Five-Year Review of the Effects of Amendment 80

Prepared for

North Pacific Fishery Management Council

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Prepared by

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Abbreviations

§	Section
X^2	Chi-Square
ABC	Acceptable biological catch
AFA	American Fisheries Act
ACSA	Alternate Compliance and Safety Agreement
ADF&G	Alaska Department of Fish and Game
AFSC	Alaska Fisheries Science Center
AGC	Alaska Groundfish Cooperative
AI	Aleutian Islands
AKFIN	Alaska Fisheries Information Network
AKSC	Alaska Seafood Cooperative
AM80	Amendment 80
AM80 LA	AM80 Limited Entry Fishery
AS	Alaska Statute
BS	Bering Sea
BSAI	Bering Sea/Aleutian Islands
BUC	Best Use Cooperative
CAA	Catch and Area
CAS	Catch Accounting System
CDQ	Western Alaska Community Development Quota Program
COAR	ADF&G Commercial Operator Annual Report
CP	Catcher/processor
CQ	Cooperative Quota
CV	Catcher vessel
DCF	Discounted cash flow
DNR	Alaska Department of Natural Resources
EDR	Economic Data Report
FBT	Fishery Business Tax
FCA	Fishing Company of Alaska
FFP	Flatfish Flexibility Plan
FL	Freezer-longliner
FMP	Fishery Management Plan

FRT	Fishery Resource Tax
FTE	Full-time equivalent worker
GOA	Gulf of Alaska
GRS	Groundfish Retention Standards
H&G	Headed and gutted
HR	Human resources
IRR	Internal rate of return
ITAC	Initial Total Allowable Catch
kg	Kilograms
LAPP	Limited Access Privilege Program
LOA	Length overall
MSA	Magnuson-Stevens Fishery Conservation and Management Act
mt	Metric tons
NIOSH	National Institute for Occupational Safety and Health
NBBTA	Northern Bristol Bay Trawl Area
NMFS	National Marine Fisheries Service
NMFS-AKR	NMFS Alaska Region
NPFMC	North Pacific Fishery Management Council
NPV	Net present value
OFL	Overfishing level
PSC	Prohibited Species Catch
PSQ	Prohibited species quota
QS	Quota Share
ROCE	Return on capital employed
RWE	Round weight equivalent
SSC	Scientific and Statistical Committee
TAC	Total Allowable Catch
TLA	Trawl Limited Access
U.S.	United States
USCG	United States Coast Guard
VMS	Vessel Monitoring System

Executive Summary

The Executive Summary (ES) provides an overview of all activities in the Amendment 80 (AM80) sector. The first section of the ES describes all harvesting and processing of the AM80 fleet of catcher processors (CPs) in both the Gulf of Alaska (GOA) and the Bering Sea/Aleutian Islands (BSAI), including catch and processing associated with the Western Alaska Community Development Quota Program (CDQ) and processing that AM80 vessels have undertaken while acting as motherships. The first ES section then discusses operating costs and estimates of net operating residuals.

Following the overview, the ES examines the goals and objectives set by the Council in developing the AM80 program. This section of the ES includes summary tables and figures that specifically address the question of whether and the extent to which, the Council's AM80 goals and objectives have been attained.

Overview of AM80 Catch, Processing, Revenues and Operating Residuals.

Table ES-1 and Figure ES-1 summarize total catch and total wholesale revenue in all AM80 fisheries in both the BSAI and the GOA, including CDQs and processed catch of AM80 motherships. From 2003–2006 total groundfish catch ranged between 319,000 to 333,000 metric tons (mt) before increasing in 2007 to 347,000 mt. In 2008, total catch by all AM80 vessels (including mothership deliveries) jumped to 385,000 mt and from 2010–2012 averaged 392,000 mt. Overall increases in total wholesale revenues in recent years have been even more pronounced than increases in tonnage. Although total revenues declined in 2008 and 2009, they surged upward in 2010 and, in 2011, exceeded $1,000 per ton harvested in real values ($2012) for the first time.

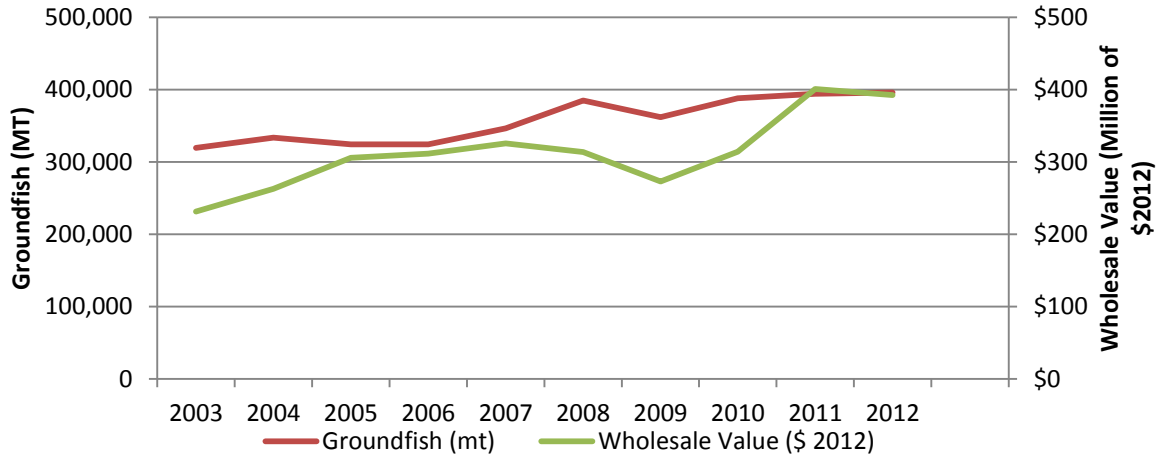
Table ES-1. Total Catch and Wholesale Value of Groundfish of All AM80 Vessels in the BSAI and GOA

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	319,530	333,552	324,345	324,437	346,659	384,987	362,090	387,881	394,133	396,182
Wholesale $ Millions (2012)	$231.29	$262.68	$305.88	$311.71	$325.86	$313.84	$273.08	$314.28	$400.87	$392.56

Note: Includes all AM80 CPs along with their CDQ and mothership activities.

Source: Table developed by Northern Economics from Catch Accounting System (CAS) data provided by Alaska Fisheries Information Network (AKFIN) (Fey, 2014).

Figure ES-1. Total Volume and Wholesale Value of Groundfish Catch for All AM80 Vessels in the BSAI and GOA



Note: Includes all AM80 CPs along with their CDQ and mothership activities.

Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table ES-2 shows the relative importance of the BSAI and the GOA to AM80 vessels in terms of total groundfish catch and revenue. The table also shows the number of active vessels in the both the BSAI and the GOA, as well as the number of vessels that fished only in either the BSAI or the GOA. As can be inferred from the table, the relative importance of the GOA and the BSAI to the AM80 fleet has not changed significantly overall—over the 10-year period, 92 percent of the catch and 91 percent of the revenue have come from the BSAI.

The review of vessel activity also shows that the number of vessels active only in the Bering Sea fell to four from 2009–2011, and only one AM80 vessel (the Golden Fleece) has participated exclusively in the GOA since the program was implemented.

Table ES-2. Comparison of Total Catch and Revenue between the BSAI and GOA with Participation Levels

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BSAI Catch ÷ All Catch	88%	94%	93%	91%	93%	94%	93%	93%	93%	93%
BSAI Revenue ÷ All Revenue	86%	92%	91%	89%	93%	93%	92%	92%	91%	92%
GOA Catch ÷ All Catch	12%	6%	7%	9%	7%	6%	7%	7%	7%	7%
GOA Revenue ÷ All Revenue	14%	8%	9%	11%	7%	7%	8%	8%	9%	8%
Vessels Active in Both FMP Areas	20	15	15	15	14	12	17	16	16	16
Vessels Active in the BSAI Only	2	7	7	7	8	10	4	4	4	4
Vessels Active in the GOA Only	0	0	0	0	0	1	0	0	0	0
Total Number of Active Vessels	**22**	**22**	**22**	**22**	**22**	**23**	**21**	**20**	**20**	**20**

Note: Includes all AM80 CPs along with their CDQ and mothership activities.

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

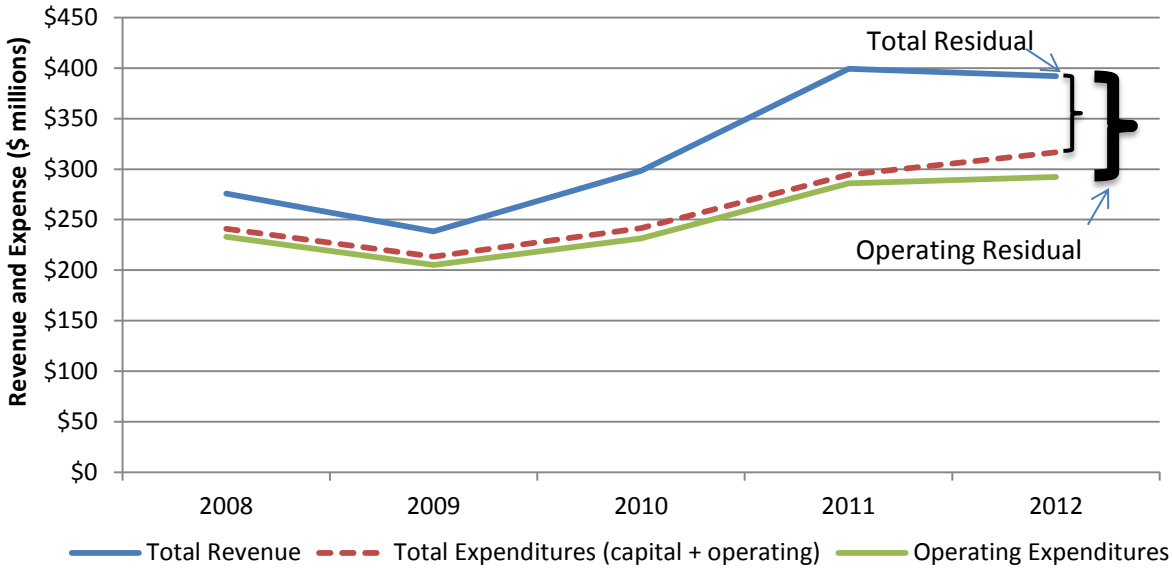
Table ES-3 summarizes fleet-wide revenue and expenses as reported in the Economic Data Reports (EDRs) that are now required under AM80. The tables show reported revenues, capital expenses, and operating expenses that were included in the EDRs from 2008-2012. It should be noted that EDRs are required of all vessels that have applied for quota share (QS) under AM80. The EDRs include revenues and expenditures of two vessels that have not been active at any time since implementation of AM80 in 2008, as well as revenues and expenditures of three other vessels that have exhibited relatively sporadic activity. Table ES-3 and Figure ES-2 summarize revenues and expenses for the AM80 fleet, as reported in the EDS from 2008-2012. Since implementation of the AM80 in 2008 there has been a steady increase in overall operating residuals for AM80 owners and operators. While it is probably too early to be certain, it appears that operating residuals have improved over time under AM80. There are no data for residuals prior to 2008, but AM80 active owners and operators report that they are better off under AM80 than before.

Table ES-3. Summary of EDR Revenues and Expenses over All AM80 Vessels, 2008–2012

	2008		2009		2010		2011		2012		2008 – 2012 Average	
EDR Expenditure Item	**$ million**	**%**	**$ million**	**%**	**$ million**	**%**	**$ million**	**%**	**$ million**	**%**	**$ million**	**%**
Total Revenue	**275.7**	***100%***	**238.5**	***100%***	**298.3**	***100%***	**399.3**	***100%***	**392.1**	***100%***	**320.8**	***100%***
Capital Expenditures	**(7.9)**	***2.9%***	**(8.3)**	***3.5%***	**(10.1)**	***3.4%***	**(8.5)**	***2.1%***	**(24.2)**	***6.2%***	**(11.8)**	***3.7%***
Operating Expenditures	**(232.9)**	***84.5%***	**(205.1)**	***86.0%***	**(231.4)**	***77.6%***	**(286.1)**	***71.6%***	**(292.3)**	***74.6%***	**(249.6)**	***77.8%***
Operating Residual (Total Rev. - Operating Expenditures)	**42.9**	***15.5%***	**33.3**	***14.0%***	**66.9**	***22.4%***	**113.3**	***28.4%***	**99.8**	***25.4%***	**71.2**	***22.2%***
Total Residual (Total Rev. - All Expenditures)	**34.9**	***12.7%***	**25.0**	***10.5%***	**56.7**	***19.0%***	**104.8**	***26.3%***	**75.6**	***19.3%***	**59.4**	***18.5%***

Source: Developed by Northern Economics from EDR Data from provided by AKFIN (Fey, 2014)

Figure ES-2. EDR Revenues and Expenses of all AM80 Vessels, 2008–2012



Note: EDR revenues and expenses have not been adjusted for inflation.
Source: Developed by Northern Economics from EDR Data from provided by AKFIN (Fey, 2014)

Goals and Objectives of AM80

The AM80 Problem Statement provided in full in Section 1.2 articulates six specific goals and implicitly includes a seventh. These are listed below:

1. To maintain a healthy marine ecosystem to ensure the long-term conservation and abundance of the groundfish and crab resources;
2. To reduce bycatch;
3. To minimize waste and improve utilization to the extent practical;
4. To provide maximum benefit to present generations of fishermen, including CDQ groups, communities, and the nation as a whole;
5. To further rationalize the fishery as a means to mitigate costs of achieving the goals of bycatch reduction and other program objectives;
6. To minimize negative impacts on other fisheries;
7. To apportion the yellowfin sole fishery between the AM80 Sector and the BSAI Trawl Limited Access (BSAI TLA) Sector.

AM80 Goal 1: To maintain a healthy marine ecosystem to ensure the long-term conservation and abundance of the groundfish and crab resources

AM80 has led to the near elimination of the race for fish in the BSAI non-pelagic trawl fisheries. No longer forced by the race for fish to maximize catch and revenue per unit of time, participants in these fisheries have been much more amenable to gear changes and other behavioral changes that have reduced negative impacts of non-pelagic trawling on the ecosystem. Examples include the use of modified trawl doors and sweeps, ongoing experiments with gear modifications, and the use of excluders and deck sorting to reduce bycatch mortality. More detailed discussions of these points are

included in Section 3.1.7.3, which examines the issue of innovation and experimentation, as well as in Section 5, which discusses the move to gear modifications that lift trawl sweeps off bottom.

AM80 Goal 2: To reduce bycatch—a priority focus of AM80

AM80 subdivided the halibut PSC allocation to the trawl sectors, with 875 metric tons (mt) allocated to the BSAI TLA sector and the remainder assigned to the AM80 sector. AM80 also reduced the total PSC allocated to the trawl sector, in general, and to the AM80 sector, in particular. The AM80 sector was allocated 2,525 mt in 2008, with the amount reduced 50 mt each year through 2012. In years 2012 and beyond, the AM80 PSC allocation of halibut PSC was set at 2,325 mt. AM80 also establishes a halibut prohibited species quota (PSQ) for CDQ harvests. The 5-year review summarizes halibut PSC in the AM80, CDQ, and BSAI TLA fisheries for AM80 species.

AM80 also sets an initial AM80 Crab PSQ percentage based on historical usage from 1995–2002 in all groundfish fisheries. The crab PSQs have been reduced five percent per year from 2009–2012, such that by 2012 PSQs for crab species are set at 80 percent of historical usage. The five-year review will summarize crab PSC in the BSAI TLA and AM80 Sectors and in CDQ fisheries for AM80 species. The crab PSQs under AM80 are abundance-based limits. The five-year review documents crab PSC limits and use in the AM80, CDQ, and BSAI TLA fisheries, as well bycatch of herring and salmon.

Analysis of catch of various prohibited species in the BSAI sector over the five-year periods before and after the implementation of the AM80 regulations reveals pronounced declines in bycatch volumes across species over the five years ending 2012. Similarly, bycatch rates for these prohibited species, measured as the ratio of volume of prohibited species catch to volume of groundfish catch, dropped off considerably in BSAI sector from 2003–2007 to the following five years.

Declines in bycatch rates for these species—including halibut, herring, king and tanner crab, and Chinook and other salmon—ranged from 32 percent (halibut) to 82 percent (Chinook), while declines in total volumes of prohibited species catch ranged from 18 percent (king crab) to 79 percent (Chinook). That declines in catch of each of these prohibited species occurred, on average, following the initiation of the AM80 regulations suggests that they are having the intended effect of reducing bycatch. Importantly, reductions in bycatch did not occur at the expense of the groundfish catch. Indeed, both the average total groundfish catch and wholesale value of the catch were higher from 2008–2012 than over the prior five years. The following three figures show AM80 PSC trends in the BSAI, while the two tables that follow provide the details of total PSC and PSC rates.

Figure ES-3. Herring and Halibut Bycatch by AM80 BSAI Fisheries, 2003–2012

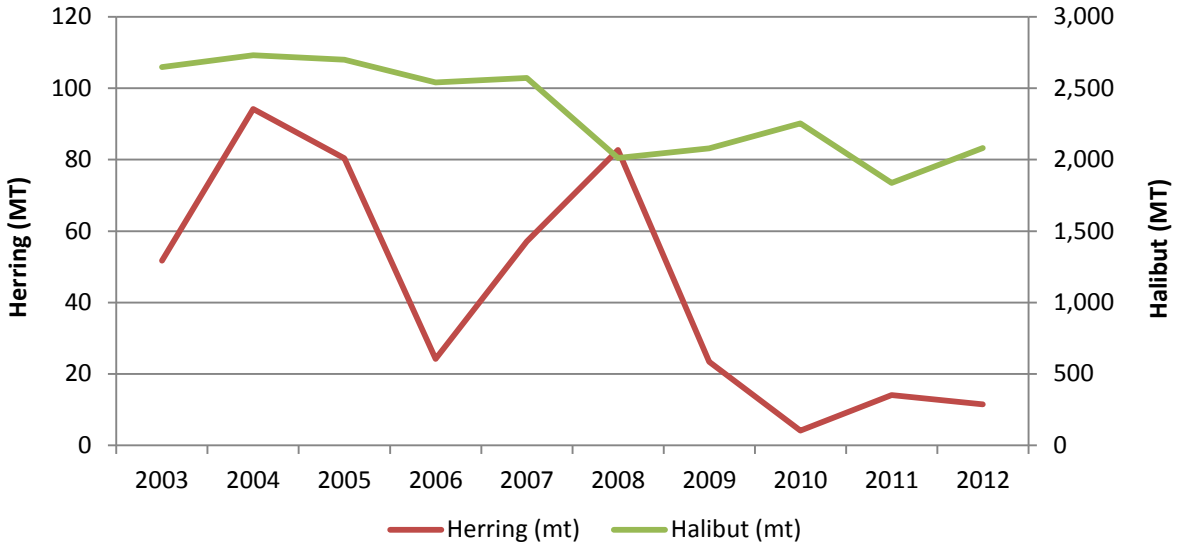
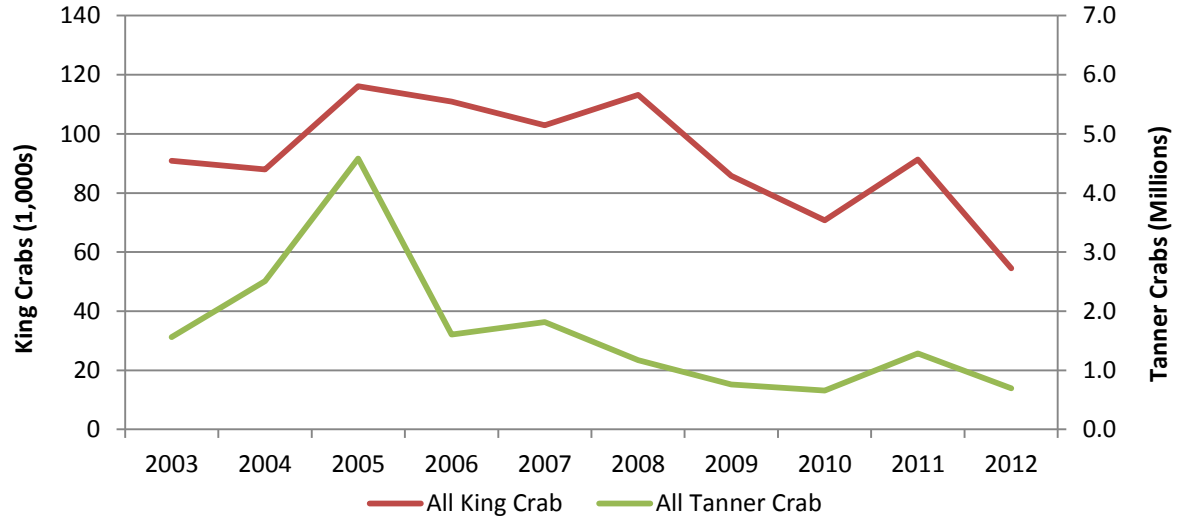
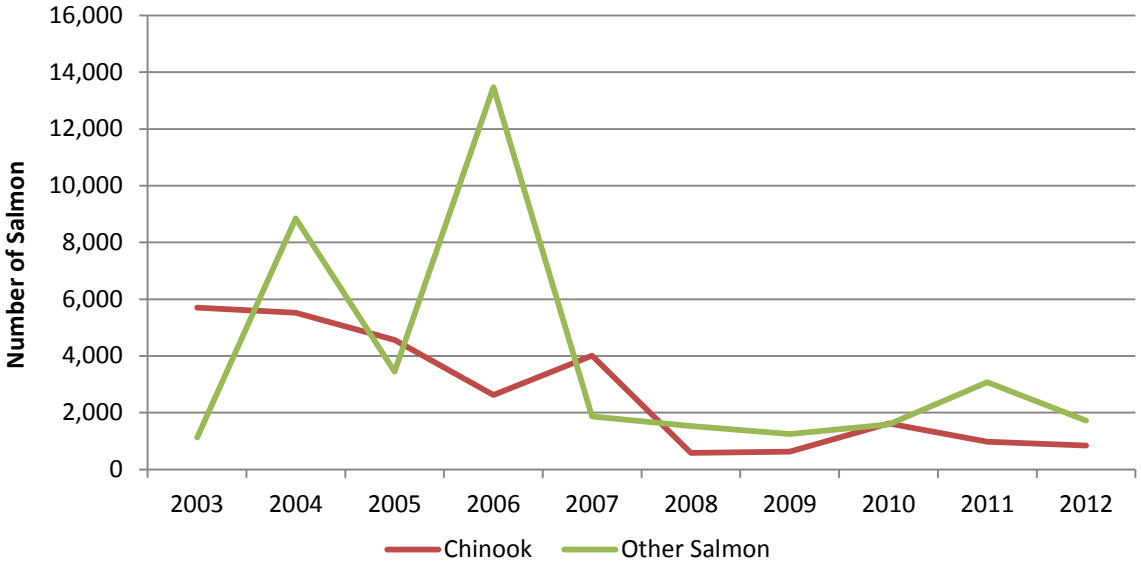


Figure ES-4. King Crab and Tanner Crab Bycatch by AM80 BSAI Fisheries, 2003–2012



Source: Both figures developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure ES-5. Bycatch of Salmon Species by AM80 BSAI Fisheries, 2003–2012



Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table ES-4. Bycatch of Prohibited Species in the AM80 BSAI Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	2,649	2,732	2,700	2,540	2,572	2,012	2,080	2,255	1,838	2,082
PSC King Crab (#s)	90,901	87,997	116,133	110,893	102,852	113,163	85,794	70,726	91,270	54,539
PSC Bairdi Crab (#s)	608,798	1,734,731	3,118,248	832,166	1,214,389	615,392	364,563	267,030	484,842	339,775
PSC Opilio Crab (#s)	951,732	774,933	1,461,852	770,884	602,427	554,482	396,036	389,198	802,076	352,912
PSC Herring (kg)	51,692	94,193	80,387	24,252	57,103	82,703	23,401	4,117	14,048	11,445
PSC Chinook (#s)	5,698	5,526	4,567	2,625	4,010	583	623	1,625	983	848
PSC non-Chinook (#s)	1,126	8,854	3,442	13,468	1,866	1,535	1,247	1,589	3,078	1,717

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table ES-5. Bycatch Rates in the AM80 BSAI Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0099	0.0092	0.0095	0.0091	0.0087	0.0060	0.0066	0.0067	0.0057	0.0064
PSC King Crab (#/mt)	0.3387	0.2959	0.4072	0.3969	0.3488	0.3400	0.2726	0.2100	0.2811	0.1668
PSC Bairdi Rate (#/mt)	2.2682	5.8328	10.9349	2.9785	4.1182	1.8491	1.1584	0.7929	1.4933	1.0390
PSC Opilio Rate (#/mt)	3.5459	2.6056	5.1263	2.7591	2.0429	1.6660	1.2584	1.1557	2.4703	1.0792
PSC Herring Rate (kg/mt)	0.1926	0.3167	0.2819	0.0868	0.1936	0.2485	0.0744	0.0122	0.0433	0.0350
PSC Chinook (#/mt)	0.0212	0.0186	0.0160	0.0094	0.0136	0.0018	0.0020	0.0048	0.0030	0.0026
PSC non-Chinook (#/mt)	0.0042	0.0298	0.0121	0.0482	0.0063	0.0046	0.0040	0.0047	0.0095	0.0053

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

AM80 Goal 3: Minimize waste and improve utilization to the extent practical.

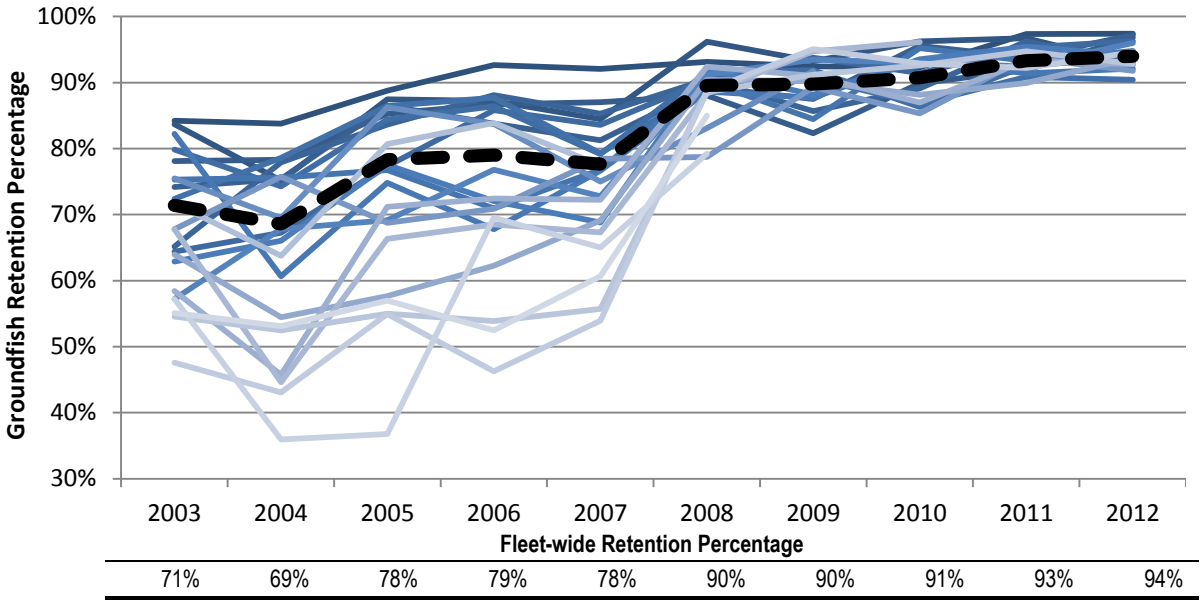
A major goal of AM80 is the improvement of retention and utilization of groundfish within the AM80 sector. To this end, it was presumed that the establishment of multispecies cooperatives could lead to greater retention improvements and could provide cost-effective means for the sector to meet the Groundfish Retention Standards (GRS) approved by the Council in 2003 under Amendment 79. GRS would require AM80 CPs, if they were > 125′, to meet standards for retention of BSAI groundfish

each year. The GRS for 2008 was set at 65 percent and by 2010 it would increase to 80 percent. In 2011 and each subsequent year, the GRS would be set at 85 percent. The regulations governing the implementation of AM80 effectively supersede those proposed for implementation under the GRS. Under AM80 regulations, the retention standards set by GRS will still apply to any AM80 cooperative as an aggregate. Meanwhile, vessels that do not join an AM80 cooperative must comply with GRS percentages on an individual basis.

Figure ES-6 shows estimated groundfish retention percentages of AM80 for individual vessels operating in the BSAI from 2003–2012, noting that estimated retention rates for the vessels with the lowest four retention percentages have been deleted for the years 2009–2012 to prevent disclosure of confidential information. The heavy black dashed line shows the estimated average retention percentage of all of the vessels in the AM80 sector operating in the BSAI. The fleet-wide weighted average is also summarized in the table embedded at the bottom of the figure and includes vessels excluded from the figure.

The data summarized in the figure include catch and retention from CDQ fisheries, as well as catch and retention of AM80 vessels when they are acting as motherships in the BSAI TLA fisheries. It should also be noted that the figure uses retention estimates based on observer data in the CAS. As is clearly evident from the graphic, overall levels of groundfish retention increased significantly from the low of 69 percent seen in 2004. In 2005, the weighted average retention jumped to 78 percent, but five vessels still had retention percentages below 60 percent. From 2005–2007, overall retention remained between 78 and 79 percent. The fleet's overall retention improved to 90 percent with the implementation of AM80 and the modified GRS in 2008, with all but two vessels (not shown) achieving a rate well above 80 percent. The overall weighted average retention percentages of the fleet have improved every year under AM80 and, in 2012, were estimated at 94 percent.

Figure ES-6. Groundfish Retention Percentages in the BSAI by AM80 Vessels, 2003–2010



Notes:

1) Includes retention of AM80 vessels acting as motherships and catches in the CDQ fisheries.
2) In order to protect the confidentiality of the data, the lines of lowest four the participating vessels from 2009 – 2012 have been excluded from the figure, but their retention is included in the fleet averages.
3) Retention percentages were calculated by Northern Economics from CAS data.

Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

AM80 Goal 4: To provide maximum benefit to present generations of fishermen, including CDQ groups, communities, and the nation as a whole

This goal clearly is very broad-based and is addressed below by it components.

Benefits to vessels owners and operators are perhaps most effectively captured by the increases in total revenues under AM80 as demonstrated in , and by the fact that operating residuals (the amount remaining after operating expenses are subtracted from total revenue) appear to be increasing more slowly than revenues, as summarized in Table ES-3 and Figure ES-2, above.

Crewmember Benefits: The extent to which AM80 benefits crew members can be seen in increased total revenue in the AM80 fisheries. In general, crew members are paid on a share basis: if shares are stable and total revenues increase, payments to labor are higher. As shown in Table ES-6, direct labor payments peaked in 2012 at $106.6 million.

Table ES-6. EDR Revenue and Labor Expenses over All AM80 Vessels

	2008		2009		2010		2011		2012		2008 – 2012 Average	
EDR Expenditure Item	$ million	%	$ million	%	$ million	%	$ million	%	$ million	%	$ million	%
Total Revenue	**275.7**	***100%***	**238.5**	***100%***	**298.3**	***100%***	**399.3**	***100%***	**392.1**	***100%***	**320.8**	***100%***
Direct Labor Expenditures	(79.6)	*28.9%*	(71.1)	*29.8%*	(82.6)	*27.7%*	(104.6)	*26.2%*	(106.6)	*27.2%*	(88.9)	*27.7%*
Indirect Labor Expenditures	(14.3)	*5.2%*	(12.8)	*5.4%*	(13.4)	*4.5%*	(17.3)	*4.3%*	(15.1)	*3.8%*	(14.6)	*4.5%*
Total Labor Expenditures	(93.92)	*34.1%*	(83.83)	*35.2%*	(95.96)	*32.2%*	(121.92)	*30.5%*	(121.62)	*31.0%*	(103.45)	*32.2%*

Note: EDR revenues and expenses have not been adjusted for inflation.

Source: Developed by Northern Economics from EDR Data from provided by AKFIN (Fey, 2014)

Crewmembers and society as a whole benefit from increased safety that may have occurred under AM80. This section summarizes the findings from Section 4.3 – 4.5 and is based on data for all worker injuries and vessel casualties that were reported to the USCG and NMFS for the AM80 fleet during 2001–2012. The findings were developed by the National Institute for Occupational Safety and Health (NIOSH) specifically for this 5-year review.

The rates of injuries are steady over the time period (except for the minor injuries as explained). While the rate of injuries did not decrease, serious vessel casualties did decline slightly, which we attribute to the vessel safety improvements required by Alternate Compliance and Safety Agreement (ACSA). Since ACSA and AM80 occurred at similar times, it is impossible to establish definitively which program influenced the decrease in serious vessel casualties. However, because ACSA focuses entirely on improving vessel safety, it seems likely that it had the more direct influence.

The USCG considers the AM80 fleet high-risk for several reasons (USCG, 2006). The fleet can operate in the most remote areas of Alaska for extended periods of time, far away from search and rescue support if an emergency occurs. In addition to the hazards of catching fish, these vessels also contain processing and freezing machinery, as well as large crew complements who are fish processors and not professional mariners. These vessels carry hazardous gases for refrigeration and large amounts of flammable packaging materials which pose hazards that do not exist on catcher vessels.

During the most recent decade of data (2003–2012), the annual risk of fatal injuries in the AM80 fleet was 1.3 per 1,000 full-time equivalent workers (FTEs). This is similar to the average fatality rate for the entire Alaskan fishing fleet which was 1.1 per 1,000 for 2000–2009. Risk reduction measures should continue for the AM80 fleet since high numbers of crewmembers can be put in danger during a single vessel emergency. To reduce the risk of fatal falls overboard and fatal deck injuries, crewmembers

should wear personal floatation devices while working on deck and establish and follow deck safety procedures (Lucas et al., 2014b).

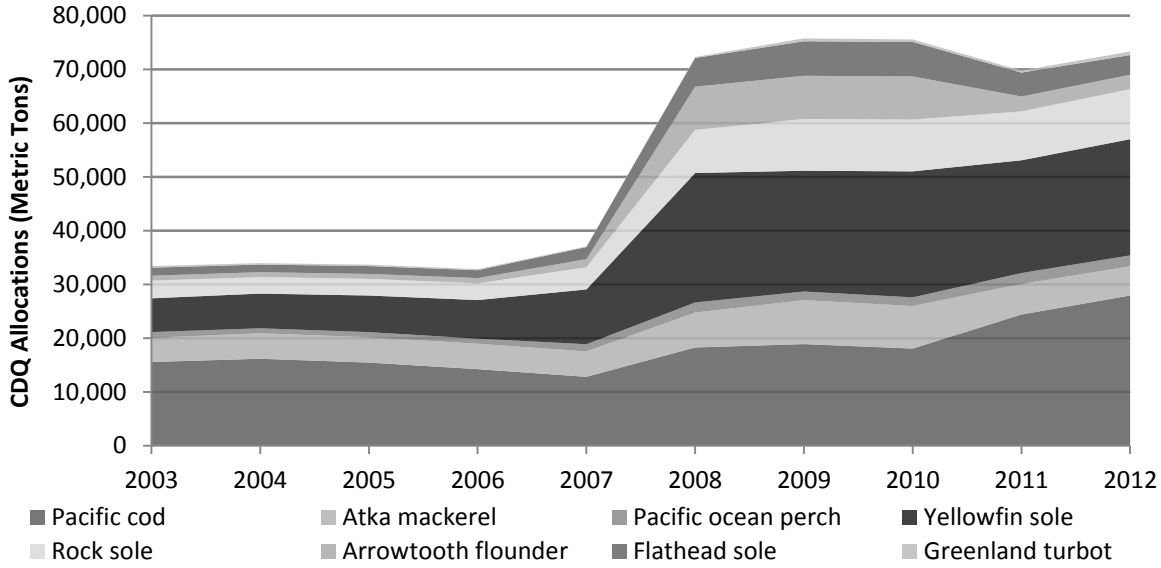
The annual risk of non-fatal injuries was 43 per 1,000 FTEs. For injuries greater than minor in severity, the rates were stable across the time period. Most of the serious and moderately severe injuries occurred during the handling of frozen fish and while processing fish, which reflects the relatively high number of people required to perform these tasks. A thorough review of each process should reveal opportunities to reduce the numbers severity of the injuries that occur during these processes.

Although the majority of vessel casualties reported were minor, 27 percent of the vessel casualties could not be resolved at sea. Moderate vessel casualties were defined as problems that required the vessel to return immediately to port for repairs, and serious casualties meant that the vessel was unable to cope with the problem at sea on its own and had to be rescued by a third party (such as being towed to port). These events most commonly occurred as a result of a loss of propulsion. Current ACSA requirements do little to address this area. Since serious vessel casualties have the most immediate potential to develop into vessel disasters that put crews' lives at risk, more effort should be placed in preventing loss of propulsion events at sea (Lucas et al., 2014a).

ACSA was developed to prevent vessel disasters at sea. Lucas et al. (2014a) found indications of a positive effect of ACSA on vessel safety in the AM80 and FL fleets. On both types of vessels, reported rates of serious vessel casualties decreased after the vessels reached compliance with ACSA requirements. Owners of AM80 vessels are encouraged to maintain enrollment in the program.

CDQ groups benefitted from AM80 through increased allocations of most of their groundfish species within AM80. Allocations increased from 7.5 percent to 10.7 percent of the TAC for all CDQ groundfish species, with the exceptions of pollock, which was already at allocated to CDQs at 10 percent, and sablefish, which currently is allocated to CDQ at over 15 percent. Figure ES-7 shows the CDQ allocations in metric tons from 2003–2012. As discussed in Section 10, the very large increase in 2008 is due only in part to the increased allocation percentages. TAC increases in 2008 contribute a larger portion of the overall increases than can be attributed to the percentage change.

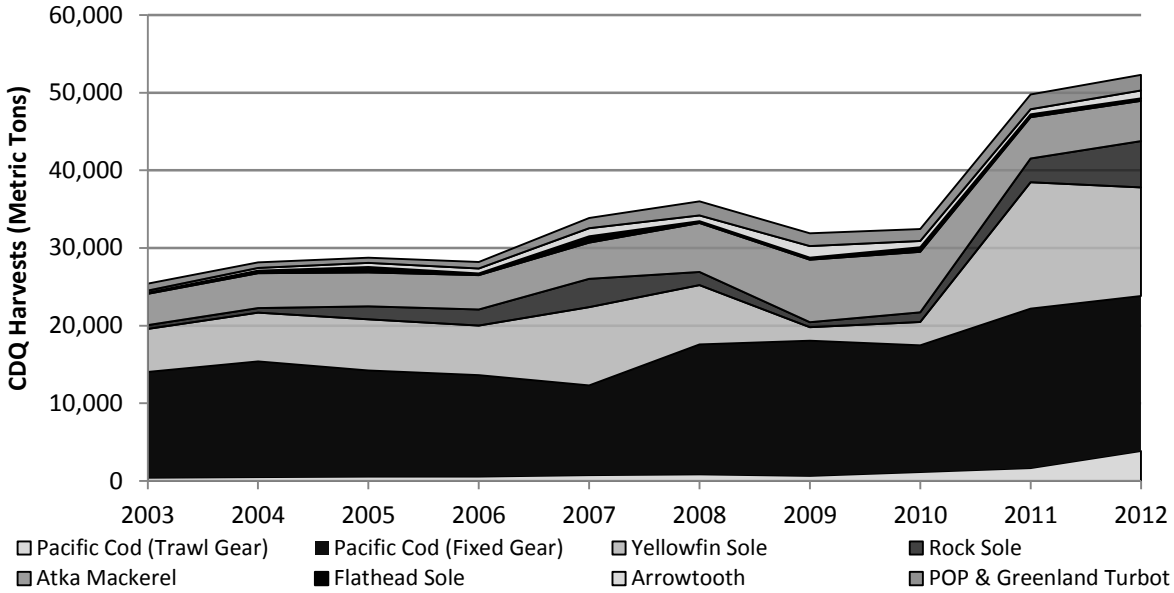
Figure ES-7. CDQ Allocations of Groundfish other than Pollock and Sablefish



Note: The legend (from left-to-right and top-to-bottom) corresponds with areas moving up from the bottom.
Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a).

Figure ES-8 shows the combined harvest for all six CDQ groups in non-pollock/non-sablefish CDQ target fisheries.[1] The figure stacks the catch of each species to show the total for the year. It is very clear that the largest single component of these CDQ harvests are Pacific cod using fixed gear. Overall CDQ harvests increased in 2008 but in 2009 dropped to levels below those experienced in 2007. Overall harvest levels were flat in 2010 but increased in 2011 and again in 2012. CDQ harvests of yellowfin sole appear to have the greatest variability: both the decline in 2009 and the increase in 2011 can be attributed primarily to changes in yellowfin sole.

Figure ES-8. Catch (mt) in CDQ Non-Pollock/Non-Sablefish Target Fisheries, 2003–2012



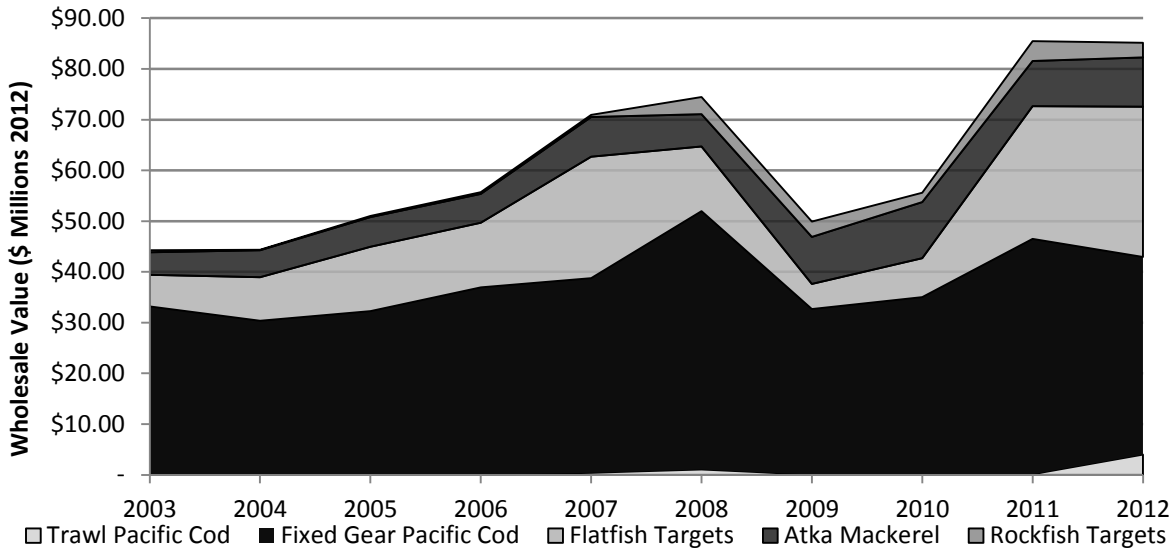
Source: Figure developed by Northern Economics with CAS data provided by AKFIN (Fey, 2014).

Note: The legend (from left-to-right and top-to-bottom) corresponds with areas moving up from the bottom. Thus the first area shows Pacific Cod (Trawl Gear) then the next darker area shows Pacific Cod (Trawl Gear).

As shown in Figure ES-9 the wholesale revenue generated in non-pollock/non-sablefish CDQ fisheries fell dramatically in 2009. The leading component of the decline in 2009 was the value generated in the CDQ fisheries for Pacific cod, although revenue in flatfish fisheries also declined. The assessment in Section 10.1 finds that there were very large price declines for Pacific cod and several of the flatfish species. These price declines, coupled with declining CDQ flatfish harvests, led to a large drop in the total wholesale value in 2009. In 2009, the biggest revenue decline was seen in the Pacific cod fisheries, which fell from over $50 million in 2008 to less than $33 million in 2009. CDQ revenues began to increase in 2010 and now exceed levels witnessed in 2007.

[1] An average of 1,114 tons of CDQ groundfish (primarily Pacific cod, arrowtooth flounder, flathead sole, and rock sole) are taken incidentally in CDQ target fisheries for pollock and sablefish.

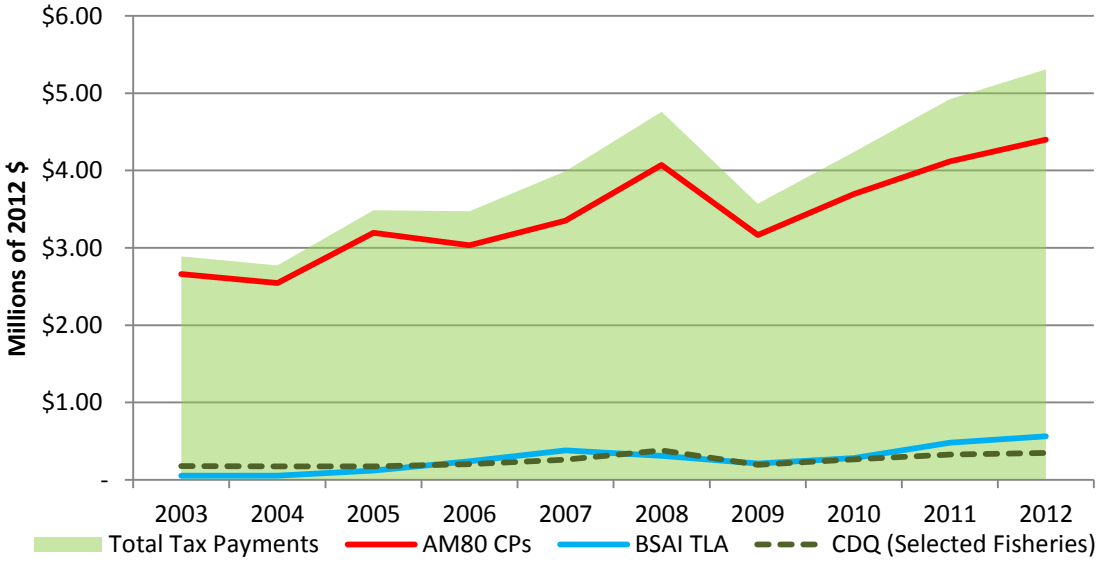
Figure ES-9. Real Wholesale Revenue ($2012) in CDQ Target Fisheries, 2003–2012



Source: Figure developed by Northern Economics with CAS data provided by AKFIN (Fey, 2014).

Benefits to the State and Alaska communities from AM80 accrue in part from increases in fish taxes. Figure ES-10 provides estimates of Fishery Resources Tax (FRT) and Fishery Business Tax (FBT) paid by th4ee groups: 1) AM80 CPs, 2) vessels participating in BSAI TLA fisheries (excluding pollock and Pacific cod) and 3) CDQ fisheries. Details of the calculations are provided in Section 11.3. Estimated fish tax payments jumped in 2008 then fell in 2009 due to depressed prices and the global recession. Estimated taxes have since increased and, in 2012, topped $5.0 million. Data are not available to quantify AM80-related fish taxes by community. However, since almost all of the offloads of AM80 products occur at Dutch Harbor, that community, along with the State of Alaska, receives the vast majority of the FRT and FBT taxes.

Figure ES-10. Estimates of Fish Taxes Paid by BSAI Fisheries Affected by AM80



Source: Figure developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

Alaska and Dutch Harbor, as well as other coastal communities benefit from AM80 due to the increased economic activity of AM80 CPs and of the vessels in the BSAI TLA. These economic impacts are also felt in the **Pacific Northwest and the rest of the US**. The 5-year review summarizes estimated economic impacts (multiplier effects) of the AM80 fleet from a recently published report (Waters, 2014) that incorporated EDR data from the 2008–2010 AM80 fisheries to develop a model that estimated the multiplier impacts associated with activities of the AM80 fleet in Alaska, the West Coast (Washington, Oregon and California), and the rest of the U.S.

The report estimates that in 2008 the total economic contribution of the AM80 sector's $281 million of first wholesale revenues (estimated from 2008 COAR data) was approximately $1 billion in total output, which contributed $571 million in total value added, $289 million in total labor income, $351 million in total household income, $79 million in total state and local government revenue, and 6,800 total jobs in the combined economies of the three regions. About 80 percent of the $351 million total household income generated by AM80 sector activities accrued to households outside Alaska (including payments to non-Alaska residents in the AM80 sector workforce). Also, about 71 percent of the $79 million in total state and local government revenues were paid to governments outside Alaska. The primary findings from that report are summarized in Table ES-7. The table highlights the wide geographic distribution of economic impacts of the AM80 fleet's activities.

Table ES-7. Estimated Geographic Distribution of Total AM80 Sector Impacts

Region	Output	Household Income	S-L Government Revenue	Jobs
Alaska	47%	20%	29%	53%
West Coast	18%	39%	27%	18%
Rest of the U.S.	35%	40%	44%	29%
Total (Direct, Indirect and Induced) U.S. Impacts:				
Total U.S. Impact in $ million	1,027	351	79	-
Total U.S. Impact in jobs (1,000)	-	-	-	6.8

Note: Economic impacts are based on the 2008 economic contribution from the SAM model
Source: Table excerpted from Table 6 of Waters (2014).

AM80 Goal 5: To further rationalize the fishery as a means to mitigate costs of achieving the goals of bycatch reduction and other program objectives

AM80 rationalized the AM80 fishery by allocating catch shares of primary target species to owners of vessels that historically had participated in the fishery. Shares were also provided for prohibited species. The allocation of catch shares for both target species and prohibited species provided operators with the means to mitigate the cost of significant reductions in halibut PSC limits set for the AM80 fisheries. Vessels were also incentivized to join cooperatives as a means to meet the program objective of increasing the retention of groundfish. With rationalization, AM80 CPs have been able to:

1) Reduce bycatch of prohibited species across the board, as shown in Tables ES-4 and ES-5, as well as in Figures ES-3 – ES-5;
2) Improve retention and utilization of groundfish species and meet target retention rates set under GRS rules as shown in Figure ES-6; and
3) Increase overall harvest levels and wholesale revenues as seen in Figure ES-1.

AM80 Goal 6: To minimize negative impacts on other fisheries

Catch limits, commonly known as sideboards, limit the ability of AM80 vessels to expand their harvest efforts in the GOA. Otherwise, AM80 vessels could use the economic advantages attributable to AM80 to increase their participation in GOA fisheries, thereby adversely affecting the participants in those fisheries. GOA groundfish and halibut PSC sideboards prevent these undesirable effects by limiting the catch by AM80 vessels to historic levels in the GOA. The AM80 sideboards in the GOA are discussed more completely in Section 3.1.6.

Under AM80, AM80 vessels fishing in the GOA are subject to Central GOA (Area 620 and 630), Western GOA (Area 610) and West Yakutat (Area 640) northern rockfish, pelagic shelf rockfish, and Pacific Ocean perch sideboard limits, as well as limits on Pacific cod and pollock. Table 12 in Section 3.1.6 identifies the sideboards placed on the AM80 CPs participating in the GOA. The analysis indicates that AM80 vessels operating in the GOA generally have been able to stay within their sideboard limits for Pacific cod, northern rockfish, and pelagic shelf rockfish but have exceeded limits for Pacific Ocean perch and pollock. According NMFS-AKR, the sideboards for pollock are managed as a soft constraint that strictly limit the amount of targeting for pollock that vessels can undertake (Furuness, 2014).

AM80 also imposes deep- and shallow-water halibut PSC limits for AM80 vessels fishing in the GOA. A total limit has been set at 418 mt for the deep-water species fishery (sablefish, rockfish, deep-water flatfish, rex sole, and arrowtooth flounder) and 137 mt for the shallow-water species fishery (pollock, Pacific cod, shallow-water flatfish, flathead sole, Atka mackerel, skates, and "other species"). There were instances from 2008–2012, in which NMFS closed directed fishing by AM80 vessels for species that comprise the shallow-water species fishery or deep-water species fishery because the seasonal apportionments of the halibut PSC limits in the GOA had been reached.

AM80 Goal 7: To apportion the yellowfin sole fishery between the AM80 Sector and the BSAI Trawl Limited Access (BSAI TLA) Sector

Implementation of AM80, coupled with TACs in excess of 125,000 mt, mean that sideboards on yellowfin sole harvests of AFA CVs and AFA CPs have not been enforced since 2008. Elimination of the sideboards allows the AFA vessels to expand their operations in the yellowfin sole fishery if they choose. In addition, one AM80 vessel has operated as a mothership in the yellowfin sole fishery every year since 2003, utilizing non-AFA CVs with valid trawl licenses and endorsements to harvest yellowfin sole. Because the harvests in the mothership operations are made by non-AFA CVs, the harvests are assigned to the BSAI TLA sector and are not constrained by AFA sideboards.

The BSAI TLA fishery for yellowfin sole receives specific apportionments of PSC species for halibut, king crab, and tanner crab (*c. bairdi* and *c. opilio*) and other PSC species. As with other "race for fish" fisheries, both halibut and crab bycatch limits have the potential to shut down the fishery or move the activity out of preferred fishing areas.

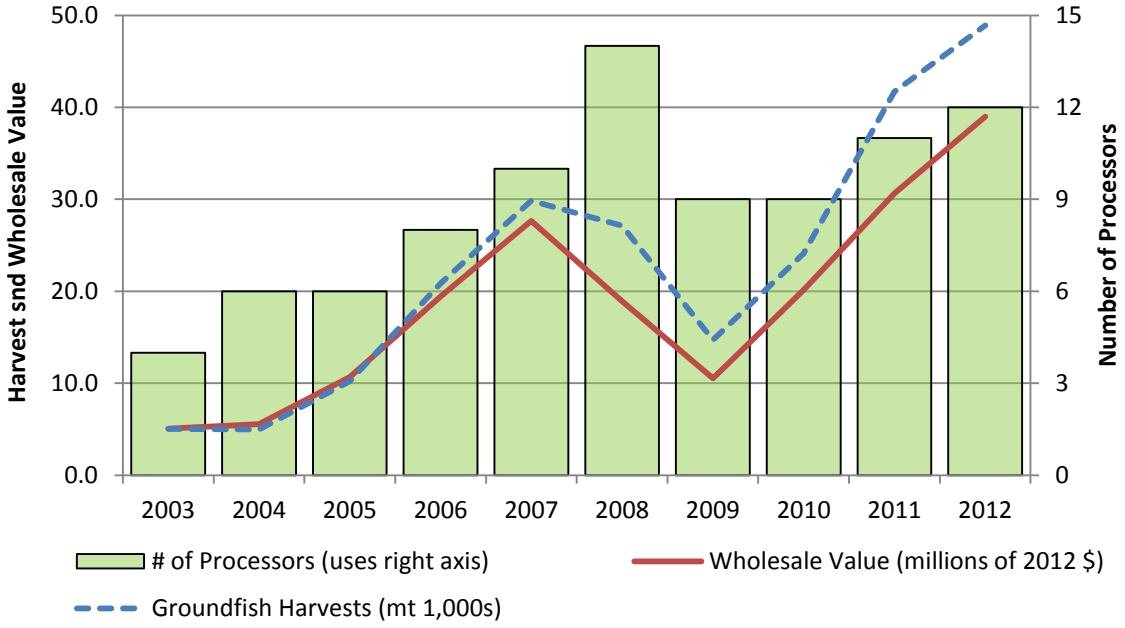
The fact that neither the AFA CPs nor the mothership operations have an exclusive privilege to harvest a predetermined quantity means that the various operations must engage in a race for fish if they want to maximize their revenues from the fishery. As in many "race-for-fish" fisheries, the BSAI TLA fishery for yellowfin sole has been contentious at times with both AFA CPs and mothership operations hoping the other will limit their activities in the fishery. An in-depth analysis of the fishery that could shed light on the difference between AFA CPs and mothership operations in the yellowfin sole fishery would provide sector-by-sector details of historic harvest volumes and values generated in the fishery, along with relative rates of halibut and crab PSC. However, because fishery data are considered confidential, and because there are fewer than three mothership operations involved, sector-specific

(AFA CPs vs. motherships) data cannot be provided in a public document or public forum. Therefore, information provided in Section 3.2 summarizes the BSAI TLA sector as a whole.

Figure ES-11 shows groundfish species caught in yellowfin sole target fisheries harvested by vessels other than AM80 CPs in the BSAI from 2003–2012. Total groundfish harvested in BSAI TLA target fisheries for yellowfin sole increased from 4,486 mt in 2003 to 22,762 by 2007. Harvest dropped in 2009, then climbed rapidly, and by 2012 over 34,000 mt were harvested. Total revenues (in nominal terms) in the fishery have increased from just over $5 million in 2003 to $39 million in 2012.

It is also very clear from Figure ES-11 that there has been a significant increase in the number of processing vessels involved in the BSAI TLA yellowfin sole fishery. From the low in 2004 to high in 2012, the total amount of groundfish harvest in the fishery has increased by nearly an order of magnitude. Similarly, the number of processors increased from a low of 4 in 2003 to a high of 14 in 2008. Over the 10-year period ending in 2012, a total of 17 different processors participated in the fishery.

Figure ES-11. Volume, Wholesale Value and Processor Count in the BSAI TLA Yellowfin Sole Fishery



Source: Figure developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

1 Introduction

This document is a 5-year review of Amendment 80 (AM80) to the Bering Sea/Aleutian Islands (BSAI) groundfish Fishery Management Plan (FMP).

AM80 was approved by the North Pacific Fishery Management Council (Council or NPFMC) in June of 2006, and enabled the formation of fishery cooperatives for trawl catcher/processors (CPs) that are not eligible under the American Fisheries Act (AFA) to participate in directed pollock fisheries. This group of Trawl CPs is hereafter referred to as the AM80 CPs or the AM80 Sector. In addition to enabling the formation of a cooperative for the AM80 CPs, AM80 also had the effect of creating a separate BSAI Trawl Limited Access (TLA) fishery for yellowfin sole, Pacific cod, and Atka mackerel, and increased the Community Development Quota (CDQ) allocations of target species of flatfish, Pacific Ocean Perch, Atka Mackerel, and Pacific cod from 7.5 percent to 10.7 percent.

Because AM80 created a Limited Access Privilege Program (LAPP) as defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), a formal and detailed review to determine progress in meeting the goals of the program and of the MSA is required.

The remainder of this introduction contains a subsection that provides additional details regarding the requirements that a 5-year review be developed, and a subsection that provides the basis for inclusion of particular issues within the 5-year review.

1.1 Requirements for a 5-year Review

This subsection of the introduction summarizes the requirements that a 5-year review of AM80 be developed. Not only is the 5-year review a requirement of the MSA, it was also requested by the Council in its motion approving the AM80.

The Council's AM80 motion provides the first reference to a 5-year review of AM80. (The Council motion from June 10, 2006 is included as Appendix A.) Component 6 of the Council motion established Prohibited Species Catch (PSC) allowances of halibut and crab. The language in Component 6 further states that "the halibut and crab PSC levels shall be reviewed by the Council during the fifth year of the program (implemented in 2008) and adjusted as necessary (through the normal amendment process)".

Additional guidance for development of 5-year reviews comes from the MSA. The MSA defines LAPPs in Section 303A(c)(1) and has a requirement to …

> (G) include provisions for the regular monitoring and review by the Council and the Secretary of the operations of the program, including determining progress in meeting the goals of the program and this Act, and any necessary modification of the program to meet those goals, with a formal and detailed review 5 years after the implementation of the program and thereafter to coincide with scheduled Council review of the relevant fishery management plan (but no less frequently than once every 7 years)…

While the Council did not specifically use the term "LAPP" in their motion approving AM80,[2] it is clear that the Council was creating a program that conveyed harvesting privileges to an exclusive set

[2] The term "Limited Access Privilege Program" is not found in any of the draft versions of the EA/RIR/IRFAs developed for Amendment 80, nor was the term contained in Final Secretarial Review version of the EA/RIR/FRFA published on September 7, 2007.

of vessels—i.e., a LAPP. Further, when the National Marine Fisheries Service (NMFS) developed and approved the regulations implementing AM80 in September 2007, it made the assertion that the AM80 has the effect of creating a LAPP.

The MSA does contain language at §303A(i) exempting existing programs from certain LAPP Requirements if the action was approved by the Council no later than 6 months after the enactment date of the amended MSA. While the Council took its final action nearly seven months prior to enactment of the MSA, the MSA requires that LAPPs that are otherwise exempt from LAPP rules, **are not exempt** from the requirement to develop a 5-year review. Specifically, §303A(i)(1)(B) indicates that even though AM80 is exempt from other MSA requirements for LAPPs …

> (B) the program shall be subject to review under subsection (c)(1)(G) of this section not later than 5 years after the program implementation…

1.2 Issues to Study in the 5-Year Review

As indicated earlier, language in the MSA states that a formal and detailed review to determine progress in meeting the goals of the program (AM80) and of the MSA is required. In the following sections we examine the stated goals of AM80, language regarding LAPPs in the MSA, the 10 National Standards of the MSA, and finally, specific AM80 program components, in order to develop a comprehensive list of issues that could be included in the 5-Year review of AM80. The discussion of particular 5-year review issues in this section is relatively general.

1.2.1 5-Year Review Issues from the Goals of Amendment 80

This section summarizes both stated and implicit goals of AM80 as determined from the September 2007 EA/RIR/FRFA for the Amendment. Issues arising from these goals are addressed in the 5-year review.

In December 2004, the Council approved the following Problem Statement for AM80:

> The Council's primary concern is to maintain a healthy marine ecosystem to ensure the long-term conservation and abundance of the groundfish and crab resources. To this end, the Council is committed to reducing bycatch, minimizing waste, and improving utilization of fish resources to the extent practicable in order to provide the maximum benefit to present generations of fishermen, associated fishing industry sectors, including the CDQ sector, communities, and the nation as a whole, while at the same time continuing to look for ways to further rationalize the fisheries. Focusing on reduction of bycatch and the attendant benefits of cooperatives and CDQ allocations in meeting bycatch reduction objectives are initial steps towards rationalization of the BSAI groundfish fisheries. Bycatch reduction measures for the Non-AFA trawl Catcher Processor sector is a priority focus in this step toward rationalization given this sector's historical difficulty in achieving acceptable bycatch levels. Allocations to this sector associated with cooperative management of catch and bycatch provide the opportunity for participants in this sector to mitigate the cost, to some degree, associated with bycatch reduction. In addition to reducing bycatch in one sector, assurance should be provided to minimize negative impacts on others.

Six specific goals are articulated in the AM80 Problem Statement. Below we summarize each goal, and indicate briefly whether and how the attainment of the goal could be addressed in the 5-year review.

Goal 1: To maintain a healthy marine ecosystem to ensure the long-term conservation and abundance of the groundfish and crab resources

Discussion: AM80 has led to the near elimination of the race for fish in the BSAI non-pelagic trawl fisheries. No longer forced by the race for fish to maximize catch and revenue per unit of time, participants in these fisheries have been much more amenable to gear changes and other behavioral changes that have reduced negative impacts of non-pelagic trawling on the ecosystem. Examples include the use of modified trawl doors and sweeps, and ongoing experiments with gear modifications and excluders and to reduce bycatch. The 5-year review addresses these issues in a qualitative manner.

Goal 2: To reduce bycatch—this a priority focus of AM80.

Discussion: AM80 subdivided the halibut PSC allocation to the trawl sectors; 875 metric tons (mt) are allocated to the BSAI TLA sector with the remainder assigned to the AM80 Sector. AM80 also reduced the total PSC allocated to the trawl sector in general and the AM80 sector in particular. The AM80 Sector was allocated 2,525 mt in 2008, and the amount was reduced 50 mt each year through 2012. In years 2012 and beyond, the AM80 PSC allocation of halibut PSC would be 2,325. AM80 also establishes a halibut prohibited species quota (PSQ) for CDQ harvests. The 5-year review summarizes halibut PSC in the AM80, CDQ, and BSAI TLA fisheries for AM80 species.

AM80 also sets an initial AM80 Crab PSQ percentage based on historical usage from 1995–2002 in all groundfish fisheries. The crab PSQs have been reduced 5 percent per year from 2009–2012, such that by 2012 PSQs for crab species are set at 80 percent of historical usage. The 5-year review summarizes crab PSC in the BSAI TLA and AM80 Sectors, and in CDQ fisheries for AM80 species.

Goal 3: Minimize waste and improve utilization to the extent practical.

Discussion: Improving retention and utilization of the flatfish species was a major driver of AM80 and is assessed in the 5-year review. A more detailed discussion of the issue follows the discussion of Goal #6 below.

A major goal of AM80 is facilitating bycatch reductions and retention improvements in the AM80 sector. To this end, it was presumed that multispecies cooperatives could lead to greater retention improvements, and could provide cost-effective means for the sector to meet the Groundfish Retention Standards (GRS) approved by the Council in 2003 under Amendment 79. GRS would require AM80 CPs, if they were > 125', to meet standards for retention of BSAI groundfish each year. The GRS for 2008 was set at 65 percent and by 2010 it would increase to 80 percent. In 2011 and each subsequent year, the GRS would be set at 85 percent.

The regulations implementing AM80 have the effect of superseding regulations proposed for implementation of The GRS. Under AM80, regulations the retention standards set by GRS still apply to any AM80 cooperative as an aggregate. Vessels that do not join an AM80 cooperative must comply with GRS percentages on an individual basis.

The 5-year review includes an accounting of groundfish retention and utilization based on GRS accounting rules for the years before and after implementation of AM80.

Goal 4: To provide maximum benefit to present generations of fishermen, including CDQ groups, communities, and the nation as a whole.

Discussion: The primary benefits of the AM80 fisheries include:

1) income and employment to vessel owners, operators, crew-members, and CDQ groups;

2) income and employment to community members in related industries;
3) tax revenues to local and state governments; and
4) consumer benefits resulting from the production and supply of seafood products.

The 5-year review provides an assessment of these benefits within the limits of the existing data, and secondary sources.

Goal 5: To further rationalize the fishery as a means to mitigate costs of achieving the goals of bycatch reduction and other program objectives.

