsal and anal fin on all commercially landed sharks to facilitate improved identification, among others. Furthermore, the HMS Management Division is currently engaged in a proposed rulemaking (March, 29, 2006, 71 FR 15680) that may facilitate improved handling, release, and disentanglement of non-target bycatch, including sharks, sea turtles, and smalltooth sawfish. NMFS recently released a dusky shark assessment (May 25, 2006, 71 FR 30123), and is considering the results of the Canadian porbeagle assessment. The final LCS stock assessment review workshop was held in June of this year, and the SCS stock assessment workshops will begin in 2007. Additional management measures for shark fisheries in the Atlantic Ocean may be implemented in the future, as necessary.

Comment 28: NMFS should release and begin work to address the findings of LCS assessment as soon as possible.

Response: The LCS stock assessment is following the SEDAR process, which emphasizes constituent and stakeholder participation in assessment development and transparency in the assessment process. As they are completed, all documents related to the LCS assessment have been placed on the SEDAR webpage at: http://www.sefsc.noaa.gov/sedar/. The final LCS review workshop was held on June 5-9, 2006. As per all stock assessments, NMFS will review the final determinations from the workshop and proceed with regulatory or management actions as necessary, consistent with Magnuson-Stevens Act, the HMS FMP, and other federal laws.

Comment 29: NMFS has relaxed the conservation framework for exceptionally vulnerable deepwater sharks by removing this special grouping from the management unit. Contrary to NFMS assertions, the finning prohibition alone is not sufficient to conserve these species. NMFS should work towards adding deepwater sharks to the list of prohibited shark species in subsequent rulemaking.

Response 30: The deepwater sharks were added to the management unit in 1999 because the Agency wanted to ensure that finning was prohibited for all sharks, including deepwater sharks. NMFS however, does not contend that the finning prohibition was sufficient to conserve these species. When deepwater sharks were included in the management unit, there were no other management regulations in place (*i.e*, permitting, reporting, trip limits, minimum size). NMFS believes that maintaining data collection only on the deepwater sharks is sufficient because they are not targeted in the shark fishery. Prohibiting landings of these species would not likely reduce mortality, as most of these sharks are dead at haulback and take of these species is a rare occurrence. Furthermore, NMFS does not want to further jeopardize the collection of data on these species, which is a rare event, by including them in the prohibited species management unit. If deepwater sharks were prohibited, scientists and fishermen would need to have an exempted fishing permit to retain them. Currently, on the rare occasions when fishermen catch a deepwater shark, they can give it to a scientist. If the species were prohibited, every fisherman and scientist who might catch a deepwater shark and who would want to retain any part of it for research would need to have an EFP on the off chance that such a shark would be caught. NMFS currently receives complaints from scientists about disruption to research for other species that are prohibited and caught more often than deepwater sharks, such as white sharks. Nonetheless, if directed fisheries for deepwater sharks are developed and/or extensive landings of these species begins to occur as bycatch in other fisheries, the Agency may implement additional measures.

Comment 31: NMFS needs to review and release the long-awaited population assessment for dusky sharks, as a matter of priority. We are concerned about the more than 23,000 dusky sharks landed in 2003, despite their prohibited species status. NMFS should investigate and address this problem immediately.

Response: The Southeast Fishery Science Center recently released the dusky shark assessment (May 25, 2006, 71 FR 30123). This document is available on the internet (http://www.sefscpanamalab.noaa.gov/shark/pdf/Dusky_Shark_Assessment.zip). NMFS is also concerned about the status of dusky sharks; hence, this species has been on the prohibited species list since 1999. In 2003, there were 23,288 lbs dw of dusky sharks reported landed in commercial shark fisheries. In 2004, only 1,025 lbs dw of dusky sharks were landed. Effective January 1, 2005, the mid-Atlantic time area closure closed commercial shark fishing with bottom longline gear from January 1 through July 31 of every year. This area was closed in part to reduce commercial fishery interactions with dusky sharks. NMFS may also implement additional management measures as a result of the recently released dusky shark assessment.

Comment 32: NMFS received comments regarding management of porbeagle sharks including: The porbeagle population is eleven percent of its size in 1961 which is too low; Canada has already listed porbeagle sharks as endangered - the United States needs to prohibit all landing immediately and eliminate the directed quota for porbeagle sharks; we are concerned about the continuation of the directed quota for Northwest Atlantic porbeagles, given that this population has been proposed as “Endangered” by the IUCN SSG and Canada; NMFS should end the directed fishery for porbeagles by eliminating the directed commercial quota and allowing only incidental landings; we support NMFS stated interest in working with Canada to address porbeagle conservation - such negotiations will be more successful if the United States takes action to end directed porbeagle fisheries in U.S. waters; the United States should aggressively pursue no directed porbeagle shark fisheries with Canada and within ICCAT.

Response 33: The United States has, on average, landed less than 1 mt of porbeagle sharks in the last four years, most of which was incidental, not directed catch. NMFS, however recognizes the ecological significance of the historical decline in porbeagle sharks, and is currently considering the stock assessment report recently completed by Canada in the fall of 2005. Management alternatives and regulations to prevent further declines in the porbeagle stocks will likely be considered in upcoming rulemaking actions, if necessary.

Comment 34: NMFS needs to make permits available to Puerto Rican shark fishermen or allow them to retain sharks since they are retaining sharks anyway.

Response: All fishermen, fishing for HMS, are already required through state regulations to have the appropriate HMS permits when fishing in state waters. Additionally, shark fishermen fishing in Federal waters are required to have the appropriate Federal HMS permit consistent with Federal regulations. The limited access permits are available from people leaving the fishery, and the recreational permits are available to anyone and may be obtained online at: http://www.nmfspermits.com/initialapp.asp. Fishermen from all states and territories, including Puerto Rico and the Virgin Islands, may face legal action if they do not comply with Federal regulations.

Comment 35: NMFS received two comments regarding the need to propose options for adding sharks to the prohibited species list including: NMFS has offered no alternatives at all to address depletion of these species in the draft HMS FMP (oceanic whitetip, silky sharks, and hammerheads); these species are not targeted but measures to avoid and reduce bycatch of these species are urgently needed. To reduce regulatory discards within the directed and incidental shark fishing fleets, NMFS should consider removing certain species of sharks from the prohibited species list, such as bignose, Caribbean reef, dusky, Galapagos, night, sand tiger, and Caribbean sharpnose.

Response: NMFS did not consider changes to the prohibited species management unit in this rulemaking. Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks established criteria for addition or removal of species to/from the prohibited species group. These four criteria include: there is sufficient biological information to indicate that stock warrants protection, the species is rarely encountered or observed caught in HMS fisheries, the species is not commonly encountered or caught as bycatch in fishing operations, and the species is difficult to distinguish from other prohibited species. NMFS may consider changes to the prohibited species management unit in a future rulemaking, if necessary.

Comment 36: Because smooth dogfish is the only U.S. Atlantic shark that is subject to a directed fishery and not covered by management measures, NMFS should conduct an evaluation of this fishery and assess the population. NMFS should begin this work immediately, present the findings to the Mid-Atlantic Fisheries Management Council (MAFMC), and suggest a way forward as soon as possible.

Response: During the summer of 2005, NMFS received a request from the MAFMC to transfer management of smooth dogfish to the council. NMFS asked for more information regarding why the MAFMC should have sole jurisdiction over the stock. NMFS continues to wait for a response and will work with any Regional Fishery Management Council(s) to determine the appropriate management body for this species.

Comment 37: EPA noted that bycatch of SCS in the Gulf shrimp fishery fell approximately 46 percent following the introduction of turtle excluder devices in 1999. If this trend continues, this represents an encouraging level of success for the use of turtle excluder devices. EPA also noted that data entries for Table 3.90 in the Draft HMS FMP for the year 1999 and 2000 were the same and assumed that 2000 data were estimated.

Response: NMFS agrees that turtle excluder devices should reduce the amount of bycatch. Regarding 1999 and 2000 data, 1999 data were calculated as the average of the value of 1992 to 1997 divided by two in order to account for the effect of the turtle excluder devices. Data from 2000 were assumed to be the same as the 1999 data.

Comment 38: EPA notes that Table 3.90 indicates that the dressed weights of SCS are approximately one pound per shark. This suggests that these are small sharks and that would have little commercial value.

Response: SCS are generally the small sharks, and they have the lowest commercial value of all Atlantic sharks, generally less than $0.50 per pound. Many fishermen use these species as bait. In 2004, not including shark fin values, the SCS fishery was worth approximately $340,000 compared to $2.7M for LCS and just over $500,000 for pelagic sharks.

### D.9.7 Fishing Mortality and Bycatch Reduction

Comment 39: Table 3.24 contains an error that has been repeated in several documents. The Technical Memorandum – SEFSC-515 cited as Garrison 2003 contains an error in addition concerning the total number of observed sets (both Total and non-NED) for 2001. The correct Total is 584 and non-NED is 398, which would change the correct percentages to 5.4 percent and 3.7 percent, respectively. Also the 2002 Non-NED percentage should be 3.9 percent. Lance Garrison confirms these inadvertent errors in his published errata affixed to the document.

Response: NMFS has made the requested corrections.

Comment 40: Has NMFS considered the fact that the Gulf of Mexico is a special region with special needs? Could there be regulations on a regional basis (*i.e.*, regulations different for the Gulf of Mexico from that of other regions)?

Response: It is possible to implement regulations on an area-specific basis to fit the special needs of a fishery whenever possible. NMFS has implemented different regulations for the pelagic longline fishery on an area-specific basis in the past. For instance, a live bait prohibition for this fishery has been implemented in the Gulf of Mexico in an attempt to reduce the bycatch of billfish. NMFS has also implemented regional allocations and seasons for LCS and SCS including ones for the Gulf of Mexico, and BFT regulations in the Gulf of Mexico are different than those along the east coast. Another example of regionally-specific regulations is the requirement to use only 18/0 or larger circle hooks in the NED for the pelagic longline fishery while requiring 16/0 or larger circle hooks elsewhere. NMFS will continue to evaluate alternative management measures in light of the specific needs of a fishery when possible.

Comment 41: NMFS should request that the Gulf of Mexico Fishery Management Council and the Gulf states cooperate with NMFS to minimize shark bycatch associated with fisheries under their purview (*i.e.*, Gulf of Mexico shrimp and menhaden fisheries).

Response: NMFS agrees that cooperation amongst the States, Regional Fishery Management Councils, and the Agency can help to address bycatch issues, particularly in those fisheries that cross jurisdictional boundaries. NMFS has contacted the Gulf and South Atlantic States and Regional Fishery Management Councils in an attempt to identify fisheries where finetooth shark bycatch may be occurring. NMFS also consulted with all Regional Fishery Management Councils and both the Atlantic and Gulf States Marine Fisheries Commissions regarding the Draft HMS FMP and its proposed measures.

Comment 42: NMFS has failed to make any meaningful reductions to longline bycatch since 1997. While time/area closures give the appearance that something is being done, this is not the only answer.

Response: NMFS disagrees that no meaningful reductions in longline bycatch have been realized. NMFS analyzed the reported landings and bycatch in the pelagic longline fishery from 1997-99 versus 2001-03 to measure the effectiveness of the time/area closures implemented in 2000-01. The analyses showed that the existing closures have been effective at reducing bycatch of protected species and non-target HMS and have provided positive ecological benefits. For example, the overall number of reported discards of swordfish, bluefin and bigeye tunas, pelagic sharks, blue and white marlin, sailfish, and spearfish have all declined by more than 30 percent. The reported discards of blue and white marlin declined by about 50 percent and sailfish discards declined by almost 75 percent. The reported number of sea turtles caught and released declined by almost 28 percent.

It appears that bluefin tuna discards in the MAB and NEC have been reduced considerably since the implementation of the June closure in 1999. Reported discards of BFT prior to implementation of the closure ranged from 558 to over 2,700 per year. Since 1999, the number of bluefin tuna reported discarded has remained below 500 per year. The number of swordfish kept in the MAB and NEC has increased since the closure was implemented while the number of billfish discarded has declined.

NMFS agrees that time/area closures are not the only management tool that can be utilized to reduce bycatch. NMFS has also implemented circle hook and bait requirements for the pelagic longline fishery and a live bait prohibition for that fishery in the Gulf of Mexico as well. These measures are intended to reduce the bycatch of non-target species and protected resources in the pelagic longline fishery.

Comment 43: NMFS should allow longline fishermen to sell their bycatch for charity.

Response: Commercial fishermen are already allowed to sell their catch for whatever purpose unless it is a prohibited species or specific regulations prohibit its retention such as the season is closed, quota has been met, the fish is undersized, or the animal is a protected resource.

Comment 44: NMFS received several comments regarding the need for additional research including: NMFS should research live baiting using circle hooks as a technique to increase catch of YFT and reduce bycatch; NMFS should conduct and/or continue experiments on non-offset circle hooks, circle hooks 20/0 and larger, bait options, and post-hooking effects.

Response: NMFS agrees that additional research can be conducted on a number of topics to evaluate their effectiveness in reducing bycatch of non-target species and protected resources. NMFS intends to continue to evaluate research proposals in many of these areas. New research is dependent on funding availability.

Comment 45: In our scoping comments, we set forth a proposal to count, cap, and control bycatch as required. NMFS left that proposal out of the draft FMP even though it is required under international and domestic laws to develop fully and analyze that proposal.

Response: NMFS disagrees that all comments offered during the scoping process need to be developed fully and analyzed. The Agency analyzed a broad range of alternatives for the measures included in the draft FMP, however, not all of these were fully developed and analyzed for a variety of reasons. There may have been more effective alternatives considered for further analysis or a proposed measure was found to not meet the needs or objectives of the FMP, and therefore was not considered further.

Comment 46: NMFS received comments about the need to implement a cap or quota on bycatch. These comments include: to reduce bycatch, NMFS should implement a hard cap system. Such a system would, among other things, set limits on fishing mortality of marine life, provide accountability by dividing limits between fishing sectors, set limits that would stop fishing for that sector, reward clean fishing, prevent a race to fish, and result in a reduction in bycatch. Such caps should be set for commercially targeted species, spawning species, recreationally targeted species, endangered species, marine mammals, and other species, such as sea birds, that are needed to promote the health of the marine ecosystem; NMFS should implement a hard cap on the takes of protected species similar to the one successfully implemented in the Western Pacific. This would remedy the historic failure of the pelagic longline fleet to maintain up-to-date records of turtle bycatch, allow for timely corrective action to reinitiate under the ESA, and help the fleet stay within take levels intended to protect against the jeopardy to the species. Such a system would require real time observer reporting and a "yellow light" system to warn fishermen when takes are approaching the limit.

Response: NMFS agrees that additional measures designed to reduce bycatch can be examined in the future, possibly on a sector by sector basis, if the data are available to provide an analysis. However, a hard cap system may not necessarily be appropriate or feasible in every sector due to resource constraints and other restrictions that are already in place for the fishery. There are also international concerns related to rebuilding plans, fishing effort and mortality rates, and bycatch that would need to be considered prior to establishing hard caps. A hard cap on the number of sea turtle interactions in all HMS fisheries already exists. Each fishery is operating under an Incidental Take Limit that once reached can close that fishery and/or result in a re-initiation of consultation under Section 7 of the ESA.

Comment 47: NMFS has a study that indicates a default standardized bycatch reporting methodology (SBRM) must include observer coverage of at least 20 percent (or 50 percent when endangered species are at risk). Rather than analyzing its needs to meet the conservation and management goals of the fishery, NMFS claims the study was simplistic and failed to account for "limited resources." This arbitrary failure to analyze alternatives for establishing a reporting methodology violates NEPA and the Magnuson-Stevens Act. NEPA requires NMFS to undertake an analysis to determine the level of observer coverage necessary to provide accurate and precise data for each conservation and management need addressed in the draft FMP. Congress and the Magnuson-Stevens Act do not give NMFS the ability to ignore the reporting methodology based on "limited resources." Nevertheless, a NEPA analysis could consider them.

Response: The effectiveness of any SBRM depends on its ability to estimate the type and quantity of bycatch precisely and accurately enough to meet the conservation and management needs of a fishery. The National Bycatch Report contains an in-depth examination of the issues of precision and accuracy in estimating bycatch and how precision relates to sampling and to assessments. The precision of an estimate is often expressed in terms of the coefficient of variation (CV) defined as the standard error of the estimator divided by the estimate. The lower the CV, the more precise the estimate is considered to be. A precise estimate is not necessarily an accurate estimate.