Discussion: It has been presumed that reducing or eliminating the "race for fish" and its deleterious effects on the AM80 fisheries can be accomplished by rationalizing the fishery. The 5-year review summarizes the extent to which rationalization of AM80 fisheries has occurred. The review also summarizes (qualitatively) the benefits (and mitigation of costs) that can be attributed in whole or in part to the rationalization of the fishery.

Goal 6: To minimize negative impacts on other fisheries.

Discussion: The Council AM80 action included provisions that limit via sideboards the activities of AM80 vessels in the Gulf of Alaska (GOA). The 5-year review includes a summary of AM80 vessel activities in the GOA relative to their sideboards.

The Apportionment of Yellowfin Sole between the AM80 Sector and the BSAI TLA Sector

In addition to the Council's stated goals in approving AM80, the Council also established the BSAI TLA and provided a schedule for apportioning the Initial Total Allowable Catch (ITAC)—the portion of the Total Allowable Catch (TAC) after CDQs have been removed—of yellowfin sole between the AM80 and BSAI TLA Sectors. If the ITAC is greater than 125,000 mt, then the AM80 Sector is allocated 60 percent and the BSAI TLA Sector is allocated 40 percent. At ITACs less than 125,000 mt, the AM80 sector receives an increasing apportionment. If the ITAC is less than 87,500 mt, the AM80 Sector is allocated 93 percent of the ITAC.

The 5-year review includes an assessment of the effects of the apportionment of the yellowfin sole ITAC between the AM80 and BSAI TLA Sectors. In particular, the 5-year review summarizes BSAI TLA harvesting and processing in the yellowfin sole fishery to the extent reasonable within constraints of confidentiality rules.

1.3 5-Year Review Issues from General Goals for LAPPs as Stated in the MSA

Section (§)303A(c)(1) of the MSA, as amended, establishes requirements for LAPPs including the requirement for a 5-year review for all LAPPs. While AM80 is exempt from all of these requirements, except for the requirement to conduct a 5-year review, it is reasonable to include assessments of applicable MSA requirements for LAPPs. The following list of questions summarizes issues derived from language in §303A that appear relevant to a 5-year review.

Has the LAPP …

1) *promoted capacity reductions?*
2) *promoted fishing safety?*
3) *promoted social and economic benefits?*
4) *precluded attainment of excessive shares?*

5) promoted fishery conservation and management?

Capacity Reductions: §303A(c)(1)(B) addresses the issue of LAPPs' role in reducing excess capacity. The 5-year review provides an assessment of capacity measures for the five years before and after implementation of AM80. Capacity measures include summaries of the number of vessels operating in AM80 fisheries as well as measures of capacity utilization such as number of actual operating weeks as a percentage of potential operating weeks. The 5-year review also assesses consolidation of the AM80 Sector as well as expansion of operations in the BSAI TLA Sector. The review examines the effects of consolidation on vessels and operations that remain in the AM80 fishery and on vessels and operations that are no longer participating.

Fishing Safety: §303A(c)(1)(C) addresses the issue of LAPPs' role in improving fishing safety. While measures of fishing safety are not part of NMFS primary data collection process, an assessment of fishing vessel safety under AM80 has developed by analysts from the The National Institute for Occupational Safety and Health (NIOSH).

Social and Economic Benefits: §303A(c)(1)(C) address the issue of LAPPs' role in promoting social and economic benefits. As with fishery conservation and management, this goal is considered too broad-based to include as a separate element of the 5-year review. This general goal will be assessed as an aggregate of other issues.

Excessive Shares: In §303A(c)(5)(D), the MSA addresses the question of excessive shares. AM80 includes provisions to preclude attainment of excessive shares—no person can hold more than 30 percent of the overall allocation to the AM80 Sector, and no vessel may harvest more than 20 percent of the AM80 Sector's total allocation in a given year. Owners or vessels that exceeded these caps in the initial allocation are "grandfathered" at those levels. Because data regarding initial allocations and Quota Share (QS) allocations are published by NMFS, and these data report ownership information, it is possible to track and report the shares assigned to a single person and to determine whether an excessive ownership share has been attained. However, due to confidentiality restrictions, the 5-year review does report on excessive shares of harvest at the vessel level except in a qualitative manner.

Fishery Conservation and Management: §303A(c)(1)(C) addresses the issue of LAPPs' role in promoting fishery conservation and management. Nearly all of the goals and objectives that have been discussed above and that are discussed in the following subsection can be considered components of fishery conservation and management. Therefore, the conclusion section of the 5-year review serves as a summary of the fishery conservation and management effects of AM80.

1.4 5-Year Review Issues Derived From MSA's National Standards

In this section we list the ten National Standards contained in the MSA and discuss whether any add potential issues to the 5-year review that haven't already been addressed.

National Standard 1: Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery.

Discussion: The 5-year review includes summaries of harvests of AM80 species relative to TACs as an indicator of progress toward achieving optimum yield.

National Standard 2: Conservation and management measures shall be based on the best scientific information available.

Discussion: The Council's action in approving AM80 has had meaningful impacts on the use of the best scientific information available.

AM80 expands the amount of "scientific information" collected with its provisions to collect operating cost data in the form of an annual Economic Data Report (EDR) from the operators of all vessels eligible to participate in cooperatives under AM80 (i.e. the AM80 CPs). The 5-year review examines these data, summarizes them to the extent reasonable, and describes the ways that these data have been used.

In addition, any cooperatives that form under AM80 must provide an Annual AM80 Cooperative Report to the Regional Administrator of NMFS. The Annual AM80 Cooperative Reports submitted to NMFS are considered confidential by NMFS because among other elements, they include vessel-by-vessel catch and discard information. AM80 Cooperatives have also been providing the Council a "public" version of the Cooperative Reports on a voluntary basis. The 5-year review examines both versions of the cooperative reports and describes in a qualitative manner their contribution to conversation and management of the AM80 fisheries.

National Standard 3: To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

Discussion: Nothing in AM80 changes this aspect of fishery management and therefore nothing related to this standard appears in the 5-year review.

National Standard 4: Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be (A) fair and equitable to all such fishermen, (B) reasonably calculated to promote conservation, and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

Discussion: The initial allocation of catch history under AM80 was determined to comply with this standard, and therefore no additional review of the fairness and equity of the allocation is included in the 5-year review. The 5-year review includes discussions of excessive shares as well as summaries of the distribution of quota shares, harvest, and revenue across vessels and ownership entities.

National Standard 5: Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

Discussion: The 5-year review examines the question of efficient utilization of the fishery resources in many of the issues already described. For example, to address the relative efficiency of halibut PSC use the 5-year review compare the groundfish value per unit of PSC. In addition, the EDR data are used as an additional element in efficiency assessments. Using the EDRs the 5-year review assesses whether operating costs relative to revenues have changed during the years since implementation of AM80 (2008–2012).

National Standard 6: Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

Discussion: The elimination of the race for fish for the AM80 fleet allows vessels to focus their individual efforts on the species for which they are best suited. The catch shares that are embedded in AM80 allows vessels to adapt to changing market conditions and changing levels of constraining species such as halibut PSCs and Pacific cod. The 5-year review lookw at costs and revenue of two segments of the fleet—vessels that focus on Atka mackerel and vessels that focus on flatfish. The 5-year review will also discuss the fleet's adaptation to reduced access to Pacific cod TACs and some of the ways they have been to innovate to reduce bycatch.

National Standard 7: Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

Discussion: The 5-year review discusses the issue of duplication of effort within the data collection requirement of AM80. Specifically, the review discusses this issue with respect to the Co-op Reports submitted to NMFS and in the EDRs.

National Standard 8: 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 (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

Discussion: This standard implies that a review of community impacts of AM80 should be included in the 5-year review. AM80 regulations (incorporating changes included in the MSA) increased the amount of CDQ allocations from 7.5 percent of the TAC to 10.7 percent of the TAC for the AM80 species (Atka mackerel, yellowfin sole, rock sole, flathead sole, and Pacific Ocean perch) and for arrowtooth flounder, Greenland turbot in the Bering Sea, and Pacific cod in the BSAI. CDQ allocations for sablefish and pollock are unchanged. AM80 also establishes and allocates a prohibited species quota (PSQ) to CDQs for halibut, crab, and Chinook. The 5-year review includes a summary of CDQ harvests of of the eight species for which CDQ allocations increased.

This standard implies that the 5-year review should summarize levels of involvement by particular communities important to the AM80 fisheries. For example, all of the AM80 vessels use Dutch Harbor as an operational base. The 5-year review provides a summary of port-calls by community which clearly indicates that Dutch Harbor is the focal point of AM80 activity.

In addition, the 5-year review utilizes findings from a recently published economic base analysis of the AM80 fleet. The research was funded by NMFS Alaska Fisheries Science Center (AFSC), and investigators include Dr. Ed Waters an independent consultant from Beaverton OR, Dr. Chang K Seung (AFSC) and Marcus L. Hartley of Northern Economics. The paper uses available economic data from the 2008–2010 fisheries to assess direct and multiplier impacts of the AM80 fleet in Alaska, in the Pacific Northwest and in the rest of the U.S.

National Standard 9: Conservation and management measures shall, to the extent practicable, (A) minimize bycatch, and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

Discussion: An assessment of bycatch of prohibited species in the AM80 fisheries including harvests of the BSAI TLA sector is included in the 5-year review.

National Standard 10: Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

Discussion: This issue is included as Chapter 4 of the 5-year review.

2 The Use and Collection of Scientific Data in AM80 Fisheries

The regulations following implementation of AM80 now require all AM80 vessels to submit EDRs to NMFS each spring for the previous fishing year. The regulations also require all AM80 cooperatives to submit to NMFS each spring a summary report of the activities of the cooperative for the previous fishing year.

This section reviews these new data and information from a qualitative perspective, and assesses whether the information that is being provided is serving its intended purposes.

2.1 An Assessment of the Uses and Quality of Information in Economic Data Reports

2.1.1 A Brief Review Recent Studies Using Data from the EDRs

This section summarizes some of the analyses in addition to this 5-year review that have depended on the information provided in the AM80 EDRs.

2.1.1.1 Measuring the Multiregional Economic Contributions

In 2013 Dr. Edward Waters (an independent economist based in Oregon) in association with Dr. Chang Seung and Dr. Michael Dalton (economists with NMFS AFSC) and Marcus Hartley of Northern Economics and lead author of this 5-year review, developed an analysis of the economic impacts of the AM80 fleet in an AFSC working paper titled: *Measuring the Multiregional Economic Contribution of an Alaska Seafood Industry with Linkages to International Markets* (Waters, 2014).

The recently published paper estimates the economic impacts from the AM80 sector activities, not only in Alaska but also extending to other parts of the U.S. due to economic linkages with economic agents in those other areas. Using a multiregional social accounting matrix model of three U.S. regions (Alaska, West Coast, and rest of U.S.), the paper estimated the multiregional contribution of the AM80 fleet, and evaluated multiregional impacts of selected shifts in the sector's production in terms of changes in output, employment, and income. Results indicate that the AM80 vessels are important participants in Alaska fisheries and that they generate a significant economic impact within the state. The paper also found that more than half of the impacts from the fleet on total economic output and about 80 percent of the impacts on household income accrue outside Alaska. The paper also found that the AM80 fleet is relatively insensitive to variations in the world prices of its primary products.

In addition to applications noted above, EDR data for the AM80 sector have been used in preparation of a number of management analyses and program reports. Selected statistics representing the economic status of the AM80 sector over the 2008–2012 period are presented in the Groundfish Economic Status Report for 2013 (Fissel et al. 2013), intended to indicate trends in a variety of economic indicators and metrics. The reported statistics provide a general overview of fishery performance over the period in terms of the physical characteristics of the participating vessel stock, including productive capacity of vessel physical plant (freezer and processing line capacity and maximum potential throughput) and fuel consumption rates, efficiency and diversification of processing output, investment in vessel capital improvements, operational costs incurred for fishing and processing in the AM80 fisheries and elsewhere, and employment and compensation of vessel crews and processing employees. These results complement the analysis presented for the AM80 program in the catch share metrics section of the Economic Status Report for the period 2007–2012,

which rely primarily on in-season catch accounting (eLandings) and other administrative data sources other than the EDR.

2.1.1.2 Other Uses of AM80 EDR Data

Data on crew employment and earnings provided by the AM80 EDR program were used to support assessment of the economic impact of Steller sea lion protection measures on the seven CPs participating in the Atka mackerel fishery in the 2013 Draft EIS/RIR/IRFA (NMFS, 2013b). The draft of the document reviewed by the Scientific and Statistical Committee (SSC) in October, 2012 included a preliminary analysis of changes in gross revenues, costs, and quasi rents (i.e., revenues less variable costs) to the fishery associated with the protection measures, but due to concerns raised by the SSC it was not included in the most recent draft of the document.

In addition to the analyses summarized above, EDR data have been used in research studies funded by the AFSC intended for publication in peer-reviewed journals, including an analysis that tested the effect of implementing a catch shares system and the associated changes in incentives on fishing behavior and selectivity (Abbott, 2014).

2.2 A Qualitative Review of the Data Collected in the EDRs

This section provides a qualitative review of the data that are collected in the EDRs and discusses some of the benefits of collecting these data as well as some of the shortcomings of the data as currently collected. Actual data from the EDRs are summarized in Section 9.

2.2.1 Vessel Identification and Characteristics Information in the EDR

Table 1 in the EDR Questionnaire asks for the respondent to provide the AM80 QS Permit Number, and the AM80 Vessel name, and then asks for the information listed below.

1. USCG Documentation No.	2. ADF&G Vessel No.	3. ADF&G processor code
4. Amendment 80 LLP No(s).	5. Amendment 80 limited access fishery permit No.	6. Name of Amendment 80 cooperative
7. Home Port	8. U.S. gross registered tonnage	9. Net tonnage
10. Length overall	11. Beam	12. Shaft horsepower
13. Fuel capacity (U.S. gal.)	14. Year Built	

With the exception of #11, which asks for the vessel's "Beam," all of this information is already accessible in publically available data that are required to be reported under existing fishing regulations. All users of the EDR data would already have access to this information. There appears to be very little benefit but the potential for errors or confusion from requiring these data elements to be reported in the EDR.

Table 2.3 of the EDR asks about the vessel's annual and average fuel consumption per hour. According to audit reports prepared for the Pacific States Marine Fisheries Commission, most respondents expressed difficulty in preparing the information for this table. There was inconsistency in how respondents addressed this variable. The audit report recommended that the EDR instructions include a more detailed explanation as to how this variable should be calculated.

2.2.1.1 Processing Capacity Questions in the EDR

Table 2.3 and Table 2.4 of the EDR are questions that focus on freezing capacity and processing capacity, respectively. The two questions in Table 2.3 are relatively straightforward single answer questions about freezer space and freezing capacity. Both questions ask for responses in terms of product pounds:

1. How much freezer space (measured in pounds of product) did the vessel have at the beginning of calendar year 2012 (round to the nearest 100 pounds)? Include only product storage capacity. Do not include plate freezer, galley freezer, or other non-product storage capacity.
2. What is the maximum freezing capacity of this vessel in pounds per hour? Report the maximum capacity of all plate freezers in pounds, divided by the average number of hours required to freeze product (note: this is not throughput under realistic operating conditions).

The data collected on frozen storage space and freezing capacity appear to be valuable additions to information we already have about the AM80 vessels. Industry members report that frozen storage space is the key determinant on how long a vessel stays at sea. When the frozen storage space has been filled, the vessel returns to port to offload. While other data sources ask about the hold size of vessels, it is never entirely clear whether the information provided is a measure of frozen storage space.

Information on maximum freezing capacity is new information that is not collected by other sources. Industry sources state that freezing capacity is often the primary constraint that determines how often tows are made and how quickly processing can be completed. Assuming that the vessel is able to locate schools of fish, then the number of tows made and the amount of fish harvested in a given day will depend on the freezing capacity of the vessel.

The questions in Table 2.4 are much less straightforward and ask respondents to describe processing capacity for each product produced during the year for each species. The questions ask respondents to provide answers in terms of round weight rather than product weight.

Table 2.4 - Vessel Characteristics: Processing Capacity
Report the total number of processing lines on the vessel in the first line. For each type of product processed on the line in the BSAI Amendment 80 fisheries, record the number of processing lines of similar type (equipment and/or product mix), and the vessel's maximum average throughput in pounds (round weight) per hour, totaled over all processing lines for this product type. Assume optimal operating conditions and that quantity of raw fish and other inputs are not limiting. Use species and product codes to describe product types produced. Record all species processed in the BSAI, including non-Amendment 80 species harvested with Amendment 80 PSC allocations. Amendment 80 species are starred (*) in the table.

For each product and species combination vessel operators are asked to report the following:

1) Species Code
2) Product Code
3) Number of Processing Lines
4) Maximum throughput per hour (in Round Weight Pounds)

There are several issues with this set of questions:

1) NMFS objectives in asking this set of questions are not clear.
    a. Because the question asks for information on the number of processing lines, it can be interpreted that that the focus of the question is on the cleaning, cutting and

preparation of raw fish up to the point of the fish entering the freezer. In this case, the capacity of the "processing" may easily exceed the capacity of the freezer(s), particularly if the product does not involve much processing—whole fish for example.

There are, in fact, several respondents that report processing line capacities for whole fish that are in excess of their reported maximum freezing capacity. There are also several respondents that report whole fish processing line capacities less than freezing capacity and some that report whole fish processing line capacity equal to freezing capacity.

b. Because of the instruction to use round weights when reporting for this question, it can be interpreted that the question is trying to assess product recovery rates, particularly if the definition of the processing line is assumed to include the freezer. This is because plate freezers that are generally used on AM80 vessels tend to have the same capacity in terms of product pounds regardless of the product type or species. In other words, the freezer can freeze X tons of product in Y hours for a given species regardless of whether the product is a whole fish, headed and gutted (H&G), H&G with roe, H&G with tail removed, or kirimi (headed with tail removed but not gutted). Because each of these products have different product recovery rates, the round-weight capacity of the "processing line" may vary considerably.

   As an example, assume that yellowfin sole kirimi has a product recovery rate of 50 percent, while a whole yellowfin sole has (obviously) a product recovery rate of 100 percent. Assume that a plate freezer can freeze 10 tons of either kirimi or whole fish in 5 hours. The freezing capacity is 2 tons (4,413 pounds) of product per hour for both products. But the processing line capacity, if measured in terms of round weight, is 4 tons per hour if kirimi is processed and only 2 tons per hour if whole fish is processed.

   It is clear from reviewing the data reported in the EDRs that some vessels interpreted the question as in the previous example—processing capacity of the lines increases with products that have lower product recovery rates and vice versa. For other vessels however, the opposite is true—recorded processing line capacity is higher for products with higher product recovery rates, and lower for products with lower product recovery rates.

2) It is not clear whether ancillary products should be reported. Over the five years from 2008–2012, 5 of the 26 vessels that have submitted EDRs have reported information for ancillary products.

3) The language in the question makes it very clear that only species and product produced while processing fish harvested in the AM80 fisheries should be included. Any unique species or products that are produced in CDQ fisheries, in GOA fisheries, or in BSAI TLA fisheries, should therefore not be included. This differs from the other questions in the EDR—CDQ, GOA, and BSAI TLA fisheries are included in all other sections.

4) A review of the EDR data from 2008–2012 shows that a total of 1,782 combinations of species and products (primary products only) have been reported in these EDR questions. A review of weekly production report data showed 2,316 different combinations of species and primary products over the same period.

From the discussion above, as well as the review of information in the EDRs, it is fairly clear that this section of the EDR could benefit from a significant revision. However, because the analysts of this

report are not certain of the intended objectives for this set of questions, no specific recommendations have been developed.

2.2.1.2 EDR Vessel Activity Questions

Table 2.5 of the EDR asks about vessel activity in terms of fishing and processing days. These questions are problematic and responses do not appear to add new information to available data.

The EDRs recognize that AM80 vessels may be engaged in AM80 fisheries and non-AM80 fisheries, such as fisheries in the GOA, BSAI CDQ fisheries, and BSAI TLA fisheries if they choose to take deliveries as motherships. It does not appear likely that the developers of the EDR anticipated the amount of overlap between AM80 fisheries and non-AM80 fisheries. In 2012 for example, 16 of the AM80 vessels fished in both the GOA and the BSAI, 7 were active in CDQ fisheries, and 3 were active both as CPs in AM80 fisheries and as motherships in the BSAI TLA fishery. The amount of activity in fisheries other than the AM80 fishery makes it very difficult to interpret responses to these questions. Further, since users of the AM80 EDR would undoubtedly also have access to other data within the NMFS Catch Accounting System (CAS) that more precisely document activities of the vessels, the activity questions in the EDR do not appear to add to the information set already available for AM80 vessels.

2.2.1.3 EDR Revenue Questions

Table 3 in the EDR asks vessels to report revenues from various potential sources. In general, these questions appear to provide good information about the AM80 vessels that is not available elsewhere. Currently no other data collected by NMFS or the Alaska Department of Fish and Game (ADF&G) ask directly for total sales volume and value. In addition, the EDRs are the only source of "official" information on revenues generated from tendering or other non-fishery related activities. The EDRs also ask for information about revenue from sales of groundfish and crab limited entry licenses, and for information on formal leases of AM80 QS or halibut/crab PSC (PSQ). No other official source exists for the latter two types of information.

However, it does appear that the EDR questions on leases of QS and PSC could have the potential to be misinterpreted both by respondents and by analysts reviewing the information. One potential source of confusion may involve use of the term "QS shares leased." The potential confusion arises from the fact that QS amounts are converted by NMFS to Cooperative Quota (CQ) amounts each year for each vessel for each of the AM80 species. A vessel can formally transfer CQ from one vessel to another. While a sale of CQ would be considered by analysts as a lease of QS for a given year, it is very possible that the AM80 respondents would not interpret it the same way.

The product volume and value data collected in the AM80 EDRs has led to a significant improvement in the quality of wholesale revenue data reported within this analysis, and coincidentally an improved understanding of product weights that are reported for the fishery. The improvement came about because the analysts noticed that product volumes and revenues reported in the EDRs were noticeably and consistently lower than estimated product weights and wholesale values reported within the CAS. The analysts also noticed that the product volumes and wholesale revenue data in the EDRs were closer to values reported in ADF&G Commercial Operator Annual Report (COAR) data.

The issue was brought to the attention of the AM80 fleet by contacting representatives of the Alaska Seafood Cooperative and Groundfish Forum. They in turn asked fleet owners and managers if they could help explain the apparent discrepancies. A member of the O'Hara Corporation's management team quickly solved the "puzzle" by pointing out that product weights reported in the CAS are gross product weights that include "overpack" and glaze, while the product weights reported in the COAR

data are "net weights" sold. The net weights sold are typically 5–10 percent less than the actual glazed weight of the product in each case. The "overpack" ensures that customers always received at least as much product as the stated net weight sold.

The difference also explains the discrepancy between EDR product volumes and values and product volumes and wholesale revenue estimates in the CAS—the revenue estimates in the CAS utilize product prices calculated from COAR data (i.e. $ per net-weight pound sold). These prices are then applied to the gross-weight pounds in the CAS, and since the gross weight is greater than the net weight sold, the estimated wholesale revenue in the CAS is overstated.

Throughout this 5-year review, therefore, the wholesale values that are reported have been adjusted to reflect wholesale values as reported in the EDRs for the years 2008–2012. Similar proportional adjustments have been made to estimates of wholesale value for 2003–2007.

2.2.1.4 EDR Cost and Expense Questions

Tables 4 and 5 of the EDR request information on capital and operational expenditures, respectively, made during the year. In general it appears that the expenditure questions are specific and detailed enough that both the respondents and the analysts should not be misinterpreting the information requested or provided. There are, however, at least a few questions that do appear to have significant potential for confusion or misinterpretation.

Questions in Table 4 ask for calendar year expenditures on fully capitalized assets that were made during the year. The questions ask for expenditures on fishing gear, processing equipment (including freezers), other vessel and onboard equipment, and other capital expenditures to be itemized. However, there may be some issues associated with responses to these questions. First, since it is not always clear in which category a major capital expenditure should fall, there may be differences in how different owners interpret and categorize their responses. Also it is not always clear that it is the capitalized amount that is being entered rather than the total amount of the investment. This may make expenditures appear to be "lumpier" than they actually are, thus making it less informative to compare estimates of net revenues between vessels or between years.

Question #5 in Table 5 asks respondents to report on: "*Recruitment, travel, benefits and other employee related costs (excluding food and provisions and other employee costs already provided in items 1, 2 and 3.).*" This question may be misleading because these costs could all be interpreted as the total cost of the human resources (HR) department of the firm. It is not clear, however, whether wages/salaries and benefits of the HR staff should be included, or whether the HR department's share of building rent and other operating costs should be included. We presume that multi-vessel companies would report the share of HR expenses related to each particular vessel.

This question could be improved if respondents were explicitly instructed to include all HR-related costs including wages/salaries and benefits of HR staff. It would probably be best if the instructions told respondents to exclude the HR department's share of building costs.

Question #15 in Table 5 asks respondents to report on: "*General Administrative Cost, including professional services and management fees (do not include costs reported in items 13 or 14) associated with vessel operation.*"

It is assumed that the costs of managing the vessel at the vessel's land-based offices would be reported here, except that HR costs were presumably already reported in question #5. It is presumed that even though the instructions do not explicitly state that HR costs should be excluded, respondents will not intentionally add HR costs here if they have already reported them elsewhere.

It is presumed that vessels that are part of a multi-vessel company would itemize and report each vessel's share of the company's non-HR administrative costs. It is also presumed that any profits or returns to owners are not included in this question. However, since there are no questions that specifically ask about profits or returns to owners, or otherwise mention profits or returns to owners, there is the possibility that some respondents may include some profits or returns to capital within this answer.

There is a possibility that the wording of the question may lead respondents to believe the question pertains exclusively to just consulting fees, accounting fees, and legal fees. There is also the possibility that because all other questions in the EDR specifically ask about vessel-level costs and not company-wide expenses, respondents may not include the vessel's share of the company-wide costs under this cost item. The fact that some of the completed EDRs report a zero amount for this question indicates that the question is likely being misinterpreted by at least some respondents.

This question could be improved by rewording and making it explicit that this cost category includes the vessel's share of total administrative cost of managing and operating the vessel, including the company's office-based staff as well as the costs of office space. It should also be made explicit that profits or returns to capital should not be included within this category. It may also be useful to create a separate question regarding the costs of administrative office space.

Question #18 in Table 5 asks respondents to report on: *Total raw fish purchases from other vessels (all fisheries and species)*. It is fairly clear that the intent of this question is to capture the volume and costs of mothership-type activities. However, the wording of the question explicitly asks about raw-fish **purchases**. If an AM80 vessel is acting as a mothership and the catcher vessels (CV) that deliver to it are owned by the same company, then the delivery of fish from the CV to the processing vessel would not be considered a "purchase" of raw fish and therefore would not be reported. In mothership operations in which the CVs are not owned by the processing company, the purchase amount of raw fish is assumed to be at least equal to the marginal operating cost of the CV. However, when the CV and the processing vessel are owned by the same company, then it is likely that the operating costs of the CVs cannot be estimated, and thus may wind up being included in the residual returns to capital or profits of the processing vessel.

Also it appears that the set of cost questions in the EDRs do not provide for the reporting of payments for royalties or lease of quota that may be transferred between vessels under common ownership, since these transfers may be made without explicit payment, or to CDQ organizations for the right to fish CDQ shares. Between 2008–2012, an estimated $98.6 million ($2012) in wholesale revenues were generated from CDQ harvests by nine different AM80 vessels, and it is likely that the associated CDQ royalties would have been at least $10 million.

Finally, if the EDR expenditure data are intended to be used for modeling the distribution of regional economic impacts, an accounting is needed of where each expenditure item is made. For example, to accurately estimate the distribution of regional economic impacts resulting from the fleet's activities, it is necessary to know approximately what proportions of expenditures for major cost items like repair and maintenance, fuel and lube, freight and storage, and administration were made in Alaska ports vs. elsewhere (e.g., Seattle). In addition, it is necessary to know the approximate geographic distribution of residence of the crew members so that impacts of their income and spending can be accurately assigned to the correct region. This type of information may be estimated *post hoc* from informal surveys or interviews with industry representatives. But it would be clearer and more straightforward if expenditure distribution information were collected along with the expenditure value information as part of the EDR.

2.2.1.5 EDR Labor Questions

Table 6 of the EDR asks respondents to report on the average number of positions and total number of employees that worked onboard the vessel during the calendar year. There do not appear to be major issues with respect to reporting onboard labor, although in some cases vessels have reported either the average number of positions or total number of employees, but not both. There have also been sporadic cases of significant apparent over-reporting of the number of employees.

Additional questions surveying the average length of a typical onboard assignment for fishing, processing and other employees would be helpful. Also, the EDR should explicitly ask for the number of office-based staff, and wages/salaries and bonuses paid to office-based staff, as well as the proportion of those staff and payments that should be assigned to a particular vessel.

The question in Table 6 about average number of hours worked per day by a typical processing line employee may be of limited utility except perhaps for making comparisons between vessels. Responses to questions about whether a vessel used crew shares or revenue sharing to pay processing and non-processing workers can be difficult to interpret. For example what is the interpretation of meaning in cases where a vessel checks "Yes" for the question asking whether crew or revenue shares were used to pay some processing crew as well as for the question asking whether crew or revenue shares were used to pay all processing crew?

2.3 Review of Annual Cooperative Reports

This section summarizes the types of information provided in the Annual AM80 Cooperative Reports that are submitted to NFMS Regional Administrator. The "official" reports include vessel-by-vessel catch data, while public versions of the reports that have been **voluntarily** supplied to the Council exclude these vessel-by-vessel data.

The regulations at 50 CFR 679.5(s) require AM80 Cooperatives to submit an annual report detailing cooperative activities for the previous fishing year. These regulations require the report to contain the following information:

- A description of the method used by the cooperative to monitor fisheries in which cooperative vessels participated.
- The cooperative's actual retained and discarded allocated catch and GOA sideboard limited fisheries by statistical area on a vessel-by-vessel basis.
- A description of any actions taken by the cooperative against specific members in response to a member that exceeded allocated species that the member was assigned to catch for the AM80 cooperative.

Voluntary Cooperative reports have been submitted to the Council each by Alaska Seafood Cooperative (AKSC) and its predecessor the Best Use Cooperative (BUC). The Alaska Groundfish Cooperative (AGC) has also submitted required reports each year from 2011–2013 as well as voluntary reports.

Technically, the primary difference between the reports submitted to NMFS and the reports that are made available to the public is that the reports made available to the public aggregate catch and discard reports over all of the vessels in the cooperative. The reports made to NMFS list retained and discarded catches by individual vessel by area, including the GOA. Both cooperatives report that the data they supply in the Cooperative Reports to NMFS are exact duplicates of information in the CAS that is provided to the cooperative through SeaState Inc.

Both voluntary and required reports describe the methods that the cooperative uses to monitor catch within the cooperative. In theory, if there had been any internal violation of cooperative rules, the description of actions taken against specific members would be spelled out in the confidential report to NMFS and not included in the voluntary reports.

One of the cooperatives (AKSC) augments the "public" version of their annual cooperative report with additional information that they feel helps inform decision-makers of issues facing the AM80. The public versions of the Cooperative Reports are available on the NMFS Alaska Region (NMFS-AKR) web page at http://alaskafisheries.noaa.gov/sustainablefisheries/amds/80/default.htm.

The following is a summary of allocation and catch data provided in the AGC voluntary reports from 2011–2012 followed by the AKSC/BUC voluntary cooperative reports for the years 2008–2012. The numbers shown below have all been compared to CAS data. With the exception of a few typographical errors, they all match up very closely.

Table 1. Allocation, Catch and Transfer Amounts in Alaska Groundfish Cooperative Voluntary Reports

Species	AGC Am 80 Allocation	AGC Catch	AGC Am 80 Allocation	AGC Catch
	2011 Amounts		2012 Amounts	
Pacific Cod (mt)	5,079	3,600	6,188	4,074
Yellowfin Sole (mt)	59,798	21,487	60,313	16,792
Rock Sole (mt)	19,902	5,071	19,000	14,213
Flathead Sole (mt)	6,269	460	4,976	318
Atka Mackerel in 541 (mt)	19,181	19,142	17,770	17,237
Atka Mackerel in 542 (mt)	5,389	5,128	5,016	4,709
Atka Mackerel in 543 (mt)	755	183	759	150
Pacific Ocean Perch in 541 (mt)	2,364	2,332	2,347	2,304
Pacific Ocean Perch in 542 (mt)	2,078	2,054	2,091	2,043
Pacific Ocean Perch in 543 (mt)	3,879	3,835	3,883	3,844
Halibut Mortality (mt)	732	488	716	444
Red King Crab in Zone 1 (#s)	41,602	6,407	13,809	10,785
Bairdi Crab in Zone 1 (#s)	174,839	54,801	109,094	61,544
Bairdi Crab in Zone 2 (#s)	407,987	297,279	194,629	117,582
C. Opilio COBLZ (#s)	1,834,026	274,157	1,093,362	209,105
Chinook Salmon (#s)	-	0	-	6
Non-Chinook Salmon (#s)	-	270	-	388

Source: Adapted by Northern Economics from AGC Voluntary Cooperative Reports (2012, 2013).

Table 2. Allocation, Catch and Transfer Amounts in Alaska Seafood Cooperative Voluntary Reports

Species	Data Type	2008	2009	2010	2011	2012
Pacific Cod	Allocation with Rollovers (mt)	17,135	20,654	20,278	23,232	28,188
	AKSC Catch (mt)	13,517	19,637	20,023	21,139	23,917
Yellowfin Sole	Allocation with Rollovers (mt)	98,982	56,811	110,733	89,814	92,358
	AKSC Catch (mt)	84,853	69,563	74,034	85,424	85,216
	AKSC Catch in NBBTA (mt)	-	-	-	4,850	3,168
Rock Sole	Allocation with Rollovers (mt)	47,003	93,987	58,863	55,576	52,525
	AKSC Catch (mt)	34,982	33,668	44,558	42,388	46,656
Flathead Sole	Allocation with Rollovers (mt)	35,758	43,351	42,872	29,773	23,219
	AKSC Catch (mt)	16,931	12,031	13,915	6,965	5,472
Atka Mackerel in 541	Allocation with Rollovers (mt)	8,683	10,512	9,282	13,694	12,653
	AKSC Catch (mt)	8,556	10,318	9,234	13,558	12,538
Atka Mackerel in 542	Allocation with Rollovers (mt)	8,447	11,047	9,863	3,809	3,544
	AKSC Catch (mt)	7,472	10,412	7,826	3,765	3,488
Atka Mackerel in 543	Allocation with Rollovers (mt)	5,784	5,797	7,036	545	541
	AKSC Catch (mt)	5,377	5,414	6,727	17	41
Pacific Ocean Perch in 541	Allocation with Rollovers (mt)	1,908	1,543	1,551	2,095	2,041
	AKSC Catch (mt)	1,845	1,510	1,515	2,045	2,032
Pacific Ocean Perch in 542	Allocation with Rollovers (mt)	1,984	1,604	1,591	1,841	1,852
	AKSC Catch (mt)	1,941	1,566	1,458	1,812	1,826
Pacific Ocean Perch in 543	Allocation with Rollovers (mt)	3,124	2,676	2,665	3,436	3,440
	AKSC Catch (mt)	3,096	2,645	2,583	3,403	3,414
Halibut Mortality	Allocation with Rollovers (mt)	1,837	1,793	2,094	1,708	1,718
	AKSC Catch (mt)	1,293	1,497	1,668	1,321	1,501
	AKSC Catch in NBBTA (mt)	-	-	-	1.67	0.83
King Crab in Zone 1	Allocation with Rollovers (#s)	78,631	73,351	118,237	95,104	27,409
	AKSC Catch (#s)	48,931	50,406	48,615	24,557	13,378
Bairdi Crab in Zone 1	Allocation with Rollovers (#s)	340,520	321,922	547,715	410,906	222,629
	AKSC Catch (#s)	106,731	131,712	132,095	167,238	109,698
Bairdi Crab in Zone 2	Allocation with Rollovers (#s)	580,311	548,443	1,320,277	898,620	347,382
	AKSC Catch (#s)	211,792	135,331	125,648	268,709	49,331
Opilio Crab COBLZ	Allocation with Rollovers (#s)	1,632,432	1,544,825	1,461,308	3,538,834	1,560,133
	AKSC Catch (#s)	286,781	315,582	163,136	204,540	115,534
Chinook	AKSC Catch (#s)	329	508	1,437	563	570
Non-Chinook	AKSC Catch (#s)	1,225	1,128	929	2,715	727

Note: At the Council's request, ASKSC has reported yellowfin sole catch and halibut bycatch in the Northern Bristol Bay Trawl Area (NBBTA) in 2011 and 2012
Source: Adapted by Northern Economics from AKSC & BUC Voluntary Cooperative Reports (2009–2013).

The voluntary cooperative reports also provide estimates of GRS percentages. BUC/AKSC makes it very clear that the numbers they are reporting are their attempt to measure the GRS percentage as it was intended to be measured in the GRS regulations. The CAS also reports retention percentages, but CAS retention percentages do not include all non-groundfish amounts in the denominator—Table 3 shows the GRS percentages reported in the coop reports.

Table 3. Groundfish Retention Percentages Reported in Voluntary Cooperative Reports

	2008	2009	2010	2011	2012
Alaska Seafood / Best Use Cooperative	76.9%	81.0%	84.0%	95.2%	94.2%
Alaska Groundfish Cooperative	-	-	-	87.6%	87.1%

Source: Developed by Northern Economics from AKSC/ BUC and AGC Cooperative Reports (2009–2013).

While the confidential reports that are supplied by the cooperatives to NMFS do not appear to provide any critically important information that NMFS does not already have, they do appear to have a significant a role in promoting communication between the cooperative and the public at large via the non-confidential versions that are distributed more broadly. The public versions of the cooperative reports inform the Council and other interested persons about the workings of the cooperative and about issues that are important to them.

An example of this is discussed in Section 7.2. In this case, the public version of the Annual Report of the BUC for fishing year 2009, was cited as a primary information source leading to a NMFS Emergency Rule suspending the GRS. The following has been excerpted from the Groundfish Retention Emergency Rule (NMFS, 2010):

> In its March 10, 2010 report to the Council, the Best Use Cooperative, a cooperative established under the cooperative formation provisions of AM80, noted several issues that could pose potential compliance problems with the current GRS regulations. Specifically, the report stated that as retention requirements are increased through 2011, current GRS percentages may become economically impractical and unattainable.
>
> In response to these concerns, the Council asked NMFS to assess the GRS and the issues raised by the Best Use Cooperative. In June 2010, NMFS reported to the Council the agency's opinion that unintended implementation, compliance, and enforcement issues are apparent with the GRS program. These issues center around (1) the regulatory methodology used to calculate annual GRS percentages for vessels and (2) the high enforcement and prosecution costs associated with the GRS.

3 Rationalization and Elimination of the Race for Fish

This section of the 5-year review focuses on the some of the rationalization impacts of the AM80 that are not covered explicitly in other sections of the 5-year review: the impacts of rationalization and the elimination of the race for fish

In particular, this section looks at consolidation of the AM80 fleet, as well as some of the effects of rationalization that occurred. Conversely, the separate allocation of yellowfin sole for the vessels in the BSAI TLA Sector has led to a new "race-for-sole" between AFA CPs and new mothership operations.

3.1 Rationalization and Consolidation Effects in the AM80 Sector

This section summarizes the transition from a race for fish during the years prior to implementation of AM80; to partial rationalization from 2008–2010; and to full rationalization beginning in 2011.

This section

3.1.1 Numbers of Vessels and Owners Participating in the AM80 Fisheries

This section summarizes the number of Non-AFA Trawl CPs participating in the AM80 fisheries from 2003–2012.

Officially, the final rule for AM80 published in the Federal Register on September 14, 2007 listed a total of 28 vessels that would be considered AM80 vessels. These vessels are all listed in Table 4, along with their vessel identifiers; their current owners and information on whether the vessels fished through 2012. Of these 28 vessels, 3 have sunk: 1) the Arctic Rose in 2001; 2) the Prosperity in 2004, 3) the Alaska Ranger in 2008. The Arctic Rose has been replaced by the Ocean Cape (now renamed as Pacific Capes). Three other vessels have not fished in Alaska between 2003–2012: 1) Bering Enterprise, 2) Harvester Enterprise, and 3) Alaska Voyager. One of the named vessels—the Golden Fleece—has chosen to opt out of the AM80, but continues to participate in the GOA.

Of the 24 vessels that actively participated in BSAI fisheries since implementation of AM80, 21 participated in 2012 (the last year included in this 5-year review). As indicated above the Alaska Ranger sank in 2008,[3] the Tremont last fished in 2008, the Ocean Cape (now the Pacific Capes) has not fished in the BSAI since 2010. Fishing activity from 2013–2014 has not been examined.

[3] Three crew members were lost when the vessel sank on March 28, 2008, the first year of fishing under AM80.

Table 4. AM80 Vessels with Current Owners

Vessel Name	USCG #	LLP #	ADFG #	NMFS #	Current Owner | Notes
Alaska Juris	569276	LLG 2082	54693	2443	Fishing Company of Alaska
Alaska Spirit	554913	LLG 3043	59870	3819	Fishing Company of Alaska
Alaska Victory	569752	LLG 2080	61083	4093	Fishing Company of Alaska
Alaska Warrior	590350	LLG 2083	56965	3423	Fishing Company of Alaska
Alaska Ranger	550138	LLG 2118	57444	3400	Fishing Company of Alaska | Sunk in 2008
Alaska Voyager	536484	LLG 2084	51926	1311	Fishing Company of Alaska | No fishing 2003-2012
American No I	610654	LLG 2028	36202	1879	Fisherman's Finest
US Intrepid	604439	LLG 3957	54392	2800	Fisherman's Finest
Arica	550139	LLG 2429	57228	3694	Iquique U.S.
Cape Horn	653806	LLG 2432	55921	2110	Iquique U.S.
Rebecca Irene	697637	LLG 3958	51873	1610	Iquique U.S.
Unimak	637693	LLG 3662	57211	3369	Iquique U.S.
Tremont	529154	LLG 2785	55466	2018	Iquique U.S. via Arctic Sole| Last fished in 2008
Arctic Rose	931446	LLG 3895	63511	4650	Sunk 2001 | Replaced by Ocean Cape
Ocean Cape	583721	LLG 3895	29923	1615	Iquique U.S. via Arctic Sole. | Last fished in 2010
Ocean Peace	677399	LLG 2138	55767	2134	Ocean Peace Inc.
Seafisher	575587	LLG 2014	56964	3835	Ocean Peace Inc. via MV Savage in 2010/11
Constellation	640364	LLG 1147	61081	4092	O'Hara Corp.
Defender	665983	LLG 3217	62545	4635	O'Hara Corp.
Enterprise	657383	LLG 4831	69038	5822	O'Hara Corp.
Bering Enterprise	610869	LLG 3744	36502	3003	O'Hara Corp owns QS via Trident in 2009 | No fishing 2003-2012
Harvester Ent.	584902	LLG 3741	55183	2732	O'Hara Corp owns QS via Trident in 2009 | No fishing 2003-2012
Alaska Vaerdal	611225	LLG 1402	1119	2123	US Seafoods via Jubiliee Fisheries in 2010
Alliance	622750	LLG 2905	55045	2924	US Seafoods via Kodiak Fish Co. in 2007/8
Legacy	664882	LLG 3714	48183	3367	US Seafoods via Kodiak Fish Co in 2007/8
Ocean Alaska	623210	LLG 4360	41219	528	US Seafoods via Iquique U.S. in 2007
Seafreeze Alaska	517242	LLG 4692	39798	2733	US Seafoods
Prosperity	615485	LLG 1802	41864	3361	US Seafoods owns LLP via Legacy | Last fished in 1990s
Golden Fleece	609951	LLG 2524	43260	367	Did not apply for AM80 QS. Active in GOA.

3.1.2 Outcomes for Owners and Crew no Longer Participating in the AM80 Fisheries

One of the often-cited negative impacts of rationalization programs is the negative effects on vessel owners and operators and crewmembers of the vessels that are no longer participating. As documented in Table 4, several vessels have changed owners since 2003, one vessel sank, and two vessels that were active from 2003–2012 are no longer active.

In an interview with one former owner—Teressa Kandianis (2014) of Kodiak Fish Company and former owner of the Alliance and the Legacy, AM80 provided an reasonable way to exit the fishery for owners of marginally performing vessels. In the absence of AM80, GRS regulations would likely have forced these more marginal vessels out of the fishery and the owners would not have been compensated. Instead of being forced out of the fishery by competition or regulation, vessel owners were able to sell to willing buyers.

In the course of this analysis we have spoken with both current and previous owners of vessels to gain some understanding of outcomes for crew that are no longer participating in the fishery. In general, it appears that the increased season length for most of the vessels that have continued to operate coupled with regular turnover of crew members means there continue to be opportunities for qualified fishing crew and skippers. According to both current and past owners, if experienced crew members and officers wanted to remain in the fishery, they are most likely still in the fishery.

Data limitations preclude a full quantitative assessment of the number of crew members participating on AM80 vessels before and after implementation of AM80. There are, however, two new sources of crewmember data for AM80 vessels available from 2008–2012: 1) crew information in the EDRs, and 2) Vessel crew complements reported by observers. Unfortunately, both sources have been collected from 2008 forward. There are no comprehensive data on AM80 crewmembers prior to 2008.

It is possible, however, to use that the data from 2008–2012 to make inferences regarding crewmembers in prior years. Table 5 uses the assumption that the average crew complement on vessels prior to 2008 is equal to the number of crew members reported by observers on AM80 vessels in 2008 (the first year these data are available). Since all of the AM80 vessels that participated from 2003–2007 also participated in 2008, there is at least one year of observed crew data for all vessels.

While the number of active A80 vessels has declined since implementation—from an average of 22.6 in the five years prior to implementation to an average of 20.8 vessels following implementation—the average number of weeks that vessels were active during the year has increased by over 4 weeks per year—from an average of 32.2 weeks per year to an average of 36.8 weeks per year. The size of the crew complement also appears to have increased in the years following implementation. In 2008, the average reported crew complements over all vessels and weeks was 35.3 crewmembers. In 2009 that number increased to 36.2 and every year from 2010–2012 had reported crew complements that averaged 37.6 crewmembers or higher.

In Table 5, average crew member weeks is calculated by multiplying the average crew complement on each vessel by the number of weeks that vessel participated, and then by dividing the product by the number of vessels that participated during the year—in other words "Average Crewmember Weeks" is a weighted average. Prior to AM80, the Crewmember Weeks averaged 1,199 across all vessels. During the five years after AM80, the Crewmember Weeks jumped to a weighted average of 1,386, an increase of 187 crewmember weeks per vessel. The estimated total number of crewmember weeks (the right-most column) jumped by 1,677 in the five years following implementation of AM80. Given these large increases in crew member weeks, it does seem likely that displaced but qualified crewmembers from vessels that have left the fishery since 2008 are likely to be able to find work in the AM80 fleet if they desire.

Table 5. Estimated Crew and Crew Weeks on AM80 Vessels before and After Implementation

Year	Number of AM80 Vessels	Average Vessel Weeks	Average Crew Complement	Average Crew-member Weeks	Estimated Crew Weeks on all Vessels
2003	23.0	32.2	35.3	1,204	27,685
2004	22.0	33.7	36.5	1,243	27,354
2005	23.0	31.6	35.3	1,183	27,210
2006	22.0	32.0	36.5	1,196	26,310
2007	23.0	31.7	35.3	1,167	26,832
Avg 2003-07	**22.6**	**32.2**	**35.8**	**1,199**	**27,078**
2008	23.0	36.1	35.3	1,299	29,878
2009	21.0	35.8	36.2	1,315	27,615
2010	20.0	38.2	37.8	1,455	29,095
2011	20.0	37.6	37.6	1,433	28,664
2012	20.0	36.6	37.8	1,426	28,525
Avg 2008-12	**20.8**	**36.8**	**36.9**	**1,386**	**28,755**

Note: Shaded cells indicate that information was estimated using the assumption that the crewmember counts for 2003–2007 equal the crewmember counts for those vessels in 2008.
Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

3.1.3 Amendment 80 Quota Share Ownership and Issuance

Rationalization of the AM80 fishery was made possible through the issuance of AM80 QS and the annual assignment of CQ to cooperatives or to the AM80 Limited Access fishery (AM80 LA). In this section we document the QS issued to vessels and companies. Unlike catch amounts, the amount of QS issued to a vessel or to a fishing company is not confidential as is available from NMFS at http://alaskafisheries.noaa.gov/sustainablefisheries/amds/80/default.htm.

QS were assigned to vessels based on the best their catch history in the vessels five of seven calendar years for each AM80 species from 1998–2004.

The AM80 species are defined with an associated fishing area as follows:

- Atka mackerel in the Eastern Bering Sea and Aleutian Islands
- Flathead sole in the BSAI
- Pacific cod in the BSAI
- Pacific ocean perch in the Aleutian Islands (AI)[4]
- Rock sole in the BSAI
- Yellowfin sole in the BSAI

If a "listed" AM80 vessel did not have any legal landings of BSAI rock sole or yellowfin sole between 1998–2004, it was assigned 0.5 percent of the initial QS applied for by other AM80 vessels. Similarly, if a vessel did not have legal landings of flathead sole during the period it was assigned 0.1 percent of the initial QS.[5]

Of the 28 members that qualified for AM80 QS in 2008, 25 applied during the initial issuance in 2007 and 2008. As aforementioned, Golden Fleece was the only vessel to opt out of the AM80 fishery. The Bering Enterprise and Harvester Enterprise did not apply for AM80 QS until late in 2009, and therefore their QS were not part of the AM80 QS pool until 2010. Using registered address data, it appears that AM80 QS was dispersed among nine companies during initial issuance. In 2010 QS issued to Vaerdal and Seafisher were transferred to U.S. Seafoods and Ocean Peace, respectively. This consolidation brought the total number of companies participating in AM80 to seven. Further consolidation took place in 2013 when Arctic Rose/Ocean Cape QS was transferred to Iquique U.S., bringing the total number of companies operating in AM80 to six.

[4] Pacific ocean perch harvests are considered AM80 harvests only if they were taken in the Aleutian Islands—management zones 541, 542, or 543. Pacific ocean perch harvests in the Bering Sea are not consider catch of AM80 species.

[5] Three of the "listed" 28 AM80 vessels did not have legal landings during the 1998–2004 period and were issued QS as a result of this clause—Bering Enterprise, Harvester Enterprise, and Prosperity. Each vessel received 2,693,390 QS in total broken down as follows: 1) Yelllowfin Sole—1,757,999 QS, 2) Rock Sole—850,175 QS, 3) Flathead Sole—85,216 QS. Two vessels that did have legal landings of yellowfin sole, (Alliance and Arctic Rose) received fewer Yellowfin sole QS than the three that had no legal landings.

Since the first year of issuance, consolidation of AM80 QS has taken place. The study team, using registered address data from NMFS issuance data, monitored the movement of QS units. For years prior to the first QS issuance, license data and addresses, along with personal communication with NPFMC, were utilized. This analysis attempts to capture the movements of QS units from when AM80 was first initiated, but not implemented, to its current state. Table 6 tracks these movements from the date of initial issuance. While some consolidation appears obvious, other movements appear have a degree of uncertainty. Consolidation findings prior to initial issuance are listed below:

- U.S. Seafoods acquires Ocean Alaska and Prosperity from Iquique and Kodiak Fishing Company, respectively. (2006/07)
- Iquique acquires Tremont from Arctic Sole Seafoods. (2007/08)
- U.S. Seafoods acquires Alliance from Kodiak Fishing Company and Kodiak Fishing Company leaves the AM80 market. (2007/08)
- Ocean Peace is registered to the same address as other U.S. Seafoods vessels in 2003 and 2004 and as an independent company 'Ocean Peace, Inc.' onward. It is unclear if any relationship existed between U.S. Seafoods and Ocean Peace, Inc. in those years. Ocean Peace, Inc.'s website (http://www.oceanpeaceinc.com/) states ownership of the vessel beginning in 1991.
- License data shows the Seafisher being transferred to Ocean Peace, Inc. in 2012, and is consistent with Ocean Peace, Inc.'s website (http://www.oceanpeaceinc.com/). However, analysis using QS issuance data reveals QS being transferred to Ocean Peace, Inc. in 2010.

Prior to 2008, findings suggest that Kodiak Fishing Company was the only company that left the fishery before initial issuance of QS. All other consolidations took place after 2008 and are shown in Table 6.

A similar summary of QS issued to each vessel and company for AM80 species is in Appendix B.

Table 6. AM80 QS Unit Issuance (1,000s), 2008–2014

Company	Vessel	2008	2009	2010	2011	2012	2013	2014
U.S. Seafoods	ALLIANCE	6,580	6,580	6,580	6,580	6,580	6,580	6,580
	LEGACY	28,820	28,820	28,820	28,820	28,820	28,820	28,820
	OCEAN ALASKA	6,140	6,140	6,140	6,140	6,140	6,140	6,140
	PROSPERITY	2,693	2,693	2,693	2,693	2,693	2,693	2,693
	SEAFREEZE ALASKA	59,339	59,339	59,339	59,339	59,339	59,339	59,339
	VAERDAL	-	-	20,464	20,464	20,464	20,464	20,464
	U.S. Seafoods Total	103,573	103,573	124,036	124,036	124,036	124,036	124,036
Fishing Company of Alaska	ALASKA JURIS	87,116	87,116	87,116	87,116	87,116	87,116	87,116
	ALASKA RANGER	62,984	62,984	62,984	62,984	62,984	62,984	62,984
	ALASKA SPIRIT	68,422	68,422	68,422	68,422	68,422	68,422	68,422
	ALASKA VICTORY	69,679	69,679	69,679	69,679	69,679	69,679	69,679
	ALASKA VOYAGER	10,030	10,030	10,030	10,030	10,030	10,030	10,030
	ALASKA WARRIOR	88,633	88,633	88,633	88,633	88,633	88,633	88,633
	Fishing Company of Alaska Total	386,863	386,863	386,863	386,863	386,863	386,863	386,863
Arctic Sole Seafoods, Inc.	ARCTIC ROSE/OCEAN CAPE	2,913	2,913	2,913	2,913	2,913	-	-
	Arctic Sole Seafoods, Inc. Total	2,913	2,913	2,913	2,913	2,913	-	-
Iquique U.S.	ARCTIC ROSE/OCEAN CAPE	-	-	-	-	-	2,913	2,913
	ARICA	40,301	40,301	40,301	40,301	40,301	40,301	40,301
	CAPE HORN	33,860	33,860	33,860	33,860	33,860	33,860	33,860
	REBECCA IRENE	36,734	36,734	36,734	36,734	36,734	36,734	36,734
	TREMONT	30,182	30,182	30,182	30,182	30,182	30,182	30,182
	UNIMAK	40,612	40,612	40,612	40,612	40,612	40,612	40,612
	Iquique U.S. Total	181,689	181,689	181,689	181,689	181,689	184,601	184,601
Jubilee Fisheries, Inc.	VAERDAL	20,464	20,464	-	-	-	-	-
	Jubilee Fisheries, Inc. Total	20,464	20,464	-	-	-	-	-
M/V Savage, Inc.	SEAFISHER	87,064	87,064	-	-	-	-	-
	M/V Savage, Inc. Total	87,064	87,064	-	-	-	-	-
Ocean Peace	OCEAN PEACE	65,103	65,103	65,103	65,103	65,103	65,103	65,103
	SEAFISHER	-	-	87,064	87,064	87,064	87,064	87,064
	Ocean Peace Total	65,103	65,103	152,167	152,167	152,167	152,167	152,167
Fishermans Finest	AMERICAN NO I	40,506	40,506	40,506	40,506	40,506	40,506	40,506
	US INTREPID	46,664	46,664	46,664	46,664	46,664	46,664	46,664
	Fishermans Finest Total	87,170	87,170	87,170	87,170	87,170	87,170	87,170
O'Hara Corporation	CONSTELLATION	46,785	46,785	46,785	46,785	46,785	46,785	46,785
	DEFENDER	43,184	43,184	43,184	43,184	43,184	43,184	43,184
	ENTERPRISE	45,347	45,347	45,347	45,347	45,347	45,347	45,347
	BERING ENTERPRISE	-	-	2,693	2,693	2,693	2,693	2,693
	HARVESTER ENTERPRISE	-	-	2,693	2,693	2,693	2,693	2,693
	O'Hara Corporation Total	135,316	135,316	140,703	140,703	140,703	140,703	140,703
	Grand Total	1,070,153	1,070,153	1,075,540	1,075,540	1,075,540	1,075,540	1,075,540

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014

3.1.4 Excess Capacity

This section reviews the question of excess capacity from the regulatory perspective. The Council's AM80 motion and implementing regulations at § 679.92(a) state that a single person may not individually or collectively hold or use more than 30 percent of the AM80 QS units initially assigned to the AM80 sector. Persons that were initially allocated more than the QS use cap limit are grandfathered in and need not sell their excess QS. Similarly, there is a use cap on the amount of

AM80 CQ that limits a single vessel from harvesting more than 20 percent of the CQ of the AM80 groundfish species in a given year.

The 5-year review examines initial allocations of AM80 QS to persons as well as the QS ownership amounts reported at the beginning of the year. The 5-year review also examines the question of whether any individual vessel has reached the 20-percent CQ use cap using CAS data. However, because of disclosure rules, the 5-year review cannot report actual amounts that have been attained.

The only entity grandfathered as exceeded the AM80 QS personal use cap is the Fishing Company of Alaska (FCA). As show in Table 7, FCA's initial issuance was 36.15 percent of total QS issuance in 2008. This proportion decreased to 35.97 percent in 2010, when additional QS units were issued to additional applicants (Harvester Enterprise and Bering Enterprise). Total QS units have remained constant since 2010.

Since initial issuance, total AM80 QS has gone from being dispersed to nine companies to being dispersed among six companies. FCA's QS holdings are more than twice the amount of the next largest AM80 QS holder, Iquique U.S. The three largest companies (FCA, Iquique U.S., and O'Hara) account for more than two-thirds of total AM80 QS. If O'Hara Corp. is included, the top four companies hold 80 percent of AM80 QS. Of the top four companies, U.S. Seafoods increased their QS holdings with the acquisition of Vaerdal in 2010. Also in 2010, O'Hara increased its QS holdings with the acquisition of the Bering Enterprise and Harvester Enterprise from B&N Fisheries.

Table 7. AM80 QS Unit Issuance, Percent of Total, 2008–2014

Company	Vessel	2008	2009	2010	2011	2012	2013	2014
U.S. Seafoods	ALLIANCE	0.61%	0.61%	0.61%	0.61%	0.61%	0.61%	0.61%
	LEGACY	2.69%	2.69%	2.68%	2.68%	2.68%	2.68%	2.68%
	OCEAN ALASKA	0.57%	0.57%	0.57%	0.57%	0.57%	0.57%	0.57%
	PROSPERITY	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
	SEAFREEZE ALASKA	5.54%	5.54%	5.52%	5.52%	5.52%	5.52%	5.52%
	VAERDAL	-	-	1.90%	1.90%	1.90%	1.90%	1.90%
	U.S. Seafoods Total	9.68%	9.68%	11.53%	11.53%	11.53%	11.53%	11.53%
Fishing Company of Alaska	ALASKA JURIS	8.14%	8.14%	8.10%	8.10%	8.10%	8.10%	8.10%
	ALASKA RANGER	5.89%	5.89%	5.86%	5.86%	5.86%	5.86%	5.86%
	ALASKA SPIRIT	6.39%	6.39%	6.36%	6.36%	6.36%	6.36%	6.36%
	ALASKA VICTORY	6.51%	6.51%	6.48%	6.48%	6.48%	6.48%	6.48%
	ALASKA VOYAGER	0.94%	0.94%	0.93%	0.93%	0.93%	0.93%	0.93%
	ALASKA WARRIOR	8.28%	8.28%	8.24%	8.24%	8.24%	8.24%	8.24%
	Fishing Company of Alaska Total	36.15%	36.15%	35.97%	35.97%	35.97%	35.97%	35.97%
Arctic Sole Seafoods, Inc.	ARCTIC ROSE/OCEAN CAPE	0.27%	0.27%	0.27%	0.27%	0.27%	-	-
	Arctic Sole Seafoods, Inc. Total	0.27%	0.27%	0.27%	0.27%	0.27%	-	-
Iquique U.S.	ARCTIC ROSE/OCEAN CAPE	-	-	-	-	-	0.27%	0.27%
	ARICA	3.77%	3.77%	3.75%	3.75%	3.75%	3.75%	3.75%
	CAPE HORN	3.16%	3.16%	3.15%	3.15%	3.15%	3.15%	3.15%
	REBECCA IRENE	3.43%	3.43%	3.42%	3.42%	3.42%	3.42%	3.42%
	TREMONT	2.82%	2.82%	2.81%	2.81%	2.81%	2.81%	2.81%
	UNIMAK	3.79%	3.79%	3.78%	3.78%	3.78%	3.78%	3.78%
	Iquique U.S. Total	16.98%	16.98%	16.89%	16.89%	16.89%	17.16%	17.16%
Jubilee Fisheries, Inc.	VAERDAL	1.91%	1.91%	-	-	-	-	-
	Jubilee Fisheries, Inc. Total	1.91%	1.91%	-	-	-	-	-
M/V Savage, Inc.	SEAFISHER	8.14%	8.14%	-	-	-	-	-
	M/V Savage, Inc. Total	8.14%	8.14%	-	-	-	-	-
Ocean Peace	OCEAN PEACE	6.08%	6.08%	6.05%	6.05%	6.05%	6.05%	6.05%
	SEAFISHER	-	-	8.09%	8.09%	8.09%	8.09%	8.09%
	Ocean Peace Total	6.08%	6.08%	14.15%	14.15%	14.15%	14.15%	14.15%
Fishermans Finest	AMERICAN NO I	3.79%	3.79%	3.77%	3.77%	3.77%	3.77%	3.77%
	US INTREPID	4.36%	4.36%	4.34%	4.34%	4.34%	4.34%	4.34%
	Fishermans Finest Total	8.15%	8.15%	8.10%	8.10%	8.10%	8.10%	8.10%
O'Hara Corporation	CONSTELLATION	4.37%	4.37%	4.35%	4.35%	4.35%	4.35%	4.35%
	DEFENDER	4.04%	4.04%	4.02%	4.02%	4.02%	4.02%	4.02%
	ENTERPRISE	4.24%	4.24%	4.22%	4.22%	4.22%	4.22%	4.22%
	BERING ENTERPRISE	-	-	0.25%	0.25%	0.25%	0.25%	0.25%
	HARVESTER ENTERPRISE	-	-	0.25%	0.25%	0.25%	0.25%	0.25%
	O'Hara Corporation Total	12.64%	12.64%	13.08%	13.08%	13.08%	13.08%	13.08%
	Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014b.

As indicated above, the second measure of excess capacity is the CQ vessel use cap. The regulation states that no vessel can catch more than 20 percent of the combined CQ of all six AM80 species. This measure is somewhat more difficult to measure because the amount of CQ issued can change during the year if there is a rollover of ITAC from another sector. For example, if it is determined that the BSAI TLA sector will not be harvesting all of the apportionment of yellowfin sole, NMFS will re-allocate the unused amounts to the AM80 sector, thereby increasing the CQ of all of the vessels in the cooperative that receive the rollover. Similarly, rollovers can and have occurred for Pacific cod.

An alternative measure of whether any given vessel is exceeding the CQ vessel use cap is to look at total catch of the AM80 species by individual vessels. Given that the total catch of the AM80 species by AM80 CPs has not exceeded the CQ of any of the AM80 species during the 5-year period from 2008–2012, the percent of total AM80 CP catch of any given species will always be less than the percent of the AM80 CQ, and thus will serve as a very reasonable measure. If it appears that one or more of the vessels are approaching 20 percent of catch, then a more precise estimate of CQ use may be necessary. In addition, catch by individual AM80 CPs as a percent of all AM80 CPs can be assessed for the years 2003–2007, and thus enable reviewers to understand whether there has been an increase in individual vessel shares during the first 5 years of AM80 compared to the 5 years prior to implementation.

Table 8 summarizes the catch of AM80 CPs of the six AM80 species by four groups of vessels from 2003–2012. For the table, vessels were divided into four groups based on each vessel's ranking in terms of total catch of AM80 species. The top three groups each comprise five vessels, while the last group comprises the eight lowest ranked vessels, including vessels that were not active during the years. The group in which an individual vessel is assigned can and does vary from year to year. In fact, the only time that composition of vessels within the top group was the same for two consecutive years occurred during the 2004–2005 period.

Because of confidentiality rules, the percent attained by the highest ranked vessels cannot be divulged. However, by using the information in the table it is possible to estimate the highest possible percentage that the top ranked vessel in any group could have attained. For example, in 2012, the lowest ranked member of the groups achieved a catch of 6.4 percent. If the next three vessels also achieved 6.4 percent, then the top four vessels could have not caught less than 25.6 percent (6.4% × 4) in aggregate. That means that the most the top ranked boat in 2012 could have taken of the AM80 species is 8.8 percent (34.4%–25.6% = 8.8%). Similar calculations lead to the conclusion that in none of the years from 2003–2012 could any given vessel have taken more than 13.6 percent of the total harvest of AM80 species during the year. Since total harvest of AM80 species has been less than the total CQ of AM80 species each year from 2008–2012, it is clear that no vessel has come close to reaching the CQ vessel use cap.

Table 8. Catch of AM80 Species by Individual AM80 CPs as a Percentage of All AM80 CPs—Selected Statistics

Vessel Groups	Statistics	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Vessels Ranked 1–5	Total %	39.3%	36.3%	37.9%	38.2%	38.1%	36.2%	36.5%	34.4%	34.4%	34.4%
	Average %	7.9%	7.3%	7.6%	7.6%	7.6%	7.2%	7.3%	6.9%	6.9%	6.9%
	Minimum %	6.9%	6.5%	6.8%	6.9%	6.6%	5.6%	6.7%	6.3%	6.3%	6.4%
Vessels Ranked 6–10	Total %	26.0%	26.5%	28.7%	27.1%	27.0%	27.0%	30.4%	30.2%	29.6%	30.4%
	Average %	5.2%	5.3%	5.7%	5.4%	5.4%	5.4%	6.1%	6.0%	5.9%	6.1%
	Minimum %	4.3%	4.6%	4.4%	4.2%	4.1%	5.3%	5.5%	5.8%	5.7%	5.7%
Vessels Ranked 11–15	Total %	20.1%	19.9%	19.3%	19.8%	19.7%	22.3%	23.1%	24.8%	25.2%	25.1%
	Average %	4.0%	4.0%	3.9%	4.0%	3.9%	4.5%	4.6%	5.0%	5.0%	5.0%
	Minimum %	3.4%	3.8%	3.4%	3.5%	3.1%	3.5%	3.0%	3.5%	4.6%	3.9%
Vessels Ranked 16 –23 (lowest 8 vessels)	Total %	14.6%	17.4%	14.1%	14.9%	15.2%	14.5%	10.0%	10.6%	10.7%	10.1%
	Average % (if > 0)	2.4%	2.9%	2.4%	2.5%	2.5%	2.4%	2.0%	2.7%	2.7%	3.4%
	Vessels with zero mt	1	1	1	1	1	1	2	3	3	4

Source: Table developed by Northern Economics from CAS data supplied by Alaska Fisheries Information Network (AKFIN) (Fey, 2014).

The data in Table 8 lead to other findings regarding the effects of consolidation under AM80. The average percentage of the AM80 species catch for the top 5 vessels in the fleet for each year has declined, meaning more of the harvest is taken by lower ranked vessels. From 2003–2007 the top five

vessels averaged 38.0 percent of the total, while in 2008–2012 the top five average only 35.2 percent. The percentage for the second and third tier groups both increased over the two 5-year periods—for the third tier the increase was nearly a 5 percentage point gain. The bottom tier, like the first tier is harvesting a lower percent of the total—from an average of 15.2 percent from 2003–2007 to only 11.2 percent from 2008–2012.

3.1.5 Capacity and Utilization of Capacity

In this section, the review assesses the capacity and utilization of AM80 vessels from 2002–2012. The focus here is on the potential capacity to harvest and process fishery resources compared to the actual utilization of that capacity. While there are many potential ways to measure capacity and utilization, the quantitative assessment in the 5-year review focuses on season length in which AM80 vessels have been utilized. In this section the analysis includes not only fisheries of AM80 CPs in the BSAI, but also activities of AM80 in other fisheries including activities in the GOA, CDQ fisheries, and activities in the BSAI TLA fisheries.

The most straightforward demonstration that the capacity of active vessels has increased is an assessment of whether active vessels are participating in the groundfish fishery during the month. The fleet would be considered close to full capacity if all of the vessels that choose to participate during the year are active during every month. In particular, we would expect that participation in months toward the end of the year would be higher after AM80 was implemented, while participation in the earlier months would tend to be higher in the years before AM80 was implemented. Table 9 shows the number of active vessels in each month from 2003–2012, along with the count of active vessels in the year.

Table 9. Number of Active AM80 Vessels in any AK Fishery by Month and Year

Month	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1	20	22	21	21	21	20	18	15	13	14
2	21	22	22	22	22	23	21	19	18	17
3	21	22	22	21	22	23	21	19	18	18
4	21	22	22	22	22	21	20	20	20	18
5	18	22	22	20	22	21	17	19	20	19
6	15	20	16	19	22	15	11	13	19	17
7	21	22	22	21	22	21	21	20	19	19
8	22	16	22	22	22	21	21	19	17	17
9	22	20	15	21	14	21	20	19	19	18
10	19	12	11	11	10	21	21	19	18	17
11	3	3	3	3	12	17	8	12	15	12
12	1	0	0	1	1	3	0	3	6	3
Unique Active	**22**	**22**	**22**	**22**	**22**	**23**	**21**	**20**	**20**	**20**
X^2 probability	**2.8%**	**1.1%**	**0.4%**	**1.2%**	**17.1%**	**83.3%**	**16.9%**	**70.6%**	**89.8%**	**67.8%**

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

The shifts in the number of active vessels pre- and post-AM80 are most noticeable during the month of January and later in the year from October–December. After AM80 was implemented, the number of active vessels relative to the total active for the year decline. Apparently vessels did not necessarily feel the need to begin the season when it opens on January 20. Under AM80, vessels in cooperatives do not need to fear losing catch to other vessels if they are not on the grounds when the season opens. There has been a shift at the end of the year with many more vessels extending their seasons out through October, Novemeber and even December.

It is possible to test whether the distribution of active vessels by month is statistically different before and after AM80. The Chi-Square (X^2) test shows the probability that the difference between two distributions can be explained by random variations. The X^2 probablities shown in the last row of the table tested compared the number of active vessels in each month for that year against a null hypothesis that each active vessel during that year would be active in each month (excluding December).[6] A probability greater than 5 percent indicates that we can't reject the null hyptothesis that random variation causes the difference. As shown in the table, we cannot reject the null hypothesis any year from 2008–2012, but we can reject the null hypothesis each year from 2003–2006. This is a fairly strong indication that participation levels by month have evened out across the AM80 fleet.[7]

It should be noted that the table above counts a vessel as being active not only if it was fishing in AM80 fisheries—i. e. as a CP for non-CDQ fish in the BSAI—but also if it was participating in CDQ fisheries, the BSAI TLA fishery as a mothership, or if it was fishing as a CP in the GOA. It could be argued that a more appropriate test of capacity utilization would look strictly at participation in AM80 fisheries. This analysis rejects that notion because the rationalization brought about by AM80 gives vessels the flexibility to participate in other fisheries without fear that potential harvest in AM80 will be precluded by the actions of other vessels. We also note that tables showing partipation in the GOA are shown in Section 3.1.6. as part of the review of GOA sideboards, while a summary of CDQ fisheries and in GOA fisheries is provided in Section 0.

An alternative means to assess whether capacity utilization has changed under AM80 examines production levels of the AM80 fleet by month. As above, we include all activities of AM80 vessels, whether in AM80 fisheries, BSAI TLA fisheries, CDQ fisheries, or GOA fisheries.

Table 10 shows the total amount of product produced by AM80 vessels by month from 2003–2012. There has obviously been an increase in total product pounds by year in the post-AM80 years relative to the pre-AM80 years. From 2003–2012, annual total production averaged 317.4 million pounds. That number increased to 438.7 million pounds from 2008–2012.

[6] This test takes into account the fact that the Alaska Ranger sank in March 2008, and has not been replaced.

[7] We also conducted X^2 tests using the "theoretical maximum" number of active vessels in each year based on the number of vessels that have participated in any year since 2003. In this case the null hypothesis was that from 2003, as many as 23 vessels could have fished during any given month from January 2003–March 2008. The Alaska Ranger sank in March 2008, and so from April 2008–2012 the maximum was set at 22 vessels. In each case, participation in December was excluded. As with the previous test, this alternate test indicates that the null hypothesis cannot be rejected at the 5 percent probability level any year after AM80 was approved, although the X^2 probabilities are somewhat lower.

Table 10. Production By Month of AM80 Vessels, 2003–2012

Month	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	Millions of Product Pounds from All Fisheries in which AM80 Vessels Participate									
1	8.35	19.71	15.56	15.29	13.89	10.15	17.99	14.62	10.40	11.63
2	34.01	41.21	41.87	46.44	46.20	45.05	41.81	47.20	44.10	47.33
3	43.15	41.02	42.16	45.99	52.57	53.38	43.97	43.02	47.29	61.51
4	25.08	34.04	59.83	46.67	36.89	39.96	37.42	45.97	59.16	49.81
5	22.71	44.30	28.09	19.81	22.98	44.46	34.84	50.65	44.82	46.70
6	13.46	14.65	15.46	22.23	35.40	17.56	21.82	27.76	41.00	53.99
7	39.44	40.13	40.74	47.35	46.37	40.15	39.40	49.96	50.46	45.19
8	38.89	15.02	24.72	26.02	17.93	37.95	45.46	37.20	37.62	39.90
9	42.43	31.07	33.58	41.10	39.84	50.03	47.22	51.94	47.79	52.98
10	15.40	17.59	23.73	13.56	13.91	45.07	58.54	55.20	54.78	40.07
11	7.57	4.07	5.69	5.30	5.41	24.27	10.91	19.46	23.60	18.69
12	0.23	-	-	0.19	0.87	1.50	-	1.00	6.87	4.97
Total	**290.74**	**302.82**	**331.43**	**329.95**	**332.25**	**409.51**	**399.37**	**443.98**	**467.89**	**472.76**

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

To assess capacity utilization, we examined the distribution of production by month relative to an even distribution of production by month taking into account the difference in the number of days available in each month. For example, we assumed that the fishing season started each year on January 20, and that only 12 days are available during that month. Similarly, we accounted for the number of days in each month. Finally, we excluded the entire month of December from the analysis—while December is excluded from the statistical analysis we have included its production as a percentage of production from January–November. Table 11 shows the distribution of production by month for the years 2003–2012. The bottom line of the table shows the X^2 probability scores exclude December and test against the null hypothesis that average total production of the fleet is evenly distributed across months. It is clear that the null hypothesis cannot be rejected for any year after 2008, and we conclude that production capacity is more efficiently utilized under AM80.

Table 11. Production By Month as a Percent of Annual Production of AM80 Vessels, 2003–2012

Month	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	AM80 Vessel Production as a Percent all January–November Production from All Fisheries									
1	2.9%	6.5%	4.7%	4.6%	4.2%	2.5%	4.5%	3.3%	2.3%	2.5%
2	11.7%	13.6%	12.6%	14.1%	13.9%	11.0%	10.5%	10.7%	9.6%	10.1%
3	14.9%	13.5%	12.7%	13.9%	15.9%	13.1%	11.0%	9.7%	10.3%	13.1%
4	8.6%	11.2%	18.1%	14.2%	11.1%	9.8%	9.4%	10.4%	12.8%	10.6%
5	7.8%	14.6%	8.5%	6.0%	6.9%	10.9%	8.7%	11.4%	9.7%	10.0%
6	4.6%	4.8%	4.7%	6.7%	10.7%	4.3%	5.5%	6.3%	8.9%	11.5%
7	13.6%	13.3%	12.3%	14.4%	14.0%	9.8%	9.9%	11.3%	10.9%	9.7%
8	13.4%	5.0%	7.5%	7.9%	5.4%	9.3%	11.4%	8.4%	8.2%	8.5%
9	14.6%	10.3%	10.1%	12.5%	12.0%	12.3%	11.8%	11.7%	10.4%	11.3%
10	5.3%	5.8%	7.2%	4.1%	4.2%	11.0%	14.7%	12.5%	11.9%	8.6%
11	2.6%	1.3%	1.7%	1.6%	1.6%	5.9%	2.7%	4.4%	5.1%	4.0%
12	0.1%	0.0%	0.0%	0.1%	0.3%	0.4%	0.0%	0.2%	1.5%	1.1%
Total	**100.1%**	**100.0%**	**100.0%**	**100.1%**	**100.3%**	**100.4%**	**100.0%**	**100.2%**	**101.5%**	**101.1%**
X^2 probability	**3.8%**	**1.2%**	**1.9%**	**1.2%**	**1.5%**	**70.6%**	**40.6%**	**79.3%**	**90.1%**	**80.4%**

Note: The X^2 probability scores exclude December and test against the null hypothesis that average total production of the fleet is evenly distributed across months.
Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

3.1.6 Sideboards on Expansion in the Gulf of Alaska

Catch limits, commonly known as sideboards, limit the ability of AM80 vessels to expand their harvest efforts in the GOA. Otherwise, AM80 vessels could use economic advantages of AM80 to increase their participation in GOA fisheries, thereby adversely affecting the participants in those fisheries. GOA groundfish and halibut PSC sideboards prevent these undesirable effects by limiting the catch by AM80 vessels to historic levels in the GOA.

Under AM80, AM80 vessels fishing in the GOA are subject to Central GOA (Area 620 and 630), Western GOA (Area 610) and West Yakutat (Area 640) northern rockfish, pelagic shelf rockfish, and Pacific ocean perch sideboard limits, as well as limits on Pacific cod and pollock (with an exception for the F/V *Golden Fleece* which is prohibited from directed fishing for rockfish, Pacific cod, or pollock in the GOA) (Table 12). In addition, only specific AM80 vessels that met minimum participation thresholds in GOA flatfish fisheries during 1998 through 2004 are allowed to target those species. The vessels eligible to target GOA flatfish are listed in regulation.

Table 12. Groundfish Sideboard Limits (mt) for AM80 Vessels in the Gulf of Alaska, 2008–2012

				2008		2009		2010		2011		2012	
Species	Season	Area	AM80 Ratio	TAC	Side-board	TAC	Side-board	TAC	Side-board	TAC	Side-board	TAC	Side-board
Pollock	A Season Jan 20–Feb 25	610	0.0030	3,322	10	3,234	10	5,551	17	4,786	14	5,797	17
		620	0.0020	6,215	12	4,365	9	8,414	17	11,895	24	14,023	28
		630	0.0020	3,069	6	2,503	5	4,403	9	4,475	9	5,787	12
	B Season Mar 10–May 31	610	0.0030	3,321	10	3,233	10	5,551	17	4,876	15	5,797	17
		620	0.0020	7,576	15	5,413	11	9,925	20	14,231	28	17,221	34
		630	0.0020	1,709	3	1,455	3	2,891	6	2,139	4	2,589	5
	C Season Aug 25–Sep 15	610	0.0030	5,480	16	4,391	13	7,577	23	8,729	26	9,338	28
		620	0.0020	2,695	5	2,160	4	4,878	10	5,619	11	7,282	15
		630	0.0020	4,431	9	3,550	7	5,912	12	6,812	14	8,986	18
	D Season Oct 1–Nov 1	610	0.0030	5,479	16	4,391	13	7,577	23	8,729	26	9,338	28
		620	0.0020	2,695	5	2,160	4	4,878	10	5,619	11	7,282	15
		630	0.0020	4,431	9	3,550	7	5,912	12	6,812	14	8,986	18
	Annual	640	0.0020	1,517	3	1,215	2	2,031	4	2,339	5	3,244	6
Pacific Cod	A Season Jan 1–Jun 10	610	0.0200	11,669	233	9,705	194	12,458	249	13,671	273	12,614	252
		620/630	0.0440	17,056	750	14,185	624	22,069	971	24,217	1,066	25,623	1,127
	B Season Sep 1–Dec 31	610	0.0200	7,780	156	6,470	129	8,306	166	9,114	182	8,410	168
		620/630	0.0440	11,370	500	9,456	416	14,713	647	16,145	710	17,082	752
	Annual	640	0.0340	2,394	81	1,991	68	2,017	69	1,953	66	1,971	67
Pacific Ocean Perch	Annual	610	0.9940	3,686	3,664	3,713	3,691	2,895	2,878	2,798	2,781	2,102	2,089
	Annual	640	0.9610	1,100	1,057	1,108	1,065	2,004	1,926	1,937	1,861	1,692	1,626
Northern Rockfish	Annual	610	1.0000	2,141	2,141	2,054	2,054	2,703	2,703	2,573	2,573	2,156	2,156
Pelagic Shelf Rockfish	Annual	610	0.7640	1,003	766	819	626	650	497	611	467	409	312
	Annual	640	0.8960	251	225	234	210	434	389	407	365	542	486

Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a).

Table 13 shows the catch of groundfish sideboard species by AM80 Vessels in the GOA from 2003–2012, while Table 14 compares the catch of each species to its sideboard limit from 2008–2012. The sideboard limits for pollock and Pacific ocean perch were exceeded each year from 2008–2012, and the sideboard limit for pelagic shelf rockfish was exceeded in 2009.

According to Mary Furuness at NMFS-AKR, trawl catcher processors have generally been precluded from engaging in direct fishing for pollock since Inshore-Offshore allocations were implemented in 1992. The sideboards for pollock are therefore managed as a soft constraint. The vessels may not keep more than the maximum retainable percentages allowed for pollock. (Furuness, 2014).

Table 13. Catch (mt) of Groundfish Sideboard Species by AM80 Vessels in the Gulf of Alaska, 2003–2012

Species	Area	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Pollock	All Areas	701	408	281	336	400	532	1,675	923	1,600	1,197
Pacific Cod	All Areas	1,773	1,242	885	1,012	807	846	1,181	920	964	1,086
Pacific Ocean Perch	610 & 640	5,317	6,342	6,609	8,668	7,962	7,260	8,256	8,794	7,259	8,076
Northern Rockfish	610 & 640	2,273	2,438	2,559	2,987	1,895	2,514	2,614	2,723	2,473	3,130
Pelagic Shelf Rockfish	610 & 640	1,562	1,212	1,010	1,381	1,615	1,911	1,489	1,712	1,576	1,938
All Sideboard Groundfish		**11,642**	**11,344**	**14,384**	**12,679**	**13,063**	**15,215**	**15,072**	**13,872**	**15,427**	**11,642**

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 14. Catch as a Percent of Groundfish Sideboards for AM80 Vessels in the Gulf of Alaska, 2008–2012

Species	Area	2008	2009	2010	2011	2012
Pollock	All Areas	447%	1,709%	513%	796%	497%
Pacific Cod	All Areas	49%	83%	44%	42%	46%
Pacific Ocean Perch	610 & 640	112%	131%	150%	107%	170%
Northern Rockfish	610 & 640	87%	95%	75%	68%	84%
Pelagic Shelf Rockfish	610 & 640	71%	105%	66%	50%	54%

Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a) and from CAS data provided by AKFIN (Fey, 2014).

AM80 also imposes deep- and shallow-water halibut PSC limits for AM80 vessels fishing in the GOA (this restriction does not apply to the F/V *Golden Fleece*), and these limits are applied on a seasonal basis (Table 15). A total limit has been set at 418 mt for the deep-water species fishery (sablefish, rockfish, deep-water flatfish, rex sole, and arrowtooth flounder) and 137 mt for the shallow-water species fishery (pollock, Pacific cod, shallow-water flatfish, flathead sole, Atka mackerel, skates, and "other species"). From 2008–2012, there were instances when NMFS closed directed fishing by AM80 vessels for species that comprise the shallow-water species fishery or deep-water species fishery because the seasonal apportionments of the halibut PSC limits in the GOA had been reached (see Section 8.2 for halibut PSC usage data).

Table 15. Halibut Prohibited Species Catch Limits (mt) for AM80 Vessels in the Gulf of Alaska, 2008–2012

Season	Shallow-Water Species	Deep-Water Species
Jan 20–Apr 1	10	23
Apr 1–Jul 1	38	214
Jul 1–Sep 1	29	104
Sep 1–Oct 1	15	3
Oct 1–Dec 31	45	74
Total by Species Complex	137	418
Total for the Year		555

Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a).

3.1.7 Other Impacts of Rationalization

The rationalization that has taken place under AM80 has had impacts that might not have been fully anticipated or expected. These impacts include:

1) An expansion of markets for AM80 vessels;
2) The transition of Pacific cod from a target species into an incidental catch species;
3) Behavioral changes, innovation and flexibility to reduce PSC.

3.1.7.1 Expansion of Markets for AM80 Vessels

According AM80 vessel owners and operators, the rationalization under AM80 has provided the fleet with the ability develop new markets and expand existing markets. Changes in product values by major AM80 species are summarized in Table 16 for the two 5-year periods before and after AM80. The data in the table include revenue from CDQ harvests, as well as revenue generated by AM80 vessels when they are acting as motherships. The data in Table 16 also include revenue from AM80 CPs fishing in the GOA.

- Yellowfin Sole: There has been a very noticeable shift away from whole fish and kirimi to H&G Eastern Cut.[8] Yellowfin sole has declined slightly in relative importance.
- Atka Mackerel: There has not been any real shift in product forms for Atka mackerel, but the species is relatively more important overall.
- Pacific cod: There has been a very large shift from Western cut8 product to Eastern cut product. Overall Pacific cod has lost 50 percent of its share of revenue for the AM80 vessels.
- Rockfish: There have been small increases in the proportion of rockfish going into H&G product away from whole fish. Rockfish has increased its importance to the AM80 vessels from 10.7 percent in 2003–2008 to 13.6 percent in the years 2008–2012.
- Rock sole: The relative importance of rock sole with roe has fallen significantly under AM80 while the relative importance of H&G rock sole has increased. The overall importance of rock sole is about the same.
- Flathead sole: Very little flathead sole with roe is being produced since 2008, and much more of the flathead sole is going into an Eastern cut product. Flathead sole's share of overall revenue has fallen from 6 percent to 3.5 percent.
- Arrowtooth and Kamchatka Flounder: Most of these two flounder species are processed as H&G product with the tail removed. The relative importance of these products has increased substantially under AM80. Owners and operators indicate their ability to reduce halibut bycatch.

[8] In an Eastern Cut product is the head is cut posterior to the pectoral girdle/collar. A Western cut product leaves the pectoral girdle/collar intact.

Table 16. Changes in Product Mix and Species Mix under Rationalization with AM80

Species	Product	Wholesale Revenue ($Millions 2012) 2003–2007	Wholesale Revenue ($Millions 2012) 2008–2012	Product Revenue as a Percent of Species Revenue 2003–2007	Product Revenue as a Percent of Species Revenue 2008–2012	Product Revenue as a Percent of Total Revenue 2003–2007	Product Revenue as a Percent of Total Revenue 2008–2012
Yellowfin Sole	H & G Eastern Cut	$301.18	$377.86	80.08%	94.22%	21.00%	22.30%
	Whole fish	$53.66	$21.00	14.27%	5.24%	3.70%	1.20%
	Kirimi	$20.23	$2.16	5.38%	0.54%	1.40%	0.10%
	All Products	**$376.10**	**$401.04**	**100.00%**	**100.00%**	**26.20%**	**23.70%**
Atka Mackerel	H & G Eastern Cut	$200.93	$319.49	93.19%	94.51%	14.00%	18.90%
	Whole fish	$14.66	$18.52	6.80%	5.48%	1.00%	1.10%
	All Products	**$215.60**	**$338.04**	**100.00%**	**100.00%**	**15.00%**	**19.90%**
Pacific Cod	H & G Eastern Cut	$165.12	$135.46	57.27%	74.68%	11.50%	8.00%
	H & G Western Cut	$105.50	$37.37	36.59%	20.60%	7.30%	2.20%
	Whole fish	$4.81	$4.80	1.67%	2.65%	0.30%	0.30%
	All Other Products	$12.87	$3.74	4.46%	2.06%	0.90%	0.20%
	All Products	**$288.29**	**$181.38**	**100.00%**	**100.00%**	**20.10%**	**10.70%**
Rockfish	H & G Eastern Cut	$140.68	$221.22	91.39%	95.78%	9.80%	13.10%
	Whole fish	$11.62	$9.51	7.55%	4.12%	0.80%	0.60%
	All Products	**$153.94**	**$230.96**	**100.00%**	**100.00%**	**10.70%**	**13.60%**
Rock Sole	H & G Eastern Cut	$67.97	$131.29	40.67%	60.20%	4.70%	7.70%
	H & G with Roe	$98.65	$80.52	59.02%	36.92%	6.90%	4.80%
	Whole fish	$0.28	$6.26	0.17%	2.87%	-	0.40%
	All Products	**$167.14**	**$218.08**	**100.00%**	**100.00%**	**11.60%**	**12.90%**
Flathead Sole	H & G Eastern Cut	$63.31	$55.79	73.53%	94.39%	4.40%	3.30%
	H & G with Roe	$22.04	$3.13	25.61%	5.29%	1.50%	0.20%
	All Products	**$86.09**	**$59.11**	**100.00%**	**100.00%**	**6.00%**	**3.50%**
Arrowtooth/ Kamchatka	H & G Tail Removed	$30.67	$102.91	95.46%	99.72%	2.10%	6.10%
	H & G Eastern Cut	$1.36	$0.26	4.23%	0.26%	0.10%	-
	All Products	**$32.12**	**$103.20**	**100.00%**	**100.00%**	**2.20%**	**6.10%**
Other Species	All Products	$118.13	$162.82	100.00%	100.00%	8.20%	9.60%
All Species	**All Products**	**$1,437.43**	**$1,694.63**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Note: Data in the table include revenue generated from AM80 vessels operating as motherships AM80 CPs fishing in CDQs and AM80 vessels fishing in the GOA.
Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

3.1.7.2 The Transition of Pacific Cod from a Target Species to an Incidental Catch Species

Prior to implementation of AM80, NMFS set aside 7.5 percent of the Pacific cod TAC into a general incidental catch "reserve" then 7.5 percent would be allocated to CDQs. The remainder—the Pacific cod ITAC was allocated each of several gear groups including the 23.5 percent of the ITAC to Trawl CPs. All catches of Pacific cod, whether taken in targeted fisheries for Pacific cod or incidentally in target fisheries for other species would count against each gear group's ITAC allocation. If the entire ITAC allocation to a gear group was harvested, NMFS would close the Pacific target fishery for the gear group and prohibited directed fishing. Any Pacific cod taken as an incidental harvest when directed fishing was closed, counted as part of the "incidental catch" reserve that was set aside from the TAC at the beginning of the process. The combination of an incidental catch reserve, an ITAC gear allocation, and the potential for closures to directed fishing, meant that each gear groups faced a "soft" cap for Pacific cod.

Under AM80, access to the incidental catch reserve for was eliminated for AM80 CPs for Pacific cod and the other five target species for which they received allocations. Instead AM80 CPs are issued fixed percentage of the ITAC of the AM80 species, and these allocations are treated as a "hard" cap. If an AM80 cooperative takes the entire allocation of any of the six AM80 species then no additional fishing is allowed.

AM80 CPs are allocated 13.4 percent of the Pacific cod ITAC,[9] and according to AM80 owners and operators, the "hard" cap under AM80, coupled with the size of the allocation, and other rationalization elements of AM80, has led to the transition of Pacific cod from a target species to an incidental catch species that sometimes constrains harvest in other target fisheries. In other words, the hard-cap on Pacific cod under AM80 has forced operators to manage their incidental catch of Pacific cod in ways that are similar to ways they manage halibut or crab PSC apportionments.

Under AM80, operators indicate that they calculate how much Pacific cod they will need in their fall fisheries, and then adjust the amount of effort undertaken in fisheries with high catch rates of cod in the earlier part of the year. It is believed that relatively high rates of incidental catch of Pacific cod in the flathead sole and Alaska place fisheries have contributed to reductions in the amount of effort in those targets. More recently, the relatively low levels of Pacific cod seen in fisheries for arrowtooth and Kamchatka flounder appears to have led to an increase in targeted effort in those fisheries.

Table 17 shows the proportion of Pacific cod taken in Pacific cod target fisheries by AM80 CPs from 2003–2012. Beginning in 2008 with the implementation of AM80, there is a very distinct drop in the proportion of Pacific cod catch taken in Pacific cod target fisheries. In the five years from 2003–2007, 62 percent of AM80 CPs harvests of Pacific cod were taken in Pacific cod target fisheries. After implementation of AM80, the proportion of catch taken drops to an average of 13 percent.

Table 17. Proportions of Pacific Cod Taken in AM80 CP BSAI Pacific Cod Target Fisheries, 2003–2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Pacific Cod Targets	17,756	23,279	17,206	18,657	25,106	3,959	3,867	3,477	1,601	2,356
All Other Targets	12,378	14,732	13,868	11,234	9,259	12,619	18,392	21,732	24,203	26,763
All Targets	**30,134**	**38,012**	**31,074**	**29,891**	**34,364**	**16,578**	**22,259**	**25,209**	**25,805**	**29,119**
% of PCOD in PCOD Targets	59%	61%	55%	62%	73%	24%	17%	14%	6%	8%

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

Table 18 shows the incidental catch rate of Pacific cod in BSAI target fisheries of AM80 CPs. Incidental catches of Pacific cod are relatively high in all of the flatfish fisheries. The relatively high volume/high value rock sole fishery has the highest incidental catch rate of the flatfish targets, but rates in the flathead sole and Alaska plaice fishery are also high compared to the yellowfin sole fishery. Incidental catch rates in the arrowtooth/Kamchatka fishery have fallen sharply since 2008.

[9] The ITAC of Pacific cod equals 89.5 percent of TAC with the other 10.5 percent of the TAC allocated to CDQs.

Table 18. Incidental Catch Rates of Pacific Cod in AM80 CP BSAI Target Fisheries, 2003–2012

Target Fishery	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average
Atka Mackerel	3.2%	3.6%	3.4%	2.4%	2.8%	1.6%	2.5%	2.0%	2.4%	2.1%	2.1%
Yellowfin Sole	4.4%	3.8%	3.2%	2.2%	1.8%	3.4%	7.9%	8.6%	8.6%	10.3%	7.8%
Rock Sole	8.9%	12.0%	12.6%	10.1%	7.7%	6.1%	7.1%	9.2%	10.3%	11.1%	8.8%
Flathead Sole	9.5%	9.6%	8.9%	10.2%	8.5%	6.8%	10.1%	8.9%	12.0%	7.3%	9.0%
Alaska Plaice	-	-	-	4.6%	3.2%	4.8%	4.3%	12.4%	8.0%	7.1%	7.3%
Other Flatfish	6.6%	6.6%	5.5%	8.9%	3.2%	1.1%	4.9%	16.0%	4.0%	8.0%	6.8%
Arrowtooth/Kamchatka	7.4%	4.3%	8.3%	8.5%	3.6%	1.0%	0.8%	0.3%	0.8%	0.7%	0.7%
Rockfish	2.0%	1.4%	1.0%	0.9%	0.5%	1.2%	0.4%	1.4%	1.4%	1.1%	1.1%
Greenland Turbot	2.0%	1.2%	0.0%	-	0.0%	0.0%	0.0%	0.0%	0.0%	-	0.0%
Sablefish	-	2.7%	0.2%	-	0.0%	0.5%	0.0%	-	-	-	0.2%
Other Species	16.0%	3.4%	12.4%	5.9%	5.0%	-	11.3%	21.7%	15.2%	-	16.1%
Pollock (bottom & midwater)	1.5%	4.4%	11.2%	7.0%	15.3%	7.3%	7.5%	7.8%	12.0%	8.6%	8.7%
Pacific Cod (target catch rate)	45.6%	38.0%	42.7%	43.5%	51.2%	62.3%	51.3%	61.3%	45.2%	61.6%	56.4%

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).
Note: Percentages shown in the "Average" column are the average of the percentages in each year since 2008.

From the table above it is possible to start to understand the decisions that operators of AM80 CP make. The rock sole with roe fishery is highly value and has to take place at the beginning of the year when roe is available, but the fishery also has relatively high incidental catches of Pacific cod, which may become a constraining species later in the year. Since Pacific cod is now a constraint, operators can't afford to target Pacific cod to the same degree they have in the past. Clearly however, more information is needed to understand targeting decisions, starting with potential revenue amounts in each of the various target fisheries as shown in Table 19.

Table 19. Real Gross Revenue ($ 2012) in AM80 CP BSAI Target Fisheries, 2003–2012

Target Fishery	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average Since AM80
Atka Mackerel	$32.47	$40.82	$50.35	$49.03	$59.88	$51.00	$73.73	$76.54	$71.76	$67.77	$68.16
Yellowfin Sole	$73.91	$78.46	$106.46	$89.13	$91.27	$115.80	$84.29	$82.09	$131.88	$126.77	$108.17
Rock Sole	$25.60	$35.62	$38.70	$47.58	$37.33	$52.23	$32.59	$51.19	$60.50	$72.72	$53.85
Flathead Sole	$15.19	$22.18	$22.73	$19.49	$17.53	$22.51	$13.18	$16.29	$6.85	$5.44	$12.85
Alaska Plaice	-	-	-	$0.30	$0.03	$0.08	$0.01	$0.22	$1.35	$1.73	$0.68
Other Flatfish	$1.17	$1.30	$1.49	$0.37	$2.17	$0.12	$0.28	$0.13	$0.02	$0.14	$0.14
Arrowtooth/Kamch.	$2.71	$2.67	$4.85	$3.35	$1.39	$13.16	$19.23	$24.87	$22.97	$26.48	$21.34
Rockfish	$11.03	$9.33	$11.47	$16.04	$19.84	$14.53	$12.69	$16.04	$37.47	$28.11	$21.77
Greenland T.	$0.83	$0.19	$0.16	-	$0.01	$0.73	$2.38	$0.20	$0.01	-	$0.66
Sablefish	-	$0.26	$0.07	-	$0.01	$0.14	$0.03	-	-	-	$0.03
Other Species	$0.49	$0.03	$0.01	$0.04	$0.18	-	$0.01	$0.00	$0.00	-	$0.00
Pollock	$0.07	$0.01	$0.29	$0.14	$0.38	$3.80	$4.62	$5.41	$4.20	$1.81	$3.97
Pacific Cod	$36.56	$50.37	$41.64	$53.12	$71.26	$10.47	$6.65	$6.05	$4.00	$4.55	$6.34
All Targets	**$200.04**	**$241.24**	**$278.21**	**$278.58**	**$301.26**	**$284.58**	**$249.69**	**$279.03**	**$341.01**	**$335.52**	**$297.96**

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

Revenues in the Atka mackerel, yellowfin sole, and rock sole fisheries have accounted for 72 percent of total AM80 CP revenue over the 10-year period and 77 percent of total revenue since implementation of AM80. Questions about why these species are targeted are somewhat moot

because they have been the mainstays of the fishery over the entire period. However, since 2008, there has been a significant increase in the relative importance of the arrowtooth/Kamchatka flounder fishery and the rockfish fishery, and a noticeable decline in the importance of the flathead sole, Alaska plaice and Pacific cod target fisheries. These shifts can generally be explained by the tradeoffs between four factors: 1) the fact that Pacific cod is now a constraint, 2) the incidental catch rates of Pacific cod other target fisheries, 2) the revenue per ton of groundfish in various target fisheries and 4) halibut bycatch rates, which obviously remains an important consideration in all targeting decisions. The incidental catch rates of Pacific cod in the various target fisheries are shown in Table 18. Gross revenues per metric ton of groundfish in BSAI target fisheries of AM80 CPs are shown in Table 19, and halibut mortality as a percent of groundfish in those same fisheries is shown in Table 20. A comparison of these decision factors for the arrowtooth/Kamchatka fishery, the flathead sole fishery and the Alaska plaice fishery reveals the following:

1) Incidental catch rates of Pacific cod in the arrowtooth/Kamchatka fishery (1.1 percent) are much lower than in the flathead sole fishery (9.0 percent), but higher than in the Alaska plaice fishery (7.3 percent).
2) Halibut bycatch rates for arrowtooth/Kamchatka (1.0 percent) are about same as in the flathead sole fishery (0.9 percent), but higher than in the Alaska plaice fishery (0.3 percent).
3) Wholesale revenue per ton in the arrowtooth/Kamchatka fishery ($828/mt) is 8 percent higher than in the flathead sole fishery ($763/mt), and 2 percent higher than in the Alaska plaice fishery ($808/mt).

When all three of these factors are combined, it becomes apparent that when harvesters are faced with the choice between targeting flathead sole, Alaska place or arrowtooth/Kamchatka flounder, the latter species are likely to win out.

Table 20. Real Groundfish Revenue ($2012) per MT of Groundfish in AM80 CP BSAI Target Fisheries

Target Fishery	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average Since AM80
Atka Mackerel	$520	$631	$723	$702	$891	$802	$951	$1,004	$1,363	$1,358	$1,066
Yellowfin Sole	$710	$833	$969	$900	$772	$741	$644	$654	$827	$866	$753
Rock Sole	$687	$757	$939	$981	$916	$818	$659	$710	$874	$865	$795
Flathead Sole	$805	$785	$972	$1,032	$806	$804	$676	$712	$891	$886	$763
Alaska Plaice	-	-	-	$781	$815	$758	$445	$557	$801	$869	$809
Other Flatfish	$694	$533	$757	$741	$708	$656	$597	$846	$630	$585	$640
Arrowtooth/Kamch.	$993	$764	$860	$744	$753	$818	$799	$791	$847	$877	$828
Rockfish	$817	$918	$1,383	$1,571	$1,327	$947	$984	$1,172	$1,643	$1,322	$1,234
Greenland T.	$1,178	$677	$1,958	-	$1,990	$1,208	$921	$794	$1,199	-	$962
Sablefish	-	$2,109	$2,186	-	$1,668	$2,464	$4,391	-	-	-	$2,676
Other Species	$635	$195	$674	$342	$662	-	$430	$789	$520	-	$481
Pollock	$432	$246	$681	$787	$919	$1,287	$1,004	$947	$1,016	$986	$1,031
Pacific Cod	$940	$821	$1,035	$1,239	$1,454	$1,835	$988	$1,081	$1,142	$1,221	$1,256
All Targets	**$712**	**$773**	**$925**	**$944**	**$949**	**$807**	**$759**	**$788**	**$979**	**$970**	**$861**

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

Table 21. Halibut Mortality (MT) as a Percent Groundfish (MT) in AM80 CP BSAI Target Fisheries

Target Fishery	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average Since AM80
Atka Mackerel	0.1%	0.1%	0.1%	0.1%	0.3%	0.1%	0.1%	0.1%	0.2%	0.3%	0.1%
Yellowfin Sole	0.7%	0.5%	0.5%	0.4%	0.4%	0.6%	0.7%	0.7%	0.5%	0.5%	0.6%
Rock Sole	2.6%	1.2%	1.9%	1.7%	2.4%	1.0%	1.2%	1.3%	0.7%	0.5%	0.9%
Flathead Sole	0.9%	1.5%	1.0%	1.6%	1.4%	0.8%	1.0%	0.8%	0.9%	1.4%	0.9%
Alaska Plaice	-	-	-	0.2%	2.3%	1.2%	0.1%	0.2%	0.3%	0.2%	0.3%
Other Flatfish	2.5%	2.2%	3.4%	3.0%	2.4%	6.1%	2.5%	1.5%	3.6%	2.7%	3.1%
Arrowtooth/Kamch.	1.9%	2.7%	3.5%	3.3%	1.3%	0.8%	1.0%	0.6%	1.0%	1.7%	1.0%
Rockfish	0.4%	0.5%	0.2%	0.3%	0.1%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
Greenland T.	1.1%	0.7%	2.7%	-	0.0%	0.3%	0.2%	0.7%	11.8%	-	0.3%
Sablefish	-	1.3%	0.3%	-	2.2%	4.3%	1.2%	-	-	-	4.0%
Other Species	3.6%	5.3%	7.9%	4.7%	1.4%	-	1.1%	22.0%	18.3%	-	8.7%
Pollock	0.0%	0.0%	0.1%	1.6%	2.0%	1.3%	0.9%	1.2%	1.3%	1.5%	1.2%
Pacific Cod	1.5%	1.8%	1.9%	1.9%	1.3%	0.8%	1.1%	0.6%	0.8%	2.4%	1.1%
All Targets	**1.0%**	**0.9%**	**0.9%**	**0.9%**	**0.9%**	**0.6%**	**0.7%**	**0.7%**	**0.5%**	**0.6%**	**0.6%**

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

BSAI Pacific cod Allocation History for the Amendment 80 Sector

This subsection provides an overview of the allocation history of Pacific cod that led eventually to 13.4 percent allocation of Pacific cod ITAC to AM80 sector in 2008.

In the early years of the fishery, BSAI Pacific cod was an open access fishery prosecuted primarily by trawl gear. Under open access management, Pacific cod was not allocated among competing fishermen. As the market value of Pacific cod increased with the removal of foreign and joint venture fisheries in 1990, the domestic fixed gear sector began to increase its harvest of the TAC. In 1994, NMFS began to allocate the Pacific cod TAC with the implementation of BSAI Amendment 24 to the FMP. The allocations roughly represented the harvests of the trawl and fixed gear sectors during 1991–1993. Competition within the trawl and fixed gear sectors eventually led to the Council recommending, in subsequent amendments, further subdivisions of the allocations to these sectors to provide the desired stability within the subdivided sectors.

Amendment 46, implemented in 1997, further split the trawl allocation equally between CVs and CPs. The action also included specific authority for NMFS to annually reallocate among the various sectors, if necessary, any portion of the Pacific cod allocations that were projected to remain unused. In the years following Amendment 46, there were two amendments (Amendments 64 and 77) that further allocate Pacific cod in the BSAI among the various fix gear sectors.

Development of Amendment 85 began in October 2002 when the Council initiated discussions regarding the allocation of certain BSAI groundfish species to the non-AFA trawl CP sector. In February 2003, the Council considered a vastly expanded program for this sector, known as AM80. Growing demand for Pacific cod, a fully exploited fishery, and other distributional concerns among sectors led the Council to consider a separate action to revise allocations of Pacific cod among the many BSAI groundfish sectors. In October 2004, in a two-step process, the Council:

1) Simplified AM80 to provide allocations only to the AM80 sector (then known as the Non-AFA Trawl Catcher Processor Sector) and removed allocation of Pacific cod from that proposed action.

2) The Council then initiated a new plan amendment, which became Amendment 85, to alter the BSAI Pacific cod allocations.

The intent of Amendment 85 was to modify the sector allocations to better reflect actual dependency and use by sector, in part by basing the allocations on each sector's historical retained catch. The intent of the Council was to establish direct allocations for each specified sector in the BSAI Pacific cod fishery, in order to protect the relative historical catch distribution among those sectors.

Under Amendment 85, the Council selected nine individual non-CDQ sectors to receive separate BSAI Pacific cod allocations. The allocations to the identified sectors were selected using catch history from 1995 through 2003 and other socioeconomic and community considerations. The Council concluded that the adopted allocations better reflected actual dependency and use by each sector. The primary objective of the Council in revising the BSAI Pacific cod non-CDQ TAC allocations to each sector was to reduce the level and frequency of annual reallocations, and thus enhance stability so each sector could better plan its fishing year and operate more efficiently.

The AM80 sector received an allocation of 13.4 percent of the BSAI Pacific cod ITAC. This was based on the sector's average share during the catch history period from 1995–2003. This allocation was, however, less than the sector's average harvest share of 16 percent during the last four years of the catch history period (2000–2003), and an even greater reduction from its average of 17.7 percent of total retained harvest in 2004 and 2005. The Council's stated intent was that the allocations would represent the sector's historical retained catch of Pacific cod, while considering socioeconomic and community factors. It should be noted that at the time of final action, the sector did express its concern that the size of the allocation could constrain its ability to conduct a directed fishery for Pacific cod in order to have sufficient Pacific cod available for incidental catch in its other fisheries. As documented in the previous section, the transition from a target species to incidental species appears to have taken place.

3.1.7.3 Behavior Changes, Innovation and Flexibility in Reducing PSC

Although not entirely unexpected, rationalization under AM80 appears to have led to behavioral changes, innovation and increased flexibility on the part of AM80 operators as they work to optimize revenues under the constraints of halibut and crab PSCs. A thorough summary of PSC bycatch by the AM80 CPs from 2003–2012 is contained in Section 8 and in Appendix C.

During interviews with AM80 vessel owners and operators it was noted several times that the fleet is no longer trying to maximize revenue per day, and instead is trying to maximize total catch and revenue per pound while staying within their PSC apportionments and other constraints. This change in their primary motivation means they are much less averse to trying new gear configurations, to moving when they hit high levels of bycatch and reducing night-time trawling when halibut are abundant. They are also more willing to test bycatch reduction tools and methods like experimental halibut excluder devices, and to push for deck sorting of halibut to reduce mortality rates.

The following discussion, which summarizes the findings of Abbott, Haynie, and Reimer in their paper, *Hidden Flexibilities: Institutions, Incentives, and the Margins of Selectivity in Fishing*" (Abbot, 2014), provides some insights into the theoretical underpinning of these changes.

In their analysis of the BSAI non-pollock groundfish trawl fishery, Abbott et al. conclude that behavioral—rather than strictly technical—considerations are significant in explaining changes in catch composition in the fishery following implementation in 2008 of AM80. The authors apply multiple statistical measures and econometric modeling techniques to two primary data sources to estimate the significance of various factors in predicting pre- and post-AM80 bycatch. These data sources include: confidential observer data on the location and catch of each vessel from the North

Pacific Groundfish Observer Program (NPGOP); and vessel-level data on the production weight of final products for each target species, as well as estimates of the initial catch weight embodied in the final products. The authors focus their analysis on three margins of behavioral change, concluding that each has proved significant in explaining reduced bycatch rates: large-scale adjustments to fishing grounds away from areas with traditionally high rates of halibut and cod bycatch; smaller-scale movements away from bycatch hotspots; and reductions in night fishing, particularly during the first third of the year.

The authors also point out that AM80 represented a major policy shift away from a system under which the catch of all species, including bycatch species, was regulated by the common-pool assignment of multiple TACs for each species to one under which individual vessels operate under a multispecies catch share system with individual accountability for catch of both target and bycatch species. In addition to granting a defined share of the total AM80 TAC for the six primary target species to each vessel in the previous limited-entry program according to its catch history, AM80 allows vessels to vest their shares in either a cooperative formed by participating members, or in the limited-access common pool fishery. The regulations afford cooperatives considerable flexibility with regard to the allocation of internal allocation of catch entitlements. The authors point out that groups of AM80 CPs operating under cooperatives have avoided reaching their collective halibut and cod allocations every year since AM80 implementation. The authors also point out that halibut bycatch rates in the non-cooperative portion of the AM80 fishery remained unchanged in 2008 and reached historically high levels in 2009 and 2010.

3.2 Creation of a Race for Yellowfin Sole in the BSAI TLA Sector

Implementation of AM80 coupled with TACs in excess of 125,000 mt mean that sideboards on yellowfin sole harvests of AFA CVs and AFA CPs have not been enforced since 2008. Elimination of the sideboards allows the AFA vessels to expand their operations in the yellowfin sole fishery if they choose. In addition, one AM80 vessel has operated as a mothership in the yellowfin sole fishery every year since 2003, utilizing non-AFA CVs with valid trawl licenses and endorsements to harvest yellowfin sole. Because the harvests in the mothership operations are made by non-AFA CVs, the harvests are assigned to the BSAI TLA sector and are not constrained by AFA sideboards.

The BSAI TLA fishery for yellowfin sole receives specific apportionments of PSC species for halibut, king crab, and tanner crab (*c. bairdi* and *c. opilio*) and other PSC species. As with other "race for fish" fisheries, both halibut and crab bycatch limits have the potential to shut down the fishery, or move the activity out of preferred fishing areas.

The fact that neither the AFA CPs nor the mothership operations have an exclusive privilege to harvest a predetermined quantity means that the various operations must engage in a race for fish if they want to maximize their revenues from the fishery. As in many "race-for-fish" fisheries, the BSAI TLA fishery for yellowfin sole has been contentious at times with both AFA CPs and mothership operations hoping the other will limit their activities in the fishery. An in-depth analysis of the fishery that could shed light on the difference between AFA CPs and mothership operations in the yellowfin sole fishery would provide sector-by-sector details of historic harvest volumes and values generated in the fishery, along with relative rates of halibut and crab PSC. However, because fishery data are considered confidential, and because there are fewer than three mothership operations involved, sector-specific (AFA CPs v. motherships) data cannot be provided in a public document or public forum. Therefore, information provided in this section summarizes the BSAI TLA sector as a whole.

Table 22 shows groundfish species caught in yellowfin sole target fisheries harvested by vessels other than AM80 CPs in the BSAI from 2003–2012. The information in the table is also summarized in

Figure 1. Incidental catches of yellowfin sole in other target fisheries are not included in the table. Total groundfish harvested in BSAI TLA target fisheries for yellowfin sole increased from 4,486 mt in 2003 up to 22,762 by 2007. Harvest dropped in 2009, then climbed rapidly, and by 2012 over 34,000 mt were harvested. Total revenues (in nominal terms) in the fishery have increased from just over $5 million in 2003 to $39 million in 2012.

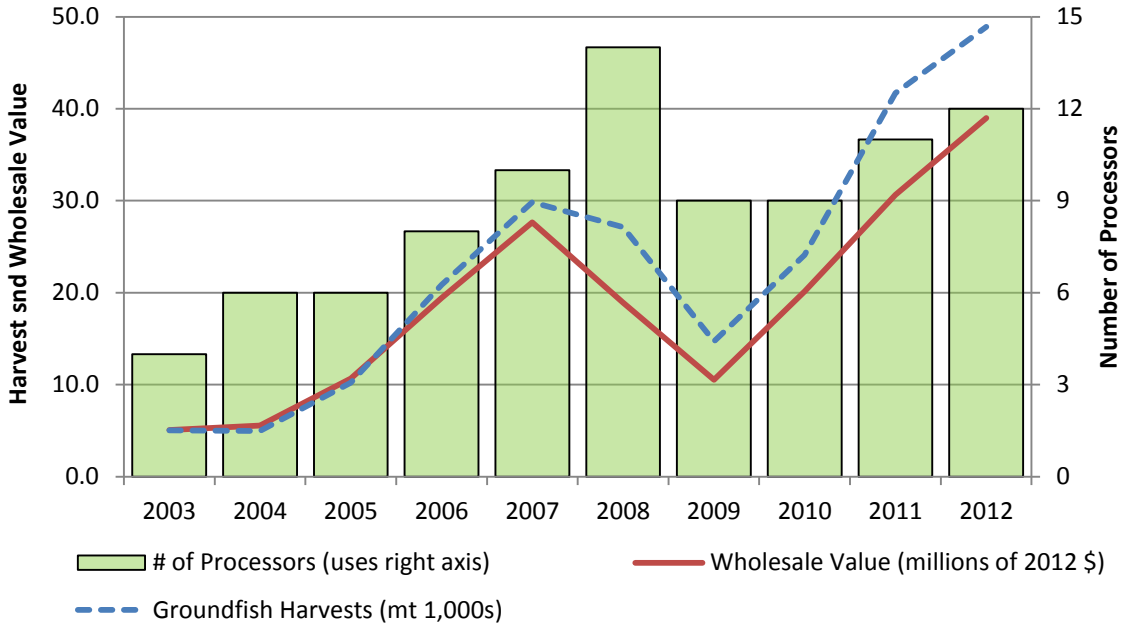
It is also very clear from Table 22 that there has been a significant increase in the number of processing vessels involved in the BSAI TLA yellowfin sole fishery. From the low in 2004 to high in 2012, the total amount of groundfish harvest in the fishery has increased by nearly an order of magnitude. Similarly, the number of processors has increased from a low of 4 to a high of 14 in 2008. Over the 10-year period a total of 17 different processors have participated in the fishery.

Table 22. Harvests and Value of Groundfish in Yellowfin Sole Target Fisheries of Vessels Other Than AM80 CPs

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Yellowfin sole	4,486	4,386	7,993	13,649	22,762	19,972	10,226	19,421	30,475	34,223	167,593
Alaska plaice	344	304	1,087	3,464	3,668	1,906	973	2,413	3,773	3,820	21,752
Pollock	132	159	562	1,463	1,024	1,412	622	712	1,704	3,244	11,032
Pacific cod	36	47	215	368	412	512	408	337	2,596	4,090	9,021
Rock sole	6	32	191	1,106	678	1,997	1,506	278	1,073	1,098	7,964
All other flatfish	18	24	71	358	571	627	501	599	1,204	1,346	5,320
Other groundfish	12	22	114	458	732	691	483	340	869	1,071	4,792
All Groundfish	**5,034**	**4,974**	**10,233**	**20,866**	**29,846**	**27,116**	**14,719**	**24,099**	**41,694**	**48,893**	**227,474**
Wholesale Value ($ Millions)	**$5.08**	**$5.56**	**$10.67**	**$19.45**	**$27.66**	**$18.93**	**$10.55**	**$20.13**	**$30.65**	**$39.00**	**$187.69**
# of Processors	**4**	**6**	**6**	**8**	**10**	**14**	**9**	**9**	**11**	**12**	**17**

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

Figure 1. Volume, Wholesale Value and Processor Count in the BSAI TLA Yellowfin Sole Fishery



Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

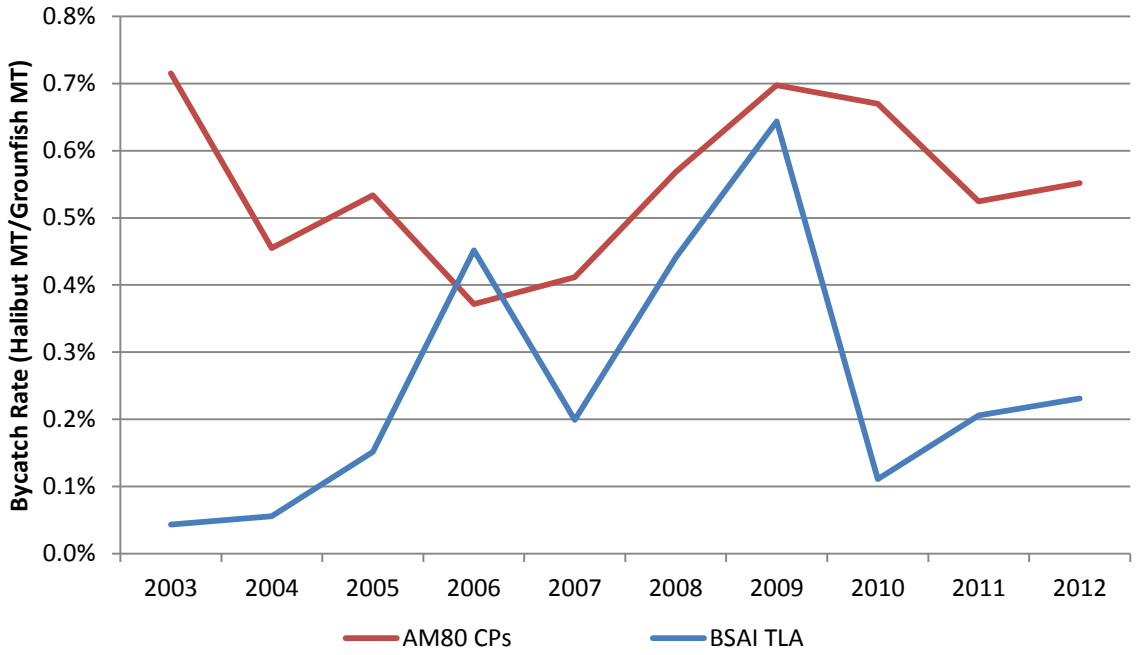
Table 23 summarizes total halibut PSC, bycatch rate and the groundfish value in the BSAI TLA target fishery for yellowfin sole. Similar information is available for the AM80 CP fishery in Appendix C beginning on page 131. In general, halibut bycatch rates in the BSAI TLA fishery have been lower than bycatch rates in the AM80 CP fishery (see Figure 2). It is believed that the difference in halibut bycatch is primarily due to the difference in the timing of the two fisheries (see in Figure 3). A higher percentage of harvests take place early in the year in the BSAI-TLA than in the AM80 CP fishery.

Table 23. Halibut PSC, Bycatch Rates and Value per MT of Bycatch in the BSAI TLA Yellfowfin Sole Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	2.2	2.8	15.5	92.6	58.2	119.4	94.7	26.8	71.6	92.4
Halibut Bycatch Rate (kg/mt of groundfish)	0.4	0.6	1.5	4.5	2.0	4.4	6.4	1.1	2.1	2.3
Groundfish Value ($-millions per MT Halibut)	$2.34	$2.01	$0.69	$0.21	$0.47	$0.16	$0.11	$0.75	$0.43	$0.42

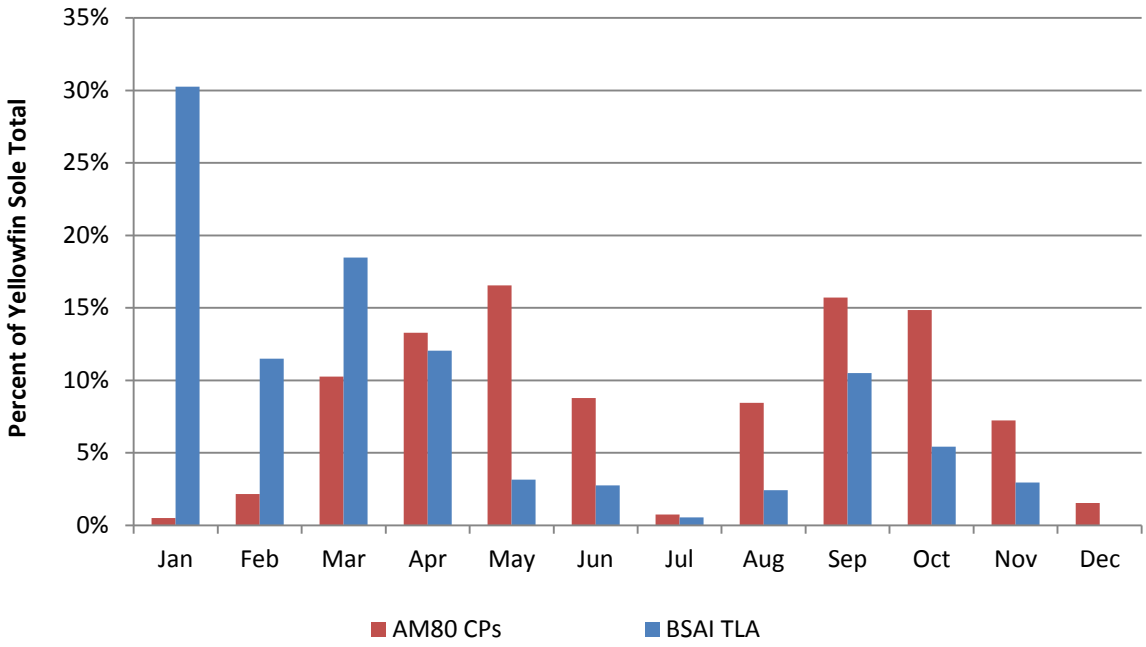
Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

Figure 2. Halibut Bycatch Rates in BSAI TLA and AM80 CP Yellowfin Sole Fisheries



Source: Figure developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

Figure 3. Harvests in BSAI TLA and A80-CP Yellowfin Sole Fisheries by Month, 2008–2012



Source: Figure developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

4 Safety in AM80 Fisheries[10]

4.1 Introduction

This report reviews the various safety matrices for the AM80 fleet to understand the trends and to identify opportunities to enhance safety for crews who work on these vessels. In addition to the adoption of AM80 in 2008, vessels also enrolled in a USCG safety and risk reduction program known as the Alternate Compliance and Safety Agreement (ACSA) during 2006–2009. ACSA focuses on safety improvements for the fleet.

Unlike catcher vessels, which catch and deliver fish in the round to shore plants, AM80 vessels catch, sort, head, eviscerate, clean, and prepare fish into various fish products onboard the vessel. To conduct these operations, these vessels have larger crew complements than catcher vessels. The majority of AM80 vessel crews are not professional mariners, but instead are fish processing workers. In addition to large crews, these vessels also carry processing and freezing machinery, hazardous gases for refrigeration, and large amounts of combustible packaging materials which pose hazards that do not exist on catcher vessels. AM80 vessels operate nearly year-round. Because of their ability to freeze, package, and store frozen catch, these vessels can operate in the most remote areas of Alaska for extended periods of time, far away from search and rescue support.

NIOSH previously provided testimony for this fleet in 2010 when the council was reviewing alternatives to allow for vessel replacement. The lack of vessel replacement provisions, other than for actual total loss or total constructive loss, ultimately inhibited long term safety improvements for the AM80 fleet. At that time, the council voted to allow owners to replace vessels with another vessel for any purpose. A replacement vessel cannot exceed a length overall of 295 feet. This is now not dependent on the total loss of the vessel.

This 5-year review discusses the numbers of personnel and vessel casualties that have occurred in this fleet since 2001. In addition, we discuss the changes in safety regulations due to the enrollment in the ACSA and to what extent safety indicators have improved as a result of the ACSA program.

4.2 Data Collection

The AM80 fleet for this report was defined as the non-AFA trawl catcher-processors that were listed in the original AM80 legislation (28 vessels), except for the 4 original AM80 vessels that were retired prior to 2001, resulting in the 24 AM80 vessels in our study group. Vessel safety was assessed by analyzing data on a selection of marine casualties including personnel casualties (e.g., fatal and non-fatal work-related injuries) and vessel casualties (e.g., sinking, grounding, collision, flooding, fire, loss of propulsion, loss of electrical power, and loss of steering).

Cases of marine casualties were identified through two sources, the USCG Marine Information for Safety and Law Enforcement and the NMFS Observer Vessel Survey. For personnel casualties, all reported traumatic occupational injuries to workers onboard AM80 vessels during 2001–2012 were included. For each case of occupational injury identified in the two data sources, measures on the geographic location (latitude and longitude), weather conditions (wind speed, wave height, air

[10] This section provided by Devin Lucas, PhD & Jennifer Lincoln, PhD of NIOSH. Minor edits and formatting for style have been made by Northern Economics. NIOSH is the federal agency responsible for conducting scientific research and making evidence-based recommendations to prevent workplace injury and illness. The NIOSH Alaska Pacific Office has been involved with research on worker safety in the commercial fishing industry since 1991.

temperature), vessel characteristics (length, year built), injury characteristics (nature, body part, mechanism, source, severity), and victim demographics were collected. For vessel casualties, all reported breakdowns at sea and other vessel safety events involving AM80 vessels during 2001–2012 were included. Data were collected on the type of vessel casualty, severity, resolution, location, and weather conditions.

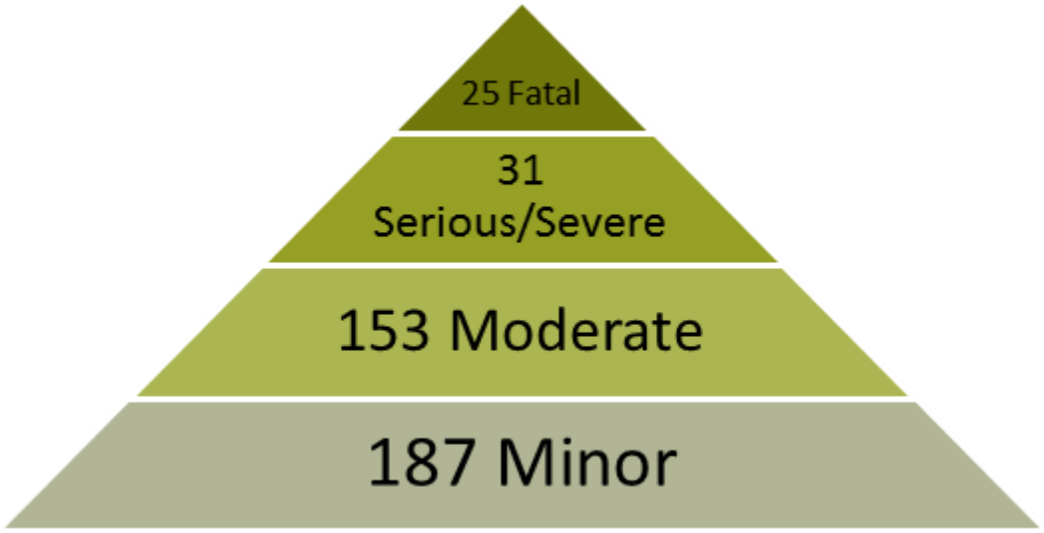
Because fishing vessels vary in terms of days at sea and crew size, they experience different amounts of exposure to hazards that result in marine casualties. A common denominator is necessary to accurately measure the risk of marine casualties in the AM80 fleet and allow it to be compared to other fishing fleets and industries. The exposure estimate used as the denominator to calculate injury rates in this study was full-time equivalent workers (FTEs). FTEs adjust the worker population to reflect the same amount of exposure to risk as workers in other fishing fleets and industries, thereby allowing comparisons of risk between fleets and industries. Risk was expressed as the number of injuries that occurred for every 1,000 FTEs. For vessel casualties, the exposure estimate used to measure risk was vessel-days-at-sea, expressed as the number of vessel casualties per 1,000 days at sea. A statistical analysis was performed to explore and characterize the data. The results of the analysis are presented next to provide a current assessment of vessel safety in the AM80 fleet.

4.3 Results: Personnel Casualties

During 2001–2012, 24 AM80 vessels operated in Alaskan waters at some time during this time period (range 20–24 vessels each year). The median length of AM80 vessels was 148 feet (91 to 267 feet) with a median of 35 crewmembers (11 to 77 crewmembers). For the 12-year period 2001–2012, a total of 772 marine casualties were reported, resulting in 409 work-related injuries. The median age of injured workers was 33 years (16 to 65 years). Only six women were among the injured workers. Data on race/ethnicity were missing in almost all case reports. The state of Washington was the residence for 138 injured workers (60 percent). The median amount of work experience was two years (0 to 48 years). Fish processors were the most frequently injured workers (268, 75 percent), followed by deckhands (61, 17 percent). The majority of injuries occurred throughout the fleet's main operating areas in the Bering Sea and along the Aleutian Island Chain. The median distance from shore of an injury incident was 29 miles (0 to 174 miles).

Of the 409 injuries, 25 were fatal and 384 were non-fatal (Figure 4). Approximately half (187, 47 percent) of injuries were minor and 39 percent (153) were moderate. Table 24 contains detailed descriptions of injury severity levels. Most of the fatal injuries occurred during two vessel disasters, the sinking of the Arctic Rose in 2001 (15 deaths) and the sinking of the Alaska Ranger in 2008 (5 deaths). The other five fatal injuries were caused by drowning after falling overboard (3 deaths) and blunt force trauma due to being struck by a cable and a hydraulic door (2 deaths). A complete list of fatal injuries occurring in the AM80 fleet during 2001–2012 is shown in Table 25.