The National Working Group on Bycatch recommended that at-sea sampling designs should be formulated to achieve precision goals for the least amount of observation effort, while also striving to increase accuracy. This can be accomplished through random sample selection, developing appropriate sampling strata and sampling allocation procedures, and by implementing appropriate tests for bias. Sampling programs should be driven by the precision and accuracy required by managers to address management needs for estimating management quantities such as allowable catches through a stock assessment, for evaluating bycatch relative to a management standard such as allowable take, and for developing mitigation mechanisms. The recommended precision goals for estimates of bycatch are defined in terms of the coefficient of variation (CV) of each estimate. For marine mammals and other protected species, including seabirds and sea turtles, the recommended precision goal is a 20-30 percent CV for estimates of interactions for each species/stock taken by a fishery. For fishery resources, excluding protected species, caught as bycatch in a fishery, the recommended precision goal is a 20-30 percent CV for estimates of total discards (aggregated over all species) for the fishery; or if total catch cannot be divided into discards and retained catch, then the goal is a 20-30 percent CV for estimates of total catch (NMFS, 2004a). The report also states that attainment of these goals may not be possible or practical in all fisheries and should be evaluated on a case-by-case basis.

Rago *et al.*, (2005) examined potential sources of bias in commercial fisheries of the Northeast Atlantic by comparing measures of performance for vessels with and without observers. Bias can arise if the vessels with observers onboard consistently catch more or less than other vessels, if trip durations change, or if vessels fish in different areas. Average catches (pounds landed) for observed and total trips compared favorably and the expected differences of the stratum specific means and standard deviations for both kept weight and trip duration was near zero (Rago *et al.*, 2005).

The report cited by this commenter suggests that relatively high percentages of observer coverage are necessary to adequately address potential bias in bycatch estimates from observer programs. However, the examples cited in that report as successful in reducing bias through high observer coverage levels are fisheries comprised of relatively few vessels compared to many other fisheries, including the Atlantic HMS fishery. Their examples are not representative of the issues facing most observer programs and fishery managers, who must work with limited resources to cover large and diverse fisheries. It is also incorrect to assume that simply increasing observer coverage ensures accuracy of the estimates. Bias due to unrepresentative sampling may not be reduced by increasing sample size due to logistical constraints, such as if certain fishermen refuse to take observers, or if certain classes of vessels cannot accommodate observers. Increasing sample size may only result in a larger, but still biased, sample. Observer programs strive to achieve samples that are representative of both fishing effort and catches. Representative samples are critical not only for obtaining accurate (*i.e.*, unbiased) estimates of bycatch, but also for collecting information about factors that may be important for mitigating bycatch. Bias may be introduced at several levels such as when vessels are selected for coverage or when only a portion of the haul can be sampled due to weather or other concerns.

NMFS has conducted analyses to determine the level of observer coverage needed for the pelagic longline, bottom longline and shark gillnet fisheries to produce estimates for protected resource interactions with a CV of 0.3 (30 percent) or less. NMFS will continue to provide observer coverage at this level, subject to available resources.

<u>Comment 48</u>: NEPA requires that the EIS analyze the cumulative effect of all takes on sea turtles, not just the effects of takes in the HMS fisheries. While the pelagic longline fishery is one of the most damaging fisheries to sea turtle populations, a true determination of environmental impacts of this fishery cannot be made without examining the effects of all U.S. fisheries cumulatively.

<u>Response</u>: NMFS agrees that impacts to sea turtles and other protected resources are not limited to takes in HMS fisheries. The environmental impacts of the pelagic longline fishery and a description of the fishery are covered in Chapters 3 and 4 of the draft FMP. It is beyond the scope of the analyses for this draft amendment to consider all fisheries and non-fisheries impacts on the status of each protected resource. Much of that is already analyzed in the biological opinion for the PLL fishery. In addition, the impacts of not only U.S. fisheries, but foreign fisheries and non-fisheries impacts would need to be examined to evaluate the true impacts to protected resources world-wide.

<u>Comment 49</u>: The EIS provides only a cursory analysis of the impacts of HMS fisheries on marine mammals. The current bycatch monitoring methodology is not adequate for the conservation and management needs of marine mammals. Collecting the information is necessary to allow NMFS to devise specific bycatch reduction measures based on the actual behavior of marine mammals in HMS fisheries. NMFS should require fishermen to report in real-time where they are place gear and where gear is lost and to mark gear with colors to indicate the type and location of fishing gear. NMFS must also prioritize the granting of scientific research permits.

Response: As a requirement of the MMPA, all marine mammal interactions are required to be reported within 24 hours. Marine mammal interactions have been documented in the pelagic longline fishery and the shark gillnet fishery. Both fisheries are subject to observer coverage at levels that produce estimates of marine mammal interactions with a CV less than thirty percent. For marine mammals and other protected species, including seabirds and sea turtles, the recommended precision goal in the National Bycatch Report is a 20-30 percent CV for estimates of interactions for each species/stock taken by a fishery. In June 2005, NMFS convened the Pelagic Longline Take Reduction Team to assess and reduce the takes of marine mammals, specifically pilot whales and Risso's dolphins, by the pelagic longline fishery. NMFS will take action based on the results of the Pelagic Longline Take Reduction Plan, as necessary.

Comment 50: NMFS must implement comparable bycatch and sea turtle safe conservation certification program on all HMS product imports.

Response: NMFS appreciates this comment and may evaluate the efficacy and feasibility of requiring this type of certification program as part of a future action.

Comment 51: While NMFS received a number of comments on ways to better monitor recreational landings including logbook data that is tied to renewing permits, catch cards, and Vessel Trip Reports (VTR), the issue was relegated to one paragraph in the "Issues for Future Consideration and Outlook" section. The AP wants to move from survey methods to census methods and that idea is lost in this draft. NMFS should work with ACCSP to implement a mandatory VTR program that provides timely, accurate catch and effort data for the for-hire fleets. And NMFS received a comment that NMFS should state that it supports a comparison of existing for-hire VTR catch data with LPS data for the same time periods.

Response: NMFS recognizes the desire to make improvements in the collection of recreational landings data. At the request of NMFS, the National Academy of Science recently conducted a review of marine recreational fishery surveys, both state and federal. The review committee's report has been published and the Agency is evaluating the recommendations.

Comment 52: The Agency has a lack of attention to recreational fisheries data collection resulting in negative impacts to the recreational fishery.

Response: NMFS disagrees with this comment. The Agency spends considerable time and money collecting data from recreational fisheries, including recreational fisheries for HMS. Considerable time and effort is also spent by NMFS staff monitoring data collection and reviewing recreational fishery data for HMS fisheries. The Agency is evaluating the recommendations of the recent review of marine fishery surveys by the NAS to identify where improvements may be made. The Agency agrees that more data from the commercial fisheries for HMS is collected each year given the mandatory reporting requirements for these fisheries. Outside of the complementary time/area closures for Madison-Swanson and Steamboat Lumps, the recreational HMS fishery has very few restrictions. In addition to mandatory reporting, commercial fishermen are negatively impacted by area closures, gear restrictions such as the circle hook requirement, and mandatory observer coverage if selected.

Comment 53: Maryland catch card data should be used to determine total BFT catch instead of using LPS catch data for Maryland.

Response: NMFS has reviewed the Maryland BFT catch card data from 2002-2005 to evaluate its utility for management purposes. Although current reporting appears to be high, there is a measured level of non-compliance with the program. This non-compliance has been determined by comparing directly observed BFT in the intercept portion of the LPS with catch card records. Non-compliance with the Maryland catch card program is currently estimated to be fifteen percent. NMFS will continue to work with the Maryland DNR to integrate the catch card program into the monitoring and management program for BFT.

### D.9.8 Permitting, Reporting, and Monitoring

Comment 54: NMFS received a number of comments regarding HMS permitting in general. These comments consisted of: NMFS should provided updated HMS regulations to permit holders when they are issued a permit; permit renewals should be conducted on a calendar year basis so fishing groups can notify their memberships and therefore improve renewal compliance; and, NMFS should implement a salt water fishing license for all fishermen in order to develop a database for data collection and observer coverage.

Response: NMFS agrees that the idea of providing copies of relevant regulations when an HMS permit is applied for and sent has merit; however that are also some negative aspects to this as well. Due to the ever changing dynamics of HMS fisheries, the rules and regulations that may apply to individuals may change throughout the season. Providing permit holders with a snapshot of the rules and regulations that exist early in the season may lead to a false sense of security that these regulations would remain consistent for the entire season. In an attempt to strike a balance, NMFS has included a number of useful pieces of information on the Atlantic tunas and HMS permits that allow the permit holder to access the most recent information. For instance, NMFS includes a web address and toll-free telephone number where permit holders can locate the most up to date regulations. For those permits that authorize the user to participate in recreational HMS fisheries, NMFS has included the appropriate telephone numbers to report their catch. In the Management Program Structure section of this document, NMFS has preferred an alternative to adjust the annual management time-frame of HMS fisheries to a calendar year, versus a wrap around fishing year, *i.e.*, June through May of the following year. As a result of implementing this preferred alternative, NMFS would realign the HMS permitting to coincide with the calendar year. For consistency purposes the shark and swordfish commercial permits, both vessel and dealers, would still be issued according to birth month, as per the business rules of the Southeast Permitting Office. NMFS encourages organization leaders to remind their membership when permits are available for renewal, whether or not it coincides with the calendar year.

Comment 55: NMFS received a comment stating that NMFS should redesign vessel permits based on fishing methods and geographic area. NMFS should combine vessel permitting for coastal pelagics and HMS for the charter boats, headboats, and commercial handgear vessels.

Response: Since the inception of the 1999 FMP, a number of issues pertaining to the permitting program have been identified by constituents, advisory panel members, NMFS staff, and others. These have included, but are not limited to, further rationalizing some segments of the HMS fisheries, streamlining or simplifying the permitting process, restructuring the permit process to a gear-based permit system from the current species-based permit system, and reopening some segments of the limited access system to allow for the issuance of additional permits. Addressing these issues in the future may be important to the successful long-term stewardship of HMS fisheries, and therefore NMFS may consider restructuring these elements in future rulemakings.

Comment 56: A mandatory HMS tournament permit (alternative E9) would help to provide an exact count of the number of marlin landed in tournaments.

Response: In the Draft Consolidated HMS FMP, a mandatory HMS tournament permit (alternative E9) was considered, but not further analyzed, because improvements to tournament registration, data collection, and enforceability may be achieved with considerably less burden to the public and the government by issuing a confirmation number, rather than a permit, to tournament operators who have registered their tournaments with NMFS. Because HMS tournaments frequently change operators, names, and dates, a tournament permit would be very burdensome to administer and enforce. Therefore, a clarification is being added to the regulations, as described in the Regulatory Housekeeping section of the Final Consolidated HMS FMP, specifying that HMS tournament registration is not considered complete unless the operator has also received a confirmation number from the HMS Management Division of NMFS. Requiring a tournament confirmation number, issued by the HMS Management Division, will achieve the same objective (*i.e.*, increased compliance) as a tournament permit. Since all tournaments awarding points or prizes for HMS are currently required to be registered with NMFS, and because all billfish tournaments are currently selected for reporting, the Agency is already obtaining an exact count of the number of marlin landed in tournaments.

Comment 57: NMFS received general comments regarding the recreational reporting requirements including: Non-compliance with recreational swordfish and billfish reporting occurs because it takes too much time to report fish to NMFS using the telephone. NMFS needs to simplify the telephone reporting system and increase Customer Service; to increase compliance with recreational reporting requirements, NMFS should provide a bumper sticker, or token reward, to those fishermen that have reported their catch. This technique has been successful in other fisheries.

Response: The recreational billfish and swordfish telephone reporting system has recently been modified to provide quicker and more convenient access. HMS Angling category permit holders (or their designees) must report landings of these species within 24 hours of landing by calling 800-894-5528, and then pushing 21 to provide information regarding the catch. A representative from NMFS will later contact the permit holder (or designee) to obtain verification of the landing and provide a confirmation number. The initial telephone call should only take a few minutes. Since the system has been modified to provide quicker access, the number of first-time callers has increased. Additionally, NMFS is actively working towards implementing an Internet reporting system for these species. The Agency appreciates suggestions to increase compliance with the mandatory recreational reporting requirement and will consider these in the future, if necessary.

Comment 58: Until NMFS seriously invests in comparable permitting, reporting, monitoring, and enforcement across all HMS fisheries, commercial and recreational, it will not be able to appropriately manage Atlantic HMS fisheries. Currently, NMFS has adequate data for only a couple of commercial fisheries.

Response: NMFS realizes the importance permitting, reporting, monitoring, and enforcement in maintaining viable management of Atlantic HMS. There are several measures included in this rulemaking that address these issues. Quality stock assessments, accurate quota monitoring, fishing effort control, and complying with current HMS regulations are paramount to the HMS management program and the Agency agrees that these programs are worth serious investments of personnel and financial resources. The Agency currently maintains a comprehensive permitting system for both commercial and recreational fisheries, including both limited and open access regimes. Reporting is required of all shark and swordfish commercial fisheries participants, and some commercial tuna fishery participants, including costs and earnings reports from selected commercial fisheries participants. Landings are monitored consistently to ensure that landings are within their allotted quotas. Recreational reporting is currently required for all non-tournament landings of bluefin tuna, swordfish, and billfish. Tournaments are also required to register and report any landings of HMS. NMFS is dependant on several entities for dockside and at sea enforcement, including NMFS/NOAA Office of Law Enforcement, the United States Coast Guard, and individual states that maintain a Joint Enforcement Agreement with NMFS. NMFS is perpetually involved in activities to enhance, update, and/or modify the permitting, reporting, monitoring, and enforcement systems currently in place.

Comment 59: NMFS received comments pertaining to the longline sector of the HMS fishery. The comments consisted of: NMFS must monitor and account for all sources of fishing mortality, not just mortality from the PLL fleet; and, is the VMS requirement meeting its intended purpose and who needs to possess one?; and, NMFS should put 100 percent observer coverage on commercial vessels around Puerto Rico for a few years due to gear conflicts between PLL vessels and other commercial vessels. These conflicts are attributed to PLL vessels operating closer to shore and thus interfering with traditional trolling practices.

Response: NMFS agrees that it is important to account for all sources of fishing mortality, not just the mortality from the PLL fleet. NMFS accounts for recreational landings in stock assessments and uses the best available science regarding post-release mortality of billfish in the recreational sector to consider impacts on billfish and other HMS taken in fisheries other than commercial longlining. VMS is required on all vessels fishing for HMS with pelagic longline gear onboard, on all directed shark bottom longline vessels between 33 º North and 36 º 30' North from January through July, and on all gillnet vessels with a directed shark permit during the Right Whale Calving Season from November 15 to March 31. VMS is meeting its intended purpose by assisting in the monitoring and enforcement of closed areas. It is one of several tools including logbooks, observer programs, gear requirements, quotas, and limited access permits that NMFS uses to manage HMS fisheries. Resources for observer programs are limited, and having 100 percent observer coverage on commercial vessels around Puerto Rico would likely not be possible due to funding constraints. Furthermore, observers are not trained as enforcement personnel, and would not be in a position to reduce conflicts between different gear sectors in and around Puerto Rico. These types of issues are more appropriately handled by enforcement personnel.

Comment 60: NMFS received a number of comments regarding the deployment of observers in HMS fisheries. These comments consisted of: Observer coverage on the pelagic longline fishery must be significantly increased from current levels, especially in areas with high levels of sea turtle take (e.g., the Northeast Distant and the Gulf of Mexico). Higher level of coverage is essential to provide data on the effectiveness of the gear and bait modifications and the rate and location of sea turtle capture. The 2004 BiOp required eight percent coverage but this increase was established by ICCAT for the purpose of assessing the bycatch of tuna species and will not be effective at assessing the bycatch of rarely encountered species such as sea turtles; proper measurement for observer coverage levels should be based on the number of observed hooks out of the number of hooks reported to have been fished, rather than number of observed sets; a voluntary HMS CHB observer program should be tested; and, NMFS should implement electronic reporting and mandatory observer coverage for all HMS fisheries.