Figure 4. Severity of Injuries Reported in the AM80 Fleet during 2001–2012 (Severity unknown for 13 cases)



Source: Figure developed by NIOSH, for this 5-year review

Table 24. Injury Severity Scale

Minor	The injury is minor or superficial. No medical treatment was required.	Examples: Minor /superficial scrapes (abrasions); minor bruises; minor buts; digit sprain; first degree burn; minor head trauma with headache or dizziness; minor sprain/strain.
Moderate	The injury exceeds the minor level, but did not result in broken bones (other than fingers, toes, or nose) loss of limbs, severe hemorrhaging, muscle, nerve, tendon, or internal organ damage. Professional medical treatment may have been required. If so the person was not hospitalized from more than 48 hours within 5 days of the injury.	Examples: broken fingers, toes, or nose, amputated fingers or toes; degloving of fingers or toes; dislocated joint; severe strain/sprain; second or third degree burn covering 10 percent or less of the body (if face is included move up one category); herniated disc.
Serious	The injury exceeds the moderate level and requires significant medical/surgical management. The person was not hospitalized for more than 48 hours within 5 days of the injury.	Examples: broken bones (other than fingers, toes, or nose) partial loss of limb (amputation below elbow/knee); degloving of the entire hand/arm or foot/leg; second or third degree burns covering 20-30 percent of the body (if face included move up one category); bruised organs.
Severe	The injury exceeds the moderate level and requires significant medical/ surgical management. The person was hospitalized for more than 48 hours within 5 days of the injury and, if in intensive care, was in for less than 48 hours.	Examples: Internal hemorrhage; punctured organs; severed blood vessels; second/third degree burns covering 30–40 percent of the body (if face included , move up one category), loss of entire limb (amputation of whole arm/leg)
Critical	The injury exceeds the moderate level and requires significant medical/surgical management. The person was hospitalized and intensive care for more than 48 hours within 5 days of the injury.	Examples: Spinal cord injury; extensive second-or third degree burns; concussion with sever neurological signs; severe crushing injury; internal hemorrhage; second/third degree burn covering 40 percent or more of the body; sever/multiple organ damage.

Source: Table developed by NIOSH, for this 5-year review

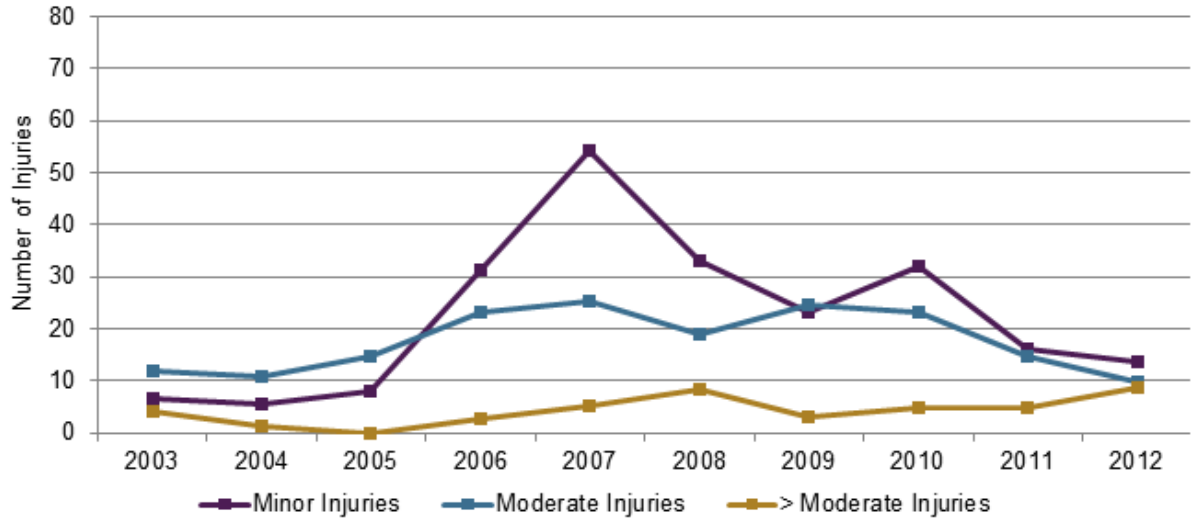
Table 25. Descriptions of Fatal Occupational Injuries in the AM80 Fleet during 2001–2012

Date of Incident	Description of Fatal Injury Event (25 Fatal Injuries)
	Vessel Disasters
4/2/2001	The Arctic Rose flooded and sank in the Bering Sea. All 15 workers onboard died as a result of the sinking.
3/23/2008	The Alaska Ranger flooded and sank in the Bering Sea. Five of the 47 workers onboard died as a result of the sinking.
	Fatal Falls Overboard
7/6/2009	A deckhand was on deck setting a net when the net became caught and would not continue into the water. He jumped on the net to free it, but fell into the water died due to drowning.
7/4/2009	A processor jumped overboard in a suspected suicide and died due to drowning.
5/25/2011	A supervisor was on deck working when he fell backwards into the water. He fell into the water and died due to drowning.
	Onboard Fatalities
6/3/2007	A processor walked into the live tank to hose it out when a hydraulic door closed. The door crushed his head and caused a severe head injury. The processor died as a result of the injury.
3/1/2012	A processor was on deck when he was struck in the head by a cable. This caused a fatal head injury to the processor.

Source: Table developed by NIOSH, for this 5-year review

The time period for which exposure estimates (i.e., vessel days at sea and crew size) were available was 2003–2012. The rate of minor injuries appeared fairly stable during 2003–2005, and then increased sharply for two years before declining back to the level observed in the first three years of the time period (Figure 5). For injuries that were greater than minor severity, the rates were more stable across the time period. The trends observed in the reported injury rates were most likely influenced by the fluctuating level of reporting of injuries to USCG authorities rather than actual increase in injuries. There was a USCG initiative during 2005–2008 aimed at improving the level of reporting of injuries by these fishing companies. For additional explanation, see Lucas et al., 2014b.

Figure 5. Rate of Occupational Injuries Reported in the AM80 Fleet, n=343



Source: Figure developed by NIOSH, for this 5-year review

In the decade between 2003 and 2012, the annual risk of fatal injuries in the AM80 fleet was 1.3 per 1,000 FTEs, and the annual risk of non-fatal injuries was 43 per 1,000 FTEs as shown in Table 26.

Table 26. Frequency and Rate of Fatal and Non-Fatal Work-Related Injuries in the AM80 Fleet

				Fatal Rate	Non-Fatal Rate
Year	Fatal	Non-Fatal	FTE	Per 1,000 FTE	
2001	15	19	–	–	–
2002	0	24	–	–	–
2003	0	19	779	0	24
2004	0	15	767	0	20
2005	0	18	784	0	23
2006	0	42	768	0	55
2007	1	63	785	1.3	80
2008	5	48	877	5.7	55
2009	2	34	715	2.8	48
2010	0	49	848	0	58
2011	1	28	842	1.2	33
2012	1	25	846	1.2	30
Period total	**25**	**384**	**8,012***	**1.3***	**43***

Note: *Period total is for 2003–2012
Source: Table developed by NIOSH, for this 5-year review

The injury rates measured in the AM80 fleet showed that workers on those vessels were at high risk for work-related injuries. The risk of fatal injury was 41 times higher than for all U.S. workers, and the risk of non-fatal injury was four times higher than for all U.S. workers. Compared to other fisheries in

the U.S., the fatality rate in the AM80 fleet was lower than in many others, including the Northeast U.S. groundfish trawl fleet, Atlantic scallop fleet, and West coast Dungeness crab fleet (Lincoln and Lucas, 2010). However, both the fatality rate and non-fatal injury rate in the AM80 fleet were higher than in the similar freezer-longline fleet (Lucas et al., 2014b).

Non-fatal injuries were grouped within job task categories or activities such as processing fish or walking around the vessel. The job tasks associated with the highest number of injuries were handling frozen fish (139, 41 percent), processing fish (72, 21 percent), and foot traffic onboard (41, 12 percent) (Figure 6). The specific job tasks that were associated with the most injuries while handling frozen fish were stacking blocks of fish (in the freezer hold) and offloading product. The 31 serious injuries reported are described in Table 27, and are grouped by the job task being completed at the time of injury.

Table 27. Descriptions of Serious Occupational Injuries in the AM80 Fleet during 2001–2012

Year of Incident	Description of Serious Injury Event (31 Serious Injuries)
	Processing Fish
2002	A processor was using a header machine in the factory when his hand was caught in the running equipment and amputated.
2004	A processor was pushing fish into a bin when he lost his balance. He fell into the fish bin and broke his leg.
2010	A processor was repairing the header machine in the factory when another individual turned the machine on causing the processor's hand to get caught in the running equipment. His wrist was cut very deep.
2012	A processor was cleaning the fish grinder equipment in the factory when he put his hand into the chute and it became caught in the grinder. His fingers on one hand were all amputated to the palm.
2012	A processor was processing fish in the factory when an ammonia line broke causing him to inhale ammonia. He had ammonia poisoning, which resulted in severe nausea, stomach pain, and burning in his lungs.
2012	A processor was processing fish in the factory when an ammonia line broke causing him to inhale ammonia. He had ammonia poisoning, which resulted in severe nausea, stomach pain, and burning in his lungs.
2012	A processor processing fish was in the factory when an ammonia line broke causing him to inhale ammonia. He had ammonia poisoning, which resulted in severe nausea, stomach pain, and burning in his lungs.
2001	A processor was kicking fish into a bin when a crewmember shut the hydraulic door crushing his foot.
	Handling Frozen Fish
2001	A factory processor supervisor was offloading fish product in the freezer when he fell 20 to 30 feet into the freezer hold and broke his ribs.
2003	A processor was offloading fish product from the vessel when another crewmember tossed a block of frozen fish to the processor. The processor was struck by the block and broke his hand.
2007	A processor was unloading the plate freezer in the factory when the vessel rolled and cases of frozen fish struck him. The frozen fish broke his knee.
2008	A processor was stacking blocks of fish in the freezer when he stood up on the conveyor belt railing and lost his footing. His foot went into the running equipment and was fractured.
	Hauling the Gear
2001	A deckhand was on deck hauling in a trawl net when he tripped and broke his arm.
2006	A deckhand was on deck hauling in a trawl net when he was struck in the head by a swinging hook. His head was injured.

Year of Incident	Description of Serious Injury Event (31 Serious Injuries)
2007	A deckhand was on deck pushing fish from the trawl deck into the hold when the fish tank hydraulic door opened. This caused his leg to fall into the open space, but then the door closed and amputated his leg.
2007	A processor was working on deck to haul in the trawl net when he slipped on a fish and broke his ankle.
	Foot Traffic Onboard
2003	A processor walked into the freezer during off-loading the catch when a case of fish fell 15 feet and landed on his head, which caused serious head injuries.
2010	The chief engineer was walking across the deck when he tripped on a deck tie down and fell onto the ladder railing, which caused his arm to break.
2010	The captain was entering his stateroom when he stepped on a cardboard tube lying on the floor and broke his ankle.
	Other Work on Deck
2001	A deckhand was repairing the trawl net on deck when a boom crane fell on top of him and broke his pelvis.
2008	A deckhand was on deck removing the crane hook from the codend. A winch was activated and his leg became caught in the running equipment. This force broke his leg.
2010	A deckhand was on deck preparing the deck gear when a heavy wire struck him in the head causing a concussion.
	Other
2003	A deckhand was kicked and stabbed by his crewmembers in the galley. He had seven stab wounds.
2006	A processor was taking a shower when he slipped and fell. As a result of his fall, he broke his tailbone.
2011	An engineer was conducting general maintenance in the storage compartment when he slipped and fell into the steering room during bad weather. The fall caused his shoulder to break.
2011	A deckhand was riding a crane hook out of the cargo hold, while the crew was readying the ship for sea, when he fell 15 feet back into the hold. His ankle was broken due to the fall.
2012	An engineer was repairing the generator in the engine room when he slipped and fell into the electrical panel. He was electrocuted due to the direct exposure to electricity.
2012	A processor was repairing freezer pans in the workshop when his hand became caught between the hydraulic press pressure plate and fish pan. His hand was crushed due to being caught in the running equipment.
	Not Enough Information
2011	A fisherman broke his arm in a hydraulic belt.
2002	A processor broke his hand.
2001	A processor fell through floor grating in the factory and broke his wrist.

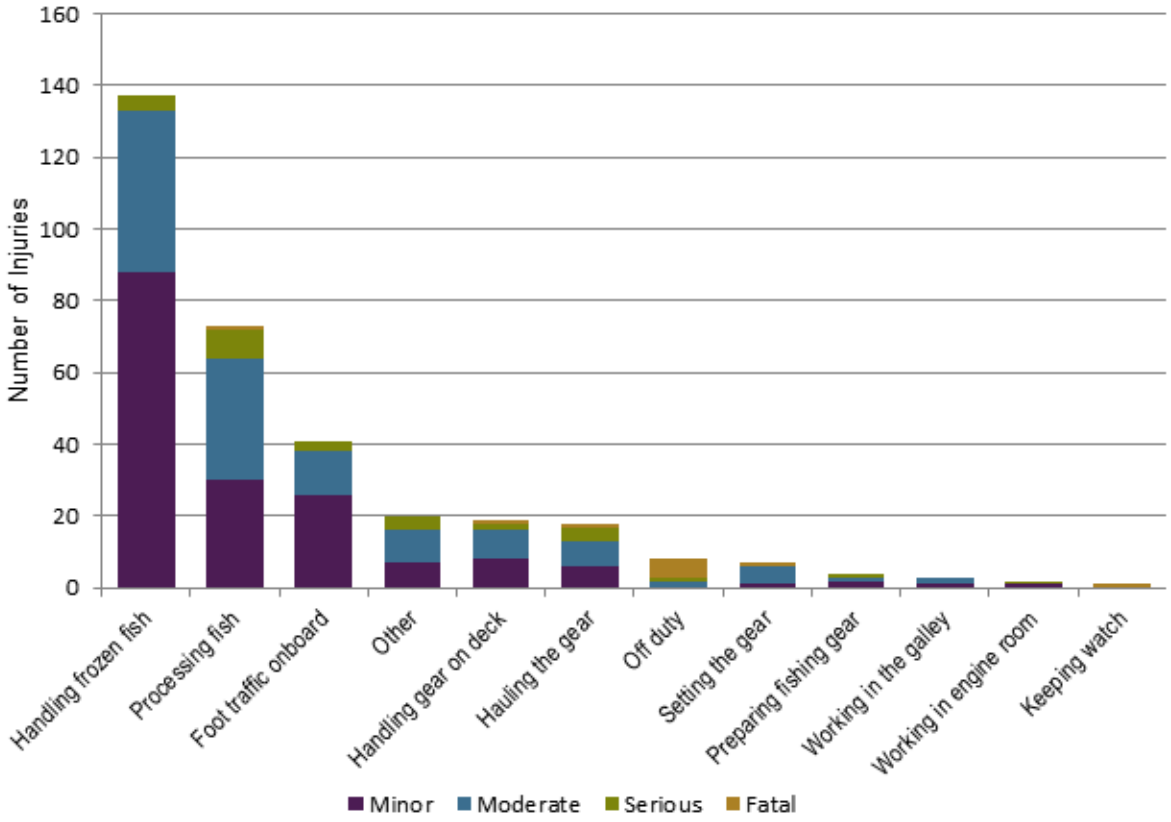
Source: Table developed by NIOSH, for this 5-year review

Handling frozen fish was the most common job task for undiagnosed pain/swelling, sprains/strains/tears, contusions, fractures, crushing injuries, and intracranial injuries. Handling frozen fish injuries were most often caused by being struck by a box of frozen fish (45, 32 percent) and by single episodes of overexertion (42, 30 percent). Almost all injuries sustained while handling frozen fish were minor (88, 64 percent) or moderate (45, 33 percent); four (3 percent) were serious (Figure 6).

Fish products manufactured in the factories onboard AM80 vessels are frozen in plate freezers and then packaged in boxes and stored in freezer holds. Boxes of frozen fish products are moved around

by a combination of conveyor systems, chutes, and manual labor. The job task of handling frozen fish was responsible for nearly half of all injuries and should be a priority area for injury prevention strategies. Interventions are needed to protect workers from being struck by boxes of frozen fish, especially while stacking boxes in the freezer holds and during offload. Ergonomic interventions are also needed to prevent injuries caused by single episodes of overexertion while manually moving boxes of fish.

Figure 6. Job Task and Severity of Occupational Injuries 2001–2012, n=333



Source: Figure developed by NIOSH, for this 5-year review

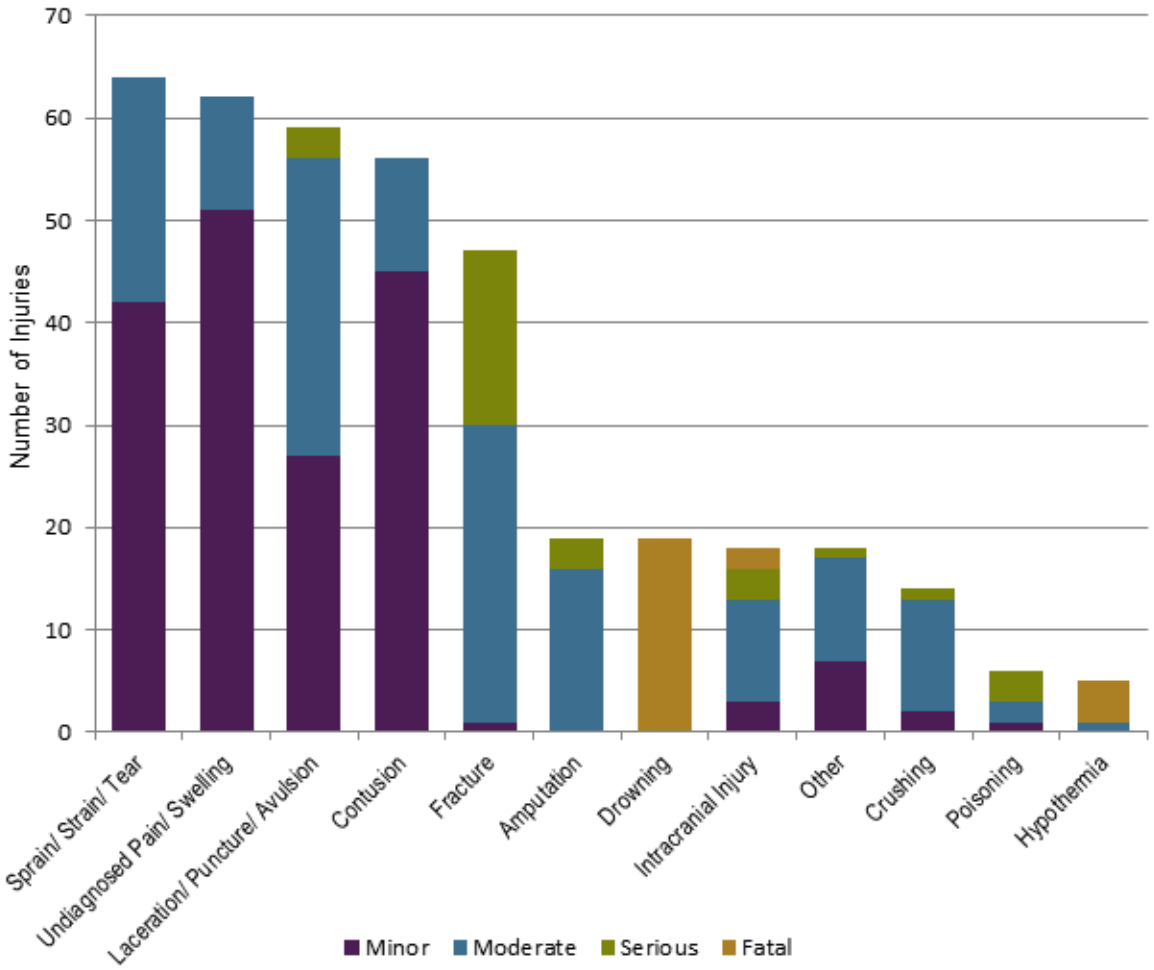
The job task of processing fish was responsible for most of the laceration/puncture/avulsion injuries, amputations, and poisonings. These injuries were most often caused by being caught in running equipment (28, 39 percent) and by slipping knives (11, 15 percent). The majority of injuries sustained while processing the catch were minor (29, 41 percent) or moderate (33, 47 percent). The remaining eight (11 percent) were serious (Figure 6).

The factories onboard AM80 vessels are equipped with fish processing machinery and conveyor systems to move fish from one machine to the next. The machines have different levels of automation that either increase or decrease the need for worker contact. The injuries sustained while processing fish were different in nature than those sustained while handling frozen fish, suggesting that successful injury prevention efforts must also be different. Interventions to reduce injuries need to target the specific hazards encountered while processing fish that cause lacerations, punctures, avulsions and amputations, which were the most frequent types of injuries associated with processing fish. Working

with knives and running equipment are exposures of particular concern that need to be a high priority.

As noted above, handling frozen fish and fish processing account for most injuries resulting in sprains/strains/tears, undiagnosed pain/swelling, lacerations/punctures/avulsions, contusions, fractures, amputations, intracranial injuries, and crushing injuries. Figure 7 below shows the severity and type of all injuries reported in the AM80 fleet between 2001 and 2012.

Figure 7. Injury Type and Severity of Occupational Injuries Reported in the AM80 Fleet during 2001–2012, n=387



Source: Figure developed by NIOSH, for this 5-year review

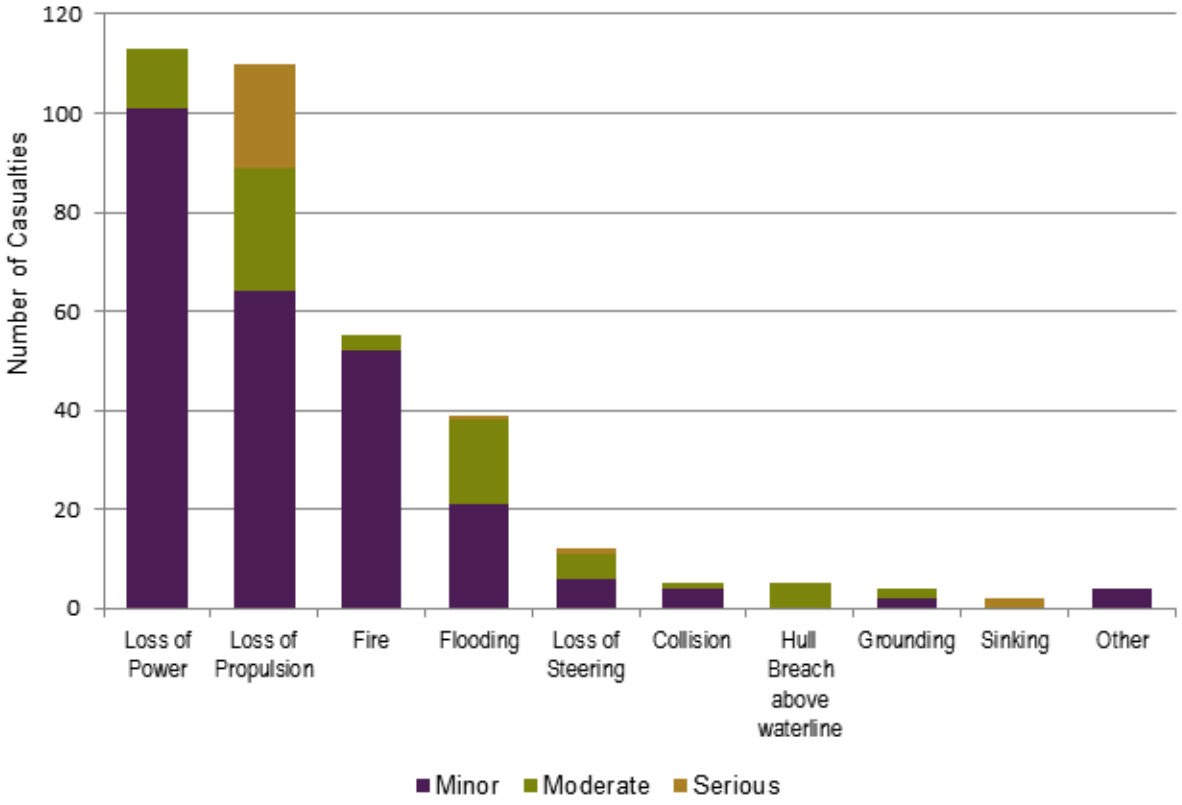
4.4 Results: Vessel Casualties

During 2001–2012, 357 vessel casualties were reported in the AM80 fleet. The majority of vessel casualties were minor (254, 73 percent), meaning that the problem was resolved permanently by the crew at sea without any third-party assistance. Moderate vessel casualties were defined as problems that required the vessel to return immediately to port for repairs, accounting for 20 percent (70) of reported casualties. The remaining 7 percent (25) of vessel casualties were serious, meaning that the

vessel was unable to cope with the problem at sea on its own and had to be rescued by a third party (such as being towed to port).

The most common types of vessel casualties were loss of electrical power (113, 32 percent) and loss of propulsion (112, 31 percent). Although the majority of loss of power casualties were minor (Figure 8), vessel owners could potentially improve production efficiency and vessel safety by reviewing their engineering systems and identifying ways to make electrical systems more reliable. In contrast to the largely minor problem of loss of power, loss of propulsion casualties were often moderate or serious. Loss of propulsion was the most common cause of serious casualties, accounting for 21 out of 25 total serious casualties. Serious casualties involving loss of propulsion were most often caused by mechanical failures of the main engines, gears, and engine cooling systems. Losing propulsion at sea is a hazard that should be addressed by vessel owners reviewing their inspection and maintenance policies to identify areas that may need more attention.

Figure 8. Vessel Casualty Type and Severity Reported in the AM80 Fleet during 2001–2012, n=349



Source: Figure developed by NIOSH, for this 5-year review

Fires were the third most common type of vessel casualty, although almost all were minor. The frequent occurrence of fires on AM80 vessels is concerning, and the causes of fires should be investigated and addressed by vessel owners. The predominance of minor fires as opposed to serious fires may indicate that current fire alarm, response, and suppression systems are effectively preventing small fires from becoming serious threats to the vessel and crew.

4.5 Safety Regulations for AM80 Vessels

USCG safety regulations for commercial fishing vessels are based upon the function of the vessel. Specifically, safety regulations are based upon the types of fish products made by the vessels. The most stringent safety regulations of classification and loadline are reserved for "fish processing vessels." According to 46 USC 2101 (11b), a "fish processing vessel" is "a vessel that commercially prepares fish or fish products other than by gutting, decapitating, gilling, skinning, shucking, icing, freezing or brine chilling." A vessel which does not prepare fish beyond these eight statutory limitations is regulated to a significantly lesser degree as a "fishing vessel" in accordance with 46 USC 2101 (11a).

Prior to 2006, the AM80 fleet had been regulated by the USCG for safety purposes as "fishing vessels" that conducted H&G operations. This meant that these vessels only had to meet minimal standards for the carriage of primary lifesaving equipment. However, in 2005, formal USCG investigations into the sinking of the *Arctic Rose* (2001) and *Galaxy* (2002) found that most AM80 vessels were actually operating as "fish processing vessels," based on the products they produced. As fish processing vessels, these AM80 vessels were required to be classed or loadlined. Due to restrictions imposed by the classification societies of Det Norske Veritas and American Bureau of Shipping, the vast majority of the AM80 vessels could not be either loadlined or classed due to age restrictions. Neither class society would class an existing vessel older than 20 years old (unless that vessel was already classed and loadlined). The average age of a vessel within the AM80 fleet was approximately 32 years.

This inability to meet current safety regulations of loadline and classification is what led the USCG and owners of AM80 vessels to collaborate to develop the ACSA (USCG, 2006). Program development began in June 2005 and implementation was achieved between June 2006 and January 2009.

The emphasis of ACSA was placed on the primary prevention of vessel disasters (i.e., preventing vessel disasters from occurring in the first place); it included rules for vessel stability, watertight integrity, and the material condition of the hull, tail shaft, rudder, and machinery. Alongside the standards for primary prevention, ACSA also included requirements aimed at secondary prevention of fatalities, such as having life-saving equipment, fire-fighting equipment, emergency communications, and navigation equipment, and conducting emergency drills (USCG, 2012). As a result of ACSA enrollment, these standards are achieved through mandatory annual inspections and regular dry-dock examinations (twice in five years). Through requirements of ACSA standards, compliant vessels approach levels of safety equivalent to loadline and to vessel classification. Millions of dollars have been spent on these vessels to reach compliance since 2006.

A recent NIOSH study evaluated the effectiveness of ACSA at improving vessel safety in the AM80 fleet (Lucas et al., 2014a). To determine if ACSA had been effective, the researchers conducted a longitudinal study using historical data on vessel casualties in the AM80 fleet and freezer-longline (FL) fleet (also included in ACSA) during 2003–2012. The goal was to compare the rate of vessel casualties before and after implementation of ACSA.

The study group consisted of all AM80 and FL vessels that operated in Alaska during the study time period and were in full compliance with ACSA standards during 2012. There were 17 AM80 vessels and 20 FL vessels that met the criteria and were included in the study group. The metric used to assess the efficacy of ACSA was the number of vessel casualties on each vessel during each year in the study period. The metric was selected by the researchers in collaboration with AM80 vessel owners and USCG staff.

The study found indications of a positive effect of ACSA on vessel safety in the AM80 and FL fleets (Lucas et al., 2014a). On both types of vessels, reported rates of serious vessel casualties decreased after the vessels reached compliance with ACSA requirements (Table 28). Serious casualties are the most important to prevent since they have the most immediate potential to develop into vessel

disasters under certain circumstances (such as severe weather conditions or prolonged time until rescuers arrive) leading to fatal injuries.

Table 28. Rates* of vessel casualties involving AM80 and FL vessels during 2003–2012

Outcome	Pre-ACSA rate	Post-ACSA rate	Pre/Post Rate Ratio	95% Confidence Interval
AM80 Vessels (n=17)				
All casualties	3.05	4.62	1.52	1.07, 2.15
Serious casualties	0.52	0.48	0.92	0.34, 2.46
FL Vessels (n=20)				
All casualties	4.25	3.8	0.89	0.61, 1.31
Serious casualties	0.25	0.04	0.17	0.02, 1.37

Note: *Number of casualties per 1,000 vessel days
Source: Figure developed by NIOSH, for this 5-year review

The major objective of ACSA was to reduce worker fatalities in the AM80 and FL fleets through primary prevention of vessel disasters. The decline in serious vessel casualties on both AM80 and FL vessels suggests that ACSA may be having the desired effect on vessel safety.

4.6 Final Conclusion and Recommendations

A full overview of this section in provided in the Executive Summary. In general, some safety improvements have been observed in this fleet. Specifically, the risk of serious vessel casualties appears to have declined slightly. Further improvements should be tailored to address specific tasks and vessel systems that have been identified in this review.

One suggestion for the current AM80 Fisheries Management Program is to provide for a more direct collection of safety indicators for this fleet by adding questions to the Economic Data Report (for instance, in Table 6 - Calendar Year Labor) to indicate how many personnel and vessel casualties occurred during the year. The new questions would ask for a simple count of the minor, moderate, serious, and fatal injuries that occurred on the vessel during the year, and the number of minor, moderate and serious vessel casualties that occurred. Alternatively, since these events are reported to the USCG, a regular report of marine casualties for this fleet could be scheduled.

5 Maintain a Healthy Marine Ecosystem: Development of Modified Trawl Sweeps in the AM80 Fisheries[11]

This section discusses gear changes and experimental research into bycatch reductions that have been facilitated by the reduction and elimination of the race for fish following implementation of AM80. One of the more important regulatory changes has been requirements that trawl sweeps on be elevated off the bottom in the BSAI (in 2011) and in the GOA beginning in 2014 (NPFMC, 2013a). These issues are discussed because they are indirectly a result of AM80. According to NMFS-AKR (Furuness, 2014) the development of the regulations and their quick acceptance by the fleet was undoubtedly made much easier because of the fact that the race-for-fish had been eliminated. With an assured percent of the TACs of their primary targets, AM80 vessel operators did not need not to worry that reduced catch rates would erode their share of the overall harvest.

Since the beginning of 2011, elevating devices on trawl sweeps have been required for the flatfish vessels operating in the Bering Sea (BS). Starting February 18, 2014 elevating devices were required for trawl vessels targeting flatfish in the Central GOA using non-pelagic trawl gear. Many of the trawl vessels affected by these requirements are AM80 since these vessels target the majority of flatfish in BS and also participate in the Central GOA flatfish fisheries. The purpose of the elevating devices on trawl sweeps is to reduce unobserved crab mortality in the BS and Central GOA from the potential adverse effects of non-pelagic trawl gear used for flatfish fishing. The requirements combine a gear and performance standard to raise the elevated section of sweep at least 2.5 inches, measured next to the elevating device. To achieve this performance standard, elevating devices are necessary along the entire length of the elevated section of the sweep.

Overall, trawl sweep modification has been tested to be effective in the BS flatfish trawl fishery in reducing trawl sweep impact effects on *C. bairdi*, *C. opilio*, and red king crabs by reducing the unobserved mortality of these species. In a study during the summer of 2008, researchers conducted a study in the BS, funded by the North Pacific Research Board, to estimate the mortality rates of *C. bairdi* and *C. opilio* that encounter non-pelagic trawls, but remain on the seafloor. The study estimated mortalities for both species for conventional and modified sweeps. Estimates of mortality for crabs encountering conventional sweeps were approximately 5 percent for both species. Mortality rates dropped to nearly zero for crab encountering the modified sweeps. In a similar study during the summer of 2009 in Bristol Bay on red king crab, results indicated a similar trend in reduced mortality rates for king crab encountering the modified sweeps.

Additionally, the trawl sweep modification has proven effective on the BS shelf at reducing effects on sea whips (a long-lived species of primary concern), and did not substantially reduce catches of target flatfish. Tests for reduced impacts on basket-stars, sponges, and polychaete siphons were positive in direction, but non-significant.

The trawl sweep modifications were estimated to result in additional equipment costs as vessels comply with the addition of disks to the trawl sweeps. On some vessels the requirement would likely result in modification to operations and/or the cost of additional deck equipment. For all vessels, the additional cost of purchasing the modified gear was estimated at the time of Council action to be between $3,000 to $3,400, annually—a 25 to 75 percent increase over the cost of sweeps without elevating devices. There may, however, be some potential for offseting these costs, or even overall savings, if the use of the elevating devices saves fuel, or reduces wear on the sweep rope or cable.

[11] This section of the report has been provided by Jon McCracken, an economist on the staff of the North Pacific Fishery Management Council. Some minor technical edits and formatting for style have been provided by NEI.

6 Attainment of Optimum Yield and Ability to Account for Variations and Contingencies

This section examines the consistency of AM80 with National Standard 1, which requires FMPs to achieve the optimum yield of fishery resources, and National Standard 6, which requires FMPs to account for variations and contingencies in the use of fishery resources. Information is presented on the total allowable catch, acceptable biological catch, and catch of AM80 vessel target species from 2003–2012. In addition, a summary of the Flatfish Flexibility Plan (FFP) is provided, along with a discussion of the potential implications of the plan with respect to achieving optimum yield. The section also includes a brief discussion of cooperative behavioral changes within the AM80 fleet that appear to have eased regulatory changes with respect to gear.

6.1 Comparison of Biomass Estimates, with Allowable and Actual Harvests of AM80 Target Species

This section compares the TAC and acceptable biological catch (ABC), which, in this assessment represents optimum yield. The section also examines harvests of AM80 species relative to TACs.

The TAC and ABC for each species targeted by AM80 vessels are presented in Table 29, while Table 30 shows the TAC as a percent of the ABC. In federal fishery management, TACs are set below the ABC to account for implementation uncertainty (i.e., imperfect management control that results in imprecision in achieving the target). Since implementation of AM80, the TAC has been set closer to (or equal to) the ABC for most species, which suggests that fisheries for species targeted by AM80 vessels have become more predictable.

Table 29. Acceptable Biological Catch and Total Allowable Catch of AM80 Vessel Target Species, 2003–2012

Species Groups	Area	Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Yellowfin sole	BSAI	ABC	114,000	114,000	124,000	121,000	225,000	248,000	210,000	219,000	239,000	203,000
		TAC	83,750	86,075	90,686	95,701	136,000	225,000	210,000	219,000	196,000	202,000
Rock sole	BSAI	ABC	110,000	139,000	132,000	126,000	198,000	301,000	296,000	240,000	224,000	208,000
		TAC	44,000	41,000	41,500	41,500	55,000	75,000	90,000	90,000	85,000	87,000
Flathead sole	BSAI	ABC	66,000	61,900	58,500	59,800	79,200	71,700	71,400	69,200	69,300	70,400
		TAC	20,000	19,000	19,500	19,500	30,000	50,000	60,000	60,000	41,548	34,134
Pacific Cod	BSAI	ABC	223,000	223,000	206,000	194,000	176,000	176,000	182,000	174,000	235,000	314,000
		TAC	207,500	215,500	206,000	189,768	170,720	170,720	176,540	168,780	227,950	261,000
Arrowtooth + Kam. Fl.	BSAI	ABC	112,000	115,000	108,000	136,000	158,000	244,000	156,000	156,000	170,700	168,600
		TAC	12,000	12,000	12,000	13,000	20,000	75,000	75,000	75,000	43,600	42,700
Alaska plaice	BSAI	ABC	137,000	203,000	189,000	188,000	190,000	194,000	232,000	224,000	65,100	53,400
		TAC	10,000	10,000	8,000	8,000	25,000	50,000	50,000	50,000	16,000	24,000
Other flatfish	BSAI	ABC	16,000	13,500	21,400	18,100	21,400	21,600	17,400	17,300	14,500	12,700
		TAC	3,000	3,000	3,500	3,500	10,000	21,600	17,400	17,300	3,000	3,200
Greenland turbot	BS	ABC	3,920	3,162	2,720	1,890	1,680	1,750	5,090	4,220	4,590	7,230
		TAC	2,680	2,700	2,700	1,890	1,680	1,750	5,090	4,220	3,500	6,230
Greenland turbot	AI	ABC	1,960	1,578	1,210	850	760	790	2,290	1,900	1,550	2,430
		TAC	1,320	800	800	850	760	790	2,290	1,900	1,550	2,430
Atka mackerel	BSAI	ABC	63,000	66,700	124,000	110,000	74,000	60,700	83,800	74,000	85,300	81,400
		TAC	60,000	63,000	63,000	63,000	63,000	60,700	76,400	74,000	53,080	50,763
Pacific ocean perch	BS	ABC	2,410	2,128	2,920	2,960	4,160	4,200	3,820	3,830	5,710	5,710
		TAC	1,410	1,408	1,400	1,400	2,160	4,200	3,820	3,830	5,710	5,710
Pacific ocean perch	AI	ABC	12,690	19,285	11,680	11,840	17,740	17,500	14,980	15,030	18,990	18,990
		TAC	12,690	19,285	11,200	11,200	17,740	17,500	14,980	15,030	18,990	18,990
Northern rockfish	BSAI	ABC	7,101	3,059	8,260	8,530	8,190	8,180	7,160	7,240	8,670	8,610
		TAC	6,000	3,059	5,000	4,500	8,190	8,180	7,160	7,240	4,000	4,700

Notes:

1) ABCs and TACs for arrowtooth and Kamchatka flounder are combined.
2) Subarea ABCs and TACs for Atka mackerel are combined. TACs in the Central and Western Aleutians (CAI, WAI) have been reduced due as a result of Stellar sea lion protection measures.
3) Subarea ABCs and TACs for Aleutian Islands Pacific ocean perch are combined.

Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a).

Table 30. Total Allowable Catch as a Percent of Acceptable Biological Catch of AM80 Vessel Target Species, 2003–2012

Species Groups	Area	Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Yellowfin sole	BSAI	TAC/ABC	73	76	73	79	60	91	100	100	82	100
Rock sole	BSAI	TAC/ABC	40	29	31	33	28	25	30	38	38	42
Flathead sole	BSAI	TAC/ABC	30	31	33	33	38	70	84	87	60	48
Pacific Cod	BSAI	TAC/ABC	93	97	100	98	97	97	97	97	97	83
Arrowtooth + Kam. Fl.	BSAI	TAC/ABC	11	10	11	10	13	31	48	48	26	25
Alaska plaice	BSAI	TAC/ABC	7	5	4	4	13	26	22	22	25	45
Other flatfish	BSAI	TAC/ABC	19	22	16	19	47	100	100	100	21	25
Greenland turbot	BS	TAC/ABC	68	85	99	100	100	100	100	100	76	86
Greenland turbot	AI	TAC/ABC	67	51	66	100	100	100	100	100	100	100
Atka mackerel	BSAI	TAC/ABC	95	94	51	57	85	100	91	100	62	62
Pacific ocean perch	BS	TAC/ABC	59	66	48	47	52	100	100	100	100	100
Pacific ocean perch	AI	TAC/ABC	100	100	96	95	100	100	100	100	100	100
Northern rockfish	BSAI	TAC/ABC	84	100	61	53	100	100	100	100	46	55

Notes:

1) ABCs and TACs for arrowtooth and Kamchatka flounder are combined.
2) Subarea ABCs and TACs for Atka mackerel are combined. TACs in the Central and Western Aleutians (CAI, WAI) have been reduced due as a result of Stellar sea lion protection measures.
3) Subarea ABCs and TACs for Aleutian Islands Pacific ocean perch are combined.

Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a).

Table 31 shows the catch of AM80 target species from 2003–2012, while Table 32 compares the catch of each species to its TAC. Implementation of AM80 has helped achieve the goal of attaining the TAC as closely as possible without exceeding the catch limit for some AM80 species, including yellowfin sole and rock sole, as well as other target species such as arrowtooth and Kamchatka flounder and Bering Sea Pacific ocean perch.

Table 31. Catch (mt) in AM80 Target Fisheries and BSAI Trawl Limited Access Yellowfin Sole Fisheries, 2003–2012

Species Groups	Area	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Yellowfin sole (AM80 + TLA)	BSAI	78,767	73,813	93,475	97,682	120,233	147,355	104,863	117,437	148,406	143,738
Rock sole	BSAI	32,794	44,062	34,698	32,908	33,951	46,085	38,235	50,495	49,646	63,983
Flathead sole	BSAI	11,624	14,412	12,729	13,857	13,781	19,221	13,984	15,077	7,607	5,908
Pacific cod	BSAI	30,170	38,066	31,302	30,275	35,141	19,409	23,959	27,778	33,782	37,695
Arrowtooth + Kam. Fl.	BSAI	9,679	14,628	11,113	9,625	7,084	17,884	26,089	35,712	26,603	28,125
Alaska plaice	BSAI	9,498	7,567	10,066	13,615	15,557	15,329	12,712	13,667	19,261	12,359
Other flatfish	BSAI	2,394	3,761	3,563	2,184	4,605	2,991	1,958	1,844	2,436	2,807
Greenland turbot	BS	549	454	390	115	171	1,133	873	300	1,090	841
Greenland turbot	AI	334	194	298	178	165	712	2,148	1,649	425	1,591
Atka mackerel	BSAI	55,831	58,761	60,941	60,533	56,890	56,751	69,391	64,872	46,455	42,257
Pacific ocean perch	BS	209	214	214	308	245	175	512	3,289	4,898	4,810
Pacific ocean perch	AI	13,551	11,120	9,290	11,777	16,754	15,894	13,533	13,270	17,017	16,546
Northern Rockfish	BSAI	4,821	4,571	3,781	3,686	3,761	3,082	2,893	3,964	2,363	1,909
All Included Species	**BSAI**	**220,051**	**233,558**	**240,559**	**246,468**	**273,197**	**326,613**	**287,192**	**321,575**	**326,206**	**324,875**

Notes: Yellowfin sole includes CDQ & non-CDQ harvests of AM80 CPs all BSAI TLA harvesters. Catch of other species other CDQ and non-CDQ catch of AM80 CPs only. Source:

Developed by Northern Economics based on from the CAS provided by AKFIN (Fey, 2014) and information at NMFS-AKR webpage, (NMFS, 2014a).

Table 32. Catch as a Percent of Total Allowable Catch in AM80 Target Fisheries and BSAI Trawl Limited Access Yellowfin Sole Fisheries, 2003–2012

Species Groups	Area	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Yellowfin sole (AM80 + TLA)	BSAI	94%	86%	103%	102%	88%	65%	50%	54%	76%	71%
Rock sole	BSAI	75%	107%	84%	79%	62%	61%	42%	56%	58%	74%
Flathead sole	BSAI	58%	76%	65%	71%	46%	38%	23%	25%	18%	17%
Pacific Cod	BSAI	15%	18%	15%	16%	21%	11%	14%	16%	15%	14%
Arrowtooth + Kam. Fl.	BSAI	81%	122%	93%	74%	35%	24%	35%	48%	61%	66%
Alaska plaice	BSAI	95%	76%	126%	170%	62%	31%	25%	27%	120%	51%
Other flatfish	BSAI	80%	125%	102%	62%	46%	14%	11%	11%	81%	88%
Greenland turbot	BS	20%	17%	14%	6%	10%	65%	17%	7%	31%	14%
Greenland turbot	AI	25%	24%	37%	21%	22%	90%	94%	87%	27%	65%
Atka mackerel	BSAI	93%	93%	97%	96%	90%	93%	91%	88%	88%	83%
Pacific ocean perch	BS	15%	15%	15%	22%	11%	4%	13%	86%	86%	84%
Pacific ocean perch	AI	107%	58%	83%	105%	94%	91%	90%	88%	90%	87%
Northern Rockfish	BSAI	80%	149%	76%	82%	46%	38%	40%	55%	59%	41%
All Included Species	**BSAI**	**86%**	**89%**	**93%**	**93%**	**74%**	**55%**	**47%**	**52%**	**69%**	**67%**

Notes: Yellowfin sole includes CDQ & non-CDQ harvests of AM80 CPs all BSAI TLA harvesters. Catch of other species other CDQ and non-CDQ catch of AM80 CPs only. Source:

Developed by Northern Economics based on from the CAS provided by AKFIN (Fey, 2014) and information at NMFS-AKR webpage, (NMFS, 2014a).

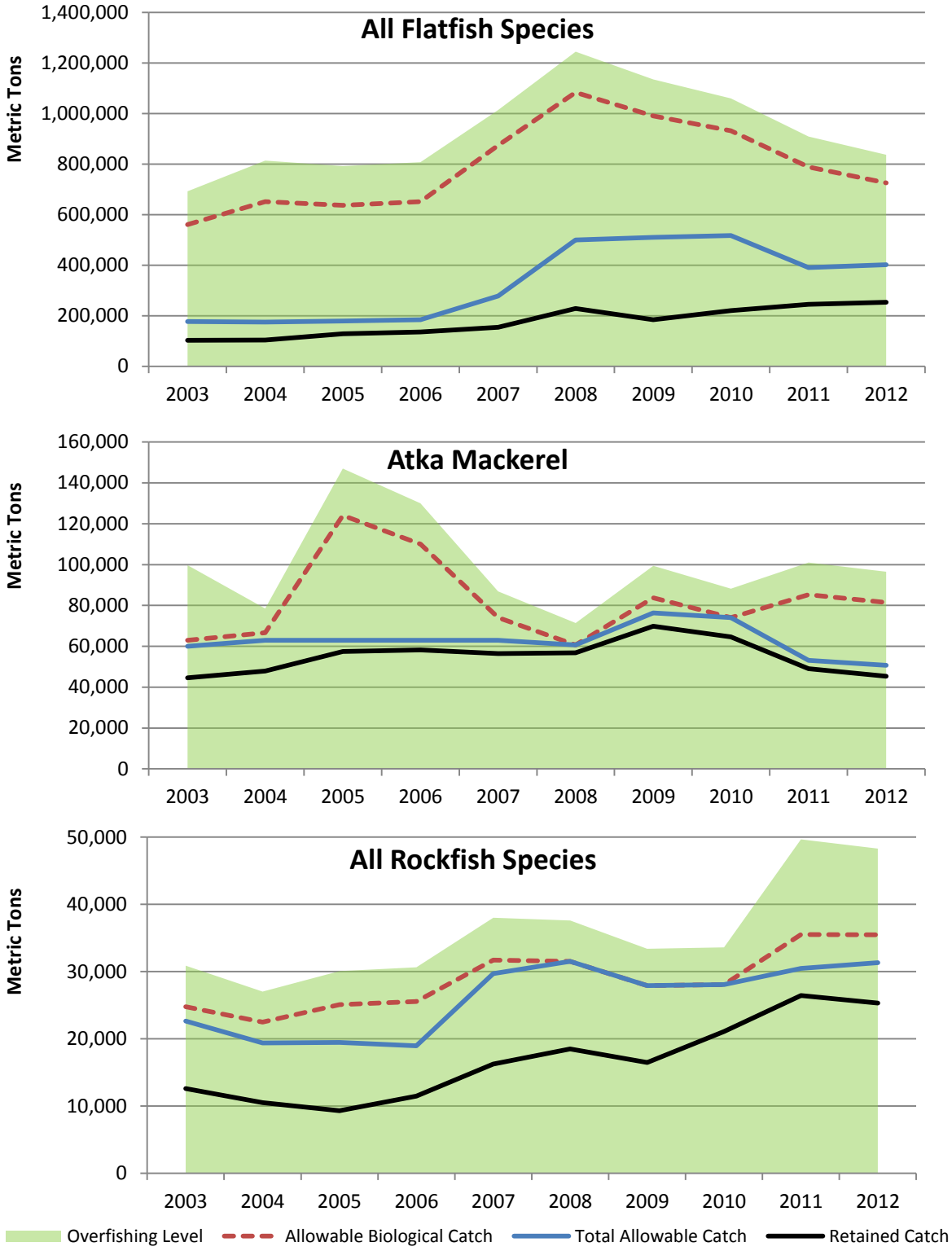
Figure 9 compares BSAI overfishing levels (OFLs), ABC, TACs, and retained harvests of the main groups of species affected under AM80. The figure contains a series of three charts showing: 1) all flatfish species, 2) Atka mackerel, and 3) all rockfish species. The vertical arrangement of the charts within the figure allows an easy comparison across the species groups. In particular, TAC levels are quite low relative to ABCs and OFLs for flatfish species. The gap between TACs and OFLs/ABCs are much smaller for Atka mackerel and rockfish.

For flatfish the combined OFL/ABC levels increased substantially by 54 percent in 2007 and 2008 from 2006 levels, but by 2012 they have dropped back down to levels closer to those seen from 2004–2006. The collective TACs of the flatfish species jumped by over 170 percent during the two year period from 2007–2008 to over 500,000 mt, and were relatively flat through 2010 before dropping back down to approximately 400,000 mt in 2011–2012—levels that are more than double the TACs seen from 2003–2006. Retained catch has risen every year since 2006 with the exception of a decline in 2009 that was most likely related to the global recession and possibly an over-supply in the market after the very large jump in retained harvests seen in 2008. Since 2009, retained harvests of flatfish have increased an average of 11 percent each year.

A very different picture is shown for Atka mackerel. In 2005 there was an 87 percent increase in the OFL and a commensurate increase in the ABC. OFLs and ABCs dropped back down starting in 2006, and by 2008 ABCs were only 95 percent of levels seen in 2004. During the same 5-year period TACs where held constant at 63,000 mt until the ABC fell to 60,000 mt in 2008. Both ABCs and TACs were higher in 2009 and 2010. In 2011, ABC increased but TACs dropped (due to Stellar Sea Lion issues) to levels last seen in 2003 and 2004. Since 2005, retained catch has tracked very closely to TACs at about 91 percent.

OFL and ABCs for rockfish species have been generally increasing over the 10-year period—the only sizeable declines occurred in 2004 and 2009. Overall, rockfish ABCs increased from 2003–2012 by 43 percent while OFLs jumped 56 percent. During the same period, rockfish TACs increased by 38 percent while retained harvests of rockfish doubled.

Figure 9. Comparisons of OFLs, ABCs, TACs, and Retained Catches of Flatfish, Atka Mackerel, and Rockfish



Note: Figures include retained catch from all BSAI trawl activity including CDQ.

Source: Developed by Northern Economics based on from the CAS provided by AKFIN (Fey, 2014) and information at NMFS-AKR webpage, (NMFS, 2014a).

6.2 The Flatfish Flexibility Plan

The FFP is summarized here to demonstrate one of the ways that AM80 is leading to greater utilization of fishery resources and efficiency in that utilization as mandated by National Standard 1 and National Standard 5.

The FFP was an initiative of the AM80 fleet that was first brought to the Council's attention in February 2011 as part of the regular presentation that the AM80 Cooperative gives to the Council. The FFP was proposed as a means of providing additional harvesting opportunities to the AM80 fleet for flathead sole, rock sole, and yellowfin sole while remaining within the TACs for those species. As a result of the proposal, the Council requested that staff bring back a more detailed discussion paper of the issue. The Council formally reviewed the FFP discussion paper in June 2012, and formally initiated an analysis to assess ways to utilize the differences between the ABC and TACs for the included species. The Council reviewed an initial draft analysis of the FFP (NPFMC, 2013b) and the plan was approved by the Council in June of 2013.

Under the FFP, AM80 cooperatives and CDQ groups could access yellowfin sole, rock sole, or flathead sole ABC that may be available in excess of the TAC. The ABC surplus for the three flatfish species, minus a discretionary buffer amount that the NPFMC would determine based on social, economic, or ecological considerations, would be allocated among the AM80 cooperatives and CDQ groups using the same formulas used in the annual harvest specifications process. Any entity wanting to access the ABC surplus for a particular flatfish species (e.g., yellowfin sole) would need to exchange an equivalent amount of existing quota for another of the two flatfish species (e.g., rock sole or flathead sole). The number of exchanges that each entity can make would be limited to three per calendar year. Because open-access participants would not have quota to exchange, they would not be eligible to participate in the FFP. The FFP is intended to increase the opportunity for maximizing the harvest of the three flatfish species, while ensuring that the overall 2 million mt optimum yield, together with the ABCs for each individual species, are not exceeded.

The FFP requires AM80 cooperatives to provide draft annual reports to the NPFMC that include information on their use of ABC reserve exchanges and quota share transfers, actual harvest, and annual changes in catch capacity (for example, measured by a change in the number of harvesting platforms). The draft reports would have to be submitted no later than December 1st of each year so that the current year's information could inform the NPFMC's decision, during the harvest specifications process, as to whether to establish a buffer reducing the amount of the ABC reserve available to be exchanged by eligible entities. The NPFMC could use the discretionary buffer to address any potential adverse impacts to other sectors, or environmental concerns, should they arise.

With respect to implementation of the FFP, NMFS noted that due to the changes that will be required to the catch accounting system, it is unlikely to be effective before the 2016 fishing season.

7 Retention and Utilization of Harvested Resources

One of the major drivers behind AM80 was the relatively low levels of groundfish retention of the fleet. As part of their initiative to improve retention and improve utilization, the Council, in June 2003, approved Amendment 79 to the BSAI Groundfish FMP that would implement GRS. Approved by the Secretary of Commerce in 2005 and scheduled to be implemented on January 20, 2008, the GRS required AM80 vessels to significantly improve their retention and utilization of groundfish resources in the BSAI.

Under GRS, all AM80 CPs 125' in length overall (LOA) or longer would be required to meet increasing retention standards while fishing and processing groundfish in the BSAI. The GRS would be phased in from 2008–2011 as shown below:

2008: 65 percent **2009**: 75 percent **2010**: 80 percent **2011 and forward**: 85 percent

In addition to the increasing GRS, Amendment 79 mandated flow-scales on all AM80 vessels participating in BSAI fisheries and required that two observers be onboard all trips. While the Council recognized that vessels less than 125' had generally higher levels of discards, the Council also recognized that the compliance costs for smaller vessels (two observers and flow scales) could potentially drive vessels out of the fishery. Therefore, vessels less than 125' were exempted from the GRS. The following language is found in the preamble of the final rule for AM80:

> Amendment 79 authorizes the GRS as a tool for further increasing the retention and utilization of groundfish and responding to bycatch reduction goals described in the MSA National Standards (16 U.S.C. 1851(a)). The GRS balanced the requirements for conservation and management of the groundfish fisheries under the MSA with the requirements to minimize bycatch under National Standard 9 and minimize economic burdens under National Standard 7 to the extent practicable (minimize costs and avoid unnecessary duplication).

AM80 supersedes Amendment 79—the GRS and its phased in retention percentage would still be implemented under AM80, but it would apply to all AM80 vessels regardless of length that operate in the BSAI. For vessels that choose to join cooperatives, the GRS would be measured jointly over the entire co-op, while vessels choosing to operate in the AM80 LA fishery would, as before, be individually accountable to meet the standards. The preamble to the final rule for AM80 has the following language.

> The Council recognized that if harvesters could apply the GRS to a cooperative by aggregating the retention rate of all vessels assigned to a cooperative, owners of non-AFA trawl catcher/ processors less than 125 ft (38.1 m) LOA could choose to join a cooperative, assign their harvest privilege to the cooperative, and allow other larger vessels to harvest the cooperative's exclusive allocation of fish without incurring the compliance costs associated with monitoring the GRS. Non-AFA trawl catcher/processor vessels less than 125 ft (38.1 m) LOA would still receive economic benefits from the cooperative's harvests but would not need to refit their vessels to meet the additional monitoring and enforcement (M&E) requirements and pay the additional costs to fish in the BSAI. Those vessels could continue to participate in other fisheries in the GOA. Furthermore, the catch associated with smaller non-AFA trawl catcher/ processor vessels that are used to fish in the BSAI would be subject to the GRS, thereby further improving retention of groundfish and reducing discards of fish.

7.1 Groundfish Retention Summary

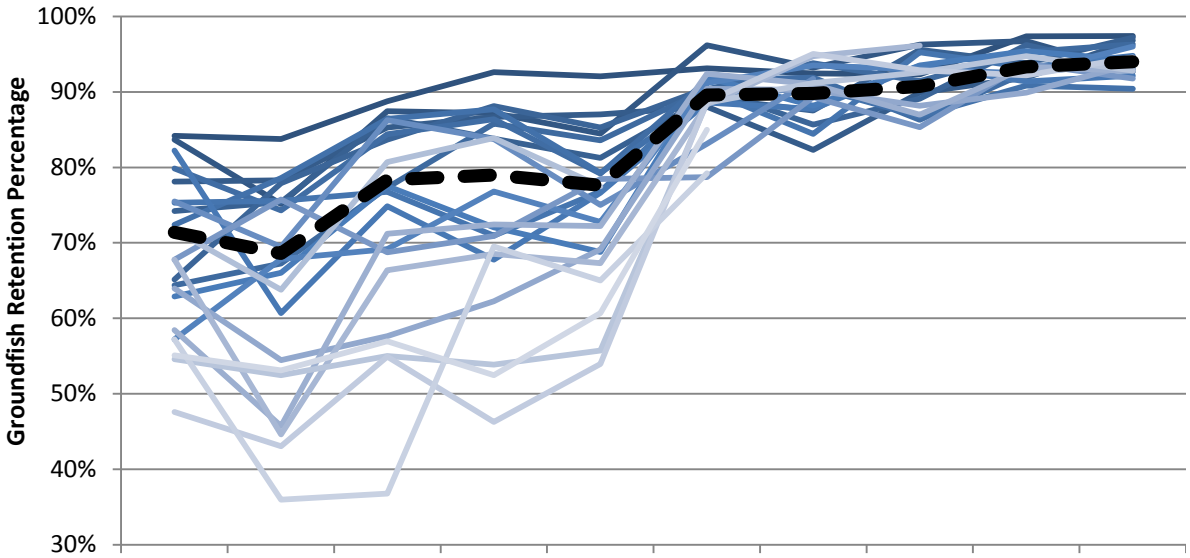
Figure 10 shows estimated groundfish retention percentages of AM80 of individual vessels operating in the BSAI from 2003–2012, noting that estimated retention rates for the lowest four vessels have been deleted for the years 2009–2012 in order to prevent disclosure of confidential information. The heavy black dashed line shows the estimated average retention percentage of all of the vessels in the AM80 sector operating in the BSAI. The fleet-wide weighted average is also summarized in the table embedded at the bottom of the figure—these estimates include the four vessels excluded from the figure.

The data summarized in the figure include catch and retention from CDQ fisheries as well as catch and retention of AM80 vessels when they are acting as motherships in the BSAI TLA fisheries. It should also be noted that the figure uses estimates of retention based on observer data in the CAS. The analysis does not attempt to estimate retention percentages based on the formula used in NMFS final rule implementing AM80.[12] That formula used a combination of: 1) production reports that are submitted by all processors and 2) standard product recovery rates as listed in the regulations.

As is clearly evident from the graphic, overall levels of groundfish retention increased significantly from the low seen in 2004 at 69 percent. In 2005 the weighted average retention jumped to 78 percent, but five vessels still had retention percentages below 60 percent. From 2005–2007, overall retention stayed between 78 and 79 percent. In 2008 AM80 and the modified GRS was implemented. Overall the fleet's retention improved to 90 percent, with all but two vessels (not shown) achieving a rate well above 80 percent. The overall weighted average retention percentages of the fleet have improved every year under AM80 and in 2012 were estimated in this analysis at 94 percent.

[12] The differences in estimated retention rates using observer based retention rates as found in CAS data (and used in Figure 10), and retention rates estimated using product recovery rates and weekly/daily product reports based estimates as defined in the regulation are reported by industry and NMFS to be significant.

Figure 10. Groundfish Retention Percentage in the BSAI by AM80 Vessels, 2003–2010



Fleet-wide Retention Percentage									
71%	69%	78%	79%	78%	90%	90%	91%	93%	94%

Notes:

4) Includes retention of AM80 vessels acting as motherships and catches in the CDQ fisheries.
5) In order to protect the confidentiality of the data, the lines of the lowest four participating vessels from 2009–2012 have been excluded from the figure, but their retention is included in the fleet averages.
6) Retention percentage were calculated by Northern Economics from CAS data using the observer estimated weight of retained groundfish ÷ estimated total weight of groundfish.

Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

The AM80 cooperative reports also provide estimates of GRS percentages. BUC/AKSC in their cooperative reports make it very clear that the numbers they are reporting are their attempt to measure the GRS percentage as they were intended to be measured in the GRS regulations. Table 3 shows the GRS percentages reported in the co-op reports.

Table 33. Groundfish Retention Percentages Reported in Voluntary Cooperative Reports

	2008	2009	2010	2011	2012
Alaska Seafood / Best Use Cooperative	76.9%	81.0%	84.0%	95.2%	94.2%
Alaska Groundfish Cooperative	-	-	-	87.6%	87.1%

Source: Developed by Northern Economics from AKSC/ BUC and AGC Cooperative Reports (2009–2013).

Development of retention rate estimates following the formula specified in AM80 regulations for inclusion in this initial draft of the AM80 5-Year Review has not yet been completed. If requested, a comparison of CAS-based rates and estimates based on regulations could be added to the final draft of the report, but as discussed below, NMFS has suspended enforcement of the GRS, and the relevance of the comparison may have diminished.

7.2 Suspension and Revocation of the Groundfish Retention Standard

On December 15, 2010 NMFS issued an emergency order exempting the AM80 fleet from the requirements of the GRS as implemented under AM80. In exempting the fleet from compliance NMFS cited information provided to NMFS in the 2009 Fishing Year Report submitted by the BUC in 2010. In the Emergency Rule NMFS indicates they believe that the methodology used to calculate the GRS percentage has the effect of requiring retention well above that intended by the NPFMC or as implemented by NMFS. In addition, NMFS indicates that the monitoring and enforcement of the GRS is much more complex and costly than anticipated.

In December 2012, NMFS published a Final Regulatory Impact Review/Final Environmental Assessment/Initial Regulatory Flexibility Analysis[13] to *"Remove the Groundfish Retention Standard for the Non-AFA Trawl Catcher Processors in the Bering Sea and Aleutian Islands."* On February 25, 2013 NMFS publish a Final Rule to change the regulations regarding the GRS.[14]

The new regulation would remove the requirement to meet the GRS, and would instead require cooperatives to internally monitor their retention percentages and submit annual retention reports in their report to NMFS. In addition, third-party audits of cooperatives' retention percentages would be required. If vessels choose to participate in the AM80 LA fishery, NMFS will estimate each vessel's retention percentage independently. NMFS management reports to the Council regarding the AM80 fisheries will include summaries of estimated retention percentages.

As with the GRS, retention percentages will continue to be measured as: Round Weight Equivalent (RWE) of Retained Product ÷ Total Groundfish Catch. The RWE of Retained Product is a two part calculation using the Production Reports submitted daily by processors. These product amounts would be expanded to RWE using standard product recovery rates published in the regulations and available online at http://alaskafisheries.noaa.gov/rr/tables/tabl3.pdf. Total Groundfish Catch would continue to be measured using flow scales and observer estimates.

[13] The document is available online at http://alaskafisheries.noaa.gov/analyses/groundfish/rireairfa_grs1212.pdf.

[14] The final rule was published in the Federal Register and is available online at http://www.gpo.gov/fdsys/pkg/FR-2013-02-25/html/2013-04262.htm

8 Prohibited Species Catch in AM80 CP Fisheries

This section of the AM80 5-year review summarizes PSC of halibut and crab in the AM80 CP fisheries from 2003–2012. Total PSC, and PSC rates as a percentage of target catches are reported for each target fishery. The 5-year report also includes estimates of the first wholesale value of groundfish products per unit of PSC in each of the AM80 target fisheries.

As mentioned in earlier discussions regarding confidentiality, it not possible to report PSCs by sector (AFA-CPs v, Other CVs) within the BSAI TLA Sector in the yellowfin sole target fishery. It does however provide information for the two sectors combined.

Analysis of catch of various prohibited species in the BSAI sector over the five-year periods before and after the implementation of the AM80 regulations reveals pronounced declines in bycatch volumes across species over the five years ending 2012. Similarly, bycatch rates for these prohibited species, measured as the ratio of volume (alternately weight or number) of prohibited species catch to volume of groundfish catch, dropped off considerably in BSAI sector from 2003–2007 to the following five years. Declines in bycatch rates for these species—including halibut, herring, king crab, tanner crab, Chinook salmon, and other salmon—ranged from 32 percent (halibut) to 82 percent (Chinook), while declines in total volumes of prohibited species catch ranged from 18 percent (king crab) to 79 percent (Chinook). That declines in catch of each of these prohibited species occurred, on average, following the initiation of the AM80 regulations suggests that they are having the intended effect of reducing bycatch. Importantly, reductions in bycatch did not occur at the expense of the groundfish catch. Indeed, both the average total groundfish catch and wholesale value of the catch were higher from 2008–2012 than over the prior five years.

Meanwhile, changes in bycatch volumes and rates among AM80 vessels in the Gulf of Alaska (GOA) exhibited far more variation with regard to both magnitude and direction of change. Average annual bycatch volumes and rates decreased over the five years beginning 2008 from the previous five years for halibut, tanner crab, and non-Chinook salmon but increased for king crab and herring. Catch of Chinook salmon within the AM80 GOA sector remained virtually unchanged, on average, over the first and second halves of the decade ending 2012.

8.1 PSC Bycatch of AM80 CPs in the BSAI

The groundfish catch in the AM80 CPs in BSAI fisheries was substantially higher over the five years 2008–2012 than from 2003–2007. The total groundfish catch averaged 285,000 mt over the first five years of this decade and 327,000 mt over the next five years (see Table 34 and Figure 11). The average wholesale value of the catch over the five years ending in 2012 also exceeded that of the preceding five years, but this primarily is due to a sharp increase in catch value in 2011 and 2012 from previous years. Total catch wholesale values of $317 million and $314 million in 2011 and 2012, respectively, represent a jump from catch values from the previous eight years, over which time the greatest single-year catch value was $278 million. All dollar values in this analysis have been adjusted for inflation to 2012 dollars.

Table 34. Total Catch and Wholesale Value of Groundfish in the AM80 BSAI Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	268,404	297,410	285,166	279,394	294,881	332,814	314,705	336,764	324,686	327,016
Wholesale $ Millions (2012)	190.3	228.3	261.2	262.5	277.6	266.5	235.8	262.1	316.9	314.2

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Bycatch Volumes

Total halibut bycatch in the AM80 BSAI fishery was greater each year from 2003–2007 than from 2008–2012 (see Table 35 and Figure 12). Annual halibut bycatch averaged 2,638 mt over the five years ending 2007 and 2,053 mt over the next five years. Halibut bycatch also exhibited relatively little variation over each of these five-year periods. Bycatch of herring, meanwhile, fell considerably from 2009–2012 from levels witnessed over the preceding six years. Herring bycatch ranged from 24,252 mt (2006) to 94,193 mt (2004) over the years 2003–2008, before dropping to 23,401 mt in 2009. From 2010 to 2012, herring bycatch did not exceed 14,048 in any single year.

Total bycatch of both king crab and tanner crab in the AM80 BSAI fishery trended downward over the five years ending in 2012 from levels witnessed from 2003–2007. This difference was much more pronounced, however, among king crab species than tanner crab species (see Figure 13). The average annual king crab bycatch fell from nearly 102,000 crabs from 2003–2007 to just over 83,000 crabs over the next five years. Total average annual bycatch of tanner crab, meanwhile, fell from over 1.2 million crabs from 2003–2007 to under 457,000 crabs from 2008–2012. Bycatch of C. Bairdi crab was particularly high in 2005 at 3.1 million crabs and did not exceed 616,000 crabs any year from 2008–2012. Bycatch of C. Opilio crab was lower each year from 2008–2012 than over the preceding five years except in 2011, when C. Opilio bycatch spiked to 802,000 crabs (see Figure 15). Among king crab species, bycatch of red king crab exceeded that of both golden king crab and blue king crab until 2011, when bycatch of golden king crab was greater than that of red king crab (see Figure 16). Bycatch of red king crab fell each year from 2005 to 2012, while golden king crab bycatch trended upward from 2007–2012.

Total bycatch of Chinook and other salmon species has remained relatively low since 2008. Total bycatch of Chinook ranged from 2.625 to 5,698 fish from 2003–2007 and from 583 to 1,625 fish from 2008–2012. The average annual Chinook bycatch totaled 4,485 fish over the five years ending 2007 and 932 fish over the next five years (see Figure 16). Annual bycatch of other salmon species exhibited inconsistency from 2003–2007 but was, on average, substantially lower over the next five years. Bycatch of non-Chinook salmon averaged 5,751 fish from 2003–2007 and 1,833 fish from 2008–2012.

Table 35. Bycatch of Prohibited Species in the AM80 BSAI Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	2,649	2,732	2,700	2,540	2,572	2,012	2,080	2,255	1,838	2,082
PSC King Crab (#s)	90,901	87,997	116,133	110,893	102,852	113,163	85,794	70,726	91,270	54,539
PSC Bairdi Crab (#s)	608,798	1,734,731	3,118,248	832,166	1,214,389	615,392	364,563	267,030	484,842	339,775
PSC Opilio Crab (#s)	951,732	774,933	1,461,852	770,884	602,427	554,482	396,036	389,198	802,076	352,912
PSC Herring (kg)	51,692	94,193	80,387	24,252	57,103	82,703	23,401	4,117	14,048	11,445
PSC Chinook (#s)	5,698	5,526	4,567	2,625	4,010	583	623	1,625	983	848
PSC non-Chinook (#s)	1,126	8,854	3,442	13,468	1,866	1,535	1,247	1,589	3,078	1,717

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Bycatch Rates

Figure 17 through Figure 22 show bycatch of prohibited species as shares of both the volume and wholesale value of target groundfish catches from 2003–2012. The left axis of each figure shows the ratio of prohibited species bycatch weight to total weight of target groundfish species, while the right axis shows the wholesale value of the target groundfish catch per unit of weight of bycatch species. Assuming groundfish prices remain fairly stable, an increase in the bycatch rate (represented by the left axis) generally will be accompanied by a decrease in the value of the groundfish catch per unit of weight of the bycatch species; thus, the lines representing these two metrics should move in opposite

directions. Table 36 and Table 37 display the bycatch rate and groundfish wholesale values, respectively, for prohibited species each year from 2003–2012.

The halibut bycatch rate, measured as mt of groundfish catch to mt of halibut bycatch, fell considerably over the five years ending 2012 from the previous five years (see Figure 17). Halibut bycatch averaged 0.93 percent of groundfish catch from 2003–2007 but only 0.63 percent from 2008–2012. Conversely, the average wholesale value of groundfish catch per mt of halibut bycatch rose sharply from the five years ending 2007 ($93,000) to the next five years ($137,000).

The herring bycatch rate, measured as the ratio of kilograms (kg) of herring bycatch to mt of groundfish catch, fell sharply after 2008 (see Figure 18). From 2003–2008, an average of 0.22 kg of herring were caught for every mt of groundfish, compared to 0.04 kg per mt of groundfish over the following four years. The decline in herring bycatch rate was accompanied by a more than six-fold increase in the wholesale value of groundfish caught per kg of herring bycatch. This ratio increased from $4,710/kg from 2003–2008 to $30,941/kg for the next four years.

The king crab bycatch rate, measured as the number of king crabs bycatch per mt of groundfish catch, trended downward over the second half of the decade ending 2012, while the value of groundfish catch per king crab rose (see Figure 19). From 2003–2008, an average of 35 king crabs were caught for every 100 mt of groundfish catch. This ratio declined over the next four years, averaging 23 king crabs per 100 mt of groundfish. Accompanying this decline in the bycatch rate was an increase in the average value of groundfish catch per king crab of bycatch from $2,393 from 2003–2008 to $3,922 from 2009–2012.

The tanner crab bycatch rate exhibited a particularly pronounced decline over the five years ending 2012 from the prior five years (see Figure 20). On average, 523 C. Bairdi crabs were caught for every 100 mt of groundfish from 2003–2012, compared to 127 C. Bairdi crabs per 100 mt of groundfish over the following five years. Similarly, an average of 322 C. Opilio crabs were caught for every 100 mt of groundfish from 2003–2007, compared to 153 C. Opilio crabs from 2008–2012. Not unexpectedly, each of these declines in bycatch rate occurred in tandem with an increase in the average value of groundfish catch per bycatch of crab. The average wholesale value of groundfish catch per C. Bairdi increased from $214 from 2003–2007 to $728 from 2008–2012, while the average value of groundfish catch per C. Opilio jumped from $295 to $607.

The Chinook bycatch rate, measured as the number of salmon caught per mt of groundfish caught, fell sharply over the five years ending 2012 from the previous five years (see Figure 21). An average of 16 Chinook salmon were caught per 1,000 mt of groundfish from 2003–2007, compared to fewer than three salmon per 1,000 mt from 2008–2012. Meanwhile, the value of groundfish catch per Chinook caught as prohibited species bycatch experienced a more than five-fold increase over the five years ending 2012 from the prior five years, jumping from $60,000 to $338,000. The average annual bycatch rate among non-Chinook salmon species also was lower from 2008–2012 than 2003–2007, but this bycatch rate exhibited volatility from 2003–2007. Overall, an average of 20 non-Chinook salmon were caught for every 1,000 mt of groundfish catch from 2003–2007, compared to only 6 salmon per 1,000 mt of groundfish from 2008–2012. The average value of groundfish catch per non-Chinook salmon caught as a prohibited species also increased over the five years ending 2012 from the previous five years, from $88,000 $163,000. This value varied considerably, however, from 2003–2007, from as low as $19,487 (2006) to as high as $169,038 (2003).

Table 36. Bycatch Rates in the AM80 BSAI Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All rates are measured as the total units of PSC ÷ mt of Groundfish.										
PSC Halibut Rate (mt/mt)	0.0099	0.0092	0.0095	0.0091	0.0087	0.0060	0.0066	0.0067	0.0057	0.0064
PSC King Crab (#/mt)	0.3387	0.2959	0.4072	0.3969	0.3488	0.3400	0.2726	0.2100	0.2811	0.1668
PSC Bairdi Rate (#/mt)	2.2682	5.8328	10.9349	2.9785	4.1182	1.8491	1.1584	0.7929	1.4933	1.0390
PSC Opilio Rate (#/mt)	3.5459	2.6056	5.1263	2.7591	2.0429	1.6660	1.2584	1.1557	2.4703	1.0792
PSC Herring Rate (kg/mt)	0.1926	0.3167	0.2819	0.0868	0.1936	0.2485	0.0744	0.0122	0.0433	0.0350
PSC Chinook (#/mt)	0.0212	0.0186	0.0160	0.0094	0.0136	0.0018	0.0020	0.0048	0.0030	0.0026
PSC non-Chinook (#/mt)	0.0042	0.0298	0.0121	0.0482	0.0063	0.0046	0.0040	0.0047	0.0095	0.0053

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 37. Groundfish Wholesale Value per Unit of PSC in the AM80 BSAI Fishery

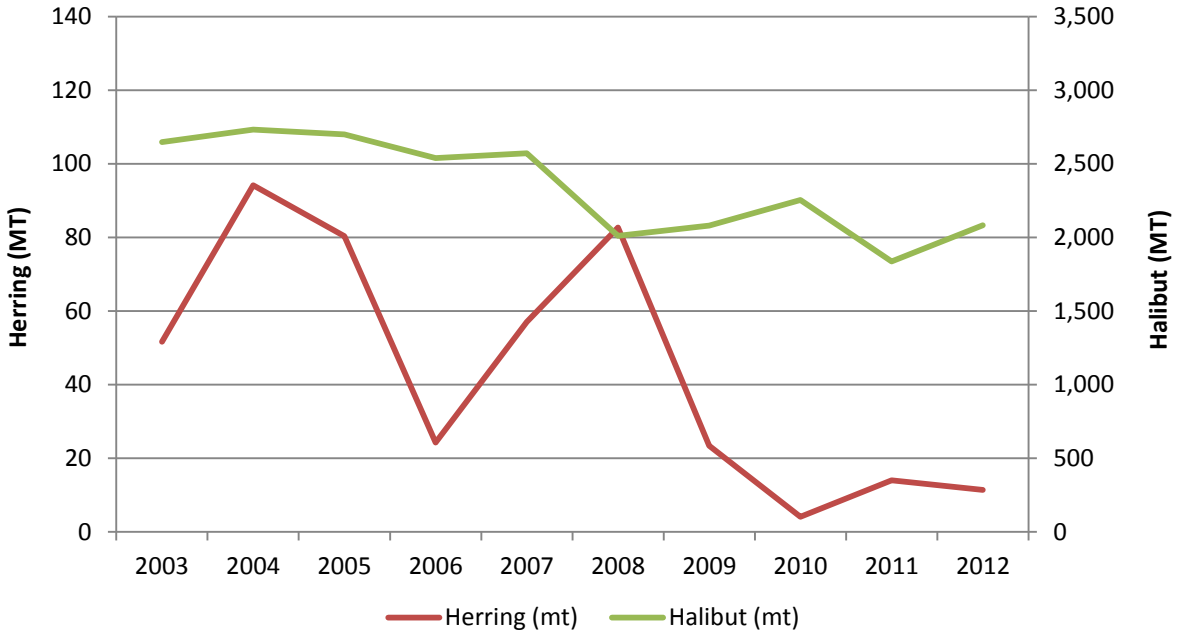
Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units										
PSC Halibut ($/mt)	71,843	83,590	96,757	103,335	107,902	132,446	113,395	116,251	172,467	150,907
PSC King Crab ($/#)	2,093	2,595	2,249	2,367	2,699	2,355	2,749	3,706	3,472	5,761
PSC Bairdi Crab ($/#)	313	132	84	315	229	433	647	982	654	925
PSC Opilio Crab ($/#)	200	295	179	340	461	481	595	674	395	890
PSC Herring ($/kg)	3,681	2,424	3,250	10,822	4,861	3,222	10,078	63,677	22,559	27,452
PSC Chinook ($/#)	33,394	41,318	57,195	99,992	69,221	457,154	378,468	161,350	322,396	370,512
PSC non-Chinook ($/#)	169,038	25,788	75,892	19,487	148,775	173,617	189,103	164,962	102,972	182,992

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 11. Total Volume and Wholesale Value of Groundfish Catch in AM80 BSAI Fisheries, 2003–2012

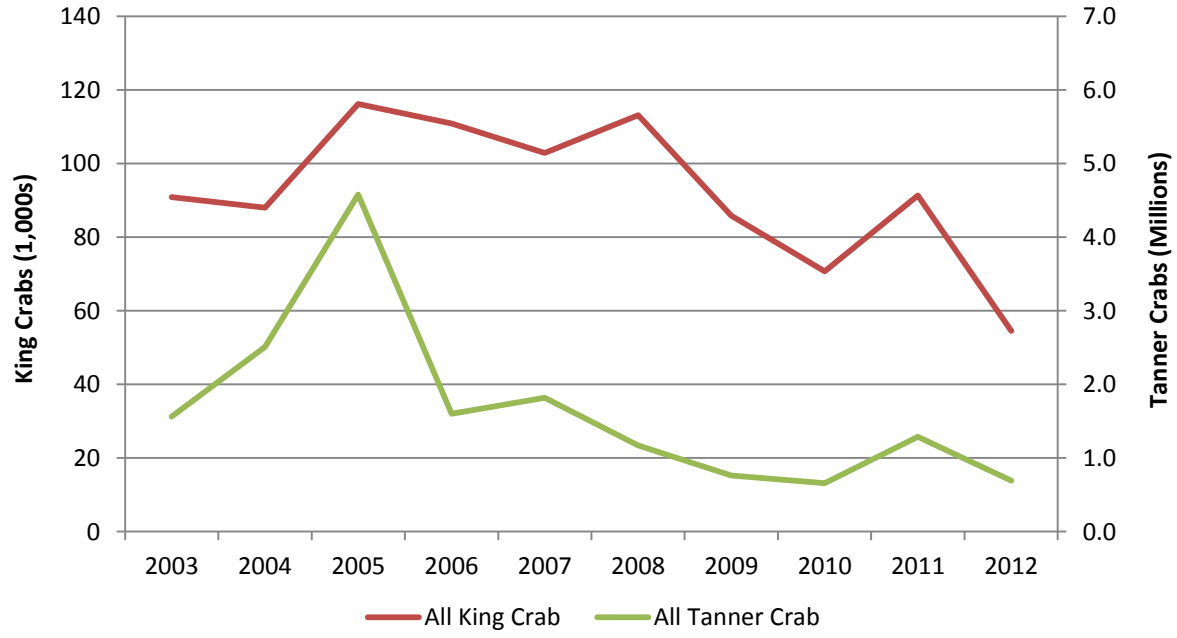
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 12. Herring and Halibut Bycatch by AM80 BSAI Fisheries, 2003–2012



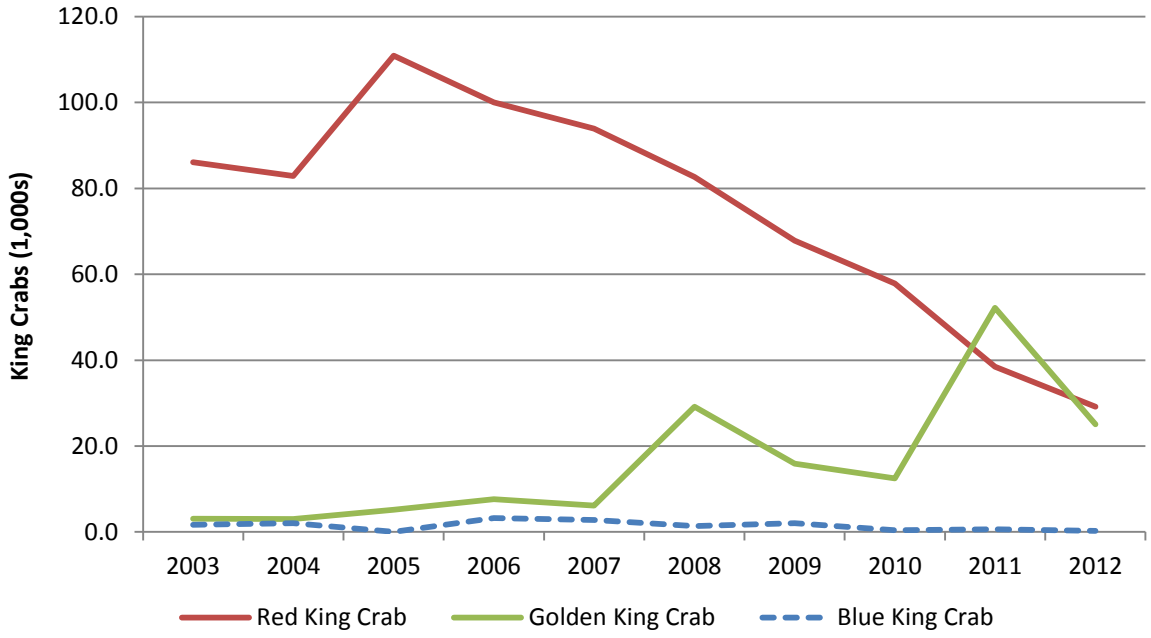
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 13. King Crab and Tanner Crab Bycatch by AM80 BSAI Fisheries, 2003–2012



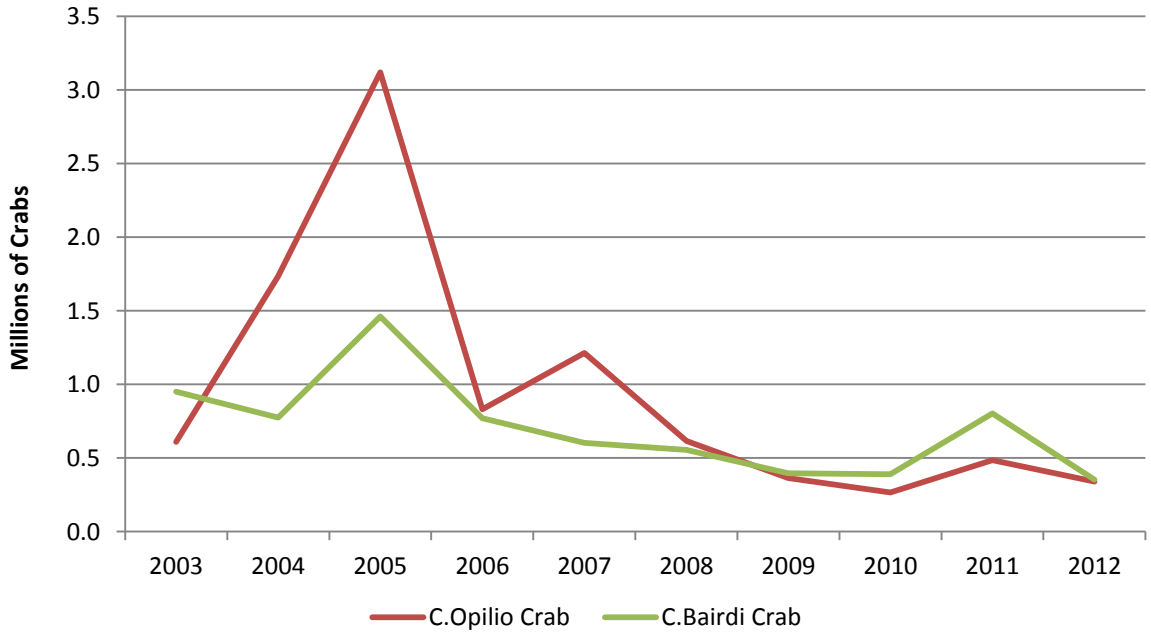
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 14. Bycatch of King Crab Species by AM80 BSAI Fisheries, 2003–2012



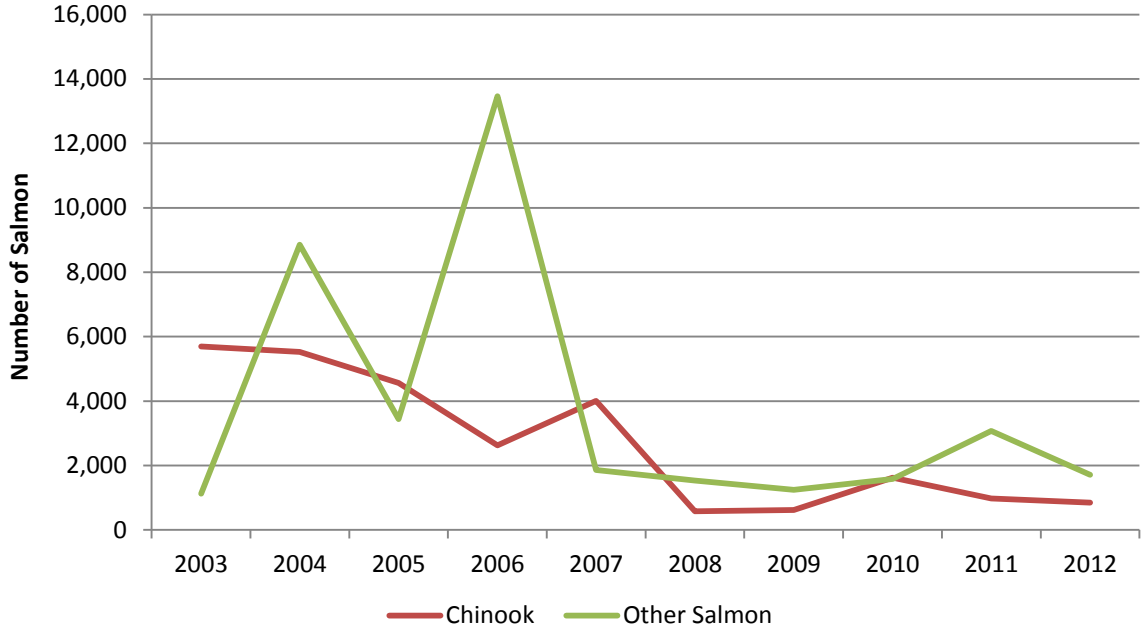
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 15. Bycatch of Tanner Crab Species by AM80 BSAI Fisheries, 2003–2012



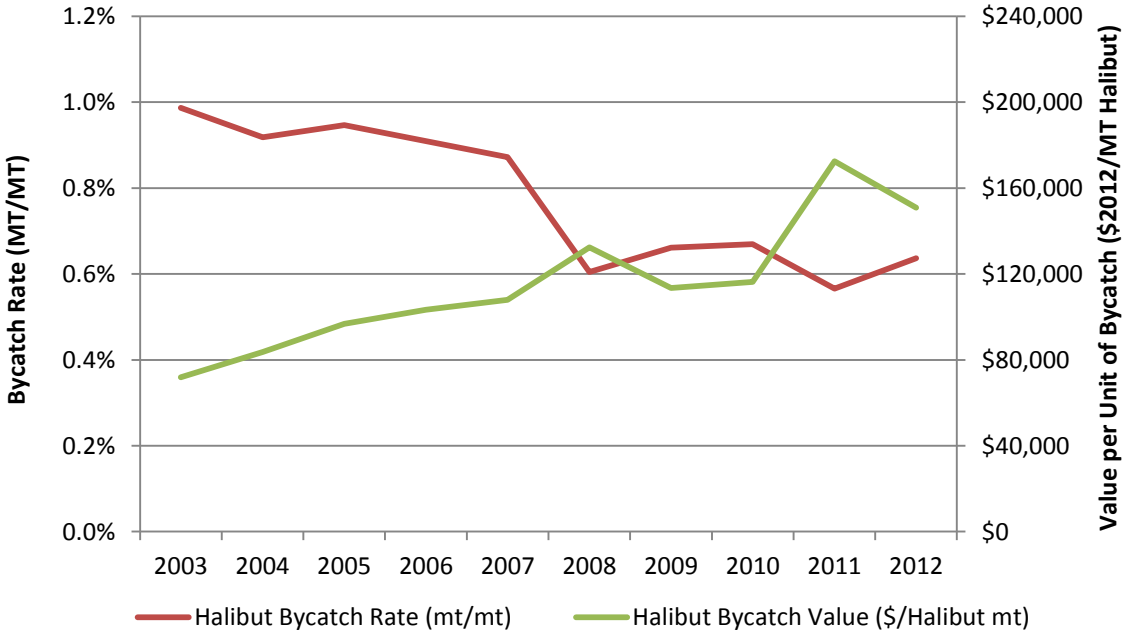
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 16. Bycatch of Salmon Species by AM80 BSAI Fisheries, 2003–2012



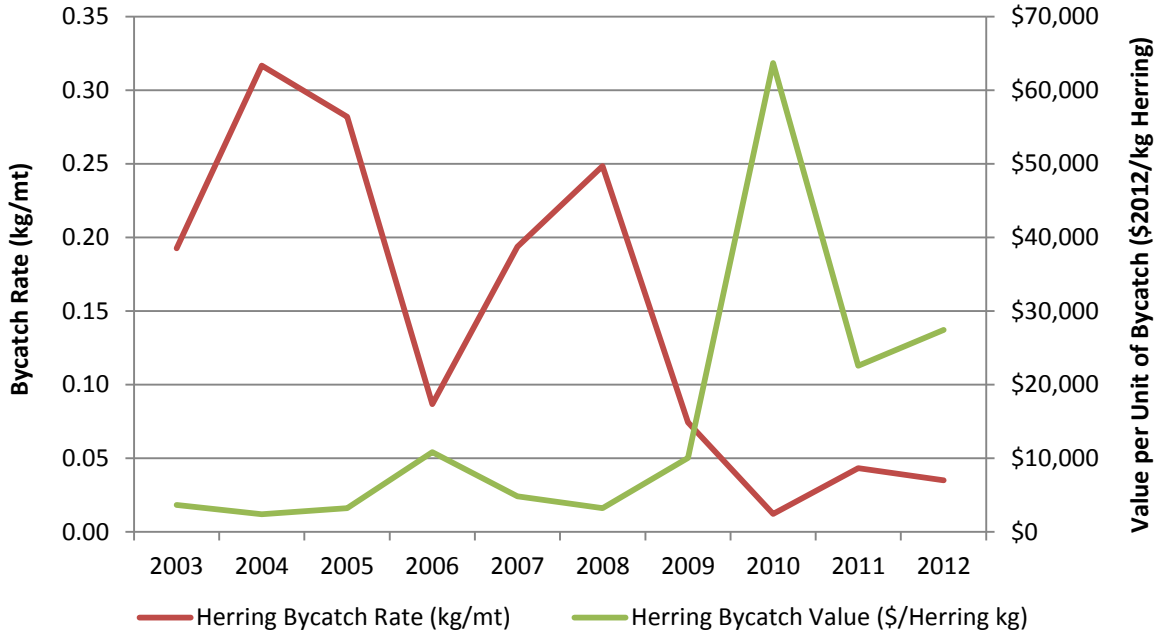
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 17. Bycatch of Halibut by AM80 BSAI Fisheries as Share of Groundfish Catch and Value, 2003–2012



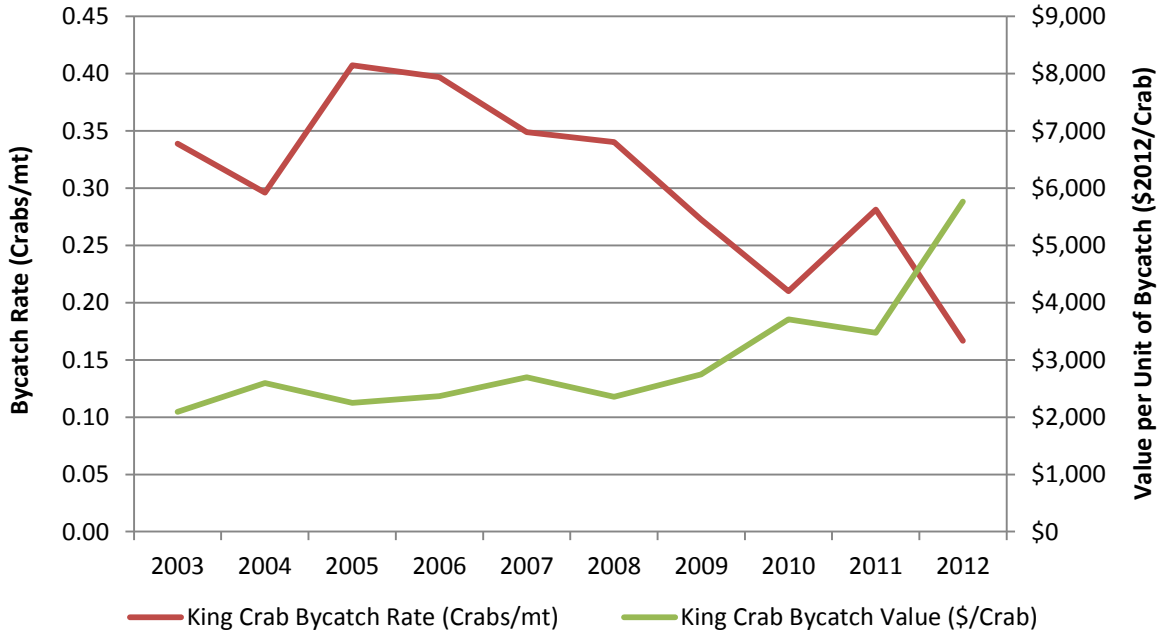
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 18. Bycatch of Herring by AM80 BSAI Fisheries as Share of Groundfish Catch and Value, 2003–2012



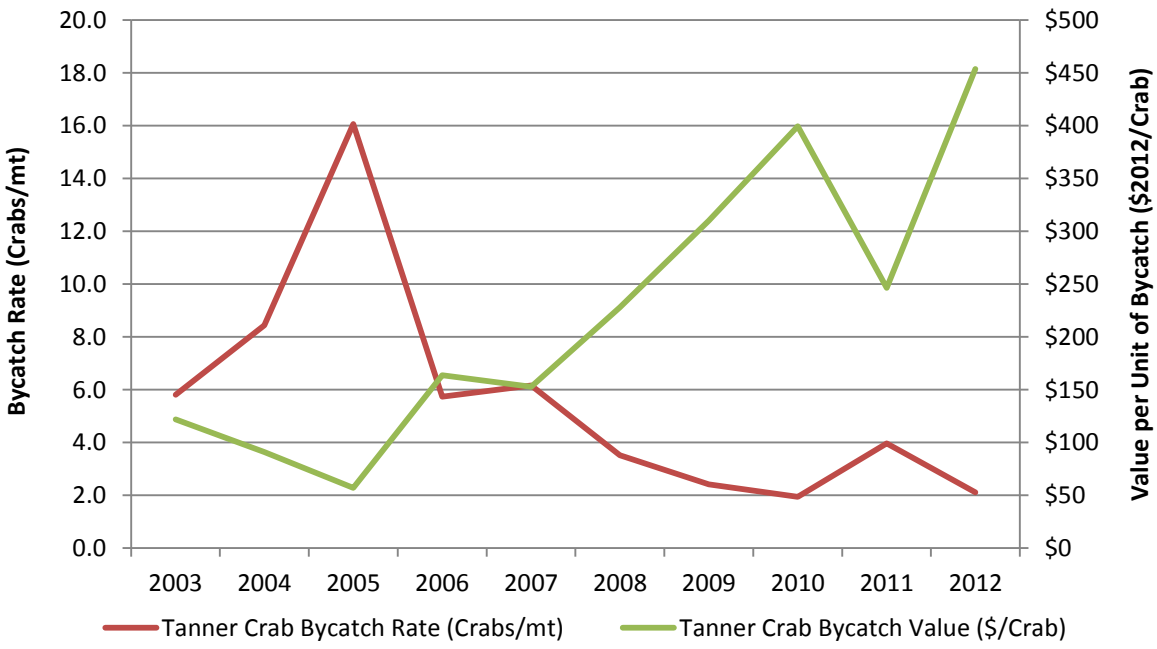
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 19. Bycatch of King Crab by AM80 BSAI Fisheries as Share of Groundfish Catch and Value, 2003–2012



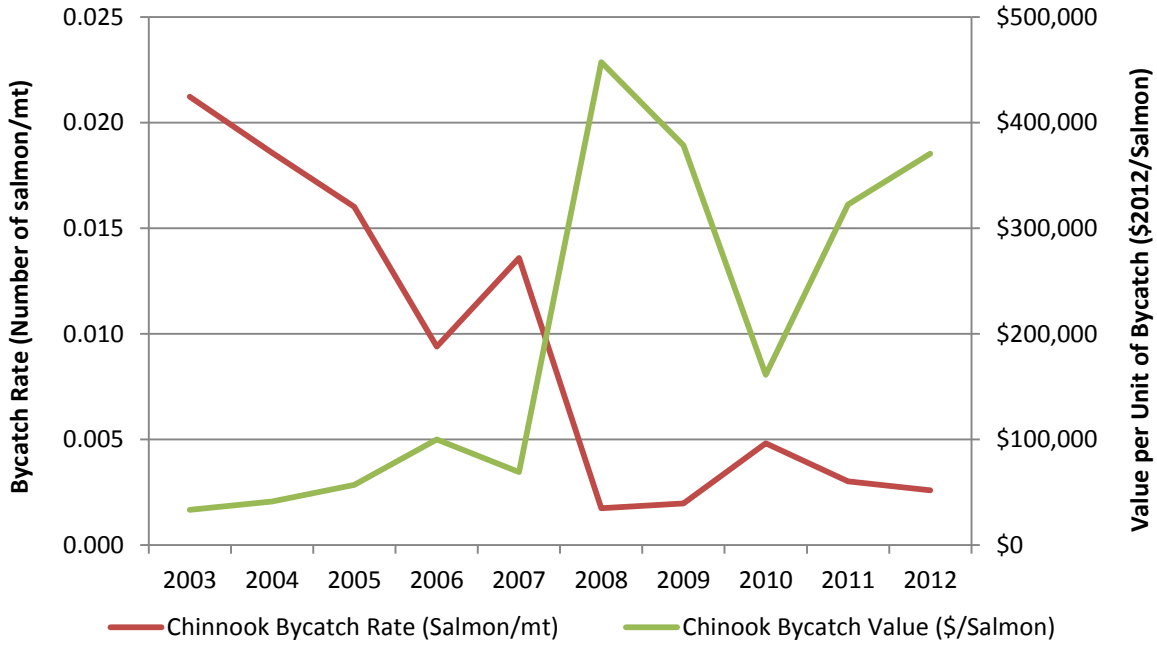
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 20. Bycatch of Tanner Crab by AM80 BSAI Fisheries as Share of Groundfish Catch and Value, 2003–2012



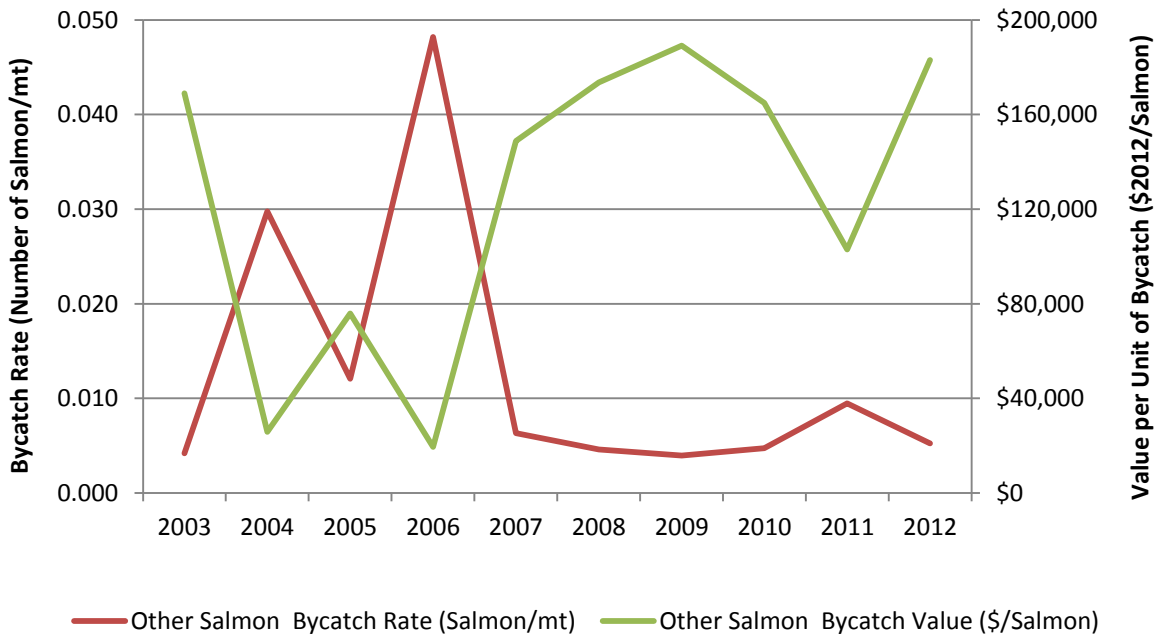
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 21. Chinook Bycatch by AM80 BSAI Fisheries as Share of Groundfish Catch and Value, 2003–2012



Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 22. Non-Chinook Salmon Bycatch by AM80 BSAI Fisheries as Share of Groundfish Catch and Value, 2003–2012



Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

8.2 AM80 Bycatch in Gulf of Alaska

The average groundfish catch by AM80 vessels in the Gulf of Alaska exhibited little variation over the five-year periods 2003–2007 and 2008–2012 (see Table 38 and Figure 23). Total average annual groundfish catch for each of these periods was close to 27,000 mt. However, total catch over the first five years of this decade was as high as 38,000 mt and as low as 21,000 mt. Annual total catch exhibited much less variation from 2008–2012, ranging from more than 24,000 mt to less than 29,000 mt. The average wholesale value of the groundfish catch also differed very little between the first and second five-year segments of the decade ending 2012. The average value was $27.4 million over the first five years of the decade and $27.6 million over the next five years. The wholesale value ranged from $21.4 million (2004) to $33.1 million (2006) from 2003–2007 and from $21.5 million (2009) to $37.4 million (2011) from 2008–2012.

Table 38. Total Catch and Wholesale Value of Groundfish in the AM80 GOA Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	38,402	21,294	22,896	28,380	24,284	24,459	26,280	26,615	28,760	27,609
Wholesale $ Millions (2012)	31.3	21.4	27.6	33.1	23.8	23.2	21.5	25.6	37.4	30.3

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Bycatch Volumes

Halibut bycatch was higher during the first half of the decade ending 2012 but varied somewhat over the second half of the decade (see Table 35 and Figure 24). Average halibut bycatch from 2003–2007 totaled 454 mt, compared to 313 mt from 2008–2012. Halibut bycatch reached a ten-year peak in

2003 at 692 mt and, despite declining on average over the second half of the decade, experienced a five-year high of 336 mt in 2012. Meanwhile, herring bycatch among AM80 vessels fishing in the GOA was minimal over the decade ending 2012, peaking at 70 kg in 2010.

Bycatch of king crab exhibited inconsistency from 2003–2012 but peaked in 2009 and 2010 at more than 2,900 crabs each year (see Figure 25). The greatest number of king crabs caught on any other year over the decade ending 2012 was 522, in 2004. King crab bycatch totaled 1,361 crabs over the five years ending 2012, compared to 181 crabs over the five years ending 2007. However, only 129 and 102 king crabs were caught in 2011 and 2012, respectively. Virtually all king crab bycatch from 2003–2012 consists of bycatch of golden king crab (see Figure 26). Average annual bycatch of tanner crabs was much higher from 2003–2007 (21,628 crabs) than 2008–2012 (4,093 crabs) but spiked in 2011 at more than 12,000 crabs. In this analysis, tanner crab bycatch among AM80 vessels fishing in the GOA consists exclusively of bycatch of C. Opilio crabs (see Figure 27). Total tanner crab bycatch exceeded 25,000 crabs in 2003, 2005, and 2006, and was less than 1,500 crabs each year from 2008–2010.

Average annual bycatch of Chinook salmon remained virtually unchanged over the five years beginning 2008 from the prior five years. Average annual Chinook bycatch totaled 2,540 fish from 2003–2007 and 2,537 fish from 2008–2012 (see Figure 28). Chinook bycatch ranged from 840 salmon (2006) to 5,200 salmon (2003) over the first half of the decade ending 2012 and from 1,525 salmon (2009) to 3,791 salmon (2010) over the second half of the decade. Average annual bycatch of other salmon species declined considerably over the five years ending 2012 (897 salmon) from the prior five years (414 salmon) (see Figure 27). From 2008–2012, non-Chinook bycatch ranged from as few as 250 salmon (2009) to 749 salmon (2011).

Table 39. Bycatch of Prohibited Species in the AM80 GOA Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	692	364	423	459	332	311	298	308	313	336
PSC King Crab (#s)	206	522	-	49	129	339	3,246	2,988	129	102
PSC Bairdi Crab (#s)	-	-	-	-	-	-	-	-	-	-
PSC Opilio Crab (#s)	32,156	11,859	34,432	25,971	3,725	1,469	1,361	1,729	12,028	3,877
PSC Herring (kg)	6	0	7	50	1	2	13	70	-	68
PSC Chinook (#s)	5,200	2,123	2,168	840	2,366	2,967	1,525	3,791	2,503	1,901
PSC non-Chinook (#s)	1,185	862	592	645	1,203	429	250	336	749	304

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Bycatch Rates

Figure 29 through Figure 34 show bycatch of prohibited species as shares of both the volume and wholesale value of target groundfish catches from 2003–2012 for AM80 vessels in the GOA. Table 40 and Table 41 display these bycatch rate and groundfish wholesale values, respectively, for prohibited species each year from 2003–2012.

The halibut bycatch rate, measured as mt of groundfish catch to mt of halibut bycatch, declined from an average of 0.017 over the years 2003–2007 to 0.012 from 2008–2012 (see Figure 29). Conversely, the average value of groundfish catch per metric ton of halibut bycatch increased from $63,000 over the five years ending 2007 to $88,000 over the following five years. Low herring bycatch volumes among AM80 vessels fishing in the GOA translated to low average annual bycatch rates of 0.4 and 1.1 kg of herring per mt of groundfish catch over the five-year periods 2003–2007 and 2008–2012, respectively (see Figure 30).

The king crab bycatch rate, measured as the number of king crabs bycatch per mt of groundfish catch, was substantially higher on average over the latter half of the decade ending 2012 than the first half

(see Figure 31). This was driven primarily by the relatively large volumes of golden king crab bycatch in 2009 and 2010. Meanwhile, the average value of groundfish catch per king crab from 2003–2007 $134,000) was nearly double that from 2007–2012 ($263,000).

The tanner crab bycatch rate was lower each year from 2007 through 2012 than the previous four years (see Figure 32). Fewer than 15 tanner crabs were caught for each 100 mt of groundfish catch each year from 2007 to 2012 except for 2011, when the rate jumped to 42 crabs per100 mt of groundfish. An average of 95 tanner crabs were caught per 100 mt of groundfish from 2003–2006, compared to 15 crabs per 100 mt over the next six years. As a byproduct of this lower bycatch rate, the average yearly value of groundfish catch per tanner crab caught as a prohibited species increased from $1,214 from 2003–2006 to $10,629 from 2007–2012.

The Chinook bycatch rate, measured as the number of salmon caught per mt of groundfish caught, fluctuated somewhat across the ten years ending 2012 but exhibited less variation when averaged across the first and second halves of the decade (see Figure 33). On average, between 9 and 10 Chinook were caught each year per 100 mt of groundfish from 2003–2007 and from 2008–2012. However, the bycatch rate ranged from 3 to 14 fish (per 100 mt) from 2003–2007 and from 6 to 14 fish from 2008–2012. Over the first half of the decade ending 2012, the average value of groundfish catch per Chinook caught as a prohibited species ranged from just over $6,000 to more than $39,000; this value varied less from 2008–2012, from under $7,000 to close to $16,000.

The bycatch rate for non-Chinook salmon species, measured as number of salmon caught per mt of groundfish catch, dropped off considerably between the first and second halves of the decade ending 2012 (see Figure 34), from 0.034 to 0.015. With the exception of 2011, when the rate spiked somewhat to 0.0260, the non-Chinook bycatch rate was lower each year from 2008–2012 than 2003–2007. The average yearly value of groundfish catch per non-Chinook salmon caught as a prohibited species more than doubled from 2003–2007 to 2008–2012, from under $34,000 to over $73,000.

Table 40. Bycatch Rates in the AM80 GOA Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0180	0.0171	0.0185	0.0162	0.0137	0.0127	0.0113	0.0116	0.0109	0.0122
PSC King Crab (#/mt)	0.0054	0.0245	-	0.0017	0.0053	0.0139	0.1235	0.1123	0.0045	0.0037
PSC Bairdi Rate (#/mt)	-	-	-	-	-	-	-	-	-	-
PSC Opilio Rate (#/mt)	0.8373	0.5569	1.5038	0.9151	0.1534	0.0601	0.0518	0.0650	0.4182	0.1404
PSC Herring Rate (kg/mt)	0.0001	0.0000	0.0003	0.0018	0.0000	0.0001	0.0005	0.0026	-	0.0025
PSC Chinook (#/mt)	0.1354	0.0997	0.0947	0.0296	0.0974	0.1213	0.0580	0.1424	0.0870	0.0689
PSC non-Chinook (#/mt)	0.0309	0.0405	0.0259	0.0227	0.0495	0.0175	0.0095	0.0126	0.0260	0.0110

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 41. Groundfish Wholesale Value per Unit of PSC in the AM80 GOA Fishery

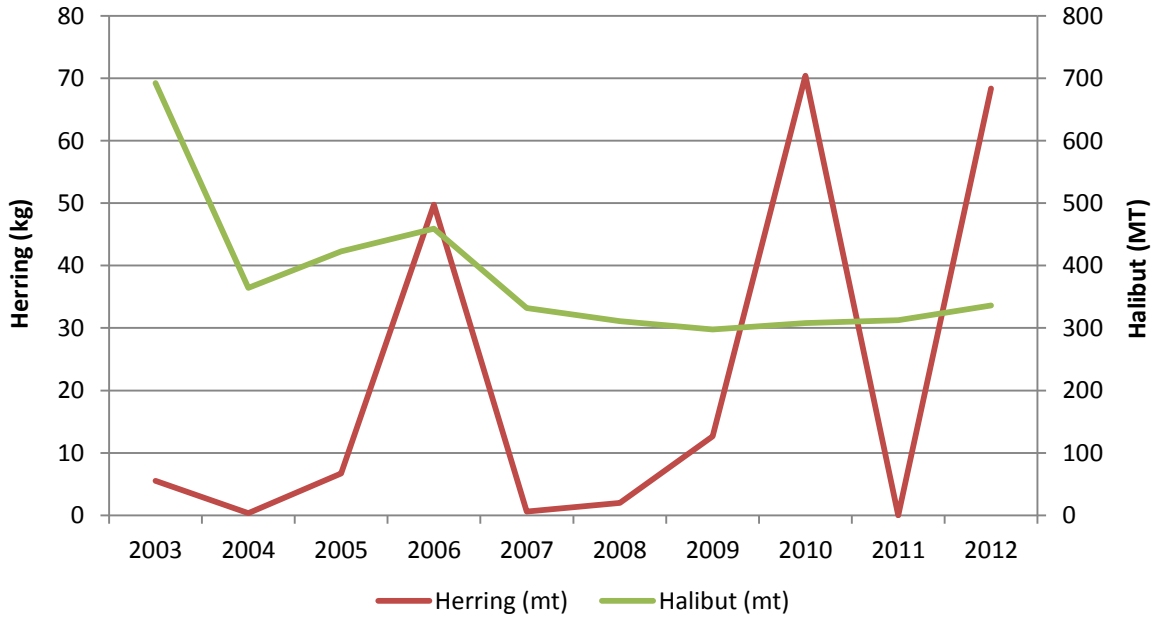
Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	45,135	58,878	65,407	72,072	71,668	74,671	72,301	83,296	119,746	90,044
PSC King Crab ($/#)	151,818	41,099	0	676,259	184,357	68,554	6,631	8,578	290,222	296,797
PSC Bairdi Crab ($/#)	0	0	0	0	0	0	0	0	0	0
PSC Opilio Crab ($/#)	972	1,808	803	1,273	6,389	15,821	15,820	14,825	3,113	7,809
PSC Herring ($/kg)	5,671,833	63,060,914	4,125,884	664,571	38,384,938	11,796,895	1,700,312	364,080	0	442,894
PSC Chinook ($/#)	6,010	10,098	12,750	39,360	10,059	7,831	14,113	6,762	14,960	15,925
PSC non-Chinook ($/#)	26,375	24,859	46,689	51,296	19,788	54,152	86,056	76,347	49,980	99,439

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 23. Total Volume and Wholesale Value of Groundfish Catch in AM80 GOA Fisheries, 2003–2012

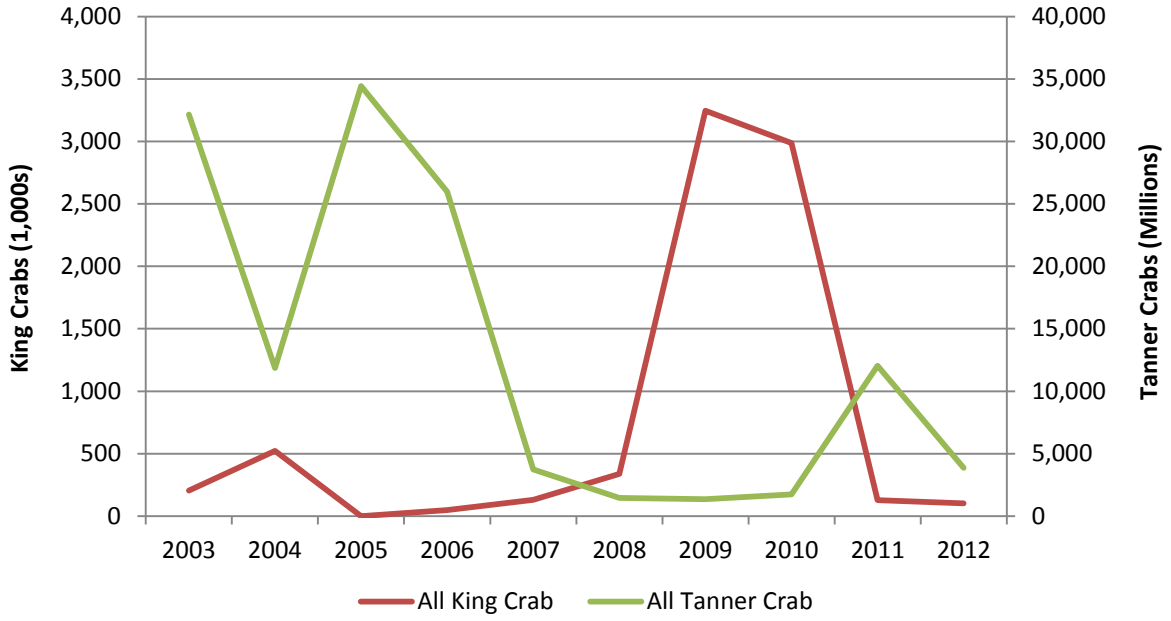
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 24. Herring and Halibut Bycatch by AM80 GOA Fisheries, 2003–2012



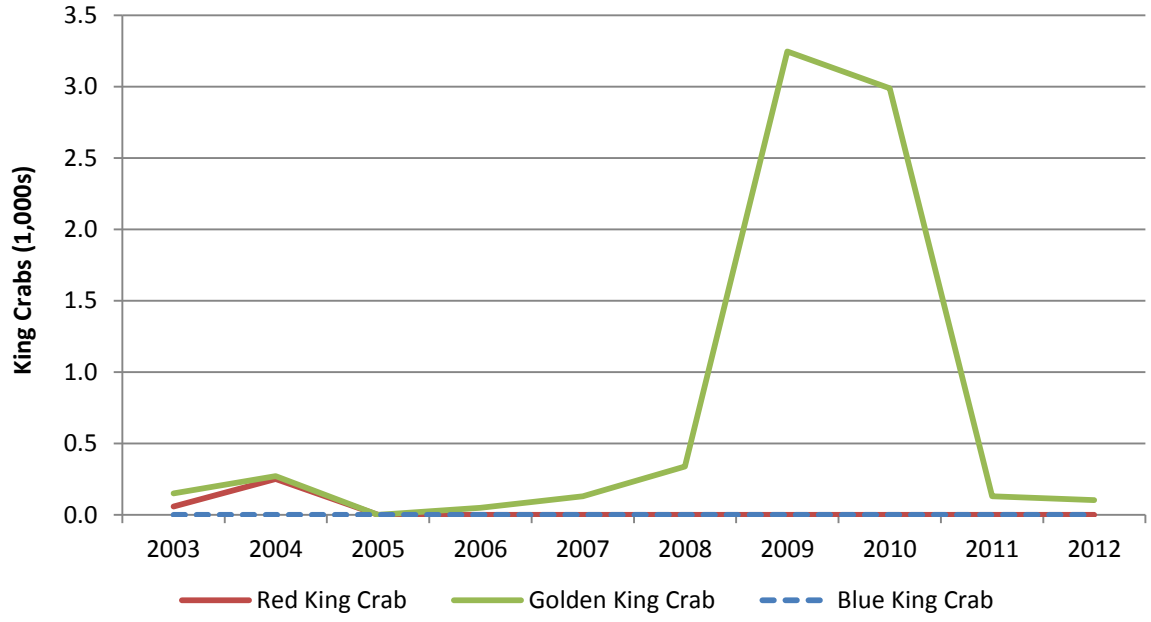
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 25. King Crab and Tanner Crab Bycatch by AM80 GOA Fisheries, 2003–2012



Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 26. Bycatch of King Crab Species by AM80 GOA Fisheries, 2003–2012

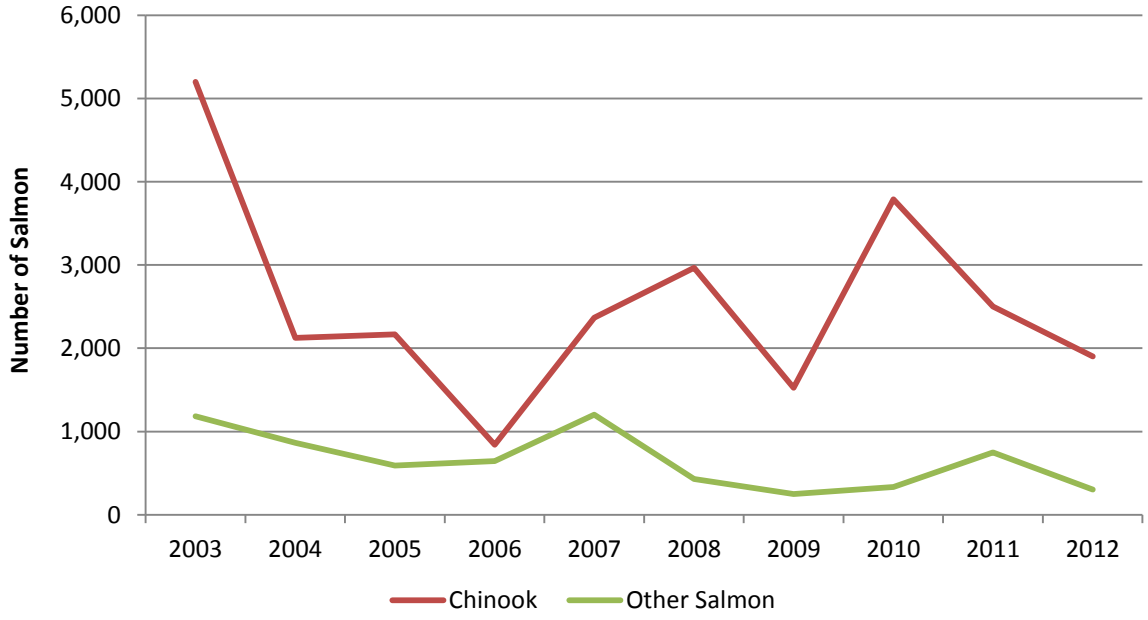


Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 27. Bycatch of Tanner Crab Species by AM80 GOA Fisheries, 2003–2012

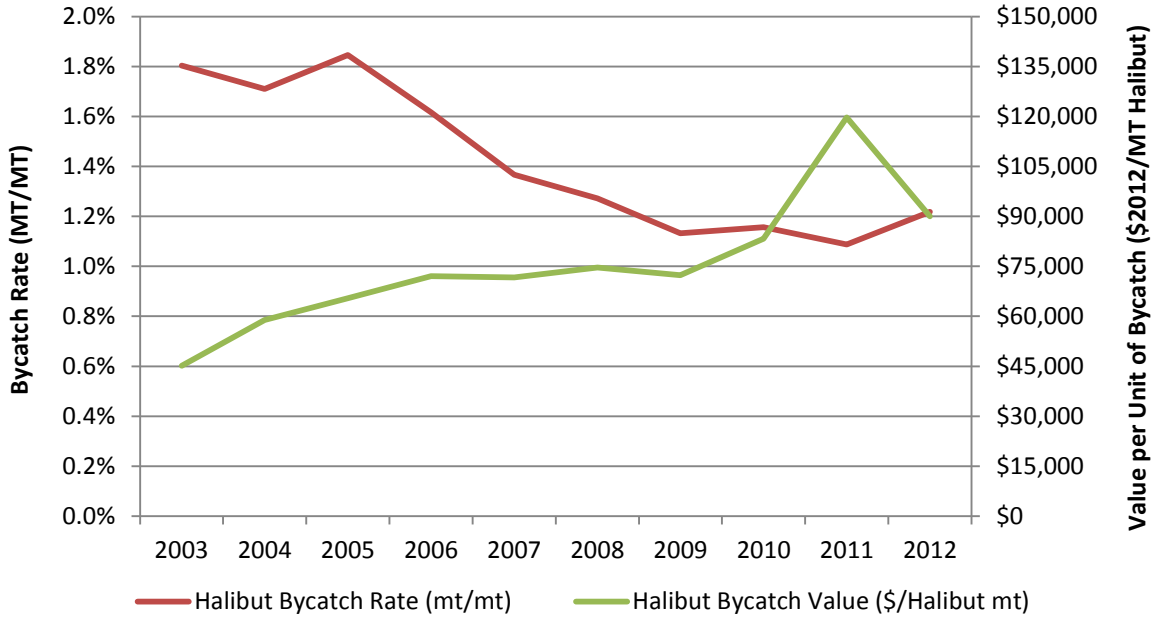
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 28. Bycatch of Salmon Species by AM80 GOA Fisheries, 2003–2012



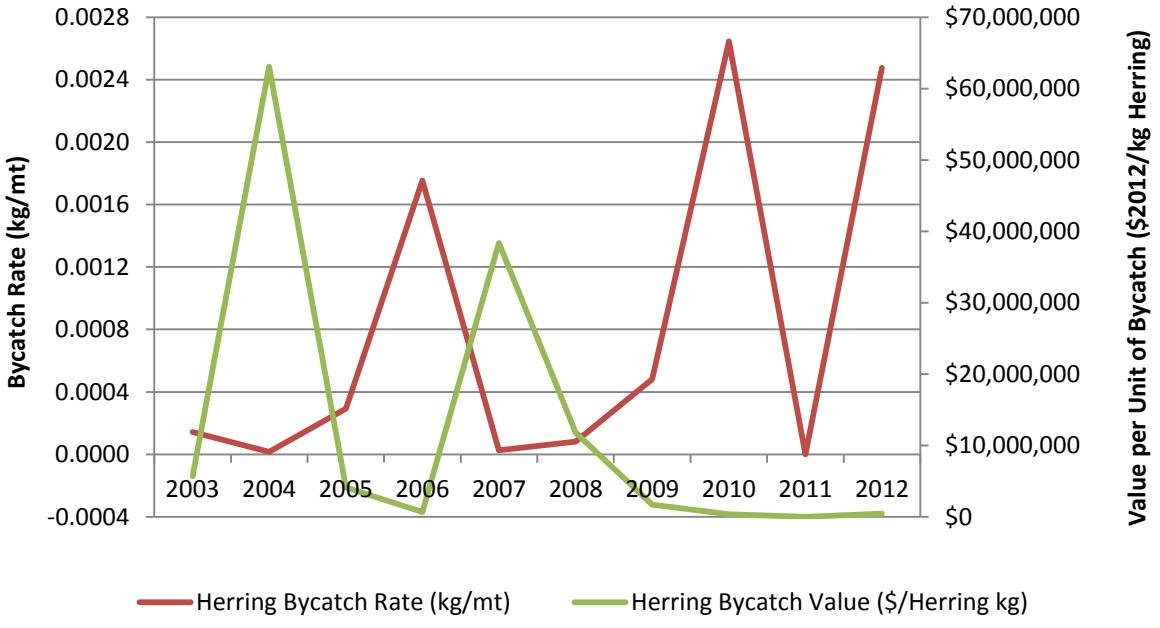
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 29. Bycatch of Halibut by AM80 GOA Fisheries as Share of Groundfish Catch and Value, 2003–2012



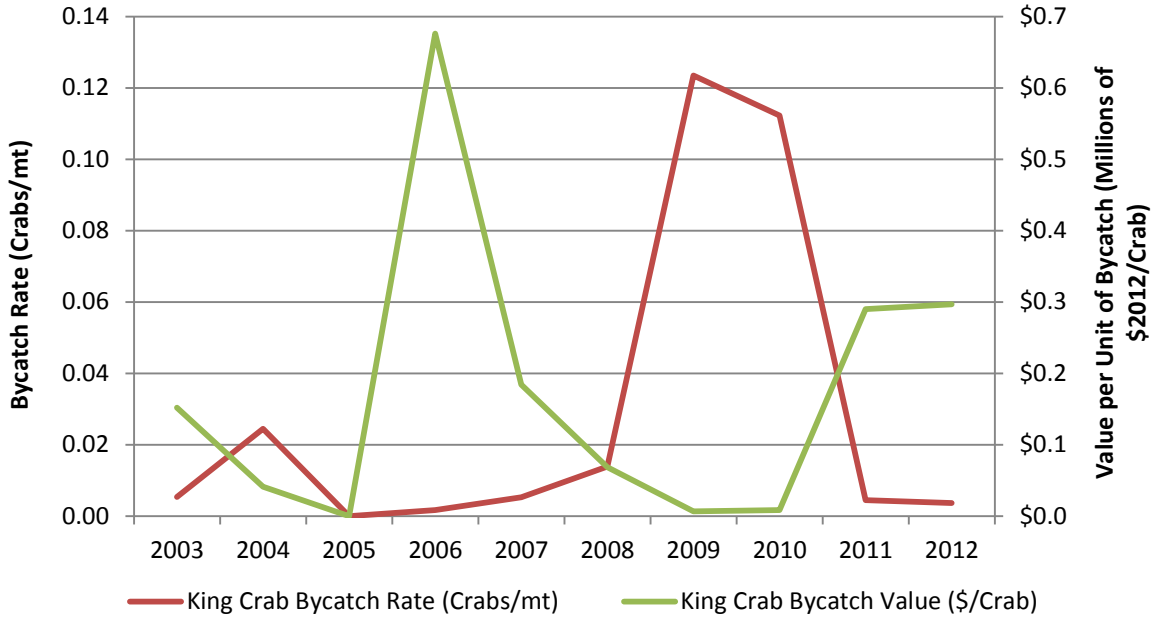
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 30. Bycatch of Herring by AM80 GOA Fisheries as Share of Groundfish Catch and Value, 2003–2012



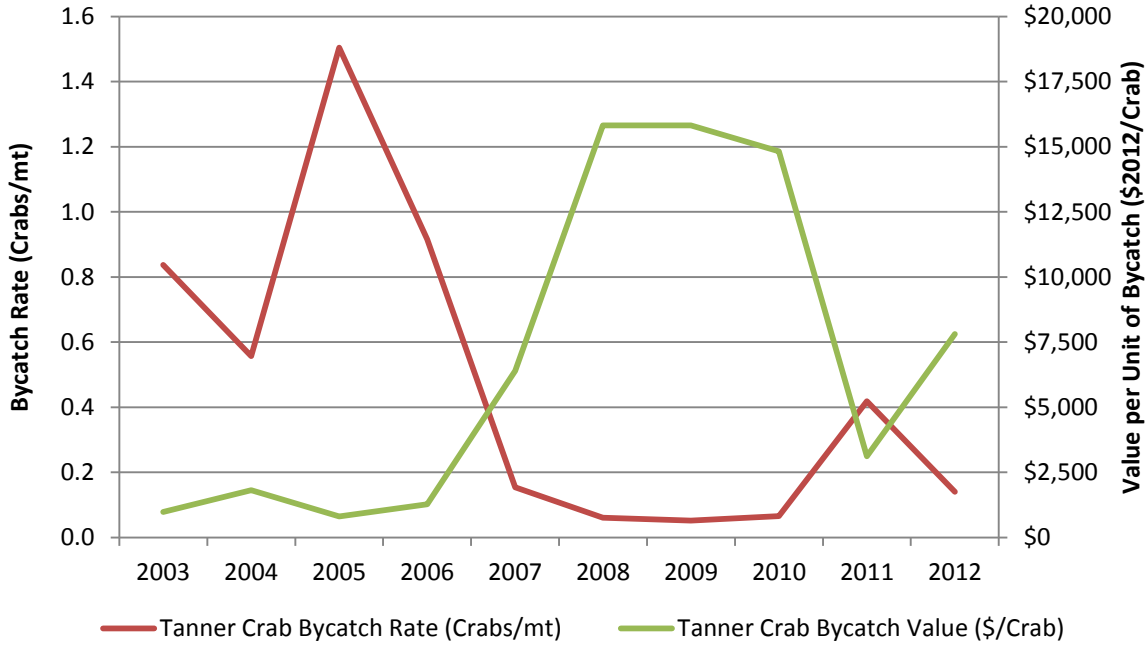
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 31. Bycatch of King Crab by AM80 GOA Fisheries as Share of Groundfish Catch and Value, 2003–2012



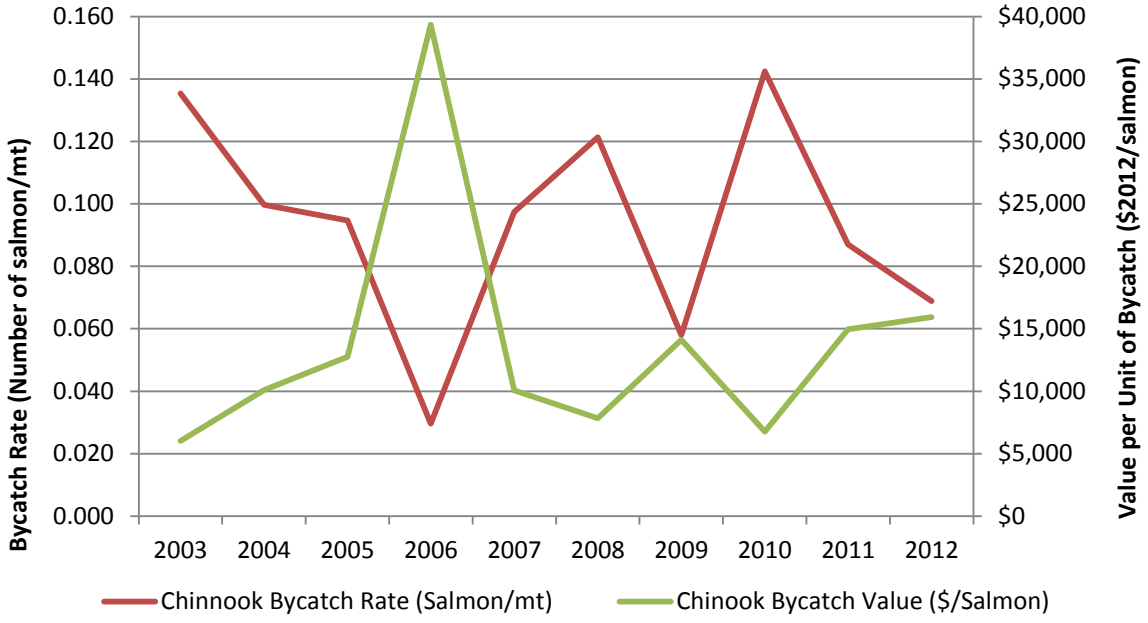
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 32. Bycatch of Tanner Crab by AM80 GOA Fisheries as Share of Groundfish Catch and Value, 2003–2012



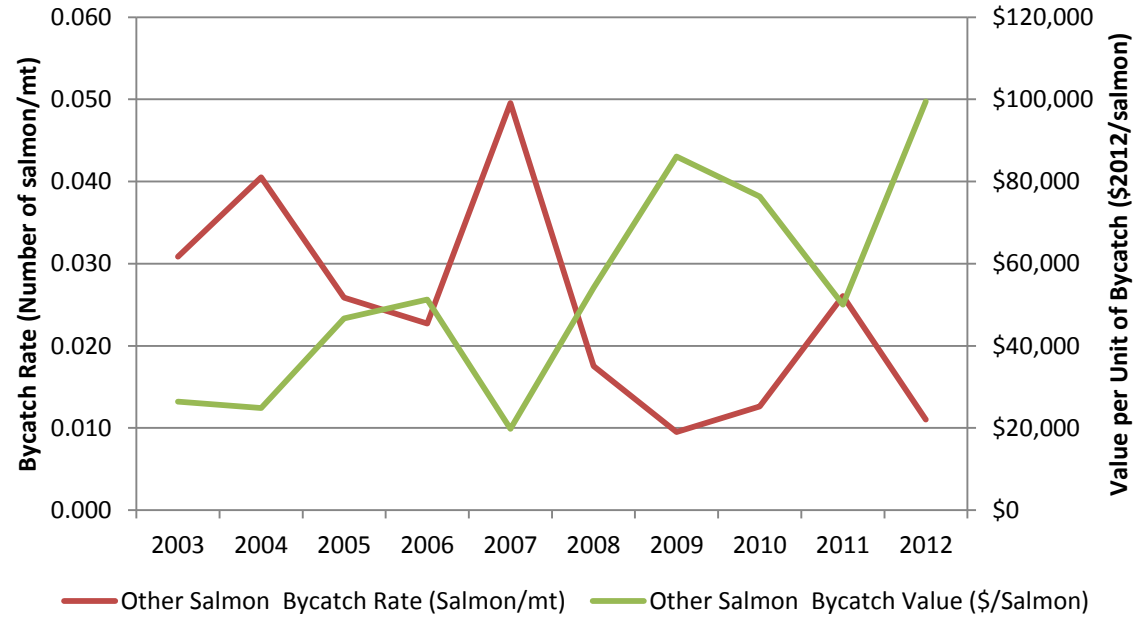
Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 33. Chinook Bycatch by AM80 GOA Fisheries as Share of Groundfish Catch and Value, 2003–2012



Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 34. Non-Chinook Salmon Bycatch by AM80 GOA Fisheries as Share of Groundfish Catch and Value, 2003–2012



Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

9 Benefits Generated by the AM80 Fishery

This section summarizes measures of benefits generated by the AM80 fisheries. Calculations of net revenues for the AM80 fleet as a whole and two subsets of the AM80 fleet are provided for the years 2008–2012. Estimates of total revenues used in the calculations and all expenditure and employment items are taken from the EDR. Total revenues are defined as total fishery sales revenue plus other income, total revenue LLP sales, and QS royalties earned minus QS royalties paid and raw fish costs. Percentage shares of total revenues are calculated each year and in average over the period. Two indicators of net income ("residual") are provided to estimate and compare returns to the fleet's fixed capital assets (vessels and equipment) over the period. "Total Residual" (defined as total revenue minus all EDR expenditures) is the broader measure, while "Operating Residual" (defined as total revenue minus non-capital expenditures only) may provide a more representative estimate of average returns to capital because it excludes expenditures on major physical assets which tend to be large and rather "lumpy."