Response: NMFS increased observer coverage in the pelagic longline fishery to eight percent in 2004 in order to effectively monitor bycatch after implementation of new gear requirements. The pelagic longline observer program coverage level was raised to eight percent not just to meet ICCAT targets, but also to improve the precision of catch and bycatch estimates specified in NMFS' guidelines for fisheries observer coverage levels. The number of sets is the standard effort used by other fisheries in calculating the level of observer coverage required. Additionally, the set location is more easily tracked to the statistical reporting areas in the Atlantic than logbook or fishing effort based on the number of hooks would be. NMFS agrees that voluntary observer coverage would be helpful in a number of different fisheries, as would electronic reporting if it were technologically feasible and not cost prohibitive. NMFS will continue to explore these options in the future.

Comment 61: An operator's permit should be required for all HMS fisheries.

Response: NMFS did not include measures to requiring a vessel operator's permit in all HMS fisheries in this rulemaking. The HMS Management Division is aware of several other federally managed fisheries that have imposed this requirement, however, have not proposed similar measures for HMS at this time. This requirement may be considered in the future as necessary and appropriate.

### D.9.9 Enforcement

Comment 62: NMFS received several comments related to the lack of enforcement of HMS regulations, including: the Agency needs to enforce the HMS regulations for all people fishing for HMS, there is virtually no fisheries enforcement in the United States Virgin Islands, lack of enforcement is a big problem in Puerto Rico, law enforcement should increase effort around places where marlin are sold illegally and there are many issues with billfish landings in Puerto Rico and there should be continued focused efforts to better understand how many billfish are being landed in the Caribbean.

Response: NOAA Fisheries Office for Law Enforcement (NOAA OLE) has Special Agents stationed in Puerto Rico conducting enforcement of all federal fisheries laws, included those involving HMS. In addition, the United States Coast Guard (USCG) conducts fisheries enforcement in all federal waters, including the waters off the coast of Puerto Rico. With regard to the specific concerns that the commenter raised about billfish, NMFS has very little hard data on the extent of illegal sales of billfish in Puerto Rico, and as such cannot verify the veracity of the commenter's claims or assess their impact. NMFS has received a significant number of anecdotal reports of sales of Atlantic marlin in Puerto Rico. The number of these anecdotal reports suggests that a sizable number of Atlantic marlin may be illegally sold and implies that more than just those fish that come to the boat dead are illegally entered into commerce. NMFS acknowledges that there is some uncertainty associated with marlin landings statistics from the U.S. Caribbean, and the Agency is working to improve these statistics by increasing enforcement of existing permitting and reporting requirements, including those for tournaments.

Comment 63: One commenter was confused by the 3 and 12 mile limits, other confusing rules, and whom they should call to complain and ask for patrols.

Response: Most states on the Atlantic Ocean, with the exception of Texas and the west coast of Florida, have a 3 mile limit which delineates their states' waters. Individual states (or commonwealths) have jurisdiction over fisheries management and enforcement in their waters. The west (Gulf of Mexico) coast of Florida and Texas have jurisdiction out to nine miles within their respective states. Puerto Rico, a U.S. Territory, has jurisdiction out to nine miles. The 2005 Guide for Complying With the Regulations for Atlantic Tunas, Swordfish, Sharks, and Billfish provides detailed information and responses to frequently asked questions concerning HMS regulations. The contact numbers for law enforcement are also provided in this document which can be downloaded from the HMS website or by contacting NMFS.

Comment 64: NMFS must do a better job in protecting and preserving our marine resources in general. Possible strategies that NMFS should consider include: discouraging overfishing by increasing fees, implementing stricter regulations, and improving enforcement.

Response: NMFS is concerned about protecting and preserving our marine resources. NMFS has implemented numerous rules and regulations that are intended to prevent overfishing, rebuild overfished stocks, reduce bycatch, and limit fishing capacity in efforts to ensure that viable stocks of HMS are enjoyed by future generations of stakeholders. Enforcement of HMS regulations is one of several priorities shared the NOAA OLE, USCG, and states that have a Joint Enforcement Agreement with the Federal government. NOAA OLE, USCG, and individual states are constantly striving to improve enforcement of not just HMS regulations, but regulations pertaining to all fisheries. This particular rulemaking includes regulations aimed at rebuilding overfished stocks of billfish, preventing overfishing of finetooth sharks, reducing post release mortality of sea turtles and other protected resources, simplifying management of bluefin tuna, authorizing additional fishing gears for HMS, and improving identification of sharks by dealers, among other measures. Increasing fees was not analyzed in this rulemaking, however, NMFS has implemented a suite of other regulations, in this rulemaking and otherwise, that prevents or discourages overfishing.

Comment 65: There is a provision under ATCA and the Magnuson-Stevens Act stating that U.S. flagged vessels must comply with U.S. regulations when pursuing ICCAT managed species, regardless of where they are fishing. This would impact recreational vessels fishing outside the U.S.

Response: Generally, U.S. flagged vessels are required to comply with U.S. domestic regulations that pertain to Atlantic HMS while fishing anywhere in the Atlantic Ocean. Depending on circumstances, however, the requirements may change. Some U.S. citizens, even on foreign flagged vessels, may need an Exempted Fishing Permit from NMFS.

Comment 66: Possession of HMS angling permits in South Florida is still an issue. Many anglers do not possess the appropriate permit. Could the Sun Sentinel or Miami Herald be involved in reporting cases where anglers are caught for fishing without the proper permits?

Response: NMFS agrees that it is important for all participants in HMS fisheries to possess the appropriate permit and is interested in exploring options to improve outreach in all areas of the Atlantic with the objective of increased compliance with HMS permitting requirements. Advertising the requirements in newspapers or other media may be a viable option to improve compliance. However, individuals have the primary responsibility for knowing the laws surrounding their participation in all activities, including the pursuit of HMS. Many freshwater, estuarine, and/or marine fisheries require compliance with regulations that include, but are not limited to: permitting, size and bag limits, and seasons. HMS fisheries are no exception.

Comment 67: NOAA OLE needs to prioritize which violations are the most significant and pursue these cases first.

Response: NOAA OLE, in conjunction with the NMFS Regional Administrator, does set regional enforcement priorities. These priorities are set based on the threat that a certain violation or category of violations presents to marine resources, identified trends in noncompliance, as well as other factors. In addition, the Magnuson-Stevens Act, as well as the Agency's own civil monetary penalty schedule, provides that the egregiousness of the offense and the violator's history of prior violations is considered, along with other factors, in determining the appropriate civil monetary penalty.

### D.9.10 ICCAT

Comment 68: NMFS received a number of comments pertaining to ICCAT, the 250 recreationally caught marlin landing limit, U.S. participation at ICCAT, and U.S. negotiating positions at ICCAT, including: ICCAT should look at a longer billfish time series so they can see the increase in biomass overtime; the bargaining power of the United States may be reduced at ICCAT if the full quota is not being utilized; the United States impact on Atlantic blue and white marlin is probably considerably less than five percent. The White Marlin Status Review Team noted that if the United States were to stop all commercial and recreational fishing mortality for white marlin, the impact on the stock trajectory would be minimal. The United States cannot have a meaningful impact acting alone. ICCAT does not give credit for unilateral conservation measures. If the United States implements the preferred alternatives measures now, we will greatly reduce our ability to negotiate with other nations to further reduce their impacts on these overfished stocks; we do not favor additional domestic regulations on catches of marlin until after further development of a rebuilding plan by ICCAT; we would be better off if NMFS waited until the other countries reduced their commercial landing by 50 percent before we agree to the 250. We would like to see verification of the 50 percent and 66 percent landing reductions that other countries have agreed to; United States ICCAT representatives should demand the unjustified 250 marlin limit be remanded. Particularly, when across the ocean, foreign longliners harvest these species for sale, with no thought of conservation; if NMFS wants angler support of recreational limits, they need to prove to recreational anglers that the United States will take a tougher stand at ICCAT; ICCAT may not be enough to deal with global conservation concerns relating to billfish; I support aggressive efforts to attain international agreements regarding HMS; more pressure needs to be applied on countries that are not complying with ICCAT recommendations; the United States should reconsider how we participate in the ICCAT process due to its effectiveness and the inability to get other member nations to comply with recommendations; and, NMFS must strengthen its ability to establish responsible fishing practices in other countries and protect this global resource.

Response: Contrary to the assertion of one commenter that an examination of data over a longer time series would reveal an increase in billfish biomass overtime, an examination of Atlantic billfish biomass, catch, CPUE, and fishing mortality rate data back to the late 1950s shows an even more extreme decline in biomass than an examination of more recent time series. To use Atlantic blue marlin as an example, biomass of Atlantic blue marlin fell from an estimated 200 percent of MSY in the late 1950s to just 40 percent of MSY in 2000. CPUE during the same period fell by more than eighty percent and total Atlantic catches of blue marlin fell from approximately 9,000 mt to just over 2,000 mt. These dramatic declines were accompanied by similarly large increases in the fishing mortality rate, which rose from less than 0.3 to approximately 4.0. Catches of U.S. flagged vessels represent 4.5 percent of catches reported to ICCAT. NMFS agrees that U.S. action alone is not sufficient to fully recover stocks of Atlantic billfish, and believes that reductions in catches, landings, and post-release mortalities from the pelagic longline and recreational fisheries, at both the international and domestic levels, are essential to the recovery of the Atlantic billfish. NMFS is further convinced that there are appropriate domestic management measures, including implementation of circle hook requirements and implementation of ICCAT recommendations, as per the preferred alternatives in this rulemaking, among others, that can and should be implemented at this time. A unilateral decision by the United State to tie implementation of the 250 fish limit to the actions of other ICCAT nations, as suggested by one commenter, is not an option and NMFS rejects the notion that the annual 250 recreationally landed marlin limit is unjustified or unfair. The 250 marlin landing limit was contained in a recommendation (00-13) championed by the United States and supported by the U.S. recreational, commercial, and government ICCAT commissioners. Recommendation 00-13 established a number of additional stringent conservation measures on other nations intended to improve the stock status of Atlantic marlin, including mandatory reductions in landings of blue and white marlin by 50 percent and 67 percent, respectively, among others. On average for the period 2001 through 2004, the United States has averaged 189 recreationally landed marlins, or approximately 75 percent of the landing limit each year. In two of those four years, the United States was more than 100 marlin, or the equivalent of more than 40 percent, below the U.S. landing limit, and U.S. fishermen are free to practice catch and release unabated, which is the dominant component of the fishery by choice. While it may be appropriate to reexamine the 250 marlin limit, NMFS rejects the notion that it is unjustified. NMFS further believes that establishing a policy of delaying any further management measures until international bycatch issues are fully addressed would result in a detrimental and unnecessary continuation of elevated levels of fishing mortality of Atlantic billfish when appropriate domestic management measures became available. As mentioned previously, NMFS agrees that aggressive international action is needed to reverse current trends in billfish stock status and that ICCAT is the only viable mechanism to address these issues at this time. The United States has championed, and will continue to champion, billfish conservation internationally, and important components of a successful international strategy is to abide by U.S. international obligations and lead by example when appropriate. NMFS agrees that substantial quota stockpiles of certain species may present some negotiating challenges, but also believes that such stock piles may present certain opportunities.

Comment 69: The biggest threat to Atlantic billfish is illegal, unregulated, and unreported (IUU) fishing activities by foreign longline vessels. ICCAT nations must agree to eliminate these activities. No further restrictions should be placed upon U.S. recreational billfish fishermen until the problems associated with IUU fishing are addressed, and a further reduction in bycatch by legitimate longline vessels is achieved.

Response: NMFS agrees that IUU fishing represents a substantial threat to the health of Atlantic billfish populations, and as such, the United States continues to work through ICCAT to address this issue as rapidly and efficiently as possible. NMFS is convinced that reductions in bycatch and bycatch mortality from the pelagic longline and recreational fisheries, at both the international and domestic levels, are essential to the recovery of the Atlantic billfish. NMFS is further convinced that there are appropriate domestic management measures, including implementation of circle hook requirements and implementation of ICCAT recommendations, as per the preferred alternatives in this rulemaking, among others, that can and should be implemented while concurrently working to end IUU fishing. Establishing a policy of delaying any further management measures until IUU fishing and international bycatch issues are fully addressed would result in a detrimental and unnecessary continuation of elevated levels of fishing mortality of Atlantic billfish when appropriate domestic management measures became available.

Comment 70: NMFS received suggestions recommending consideration or adoption of a number of international positions and trade restrictive actions by the United States, including: To effectively reduce billfish mortality, NMFS should first impose trade penalties and tariffs on other countries that do not adhere to their ICCAT billfish recommendations; initiate action at ICCAT to stop longlining worldwide; prohibit all longlining in the United States immediately; and, prohibit the importation of any fish from other countries whose vessels deploy longlines, do not adhere to ICCAT quotas, and do not require circle hooks on longlines.

Response: NMFS appreciates these suggestions and encourages the public to continue to provide suggestions to the Agency to help address billfish issues. The above suggestions are beyond the scope of this rulemaking, but NMFS may consider such proposals in future rulemakings, as necessary and appropriate. NMFS has imposed import restrictions on swordfish below the ICCAT minimum size, and may consider imposing future trade restrictions on any ICCAT species, in accordance with adopted ICCAT recommendations to impose trade restrictions. The United States continues to believe multilateral trade restrictions, as approved via ICCAT recommendations, are an effective tool for addressing nations whose vessels fish in a manner that undermines the effectiveness of ICCAT conservation recommendations. Pelagic longline gear is the predominant gear type for harvesting highly migratory species and, with application of appropriate management measures, can provide for the sustainable harvest of fisheries resources in many instances. NMFS is not convinced that an international or domestic prohibition on pelagic longline fishing is appropriate at this time.

Comment 71: NMFS should not implement any additional management measures on billfish until after the ICCAT meeting following the next assessments of blue and white marlin; I support alternative E1 (no action) because I disagree that we need to put more regulations on US fishermen. Our State department needs to be listening to the United States, but they don't care that they are putting U.S. fishermen out of business. What the United States cares about is leading by example without compliance. The United States still does not take international compliance at ICCAT seriously. The United States should say that it would not do anything to domestic fishermen unless we see better international compliance through ICCAT. Why is NMFS in such a hurry to put more regulations on U.S. fishermen?

Response: As discussed in the response to Comment 69 above, NMFS is convinced that reductions in bycatch and bycatch mortality from the pelagic longline and recreational fisheries, at both the international and domestic levels, are appropriate at this time and essential to the recovery of the Atlantic billfish. NMFS is further convinced that there are appropriate domestic management measures, including implementation of circle hook requirements and implementation of ICCAT recommendations, as per the preferred alternatives in this rulemaking, among others, that can and should be implemented while concurrently working with the international community to improve management and compliance with existing ICCAT recommendations. Establishing a policy of delaying any further management measures until compliance measures are fully addressed would result in a detrimental and unnecessary continuation of elevated levels of fishing mortality of Atlantic billfish when appropriate domestic management measures became available. The United States takes compliance issues at ICCAT very seriously and has led efforts at ICCAT to improve compliance at every available opportunity. The United States has been the driving force behind most measures at ICCAT that have resulted in improved compliance with management recommendations and data collection requirements.

## APPENDIX E TABLE OF CONTENTS

# E OMB PEER REVIEW BULLETIN

On December 16, 2004, the Office of Management and Budget (OMB) issued a directive requiring Federal Agencies to have “influential scientific information” and “highly influential scientific assessments” peer reviewed. NMFS decided that certain sections of the Draft Consolidated Atlantic HMS FMP could contain “influential scientific information,” which is defined as: scientific information (factual inputs, data, models, analyses, technical information, or scientific assessments) that the agency reasonably can determine does have or will have a clear and substantial impact on important public policies or private sector decisions. As such, NMFS requested three scientists who were not involved in the drafting of HMS FMP to review certain sections of the HMS FMP. Specifically, NMFS asked them to review the standardized bycatch reporting methodology (Sections 3.8.2 through 3.8.5), time/area closure analyses (Section 4.4.2 and Appendix A), and essential fish habitat (EFH) sections (Chapter 10 and Appendix B).