Table 42 itemizes aggregate expenditures and revenues by EDR category for all vessels participating in AM80 fisheries each year during 2008–2012, and also in average over those five years. The table shows total revenues fluctuating from a low of $238.5 million in 2009 to a high of $399.3 million in 2011. The average over the period was $320.8 million. The table also shows each item's percentage share of total revenues. For example, a pronounced downward trend in the annual expenditure share for fuel and lubrication is apparent over the period. The total residual (a broad measure of net income) share varies from a low of 10.5 percent in 2009 to a high of 26.5 percent in 2011. The average total residual share over the period was 18.5 percent. The operating residual share (a narrower measure of net income) varies from a low of 14 percent in 2009 to a high of 28.4 percent in 2011, with an average over the period of 22.2 percent.

Table 43 shows aggregate expenditures and revenues by EDR category for the subset of vessels participating in AM80 fisheries that had at least 12 percent of annual catch and revenues from Atka mackerel. These vessels tend to be larger than the average AM80 vessel, and are clearly distinct from the remainder of the fleet in terms of the composition of their AM80 species catch. The table shows total revenues for these vessels fluctuating from a low of $124.3 million in 2009 to a high of $192.6 million in 2011. The average over the period was $157.3 million. The table also shows each item's percentage share of total revenues. Notice the fluctuations and absence of a distinct downward trend in the annual expenditure share for fuel and lubrication costs. The total residual (net income) share for these vessels varies from a low of 18.3 percent in 2009 to a high of 28.6 percent in 2011. The average total residual share over the period was 23.9 percent, 5.4 percentage points above the overall fleet average. The operating residual share varies from a low of 20.6 percent in 2009 to a high of 29.6 percent in 2011. The average over the period of 26.7 percent was 4.5 percentage points above the overall fleet average.

Table 44 shows aggregate expenditures and revenues by EDR category for the subset of vessels participating in AM80 fisheries that had less than 12 percent of annual catch and revenues from Atka mackerel. The table shows total revenues for these vessels fluctuating from a low of $114.2 million in 2009 to a high of $206.7 million in 2011. The average over the period was $163.5 million. The table also shows each item's percentage share of total revenues. The downward trend in these vessels' aggregate annual fuel and lubrication expenditure share is noticeable, but less distinct than it is for the whole fleet. The total residual (net income) share for this subset of vessels varies from a low of two percent in 2009 to a high of 24.1 percent in 2011. The average total residual share over the period was 13.4 percent, 5.1 percentage points below the overall fleet average. The operating residual share

varies from a low of 6.7 percent in 2009 to a high of 27.3 percent in 2011. The average over the period of 17.9 percent was 4.3 percentage points below the overall fleet average.

Table 42. Summary of EDR Data and Estimation of Residuals for all AM80 Vessels Submitting EDRs

		Annual Totals for All Vessels[1] Submitting EDR Data											
		2008		2009		2010		2011		2012		Average	
No.	EDR Expenditure Item	$million	%	$million	%	$million	%	$million	%	$million	%	$million	%
1	Fishing gear capital expenditures	1.6	0.6%	0.6	0.2%	1.2	0.4%	1.3	0.3%	2.9	0.7%	1.5	0.5%
2	Processing equipment capital expenditures	1.8	0.6%	1.0	0.4%	2.9	1.0%	2.4	0.6%	3.0	0.8%	2.2	0.7%
3	Capital expenditures	1.8	0.6%	6.2	2.6%	5.3	1.8%	3.0	0.8%	17.4	4.4%	6.7	2.1%
4	Other capital expenditures related to vessel operations	2.8	1.0%	0.6	0.2%	0.8	0.3%	1.8	0.5%	0.8	0.2%	1.4	0.4%
	Sub-total: Capital Expenditures	7.9	2.9%	8.3	3.5%	10.1	3.4%	8.5	2.1%	24.2	6.2%	11.8	3.7%
5	Deck crew labor expense. Include bonuses and payroll taxes, but exclude benefits and insurance.	14.8	5.4%	21.3	8.9%	13.2	4.4%	16.9	4.2%	16.5	4.2%	16.5	5.2%
6	Processing crew labor expense. Include bonuses and payroll taxes, but exclude benefits and insurance.	40.5	14.7%	28.2	11.8%	41.2	13.8%	51.5	12.9%	52.4	13.4%	42.7	13.3%
7	Other employees (officers, engineers, cooks, etc) labor expense. Include bonuses and payroll taxes, but exclude benefits and insurance.	24.3	8.8%	21.6	9.0%	28.2	9.5%	36.2	9.1%	37.7	9.6%	29.6	9.2%
8	Food and provisions expenses (not paid by crew)	6.3	2.3%	5.1	2.1%	4.7	1.6%	5.5	1.4%	5.6	1.4%	5.4	1.7%
9	Recruitment, travel, benefits and other employee related expenditures	8.1	2.9%	7.7	3.2%	8.7	2.9%	11.8	3.0%	9.5	2.4%	9.2	2.9%
10	Lease expenses for vessels and onboard equipment expenditures	0.0	0.0%	0.1	0.0%	0.1	0.0%	0.1	0.0%	0.1	0.0%	0.1	0.0%
11	Fishing gear leases, repairs and purchase expenses (e.g. nets, doors, and cables that were fully expensed in 2011)	6.3	2.3%	8.8	3.7%	8.2	2.7%	9.1	2.3%	9.3	2.4%	8.3	2.6%
12	Repair and maintenance expenditures	25.4	9.2%	28.5	11.9%	38.5	12.9%	34.4	8.6%	42.1	10.7%	33.8	10.5%
13	Freight, storage, and other sales costs	15.4	5.6%	12.2	5.1%	14.2	4.7%	14.4	3.6%	12.6	3.2%	13.7	4.3%
14	Freight and storage costs other than for products (e.g. gear, supplies, wharfage and offloading costs)	1.4	0.5%	1.9	0.8%	1.6	0.5%	1.8	0.4%	1.8	0.5%	1.7	0.5%
15	Product and packaging materials expenses	4.3	1.5%	3.3	1.4%	3.9	1.3%	4.5	1.1%	5.0	1.3%	4.2	1.3%
16	Fuel and lubrication expenses	48.2	17.5%	32.7	13.7%	40.5	13.6%	52.4	13.1%	48.9	12.5%	44.5	13.9%
17	Observer fees and other fishery monitoring and reporting costs	4.3	1.6%	3.6	1.5%	3.7	1.2%	3.6	0.9%	3.6	0.9%	3.8	1.2%
18	Cooperative costs including lawyer and accountant costs, association fees, and other fees charged to you by the harvest cooperative	0.5	0.2%	1.2	0.5%	1.1	0.4%	1.3	0.3%	1.2	0.3%	1.0	0.3%
19	General administrative costs associated with vessel operation. Include professional services and management fees, but exclude costs reported in the two previous questions.	19.5	7.1%	15.3	6.4%	11.3	3.8%	26.8	6.7%	27.4	7.0%	20.1	6.3%
20	Insurance expenses associated with the operation of this vessel (not including employee health insurance)	10.9	3.9%	10.9	4.6%	10.5	3.5%	13.5	3.4%	15.6	4.0%	12.3	3.8%
21	Fisheries landings taxes, including Shared Fisheries Business Tax and Fishery Resource Landing Tax	2.8	1.0%	3.0	1.3%	1.9	0.6%	2.1	0.5%	3.1	0.8%	2.6	0.8%
	Sub-total: Non-capital Expenditures	232.9	84.5%	205.1	86.0%	231.4	77.6%	286.1	71.6%	292.3	74.6%	249.6	77.8%
	Total Residual (Total Revenue - All EDR expenditures)	34.9	12.7%	25.0	10.5%	56.7	19.0%	104.8	26.3%	75.6	19.3%	59.4	18.5%
	Operating Residual (Total Rev - Non-capital expends.)	42.9	15.5%	33.3	14.0%	66.9	22.4%	113.3	28.4%	99.8	25.4%	71.2	22.2%
	Total Revenue[2]	**275.7**	**100%**	**238.5**	**100%**	**298.3**	**100%**	**399.3**	**100%**	**392.1**	**100%**	**320.8**	**100%**
	Employment:[3,4]												
	EMPLOYEES_FISH	392		173		357		234		242		280	
	EMPLOYEES_PROC	1,308		1,043		1,742		1,234		1,296		1,325	
	EMPLOYEES_OTHER	490		291		689		356		436		452	
	Total Employees	**2,190**		**1,507**		**2,788**		**1,824**		**1,974**		**2,057**	
	AVG_POSITIONS_FISH	134		120		114		111		107		117	
	AVG_POSITIONS_PROC	529		516		476		473		447		488	
	AVG_POSITIONS_OTHER	156		136		145		150		176		153	
	Total Avg_Positions	**819**		**772**		**735**		**734**		**730**		**758**	

1/ Excludes data from two vessels that submitted EDR forms but recorded zero fisheries sales revenue in all five years.
2/ Total fishery sales revenue plus other income, total revenue LLP sales and QS royalties earned minus QS royalties paid and raw fish cost (from EDR data).
3/ Number of employees or average number of positions from responses to questions in EDR Table 6.
4/ Data for 2010 were adjusted based on input from AFSC 11/04/2013.

Table 43. Summary of EDR Data and Estimation of Residuals for all "Atka Mackerel" Vessels Submitting EDRs

		Annual Totals for All "A" Vessels[1] Participating in A80 Fisheries and Submitting EDR Data											
		2008		2009		2010		2011		2012		Average	
No.	EDR Expenditure Item	$million	%	$million	%	$million	%	$million	%	$million	%	$million	%
1	Fishing gear capital expenditures	0.7	0.6%	0.2	0.1%	0.1	0.1%	0.7	0.3%	0.5	0.3%	0.4	0.3%
2	Processing equipment capital expenditures	0.4	0.3%	0.4	0.4%	1.1	0.7%	0.3	0.1%	0.6	0.3%	0.6	0.4%
3	Capital expenditures	0.6	0.5%	2.3	1.8%	2.9	1.9%	1.0	0.5%	10.2	5.4%	3.4	2.2%
4	Other capital expenditures related to vessel operations	0.1	0.1%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
	Sub-total: Capital Expenditures	1.8	1.4%	2.9	2.3%	4.2	2.7%	1.9	1.0%	11.4	6.0%	4.4	2.8%
5	Deck crew labor expense. Include bonuses and payroll taxes, but exclude benefits and insurance.	6.0	4.8%	14.2	11.5%	5.2	3.4%	5.8	3.0%	5.8	3.0%	7.4	4.7%
6	Processing crew labor expense. Include bonuses and payroll taxes, but exclude benefits and insurance.	17.9	14.1%	10.4	8.3%	18.3	12.0%	20.2	10.5%	19.9	10.5%	17.3	11.0%
7	Other employees (officers, engineers, cooks, etc) labor expense. Include bonuses and payroll taxes, but exclude benefits and insurance.	7.7	6.1%	7.6	6.1%	10.7	7.0%	11.9	6.2%	12.7	6.7%	10.1	6.4%
8	Food and provisions expenses (not paid by crew)	2.9	2.3%	2.8	2.3%	2.6	1.7%	3.0	1.6%	3.3	1.7%	2.9	1.9%
9	Recruitment, travel, benefits and other employee related expenditures	4.5	3.6%	4.1	3.3%	4.3	2.8%	6.8	3.5%	4.4	2.3%	4.8	3.1%
10	Lease expenses for vessels and onboard equipment expenditures	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
11	Fishing gear leases, repairs and purchase expenses (e.g. nets, doors, and cables that were fully expensed in 2011)	3.3	2.6%	4.4	3.5%	4.1	2.7%	5.0	2.6%	5.3	2.8%	4.4	2.8%
12	Repair and maintenance expenditures	12.0	9.4%	14.8	11.9%	22.2	14.5%	13.8	7.2%	21.2	11.1%	16.8	10.7%
13	Freight, storage, and other sales costs	2.2	1.7%	6.6	5.3%	7.5	4.9%	7.4	3.8%	4.4	2.3%	5.6	3.6%
14	Freight and storage costs other than for products (e.g. gear, supplies, wharfage and offloading costs)	0.4	0.3%	0.6	0.5%	0.8	0.6%	0.8	0.4%	0.8	0.4%	0.7	0.4%
15	Product and packaging materials expenses	1.9	1.5%	1.2	1.0%	1.6	1.0%	2.2	1.1%	2.6	1.4%	1.9	1.2%
16	Fuel and lubrication expenses	19.4	15.2%	14.9	12.0%	19.1	12.5%	27.5	14.3%	23.8	12.5%	20.9	13.3%
17	Observer fees and other fishery monitoring and reporting costs	1.4	1.1%	1.3	1.0%	1.3	0.8%	1.3	0.7%	1.4	0.7%	1.3	0.8%
18	Cooperative costs including lawyer and accountant costs, association fees, and other fees charged to you by the harvest cooperative	0.2	0.1%	0.2	0.2%	0.3	0.2%	0.4	0.2%	0.3	0.2%	0.3	0.2%
19	General administrative costs associated with vessel operation. Include professional services and management fees, but exclude costs reported in the two previous questions.	9.8	7.7%	8.4	6.8%	6.1	4.0%	19.9	10.3%	19.4	10.2%	12.7	8.1%
20	Insurance expenses associated with the operation of this vessel (not including employee health insurance)	4.9	3.9%	6.1	4.9%	5.5	3.6%	8.8	4.6%	10.0	5.3%	7.1	4.5%
21	Fisheries landings taxes, including Shared Fisheries Business Tax and Fishery Resource Landing Tax	1.2	0.9%	1.1	0.8%	0.5	0.3%	0.7	0.4%	1.2	0.6%	0.9	0.6%
	Sub-total: Non-capital Expenditures	95.6	75.2%	98.7	79.4%	110.2	72.2%	135.7	70.4%	136.4	71.7%	115.3	73.3%
	Total Residual (Total Revenue - All EDR expenditures)	29.6	23.3%	22.8	18.3%	38.2	25.0%	55.0	28.6%	42.4	22.3%	37.6	23.9%
	Operating Residual (Total Rev - Non-capital expends.)	31.4	24.8%	25.7	20.6%	42.3	27.8%	56.9	29.6%	53.8	28.3%	42.0	26.7%
	Total Revenue[2]	**127.0**	**100%**	**124.3**	**100%**	**152.5**	**100%**	**192.6**	**100%**	**190.2**	**100%**	**157.3**	**100%**
	Employment:[3,4]												
	EMPLOYEES_FISH	212		47		121		141		142		133	
	EMPLOYEES_PROC	559		350		345		613		685		510	
	EMPLOYEES_OTHER	248		119		103		170		175		163	
	Total Employees	**1,019**		**516**		**569**		**924**		**1,002**		**806**	
	AVG_POSITIONS_FISH	58		57		55		54		54		56	
	AVG_POSITIONS_PROC	250		221		228		226		223		230	
	AVG_POSITIONS_OTHER	65		55		62		63		67		62	
	Total Avg_Positions	**373**		**333**		**345**		**343**		**344**		**348**	

1/ Vessels with at least 12% of annual catch and revenues consisting of Atka mackerel.
2/ Total fishery sales revenue plus other income, total revenue LLP sales and QS royalties earned minus QS royalties paid and raw fish cost (from EDR data).
3/ Number of employees or average number of positions from responses to questions in EDR Table 6.
4/ Data for 2010 were adjusted based on input from AFSC 11/04/2013.

Table 44. Summary of EDR Data and Estimation of Residuals for all "Flatfish" Vessels Submitting EDRs

		Annual Totals for All Non-"A" Vessels[1] Participating in A80 Fisheries and Submitting EDR Data											
		2008		2009		2010		2011		2012		Average	
No.	EDR Expenditure Item	$million	%	$million	%	$million	%	$million	%	$million	%	$million	%
1	Fishing gear capital expenditures	0.8	*0.5%*	0.4	*0.4%*	1.1	*0.7%*	0.6	*0.3%*	2.3	*1.2%*	1.1	*0.6%*
2	Processing equipment capital expenditures	1.4	*0.9%*	0.5	*0.5%*	1.7	*1.2%*	2.1	*1.0%*	2.4	*1.2%*	1.6	*1.0%*
3	Capital expenditures	1.2	*0.8%*	3.9	*3.4%*	2.4	*1.6%*	2.0	*1.0%*	7.2	*3.6%*	3.3	*2.0%*
4	Other capital expenditures related to vessel operations	2.7	*1.8%*	0.6	*0.5%*	0.8	*0.6%*	1.8	*0.9%*	0.8	*0.4%*	1.4	*0.8%*
	Sub-total: Capital Expenditures	6.1	*4.1%*	5.4	*4.8%*	6.0	*4.1%*	6.5	*3.1%*	12.8	*6.3%*	7.4	*4.5%*
5	Deck crew labor expense. Include bonuses and payroll taxes, but exclude benefits and insurance.	8.8	*5.9%*	7.1	*6.2%*	8.0	*5.5%*	11.1	*5.4%*	10.7	*5.3%*	9.1	*5.6%*
6	Processing crew labor expense. Include bonuses and payroll taxes, but exclude benefits and insurance.	22.6	*15.2%*	17.8	*15.6%*	22.9	*15.7%*	31.3	*15.1%*	32.5	*16.1%*	25.4	*15.5%*
7	Other employees (officers, engineers, cooks, etc) labor expense. Include bonuses and payroll taxes, but exclude benefits and insurance.	16.6	*11.1%*	14.0	*12.2%*	17.5	*12.0%*	24.3	*11.8%*	25.0	*12.4%*	19.5	*11.9%*
8	Food and provisions expenses (not paid by crew)	3.4	*2.3%*	2.2	*1.9%*	2.1	*1.4%*	2.5	*1.2%*	2.3	*1.1%*	2.5	*1.5%*
9	Recruitment, travel, benefits and other employee related expenditures	3.5	*2.4%*	3.7	*3.2%*	4.4	*3.0%*	5.0	*2.4%*	5.1	*2.5%*	4.3	*2.6%*
10	Lease expenses for vessels and onboard equipment expenditures	0.0	*0.0%*	0.0	*0.0%*	0.1	*0.1%*	0.0	*0.0%*	0.1	*0.0%*	0.0	*0.0%*
11	Fishing gear leases, repairs and purchase expenses (e.g. nets, doors, and cables that were fully expensed in 2011)	3.0	*2.0%*	4.4	*3.9%*	4.1	*2.8%*	4.2	*2.0%*	4.0	*2.0%*	3.9	*2.4%*
12	Repair and maintenance expenditures	13.4	*9.0%*	13.7	*12.0%*	16.4	*11.2%*	20.6	*10.0%*	20.9	*10.3%*	17.0	*10.4%*
13	Freight, storage, and other sales costs	13.2	*8.9%*	5.6	*4.9%*	6.6	*4.5%*	7.0	*3.4%*	8.1	*4.0%*	8.1	*5.0%*
14	Freight and storage costs other than for products (e.g. gear, supplies, wharfage and offloading costs)	1.0	*0.7%*	1.3	*1.1%*	0.7	*0.5%*	1.0	*0.5%*	1.0	*0.5%*	1.0	*0.6%*
15	Product and packaging materials expenses	2.4	*1.6%*	2.0	*1.8%*	2.3	*1.6%*	2.3	*1.1%*	2.4	*1.2%*	2.3	*1.4%*
16	Fuel and lubrication expenses	28.9	*19.4%*	17.8	*15.6%*	21.4	*14.7%*	24.9	*12.0%*	25.1	*12.4%*	23.6	*14.5%*
17	Observer fees and other fishery monitoring and reporting costs	2.9	*2.0%*	2.3	*2.0%*	2.4	*1.6%*	2.3	*1.1%*	2.2	*1.1%*	2.4	*1.5%*
18	Cooperative costs including lawyer and accountant costs, association fees, and other fees charged to you by the harvest cooperative	0.3	*0.2%*	0.9	*0.8%*	0.8	*0.5%*	0.8	*0.4%*	0.9	*0.4%*	0.8	*0.5%*
19	General administrative costs associated with vessel operation. Include professional services and management fees, but exclude costs reported in the two previous questions.	9.7	*6.5%*	6.8	*6.0%*	5.2	*3.5%*	7.0	*3.4%*	8.1	*4.0%*	7.3	*4.5%*
20	Insurance expenses associated with the operation of this vessel (not including employee health insurance)	6.0	*4.0%*	4.8	*4.2%*	5.0	*3.4%*	4.7	*2.3%*	5.6	*2.8%*	5.2	*3.2%*
21	Fisheries landings taxes, including Shared Fisheries Business Tax and Fishery Resource Landing Tax	1.7	*1.1%*	2.0	*1.7%*	1.4	*1.0%*	1.4	*0.7%*	1.9	*1.0%*	1.7	*1.0%*
	Sub-total: Non-capital Expenditures	137.3	*92.3%*	106.5	*93.3%*	121.2	*83.2%*	150.4	*72.7%*	155.9	*77.2%*	134.3	*82.1%*
	Total Residual (Total Revenue - All EDR expenditures)	5.3	*3.6%*	2.2	*2.0%*	18.6	*12.7%*	49.8	*24.1%*	33.2	*16.4%*	21.8	*13.4%*
	Operating Residual (Total Rev - Non-capital expends.)	11.4	*7.7%*	7.7	*6.7%*	24.6	*16.8%*	56.3	*27.3%*	46.0	*22.8%*	29.2	*17.9%*
	Total Revenue[2]	**148.7**	***100%***	**114.2**	***100%***	**145.8**	***100%***	**206.7**	***100%***	**201.9**	***100%***	**163.5**	***100%***
	Employment:[3,4]												
	EMPLOYEES_FISH	180		126		236		93		100		147	
	EMPLOYEES_PROC	749		693		1,397		621		611		814	
	EMPLOYEES_OTHER	242		172		586		186		261		289	
	Total Employees	**1,171**		**991**		**2,219**		**900**		**972**		**1,251**	
	AVG_POSITIONS_FISH	76		63		59		57		53		62	
	AVG_POSITIONS_PROC	279		295		248		247		224		259	
	AVG_POSITIONS_OTHER	91		81		83		87		109		90	
	Total Avg_Positions	**446**		**439**		**390**		**391**		**386**		**410**	

1/ Vessels with less than 12% of annual catch and revenues consisting of Atka mackerel.
2/ Total fishery sales revenue plus other income, total revenue LLP sales and QS royalties earned minus QS royalties paid and raw fish cost (from EDR data).
3/ Number of employees or average number of positions from responses to questions in EDR Table 6.
4/ Data for 2010 were adjusted based on input from AFSC 11/04/2013.

Table 45 condenses down the detailed information for all AM80 vessels that was provided in Table 42. The condensed version enables discussion of cost component groups. Capital Expenditures as shown in Table 45 summarize four categories of capital expenditures in the more detailed tables above. Capital expenditures include purchases of deck gear or equipment that is intended to last over several years as well as expenditures made to reconfigure the deck, replace engines, or to "sponson" a

vessel for stability. The $24.2 million in capital expenditures made in 2012 were well over twice the $11.6 million average over the five year period.

Unlike capital expenditures which varied widely by year, direct labor expenditures are fairly stable as a percent of revenue. This is to be expected as most crewmembers are paid on a share basis. There is some indication that direct labor expenses as a percent of total revenue may be declining, but with only five years of data, it probably too soon to tell.

Indirect labor expenditures are payments for food and provisions that are not paid by the crew and other labor-based expenses such as airfare, recruiting, and includes benefits provided to labor. Indirect labor expenditures also appear to be trending downward as a percent of total revenue.

Other operating expenditures include purchases of trawl gear, ordinary repairs and maintenance, product storage and shipping costs, and packing materials. There doesn't appear to be a trend in this group of expenditures.

The costs of fuel and lubricants were relatively high in 2008 at 17.5 percent of total revenue. During the remaining four years for which there are data, fuel expenditures were relatively stable as a percent of revenue.

Administrative expenditures include vessel insurance, observer costs, and costs for professional services. These costs were relatively low in 2010, but the other years are fairly consistent as a percent of total revenues.

State shared taxes are taxes paid to the State of Alaska. Catcher processors and motherships pay a "fishery resource tax" based on the estimated ex-vessel value of the products that are reported. These taxes as reported on the EDRs have varied from a high of $3.0 million in 2009—the year with the lowest total revenue to a low of $2.1 million in 2011—the year with the highest total revenue.

Table 45. Summary of EDR Revenue and Expenses over All AM80 Vessels

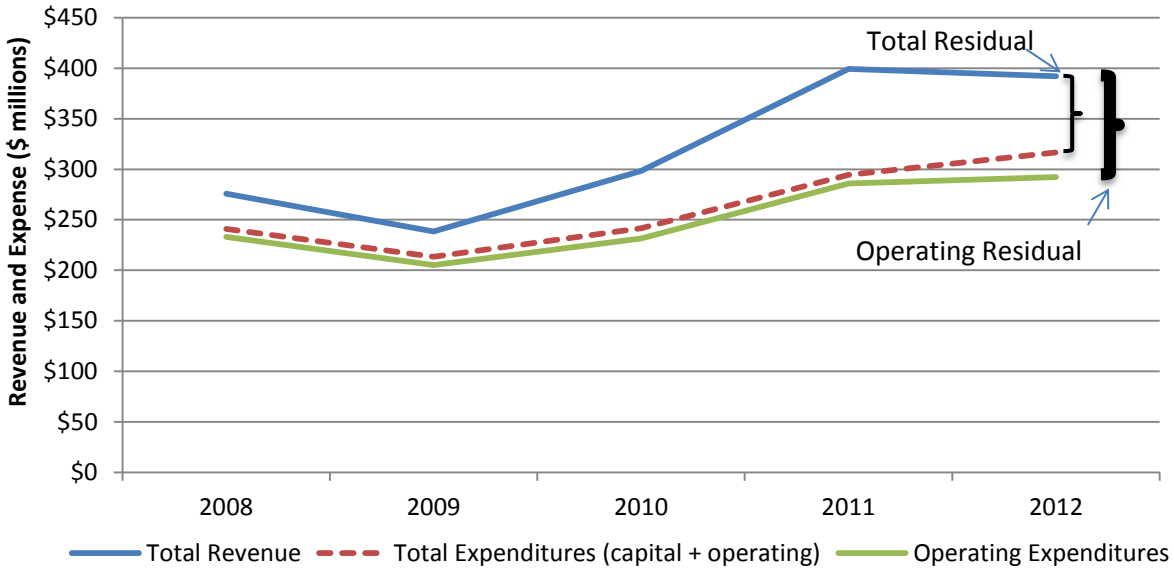
	2008		2009		2010		2011		2012		2008 – 2012 Average	
EDR Expenditure Item	**$ million**	**%**	**$ million**	**%**	**$ million**	**%**	**$ million**	**%**	**$ million**	**%**	**$ million**	**%**
Total Revenue	**275.7**	***100%***	**238.5**	***100%***	**298.3**	***100%***	**399.3**	***100%***	**392.1**	***100%***	**320.8**	***100%***
Capital Expenditures	**(7.9)**	***2.9%***	**(8.3)**	***3.5%***	**(10.1)**	***3.4%***	**(8.5)**	***2.1%***	**(24.2)**	***6.2%***	**(11.8)**	***3.7%***
Direct Labor Expenditures	(79.6)	*28.9%*	(71.1)	*29.8%*	(82.6)	*27.7%*	(104.6)	*26.2%*	(106.6)	*27.2%*	(88.9)	*27.7%*
Indirect Labor Expenditures	(14.3)	*5.2%*	(12.8)	*5.4%*	(13.4)	*4.5%*	(17.3)	*4.3%*	(15.1)	*3.8%*	(14.6)	*4.5%*
Other Operating Expenditures	(52.7)	*19.1%*	(54.7)	*22.9%*	(66.4)	*22.3%*	(64.4)	*16.1%*	(70.9)	*18.1%*	(61.8)	*19.3%*
Fuel & lubrication expenses	(48.2)	*17.5%*	(32.7)	*13.7%*	(40.5)	*13.6%*	(52.4)	*13.1%*	(48.9)	*12.5%*	(44.5)	*13.9%*
Administrative Expenditures	(35.2)	*12.8%*	(30.9)	*13.0%*	(26.6)	*8.9%*	(45.3)	*11.3%*	(47.8)	*12.2%*	(37.2)	*11.6%*
State Shared Taxes	(2.8)	*1.0%*	(3.0)	*1.3%*	(1.9)	*0.6%*	(2.1)	*0.5%*	(3.1)	*0.8%*	(2.6)	*0.8%*
Operating Expenditures	**(232.9)**	***84.5%***	**(205.1)**	***86.0%***	**(231.4)**	***77.6%***	**(286.1)**	***71.6%***	**(292.3)**	***74.6%***	**(249.6)**	***77.8%***
Operating Residual (Total Rev. - Operating Expenditures)	**42.9**	***15.5%***	**33.3**	***14.0%***	**66.9**	***22.4%***	**113.3**	***28.4%***	**99.8**	***25.4%***	**71.2**	***22.2%***
Total Residual (Total Rev. - All Expenditures)	**34.9**	***12.7%***	**25.0**	***10.5%***	**56.7**	***19.0%***	**104.8**	***26.3%***	**75.6**	***19.3%***	**59.4**	***18.5%***

Note: EDR revenues and expenses have not been adjusted for inflation.
Source: Developed by Northern Economics from EDR Data from provided by AKFIN (Fey, 2014)

Figure 35 summarizes revenues and expenses for the AM80 fleet as reported in the EDS from 2008-2012. Since implementation of the AM80 in 2008 there has been a steady increase in overall operating residuals for AM80 owners and operators. While it is probably to early to be certain, it

appears that operating residual have improved over time under AM80. There are no data for residuals prior to 2008, but AM80 active owners and operators report that they are better off under AM80.

Figure 35. EDR Revenues and Expenses of all AM80 Vessels, 2008–2012



Note EDR revenues and expenditures have not been adjusted for inflation.
Source: Developed by Northern Economics from EDR Data from provided by AKFIN (Fey, 2014)

9.1 A Discussion of Estimates of Net Operating Revenues of AM80 Vessels

The EDRs for the AM80 fleet provide a relatively unique opportunity for fishery managers and the general public to understand the impacts of management actions on the costs and revenues for an entire fleet of vessels from harvesting operations through the processing and sale of products. No other fleet of CPs in the North Pacific or elsewhere in the U.S. provide the level of detail with respect to operating costs and revenues that is provided in the AM80 EDRs.

It is important to note, however, that the EDRs do have some limitations. These limitations are most evident with respect to the long-term investments that were made by the current owners. The EDRs do not include the cost of building or acquiring the vessels in the first place, nor do they include any ongoing debt service payments that the current owners may be making.

The fact that acquisition costs and costs of long-term capital improvements made by the owners are not included in the EDRs, means that it is not possible to calculate the actual internal rate of return (IRR) on investment that the vessels generate for their owners. We are left instead with estimates of the average annual "Operating Residuals," which exclude all reported capital expenditures. While these estimates indicate whether or not vessel operations are providing some level of income to owners, they are insufficient (without additional information) to determine whether or not the investment in an AM80 CP was a sound decision. A more complete assessment of the returns to owners of AM80 vessels would undoubtedly involve a discounted cash flow (DCF) model in which the upfront capital costs of the investment are included along with annual revenues and expenditures.

Table 46 is developed as a hypothetical DCF model that might be used by a potential investor in an AM80 vessel. This hypothetical DCF model contains the types of information contained in the AM80 EDRs and not coincidentally shows annual operating revenues of $15.8 million and average operating

residual percentages of 22.0 percent. Both of these numbers are approximately equal to the revenues and operating residual percentages of the average AM80 vessel over the first 5 years of the program.

Table 46. Hypothetical Discounted Cash Flow Model Based on Information in AM80 EDRs

Year	Capital Costs	Operating Revenues	Operating Expenditures	Operating Residual	Operating Residual %	Total Residual	Discounted Cash Flow @ 10%
		All dollar values are shown in $ millions					
Year 1	-	$16.75	$14.15	$2.60	15.5%	$2.60	$2.36
Year 2	-	$10.30	$9.52	$0.78	7.6%	$0.78	$0.65
Year 3	-	$9.61	$8.16	$1.45	15.1%	$1.45	$1.09
Year 4	-	$12.54	$8.84	$3.70	29.5%	$3.70	$2.53
Year 5	$4.00	$19.15	$16.15	$3.00	15.7%	($1.00)	($0.62)
Year 6	-	$16.83	$10.56	$6.27	37.3%	$6.27	$3.54
Year 7	-	$20.19	$18.69	$1.50	7.4%	$1.50	$0.77
Year 8	-	$18.59	$12.33	$6.26	33.7%	$6.26	$2.92
Year 9	-	$9.83	$6.48	$3.34	34.0%	$3.34	$1.42
Year 10	-	$20.27	$12.71	$7.56	37.3%	$7.56	$2.91
Year 11	$6.00	$18.82	$16.00	$2.82	15.0%	($3.18)	($1.12)
Year 12	-	$13.03	$12.76	$0.27	2.1%	$0.27	$0.09
Year 13	-	$20.43	$12.36	$8.07	39.5%	$8.07	$2.34
Year 14	-	$12.94	$9.99	$2.95	22.8%	$2.95	$0.78
Year 15	-	$17.33	$15.86	$1.46	8.4%	$1.46	$0.35
15 Year Total	**$10.00**	**$236.58**	**$184.55**	**$52.03**	**22.0%**	**$42.03**	**$20.00**

Source: Developed by Northern Economics based on hypothetical data from AM80 EDRs.

The DCF model shown in Table 46 was intentionally constructed for demonstration purposes only. It was developed so that it would show yield a 10 percent IRR on an initial $20 million investment over the 15 year period with average operating residual of 22.0 percent and average revenues of $15.8 million. Actual capital investments in AM80 vessels are unknown, and therefore the hypothetical DCF model is used only as a tool to demonstrate the uses of EDR data.

One of the major take-home points of the hypothetical DCF model, is that even though the operating residuals of the AM80 fleet have averaged 22.0 percent over all vessels, the annual rate of return to owners may be much less.

Is should also be noted that even though the hypothetical DCF model shows an example of a 15-year period that would have provided an investor of $20 million an IRR of 10 percent, there are no guarantees that the particular circumstances shown in the hypothetical model will repeat themselves, or whether they are a good predictor of future revenue and cost streams for AM80 owners.

As a matter of fact, the hypothetical DCF model depicted in Table 46 is randomized in terms of revenue and operating costs, and is run iteratively until the random numbers combine to yield a 10 percent IRR on a $20 million investment with average revenues of 15.5 and 16 million with average operating residual of 22.0 and 22.5 percent. To arrive at the numbers in shown in Table 46, a total of 1,399 iterations were required and the average annual IRR was just 7.5 percent.

9.1.1 A Comparison of the AM80 Fleet to other Resource Industries

A comparison of the profitability of the AM80 fleet and other resource-based industries warrants the consideration of the comprehensive and long-term costs and risks associated with each. Indeed, the exclusive focus on year-to-year operating costs and revenues in the AM80 EDRs may bias an analysis

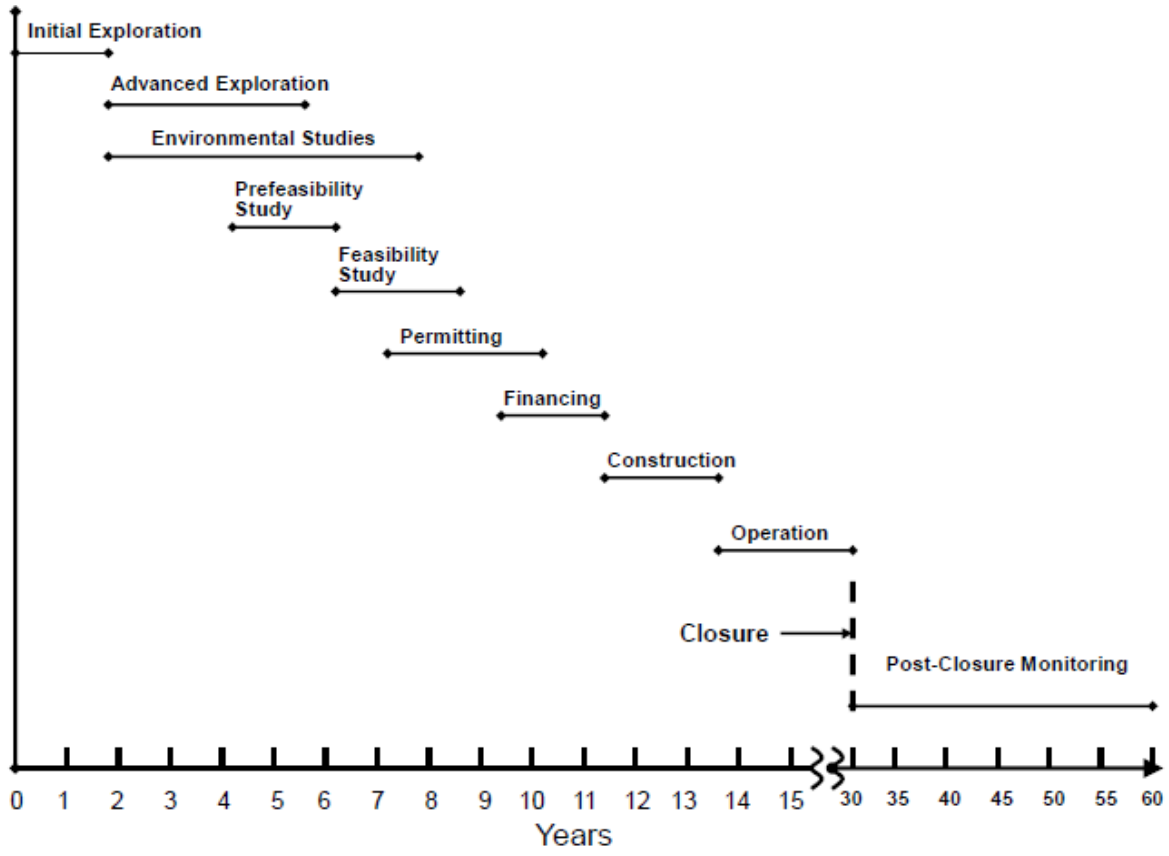
of the comparative profitability of industries whose risk profiles and upfront capital costs may vary considerably.

The substantial upfront costs and inherent risks associated with mining and oil and gas projects illustrate the importance of employing some type of DCF analysis of lifecycle costs and revenues in assessing the comparative profitability of these industries and their participants. Unlike fishing operations, however, most mining and oil and gas companies evaluate their year-to-year financial performance based on portfolios of projects. Further, annual financial statements of mining and oil and gas companies typically reflect aggregations of capital and operating costs, debts, and revenues across multiple projects. This muddies the direct comparison of profitability of the A80 fleet with players in other resource-based industries.

Profitability in the Mining Industry

Profitability within the mining industry varies according to both the prevailing value of the commodity being mined relative to costs of production and the duration and cost of pre-operation project development. According to the Alaska Department of Natural Resources (DNR), very few exploration projects ever become producing mines, and project owners frequently abandon projects after independently determining them to be technically or economically unfeasible. Mines in Alaska must obtain numerous permits from various state and federal agencies prior to reaching the production stage, and, as shown in Figure 36, permitting is just one of numerous major steps in the mineral development process (DNR, 2014).

Figure 36. Typical Timeframe for a Completed Mine Project, Alaska



Source: Figure reproduced from DNR, 2014.

One financial measure that the mining industry uses to assess profitability over a particular time-period is the return on capital employed (ROCE), which is a ratio of earnings before interest and tax to the value of capital employed (www.investopedia.com 2014). ROCE allows for the comparison of companies' (or projects') profitability based on the amount of capital they use but does not necessarily account for the explicit or opportunity costs accrued by companies prior to the production stage. Across mining companies worldwide, ROCE rose from 5 percent in 2002 to 23 percent in 2006, before bouncing around to 9 percent in 2009, 18 percent in 2010, and 8 percent in 2012 (Finweek, 2013).

Profitability in the Oil and Gas Industry

According to a contact with more than 20 years of direct employment in the oil and gas industry, standard DCF/net present value (NPV) analysis should be employed to evaluate the financial feasibility of potential projects. Most companies use a stage-gate process that includes several stages of peer/management review before final approval is granted. The DCF/NPV analysis is tied to a rate-of-return—or hurdle rate—that a project must meet to receive final approval. These hurdle rates vary by company but typically range from 8–12 percent (Nelson, 2014).

The use of standard DCF/NPV analysis allows for the comparison of competing projects with disparate attributes. For most companies, this analysis includes the use of probabilistic/stochastic methods that account for the variable risk of all input factors in the calculation of an estimated project NPV (Nelson, 2014).

10 Assessment of CDQ Program Allocations in AM80 Fisheries

The CDQ Program receives apportionments of the annual catch limits for a variety of commercially valuable species in the BSAI, which are in turn allocated among six different non-profit managing organizations representing different affiliations of communities (CDQ groups). The CDQ Program was established by the NPFMC in 1992, and in 1996, the program was incorporated into the MSA. The final rule to implement AM80 increased the percentage of TAC for directed fisheries (with the exception of pollock and sablefish) that are allocated to the CDQ Program from 7.5 percent to 10.7 percent, modified the percentage of halibut, crab, and non-Chinook salmon PSC allocated to the CDQ Program as prohibited species quota, and included other provisions necessary to bring AM80 and the CDQ Program into compliance with applicable law.

Table 47 summarizes the CDQ allocations for groundfish species from 2003 to 2012. CDQ allocations of Greenland turbot are made only for the Bering Sea portion of the BSAI, and CDQ allocations of Pacific Ocean perch are made only for Aleutian Islands portions of the BSAI. Therefore, the CDQ allocations shown for those two species here are less than the full 10.7 percent. Table 48 on the following page, contains details of the CDQ allocations for Greenland turbot and Pacific Ocean perch.

Table 47. CDQ Allocation of Major Groundfish Species, 2003–2012

Species	Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Arrowtooth flounder	TAC	12,000	12,000	12,000	13,000	20,000	75,000	75,000	75,000	25,900	25,000
	CDQ	900	900	900	975	1,500	8,025	8,025	8,025	2,771	2,675
	CDQ %	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%
Atka mackerel	TAC	60,000	63,000	63,000	63,000	63,000	60,700	76,400	74,000	53,080	50,763
	CDQ	4,500	4,725	4,725	4,725	4,725	6,495	8,175	7,918	5,680	5,432
	CDQ %	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%
Flathead sole	TAC	20,000	19,000	19,500	19,500	30,000	50,000	60,000	60,000	41,548	34,134
	CDQ	1,500	1,425	1,463	1,463	2,250	5,350	6,420	6,420	4,446	3,652
	CDQ %	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%
Greenland turbot	TAC	4,000	3,500	3,500	2,740	2,440	2,540	7,380	6,120	5,050	8,660
	CDQ	300	263	263	206	126	187	545	452	375	667
	CDQ %	7.5%	7.5%	7.5%	7.5%	5.2%	7.4%	7.4%	7.4%	7.4%	7.7%
Pacific cod	TAC	207,500	215,500	206,000	189,768	170,720	170,720	176,540	168,780	227,950	261,000
	CDQ	15,563	16,163	15,450	14,233	12,804	18,267	18,890	18,059	24,391	27,927
	CDQ %	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%
Pacific ocean perch	TAC	14,100	12,580	12,600	12,600	19,900	21,700	18,800	18,860	24,700	24,700
	CDQ	1,059	943	945	945	1,331	1,872	1,603	1,609	2,033	2,032
	CDQ %	7.5%	7.5%	7.5%	7.5%	6.7%	8.6%	8.5%	8.5%	8.2%	8.2%
Pollock	TAC	1,492,810	1,493,050	1,497,510	1,504,010	1,413,010	1,019,010	834,050	832,050	1,271,150	1,219,150
	CDQ	149,176	149,200	149,750	150,400	141,300	101,900	83,400	83,200	127,100	121,900
	CDQ %	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Rock sole	TAC	44,000	41,000	41,500	41,500	55,000	75,000	90,000	90,000	85,000	87,000
	CDQ	3,300	3,075	3,113	3,113	4,125	8,025	9,630	9,630	9,095	9,309
	CDQ %	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%
Sablefish	TAC	6,000	6,000	5,360	5,820	5,790	5,300	4,920	4,860	4,750	4,280
	CDQ	922	922	778	887	884	805	745	733	713	653
	CDQ %	15.4%	15.4%	14.5%	15.2%	15.3%	15.2%	15.1%	15.1%	15.0%	15.3%
Yellowfin sole	TAC	83,750	86,075	90,686	95,701	136,000	225,000	210,000	219,000	196,000	202,000
	CDQ	6,281	6,456	6,801	7,178	10,200	24,075	22,470	23,433	20,972	21,614
	CDQ %	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%

Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a).

Table 48. CDQ Allocation of Greenland Turbot and Pacific Ocean Perch, 2003–2012

Species	Area	Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Greenland turbot	BSAI	TAC	4,000	3,500	3,500	2,740	2,440	2,540	7,380	6,120	5,050	8,660
		CDQ	300	263	263	206	CDQ Allocated at Sub-Area level					
		CDQ%	7.5%	7.5%	7.5%	7.5%						
	AI	TAC	1,320	800	800	850	760	790	2,290	1,900	1,550	2,430
		CDQ	99	60	60	64	AI CDQs not Allocated					
		CDQ%	7.5%	7.5%	7.5%	7.5%						
	BS	TAC	2,680	2,700	2,700	1,890	1,680	1,750	5,090	4,220	3,500	6,230
		CDQ	201	203	203	142	126	187	545	452	375	667
		CDQ%	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%
Pacific ocean perch	BSAI	TAC	14,100	12,580	12,600	12,600	18,890	21,700	18,800	18,860	24,700	24,700
		CDQ	1,059	943	945	945	CDQ Allocated at Sub-Area level					
		CDQ%	7.5%	7.5%	7.5%	7.5%						
	BS	TAC	1,410	1,408	1,400	1,400	2,160	4,200	3,820	3,830	5,710	5,710
		CDQ	106	106	105	105	BS CDQs not Allocated					
		CDQ%	1,516	1,514	1,505	1,505						
	Central AI	TAC	3,500	3,059	3,080	3,080	4,970	4,900	4,200	4,220	5,660	5,620
		CDQ	263	229	231	231	373	524	449	452	606	601
		CDQ%	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%
	Eastern AI	TAC	3,340	2,926	3,035	3,035	5,050	4,990	4,260	4,270	4,960	4,990
		CDQ	251	219	228	228	379	534	456	457	531	534
		CDQ%	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%
	Western AI	TAC	5,850	5,187	5,085	5,085	7,720	7,610	6,520	6,540	8,370	8,380
		CDQ	439	389	381	381	579	814	698	700	896	897
		CDQ%	7.5%	7.5%	7.5%	7.5%	7.5%	10.7%	10.7%	10.7%	10.7%	10.7%

Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a).

Under the MSA, the primary portion of each CDQ reserve (10 percent of the TAC) must be allocated among the six CDQ groups based on the percentage allocations that were in effect on March 1, 2006. The balance of each reserve (0.7 percent of the TAC) is allocated among CDQ groups based on the percentage allocations agreed on by the Western Alaska Community Development Association Board of Directors, serving in its capacity as the CDQ Program Panel. Relative proportions allocated to each group vary by species. In 2012, for example, three of the six CDQ groups were each allocated approximately a quarter of the CDQ Program's apportionment of yellowfin sole, while the other three groups all shared the remaining amount. For flathead sole, the allocations to each group were more comparable, with only one group allocated a substantially smaller amount (NMFS, 2013a).

Table 47 and Figure 37, on the following page, demonstrate the very significant increase in CDQ allocations that occurred in 2008 and which have continued since. It is, however, important to note that the very large increases seen are due to two separate components of change:

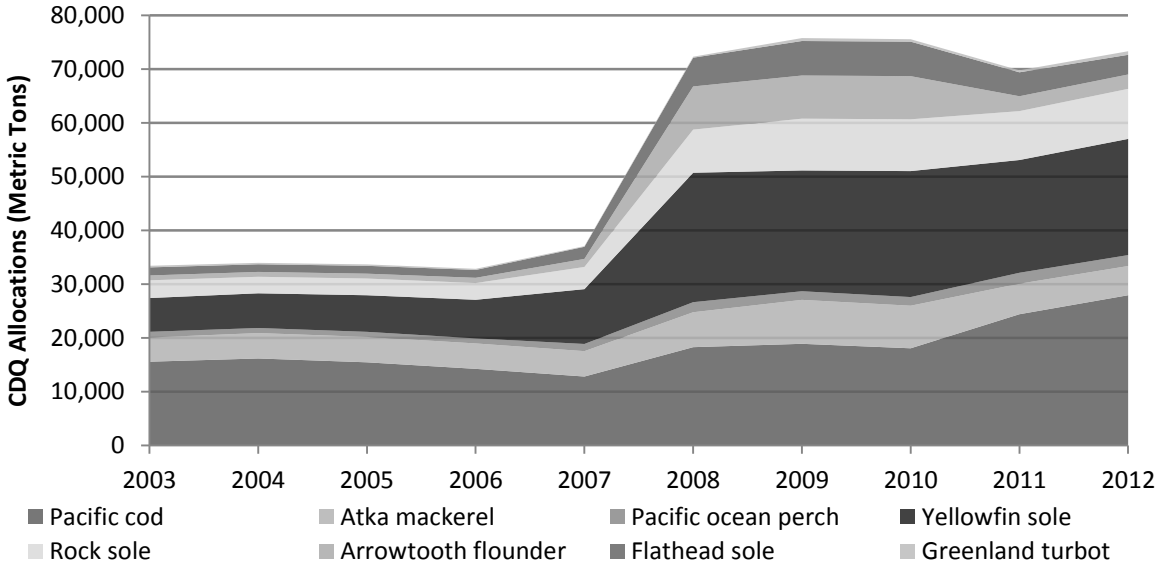
1) Increases in the percentage of TACs allocated to non-pollock and non-sablefish CDQs—the allocation percentages for non-pollock/non-sablefish allocations of CDQs increased by 30 percent in 2008 from 7.5 percent to 10.7 percent.

2) Increases in the TACs for non-pollock and non-sablefish CDQ species—TACS increased collectively by 27 percent in 2008 and since then have exceeded 2007 TACs by an average of 28 percent.

Figure 38, on the following page, shows these two components of change graphically. In the figure the blue shaded area at the bottom shows the actual non-pollock/non-sablefish CDQ allocations from

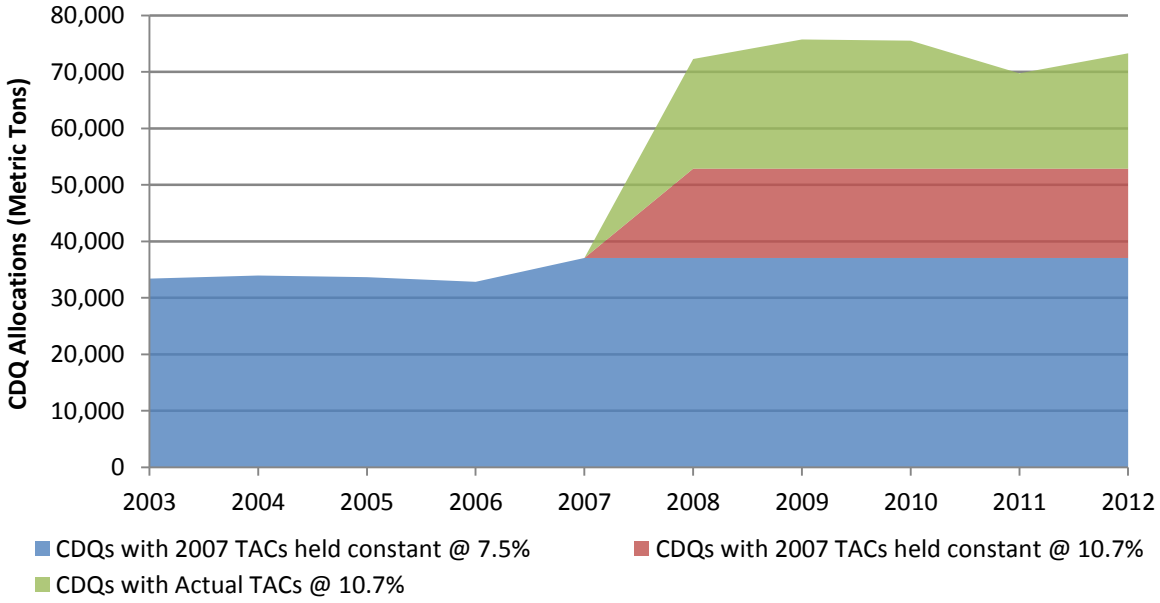
2003–2007, and then holds the 2007 allocations constant for the remaining years. The red area, in the middle, shows the increase in 2008–2012 CDQ allocations that are due to the increase in TACs relative to the 2007 TACs using a 7.5 percent allocation. The green area at the top of the figure shows the change that is due to the increase in the CDQ percentage from 7.5 to 10.7 percent. The combined increase from the two components has resulted in a 49 percent average increase in non-pollock/non-sablefish CDQ allocations relative to 2007.

Figure 37. CDQ Allocations of Groundfish other than Pollock and Sablefish



Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a).

Figure 38. Components of Change in Non-Pollock/Non-Sablefish CDQ Allocations from 2008–2012



Source: Developed by Northern Economics based on information at NMFS-AKR webpage, (NMFS, 2014a).

The remainder of this section focuses on CDQ harvests made in directed fisheries of the eight CDQ species for which the allocation increased under AM80—i.e. the six AM80 species, as well as arrowtooth flounder, and Greenland turbot. For completeness, some of the tables include catches in directed fisheries for pollock and sablefish, and separately report on CDQ target fisheries for Pacific cod by gear (fixed and trawl).

10.1 Volume and Value of Catch in CDQ Fisheries with Increased Allocations

All the CDQ groups partner with established companies to harvest their allocations of the various groundfish target species. In general, CDQ groups have a single contract with a partner company to harvest their CDQ Pollock, and in some cases have a separate contract or partner for harvesting their flatfish, rockfish, and Atka mackerel. Similarly, CDQ harvests of Pacific cod and sablefish are often conducted with a different partner than used for their CDQ Pollock. The CDQ groups vary individually in the degree to which they harvest their non-pollock/non-sablefish AM80 species allocations.

Table 49 shows the combined harvest for all six CDQ groups in non-pollock/non-sablefish CDQ target fisheries. It should be noted that an average of 1,114 tons of CDQ groundfish are taken incidentally in CDQ target fisheries for pollock and sablefish, of which 50 percent is Pacific cod and 46 percent is a combination of rock sole, flathead sole and arrowtooth flounder. Figure 39 shows the information from the table graphically, but leaves out incidental catches of pollock, sablefish and non-CDQ groundfish. Note that the figure stacks the catch of each species.

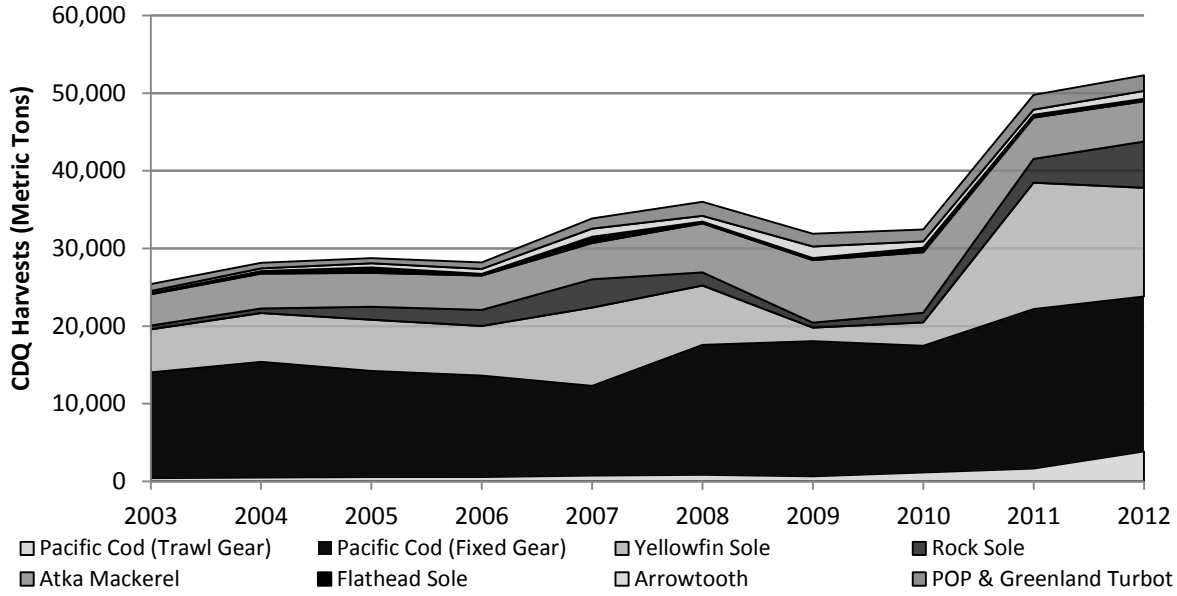
In both Table 49 and Figure 39, it is clear that overall CDQ harvests in non-pollock/non-sablefish CDQ fisheries have increased substantially since 2007. By 2011 and 2012 CDQ harvests in these fisheries approached 60,000 mt. In spite of the overall increases, CDQ harvests in 2008 and 2009 of yellowfin sole and rock sole actually declined in spite of significantly higher allocations. Overall the increases in total non-pollock non-sablefish CDQ harvests have not kept pace with allocations.

Table 49. Catch (mt) in CDQ Non-Pollock/Non-Sablefish Target Fisheries, 2003–2012

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Yellowfin Sole	5,539	6,284	6,588	6,384	10,081	7,637	1,741	3,003	16,274	13,986
Rock Sole	491	585	1,671	2,071	3,643	1,695	644	1,244	3,057	5,962
Flathead Sole	154	330	700	219	816	236	263	591	373	328
Atka Mackerel	4,028	4,494	4,370	4,423	4,663	6,303	8,049	7,791	5,319	5,181
Pacific Cod Fixed	13,622	14,898	13,668	13,064	11,554	16,732	17,407	16,320	20,538	19,959
Pacific Cod Trawl	409	490	554	558	744	844	648	1,141	1,648	3,852
Pacific Ocean Perch	846	673	608	807	1,252	1,659	1,490	1,497	1,815	1,878
Arrowtooth Flounder	263	346	527	636	1,042	740	1,490	806	656	1,011
Greenland Turbot	49	47	60	31	64	155	157	42	84	131
Sablefish	13	20	19	37	35	15	18	23	12	25
Pollock	1,286	1,426	648	756	1,187	1,268	1,083	1,231	1,655	2,297
Non-CDQ Groundfish	2,720	3,930	2,792	2,897	4,327	4,501	3,422	4,333	7,219	5,220
Total	**29,422**	**33,521**	**32,203**	**31,882**	**39,407**	**41,786**	**36,410**	**38,023**	**58,649**	**59,829**

Source: Table developed by Northern Economics with CAS data provided by AKFIN (Fey, 2014).
Note: Excludes CDQ harvests that were harvested in target fisheries for pollock or sablefish.