Per the OMB peer review bulletin, NMFS noted that such a peer review should evaluate the clarity of hypotheses, the validity of the research design, the quality of data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypotheses being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product. The peer reviews will be used, as appropriate, to clarify assumptions, findings, and conclusions of the bycatch, time/area closure, and EFH sections of the Final HMS FMP. Their reviews are reproduced in their entirety below. A copy of Gregory Skomal’s certification of no conflict of interest is on file with the HMS Management Division.

The following sections provide each peer reviewer’s complete comments, followed by a response section by NMFS. In the response section, NMFS uses the same section headings used by the peer reviewer to respond to the comments. NMFS used this approach of providing the peer reviewer’s comments in their entirety to offer the reader the full context of the reviewer’s comments, for ease of reading, and to avoid any confusion between the reviewer’s comments and NMFS’ response which follows each reviewer’s section.

## E.1 Peer Review by Gregory Skomal, Commonwealth of Massachusetts, Division of Marine Fisheries, December 21, 2005

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**Paul J. Diodati**
*Director*

December 21, 2005

Mr. John H. Dunnigan
Director, Office of Sustainable Fisheries
National Marine Fisheries Service
Silver Spring, MD 20910

Dear Mr. Dunnigan:

As per your request, I've conducted a peer review of the following sections of the Draft Consolidated Atlantic Highly Migratory Species Fishery Management Plan: Sections 3.8.2-3.8.5 (Standardized Bycatch Reporting Methodology), 4.4.2 (Time/Area Closures), Chapter 10 (Essential Fish Habitat) and associated appendices (A, B).

In doing so, I made every effort to evaluate the clarity of hypotheses, the validity of the research design, the quality of the data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypothesis being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product. My comments on each of the sections follow.

Please do not hesitate to contact me for any additional information. I thank you for the opportunity to comment on this important Fishery Management Plan.

Sincerely,

Gregory Skomal
Senior Marine Fisheries Biologist

## Section 3.8.2: Standardized Reporting of Bycatch

This section describes and discusses the three major sources of bycatch data for HMS: self-reported logbook data, at-sea observer data, and survey data. While this would imply three discrete sources, fishery-specific information indicates that there are multiple self-reporting programs (e.g. HMS logbook, vessel trip reports, supplemental discard forms), two observer programs, and two recreational dockside surveys. I suggest that a table or two be added to this section to clarify each of these programs on a fishery-specific basis and to eliminate any potential redundancies.

Section 3.8.2.6: Recreational Handgear Fishery

For the last several years, members of the US Advisory Committee to ICCAT have questioned the validity of HMS catch and bycatch estimates derived from the two recreational surveys (MRFSS and LPS). Specifically, the BAYS species working group stated in 2005 that "MRFSS and LPS landings data collection programs are fatally flawed and have failed. It is time to acknowledge that they cannot be further modified or adapted for the current needs of fishery management. The BAYS SWG recommends the development of a HMS landings data collection program that meets high standards for accuracy and precision." While NMFS notes that CV's are very high for most HMS estimates derived from these sources, there has been little effort to alleviate this longstanding problem over the last several years.

Section 3.8.5: Bycatch Mortality

This section presents very qualitative information on fishery-specific bycatch mortality. In my view, this section is incomplete. Although NMFS purports to have estimates of bycatch and bycatch disposition, these data are not reported on a fishery-specific or species-specific basis. I suggest that this section or section 3.4.6 be augmented to include these data so that the reader has a quantitative sense of this issue. For example, a table containing annual fishery-specific estimates of HMS bycatch (e.g. blue shark) including catch disposition (released alive, dead discards) would be very useful.

Bycatch mortality comprises two issues, direct mortality and post-release mortality, which have been combined into a single section. These two issues should be addressed separately to avoid confusion. Estimates of direct mortality are derived from bycatch data sources, but estimates of release mortality require catch disposition information coupled with species and fishery-specific release mortality rates. Although the latter is largely lacking for most HMS bycatch species, the section on release mortality should consolidate what is known to date on a fishery-specific basis. The new section would include the published information on billfish release mortality currently referenced under "Recreational Handgear Fishery". It should be noted that Kerstetter et al. (2003) conducted similar research on longline-caught blue marlin.

Moreover, section 3.8.2 states that "post-release mortality of HMS is accounted for in stock assessments to the extent that the data allow". However, there is no indication in the current section that post-release mortality rates are incorporated into stock assessments. The section should include a table summarizing fishery and species-specific estimates of post-release mortality rates and post-release bycatch mortality (numbers of fish) used in stock assessment.

**Section 4.1.2/Appendix A: Time/Area Closures**

NMFS provides an extensive and comprehensive analysis of the ecological/economic/social benefits and impacts of existing and proposed time/area closures. In virtually all cases, the ecological benefits are inversely related to the economic impacts and both are greatly influenced by the potential redistribution of effort. Without redistribution of effort, there are ecological benefits and discard reductions across all species, but economic and social impacts. With redistribution of effort, all of the time/area closures analyzed have positive and negative feedbacks that render none of them fully effective. Given the assumption of effort redistribution, it is difficult to believe that NMFS will be able to implement a time/area closure that does not have ecological impacts that counter positive gains. Hence, for time/area closures to be effective, assumptions on effort redistribution need to be rigorously tested. There are strong indications that there was not a significant spatial redistribution of effort resulting from the current time/area closures (Table 4.9). Moreover, discard reductions realized by the current closures met or exceeded those predicted without the redistribution of effort (Tables 4.7, 4.8). However, as stated in the draft FMP, reality likely lies between no effort redistribution and complete redistribution.

In light of this conundrum, I concur with the preferred option (B5) to establish criteria to consider when implementing new time/area closures or making modifications to existing time/area closures. These criteria must include objective quantitative thresholds for bycatch reduction taking into account those factors listed under this alternative (page 4-34) as well as status of the stocks, assessment information, and stock rebuilding schedules. In addition, as stated above, discard reduction analyses should make every attempt to test hypotheses of effort redistribution while taking into account the potential influence of declining stocks.

Minor edit: There is an inconsistency between the percent reduction of bluefin tuna discards reported in Table 4.6 and Table 4.11. For alternatives B2(d), B2(e), and B2(a)/B2(b)(year round) the former lists -3.3%, 5.7%, and -24.3% respectively; these are reflected in the text. However, Table 4.11 reports different values of 38%, -40.7%, and -19.1%, respectively. Two of these values counter the arguments presented in the text.

**Chapter 10/Appendix B: Essential Fish Habitat**

In this chapter and the associated appendix (B), NMFS presents a comprehensive five-year review of Essential Fish Habitat (EFH) for all HMS. In addition, the chapter makes every effort to identify fishing and non-fishing activities that may adversely affect EFH. EFH is defined as "those habitats necessary to the species for spawning, breeding, or growth to maturity".

Section 10.2.1: Descriptions of Datasets Used in the Review

In addition to the datasets used in the current analyses, two surveys are conspicuously absent. The NEFSC Longline Shark Survey has been conducted by the NMFS Apex Predators

Investigation for no less than 30 years. These biological surveys targeted pelagic sharks, swordfish, and tunas in the early years and large coastal sharks in recent years. Like the Southeast Fishery Longline Shark Survey, biological and associated environmental data are collected from all captures and most fishes are tagged and released. This survey would contribute useful fisheries independent data. Also, the now defunct CETAP (Cetacean and Turtle Assessment Program) survey is another fisheries independent historical source of distribution data on large pelagic fishes (see Kenney et al., 1985). This is particularly important for shark species that are not routinely taken in fisheries (e.g. basking shark).

Section 10.2.2: Methods Used to Map and Analyze EFH Data

While it is clear that size stratified spatial data from multiple sources were plotted to identify areas of high concentration, it is unclear how this grid will be used to designate EFH.

Section 10.3: Summary of Review and Findings

Reference to the McCandless et al. (2002) study should note that 15 separate research studies were conducted from Massachusetts to Texas, not New York to Texas.

As written, the text in this and the previous section implies that new EFH has been designated based on recent information. However, it is stated in the Introduction (Section 10.1) that EFH has not been modified from the 1999 designations and that the current review is simply to provide new EFH information and data collected since that time. Since there is a great deal of discussion regarding new EFH information and species-specific descriptions of EFH, clarification is warranted.

Section 10.3.2: Swordfish

Reference to juvenile swordfish in the vicinity Long Island Sound needs to be substantiated. Perhaps this information refers to historical reports of swordfish east of Long Island in the vicinity of Block Island and Nomans Island south of Martha's Vineyard.

**Appendix B: Essential Fish Habitat**

Many of the species-specific descriptions in this appendix present life history information that has been updated or replaced with new or more applicable research findings. In the following sections, I've noted recently published literature that may assist NMFS in identifying EFH for several species of HMS.

B.1.4.1: Basking Shark

Distribution data for the basking shark is incomplete largely because the species is not commonly taken by fisheries. EFH for the basking shark should include waters east of the Great South Channel and the Gulf of Maine to the Bay of Fundy. Pertinent information on life history and distribution of the basking shark in the North Atlantic may be found in Templeman (1963), Owen (1984), Kenney et al. (1985), Sims and Merrett (1997), Sims and Quayle (1998), Sims (1999), Sims et al. (2000), Skomal et al. (2004), and Wilson (2004).

B.1.4.2: Hammerhead Sharks

Scalloped Hammerhead

Additional life history information can be found in Lessa et al. (1998), Hazin et al. (2001), and Bush and Holland (2002).

B.1.4.3: Mackerel Sharks

White Shark

In all likelihood, EFH of the white shark will need to be modified. The review by Casey and Pratt (1985) is a comprehensive size-specific examination of white shark distribution, life history, and nursery habitat in the western North Atlantic. Preliminary estimates of age and growth of this species were recently conducted by Natanson (2002). Estrada et al. (in press) present new information on the trophic ecology of this species in the western North Atlantic based on stable isotopes.

Nurse Shark

This species should not be listed under Mackerel Sharks (Section B.1.4.3).

B.1.4.4: Requiem Sharks

Blacktip Shark

Additional information on blacktip shark nursery habitat can be found in Heupel and Hueter (2002), Heupel and Simpfendorfer (2002), Keeney et al. (2003), Heupel et al. (2004), Keeney et al. (2005), and Heupel and Simpfendorfer (2005a; 2005b).

Bull Shark

Additional information on bull shark life history and nursery habitat can be found in Tremain et al. (2004), Neer et al. (2005), and Simpfendorfer et al. (2005).

Dusky Shark

Age and growth information can be found in Natanson et al. (1995).

Lemon Shark

Additional life history information can be found in Sundstrom et al. (2001) and Barker et al. (2005).

Night Shark

Hazin et al. (2000) and Santana and Lessa (2004) provide additional information on reproduction and age and growth, respectively.

Spinner Shark

Additional life history information on the spinner shark can be found in Allen and Wintner (2002), Capape et al. (2003), Bethea et al. (2004), Carlson and Baremore (2005), and Joung et al. (2005).

Tiger Shark

More recent age and growth information on the tiger shark can be found in Natanson et al. (1999) and Wintner and Dudley (2000).

B.1.4.5: Sand Tiger Sharks

Sand tiger shark

Additional information on the sand tiger shark may be found in Gelsleichter et al. (1999) and Lucifora et al. (2002).

B.1.4.6: Whale Sharks

Additional life history information can be found in Chang et al. (1997), Colman (1997), and Wintner (2000).

B.1.4.8: Hammerhead Sharks

Bonnethead

Additional life history information can be found in Cortes et al. (1996), Cortes and Parsons (1996), Cortes et al. (1996), Carlson and Parsons (1997), Lessa and Almeida (1998), Marquez-Farias et al. (1998), Carlson et al. (1999), and Lombardi-Carlson et al. (2003).

B.1.4.9: Requiem Sharks

Atlantic Sharpnose Shark

Additional life history information can be found in Cortes (1995), Marquez-Farias and Castillo-Geniz (1998), Gelsleichter et al. (1999), Carlson and Baremore (2003), Hoffmayer and Parsons (2003), Loefer and Sedberry (2003), and Bethea et al. (2004).

Blacknose Shark

Additional life history information can be found in Carlson et al. (1999), Hazin et al. (2002), and Driggers et al. (2004a; 2004b).

Finetooth Shark

Additional life history information can be found in Carlson et al. (2003), Hoffmayer and Parsons (2003), and Bethea et al. (2004).

Smalltail Shark

Additional life history information can be found in Lessa and Santana (1998) and Lessa et al. (1999b).

B.1.5.1: Cow Sharks

Sixgill Shark

Additional life history information can be found in Ebert (2002) and McFarlane et al. (2002).

B.1.5.2: Mackerel Sharks

Porbeagle Shark

More recent life history information can be found in Francis and Stevens (2000), Jensen et al. (2002), Joyce et al. (2002), Natanson et al. (2002), Campana and Joyce (2004), and Francis and Duffy (2005).

Shortfin Mako Shark

Additional life history information can be found in Stillwell and Kohler (1982), Pratt and Casey (1983), Heist et al. (1996), Mollet et al. (2000), Campana et al. (2002), Estrada et al. (2003), Francis and Duffy (2005), Loefer et al. (2005), and MacNeil et al. (2005).

B.1.5.3: Requiem Sharks

Blue Shark

Additional life history and ecological information can be found in Kenney et al. (1985), Estrada et al. (2003), and Skomal and Natanson (2003).

Oceanic Whitetip Shark

Additional life history information can be found in Lessa et al. (1999a), Lessa et al. (1999c), and Whitney et al. (2004).

B.1.5.4: Thresher Sharks

Bigeye Thresher

Additional life history information can be found in Chen et al. (1997), Liu et al. (1998), and Weng and Block (2004).

Thresher Shark

New age and growth information can be found in Gervelis (2005).

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## E.2 Response to OMB Peer Review by Gregory Skomal, Commonwealth of Massachusetts, Division of Marine Fisheries, December 21, 2005

*Section 3.8.2: Standardized Reporting of Bycatch*

The reviewer indicated that there was some confusion as to the various reporting programs for the different fisheries which harvest HMS. Additional clarification was added to the descriptions in the text.

*Section 3.8.2.6: Recreational Handgear Fishery*

The reviewer indicated that the catch and bycatch estimates derived from the programs used to monitor recreational landings of HMS have been questioned by members of the U.S. ICCAT Advisory Committee and that changes should be made to ensure that high standards of accuracy and precision are met. NMFS recognizes the desire to make improvements in the collection of recreational catch and landings data. At the request of NMFS, the NAS recently conducted a review of marine recreational fishery surveys, both state and federal. The review committee's report has been published and the Agency is evaluating the recommendations.

*Section 3.8.5: Bycatch Mortality*

The reviewer suggested that this section be augmented by adding estimates of bycatch and bycatch disposition on a fishery-specific basis. This information has been included for those fisheries where it is available and can be found in Section 3.4.

*Section 4.1.2/Appendix A: Time/Area Closures*

The review noted that the criteria must include objective, quantitative thresholds for bycatch reduction taking into account those factors listed under this alternative as well as status of the stocks, assessment information, and stock rebuilding schedules. In addition, the reviewer stated that discard reduction analyses should make every attempt to test hypotheses of effort redistribution while taking into account the potential influence of declining stocks.

NMFS does not believe that established quantitative thresholds for strict bycatch reduction percentages need to be created for specific time/area closures. Pre-determined target reduction goals for specific species are inappropriate because it does not consider the impact on the remaining portion of the catch. By not setting such thresholds, NMFS retains the flexibility of considering percent change of bycatch for all species before implementing a time/area closure. Consideration of the overall catch is critical when implementing a multispecies or ecosystem-based approach to management. Furthermore, while the Magnuson-Stevens Act provides NMFS the authority to manage all species, NMFS must balance the impacts of management measures on all managed species and may not choose protections for one species to the detriment of protected or overfished species (*e.g.*, NMFS may not choose to protect BFT even if sea turtle interactions may increase substantially). Under the approach preferred in this rulemaking (the criteria), NMFS can consider the largest range of alternatives when considering time/area closures. For example, if NMFS is given a specific goal (*e.g.*, a jeopardy conclusion regarding the PLL fishery and leatherback sea turtles), this flexibility outlined in the criteria allows NMFS to close certain areas or take other actions to protect that specific species while also protecting, to the extent practicable, the other species and the rest of the fishery. Absent this flexibility, NMFS might potentially have to implement more restrictive measures to protect one species causing potential cascade effects (*e.g.*, closing one area may increase the bycatch of another species, which could result in closing another area, etc.).