Figure 39. Catch (mt) in CDQ Non-Pollock/Non-Sablefish Target Fisheries, 2003–2012

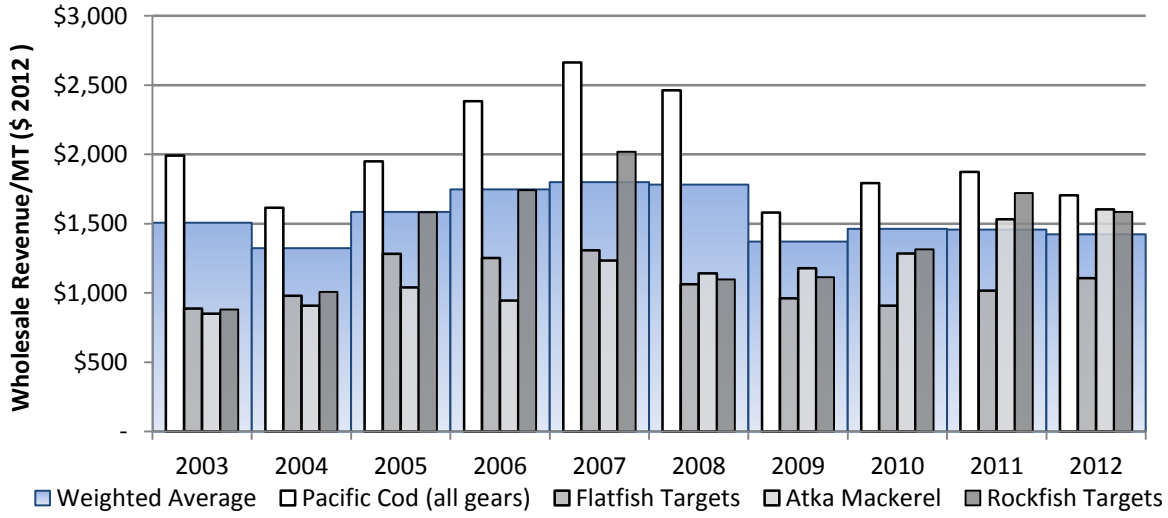


Source: Figure developed by Northern Economics with CAS data provided by AKFIN (Fey, 2014).

Note: The legend (from left-to-right and top-to-bottom) corresponds with areas moving up from the bottom. Thus the first area shows Pacific Cod (Trawl Gear) then the next darker area shows Pacific Cod (Trawl Gear).

Figure 40 and Figure 41 combine to explain, at least in part, the reductions CDQ catches of flatfish in 2008 and 2009 relative to harvests in 2007. In 2008 average revenue per MT in real terms (adjusted for inflation) in the CDQ flatfish target fisheries dropped by 23 percent relative to 2007, by 2010 real prices 44 percent lower than their peak in 2007. The global recession undoubtedly contributed to the price declines, but the fact that the overall amount of flatfish coming of the North Pacific (in the non-CDQ fisheries) was almost certain a factor in those price declines. Pacific cod revenues per MT experienced similar declines, while real revenue per unit in CDQ rockfish fishery fell by 82 percent in 2008. In 2009 the weighted average revenue per unit sold in CDQ fisheries over all of non-pollock/non-sablefish targets was 31 percent less than revenue per unit sold in 2007.

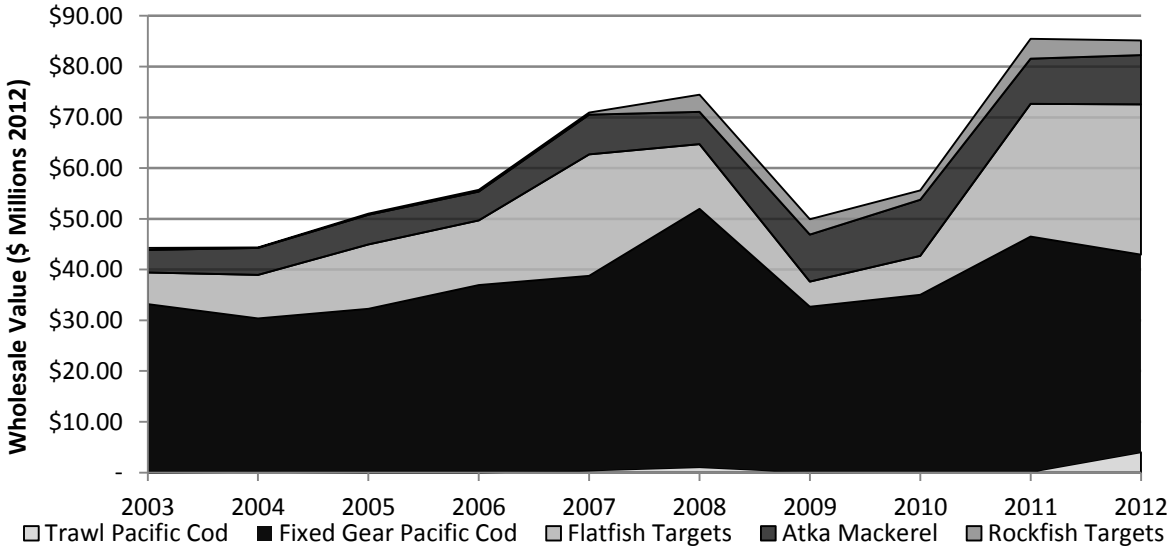
Figure 40. Real Wholesale Revenue ($2012) per MT in CDQ Target Fisheries, 2003–2012



Source: Figure developed by Northern Economics with CAS data provided by AKFIN (Fey, 2014).

The price declines coupled with declining CDQ flatfish harvests led to a large drop in the total wholesale value generated in non-pollock/non-sablefish CDQ fisheries in 2009. In 2009 the biggest revenue decline was seen in the Pacific cod fisheries, which fell from over $50 million in 2008 to less than $33 million in 2009. All of this decline in revenues can be attributed to declining prices as overall Pacific cod harvest levels were flat between 2008 and 2009. Beginning in 2010, CDQ revenues have increased and now exceed levels experienced in 2007.

Figure 41. Real Wholesale Revenue ($2012) in CDQ Target Fisheries, 2003–2012



Source: Figure developed by Northern Economics with CAS data provided by AKFIN (Fey, 2014).

Table 50 summarizes CDQ harvest volumes as percent of CDQ allocations. The combination of a 49 percent allocation increase over all non-pollock/non-sablefish CDQ relative to 2007, coupled with declining wholesale prices at least partially explains the lower than expected utilization of CDQ allocations from 2008–2010. Utilization rates increased substantially in 2021–2012.

Table 50. CDQ Harvest Volumes as a Percent of CDQ Allocations

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Yellowfin Sole	89%	98%	97%	89%	99%	32%	8%	13%	78%	65%
Rock Sole	19%	29%	59%	70%	89%	24%	9%	14%	36%	66%
Flathead Sole	26%	38%	61%	28%	48%	9%	8%	15%	15%	14%
Arrowtooth Flounder	49%	48%	65%	70%	81%	10%	20%	11%	28%	39%
Greenland Turbot	27%	23%	28%	21%	68%	96%	34%	13%	27%	22%
Atka Mackerel	45%	95%	92%	94%	99%	97%	98%	98%	94%	95%
Pacific Cod	93%	99%	95%	100%	100%	100%	98%	100%	94%	87%
Pacific Ocean Perch	81%	71%	64%	86%	94%	89%	93%	93%	89%	93%
Sablefish	20%	19%	73%	55%	71%	50%	49%	68%	51%	59%
Pollock	101%	101%	100%	101%	99%	99%	99%	99%	93%	102%
Percent of Total Excluding Pollock & Sablefish	**70%**	**87%**	**88%**	**89%**	**94%**	**52%**	**44%**	**44%**	**73%**	**73%**

Source: Table developed by Northern Economics with CAS data provided by AKFIN (Fey, 2014) combined with CDQ allocations information from NMFS-AKR (NMFS, 2014a).

Other seemingly reasonable theories regarding the decline in CDQ utilization rates in non-pollock/ non-sablefish fisheries have been expressed. According to one CDQ group, harvest rates of Bering Sea flatfish species decreased after 2008 largely due to the formation of the AM80 cooperatives, which reduced the incentive for the group's partner company to lease CDQ quota for the flatfish species (Alaska Departments of Fish and Game et al. 2013). The allocation of exclusive harvest privileges among cooperative members allows them to slow the pace of their fishing operations, thereby encouraging each member to concentrate on their own allocation rather than lease CDQ quota (Aleutian Pribilof Island Community Development Association undated). Since 2010, however, a new contract with the CDQ group's partner company in the flatfish fisheries requires the company to harvest at least 80 percent of the group's yellowfin sole and rock sole allocations (Alaska Departments of Fish and Game et al. 2013). In addition, beginning in 2011, some CDQ groups have contracted non-AM80 vessels to harvest their yellowfin sole and rock sole (NMFS, 2013). Nevertheless, anecdotal evidence suggests that leasing CDQ species by AM80 vessels is desirable, and as these vessels increase their efficiency they will continue to seek other fishing opportunities, such as CDQ fishery harvests (NMFS, 2013).

10.2 Prohibited Species Bycatch in CDQ Fisheries for AM80 Species

Table 51 shows the amount of prohibited species caught in CDQ non-pollock trawl target fisheries, while Table 52 shows the prohibited species catch rates in those fisheries. Bycatch rates in CDQ fisheries have been lower than those in non-CDQ fisheries for all prohibited species except non-Chinook salmon. (See Section 8.1).

Table 51. Prohibited Species Bycatch Amounts in CDQ Non-Pollock Trawl Target Fisheries, 2003–2012

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	91.9	93.8	69.4	103.6	166.7	105.3	63.6	74.9	128.6	186.6
PSC King Crab (#s)	NA	569	1,441	6,901	7,015	2,901	2,187	1,687	4,407	2,927
PSC Bairdi Crab (#s)	NA	15,814	1,717	4,741	60,597	13,151	12,858	28,740	24,153	30,152
PSC Opilio Crab (#s)	NA	30,117	7,362	2,518	63,150	10,602	56,688	12,389	29,506	27,003
PSC Chinook (#s)	NA	35	123	47	24	77	56	0	0	29
PSC non-Chinook (#s)	NA	200	671	158	706	77	8	0	163	168

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).
Notes: Includes estimated bycatch in all trawl groundfish hauls designated as a "CDQ hauls" in target fisheries for yellowfin sole, rock sole, Atka mackerel, rockfish, arrowtooth flounder, Kamchatka flounder, Alaska plaice, flathead sole, Greenland turbot and "Other Species".

Table 52. Prohibited Species Bycatch Rates in CDQ Non-Pollock Trawl Target Fisheries, 2003–2012

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Rate	0.0073	0.006	0.004	0.006	0.007	0.005	0.004	0.004	0.004	0.005
PSC King Crab Rate	NA	0.039	0.092	0.423	0.282	0.141	0.139	0.091	0.130	0.085
PSC Bairdi Crab Rate	NA	1.076	0.110	0.290	2.439	0.638	0.817	1.557	0.714	0.871
PSC Opilio Crab Rate	NA	2.050	0.471	0.154	2.542	0.514	3.603	0.671	0.873	0.780
PSC Chinook Rate	NA	0.002	0.008	0.003	0.001	0.004	0.004	-	-	0.001
PSC non-Chinook Rate	NA	0.014	0.043	0.010	0.028	0.004	0.001	-	0.005	0.005

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).
Notes:

1) Bycatch rates are calculated by dividing the bycatch amount into the total groundfish catch.
2) Includes estimated bycatch in all trawl groundfish hauls designated as a "CDQ hauls" in target fisheries for yellowfin sole, rock sole, Atka mackerel, rockfish, arrowtooth flounder, Kamchatka flounder, Alaska plaice, flathead sole, Greenland turbot and "Other Species".

11 Community Impacts of AM80

This section describes in general terms the community impacts of the AM80 fisheries. The section has three components.

The first section provides a summary of port calls made by AM80 vessels. The port call summary provides an assessment of the best available data regarding the different communities in Alaska affected by the AM80 fleet and indicates that Dutch Harbor is the most important hub of activity for the AM80 Fleet. Included in this summary is separate sub-section that address the AM80 activities in Adak.

The second section reports the findings of an Economic Impact Model showing the multiplier effects the AM80 fleet that was developed in 2012 and published in the journal *Marine Policy* in July 2014 (Waters, 2014). The section focuses on impacts in Dutch Harbor—the community out of which the vessels operate during the fishing year; and in Seattle—the community in which most of the vessels undertake maintenance and shipyard work and where most of the company are based.

The third component of the community impact section contains an assessment of shared fished taxes that are estimated to have been paid from harvests of the AM80 CPs and the BSAI TLA sector from 2003–2012. Also included are estimates of taxes paid in CDQ harvests in fisheries for the CDQ species that saw increased apportionments in 2008 under the regulations implementing AM80.

11.1 Summary of Port Calls Made by AM80 Vessels

This section provides an overview of port calls made by AM80 vessels as an indicator of the geographic scope of the community impacts of the AM80 fleet. Port call information used in this summary has been developed by Steve Lewis and colleagues at NMFS-AKR using the "Catch and Area" (CAA) database. The CAA combines Vessel Monitoring System (VMS) data with other CAS data. VMS data report the longitude and latitude every 15 minutes of nearly every active groundfish and crab vessel operating in Alaska,[15] and is the primary source of information used to "generate" the port call information. The port call summaries rely on an algorithm rather than on actual port call data. The algorithm tracks each vessel's movement over time. If a vessel is "stationary" for fixed period of time or longer within a pre-determined geographic area[16] that has been defined around each Alaska port, then the algorithm makes the determination that a port call has been made.

It should be noted that the port-call algorithm is not perfect, but it is the best information that is available to researchers and fishery managers. One part of the algorithm known to have flaws is when a vessel offloads directly to another vessel, rather than onto a dock at a fixed location. For example, if a ship-to-ship transfer takes place in Unalaska Bay but outside of the CAA's pre-determined polygon that defines Unalaska with respect to port calls, the transfer will not be recorded as having taken place in Unalaska. In fact it might not be recorded as an offload at all.

Another area of uncertainty is whether a port call necessarily implies an offload of product. Each trip in the port-call data includes a starting port and an ending port and must have included some fishing activity between port calls. Repositioning trips (i.e. moving from one port to another) are not included in the port-call data set. It is very possible that vessels, particularly vessels operating far out in the

[15] VMS regulations are summarized online at https://alaskafisheries.noaa.gov/sustainablefisheries/vms/.

[16] Each port is defined within the CAA as a GIS-based "polygon". The polygons, developed by NMFS staff for use in the port-call algorithm, are only estimates and as such may not be infallible.

Aleutians, will make port calls for fuel or other provisions and not make an offload. The port call algorithm is unable to distinguish port calls that involve an offload from those that do not.

It should further be noted that it appears that most operators of AM80 vessels consider a "trip" to begin when their vessel leaves a port with an empty fish hold to go fishing and end with the offload of product. Under this definition, a port call made for refueling, or re-provisioning that doesn't involve an offload would not typically be considered the end of a trip.

There is a need to distinguish between "trips" as used in the port-call dataset and "trips" defined as fishing activity from offload-to-offload. For the remainder of the discussion in this section the term "port-call fishing trip" will be used to denote *trips* as defined in the port-call dataset, and the term "offload fishing trip" will refer to an offload-to-offload fishing trip.

It should also be noted that all CPs and motherships are required by regulation to report to NMFS Enforcement Division, the location of every offload of product from fish harvested in Alaska waters (i.e. for all offload-to-offload fishing trips). The "Product Transfer Report" (an example of which is shown in Appendix D) shows not only the products that are offloaded, by species, product type and weight, but also the date, time, and specific location (by latitude and longitude) of the offload, as well as the receiver of the product, the mode of transportation, and its intended route. These data are not provided to NMFS-AKR Sustainable Fisheries Division, and have not been integrated into the CAS or CAA data bases. (Furuness, 2014). Were these data integrated into the CAS system, then any uncertainty regarding the number of offloads and the locations of offloads made by CPs and motherships would be eliminated.

Table 53 summarizes the starting and ending ports of over 5,400 port-call fishing trips that were made by AM80 vessels from 2003–2012. In the table, the rows indicate the starting port and the columns indicate the trip-ending port.

It is very clear that Dutch Harbor is the center of AM80 activity. Between 2003 and 2012 there were 4,097 AM80 port-call fishing trips that started at Dutch Harbor, and 4,096 that ended at Dutch Harbor. Adak has been the second most import port for the AM80 fleet, and it appears that vessels will occasionally start a port-call fishing trip in Dutch Harbor and fish before make a port call in Adak (186 port-call fishing trips). They then will make an Adak–Adak trip (239 port-call fishing trips), and then make another trip starting in Adak and ending in Dutch Harbor (178 port-call fishing trips). Similar cycles are seen for Dutch Harbor–St. Paul, Dutch Harbor–Atka, and for Dutch Harbor–Sand Point in the GOA. While Kodiak has the most port calls in the GOA with 253 trip-starts, Sandpoint is not far behind with 194 trip-starts.

Table 53. Starting and Ending Ports of AM80 Vessels, 2003–2012

Start Port	End Port									
	Dutch Harbor	Adak	Saint Paul	Atka	Other BSAI Ports	Kodiak	Sand Point	Seward	Other GOA Ports	Grand Total
Dutch Harbor	3,549	186	161	71	13	16	86	5	10	4,097
Adak	178	239	2	36	1	-	3	-	-	459
Saint Paul	169	-	65	-	-	-	-	-	-	234
Atka	55	42	-	42	-	-	-	-	-	139
Other BSAI Ports	12	-	1	-	-	-	-	-	-	13
Kodiak	21	2	-	-	-	218	9	-	3	253
Sand Point	97	-	2	-	-	14	76	5	-	194
Seward	5	2	-	-	-	-	9	2	8	26
Other GOA Ports	10	1	-	-	-	-	1	3	4	19
All BSAI Ports	**3,963**	**467**	**229**	**149**	**14**	**16**	**89**	**5**	**10**	**4,942**
All GOA Ports	**133**	**5**	**2**	**-**	**-**	**232**	**95**	**10**	**15**	**492**
Grand Total	**4,096**	**472**	**231**	**149**	**14**	**248**	**184**	**15**	**25**	**5,434**

Source: Table developed by Northern Economics based on data from NMFS-AKR "Catch and Area Database" (Lewis, 2014).

A review of starting and ending ports before and after AM80 reveals some relatively minor shifts in port usage by the AM80 fleet. First it must be said that the total number of port-call fishing trips increased in the post-AM80 years from 2,450 to 2,984—a 21 percent increase over the 5-year period. In the BSAI, port-call fishing trips increased by 23 percent, while in the GOA port-call fishing trips increased by 7 percent. The relative importance[17] of Dutch Harbor, Adak, and Atka all increased in the post-AM80 period, while the relative importance of St. Paul and all of the GOA ports declined, although the total number of port-call fishing trips in and out of both Sand Point and Seward actually increased.

11.1.1 Assessment of Impact of the AM80 Fleet on the Port of Adak[18]

This section provides a summary of the impact of the AM80 fleet on the Port of Adak—the second most important port for the AM80 vessels. The information has been adapted from NMFS EIS/RIR/IRFA for Steller Sea Lion Protection Measures (NMFS, 2013b) and was discussed and requested by the Council at its December 2013.

Historically, the AM80 sector has participated in the AI Pacific cod fishery on a limited basis prior to the implementation of the AM80 program, but since implementation of the program in 2008, participation in the fishery by the sector has increased. This increased participation in the AI Pacific cod fishery during 2008 through 2012 by the AM80 vessels has likely impacted the community of Adak through reduced processing of AI Pacific cod, but has also increased economic activity in the community as a remote port for AM80 vessels purchasing goods and services during extended western fishing.

[17] The relative importance of ports were measured by percent of port-call fishing trips starting or ending in a port for the periods in question.

[18] This section of the report has been provided by Jon McCracken, an economist on the staff of the North Pacific Fishery Management Council. Some minor technical edits and formatting for style have been provided by Northern Economics.

Adak is located on Kuluk Bay on Adak Island in the Aleutian chain. It is the southernmost community in Alaska. It lies 350 miles west of Unalaska in the Aleutian Island chain and is not a CDQ community. The Aleut Corporation acquired the majority of Adak's former military facilities in 2004. Since that time, the Aleut Corporation has continued its efforts to develop Adak as a civilian community with a private sector economy focused heavily on commercial fishing. Adak is pursuing a broad range of fisheries for a resident fleet to be able to deliver to Adak Fisheries, the shoreside processor.

Most commercial fishing deliveries to Adak are to a single processing plant from larger vessels from outside the area. Of the species processed, Pacific cod, halibut, and sablefish have been the primary species. The community has also seen some crab and Pacific cod activity related to other companies, but these companies are not physically located in the community. During the 2003 to 2009, the Adak processing plant was most activate from January through March followed by a relatively quiet period from April through June, and then running about half-speed from July through September before activity tapering off from October into November. The A season Pacific cod fishery is the main source of income for the plant (and raw fish tax revenue for the City of Adak), accounting for about 75% of the plant revenue. The plant has the capability to process one million round pounds (454 mt.) of Pacific cod daily (Fraser, 2013).

With no other shore-based processor in the community, the Pacific cod processing activity at the Adak shore plant accounted for a large proportion of effort and local employment in Adak. The A season Pacific cod fishery "overwhelms anything else that happens during the rest of the year, not just in terms of volume at the plant, but in terms of crew utilizing local businesses (the fuel, dock, store, and bar); without A season cod, the plant does not survive" (EDAW 2008).

As noted in the May 2013 version of the Steller Sea Lion Protection Measures EIS, Chapter 10: Community Impacts, during 2004 through 2010, the Adak shoreplant accepted deliveries of Pacific cod from Area 541 every year. The shore-based processor accepted deliveries from Area 542 for every year 2004 through 2009, and accepted deliveries from Area 543 for every year 2004 through 2008. As part of the EIS, Adak Fisheries (now Adak Seafood) did provide a confidentiality waiver for harvest volume for the years 2002 through 2008. The volume of Pacific cod landings from the AI subarea processed at Adak Fisheries was substantial, accounting for an average of 63% of the total CV landings of Pacific cod from the AI subarea. In some years, the proportion of Pacific cod from the AI subarea landings processed at the shore plant was over 80%. The high level of processing at the Adak facility suggests an overwhelming importance the plant plays in the AI Pacific cod fishery. The vast majority of AI Pacific cod comes from Area 541.

While the deliveries of Area 541/542 Pacific cod cannot be provided on an individual sector level due to confidentiality, Table 54 shows how much of the total trawl catcher vessel Pacific cod harvest from area 541/542 was delivered the Adak processing plant relative to how much was processed offshore. As noted in Table 54, during the 2003 through 2009 period, the majority of Area 541/542 Pacific cod was delivered to the plant in Adak. The data shows that the shoreside sector received an increasing share of the Area 541/542 Pacific cod deliveries from 2003 through 2007. In contrast, the offshore sector, which ranges from one to two Amendment 80 vessels depending on the time of the year, during this same time period processed a declining share of Area 541/542 Pacific cod. During 2010 and 2011 fishing years, financial difficulties surrounding the Adak shoreplant resulted in no processing of Pacific cod, so the offshore sector processed nearly all of the Area 541/542 Pacific cod processed during those two years. In 2012, the Adak shoreplant was once again open for business and once again processed a large portion of Area 541/542 Pacific cod in the years since. In April 2013, Icicle Seafoods closed its operation in Adak citing concerns about the health of the region's Pacific cod resource and increased regulatory uncertainty surrounding AI Pacific cod. In September 2013, Aleut Corporation's subsidiary Aleut Fisheries signed a 20-year lease with Adak Cod Cooperative to operate the Adak seafood processing facility. The Adak seafood processing facility has been renovated from an

H&G operation into a fillet operation. The renovated shore plant began processing AI Pacific cod in early February of 2014.

Table 54. Amount of CV Pacific cod harvested in Areas 541/542, by processing sector, 2003 through 2013

Year	CV deliveries to AFA/Crab/ AM80 motherships and floaters (Areas 541 & 542)			Shoreside landings (Areas 541 & 542)			CV cod landings in Areas 541 & 542	Total CV cod catch in BSAI	Percentage of Areas 541 & 542 CV cod landings relative to total CV cod catch in BSAI
	mt	% of AI	% of BSAI	mt	% of AI	% of BSAI			
2003	8,209	48%	13%	9,033	52%	14%	17,242	65,353	26
2004	4,153	31%	7%	9,345	69%	17%	13,498	55,700	24
2005	1,521	19%	3%	6,478	81%	13%	8,000	50,574	16
2006	1,324	21%	3%	4,879	79%	10%	6,203	50,242	12
2007	2,147	17%	5%	10,163	83%	22%	12,310	46,743	26
2008	6,514	58%	14%	4,764	42%	10%	11,278	47,382	24
2009	3,307	29%	8%	8,272	71%	20%	11,578	40,532	29
2010	8,016	96%	18%	291	4%	1%	8,307	43,254	19
2011	7,726	99%	12%	43	1%	0%	7,769	64,617	12
2012	3,056	49%	5%	3,202	51%	5%	6,258	67,887	9
2013	1,586	31%	2%	3,516	69%	5%	5,102	65,281	8

Source: Developed by NPFMC staff using CAS data from AKFIN for the discussion paper *Aleutians Islands Pacific Cod CV Allocation with a Regionalized Delivery Requirement* (NPFMC, 2014).
Note: Includes landings to Adak, Akutan, Dutch Harbor, and other Alaska communities.

Looking specifically at the AM80 sector, in general, only two vessels participated in the AI Pacific cod fishery on a regular basis during 2008 through 2012. Given the limited number of AM80 vessels that participated in the AI Pacific cod fishery during this period, quantitative information concerning their activity in the AI Pacific cod fishery cannot be disclosed. From a qualitative perspective, these AM80 vessels operated predominately as motherships in the AI Pacific cod fishery. Prior to implementation of AM80 Program, these AM80 vessels participated rarely as motherships in the AI Pacific cod fishery. Since implementation of the AM80 program, these vessels have increased their mothership activity in the AI Pacific cod fishery significantly. One likely consequence of their increased mothership activity in the AI Pacific cod fishery is some amount of AI Pacific cod, which would otherwise have been processed by the Adak seafood processing facility, was instead processed by AM80 vessels. This redistribution of AI Pacific cod processing during the 2008 through 2012 likely represents a loss in economic activity for the community of Adak.

Another consequence of the increased mothership activity by the AM80 vessels has been the increased economic activity in Adak from the purchase of goods and services from Adak venders by the AM80 companies. The economic activity generated by the AM80 vessel port calls are a substantial. For example, the May 2013 version of the Steller Sea Lion Protection Measures EIS notes that the owners of F/V *Seafisher* conduct offloads and/or crew changes in Adak about four times a year. In another example, United States Seafoods reported that they flew hundreds of crewmembers through Adak during 2008 through 2012, and spent over $4 million in Adak community. Purchases of services and goods include fuel, general store, marine storage facility, logistics, lodging, vehicle rentals, and airport services to include crew movements, critical freight, and resupply. Although Adak undoubtedly has a relatively low economic multiplier, the money spent on goods and services by AM80 companies during port calls does circulate in the small economy of Adak.

11.2 An Economic Impact Model of the AM80 Fleet

This section summarizes estimated economic impacts (multiplier effects) of the AM80 fleet from a soon to be recently published report funded by the AFSC. Investigators included Dr. Ed Waters an independent consultant from Beaverton OR, Dr. Chang K Seung of AFSC, and Marcus Hartley of

Northern Economics. The paper incorporated EDR data from the 2008–2010 fisheries to develop a model that was used to measure the multiplier impacts in Alaska, the West Coast (Washington, Oregon and California), and the rest of the U.S. that are associated with activities of the AM80 fleet.

Results from that report show that on average during 2008–2010 the AM80 fleet accounted for nearly 100 percent of Atka mackerel, 80 percent of flatfish, and 74 percent of rockfish (Pacific Ocean perch) products manufactured by Alaska processors. The estimated total economic contribution of the AM80 sector's $281 million of first wholesale revenues (estimated from 2008 COAR data) was approximately $1 billion in total output which contributed $571 million in total value added, $289 million in total labor income, $351 million in total household income, $79 million in total state and local government revenue and 6,800 total jobs in the combined economies of the three regions. About 80 percent of the $351 million total household income generated by AM80 sector activities accrued to households outside Alaska (including payments to non-Alaska residents in the AM80 sector workforce). Also about 71 percent of the $79 million in total state and local government revenues generated were paid to governments outside Alaska.

The primary findings from that report are summarized in Table 55. The table highlights the wide geographic distribution of economic impacts of the AM80 fleet's activities.

Table 55. Estimated geographic distribution of total AM80 sector impacts

Region	Output	Household Income	S-L Government Revenue	Jobs
Alaska	47%	20%	29%	53%
West Coast	18%	39%	27%	18%
Rest of the U.S.	35%	40%	44%	29%
Total (Direct, Indirect and Induced) U.S. Impacts:				
Total U.S. Impact in $ million	1,027	351	79	-
Total U.S. Impact in jobs (1,000)	-	-	-	6.8

Note: Economic impacts are based on the 2008 economic contribution from the SAM model.
Source: Table excerpted from Table 6 of Waters (2014).

The finding that the majority of economic impacts of the AM80 fishery occur outside of Alaska is not ground-breaking, and has been found to be the case for many other fisheries in Alaska. In its initial decision to allocate pollock and Pacific cod in the BSAI and GOA among inshore and inshore-offshore processors, NPFMC economists found that the vast majority of economic impacts of both the shore-based and at-sea fisheries occurred in the Pacific Northwest rather than in Alaska. (NPFMC, 1992). Similar findings have also been documented in the Alaska salmon fisheries, including a 2013 report on *The Economic Importance of the Bristol Bay Salmon Industry* report by Dr. Gunnar Knapp (Knapp, 2013), which found the following impacts:

1) Direct employment in harvesting and processing in the Bristol Bay salmon fishery by residents of Washington and Oregon exceeds employment of Alaska residents by 23 percent,
2) Household income impacts going to Washington and Oregon exceeds income impacts going to households in Alaska by 44 percent
3) Overall economic output attributable to Washington and Oregon exceeds estimated total economic output generated in Alaska by 80 percent.

11.3 An Assessment of Fish Tax Payments Related to AM80

This section develops estimates of fish tax payments made by vessels and processors that have been active in the AM80 fisheries, or in the CDQ fisheries for which allocations increased under AM80.

Under Alaska Statute (AS) 43.77, CPs and motherships are required to pay a Fishery Resources Tax (FRT) at a rate that is the equivalent of rates paid by catcher vessels and shore-based processors under the Fisheries Business Tax (FBT) (see AS 43.75). The rate for both taxes in nominally 3 percent, but there may be some variations of rates for developing fisheries. The FRT is applied to the ex-vessel value equivalent of the processed products that are offloaded in state waters by all CPs and motherships. Both the FRT and the FBT are "shared taxes" in which the revenue is split evenly between the State of Alaska and the Borough at which the offload occurred. If the offload or landing occurs at a community in the "un-organized borough" (as is the case for communities like Dutch Harbor and Adak), the fish taxes are shared primarily between that community and State, with a small portion going out to other communities in the un-organized borough. The State reports FRT and FBT revenues by community and borough each year, but the information is not separated by species or gear type so the standard reports cannot be used to assess the tax impacts of AM80.

Table 56 shows the calculations used to estimate FRT and FBT in the BSAI fisheries affected by AM80.[19] As indicated above both the FRT and FBT are paid as a percent of the ex-vessel value of the landings or offload. For this assessment the analysts used estimates of ex-vessel value that are calculated by AKFIN in the CAS for processed products of at-sea processors. For this analysis, nominal ex-vessel values and taxes have been adjusted for inflation to 2012 $. The values in the table include: 1) all BSAI harvests of AM80 CPs in non-CDQ fisheries, 2) all BSAI harvests by the vessels in the BSAI TLA fisheries, excluding landings made in pollock and Pacific cod fisheries, and 3) All CDQ landings and offloads excluding landings in CDQ fisheries for pollock, sablefish, and halibut. As seen in the table, real ex-vessel values in the included fisheries have increased from a low in 2004 of $99.34 million to a high in 2012 of $190.82 million. Estimates of tax payments have increased similarly; from $2.77 million in 2004 to $5.31 million in 2012.

Table 56. Estimates of Fish Taxes Paid by BSAI Fisheries Affected by AM80

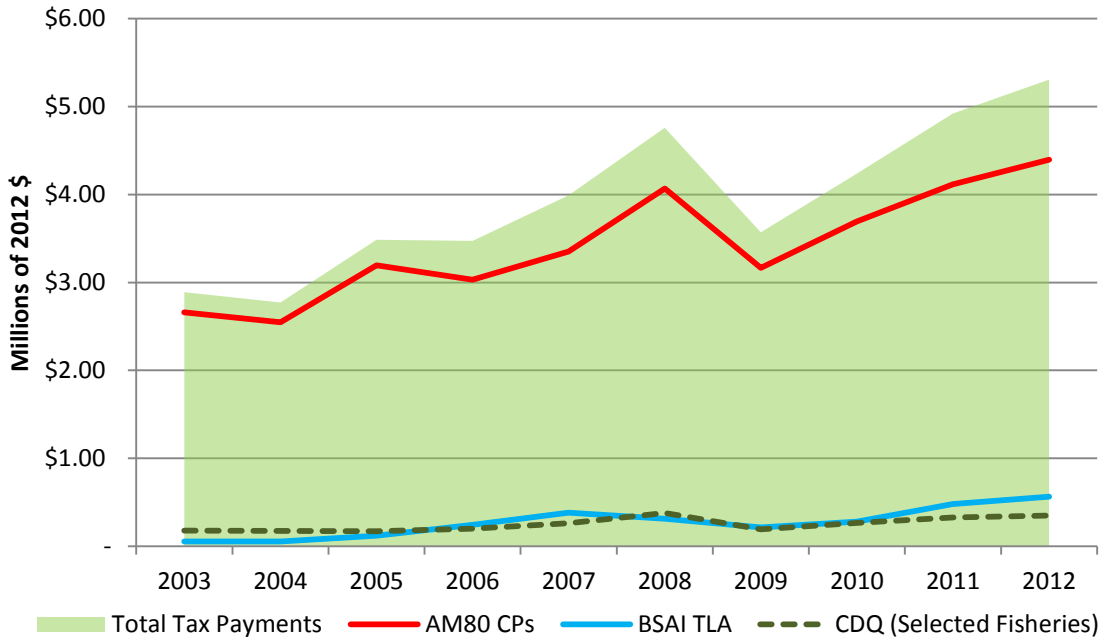
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Sector	**Ex-Vessel Value (Millions of 2012 $)**									
AM80 CPs	$88.60	$84.85	$106.52	$101.03	$111.70	$135.67	$105.53	$123.14	$137.18	$146.58
BSAI TLA	$1.79	$1.77	$3.95	$8.04	$12.66	$10.35	$7.06	$9.34	$15.98	$18.73
CDQ (Selected Fisheries)	$13.01	$12.72	$12.56	$14.69	$19.11	$27.79	$14.14	$19.37	$24.02	$25.50
Total Ex-Vessel $	**$103.40**	**$99.34**	**$123.03**	**$123.77**	**$143.47**	**$173.81**	**$126.73**	**$151.85**	**$177.18**	**$190.82**
Sector	**Estimated Fish Taxes (Millions of 2012 $) using the Standard Fish-Tax Rate of 3 Percent**									
AM80 CPs	$2.66	$2.55	$3.20	$3.03	$3.35	$4.07	$3.17	$3.69	$4.12	$4.40
BSAI TLA	$0.05	$0.05	$0.12	$0.24	$0.38	$0.31	$0.21	$0.28	$0.48	$0.56
CDQ (Selected Fisheries)	$0.18	$0.17	$0.17	$0.20	$0.26	$0.38	$0.19	$0.26	$0.33	$0.35
Total Tax Payments	**$2.89**	**$2.77**	**$3.49**	**$3.47**	**$3.99**	**$4.76**	**$3.57**	**$4.24**	**$4.92**	**$5.31**

Source: Table developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).
Note: According to AS, landings and offloads of CDQ fish are taxed at a rate that is approximately 45 percent of the standard fish tax rate of 3 percent.

[19] Ideally analysts would be able to use the information provided in the "Product Transfer Report" (see Appendix D) to assess the amount of product by species offloaded at each community. Unfortunately, as discussed in Section 11.1 these data, while provided to NMFS Enforcement Division, are not part of the datasets included in the CAS that are used to manage the fisheries.

Figure 42 shows the estimated fish tax payments related to BSAI portions of AM80. It is clear that with the exception of 2009, when revenues dropped coincident with the global recession, fish taxes have increased since the implementation of AM80 in 2008.

Figure 42. Estimates of Fish Taxes Paid by BSAI Fisheries Affected by AM80



Source: Figure developed by Northern Economics from CAS data supplied by AKFIN (Fey, 2014).

Data are not available to quantify AM80 related fish taxes by community. However, since almost all of the offloads of AM80 products occur at Dutch Harbor, that community, along with the State of Alaska, receives that vast majority of the FRT and FBT taxes estimated above.

12 Overall Summary of AM80 Vessel Activities in the BSAI and GOA

This section provides an overall summary of all activities in the AM80 sector. The data include all harvesting and processing of the fleet in both the GOA and the BSAI, and combine CDQ catch and processing as well as all processing AM80 vessels have undertaken while acting as motherships. The section uses a top down approach, first describing all groundfish catch and revenues and estimates of net operating residual. The section then moves on to summarize catch and retention by species.

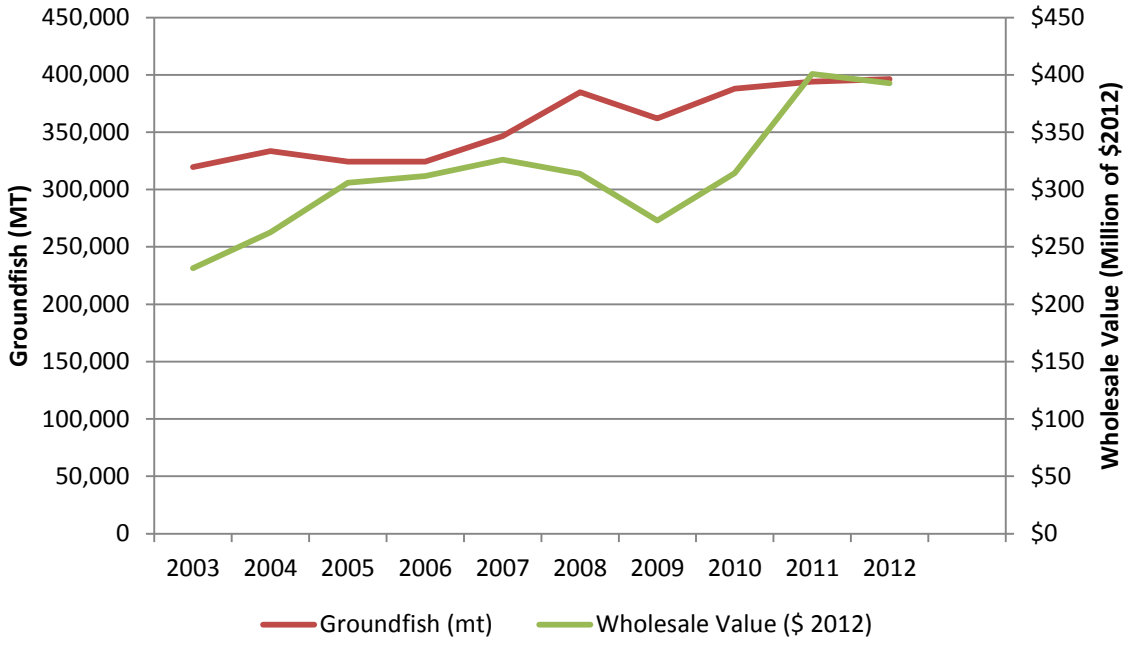
Table 57 and Figure 43 summarize total catch and total wholesale revenue in all AM80 fisheries in both the BSAI and the GOA including CDQs and processed catch of AM80 motherships. From 2003–2006 total groundfish catch ranged between 319,000 to 333,000 mt before increasing in 2007 to 347,000 mt. In 2008, total catch by all AM80 vessels (including mothership deliveries) jumped to 385,000 mt and from 2010–2012 has averaged 392,000 mt. Overall Increases in total wholesale revenues have been even more pronounced than increases in tonnage. Although total revenues declined in 2008 and 2009, they surged upward in 2010. In 2011, for the first time, total revenue exceeded $1,000 per ton harvested in real values ($2012).

Table 57. Total Catch and Wholesale Value of Groundfish of All AM80 Vessels in the BSAI and GOA

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	319,530	333,552	324,345	324,437	346,659	384,987	362,090	387,881	394,133	396,182
Wholesale $ Millions (2012)	$231.29	$262.68	$305.88	$311.71	$325.86	$313.84	$273.08	$314.28	$400.87	$392.56

Note: Includes CDQ catch and revenue as well as processed catch and revenues of AM80 vessels acting as motherships.
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 43. Total Volume and Wholesale Value of Groundfish Catch for All AM80 Vessels in the BSAI and GOA



Note: Includes CDQ catch and revenue as well as processed catch and revenues of AM80 vessels acting as motherships.

Source: Figure developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 58 shows the relative importance of the BASI and the GOA to AM80 vessels in terms of total groundfish catch and revenue. The table also shows the number of active vessels in the both the BSAI and the GOA (both FMP areas) as well as the number that fished only in the BSAI or only in the GOA. As can be inferred from the table, the relative importance of the GOA and the BSAI to the AM80 fleet overall has not changed significantly—over the 10-year period 92 percent of the catch and 91 percent of the revenue have come from the BSAI.

The review of vessel activity also shows that the number of vessels that are active only in the Bering Sea has fallen to four vessels from 2009–2011, and only one AM80 vessel has participated only in the GOA since the program was implemented.[20]

Table 58. Comparison of Total Catch and Revenue between the BSAI and GOA with Participation Levels

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BSAI Catch ÷ All Catch	88%	94%	93%	91%	93%	94%	93%	93%	93%	93%
BSAI Revenue ÷ All Revenue	86%	92%	91%	89%	93%	93%	92%	92%	91%	92%
GOA Catch ÷ All Catch	12%	6%	7%	9%	7%	6%	7%	7%	7%	7%
GOA Revenue ÷ All Revenue	14%	8%	9%	11%	7%	7%	8%	8%	9%	8%
Vessels Active in Both FMP Areas	20	15	15	15	14	12	17	16	16	16
Vessels Active in the BSAI Only	2	7	7	7	8	10	4	4	4	4
Vessels Active in the GOA Only	0	0	0	0	0	1	0	0	0	0
Total Number of Active Vessels	**22**	**22**	**22**	**22**	**22**	**23**	**21**	**20**	**20**	**20**

Note: Includes CDQ catch and revenue as well as processed catch and revenues of AM80 vessels acting as motherships.
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

12.1 Catch, Retained and Revenue by Species in the BSAI and the GOA

This section summarizes catch, retained catch, and revenue by species in the BSAI and the GOA for all AM80 vessels. The tables include catch and revenues from CDQ fisheries and delivered catch and revenues generated by AM80 vessels acting as motherships.

Table 59 shows the total retained catch by major species groups—in the table the species are sorted by total catch over the 10-year period. Comparing the two periods before AM80 (2003–2007) and after (2008–2012), there are clear winners and losers. Total catch of yellowfin sole has increased—post-AM80 yellowfin sole jumped from 27 percent to 31 percent of total catch. Similarly, total catch of arrowtooth and Kamchatka Flounder rose from 3 percent prior AM80 to 8 percent after. While it doesn't have a large share, catches of Greenland turbot have more than doubled since 2008.

Total catch numbers of Pacific cod are relatively surprising given the reallocation of Pacific cod away from the fleet under AM80. From 2003–2007 the AM80 fleet averaged slightly less than 32,777 mt of Pacific cod per year. From 2008–2012 they have harvested an average of 27,454 per year. As a percent of total catch, Pacific cod has dropped from 11 percent to 8 percent in the post AM80 era. According to industry members, Pacific cod has shifted from a target species prior to AM80 to an incidental catch species that has the potential to constrain harvests of other species.

Other species that have seen declining shares of total catch are pollock and Atka mackerel. Pollock harvests as a percent of total catch have declined after AM80—falling from 9 percent of the total from 2003–2007 to 6 percent from 2008–2012. Atka mackerel has also declined slightly from 19 percent to 17 percent.

[20] The Golden Fleece, while listed as an AM80 vessel in the final rule has never applied for AM80 QS and therefore for purposes of this analysis has not been included in any of the tables and figures.

Table 59. Total Catch by Species of AM80 Vessels in the BSAI

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	Total Catch (mt)									
Yellowfin Sole	74,306	69,470	85,832	84,644	98,041	129,867	95,219	98,016	120,143	116,328
Atka Mackerel	55,831	58,762	60,941	60,533	58,328	57,946	72,669	68,458	50,647	46,561
Rock Sole	32,796	44,070	34,844	33,081	34,902	46,380	38,422	50,524	50,057	64,819
Pacific Cod	30,138	38,019	31,090	29,909	34,732	18,985	23,740	27,442	32,044	35,058
Pollock	26,880	36,162	29,974	23,983	21,790	20,996	20,802	18,492	20,520	19,652
Arrowtooth & Kam. Flounder	9,679	14,631	11,114	9,625	7,101	17,926	26,109	35,739	26,782	28,229
Pacific Ocean Perch	13,760	11,334	9,504	12,085	17,491	16,802	14,853	17,589	23,341	22,838
Alaska Plaice	9,501	7,567	10,108	13,646	15,674	15,533	12,804	13,667	19,682	13,197
Flathead Sole	11,625	14,417	12,731	13,857	13,782	19,256	13,990	15,080	7,732	6,120
All Other Groundfish	7,627	7,879	6,502	7,869	10,921	7,918	8,444	7,411	6,532	6,866
Northern Rockfish	4,821	4,571	3,781	3,686	3,919	3,172	3,023	4,162	2,705	2,235
All Other Flatfish	2,394	3,762	3,586	2,204	4,685	3,048	1,959	1,847	2,437	2,847
Greenland Turbot	882	648	688	293	344	1,845	3,037	1,953	1,526	2,433
All Other Rockfish	670	667	376	509	545	600	574	782	1,133	1,153
Sablefish	217	298	376	136	120	256	166	104	90	239
All Species	**281,128**	**312,258**	**301,449**	**296,058**	**322,374**	**360,528**	**335,810**	**361,265**	**365,373**	**368,573**

Note: Includes CDQ catch as well as all processed catch of AM80 vessels acting as motherships.
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 60 shows estimated retention percentages by species for the AM80 in the BSAI. Overall, retention has increased from an average of 75 percent from 2003–2007 to an average of 92 percent 2008–2012. The highlighted rows indicate the species with the largest gains in retentions. The largest gains in retention on a percentage basis are seen in Alaska plaice, northern rockfish and arrowtooth and Kamchatka flounder—for which retention percentages have more than doubled. There have also been large gains in pollock—these increases have undoubtedly been a result of changes in the way that maximum retainable allowance percentages have been enforced.

Table 60. Estimated Retention Percentages by Species in the BSAI

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	Estimated Retention Percentage									
Yellowfin Sole	86%	83%	91%	91%	89%	96%	94%	95%	97%	97%
Atka Mackerel	80%	81%	94%	96%	97%	98%	96%	94%	97%	97%
Rock Sole	60%	58%	68%	81%	77%	93%	93%	96%	98%	97%
Pacific Cod	98%	99%	98%	98%	99%	98%	98%	96%	99%	98%
Pollock	51%	47%	56%	54%	58%	87%	85%	93%	93%	92%
Arrowtooth & Kam. Flounder	37%	23%	53%	41%	33%	80%	86%	86%	91%	94%
Pacific Ocean Perch	85%	83%	85%	83%	86%	98%	94%	97%	98%	98%
Alaska Plaice	2%	2%	1%	4%	6%	45%	62%	59%	69%	80%
Flathead Sole	77%	76%	84%	79%	74%	97%	97%	97%	98%	97%
All Other Groundfish	25%	19%	17%	19%	15%	15%	12%	16%	13%	14%
Northern Rockfish	10%	15%	24%	28%	22%	48%	65%	79%	95%	90%
All Other Flatfish	44%	34%	40%	32%	22%	36%	61%	30%	29%	25%
Greenland Turbot	82%	67%	89%	77%	71%	72%	89%	95%	99%	99%
All Other Rockfish	70%	61%	73%	78%	62%	78%	86%	89%	87%	87%
Sablefish	74%	74%	92%	94%	97%	100%	97%	97%	98%	99%
All Species	**71%**	**69%**	**78%**	**79%**	**78%**	**90%**	**90%**	**91%**	**93%**	**94%**

Note: Includes all retained catches harvested by, or delivered to, AM80 vessels.
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 61 shows total catch by species of AM80 vessels in the GOA. While the AM80 program does not directly affect the GOA fisheries in terms of rationalization, there appear to have been some coincidental changes or indirect effects. For example, the relative share of arrowtooth & Kamchatka flounder has declined, and the relative share of Pacific ocean perch has increased.

Table 61. Total Catch by Species of AM80 Vessels in the GOA

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	Total Catch (mt)									
Arrowtooth & Kam. Flounder	18,389	4,725	6,343	8,399	6,484	6,378	4,153	5,325	9,379	7,118
Pacific Ocean Perch	5,317	6,342	6,610	8,668	7,962	7,488	8,256	8,794	7,259	8,076
Northern Rockfish	2,273	2,438	2,559	2,987	1,895	2,514	2,614	2,723	2,473	3,130
Pelagic Shelf Rockfish	1,562	1,212	1,010	1,381	1,615	1,911	1,489	1,712	1,576	1,938
All Other Rockfish	2,309	1,417	1,171	1,243	1,170	1,139	1,240	1,114	1,372	1,508
Rex Sole	2,585	871	1,298	1,484	796	913	1,989	1,487	1,039	1,014
Atka Mackerel	553	772	774	810	1,233	1,782	2,153	2,197	1,594	1,170
Pacific Cod	1,773	1,242	885	1,012	807	847	1,181	920	964	1,086
All Other Flatfish	1,168	969	1,073	1,121	875	554	837	621	585	536
Pollock	701	408	282	336	400	557	1,675	923	1,600	1,197
Sablefish	1,096	608	572	550	471	406	360	396	513	421
All Other Groundfish	675	289	338	388	575	234	335	404	407	416
All Species	**38,402**	**21,294**	**22,915**	**28,380**	**24,284**	**24,723**	**26,280**	**26,615**	**28,760**	**27,609**

Note: Includes all retained catches harvested by AM80 vessels.
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 62 shows retention percentages by species in the GOA. During the five years prior to implementation of AM80, overall retention of groundfish by AM80 vessels in the GOA averaged 74 percent. After implementation of AM80, overall retention has increased to 83 percent. In the table the species showing the largest gains in retention are shaded. While retention of several species in the GOA has increased, retention percentages have decreased for others, including pollock (from 74 to 66 percent), Atka mackerel (from 67 to 56 percent) and "All other rockfish" (from 68 to 61 percent).

Table 62. Estimated Retention Percentages by Species in the GOA

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	Estimated Retention Percentage									
Arrowtooth Flounder	59%	22%	55%	55%	64%	81%	33%	53%	86%	87%
Pacific Ocean Perch	74%	92%	93%	91%	96%	94%	91%	95%	92%	94%
Northern Rockfish	80%	90%	96%	92%	97%	97%	96%	98%	97%	99%
Pelagic Shelf Rockfish	97%	97%	99%	92%	99%	99%	98%	99%	98%	93%
All Other Rockfish	67%	61%	79%	59%	80%	59%	57%	53%	67%	65%
Rex Sole	94%	94%	89%	94%	96%	97%	99%	98%	99%	98%
Atka Mackerel	57%	63%	82%	58%	70%	44%	60%	54%	64%	58%
Pacific Cod	71%	96%	82%	86%	93%	90%	92%	87%	96%	91%
All Other Flatfish	68%	63%	70%	66%	76%	78%	84%	88%	86%	71%
Pollock	78%	72%	94%	61%	65%	69%	68%	81%	49%	74%
Sablefish	52%	88%	91%	68%	86%	84%	85%	92%	69%	88%
All Other Groundfish	46%	34%	24%	14%	18%	53%	43%	42%	33%	39%
All Species	**68%**	**71%**	**79%**	**75%**	**82%**	**85%**	**77%**	**80%**	**85%**	**88%**

Note: Includes all retained catches harvested. Percentages are calculated using observer retention data.
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

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Appendix A: NPFMC Motion on AM80

Draft

Amendment 80 – Council Motion (Final Action) – June 10, 2006

The Council adopts the following components and options for analysis as a Preferred Alternative:

Issue 1: Sector Allocation of BSAI Non-Pollock Groundfish to the Non-AFA Trawl Catcher Processor
Sector and CDQ Program

Component 1 Allocate only the following primary target species to the Non-AFA Trawl CP sector: yellowfin sole, rock sole, flathead sole, Atka mackerel, and Aleutian Islands Pacific Ocean perch. Species could be added or deleted through an amendment process.

Component 2 CDQ allocations for each primary target (Component 1) species in the program shall be removed from the TACs prior to allocation to sectors at percentage amounts equal to 10%

For Amendment 80 species, the reserves would be set at 10% of the TAC and all would be allocated to the
CDQ reserves.

CDQ allocations for secondary groundfish species (except Pacific cod) taken incidental in the primary trawl target fisheries shall be removed from the TACs prior to allocation to sectors at percentage amounts equal to
10%.

Component 3 Identifies the sector allocation calculation (after deductions for CDQs, ICAs, and other existing fishery allocations, i.e., Atka mackerel jig) for the Non-AFA Trawl CP sector. The remaining portion of the primary species TAC included in this program would be allocated to the BSAI trawl limited access fishery.

For purpose of allocation to the Non-AFA Trawl CP sector, each primary species allocation is:

Yellowfin Sole	ITAC (mt)	H&G/Limited Access
	< = 87,500	93% / 7%
	87,500 – 95,000	87.5% / 12.5%
	95,000 – 102,500	82% / 18%
	102,500 – 110,000	76.5% / 23.5%
	110,000 – 117,500	71% / 29%
	117,500 – 125,000	65.5% / 34.5%
	>125,000	60% / 40%

AFA Yellowfin sole sideboards are removed when the Yellowfin sole ITAC is 125,000 mt or greater. Rock Sole 100%

Flathead Sole	100%
Atka Mackerel	98% in 541/EBS and 542, in the first year of the program, decreasing by 2% increments over 4-yr period to 90%. 100% in 543.
AI POP	95% in 541 and 542 in the first year of the program, decreasing to 90% in the second year of the program. 98% in 543.

Allocations would be managed as a hard cap for the H&G sector, and for the Non H&G sector, an ICA would be taken off the top to accommodate incidental bycatch by the non-H&G sector. AFA vessel sideboard amounts will be determined after CDQ reserve amounts are deducted from TAC.

Legal landing means, for the purpose of initial allocation of QS, fish harvested during the qualifying years specified and landed in compliance with state and federal permitting, landing, and reporting regulations in effect at the time of the landing. Legal landings exclude any test fishing, fishing conducted under an experimental, exploratory, or scientific activity permit or the fishery conducted under the Western Alaska CDQ program.

Target species, PSC, and ICA rollover: any unharvested portion of the Amendment 80 target species or unharvested portion of PSC or ICA in the limited access fishery that is projected to remain unused shall be rolled over to vessels that are members of Amendment 80 cooperatives.

Any roll over of halibut PSC to the Non-AFA Trawl CP sector shall be discounted by 5%. That is, if 100 mt of halibut is available for roll over, then 95 mt of halibut would be re-allocated to the Non-AFA Trawl CP sector. Once the initial allocation has been determined, the Non-AFA Trawl CP sector may re-allocate the PSC among the target species.

NMFS shall perform a review on or before May 1 and August 1 each year, and at such other times after August 1 as it deems appropriate. In making its determination, NMFS shall consider current catch and PSC usage, historic catch and PSC usage, harvest capacity and stated harvest intent, as well as other relevant information.

Component 4 Elements of Component 4 were integrated in Component 3 with selection of percentages.

Issue 2: PSC Allowance for the Non-AFA Trawl Catcher Processor Sector and the CDQ Program

Component 5 Increase PSQ reserves allocated to the CDQ program (except herring, halibut, and Chinook salmon) to levels proportional to the CDQ allocation of primary species under Component 2.

Component 6 PSC allowances of halibut and crab to the Non-AFA Trawl CP Sector. The halibut and crab PSC levels shall be reviewed by the Council during the fifth year of the program and adjusted as necessary (through the normal amendment process).

Halibut PSC

BSAI Trawl limited access sector: 875 mt

Non-AFA Trawl CP sector: 2525 mt initial allocation with a 50 mt reduction in the second, third, fourth and fifth year after program implementation. In the sixth year and subsequent years, the allocation would be 2325mt unless adjusted. In the third year only, the 50 mt reduction would be reallocation to the CDQ/PSQ reserve program.

Crab PSC

Allocation of crab PSC to the non-AFA Trawl CP sector shall be based on the % of historic usage of crab PSC in all groundfish fisheries from 2000-2002 for red king crab (62.48%) and from 1995 to 2002 for opilio (61.44%) and bairdi (zone 1: 52.64% and zone 2: 29.59%) (resulting percentages are reported in the far right column in Table 3-43 May 5, 2006 EA/RIR/IRFA). The initial allocation will be reduced by 5% per year starting in the second year until the Non-AFA Trawl CP sector is at 80% of their initial allocation. Trawl limited access sectors shall receive an allowance of the sum of the combined AFA CV/CP sideboards. (Note – basing usage on a % of annual PSC limits, results in a calculation that is crab abundance based.)

If Amendment 85 is implemented prior to Amendment 80, the Non-AFA Trawl CP sector would receive an allocation of PSC in accordance with Amendment 85. Upon implementation of Amendment 80, no allocation of PSC will be made to the Non-AFA Trawl CP sector under Amendment 85.

Issue 3: Cooperative Development for the Non-AFA Trawl Catcher Processor Sector

Component 7 The BSAI non-pollock groundfish CP buyback legislation establishes the vessels eligible to participate as a catcher processor in the BSAI non-pollock groundfish fisheries. The members of the Non-AFA Trawl Catcher Processor subsector are defined as the owner of each trawl CP:

a.) that is not an AFA Trawl CP

b.) to whom a valid LLP license that is endorsed for BSAI Trawl CP fishing activity has been issued;

and

c.) that the Secretary determines who has harvested with trawl gear and processed not less than a total of 150 mt of non-pollock groundfish during the period January 1, 1997 – through December 31, 2002.

This definition establishes the vessels that can participate in the Amendment 80 program.

Restrict LLPs that are used for eligibility in Amendment 80 (either to be included in the Non-AFA CP
sector or to be used in Amendment 80 cooperative formation) from being used outside of the Amendment
80 sector, except that any eligible vessel which is authorized to fish Pollock under the AFA would still be authorized to fish under the statute.

Only history from eligible vessels will be credited in the program. The catch history credited to an eligible vessel will be catch history of that vessel. The catch history credited to an eligible vessel for the first license assigned to that vessel will only be the catch history of the eligible vessel**.** In the event of the actual total loss or constructive total loss of a vessel, or permanent inability of a vessel to be used in the Program as documented by the vessel owner and NMFS either before or after the qualifying period, the vessel owner may transfer the catch history of the vessel that meets the non-AFA and catch criteria of Component 7 from that vessel to the LLP license that was originally issued for that vessel. Any such license assigned to an eligible vessel will be credited with the catch history during the Component 10 period of the eligible non- AFA trawl CP from which the license arose, except that no history can be assigned to

more than one vessel at a given time. Once the catch history has been assigned to the license, that license must be used on an eligible Non-AFA Trawl CP vessel.

Component 8 Component 8 establishes the number of vessels required before the cooperative is allowed to operate. No later than November 1 of each year, an application must be filed with NOAA fisheries by the cooperative with a membership list for the year.

In order to operate as a cooperative, membership must be comprised of at least three separate entities (using the
10% AFA rule) and must be:

Option 8.2 At least 30% of the eligible vessels, including LLP licenses with associated catch history for an eligible vessel that has been transferred to that LLP license under Component 7.

Component 9 Determines the method of allocation of PSC limits and groundfish between the cooperative and eligible Non-AFA Trawl CP participants who elect not to be in a cooperative.

Option 9.1 Catch history is based on total catch

Assign PSC within the sector to allocated target species and Pacific cod based on the average use of PSC in each target species from the years 1998-2004, expressed as a percent of the total PSC allocation to the sector.

Each eligible vessel will then receive an allocation percent of PSC for catch of allocated target species and
Pacific cod equal to its proportion of the catch history of the allocated fishery.

This PSC allocation will not change from year to year (i.e., will not fluctuate annually with the TAC).

Component 10 Determines which years of catch history are used for establishing cooperative allocations. The allocation of groundfish between the cooperative and those eligible participants who elect not to join a cooperative is proportional to the catch history of groundfish of the eligible license holders included in each pool. Applicable PSC limits are allocated between the cooperative and non-cooperative pool in same proportions as those species that have associated PSC limits. The catch history as determined by the option selected under this component would be indicated on the Sector Eligibility Endorsement, which indicates the license holder's membership in the Non-AFA Trawl CP sector. The aggregate histories would then be applied to the cooperative and the non-cooperative pool.

Notwithstanding the qualifying history of the vessel, a qualified vessel that has not fished after 1997 will receive an allocation under the program of no less than:

0.5 percent of the yellowfin sole catch history

0.5 percent of the rock sole catch history

0.1 percent of the flathead sole catch history

For all other qualified vessels, the allocation will be based on 1998 – 2004, but each vessel drops its two lowest annual catches by species during this period.

For AI POP, all vessels will receive their allocation equally in 541, 542 and 543.

Each vessel will receive its historic share of the sector's Atka mackerel allocation based on component 10 (all areas combined). Vessels less than 200' in length having less than 2% of the sector's Atka mackerel history ("Non-mackerel vessels") will receive their allocation distributed by area according to each individual vessel's catch distribution during the component 10 years. The remainder of EBS/541, 542 and 543 sector allocation after "Non-mackerel vessels" have been removed will be allocated to vessels that are greater than 200' in length or have more than 2% of the sector's Atka mackerel allocation ("mackerel vessels"). Mackerel vessels will receive their respective percentages (adjusted to 100%) equally in each area.

In the event that the Non-AFA Trawl CP sector receives an exclusive allocation of Pacific cod, that allocation will be divided between cooperatives and the sector's limited access fishery in the same manner (and based on the same history) as the division of the other allocated species within the sector.

Component 11 Determines if excessive share limits are established in the Non-AFA Trawl CP sector.

Option 11.2 Consolidation in the Non-AFA Trawl Catcher Processor sector is limited such that no single person (using the individual and collective rule) can hold catch history more than a fixed percentage of the overall sector apportionment history. The cap would be applied on an aggregate basis at 30%, of the sector's allocation).

Suboption 11.2.2 Persons (individuals or entities) that exceed the cap in the initial allocation would be grandfathered based on catch history held at the time of final Council action.

Option 11.3 No vessel shall harvest more than 20% of the entire Non-AFA Trawl CP sector allocation.

Suboption 11.3.1 Vessels that are initially allocated a percentage of the sector allocation that is greater than the vessel use cap shall be grandfathered at their initial allocation based on catch history held at the time of final Council action.

If a buyback program proceeds, any person or vessel that exceeds a cap due to the buyback removing catch history would be grandfathered in at that new level.

Component 12 Establishes measures to maintain relative amounts of non-allocated species until such time that fisheries for these species are further rationalized in a manner that would supersede a need for these sideboard provisions. Sideboards shall apply to eligible licenses and associated vessels from which the catch history arose.

Option 12.3 In the BSAI, Pacific cod will be managed under existing sector apportionments, with rollovers, until new Pacific cod sector allocations are implemented. Pacific cod will be allocated between the cooperative and non-cooperative sub-sectors based on the same formula as Component 10.

In the BSAI, management of unallocated species should remain status quo.

Option 12.4 GOA sideboard provisions

Sideboard provisions for Amendment 80 qualified non-AFA trawl CP sector with valid GOA LLP with appropriate area endorsements are as follows:

Suboption 12.4.1 Vessels associated with LLPs that have Gulf weekly participation of greater than 10 weeks in the flatfish fishery during the years defined in Component 10 will be eligible to participate in the GOA flatfish fisheries.

Suboption 12.4.2 Non-AFA trawl CP vessel(s) that fished 80% of their weeks in the GOA flatfish fisheries from January 1, 2000 through December 31, 2003 will be exempt from GOA halibut sideboards in the GOA**.** Vessel(s) exempted from Amendment 80 halibut sideboards in the GOA and may participate fully in the GOA open-access flatfish fisheries. Vessel(s) will be prohibited from directed fishing for all other sideboarded species in the GOA (rockfish, Pacific cod, and Pollock). The history of this vessel will not contribute to the Non-AFA Trawl CP sideboards and its catch will not be subtracted from these sideboards.