NMFS already considers the status of the stocks when implementing time/area closures. Closed areas like the Northeastern U.S. closed area, the mid-Atlantic shark closed area, and the Northeast Distant closed area were all implemented to address specific overfished or protected species. The other closed areas, while implemented to reduce bycatch in general, also considered the status of the stocks before implementation. In addition, considering the status of a stock is one criterion in the preferred alternative, B5.

NMFS currently does not test "hypotheses" of effort redistribution, but agrees that assumptions of the redistribution of effort need to be tested. To test this model, NMFS explored different assumptions regarding the movement of the PLL fleet and how more limited movements by the fleet may affect predictions regarding bycatch reduction. NMFS investigated the movement of the PLL fleet from 2001 through June of 2004 to see where vessels fished in relation to their reported homeports. This mobility analysis broke the Atlantic, Caribbean, and Gulf of Mexico into six distinct areas, with one area, Area 2, split along the west and east coasts of Florida (Areas 2A and 2B, respectively). Using GIS, NMFS plotted the locations vessels reported fishing (*i.e.*, made sets) in six different areas in relation to their reported homeport in order to determine the distance different vessels traveled. Overall, of the vessels that moved out of the Gulf of Mexico, the majority (80 percent in terms of hooks) moved out of the Gulf of Mexico (Areas 1 and 2A) into Area 6, the high seas, but other vessels also moved from the Gulf to the eastern seaboard. Conversely, a few vessels that fished along the eastern seaboard also moved into the Gulf of Mexico, although the movement was somewhat limited.

NMFS also investigated the physical characteristics of vessels to see if there were any differences in the vessels that reported fishing only in the Gulf of Mexico compared to vessels that reporting fishing out of the Gulf of Mexico. NMFS found no significant difference in the vessels' length ($t_{104} = 0.43$, $P = 0.35$) or vessels' horsepower ($t_{104} = 0.43$, $P = 0.66$) for vessels that fished only in the Gulf of Mexico versus those that fished out of the Gulf of Mexico. These results indicate that vessels that fish exclusively in the Gulf of Mexico have the physical capability (in terms of vessel size and horsepower) to fish outside of the Gulf of Mexico. Furthermore, despite the upgrading restrictions, this indicates that the Gulf of Mexico vessel owners could sell their permits to fishermen who may want to fish outside the Gulf of Mexico.

Based on these analyses, NMFS evaluated different scenarios of the redistribution of effort model where each scenario had a different assumption regarding where effort from a closure would be displaced. NMFS calculated redistribution of fishing effort only to open areas along the eastern seaboard for a closure in the Northeast [B2(b)]. NMFS also redistributed fishing effort in the open areas of the Gulf of Mexico and Area 6 for two closures in the Gulf of Mexico [B2(a) and B2(c)]. Taken with the results of not considering redistribution of effort to the full effort redistribution model, these additional scenarios provide estimates of changes in bycatch and retained catch somewhere in-between the two base scenarios (*i.e.*, some movement is expected, and thus, some redistribution of effort is expected into a particular area (in this case, Area 6)). However, these additional scenarios assume that the same amount of effort is moved out of the Gulf of Mexico regardless of the size of the closure in the Gulf of Mexico, when in reality, larger closures may result in more movement out of the Gulf of Mexico. These scenarios also assume that fishermen do not relocate, possibly due to community ties to unloading docks, processing plants, etc. However, it should be noted that while fishermen may prefer not to disrupt ties to their communities, the 2001-2004 HMS logbook data indicate that fishermen from the Gulf of Mexico already fish outside of the Gulf of Mexico. If a large closure were implemented in the Gulf of Mexico, it is likely that additional fishermen would move their fishing locations or sell their permits rather than go out of business. However, in the future, NMFS intends to investigate the choices fishermen have made regarding previous closures (*i.e.*, did they move, sell their permits, go out of business, retain their permit but fish for something else, etc?). This type of analysis could help NMFS improve the effort redistribution models used in the future.

The reviewer also noted that there was an inconsistency between the percent reduction of BFT discards reported in Table 4.6 and Table 4.11 of the Draft HMS FMP. For alternatives B2(d), B2(e), and B2(a)/B2(b)(year round) the former listed -3.3%, 5.7%, and -24.3% respectively; these were reflected in the text. However, Table 4.11 reported different values of 38%, -40.7%, and -19.1%, respectively. Two of these values countered the arguments presented in the text. NMFS found that the values reported in Table 4.6 were incorrect and the values listed in Table 4.11 of the Draft HMF FMP were correct. NMFS has corrected these discrepancies in the tables and the text of the Final HMS FMP. However, these changes did not affect the overall conclusions.

*Chapter 10/Appendix B: Essential Fish Habitat*

<u>Section 10.2.1.: Descriptions of Dataset Used in the Review</u>

The reviewer noted that two data sources were conspicuously absent: the NEFSC Longline Shark Survey conducted by the NMFS Apex Predators Investigation, and the CETAP (Cetacean and Turtle Assessment Program) survey which would be particularly important for shark species not normally taken in fisheries such as the basking shark. The NEFSC Longline Shark Survey data was included in the data compiled during the review, but was labeled as Cooperative Shark Tagging Program (CSTP). Thus all shark data collected during the NEFSC Longline Shark Survey were included (C. McCandless pers. comm.). The CETAP survey was not obtained but references have been included in the life history section for basking sharks.

Section 10.2.2: Methods Used to Map and Analyze EFH Data

It was unclear to the reviewer how the grid used to plot data for each of the species would be used to designate EFH. As described in the FMP, the grid has a dual purpose, to allow the viewer to distinguish between low and high number of observations which would be difficult with point data only, and to serve as a guide for potential future modifications to EFH boundaries. The grid could be used to include or exclude a given number of observations per 100 $nm^2$ area in the EFH boundary. NMFS could establish criteria for each species and use the grid to decide whether to include or exclude those areas. This would allow NMFS to consider different alternatives for EFH boundaries based on different criteria. For example, in Amendment 1 to the FMP, criteria (presented here for reference only) for including or excluding a given number of observations per square were established for each species based on the status of the stock, and used as a guide to identify appropriate EFH areas. For a rebuilt species like blacktip shark, a criteria of greater than 10 observations per 100 $nm^2$ was used to help identify and map areas as EFH. For an overfished species such as finetooth shark, a more precautionary criteria of > 1 observation per 100 $nm^2$ was used to help identify and map EFH areas. Thus, the grid might be used in a future rulemaking to analyze potential alternatives based on including or excluding a specific number of observations per 100 $nmi^2$ area.

Section 10.3: Summary of Review and Findings

Based on the reviewer's comment, the reference to the McCandless et al. (2002) study was modified to note that 15 separate research studies were conducted from Massachusetts to Texas, not New York to Texas. The reviewer commented that the document seemed to imply that new EFH had been designated based on recent information, contrary to what was stated in the Introduction that EFH was not being modified in this FMP. NMFS did not mean to imply that EFH was being modified in this FMP. Rather, NMFS was attempting to provide NOAA technical reviewer's comments and concerns regarding the existing EFH boundaries and whether they considered changes to EFH to be warranted. In some cases the reviewers seemed to indicate that this was the case, but NMFS did not mean to imply that those changes would be made in this FMP. Any references to EFH being modified have been clarified to indicate that no changes are being made at this point.

Section 10.3.2: Swordfish

The reviewer noted that references to juvenile swordfish in the vicinity of Long Island Sound would need to be substantiated. NMFS agrees, and has asked NMFS technical experts to confirm whether they consider the datapoints to be valid. NMFS is awaiting a response from the NMFS technical experts, and would make any necessary changes prior to amending any swordfish EFH boundaries.

*Appendix B: Essential Fish Habitat*

The peer reviewer noted that many of the references in the life history section had been updated or replaced with new or more applicable research findings. NMFS incorporated all references provided by the peer reviewer in the life history section.

## E.3 Peer Review by Chris Boggs and Keith Bigelow, NMFS SWFSC, January 9, 2006

### GENERAL COMMENTS:

This consolidated FMP is a mammoth undertaking. The breadth and detail of the information that has been reviewed considered and presented is staggering. The quality of the data information is highly variable and the document does a good job of indicating problems and issues with data sources, and with the appropriateness of their application to management measures. And the document identifies the many areas that require improvement in information and management alternatives based on future study and deliberation. The greatest limitations to the overall products reviewed by PIFSC seems to be in the closed area alternatives, but this is to be expected. The other sections reviewed by PIFSC do not lead directly to management decisions that immediately affect fishery operations.

The section on bycatch could be improved by some clarification of terminology (as indicated in the specific comments). A few areas of information regarding bycatch mortality appear to have been missed, but the document is a comprehensive and thorough compendium of our current position in terms of knowledge and application to management issues as well as the needed direction for improvement. The theory behind establishing a standardized methodology for precision and accuracy in bycatch estimation exceeds the practice, which has been slow to develop and thus is not extensively covered. However the agency is hamstrung by lack of resources even to conduct analyses of cost/improvement ratios in any but a few fisheries, let alone to increase the myriad of observer and other monitoring programs that would be required for all fisheries. Documenting the present status of this effort is the appropriate first step for the FMP, which can present no more than what is the best available information.

The section on area closures presented the most difficulty and the specific comments may prompt clarification of the presentation. The rationale for the preferred alternatives could use strengthening where indicated. It is clear that a very large amount of information and comment was considered and a host of differing objectives had to be balanced. This will always produce choices which reflect compromise. The rationale for some of these choices appears to need some bolstering, especially as they face challenge from specific interest groups.

The section on EFH benefits from a greater wealth of published scientific information than the other sections, and results in no specific management alternatives to be considered at this time. The one identified area for future consideration appropriately awaits further data collection (bottom longline impacts on reef habitat). The rationale for expecting little impact of the fisheries on EFH at present is convincing. The issues for this section revolve around the practice of EFH designation, and these issues are well described and critiques from previous reviews made available. To be more thorough on scientific content this section would have to become encyclopedic, which would not be appropriate to its purpose. Possible errors for one species (specific comment) stood out only because of the focus by the PIFSC on the habitat of this species. The coverage of coastal anthropogenic effects on the HMS EFH is much more thorough than in our FMP for the central and western Pacific…but that seems appropriate given the greater ratio of coasts to ocean.

**SPECIFIC COMMENTS:**

**Bycatch**

**3.8**
Regarding the 2nd par:

"The national goal of the Agency's bycatch plan activities is to implement conservation and management measures for living marine resources that will minimize, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided. Inherent in this goal is the need to avoid bycatch, rather than create new ways to utilize bycatch. The plan also established a definition of bycatch as fishery discards, retained incidental catch, and unobserved mortalities resulting from a direct encounter with fishing gear."

Fishery Councils may disagree that utilization (and thus reduction) of bycatch is not a valid goal under Magnusson. Can the statement to the contrary be supported more thoroughly?

And in the next section

**3.8.1 Bycatch Reduction and the Magnuson-Stevens Act**

"The Magnuson-Stevens Act defines bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic and regulatory discards. Fish is defined as finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds. Seabirds and marine mammals are therefore considered 'incidental catch.'"

Rather than re-visit here all the discussion about the National Plan's different (from Magnuson) definition of bycatch, it is suggested that the text avoid using incidental catch in two contradictory ways in two succeeding paragraphs. There are clearer and widely-used terms for catch of seabirds and marine mammals, such as "takes of protected species" or "protected species interactions". NOAA Fisheries claims important successes in reducing bycatch" when referring to reductions in seabird and mammal takes, and can continue to do so in a broadly understood use the term "bycatch". But it isn't a broadly understood that "incidental catch" to refer to protected species. "Incidental take" might be better understood.

Next par

"National Standard 9 of the Magnuson-Stevens Act requires that fishery conservation andmanagement measures shall, to the extent practicable, minimize bycatch and minimize the mortality of bycatch that cannot be avoided. In many fisheries, it is not practicable to eliminate all bycatch and bycatch mortality. Some relevant examples of fish caught in Atlantic HMS fisheries that are included as bycatch or incidental catch…"

Should turtles also be listed as examples? They were includsed as fish bycatch under Magnuson-Stevens (was this changed recently?) and some of the subsequently listed options for bycatch reduction in this section are specific to turtles and have no documented utility for reducing any other bycatch (e.g. large circle hooks reduce turtle bycatch, but otherwise reduce mostly injury or mortality of other bycatch).

Then in a following par

"Therefore, to totally eliminate bycatch of all non-target species in Atlantic HMS fisheries would be impractical. The goal then is to minimize the amount of bycatch to the extent practicable and minimize the mortality of species caught as bycatch."

This statement is laudably practical, and such a statement was requested in the council/public reviews. However, the statement and the preceding discussion leave moot the issue of whether incidental takes of protected species (or just "fish" including [?] turtles) are addressed by the statement. The latter (just fish bycatch) is implied by the heading "Magnuson-Stevens" but the preceding section mentioned broader issues, and the mention of incidental takes in this section implicates protected species due to the use of incidental takes to refer to them in the previous section.

### 3.8.2 Standardized Reporting of Bycatch

"The National Bycatch Report (NMFS, 2004a) contains an indepth
examination of the issues of precision and accuracy in estimating bycatch. Precision of an estimate refers to its variability, or how repeatable the estimate is. The more precise an estimate is, the less variable it is. Precision of estimates is usually expressed in terms of a statistical value, the coefficient of variation (CV) of the estimate (NMFS, 2004a), which is the ratio of the square root of the estimate (also known as the standard error) to the estimate itself."

Both yellow highlighted words should be "variance". I'm not sure the blue highlighted captures the proper meaning. Marti McCracken (PIFSC mathematical statistician) provided the following, more rigorous explanation which might avoid some criticisms regarding your use of "variability" (for your consideration).

"The National Bycatch Report( NMFS, 2004a) contains an in depth examination of the issues of precision and accuracy in estimating bycatch. Accuracy refers to the closeness between the estimated value and the (unknown) true value that the statistic was intended to measure. Precision refers to how closely multiple measurements of the same statistic cluster to one another when obtained under the same protocol. The more precise an estimate is the tighter the cluster. The precision of an estimate is often expressed in terms of the coefficient of variation (CV) defined as the standard error of the estimator divided by the estimate. A precise estimate is not necessarily an accurate estimate."

One might add that "A more precise estimate is more easily distinguished from a second estimate (different time, place, treatment, etc) especially when they are close in value. Testing hypotheses about changes or differences from reference values or limits is the motivation for our interest in the precision and accuracy of bycatch estimates. We frequently need to evaluate whether or not bycatch is altered by events or actions.

Three pars down the document states:

"The CV of an estimate can also be reduced and the precision increased by increasing sample size.

Delete the highlighted "also" which is confusing because no other means of improving CV has yet been mentioned. The prior paragraph listing of randomization, stratification, sampling allocation, and testing for bias pertain to "while striving to achieve accuracy" not to precision. Balancing "precision goals and the least amount of observation effort" is basically the issue of what sample size (= precision) one can afford.

In the following paragraph:

"While the relationship between precision and sample size is relatively well known (NMFS, 2004), the relationship between sample size and accuracy is not so easily determined."

It might be better to say "is not reliable" or "can often be complex" to better anticipate the following paragraph. More samples can mean more or less accuracy. For example, when observer coverage is increased late in a season to catch up to a target level of coverage, the increased sample size may reduce accuracy if not properly stratified and weighted.

**3.8.2.3 *Shark Bottom Longline Fishery***

The par starting with "Effective August 1, 2001 …" is u necessarily reproduced in full in the following Section 3.8.2.4.

**3.8.4 Evaluation and Monitoring of Bycatch**

3rd par. Fix "estimated…estimates". It seems overly cautious to apologize for a lack of bycatch estimates in harpoon fisheries. How does one harpoon an unwanted catch? A proper approach is used under mortality in the next section and should be used here as well.

**3.8.5 Bycatch Mortality**

***3.8.5.2 Mortality by Fishery***

*Pelagic longline* Last sentence says to see section 3.4.1 for more information, inferring more information will be found there on "hook location, trailing gear and injury status of protected species interactions". I couldn't find that information in section 3.4.1 (did I miss it somewhere?). There is a literature on estimating turtle longline mortality, including US policies for estimating turtle mortality from hook location and trailing gear, and extensive tagging studies of post-release mortality, that could be cited and discussed. This lack is particularly at odds with the detailed discussion given on tagging study of released fish mortality below in the recreational handgear section. Nor is the turtle bycatch condition (alive/dead) or estimated post-release mortality covered in the ESA section which follows…where some information on marine mammal and seabird mortality is provided. Turtles seem to be given comparatively short shrift. The longline turtle bycatch mortality estimation also relies on gear configuration (i.e. shallow and deep setting). And the illustration of longine gear configuration in Section 3.4.1 taken from the Honolulu Advertiser (p.3-89) may be misleading in several ways. For one, this illustration has a strong vertical exaggeration/horizontal compression that gives a "wall of death" impression of the gear configuration. There are better technical illustrations of longline gear configuration in the literature. Second, none of the 5 types of US longline fishing described underneath the figure is close to the illustrated "tuna set" configuration. The latter best describes certain Asian and European fleets in the Atlantic, but not the US. This should be made clear. In a world context, all of the U.S. fisheries (except maybe the Carribean fishery?) are relatively shallow compared with Asian tuna longline fishing.

*Purse Seine Fishery*
This section is hard to believe. There are huge finfish bycatch mortality issues in Pacific tuna purse seines. The fish can not be easily released alive. Small fish are gillnetted by the mesh and larger ones smothered in the brail. There is an active research program in Europe looking for grids or gratings that can release purse seine bycatch that could be referenced. Pacific purse seine fisheries bycatch of small bigeye and yellowfin tunas is a major cause of overfishing, and there are also huge discarded (dead) bycatches of mahimahi, sharks, and other finfishes documented in IATTC reports. Why assume that discards are small and can easily be released in the U.S. Atlantic purse seine fishery for bluefin? Is it a very different operation? Explain.

*Bottom Longline Fishery*
*Shark Gillnet Fishery* Again both of these sections refer the reader to section 3.4.?.? for more information but there is no information on mortality in the cited sections.

### 4.1.2 Time/Area Closures

Alternative B1 is to maintain the existing time/area closures; no new time/area closures (No Action). There are no tables which present the results from Alternative B1. Isn't this necessary as some of the closures were not in effect (e.g. Mid-Atlantic Closure (effective Jan. 1, 2005, Northeast Distant Restricted (effective June, 30, 2004)) for the entire 2001−2003 period? Maybe these closures are for non-Pelagic fishing. Additionally, on p. 4-21 it says "To determine the effectiveness of the current closures, NMFS compared data prior to implementation of the closed areas (1997−1999) with effort and catch rates from 2001−2003 for various species". I couldn't locate this comparison or a reference. As such this would be a different comparison then Alternatives B2−B7 which compare catch and effort from 2001 to 2003.

Statistical validity − under-reporting in logbooks, assumptions on the redistribution of fishing effort and CPUE. Perhaps the following is addressed in additional documentation, but these are concerns regarding the presented statistics and associated assumptions for the catch and effort analyses. While I realize that the time-frame of a final FMP is rapidly approaching, perhaps the statistical validity of some of these concerns can be better documented or referenced.

Two data sources are used – the Pelagic Observer Program (POP) data and Pelagic Longline Logbook [HMS logbook] data. There is no doubt that various species will either be non-reported or under-reported in logbook data. Figures 4.1 through 4.8 clearly illustrate difference in interaction rates between PPL and POP sets. A comparison of Table 4.5 and 4.6 (A.7) indicates that the percent reduction for most species is greater with the Pelagic Longline Logbook data than Observer data which may have led to the statement for Alernative B2(a) that “the percent reductions in most bycatch were similar for the observed and reported data, and for the year-round versus May through November closures (4−26)”. This is counter-intuitive given the comparison of Figures 4.1−4.8, but may relate to spatio-temporal effects. Is there any analysis or reference by NMFS which compares observer and logbook data for observed longline sets? The absolute numbers and percent reductions for bycatch species using logsheet data would correspond to a minimum value given difficulties associated with under-reporting. In contrast, the percent reductions/increases for retained species are probably more realistic as they are more accurately reported in logbooks.

The assumptions on redistribution of effort and application of corresponding CPUE values are problematic. The current model assumes that effort will be uniformly distributed into all remaining ocean areas. Is a uniform distribution a valid assumption, or could other more plausible assumptions be considered? Specifically, if a portion of the Gulf of Mexico (GOF) is closed, is it reasonable to redistribute effort within open areas of the GOF as well as the Atlantic? While I’m not familiar with longline fleet movements under this FMP, do the fleets routinely move between the GOF and Atlantic and vice-versa? As noted periodically throughout the document, there are interactions that increase due to closed areas because interaction rates are higher in the open areas (e.g. loggerhead turtles). While the uniform distribution is easy to comprehend, could another redistribution scenarios be considered to redistribute effort in the same ocean basin?

The CPUE values are estimated as the number of animals per 1,000 hooks. I could not locate any reference as to how CPUE indices were constructed given a prevalence of zero observations. Given that some animal interactions (e.g. bluefin tuna, sea turtles) represent rare events it would be better to represent the redistribution of effort and corresponding CPUE by a statistical sub-sampling technique rather than a mean CPUE. This would also provide corresponding confidence intervals for bycatch reduction, albeit it is still based on the aforementioned logbook data with potential under-reporting.

I couldn’t locate any objectives or decision matrix in deciding on the preferred HMS alternatives. Most of the decisions seem to correspond to a percentage of reduction/increases for retained species/bycatch and associated economics. Perhaps consider a re-evaluation of those alternatives that represent a moderate closed area, such as B2(a) and B2(f) which provide substantial bycatch reduction of white and blue marlin, sailfish and sea turtles. With the redistribution of effort, these areas could have resulted in negative ecological impacts with increased discards of swordfish, bluefin and bigeye tuna. Do the negative impacts result from a redistribution to the Atlantic and associated higher catch rates?

The rational for preferred alternative B4 and benefit to HMS species appears extremely vague. Alternative B4 implements complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves. There is no indication as to the spatial size of such reserves (it’s not illustrated on any of the maps) and curiously there is the statement that “any positive ecological impacts on HMS are expected to be minimal (4-34)”. Again, I’m not familiar with Gulf issues, but if this is a gag grouper issue why can’t the Gulf Council enact appropriate regulations as the gag grouper problems and pelagic fishing exploitation appear mutually exclusive?

Preferred alternative B5 appears straightforward, but I'm not certain that it adds much more to the status quo. Doesn't the current FMP have criteria for regulatory framework adjustments for closures, given the fact that closures currently exist?

**Appendix A** was a very necessary appendix for following the discussion in section 4.1.2.

**Chapter 10 –** see general comments

**Appendix B –** see general comments

***B.1.1.2 Atlantic Bigeye Tuna (Thunnus obesus)***
Regarding "Although its distribution with depth in the water column varies, it is regularly found in deeper waters than are other tuna - to a depth of 250 m." As a Pacific expert this seems surprising to me, since archival tag data show routine behavior to 400 m and deeper, and much older studies also indicate these depths as part of the habitat in the Pacific.

**Habitat associations** see the IATTC proceedings on the World Bigeye Tuna workshops. There is an extensive literature on dissolved oxygen and temperature as the limiting factor on bigeye tuna depth distribution. Since it is a world meeting with a review for each ocean it may cover differences between oceans that could satisfactorily explain this discrepancy.

## E.4 Response to OMB Peer Review by Chris Boggs and Keith Bigelow, NMFS SWFSC, January 9, 2006

*General Comments: Bycatch*

The reviewers indicated that this section could be improved by some clarification of terminology which they included in the specific comments. These clarifications have been made as suggested.

*General Comments: Time/Area*

In the general comments section the reviewers noted that the rationale for the preferred alternatives could use strengthening where indicated as well as the rationale for some of these choices appears to need some bolstering, especially as they face challenges from specific interest groups. NMFS used Chapter 2 of the Final HMS FMP to better explain the rationale for the alternatives that were further analyzed. In addition, NMFS used Chapter 4 to clarify reasoning for the preferred alternatives and conducted additional analyses in response to comments from different interest groups.

*Specific Comments:*

3.8 Bycatch

The reviewer's suggested edits have been incorporated where applicable.

3.8.5.2 Mortality by Fishery

*Pelagic Longline*

The reviewer's noted that the cross-references for further information did not provide the information as stated. In general, these sections have been revised under Section 3.4 to be more concise and inclusive. The reviewer's suggested that the illustration of longline gear configuration in Section 3.4.1 may be misleading in that it has a strong vertical exaggeration/horizontal compression. NMFS agrees that this illustration may not be representative of how all U.S. longline gear is configured and that it was intended to only portray the gear in a general sense. Additional illustrations of all possible combinations of longline gear configuration would have been confusing to the reader.

*Purse Seine Fishery*

The reviewer's raised concerns regarding bycatch issues in the Atlantic BFT purse seine fishery by comparisons to the Pacific tuna purse seine fishery. Finfish bycatch and protected species interactions in the Atlantic purse seine fishery have not been an issue to date and the scope of the fishery is limited to only five vessels, whereas there are over one hundred purse seine vessels listed in the 2005 LOF for the Pacific tuna fishery.

*Bottom Longline Fishery*

The reviewer's noted that the cross-reference for further information did not provide the information as stated. In general, these sections have been revised under Section 3.4 to be more concise and inclusive.

4.1.2 Time/Area Closures

The reviewers stated that there were no tables which presented the results from Alternative B1. The reviewers felt that this was necessary and questioned whether some of the closures were not in effect (e.g. Mid-Atlantic Closure (effective Jan. 1, 2005, Northeast Distant Restricted (effective June, 30, 2004)) for the entire 2001−2003 period.

In the no action alternative, B1, NMFS evaluated the effect of the June Northeastern U.S. closure (effective June 1, 1999), the DeSoto Canyon (effective November 1, 2000), the Charleston Bump and Florida East Coast closures (effective March 1, 2001), and the Northeast Distant closed area (effective July 9, 2002, modified July 6, 2004). The Northeast Distant area is currently a restricted fishing area with specific gear requirements (69 FR 40734, July 6, 2004). Since most of the time/area closures were implemented in 2001 or earlier, data from 2001 - 2003 provided the basis for evaluating the effectiveness of the closures. NMFS did not re-evaluate the mid-Atlantic shark closure because, as described in the response to a petition for rulemaking from the State of North Carolina (October 21, 2005, 70 FR 61286), the closure was first effective in 2005, and NMFS did not have any additional information on which to change the conclusions of the rulemaking that established the closure (December 24, 2003, 68 FR 74746). In addition, this is the only closure that is for bottom longline gear; the rest of the closures are for pelagic gear. In the Draft HMS FMP Tables 4.7, 4.8, 4.9, and 4.10 showed the results the analysis for alternative B1. NMFS has also made sure to reference the appropriate tables in Chapter 4 of the Final HMS FMP.

The reviewers also noted that they could not locate the comparison of data prior to implementation of the closed areas (1997−1999) with effort and catch rates from 2001−2003 for various species, which NMFS used to evaluate the effectiveness of the current time/area closures. As noted above, Tables 4.7, 4.8, 4.9, and 4.10 showed the results the analysis for alternative B1 in the Draft HMS FMP. In the Final HMS FMP, NMFS clarified the references to these tables.

The reviewers also noted concerns regarding underreporting in logbooks and how this would affect the assumptions on the redistribution of fishing effort and catch-per-unit-effort (CPUE). NMFS is aware that discards may be underreported in the HMS logbook data compared to the POP data. However, NMFS tested to see if there were any differences in underreporting for different species between different regions. If no differences in underreporting occurred between regions, then the relative effect of each closure on bycatch reduction for each species should be comparable across alternatives. In order to test this, NMFS compared HMS logbook data to POP data for a dataset provided by Cramer (2000), which compared dead discards from HMS logbook and POP data. In her paper, Cramer used POP data to estimate dead discards of undersized swordfish, sailfish, white and blue marlin, and pelagic sharks from the PLL fishery operating in the U.S. Atlantic, Caribbean and Gulf of Mexico. Cramer (2000) provided the ratio of catch estimated from the POP data divided by the reported catch in the HMS logbooks. This ratio indicated the amount of underreporting for different species in a given area. NMFS analyzed the ratios in Cramer (2000) to test whether underreporting varied for different species in different parts of the Atlantic, Caribbean, and Gulf of Mexico. NMFS used a Kruskal-Wallis test (a non-parametric test equivalent to a parametric Analysis of Variance) to account for small sample sizes and non-normally distributed data. NMFS found that there was no difference in the ratio of estimated catch versus reported catch for undersized swordfish, sailfish, blue marlin, white marlin, or pelagic sharks (undersized swordfish: Chi-square=3.63; $d.f.$=5; $P$=0.60; sailfish: Chi-square=1.72; $d.f.$=5; $P$=0.89; blue marlin: Chi-square=3.89; $d.f.$ =5; $P$=0.57; white marlin: Chi-square=2.97; $d.f.$ =5; $P$=0.70; pelagic sharks: Chi-square=4.78; $d.f.$ =5; $P$=0.44). Therefore, there were no differences in underreporting between the POP and HMS logbooks for the different species in the Atlantic, Caribbean, or Gulf of Mexico. Based on the available information, NMFS believes HMS logbooks may underestimate the amount of bycatch, however, the relative effect of each closure for each species should be comparable across alternatives. While the data used in the Cramer (2000) study represented an earlier time period (1997-1998) compared to the 2001-2003 data used here, it gives some indication that the use of HMS logbook data over POP data should not invalidate or bias the results of the time/area analyses.

In addition, the reviewers noted that a comparison of Tables 4.5 and 4.6 in the Draft HMS FMP indicated that the percent reduction for most species is greater with the HMS logbook data than POP data, which may have led to the statement for alternative B2(a) that "the percent reductions in most bycatch were similar for the observed and reported data, and for the year-round versus May through November closures..." The reviewers stated this was counter-intuitive given the comparison of Figures 4.1−4.8, but may relate to spatio-temporal effects. It must be noted that the POP data only represents, on average, effort of approximately five percent of the PLL fleet, and extrapolated takes were not estimated in the Draft HMS FMP. While the POP data may more accurately report all of the bycatch associated with a given trip, it does not represent the entire PLL fishing effort. And, while underreporting may be occurring for certain species in the HMS logbooks, the HMS logbooks represent all of the PLL effort by the U.S. Atlantic PLL fleet; therefore, in absolute terms, the HMS logbook data would give the highest number of discards, and thus, the highest amount of bycatch reduction for analyses without the redistribution of effort. While the number of sets observed in the POP is much lower than the total reported sets in the HMS logbook, the relative percent reductions in bycatch were similar regardless of the dataset used.

The reviewers also asked if there was any analysis or reference by NMFS which compares POP and HMS logbook data for observed longline sets. The reviewers noted that the absolute numbers and percent reductions for bycatch species using logbook data would correspond to a minimum value given difficulties associated with underreporting. In contrast, the percent reductions/increases for retained species were probably more realistic as they are more accurately reported in logbooks. NMFS agrees that underreporting for bycatch may occur in logbook data whereas underreporting of target catch may occur in POP data. NMFS chose to use HMS logbook data for all the analyses so as to maintain consistency among the alternatives and species. If NMFS were to have used the POP data for all of the species, NMFS would have had to calculate extrapolated takes for all the species considered. NMFS felt that this extrapolation would introduce more assumptions and uncertainty than using HMS logbook data to analyze the potential impacts of time/area closures. And, if, in fact, retained catch is underreported in the POP data, then NMFS would have had the same problem with the retained catch as the reviewers noted with bycatch with in HMS logbook data. Additionally, if the maximum bycatch reductions would be seen using POP data, then the maximum bycatch increases would also be seen using POP data once extrapolated takes were calculated and redistribution of effort was considered. Therefore, NMFS felt that the relative effect of each closure could best be attained with the HMS logbook data in terms of predicted changes in bycatch, discards, and retained catch. In addition, NMFS was able to introduce the least amount of uncertainty and assumptions using HMS logbook data over extrapolated POP data. NMFS will continue to investigate potential differences in reporting between HMS logbook and POP data for all discarded species as well as potential biases in reporting between geographical areas for different species.

The two reviewers also stated that the assumptions on redistribution of effort and application of corresponding CPUE values were problematic. They asked if a uniform distribution is a valid assumption, or could other more plausible assumptions be considered? Specifically, they asked if a portion of the Gulf of Mexico is closed, is it reasonable to redistribute effort within open areas of the Gulf of Mexico as well as the Atlantic? They also asked if the fleets routinely move between the Gulf of Mexico and Atlantic and vice-versa?

Finally, they noted that while the uniform distribution is easy to comprehend, could another redistribution scenario be considered to redistribute effort in the same ocean basin?

NMFS explored different assumptions regarding the movement of the PLL fleet and how more limited movements by the fleet may affect predictions regarding bycatch reduction. As explained in the response to the Skomal review, NMFS investigated the movement of the PLL fleet from 2001 through June of 2004 to see where vessels fished in relation to their reported homeports using 2001-2004 HMS logbook data. Based on these analyses, NMFS evaluated different scenarios of the redistribution of effort model where each scenario had different assumptions regarding where effort from a closure would be displaced. Taken with the results of not considering the redistribution of effort to the full effort redistribution model, these additional scenarios provide estimates of changes in bycatch and retained catch somewhere in-between the two base scenarios (*i.e.*, some movement is expected, and thus, some redistribution of effort is expected into a particular area).

The reviewers claimed that the CPUE values were estimated as the number of animals per 1,000 hooks. The reviewers stated that they could not locate any reference as to how CPUE indices were constructed given a prevalence of zero observations. Given that some animal interactions (e.g. BFT, sea turtles) represent rare events, the reviewers felt that it would be better to represent the redistribution of effort and corresponding CPUE by a statistical sub-sampling technique rather than a mean CPUE. The reviewers stated that this would also provide corresponding confidence intervals for bycatch reduction, albeit it would still be based on the aforementioned logbook data with potential underreporting.

NMFS believes that the reviewers misunderstood how the logbook data were analyzed to evaluate the current/time area closures and to determine the effect of all the proposed closures. To select areas for proposed closures, NMFS initially analyzed both absolute numbers of discards as well as areas of highest catch and CPUE (number of animals per 1,000 hooks) for non-target HMS and protected resources (white marlin, bluefin tuna (BFT), and sea turtles). In some cases these areas overlapped, in others, they did not. This may be due to the fact that there are localized areas of high CPUE that may not necessarily represent the areas of highest bycatch in terms of absolute numbers. In order to avoid underestimation of bycatch reduction, in cases where the highest CPUE did not overlap with the areas of highest absolute numbers of discards, NMFS decided to further analyze the area that had the highest overall discards (in absolute terms), rather than areas with the highest CPUE. Thus, NMFS selected proposed closed areas and based the redistribution of effort analyses on absolute numbers to maximize the reduction in overall number of discards.

To analyze the effect of current closures, the reported catch and discards for each species and the number of hooks set were pooled by month. In a few of the tables that reported the results of the current time/area closures the number of hooks were presented as "Number of hooks set (x1000)"; NMFS believes that this led to the confusion where the reviewers thought CPUE were calculated as the number of animals per 1,000 hooks. In these tables, however, the number of hooks was meant to be multiplied by 1,000 to calculate the total monthly number of hooks; these numbers were not standardized by 1,000 nor were CPUEs or the number of animals captured per 1,000 hooks calculated in the tables. Instead, the monthly and annual Atlantic wide total~~s~~ catch and discards were calculated for each species. In the Final HMS FMP, NMFS has clarified in the text that absolute numbers were used for all analyses and refrains from using the term “catch rates,” except where only appropriate. In addition, NMFS clarified the table legends so that it is clear that the numbers of hooks presented in the table are meant to be multiplied by 1,000. Therefore, the statistical sub-sampling and corresponding confidence intervals for bycatch reduction do not apply.

The reviewers stated that they could not locate any objectives or decision matrix in deciding on the preferred HMS alternatives. The reviewers felt that most of the decisions seem to correspond to a percentage reduction/increase for retained species/bycatch and associated economics. While not a formalized decision matrix, NMFS used the analyses in time/area closure section, which considered all species, to evaluate the effects of the proposed time/area closures, including all species for a combination of closures. NMFS used the results of the analyses to guide the Agency in determining which management measures are appropriate at this time. NMFS, however, cannot place more value on one species over another species and believes that setting pre-determined or pre-set reduction goals in bycatch and/or discards would compromise NMFS’ ability to consider multiple species. However, the present criteria do not preclude NMFS from considering the establishment of a more formalized decision matrix in the future if such a matrix could be designed that would provide for the flexibility to consider all the species involved. This may be more appropriate when NMFS has a longer temporal dataset on the simultaneous effect of circle hooks and the current time/closures. At this time, NMFS believes that the criteria contained in the preferred alternative B5 provides the guidance needed, consistent with the Magnuson-Stevens Act and this FMP, to help NMFS make the appropriate decisions regarding the use of time/area closures in HMS fisheries.

The reviewers stated that NMFS should consider a re-evaluation of those alternatives that represent a moderate closed area, such as B2(a) and B2(f), which provide substantial bycatch reduction of white and blue marlin, sailfish, and sea turtles. The reviewers also asked if the negative impacts resulting from these closures could have been from redistribution of effort into the Atlantic and associated higher catch rates. NMFS considered a range in closures both in time and spatial size. NMFS re-evaluated the impact of B2(a) with redistribution of effort in the Gulf of Mexico only as well as redistribution of effort in the Gulf of Mexico and into an area outside of the Gulf of Mexico (*i.e.*, Area 6; see response to the Skomal review) that NMFS has shown vessels from the Gulf of Mexico currently fish in. With redistribution of effort in the Gulf of Mexico only, NMFS predicted increases in sailfish discards (1.8 percent or 18 discards/over three years; annual estimates can be obtained by dividing by three), spearfish discards (3.3 percent or 14 discards/over three years), pelagic shark discards (0.3 percent or 112 discards/over three years), large coastal shark discards (3.6 percent of 598 discards/over three years), swordfish discards (4.4 percent or 1,635 discards/over three years), yellowfin discards (22.3 percent or 1,224 discards/over three years), bigeye tuna discards (0.4 percent or 4 discards/over three years), and BAYS tuna discards (1.0 percent or 91 discards/over three years). With redistribution of effort in the Gulf of Mexico and Area 6, NMFS predicted increases in sailfish (4.7 percent or 61 discards/over three years), pelagic sharks (4.4 percent or 834 discards/over three years), BFT discards (1.6 percent or 35 discards/over three years), and BAYS tuna discards (0.7 percent or 70 discards/over three years). Therefore, increases in bycatch are predicted from the redistribution of effort into the Atlantic as well as the Gulf of Mexico. Given the potential negative ecological impact of B2(a) under the different redistribution of effort scenarios, NMFS is not preferring alternative B2(a) at this time.

NMFS did not further analyze alternative B2(f) as outlined in Chapter 2. When redistribution of fishing effort was considered, a seven-month closure for alternative B2(f) was predicted to result in an increase in the number of swordfish, BFT, and bigeye tuna discards (2,081, 219, and 150 discards over three years for the seven-month closure, respectively). NMFS compared possible reductions and increases of discards and retained catch with the redistribution of effort for B2(f) with results from other closures. For instance, B2(f) is larger in size than B2(a). Thus, NMFS would expect a greater ecological benefit in terms of bycatch reduction from the larger B2(f) closure rather than the smaller B2(a) closure. However, the model predicted comparable results in terms of bycatch reduction between B2(a) and B2(f). In addition, B2(a) would not have resulted in as many BFT discards or potentially had as large of a negative economic impact in terms of a reduction in retained catch as B2(f). B2(f) is also smaller than B2(d). However, NMFS choose to analyze the larger closure to better assess the ecological, social and economic impacts of a large closure in the Gulf of Mexico. Therefore, by further analyzing B2(a) and B2(d), NMFS was able to analyze a range in terms of potential ecological, social, and economic impacts with regard to the size of a closure in this area of the Gulf of Mexico.

The reviewers felt that the rationale for preferred alternative B4 and benefit to HMS species appears extremely vague. Alternative B4 implements complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves. The reviewers stated that there was no indication as to the spatial size of such reserves and were confused by the statement that "any positive ecological impacts on HMS are expected to be minimal." The reviewers asked why the Gulf Fishery Management Council cannot enact appropriate regulations since the gag grouper problems and pelagic fishing exploitation appear mutually exclusive.

Complementary HMS management measures for the Madison-Swanson and Steamboat Lumps Marine Reserves are being preferred at the request of the Gulf of Mexico Fishery Management Council. The purpose of this alternative is to implement compatible HMS regulations in the Madison-Swanson and Steamboat Lumps Marine Reserves to provide protection for spawning aggregations of gag grouper to prevent overfishing, improve spawning success, protect a portion of the offshore population of male gag grouper, and facilitate continued evaluation of the effect and usefulness of marine reserves as a fishery management tool. Similar management measures are already in effect for holders of southeast regional permits. The complementary HMS management measures would close any potential loopholes by extending the closure regulations to all other vessels that could potentially fish in the areas. As a result, this alternative is expected to improve the enforcement of the Madison-Swanson and Steamboat Lumps Marine Reserves. Only minor impacts on HMS fisheries are anticipated because the marine reserves are relatively small, and little HMS fishing effort has been reported in these areas (*i.e.*, a total of three sets were recorded between 1996 and 2004). In addition, in the Draft HMS FMP and the Final HMS FMP, there is a figure that shows the spatial extent of these two reserves. In Chapter 2 of the Draft HMS FMP and the Final HMS FMP, it is explained that the Madison-Swanson Marine Reserve is 115 $nm^2$ in size, rectangular-shaped, and is positioned southwest of Apalachicola, FL (29° 17' N. Lat., 85° 50' W. Long. to 29° 17' N. Lat., 85° 38' W.

Long. to 29° 06' N. Lat., 85° 38' W. Long. to 29° 06' N. Lat., 85° 50' W. Long.). The Steamboat Lumps marine reserve is 104 $nm^2$ in size, rectangular-shaped, and is positioned due west of Clearwater, FL (28° 14' N. Lat., 84° 48' W. Long. to 28° 14' N. Lat., 84° 37' W. Long. to 28° 03' N. Lat., 84° 37' W. Long. to 28° 03' N. Lat., 84° 48' W. Long.

Finally, the Gulf of Mexico Fishery Management Council does not have the authority to change HMS regulations. Therefore, they have requested that NMFS implement complementary management measures in these areas.

The reviewers stated that the preferred alternative, B5, appeared to be straightforward, but did not add much more to the status quo. The reviewers asked if the current FMP already has criteria for regulatory framework adjustments for closures, given the fact that closures currently exist. Currently, formalized criteria for establishing or modifying closures do not exist in NMFS' regulations. NMFS can implement time/area closures under framework actions; however, the current regulations only allow for time/area restrictions under framework actions. In the Final HMS FMP, NMFS prefers to change the regulations so that additions, changes, or modifications to time/area closures would also be allowed under a framework action. The Final HMS FMP would further allow NMFS to change or implement a new time/area without an FMP amendment. Finally, NMFS prefers to establish the criteria to help make the overall process of implementing and/or modifying current time/area closures more transparent.

**Appendix A** was a very necessary appendix for following the discussion in section 4.1.2.

*Specific Comments:*

Essential Fish Habitat

B.1.1.2 Atlantic Bigeye Tuna (*Thunnus obesus*)

The reviewer stated that NMFS' description of bigeye tuna depth distributions to a depth of 250 m may have been incorrect. The reviewer was surprised, since archival tag data show routine behavior to 400 m and deeper, and much older studies also indicate these depths as part of the habitat in the Pacific. NMFS agrees that Atlantic bigeye tuna are regularly found deeper than 250 m and has amended the section to reflect this change. The new description currently reads "Although its distribution with depth in the water column varies, it is regularly found in deeper waters than are other tuna, descending to 300–500 m and then returning regularly to the surface layer (Musyl *et al*., 2003)."

## E.5 Peer Review by Paul J. Rago, NMFS NEFSC, January 25, 2006

Assigned Sections:

A. Standardized Bycatch Reporting Methodology
    1. Section 3.8.2 Standardized reporting of bycatch
B. Time/Area Closure Analyses
    1. Section 4.1.2 Time Area Closures
    2. Appendix A. Time/Area Closures
C. Essential Fish Habitat
    1. Chapter 10. Essential Fish Habitat
    2. Appendix B. Essential Fish Habitat

### A. Standardized Bycatch Reporting Methodology
### 1. Section 3.8.2 Standardized reporting of bycatch, pp 3-191 to 3-201.

This section primarily contains descriptive material on Standardized Bycatch Reporting Methodology (SBRM) and the data collection procedures for the various fisheries that harvest highly migratory species. The descriptive material draws heavily from the work of the National Working Group on Bycatch (NWGB) and other national initiatives on bycatch analyses. The discussions of tradeoffs between precision and sampling effort, and measures to estimate bias are useful. The report continues with a description of the two major sources of bycatch data—mandatory logbooks and fisheries observers. It further notes that the two sources of information can be used together to estimate total bycatch wherein logbook effort estimates are multiplied by observer-based bycatch rates.

This approach is used in the Pelagic longline fishery (Sec. 3.8.2.1). In recent years, observer sampling rates for this fishery were fairly high (6-9%) overall and 100% in the NED experimental fishery. The stratification by area and quarter should be sufficient to address spatial and temporal heterogeneity issues.

The purse seine fishery (3.8.2.2) also uses both observers and mandatory reporting but bycatch rates are apparently too low to warrant much observer coverage in recent years.

The shark bottom longline fishery (3.8.2.3) uses a combination of voluntary observer coverage (i.e., vessel is not required to take observer when asked) and a mandatory logbook for a subsample (20%) of the fleet. The sampling design seems appropriate, but the lack of validation of the bycatch rates reported by the selected fishermen compromises estimates based on this approach. If fleet size and number of trips makes it infeasible to require logbooks for all vessels, then some effort should be made to conduct experiments to validate voluntarily reported bycatch rates. For example, one could compare bycatch rates from selected vessels with and without observers present. In addition, use of observers on vessels not required to use logbooks, could be useful. Such experiments would provide a measure of the validity of the self-reported bycatch rates. As the report acknowledges earlier, self-reported bycatch estimates are likely to be negatively biased.

The shark gillnet fishery (3.8.2.4) is the first section that mentions estimated precision levels and required sampling effort. My comments regarding section 3.8.2.3 can be applied here as well.

Discussions of commercial (3.8.2.5) and recreational (3.8.2.6) handgear fisheries note either no estimates of bycatch or very imprecise estimates, respectively. These problems are well known and the efforts to collect improved estimates from the Charter/Headboat component should greatly improve our understanding of this harvest sector.

Section 3.8.4 (Evaluation and Monitoring of Bycatch) refers to section 3.4 for species specific information. Estimates of the CVs of bycatch estimates do not appear to be reported in this chapter. If available, a summary table showing the sampling coverage, bycatch rates, and CVs would be a useful contribution to the EA. It would also be useful to describe the types of estimators used in this EA. I have inferred that most are ratio based estimators within some sort of stratified design. If model based estimators, such as Generalized Additive Models, have been used, it would be useful to include some background information on same.

Section 3.8.5.2 on discard mortality is a useful summary of difficult topic. Inclusion of information on the Code of Angling Ethics, is also a useful contribution.

Overall the SBRM describes the fisheries and monitoring systems well. Available data may not yet permit useful estimates of precision or evaluations of accuracy. Research on both of these topics should be continued. Voluntary submissions of bycatch can be difficult to decipher. True zeros or low numbers are difficult to distinguish from under reporting or failure to report. As noted earlier, large scale comparisons among bycatch rates for observed and non-observed vessels should be conducted to support expansions based on subsets of total trips.

**B. Time/Area Closure Analyses**
**1. Section 4.1.2 Time Area Closures; Pp 4-20 to 4-101**
**2. Appendix A. Time/Area Closures**

The time area closure model is based on generally accepted principles in fisheries science. In general such models rely on a set of assumptions related of assumptions related to static patterns of relative abundance at some temporal and spatial resolution, limited consideration of fish movements, and incomplete understanding of the effects of closure areas on redistribution of fishing effort. Nonetheless, such models can provide useful insights for comparisons of alternative management strategies. This is the approach taken within this Draft EIS. Twelve combinations of seasonal and spatial closures are evaluated in Section 4.1.2. Without such a model there would be no pragmatic way of comparing the proposed closed areas. In general it is probably safe to assume that the limitations of the model will be comparable across alternatives. Thus the rankings of each alternative should be relatively insensitive to the assumptions.

The model assumptions and application are well described in Appendix A. In particular the comparisons of model results with and without redistribution of existing effort are shown clearly. It should be noted however, that the use "plus" and "minus" signs in the Appendix is not consistent. Table A.1 uses a minus sign to denote a decrease in discards, and plus for increases. In contrast, Table A.28 uses a minus to denote an increase in discards and plus sign to denote a decrease. This can be seen in table A.1 for Loggerhead discards under alternative B2(d) with redistribution of effort (p.A-6) which has a value of 117. In table A.28 in the total column for column I (p. A-37) the comparable value is -117. It may be useful to make the example consistent with the usage elsewhere in the document.

For any given management alternative, the lack of consistent effects across species is also a useful conclusion from the time-area closure model. It highlights the complexity of the bycatch estimation and illustrates the importance of general effort reduction in conjunction with closure strategies. For example, it might be argued that the demonstrated declines in bycatch associated with the existing closures (alternative B1) seem to be related to a 15% reduction in effort induced by, or coincident with, the closure areas (p. 4-38).

The model discussion could be improved by emphasizing some of the assumptions more explicitly. Past patterns can be used to predict future patterns of abundance only if the distributions are persistent across years. The model assumes that CPUE or bycatch per unit effort is independent of the amount of effort present in the open area. The initial distribution of CPUE may be a valid estimate of conditions at the start of the closure. However, if fishing mortality is sufficiently high to reduce abundance, then CPUE will decline. Under these conditions, the use of a dynamic model that links abundance levels between closure periods or among closure areas would be an appropriate tool. Data necessary to support such a model for management do not appear to exist at present. Consideration should be given to the development of an operational/simulation model that embeds hypothesized fish movement patterns, fleet dynamics, and arbitrary closure area times and boundaries. Such a model would elucidate the effects of the current model assumptions that do not appear to explicitly treat species-specific movements among open and closed areas.

As noted in the report, the fleet itself is highly mobile and its ability to find fish concentrations in the open areas would tend to further diminish the effectiveness of the closure areas. By the same token, fleet mobility may also allow it to move away from high concentrations of undesirable bycatch. Fleet mobility, coupled with appropriate incentives (positive or negative) could lead to reduced bycatch. In the absence of such incentives, the assumption that fleet effort is uniformly redistributed over the open areas, is compromised. Fishermen seek profits rather than CPUE. Thus the assumptions about redistribution of effort in response to management alternatives might be improved by considering redistributions based on another simplified model, such as distance from shore or some other surrogate measure for variable costs. It may be too facile to state that the “with” and “without” redistribution of effort scenarios are sufficient to bound the effectiveness of management alternatives.

The efficacy of alternative B5 would be enhanced by developing a comprehensive procedure for evaluating tradeoffs among alternatives. Otherwise the proposed process is rather ambiguous and seems to mimic the standard Council process. All of the factors listed need to be considered and the goals of transparency and predictability are noble. However, the huge number of potential alternatives need to be evaluated and ranked quickly. Otherwise, the debates will paralyze the process. Formal procedures for considering multiple objectives and constraints, and establishing tradeoffs should be an adjunct to this alternative.

On an editorial note, I found the use of CPUE to describe both landings (kept) and discard measures somewhat confusing. This ambiguity is especially confusing when one is considering the effects of reallocating effort in response to closed areas. In general one would expect the reallocation to be redirected toward areas of highest kept CPUEs rather than high discard CPUEs.

Overall the analytical approach seems sound. It is consistent with the limitations of the data and lack of explicit understanding of migrations. Improvements may be possible by incorporating explicit movement patterns of the fish and protected resources, and fleet dynamics. Such improvements to model structure would have to be weighed against the suitability of existing data to support such a model, and the available time to implement such a model. If sufficient time is not available, then development of such a model should be considered as part of future management of HMS.

**C. Essential Fish Habitat**
**1. Chapter 10. Essential Fish Habitat**
**2. Appendix B. Essential Fish Habitat**

This review of EFH appears to be very thorough. The review is not restricted to the published literature and appears to fully, and appropriately use the existing databases from a wide number of government and private institutions. Moreover, the review draws extensively from experts in the scientific community. Both Chapter 10 and Appendix B are well written and technically sound.

The difficulties of evaluating EFH for HMS are perhaps best stated on page 10-20 "…the quantitative relationships between fishery production and habitat are very complex, and no reliable models currently exist. Accordingly, the degree to which habitat alterations have affected fishery production is unknown."

Appendix B appears to be an extraordinarily comprehensive and thorough compilation of existing data on the life history and distribution of HMS. The only cautionary comment I would have is that one should be careful when drawing conclusions about distributions derived from multiple data sets. Apparent habitat associations can be aliased with the sampling domains of specific programs. Different gears, sampling strategies and so forth can make it difficult to distinguish differences in sampling intensity from differences in true habitat usage. Percentile scale measures (e.g., quartiles) could be considered when multiple databases are depicted

## E.6 Response to OMB Peer Review by Paul J. Rago, NMFS NEFSC, January 25, 2006

*A. Standardized Bycatch Reporting Methodology*

*1. Section 3.8.2 Standardized reporting of bycatch. Pp 3-191 to 3-201*

The reviewer appears to have been confused regarding the observer coverage and reporting requirements for the shark bottom longline fishery. To clarify, vessels are currently required to take an observer when selected, voluntary coverage was employed prior to this. In addition, all vessels participating in the bottom longline fishery are required to submit logbook reports for each trip. NMFS agrees that the analyses suggested by the reviewer to compare bycatch rates between observed and reported trips are still valid and should be conducted. Observer coverage and reporting requirements for the shark gillnet fishery are also similar in addition to the one hundred percent observer coverage required during right whale season.

The reviewer notes the lack of or imprecise estimates of bycatch in the commercial and recreational handgear fisheries. NMFS recognizes the desire to make improvements in the collection of recreational (and commercial) handgear catch and landings data. At the request of NMFS, the NAS recently conducted a review of marine recreational surveys, both state and federal. The review committee's report has been published and the Agency is evaluating the recommendations.

*B. Time/Area Closure Analyses*

*1. Section 4.1.2 Time Area Closures; Pp 4-20 to 4-101*

*2. Appendix A. Time/Area Closures*

The reviewer noted that the use of "plus" and "minus" signs in the Appendix A was not consistent. In the Draft HMS FMP, Table A.1 used a minus sign to denote a decrease in discards, and a plus for increases. In contrast, Table A.28 used a minus to denote an increase in discards and a plus sign to denote a decrease. This could be seen in Table A.1 for loggerhead discards under alternative B2(d) with redistribution of effort, which had a value of 117. In Table A.28 in the total column for column I, the comparable value was -117. The reviewer stated that it may be useful to make the example consistent with the usage elsewhere in the document. NMFS recognized this inconsistency and made all the minus and plus sign consistent throughout Appendix A and other appropriate chapters.

The reviewer stated that it might be argued that the demonstrated declines in bycatch associated with the existing closures (alternative B1) seem to be related to a 15 percent reduction in effort induced by, or coincident with, the closure areas. While NMFS agrees that the reduction in bycatch may be related to the current time/area closure, NMFS also realizes that other factors may be attributing to the decline. These include: (1) stocks may be declining; (2) time/area closures may have acted synergistically with declining stocks to produce greater declines in catch than predicted; (3) fishermen may have left the fishery; and (4) fishing effort may have been displaced into areas with lower CPUEs.

The reviewer stated that the model discussion could be improved by emphasizing some of the assumptions more explicitly. The reviewer suggested that past patterns can be used to predict future patterns of abundance only if the distributions are persistent across years. NMFS explored different assumptions regarding the movement of the PLL fleet and how more limited movements by the fleet may affect predictions regarding bycatch reduction. As explained in the response to the Skomal review, NMFS investigated the movement of the PLL fleet from 2001 through June of 2004 to see where vessels fished in relation to their reported homeports. Based on these analyses, NMFS evaluated different scenarios of the redistribution of effort model where each scenario had different assumptions regarding where effort from a closure would be displaced. Taken with the results of not considering redistribution of effort to the full effort redistribution model, these additional scenarios provide estimates of changes in bycatch and retained catch somewhere in-between the two base scenarios (*i.e.*, some movement is expected, and thus, some redistribution of effort is expected into a particular area).

The reviewer stated that the model assumes that CPUE or bycatch per unit effort is independent of the amount of effort present in the open area. The initial distribution of CPUE may be a valid estimate of conditions at the start of the closure. However, if fishing mortality is sufficiently high to reduce abundance, then CPUE would decline. Under these conditions, the use of a dynamic model that links abundance levels between closure periods or among closure areas would be an appropriate tool. Data necessary to support such a model for management do not appear to exist at present. The reviewer suggested that consideration should be given to the development of an operational/simulation model that embeds hypothesized fish movement patterns, fleet dynamics, and arbitrary closure area times and boundaries. Such a model would elucidate the effects of the current model assumptions that do not appear to explicitly treat species-specific movements among open and closed areas.

NMFS acknowledges that the redistribution of effort model is incapable of making predictions based on a declining CPUE. Instead, the model assumes a current CPUE that remains constant in the remaining open areas when estimating reductions. While NMFS would like to develop a dynamic model that links abundance levels between closure periods or among closure areas, as the reviewer has pointed out, the data necessary to build such a model are not available at the present time. NMFS is working on improving the effort redistribution models to be used in the future as more appropriate data become available.

The reviewer stated that as noted in the VMS remand report, the fleet itself is highly mobile, and its ability to find fish concentrations in the open areas would tend to further diminish the effectiveness of the closure areas. By the same token, the reviewer argued that fleet mobility may also allow it to move away from high concentrations of undesirable bycatch. Fleet mobility, coupled with appropriate incentives (positive or negative) could lead to reduced bycatch. In the absence of such incentives, the assumption that fleet effort is uniformly redistributed over the open areas is compromised. The reviewer stated that fishermen seek profits rather than CPUE. Thus, the reviewer suggested that the assumptions about redistribution of effort in response to management alternatives might be improved by considering redistributions based on another simplified model, such as distance from shore or some other surrogate measure for variable costs. The reviewer stated that it may be too facile to state that the “with” and “without” redistribution of effort scenarios are sufficient to bound the effectiveness of management alternatives.

Predicting fishermen’s behavior in light of changing management measures is difficult. In addition, while many fishermen may want to avoid bycatch, many of the retained HMS coexist with non-target HMS, such as bluefin and yellowfin tuna in the Gulf of Mexico. Therefore, it could be potentially difficult for fishermen to avoid bycatch while fishing for retained HMS. However, NMFS is considering research on how changes in fishing practices may help reduce bycatch on non-target species as well as the tracking of discards (dead and alive) by all gear types. NMFS is also considering developing incentives that would dissuade fishermen from keeping incidentally caught species, such as BFT. This is of particular concern for incidentally caught spawning BFT in the Gulf of Mexico.

In the future, NMFS intends to investigate the choices fishermen have made regarding previous closures (*i.e.*, did they move, sell their permits, go out of business, retain their permit but fish for something else, etc?). This type of analysis could help NMFS improve the redistribution of effort models used in the future. While the current redistribution of models may appear overly simplified, they account for the fact that effort would be displaced out of closed areas and acknowledge that there are likely to be areas where bycatch might increase. However, NMFS will continue investigate ways to better predict fishermen's fishing behaviors and refine the current redistribution of fishing effort models.

The reviewer stated that the efficacy of alternative B5 would be enhanced by developing a comprehensive procedure for evaluating tradeoffs among alternatives. Otherwise the reviewer felt that the proposed process was rather ambiguous and seems to mimic the standard Council process. The reviewer noted that all of the factors listed need to be considered and stated that the goals of transparency and predictability are noble. However, the reviewer felt that the huge number of potential alternatives needed to be evaluated and ranked quickly. Otherwise, the debates would paralyze the process. The reviewer said that formal procedures for considering multiple objectives and constraints, and establishing tradeoffs should be an adjunct to this alternative.

As explained in the responses to the Skomal and the Bigelow and Boggs review, while not a formalized decision matrix, NMFS used the analyses in time/area closure section, which considered all species, to evaluate the effects of the proposed time/area closures, including all species for a combination of closures. NMFS used the results of the analyses to guide the Agency in determining which management measures are appropriate at this time. This approach does not preclude NMFS from considering the establishment of a more formalized decision matrix in the future if such a matrix could be designed that would provide for the flexibility to consider all the species involved. This may be more appropriate when NMFS has a longer temporal dataset on the simultaneous effect of circle hooks and the current time/closures. At this time, NMFS believes that the criteria contained in the preferred alternative B5 provides the guidance needed, consistent with the Magnuson-Stevens Act and this FMP, to help NMFS make the appropriate decisions regarding the use of time/area closures in HMS fisheries.

The reviewer felt that the use of CPUE to describe both landings (kept) and discard measures somewhat confusing. The reviewer stated that this ambiguity was especially confusing when one was considering the effects of reallocating effort in response to closed areas. The reviewer stated that one would expect the reallocation to be redirected toward areas of highest kept CPUEs rather than high discard CPUEs.

As explained in the response to the Bigelow and Boggs review, NMFS did not use CPUEs for its final selection of time/area closures. Only absolute numbers of bycatch, discards, and retained catch were used to select areas for potential closures, and absolute numbers were used for its analyses of both with and without the redistribution of fishing effort. The redistribution of effort scenarios calculated increases in bycatch, discards, and retained catch by multiplying the effort that was being redistributed from a given closures by the CPUE for each species in the particular open areas under consideration (*i.e*., either all remaining open areas, the Atlantic seaboard only, the Gulf of Mexico only, or the Gulf of Mexico and Area 6 in the Atlantic). NMFS then subtracted this number from the estimated reduction inside the closed area. Since many of these areas include areas of high CPUEs for both targeted catch as well as non-target catch, it would be almost impossible to redistribute effort to areas of high CPUEs for retained catch only. However, NMFS intends to investigate the choices fishermen have made regarding previous closures (*i.e*., did they move, sell their permits, go out of business, retain their permit but fish for something else, etc?). This type of analysis could help NMFS improve the effort redistribution models to be used in the future.

The reviewer suggested that improvements may be possible by incorporating explicit movement patterns of the fish and protected resources, and fleet dynamics. The reviewer stated that such improvements to model structure would have to be weighed against the suitability of existing data to support such a model, and the available time to implement such a model. The reviewer noted that if sufficient time is not available, then development of such a model should be considered as part of future management of HMS. NMFS acknowledges that improvements can be made to the current redistribution of effort model; however, at this time, NMFS does not have the necessary data to make such improvements nor did NMFS have sufficient time between the Draft HMS FMP and the Final HMS FMP to investigate and reanalyze the data with regards to a substantially different redistribution of effort model. NMFS is working on improving the effort redistribution models used in the future as more appropriate data become available.

*C. Essential Fish Habitat*

*1. Chapter 10. Essential Fish Habitat*

*2. Appendix B. Essential Fish Habitat*

The peer reviewer noted that "Appendix B appears to be an extraordinarily comprehensive and thorough compilation of existing data on the life history and distribution of HMS. The only cautionary comment I would have is that one should be careful when drawing conclusions about distributions derived from multiple data sets. Apparent habitat associations can be aliased with the sampling domains of specific programs. Different gears, sampling strategies and so forth can make it difficult to distinguish differences in sampling intensity from differences in true habitat usage. Percentile scale measures (e.g., quartiles) could be considered when multiple databases are depicted."

NMFS agrees that the sampling program, strategy, and methodology used may have an influence on the apparent distribution of a particular species, and that one should use caution when interpreting the results. In part this is why NMFS has included the names of the programs used to collect the data and the number of observations contributed by each program. This additional information should help NMFS technical experts to decide how much weight should be given to a particular dataset. NMFS plans to convene workshops with technical experts who will thoroughly review the data and help to make a determination about which areas should be included as EFH. The distribution data in the maps will one of many contributing factors in that ultimate decision.