Suboption 12.4.2.1 Vessel(s) exempted from Amendment 80 GOA sideboards may lease their BSAI Amendment 80 history.

Suboption 12.4.3 Gulf-wide halibut sideboards for the deep and shallow complex fisheries would be established by season based on the actual usage of the Amendment 80 qualified non-AFA trawl sector for the years defined in Component 10. That calculation results in the following percentages, less the percentage attributed to GOA PSC sideboard exempt vessel:

GOA Halibut PSC Sideboard Limits for Non-AFA Trawl CP Sector (as percent of GOA total sideboard limit, ie, 2,000mt in 2006)						
	Season 1	Season 2	Season 3	Season 4	Season 5	Total
Deep Water Trawl Fisheries	2.84%	11.92%	11.60%	n/a	Combined w/shallow water	26.36
Shallow Water Trawl Fisheries	0.85%	1.92%	2.06%	1.73%	5.15%	11.71%

Note: The F/V Golden Fleece data still needs to be deducted from the above table.

Suboption 12.4.4 GOA Pollock, Pacific cod, and directed rockfish species (POP, NR and PSR) sideboards for the Amendment 80 qualified non-AFA trawl CP sector would be established using the years defined in Component 10, where catch is defined as retained catch by Gulf area as a percentage of total retained catch of all sectors in that area.

Suboption 12.4.5 While the CGOA rockfish demonstration program is in place, the CGOA rockfish demonstration program takes precedence. The demonstration program would remove the need for catch sideboards for the CGOA directed rockfish species. The Amendment 80 CPs deep halibut mortality sideboard cap for the
3rd seasonal allowance (in July) will be revised by the amount of the deep complex halibut mortality allocated to the rockfish demonstration program for the Amendment 80 qualified non-AFA trawl CP sector while the demonstration program is in effect.

Suboption 12.4.6 Sideboards apply to vessels (actual boats) and LLPs used to generate harvest shares that resulted in allocating a percentage of the Amendment 80 species TACs to the non-AFA trawl CP sector. The intent is to prevent double-dipping with respect to GOA history related to sideboards.

Suboption 12.4.7 On completion of a comprehensive rationalization program in the GOA, any sideboards from the BSAI Amendment 80 plan amendment will be superseded by the allocations in the GOA rationalization program.

Suboption 12.4.8 GOA PSC and groundfish sideboard limits will be established. An aggregate sideboard limit for each sideboarded species will be established for all vessels subject to sideboards

Other Elements of Amendment 80

This section provides additional specifics and elements for the Non-AFA Trawl CP cooperative program. These specifics and elements are common for any cooperative program that might be developed.

- The cooperative program developed in Amendment 80 would not supersede pollock and Pacific cod
  IR/IU programs.

- The Groundfish Retention Standards (GRS) (Amendment 79) would be applied to the cooperative as an aggregate on an annual basis and on those vessels who did not join a cooperative as individuals.

- Non-AFA Trawl CP sector participants that did not elect to join a cooperative would be subject to all current regulations including all restrictions of the LLP and the GRS if approved.

- All qualified license holders participating in the fisheries of the Non-AFA Trawl CP sector for Amendment 80 species would need to have trawl and catcher processor endorsements with general licenses for BSAI and the additional sector eligibility endorsement. Length limits within the license would also be enforced such that any replacement vessel entering the fishery would not exceed the Maximum Length Overall (MLOA) specified on the license.

- Permanent transfers of an eligible vessel, its associated catch history, and its permit would be allowed.

  Eligible vessels, their associated catch history, and a sector eligibility endorsement would not be separable or divisible. In the event of the actual total loss or constructive total loss of a vessel, or permanent inability of a vessel to be used in the Program, catch history would be attached to the license that arose from the vessel and would not be separable or divisible. All transfers must be reported to NOAA fisheries in order to track who owns the sector eligibility permit and harvest privileges of a vessel. The purchaser must be eligible to own a fishing vessel under MarAd regulations or any person who is currently eligible to own a vessel.

- Annual allocations to the cooperative will be transferable among Non-AFA Trawl CP cooperative members. Such transfers will not need NOAA Fisheries approval.

- Annual allocations to the cooperative will be transferable among Non-AFA Trawl CP cooperatives.

  Inter-cooperative transfers must be approved by NOAA Fisheries.

- Any non-trawl or non-BSAI catches by qualified license holders that are considered part of the Non- AFA Trawl CP sector will not be included in the defined cooperative program. In addition, these non- trawl or non-BSAI catches allocated to the Non-AFA Trawl CP sector would not necessarily be excluded from other rationalization programs.

- Catch history used for allocation and eligibility purposes will be legal and documented catch.

- Disposition of groundfish species not allocated to the Non-AFA Trawl CP sector will not change as a result of the cooperative program developed in Amendment 80.

- Bycatch limits for non-specified species or marine resources would not be established. However, if the Council deems that bycatch is unreasonable, specific regulations to minimize impacts would be considered.

- AFA halibut PSC Sideboard limits will be fixed at the 2006/2007 level. (The intent is to fix the AFA

  halibut sideboard amounts, in metric tons, at the level listed in the 2006/2007 NMFS reports).

- The allocation of halibut PSC between the AFA trawl CP and trawl CV sector under Amendment 85 will incorporation the reallocation of halibut PSC to the Amendment 80 sector.

- The cooperative(s) would need to show evidence of binding private contracts and remedies for violations of contractual agreements would need to be provided to NOAA Fisheries. The cooperative would need to demonstrate adequate mechanism for monitoring and reporting prohibited species and groundfish catch. Participants in the cooperative would need to agree to abide by all cooperative rules and requirements.

- Specific requirements for reporting, monitoring and enforcement, and observer protocols will be developed in regulations for participants in the Non-AFA Trawl CP sector These monitoring and enforcement provisions are described in Section 3.3.7 of the April 2006 EA/RIR/IRFA. Revisions to

  3.3.7 have been described in March 27, 2006 letter from NMFS to the Council**.** Modifications to the monitoring and enforcement requirements described in the current version of the EA/RIR/IRFA necessary to accommodate changes in GOA sideboard provisions, or other issues, will be incorporated in the Secretarial review draft of the EA/RIR/IRFA.

- A socioeconomic data collection program as described in section 3.2.12.15 of the May 5, 2006 draft EA/RIR/IRFA for Amendment 80 will be implemented for the non-AFA trawl CP sector. The program will collect economic data from the non-AFA trawl CP sector similar to the types of cost, revenue, ownership, and employment data included in the draft Cost, Earnings and Employment Survey in Appendix 3 of the May 5, 2006, draft EA/RIR/IRFA prepared for Amendment 80. Data will be collected on a periodic basis.

  The purpose of the data collection program is to understand the economic effects of the Amendment 80 program on vessels or entities regulated by this action, and to inform future

management actions. The data is needed to assess whether Amendment 80 addresses some goals in the problem statement to mitigate, to some degree, the costs associated with bycatch reduction. Data will be used by Council and agency staff, recognizing that confidentiality is of extreme importance.

Economic data collected under this program include employment data by vessel collected to determine the labor amounts and costs for the sector. In addition, revenue and cost data by vessel will be collected to evaluate trends in returns to the sector that may be compared with elements of the Amendment 80 program, such as bycatch reduction measures.

Appendix B: AM80 Quota Share Allocation by Species

The tables in this Appendix present total AM80 QS units for each AM80 species and the annual allocations of species QS to individual vessels and the companies with which they are affiliated. The appendix begins by showing total species allocations as shown in Table 8 below. The percentage of the total QS allocation each species represents is shown in Table 64.

Table 63. Total AM80 Quota Share Allocation by Species, 2003–2014

	2008	2009	2010	2011	2012	2013	2014
Species				(1,000s)			
Yellowfin Sole	347,990	347,990	351,506	351,506	351,506	351,506	351,506
Rock Sole	167,869	167,869	169,569	169,569	169,569	169,569	169,569
Flathead Sole	84,896	84,896	85,066	85,066	85,066	85,066	85,066
Atka Mackerel	256,282	256,282	256,282	256,282	256,282	256,282	256,282
Pacific Ocean Perch	57,882	57,882	57,882	57,882	57,882	57,882	57,882
Pacific Cod	155,235	155,235	155,235	155,235	155,235	155,235	155,235
Total	1,070,153	1,070,153	1,075,540	1,075,540	1,075,540	1,075,540	1,075,540

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014b

As shown in Table 64, Yellowfin Sole and Atka Mackerel comprise of more than half of total QS units issued in the AM80 fishery.

Table 64. Total Percent AM80 Quota Share Allocation by Species, 2003–2014

Species	2008	2009	2010	2011	2012	2013	2014
Yellowfin Sole	32.52%	32.52%	32.68%	32.68%	32.68%	32.68%	32.68%
Rock Sole	15.69%	15.69%	15.77%	15.77%	15.77%	15.77%	15.77%
Flathead Sole	7.93%	7.93%	7.91%	7.91%	7.91%	7.91%	7.91%
Atka Mackerel	23.95%	23.95%	23.83%	23.83%	23.83%	23.83%	23.83%
Pacific Ocean Perch	5.41%	5.41%	5.38%	5.38%	5.38%	5.38%	5.38%
Pacific Cod	14.51%	14.51%	14.43%	14.43%	14.43%	14.43%	14.43%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014b

The following tables display AM80 QS allocation for each species by vessel and company. Comparing the relative proportion of each species in Table 64 and the percentage of company holdings in following tables, lends itself to understanding the composition of AM80 QS ownership. For example, yellowfin sole and Atka Mackerel comprise of more than half of the AM80 fishery. By looking at Table 65 and Table 68 below reveals FCA to be the dominant holder of QS for both species.

Table 65. Total Percent AM80 Quota Share Allocation, Yellowfin Sole, 2003–2014

Company	Vessel	2008	2009	2010	2011	2012	2013	2014
	ALLIANCE	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
	LEGACY	0.79%	0.79%	0.79%	0.79%	0.79%	0.79%	0.79%
	OCEAN ALASKA	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
	PROSPERITY	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%
	SEAFREEZE ALASKA	1.24%	1.24%	1.23%	1.23%	1.23%	1.23%	1.23%
	VAERDAL	-	-	0.56%	0.56%	0.56%	0.56%	0.56%
U.S. Seafoods	**U.S. Seafoods Total**	**2.54%**	**2.54%**	**3.09%**	**3.09%**	**3.09%**	**3.09%**	**3.09%**
	ALASKA JURIS	2.64%	2.64%	2.62%	2.62%	2.62%	2.62%	2.62%
	ALASKA RANGER	2.01%	2.01%	2.00%	2.00%	2.00%	2.00%	2.00%
	ALASKA SPIRIT	2.53%	2.53%	2.51%	2.51%	2.51%	2.51%	2.51%
	ALASKA VICTORY	2.34%	2.34%	2.33%	2.33%	2.33%	2.33%	2.33%
	ALASKA VOYAGER	0.34%	0.34%	0.34%	0.34%	0.34%	0.34%	0.34%
	ALASKA WARRIOR	2.82%	2.82%	2.80%	2.80%	2.80%	2.80%	2.80%
Fishing Company of Alaska	**Fishing Company of Alaska Total**	**12.66%**	**12.66%**	**12.60%**	**12.60%**	**12.60%**	**12.60%**	**12.60%**
	ARCTIC ROSE/OCEAN CAPE	0.06%	0.06%	0.06%	0.06%	0.06%	-	-
Arctic Sole Seafoods, Inc.	**Arctic Sole Seafoods, Inc. Total**	**0.06%**	**0.06%**	**0.06%**	**0.06%**	**0.06%**	**-**	**-**
	ARCTIC ROSE/OCEAN CAPE	-	-	-	-	-	0.06%	0.06%
	ARICA	1.56%	1.56%	1.55%	1.55%	1.55%	1.55%	1.55%
	CAPE HORN	1.12%	1.12%	1.11%	1.11%	1.11%	1.11%	1.11%
	REBECCA IRENE	1.38%	1.38%	1.37%	1.37%	1.37%	1.37%	1.37%
	TREMONT	1.06%	1.06%	1.05%	1.05%	1.05%	1.05%	1.05%
	UNIMAK	1.68%	1.68%	1.68%	1.68%	1.68%	1.68%	1.68%
Iquique U.S.	**Iquique U.S. Total**	**6.79%**	**6.79%**	**6.76%**	**6.76%**	**6.76%**	**6.81%**	**6.81%**
	VAERDAL	0.56%	0.56%	-	-	-	-	-
Jubilee Fisheries, Inc.	**Jubilee Fisheries, Inc. Total**	**0.56%**	**0.56%**	**-**	**-**	**-**	**-**	**-**
	SEAFISHER	1.54%	1.54%	-	-	-	-	-
M/V Savage, Inc.	**M/V Savage, Inc. Total**	**1.54%**	**1.54%**	**-**	**-**	**-**	**-**	**-**
	OCEAN PEACE	1.30%	1.30%	1.29%	1.29%	1.29%	1.29%	1.29%
	SEAFISHER	-	-	1.53%	1.53%	1.53%	1.53%	1.53%
Ocean Peace, Inc.	**Ocean Peace, Inc. Total**	**1.30%**	**1.30%**	**2.82%**	**2.82%**	**2.82%**	**2.82%**	**2.82%**
	AMERICAN NO I	1.31%	1.31%	1.31%	1.31%	1.31%	1.31%	1.31%
	US INTREPID	1.38%	1.38%	1.37%	1.37%	1.37%	1.37%	1.37%
Fishermans Finest	**Fishermans Finest Total**	**2.69%**	**2.69%**	**2.68%**	**2.68%**	**2.68%**	**2.68%**	**2.68%**
	CONSTELLATION	1.65%	1.65%	1.65%	1.65%	1.65%	1.65%	1.65%
	DEFENDER	1.36%	1.36%	1.36%	1.36%	1.36%	1.36%	1.36%
	ENTERPRISE	1.36%	1.36%	1.35%	1.35%	1.35%	1.35%	1.35%
	BERING ENTERPRISE	-	-	0.16%	0.16%	0.16%	0.16%	0.16%
	HARVESTER ENTERPRISE	-	-	0.16%	0.16%	0.16%	0.16%	0.16%
O'HARA CORPORATION	**O'Hara Corporation Total**	**4.38%**	**4.38%**	**4.68%**	**4.68%**	**4.68%**	**4.68%**	**4.68%**
	Grand Total	**32.52%**	**32.52%**	**32.68%**	**32.68%**	**32.68%**	**32.68%**	**32.68%**

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014b

Table 66. Total Percent AM80 Quota Share Allocation, Rock Sole, 2003–2014

Company	Vessel	2008	2009	2010	2011	2012	2013	2014
	ALLIANCE	0.11%	0.11%	0.11%	0.11%	0.11%	0.11%	0.11%
	LEGACY	0.70%	0.70%	0.70%	0.70%	0.70%	0.70%	0.70%
	OCEAN ALASKA	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
	PROSPERITY	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%
	SEAFREEZE ALASKA	0.53%	0.53%	0.53%	0.53%	0.53%	0.53%	0.53%
	VAERDAL	-	-	0.55%	0.55%	0.55%	0.55%	0.55%
U.S. Seafoods	**U.S. Seafoods Total**	**1.53%**	**1.53%**	**2.07%**	**2.07%**	**2.07%**	**2.07%**	**2.07%**
	ALASKA JURIS	0.74%	0.74%	0.73%	0.73%	0.73%	0.73%	0.73%
	ALASKA RANGER	0.56%	0.56%	0.56%	0.56%	0.56%	0.56%	0.56%
	ALASKA SPIRIT	1.07%	1.07%	1.07%	1.07%	1.07%	1.07%	1.07%
	ALASKA VICTORY	0.52%	0.52%	0.52%	0.52%	0.52%	0.52%	0.52%
	ALASKA VOYAGER	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%
	ALASKA WARRIOR	0.68%	0.68%	0.68%	0.68%	0.68%	0.68%	0.68%
Fishing Company of Alaska	**Fishing Company of Alaska Total**	**3.66%**	**3.66%**	**3.65%**	**3.65%**	**3.65%**	**3.65%**	**3.65%**
	ARCTIC ROSE/OCEAN CAPE	0.10%	0.10%	0.10%	0.10%	0.10%	-	-
Arctic Sole Seafoods, Inc.	**Arctic Sole Seafoods, Inc. Total**	**0.10%**	**0.10%**	**0.10%**	**0.10%**	**0.10%**	**-**	**-**
	ARCTIC ROSE/OCEAN CAPE	-	-	-	-	-	0.10%	0.10%
	ARICA	0.81%	0.81%	0.80%	0.80%	0.80%	0.80%	0.80%
	CAPE HORN	0.62%	0.62%	0.61%	0.61%	0.61%	0.61%	0.61%
	REBECCA IRENE	0.66%	0.66%	0.66%	0.66%	0.66%	0.66%	0.66%
	TREMONT	0.61%	0.61%	0.60%	0.60%	0.60%	0.60%	0.60%
	UNIMAK	1.16%	1.16%	1.16%	1.16%	1.16%	1.16%	1.16%
Iquique U.S.	**Iquique U.S. Total**	**3.85%**	**3.85%**	**3.84%**	**3.84%**	**3.84%**	**3.93%**	**3.93%**
	VAERDAL	0.55%	0.55%	-	-	-	-	-
Jubilee Fisheries, Inc.	**Jubilee Fisheries, Inc. Total**	**0.55%**	**0.55%**	**-**	**-**	**-**	**-**	**-**
	SEAFISHER	0.30%	0.30%	-	-	-	-	-
M/V Savage, Inc.	**M/V Savage, Inc. Total**	**0.30%**	**0.30%**	**-**	**-**	**-**	**-**	**-**
	OCEAN PEACE	0.67%	0.67%	0.67%	0.67%	0.67%	0.67%	0.67%
	SEAFISHER	-	-	0.29%	0.29%	0.29%	0.29%	0.29%
Ocean Peace, Inc.	**Ocean Peace, Inc. Total**	**0.67%**	**0.67%**	**0.96%**	**0.96%**	**0.96%**	**0.96%**	**0.96%**
	AMERICAN NO I	1.20%	1.20%	1.19%	1.19%	1.19%	1.19%	1.19%
	US INTREPID	1.13%	1.13%	1.12%	1.12%	1.12%	1.12%	1.12%
Fishermans Finest	**Fishermans Finest Total**	**2.32%**	**2.32%**	**2.31%**	**2.31%**	**2.31%**	**2.31%**	**2.31%**
	CONSTELLATION	0.86%	0.86%	0.86%	0.86%	0.86%	0.86%	0.86%
	DEFENDER	0.98%	0.98%	0.97%	0.97%	0.97%	0.97%	0.97%
	ENTERPRISE	0.87%	0.87%	0.86%	0.86%	0.86%	0.86%	0.86%
	BERING ENTERPRISE	-	-	0.08%	0.08%	0.08%	0.08%	0.08%
	HARVESTER ENTERPRISE	-	-	0.08%	0.08%	0.08%	0.08%	0.08%
O'Hara Corporation	**O'Hara Corporation Total**	**2.71%**	**2.71%**	**2.85%**	**2.85%**	**2.85%**	**2.85%**	**2.85%**
	Grand Total	**15.69%**	**15.69%**	**15.77%**	**15.77%**	**15.77%**	**15.77%**	**15.77%**

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014b

Table 67. Total Percent AM80 Quota Share Allocation, Flathead Sole, 2003–2014

Company	Vessel	2008	2009	2010	2011	2012	2013	2014
	ALLIANCE	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%
	LEGACY	0.23%	0.23%	0.23%	0.23%	0.23%	0.23%	0.23%
	OCEAN ALASKA	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%
	PROSPERITY	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
	SEAFREEZE ALASKA	0.23%	0.23%	0.23%	0.23%	0.23%	0.23%	0.23%
	VAERDAL	-	-	0.12%	0.12%	0.12%	0.12%	0.12%
U.S. Seafoods	**U.S. Seafoods Total**	**0.66%**	**0.66%**	**0.77%**	**0.77%**	**0.77%**	**0.77%**	**0.77%**
	ALASKA JURIS	0.19%	0.19%	0.19%	0.19%	0.19%	0.19%	0.19%
	ALASKA RANGER	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
	ALASKA SPIRIT	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
	ALASKA VICTORY	0.11%	0.11%	0.11%	0.11%	0.11%	0.11%	0.11%
	ALASKA VOYAGER	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
	ALASKA WARRIOR	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%
Fishing Company of Alaska	**Fishing Company of Alaska Total**	**0.73%**	**0.73%**	**0.73%**	**0.73%**	**0.73%**	**0.73%**	**0.73%**
	ARCTIC ROSE/OCEAN CAPE	0.07%	0.07%	0.06%	0.06%	0.06%	-	-
Arctic Sole Seafoods, Inc.	**Arctic Sole Seafoods, Inc. Total**	**0.07%**	**0.07%**	**0.06%**	**0.06%**	**0.06%**	**-**	**-**
	ARCTIC ROSE/OCEAN CAPE	-	-	-	-	-	0.06%	0.06%
	ARICA	0.56%	0.56%	0.56%	0.56%	0.56%	0.56%	0.56%
	CAPE HORN	0.72%	0.72%	0.72%	0.72%	0.72%	0.72%	0.72%
	REBECCA IRENE	0.58%	0.58%	0.58%	0.58%	0.58%	0.58%	0.58%
	TREMONT	0.74%	0.74%	0.74%	0.74%	0.74%	0.74%	0.74%
	UNIMAK	0.22%	0.22%	0.22%	0.22%	0.22%	0.22%	0.22%
Iquique U.S.	**Iquique U.S. Total**	**2.83%**	**2.83%**	**2.81%**	**2.81%**	**2.81%**	**2.88%**	**2.88%**
	VAERDAL	0.12%	0.12%	-	-	-	-	-
Jubilee Fisheries, Inc.	**Jubilee Fisheries, Inc. Total**	**0.12%**	**0.12%**	**-**	**-**	**-**	**-**	**-**
	SEAFISHER	0.09%	0.09%	-	-	-	-	-
M/V Savage, Inc.	**M/V Savage, Inc. Total**	**0.09%**	**0.09%**	**-**	**-**	**-**	**-**	**-**
	OCEAN PEACE	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%
	SEAFISHER	-	-	0.09%	0.09%	0.09%	0.09%	0.09%
Ocean Peace, Inc.	**Ocean Peace, Inc. Total**	**0.42%**	**0.42%**	**0.51%**	**0.51%**	**0.51%**	**0.51%**	**0.51%**
	AMERICAN NO I	0.20%	0.20%	0.19%	0.19%	0.19%	0.19%	0.19%
	US INTREPID	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%
Fishermans Finest	**Fishermans Finest Total**	**0.44%**	**0.44%**	**0.44%**	**0.44%**	**0.44%**	**0.44%**	**0.44%**
	CONSTELLATION	0.88%	0.88%	0.87%	0.87%	0.87%	0.87%	0.87%
	DEFENDER	0.75%	0.75%	0.74%	0.74%	0.74%	0.74%	0.74%
	ENTERPRISE	0.96%	0.96%	0.96%	0.96%	0.96%	0.96%	0.96%
	BERING ENTERPRISE	-	-	0.01%	0.01%	0.01%	0.01%	0.01%
	HARVESTER ENTERPRISE	-	-	0.01%	0.01%	0.01%	0.01%	0.01%
O'Hara Corporation	**O'Hara Corporation Total**	**2.58%**	**2.58%**	**2.59%**	**2.59%**	**2.59%**	**2.59%**	**2.59%**
	Grand Total	**7.93%**	**7.93%**	**7.91%**	**7.91%**	**7.91%**	**7.91%**	**7.91%**

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014b

Table 68. Total Percent AM80 Quota Share Allocation, Atka Mackerel, 2003–2014

Company	Vessel	2008	2009	2010	2011	2012	2013	2014
	ALLIANCE	0.12%	0.12%	0.12%	0.12%	0.12%	0.12%	0.12%
	LEGACY	0.35%	0.35%	0.35%	0.35%	0.35%	0.35%	0.35%
	OCEAN ALASKA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	SEAFREEZE ALASKA	1.88%	1.88%	1.87%	1.87%	1.87%	1.87%	1.87%
	VAERDAL	-	-	0.17%	0.17%	0.17%	0.17%	0.17%
U.S. Seafoods	**U.S. Seafoods Total**	**2.35%**	**2.35%**	**2.51%**	**2.51%**	**2.51%**	**2.51%**	**2.51%**
	ALASKA JURIS	3.23%	3.23%	3.22%	3.22%	3.22%	3.22%	3.22%
	ALASKA RANGER	2.42%	2.42%	2.41%	2.41%	2.41%	2.41%	2.41%
	ALASKA SPIRIT	2.04%	2.04%	2.03%	2.03%	2.03%	2.03%	2.03%
	ALASKA VICTORY	2.74%	2.74%	2.73%	2.73%	2.73%	2.73%	2.73%
	ALASKA VOYAGER	0.28%	0.28%	0.28%	0.28%	0.28%	0.28%	0.28%
	ALASKA WARRIOR	3.27%	3.27%	3.25%	3.25%	3.25%	3.25%	3.25%
Fishing Company of Alaska	**Fishing Company of Alaska Total**	**13.98%**	**13.98%**	**13.91%**	**13.91%**	**13.91%**	**13.91%**	**13.91%**
	ARCTIC ROSE/OCEAN CAPE	0.00%	0.00%	0.00%	0.00%	0.00%	-	-
Arctic Sole Seafoods, Inc.	**Arctic Sole Seafoods, Inc. Total**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**-**	**-**
	ARCTIC ROSE/OCEAN CAPE	-	-	-	-	-	0.00%	0.00%
	ARICA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
	CAPE HORN	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
	REBECCA IRENE	0.04%	0.04%	0.04%	0.04%	0.04%	0.04%	0.04%
	UNIMAK	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Iquique U.S.	**Iquique U.S. Total**	**0.08%**	**0.08%**	**0.08%**	**0.08%**	**0.08%**	**0.08%**	**0.08%**
	VAERDAL	0.17%	0.17%	-	-	-	-	-
Jubilee Fisheries, Inc.	**JUBILEE FISHERIES, INC. Total**	**0.17%**	**0.17%**	**-**	**-**	**-**	**-**	**-**
	SEAFISHER	4.46%	4.46%	-	-	-	-	-
M/V Savage, Inc.	**M/V Savage, Inc. Total**	**4.46%**	**4.46%**	**-**	**-**	**-**	**-**	**-**
	OCEAN PEACE	2.20%	2.20%	2.19%	2.19%	2.19%	2.19%	2.19%
	SEAFISHER	-	-	4.44%	4.44%	4.44%	4.44%	4.44%
Ocean Peace, Inc.	**Ocean Peace, Inc. Total**	**2.20%**	**2.20%**	**6.63%**	**6.63%**	**6.63%**	**6.63%**	**6.63%**
	AMERICAN NO I	0.23%	0.23%	0.23%	0.23%	0.23%	0.23%	0.23%
	US INTREPID	0.29%	0.29%	0.29%	0.29%	0.29%	0.29%	0.29%
Fishermans Finest	**Fishermans Finest Total**	**0.53%**	**0.53%**	**0.52%**	**0.52%**	**0.52%**	**0.52%**	**0.52%**
	CONSTELLATION	0.07%	0.07%	0.07%	0.07%	0.07%	0.07%	0.07%
	DEFENDER	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
	ENTERPRISE	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%
O'Hara Corporation	**O'Hara Corporation Total**	**0.17%**	**0.17%**	**0.16%**	**0.16%**	**0.16%**	**0.16%**	**0.16%**
	Grand Total	**23.95%**	**23.95%**	**23.83%**	**23.83%**	**23.83%**	**23.83%**	**23.83%**

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014b

Table 69. Total Percent AM80 Quota Share Allocation, Pacific Ocean Perch, 2003–2014

Company	Vessel	2008	2009	2010	2011	2012	2013	2014
	LEGACY	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	SEAFREEZE ALASKA	0.77%	0.77%	0.77%	0.77%	0.77%	0.77%	0.77%
U.S. Seafoods	**U.S. Seafoods Total**	**0.77%**	**0.77%**	**0.77%**	**0.77%**	**0.77%**	**0.77%**	**0.77%**
	ALASKA JURIS	0.88%	0.88%	0.87%	0.87%	0.87%	0.87%	0.87%
	ALASKA RANGER	0.48%	0.48%	0.47%	0.47%	0.47%	0.47%	0.47%
	ALASKA SPIRIT	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%
	ALASKA VICTORY	0.36%	0.36%	0.36%	0.36%	0.36%	0.36%	0.36%
	ALASKA VOYAGER	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%
	ALASKA WARRIOR	0.93%	0.93%	0.92%	0.92%	0.92%	0.92%	0.92%
Fishing Company of Alaska	**Fishing Company of Alaska Total**	**2.87%**	**2.87%**	**2.85%**	**2.85%**	**2.85%**	**2.85%**	**2.85%**
	CAPE HORN	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	UNIMAK	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Iquique U.S.	**Iquique U.S. Total**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**
	SEAFISHER	1.00%	1.00%	-	-	-	-	-
M/V Savage, Inc.	**M/V Savage, Inc. Total**	**1.00%**	**1.00%**	**-**	**-**	**-**	**-**	**-**
	OCEAN PEACE	0.74%	0.74%	0.73%	0.73%	0.73%	0.73%	0.73%
	SEAFISHER	-	-	1.00%	1.00%	1.00%	1.00%	1.00%
Ocean Peace, Inc.	**Ocean Peace, Inc. Total**	**0.74%**	**0.74%**	**1.73%**	**1.73%**	**1.73%**	**1.73%**	**1.73%**
	AMERICAN NO I	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
	US INTREPID	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Fishermans Finest	**Fishermans Finest Total**	**0.02%**	**0.02%**	**0.02%**	**0.02%**	**0.02%**	**0.02%**	**0.02%**
	Grand Total	5.41%	5.41%	5.38%	5.38%	5.38%	5.38%	5.38%

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014b

Table 70. Total Percent AM80 Quota Share Allocation, Pacific Cod, 2003–2014

Company	Vessel	2008	2009	2010	2011	2012	2013	2014
	ALLIANCE	0.23%	0.23%	0.22%	0.22%	0.22%	0.22%	0.22%
	LEGACY	0.62%	0.62%	0.61%	0.61%	0.61%	0.61%	0.61%
	OCEAN ALASKA	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%
	SEAFREEZE ALASKA	0.89%	0.89%	0.88%	0.88%	0.88%	0.88%	0.88%
	VAERDAL	-	-	0.51%	0.51%	0.51%	0.51%	0.51%
U.S. Seafoods	**U.S. Seafoods Total**	**1.82%**	**1.82%**	**2.33%**	**2.33%**	**2.33%**	**2.33%**	**2.33%**
	ALASKA JURIS	0.47%	0.47%	0.47%	0.47%	0.47%	0.47%	0.47%
	ALASKA RANGER	0.32%	0.32%	0.32%	0.32%	0.32%	0.32%	0.32%
	ALASKA SPIRIT	0.46%	0.46%	0.46%	0.46%	0.46%	0.46%	0.46%
	ALASKA VICTORY	0.44%	0.44%	0.44%	0.44%	0.44%	0.44%	0.44%
	ALASKA VOYAGER	0.12%	0.12%	0.12%	0.12%	0.12%	0.12%	0.12%
	ALASKA WARRIOR	0.43%	0.43%	0.43%	0.43%	0.43%	0.43%	0.43%
Fishing Company of Alaska	**Fishing Company of Alaska Total**	**2.24%**	**2.24%**	**2.23%**	**2.23%**	**2.23%**	**2.23%**	**2.23%**
	ARCTIC ROSE/OCEAN CAPE	0.05%	0.05%	0.05%	0.05%	0.05%	-	-
Arctic Sole Seafoods, Inc.	**Arctic Sole Seafoods, Inc. Total**	**0.05%**	**0.05%**	**0.05%**	**0.05%**	**0.05%**	**-**	**-**
	ARCTIC ROSE/OCEAN CAPE	-	-	-	-	-	0.05%	0.05%
	ARICA	0.84%	0.84%	0.83%	0.83%	0.83%	0.83%	0.83%
	CAPE HORN	0.68%	0.68%	0.68%	0.68%	0.68%	0.68%	0.68%
	REBECCA IRENE	0.78%	0.78%	0.77%	0.77%	0.77%	0.77%	0.77%
	TREMONT	0.41%	0.41%	0.41%	0.41%	0.41%	0.41%	0.41%
	UNIMAK	0.72%	0.72%	0.72%	0.72%	0.72%	0.72%	0.72%
Iquique U.S.	**Iquique U.S. Total**	**3.42%**	**3.42%**	**3.40%**	**3.40%**	**3.40%**	**3.46%**	**3.46%**
	VAERDAL	0.52%	0.52%	-	-	-	-	-
Jubilee Fisheries, Inc.	**Jubilee Fisheries, Inc. Total**	**0.52%**	**0.52%**	**-**	**-**	**-**	**-**	**-**
	SEAFISHER	0.75%	0.75%	-	-	-	-	-
M/V Savage, Inc.	**M/V Savage, Inc. Total**	**0.75%**	**0.75%**	**-**	**-**	**-**	**-**	**-**
	OCEAN PEACE	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%
	SEAFISHER	-	-	0.74%	0.74%	0.74%	0.74%	0.74%
Ocean Peace, Inc.	**Ocean Peace, Inc. Total**	**0.75%**	**0.75%**	**1.49%**	**1.49%**	**1.49%**	**1.49%**	**1.49%**
	AMERICAN NO I	0.84%	0.84%	0.84%	0.84%	0.84%	0.84%	0.84%
	US INTREPID	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%
Fishermans Finest	**Fishermans Finest Total**	**2.15%**	**2.15%**	**2.14%**	**2.14%**	**2.14%**	**2.14%**	**2.14%**
	CONSTELLATION	0.90%	0.90%	0.90%	0.90%	0.90%	0.90%	0.90%
	DEFENDER	0.92%	0.92%	0.91%	0.91%	0.91%	0.91%	0.91%
	ENTERPRISE	0.99%	0.99%	0.98%	0.98%	0.98%	0.98%	0.98%
O'Hara Corporation	**O'Hara Corporation Total**	**2.81%**	**2.81%**	**2.79%**	**2.79%**	**2.79%**	**2.79%**	**2.79%**
	Grand Total	**14.51%**	**14.51%**	**14.43%**	**14.43%**	**14.43%**	**14.43%**	**14.43%**

Note: 2009 QS pool was adjusted to reflect only active QS holders. QS for Bering Enterprise and Harvester Enterprise was issued late in 2009 and therefore not approved for QS until 2010 (Buck, 2014).
Source: Developed by Northern Economics from NMFS AM80 QS Holder Reports, NMFS 2014b

Appendix C: PSC Bycatch of AM80 vessels by Target Fishery

This appendix provide bycatch summaries for AM80 target fisheries including sections for yellowfin sole, rock sole, flathead sole, Atka mackerel, Pacific cod, and rockfish in the BSAI and rockfish and rex sole in the GOA. All sections contain four tables, and 12 figures. Throughout the appendix both CDQ harvests and activities of AM80 vessels while acting as motherships are excluded. It should also be noted that the overall amount of groundfish shown in the tables and figures includes all catches and revenues of groundfish not just the catch of the target species.

AM80CP BSAI Yellowfin Sole

Table 71. Total Catch and Wholesale Value of Groundfish in the AM80CP BSAI Yellowfin Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	98,040	86,072	103,435	92,901	108,257	147,768	128,746	121,447	146,308	138,034
Wholesale $ Millions (2012)	$69.0	$70.8	$99.1	$82.6	$82.2	$109.5	$82.8	$79.1	$121.2	$118.7

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 72. Bycatch of Prohibited Species in the AM80CP BSAI Yellowfin Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	701	392	552	345	446	840	898	814	767	761
PSC King Crab (#s)	27,020	38,845	59,735	33,509	11,180	34,456	19,889	18,607	7,546	5,845
PSC Bairdi Crab (#s)	291,111	1,351,860	2,379,719	576,735	603,074	471,480	202,262	174,443	414,890	298,107
PSC Opilio Crab (#s)	229,552	244,221	683,379	253,585	228,386	305,746	271,859	212,040	685,586	256,170
PSC Herring (kg)	32,584	73,006	46,419	10,446	50,053	78,500	22,654	3,319	13,249	10,048
PSC Chinook (#s)	279	29	343	1	181	61	-	138	-	90
PSC non-Chinook (#s)	515	395	492	57	55	24	182	36	318	256

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 73. Bycatch Rates in the AM80CP BSAI Yellowfin Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0071	0.0045	0.0053	0.0037	0.0041	0.0057	0.0070	0.0067	0.0052	0.0055
PSC King Crab (#/mt)	0.2756	0.4513	0.5775	0.3607	0.1033	0.2332	0.1545	0.1532	0.0516	0.0423
PSC Bairdi Rate (#/mt)	2.9693	15.7062	23.0069	6.2080	5.5708	3.1907	1.5710	1.4364	2.8357	2.1597
PSC Opilio Rate (#/mt)	2.3414	2.8374	6.6069	2.7296	2.1097	2.0691	2.1116	1.7459	4.6859	1.8558
PSC Herring Rate (kg/mt)	0.3324	0.8482	0.4488	0.1124	0.4624	0.5312	0.1760	0.0273	0.0906	0.0728
PSC Chinook (#/mt)	0.0028	0.0003	0.0033	0.0000	0.0017	0.0004	-	0.0011	-	0.0007
PSC non-Chinook (#/mt)	0.0053	0.0046	0.0048	0.0006	0.0005	0.0002	0.0014	0.0003	0.0022	0.0019

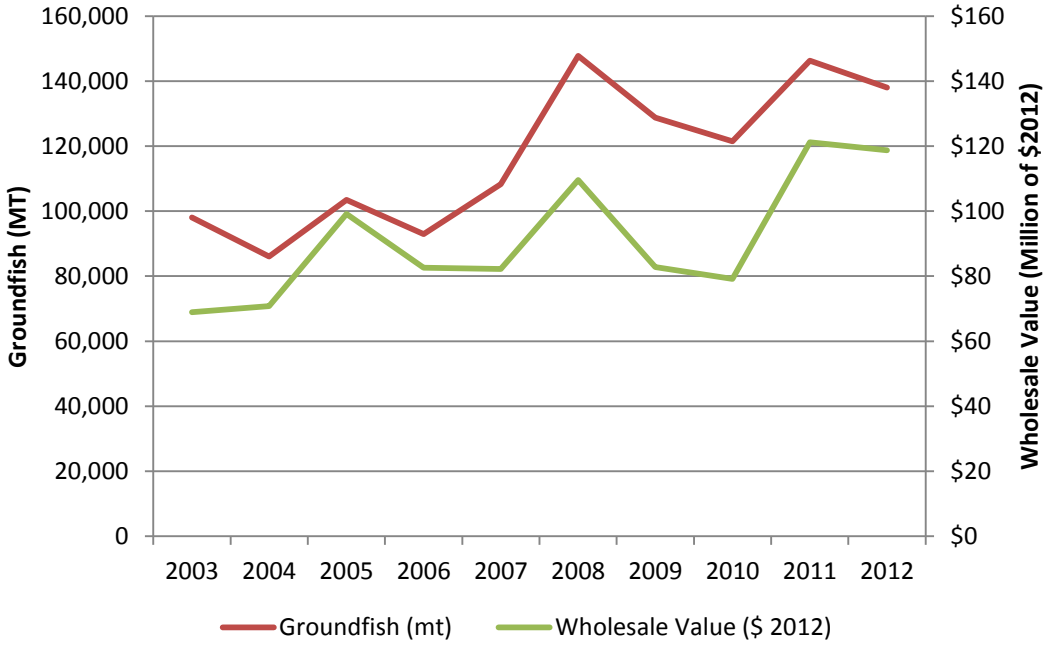
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 74. Groundfish Wholesale Value per Unit of PSC in the AM80CP BSAI Yellowfin Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	$98,372	$180,708	$179,476	$239,231	$184,464	$130,439	$92,137	$97,284	$157,972	$155,902
PSC King Crab ($/#)	$2,552	$1,822	$1,659	$2,466	$7,351	$3,179	$4,161	$4,254	$16,064	$20,310
PSC Bairdi Crab ($/#)	$237	$52	$42	$143	$136	$232	$409	$454	$292	$398
PSC Opilio Crab ($/#)	$300	$290	$145	$326	$360	$358	$304	$373	$177	$463
PSC Herring ($/kg)	$2,116	$969	$2,135	$7,909	$1,642	$1,395	$3,654	$23,843	$9,148	$11,815
PSC Chinook ($/#)	$246,879	$2,436,527	$288,577	$73,118,022	$453,245	$1,795,802	-	$573,310	-	$1,318,606
PSC non-Chinook ($/#)	$133,861	$179,072	$201,593	$1,443,960	$1,499,677	$4,563,583	$454,708	$2,197,265	$380,848	$463,763

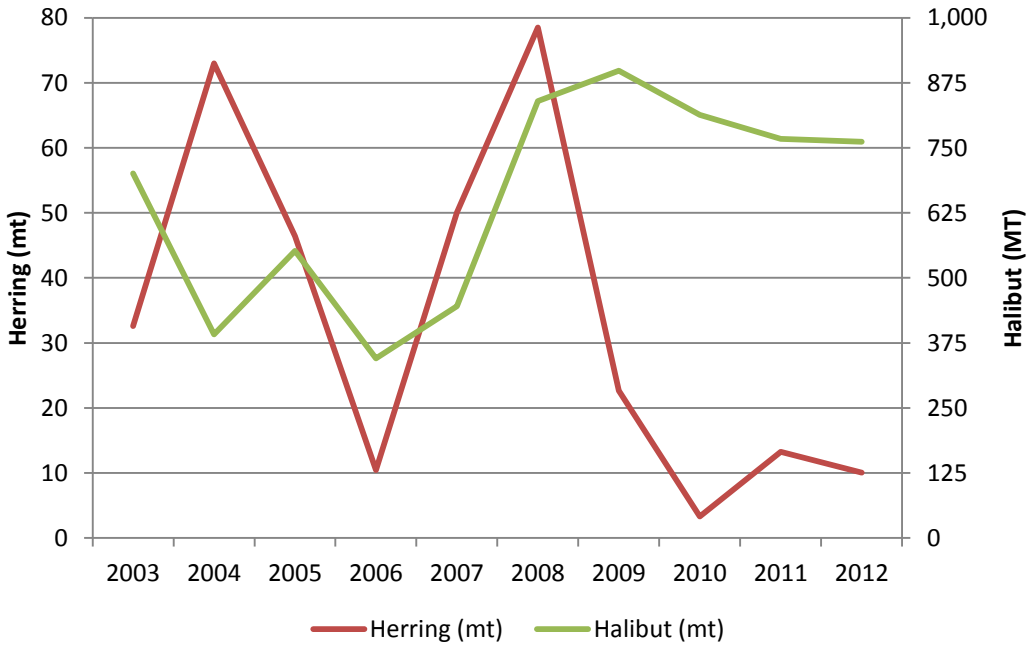
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 44. Total Volume and Wholesale Value of Groundfish Catch in the AM80CP BSAI Yellowfin Sole Target Fishery, 2003–2012



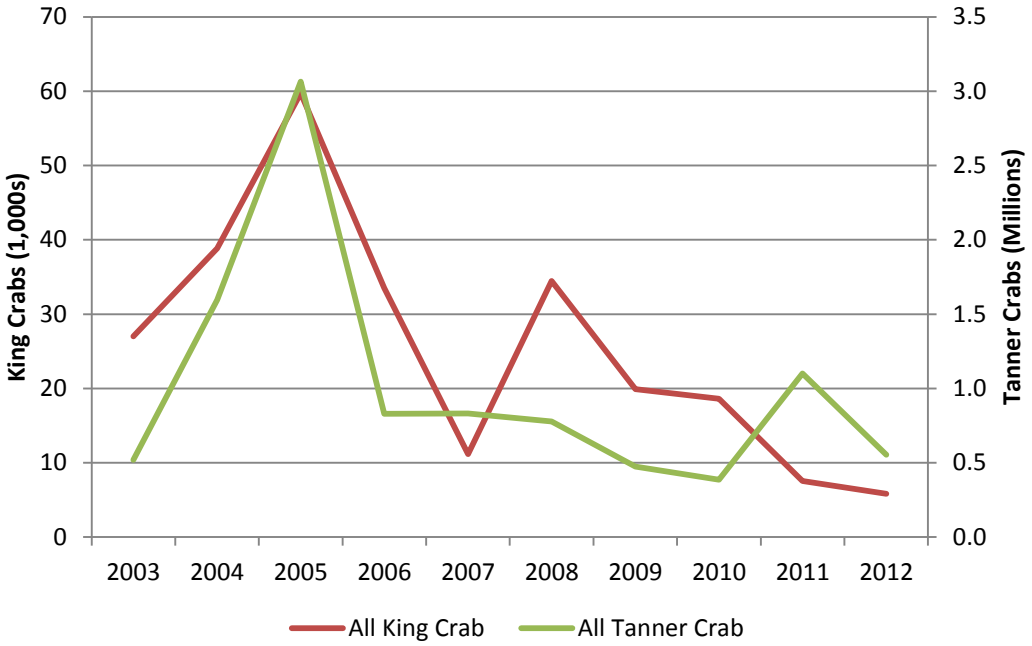
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 45. Herring and Halibut Bycatch in the AM80CP BSAI Yellowfin Sole Target Fishery, 2003–2012



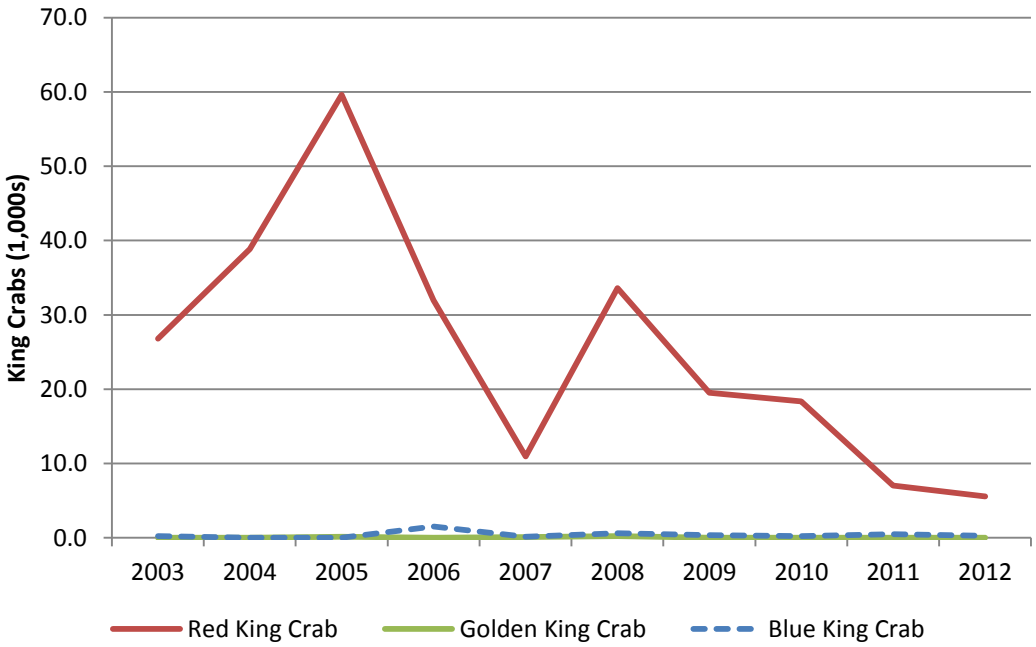
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 46. King Crab and Tanner Crab Bycatch in the AM80CP BSAI Yellowfin Sole Target Fishery, 2003–2012



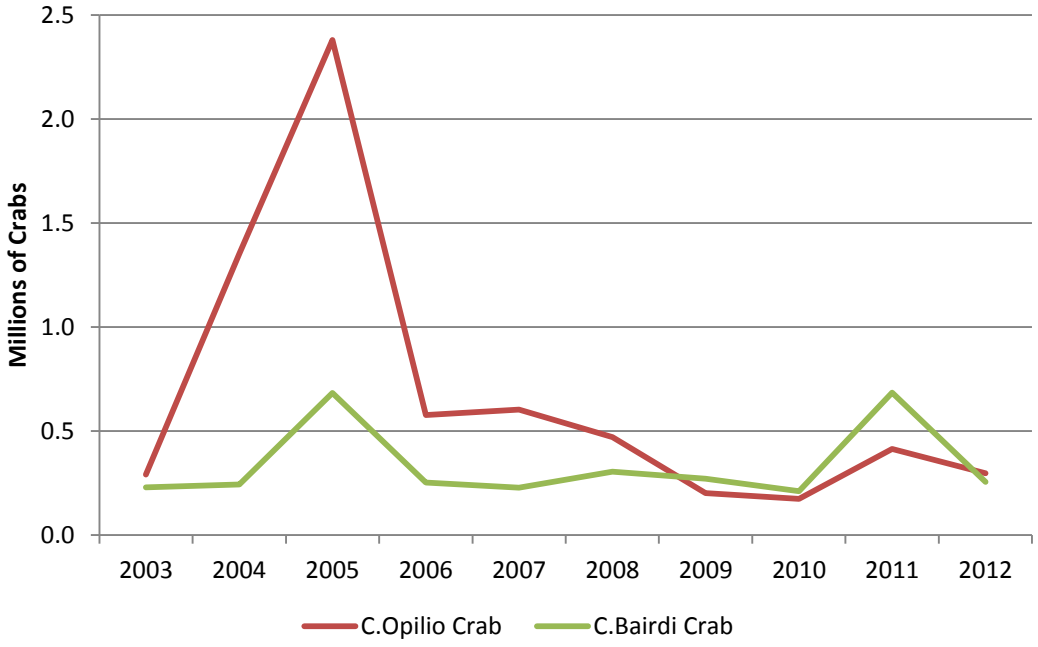
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 47. Bycatch of King Crab Species in the AM80CP BSAI Yellowfin Sole Target Fishery, 2003–2012



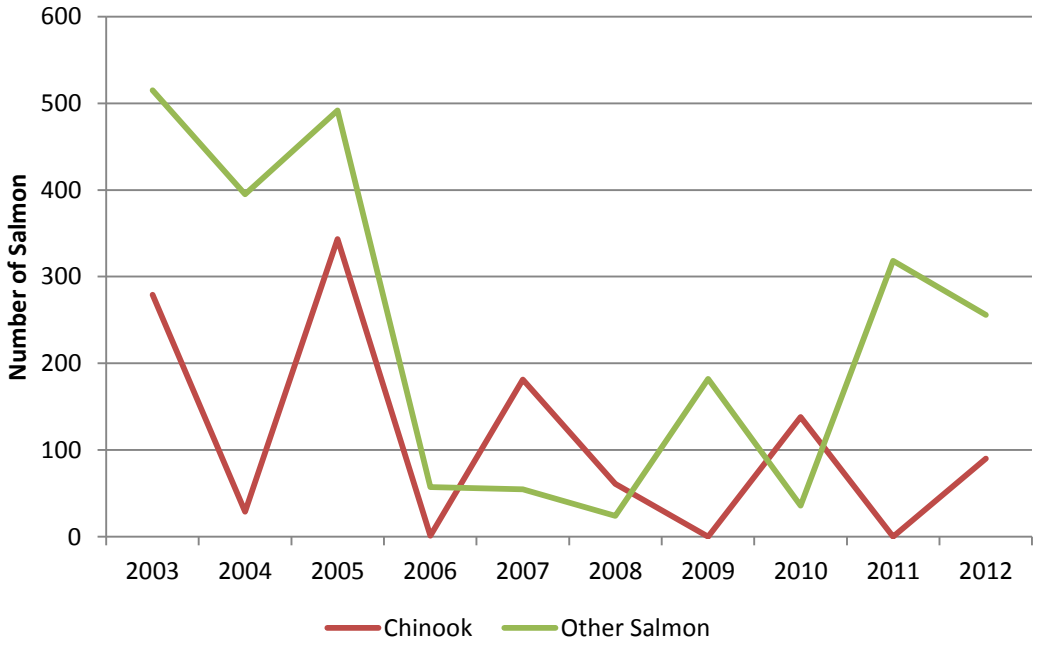
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 48. Bycatch of Tanner Crab Species in the AM80CP BSAI Yellowfin Sole Target Fishery, 2003–2012



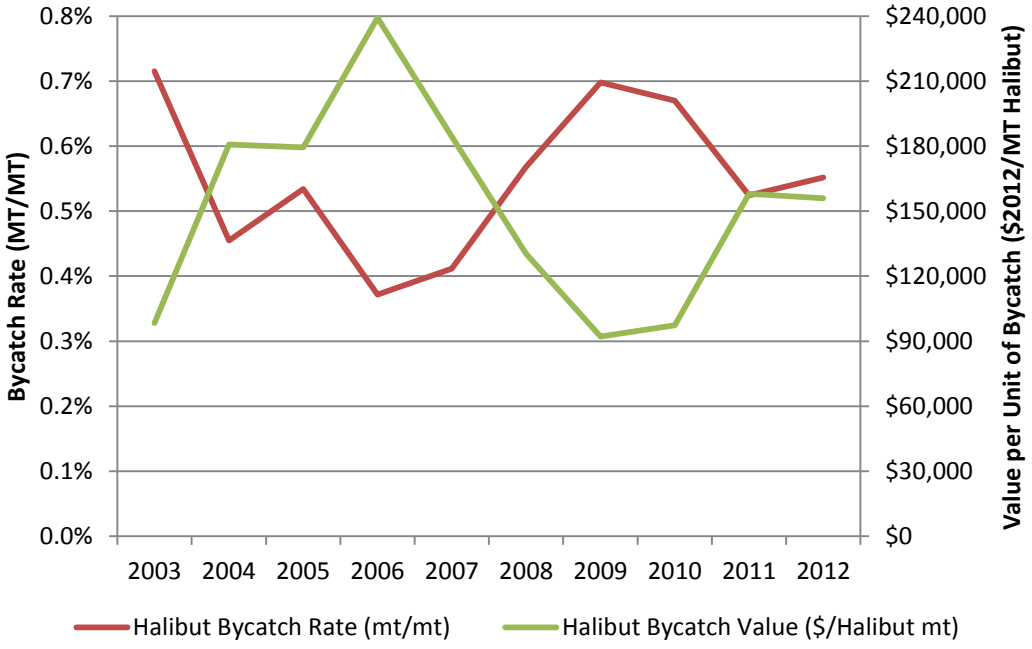
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 49. Bycatch of Salmon Species in the AM80CP BSAI Yellowfin Sole Target Fishery, 2003–2012



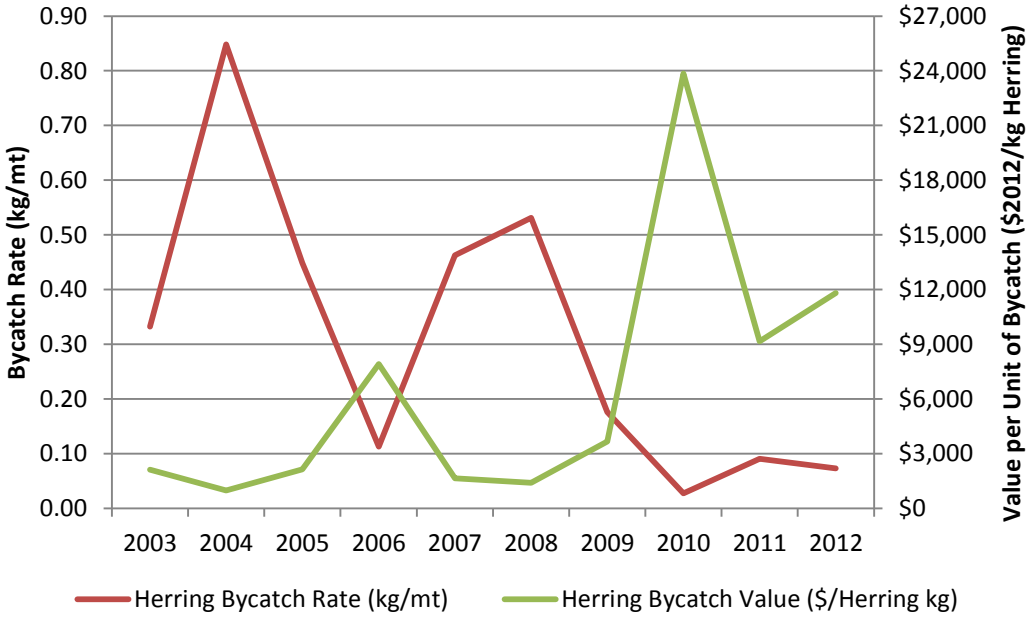
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 50. Bycatch of Halibut in the AM80CP BSAI Yellowfin Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



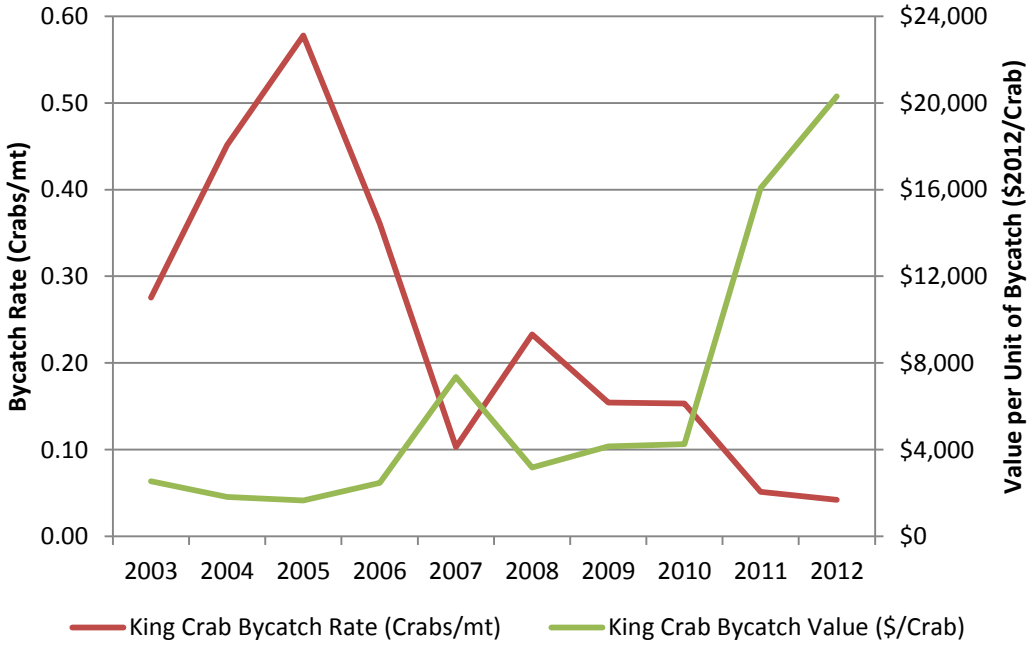
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 51. Bycatch of Herring in the AM80CP BSAI Yellowfin Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



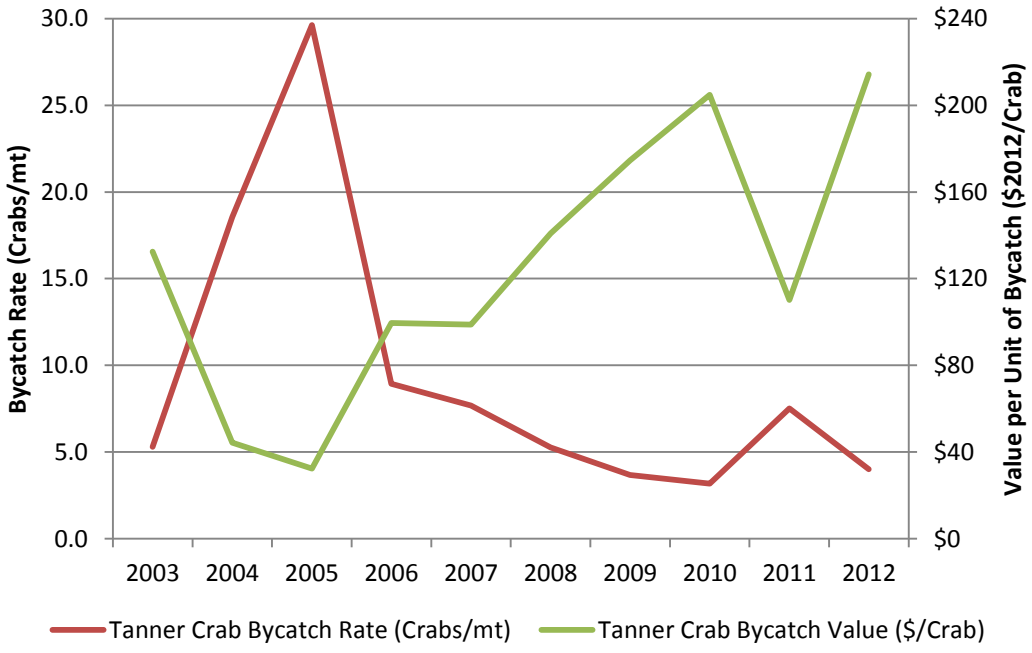
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 52. Bycatch of King Crab in the AM80CP BSAI Yellowfin Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



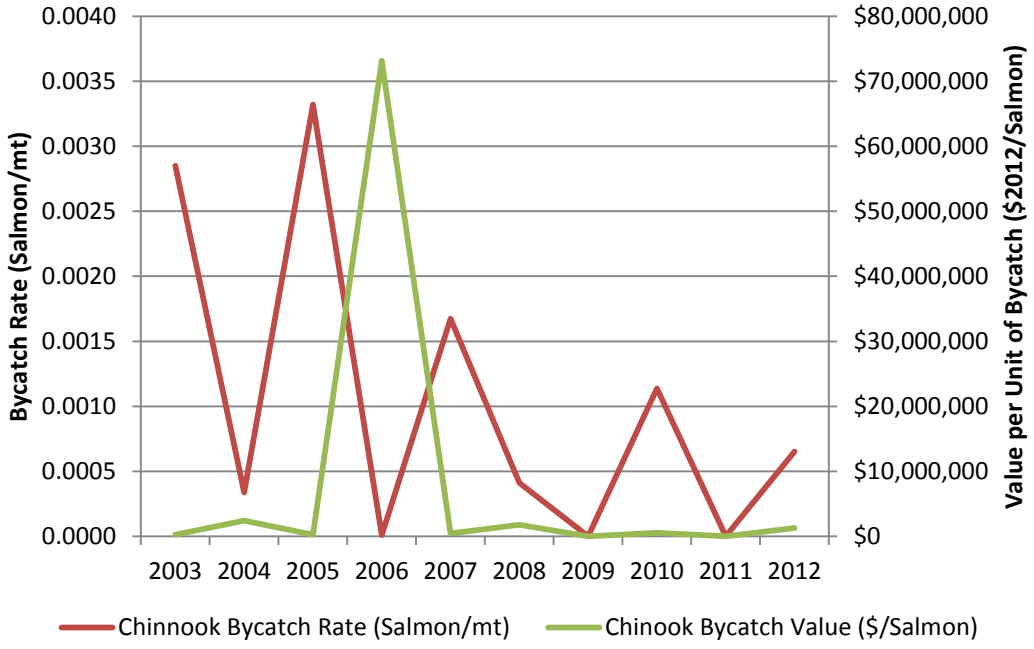
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 53. Bycatch of Tanner Crab in the AM80CP BSAI Yellowfin Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



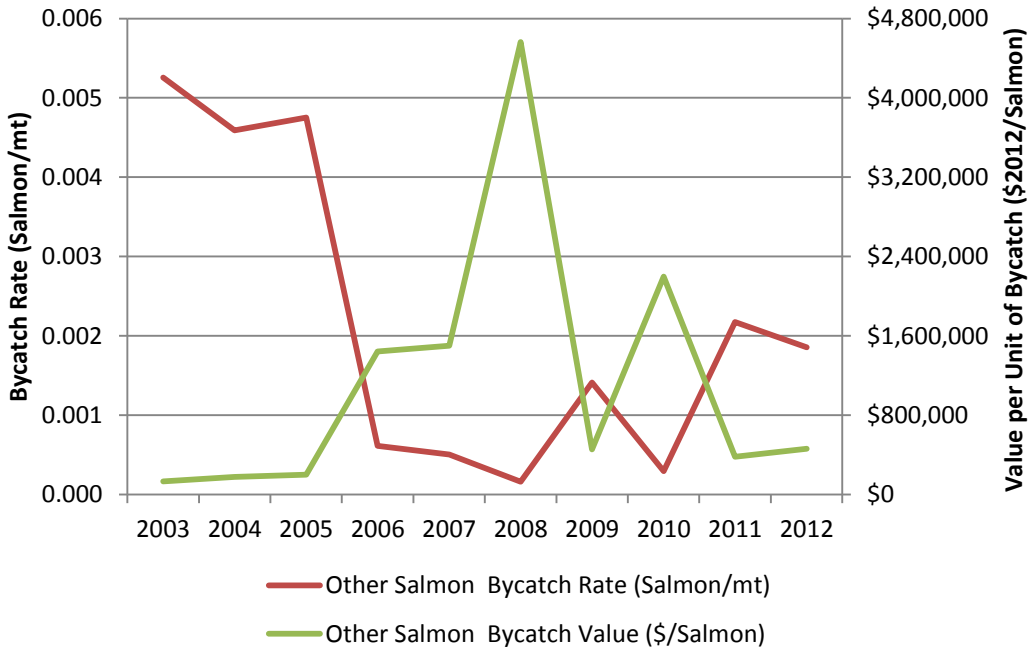
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 54. Chinook Bycatch in the AM80CP BSAI Yellowfin Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 55. Non-Chinook Salmon Bycatch in the AM80CP BSAI Yellowfin Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

AM80CP BSAI Rock Sole

This section summarizes PSC bycatch of AM80-CPs in the target|fishery for rock sole in the BSAI .The tables and figures exclude CDQ harvests and activities of AM80 vessels, while acting as motherships. It should also be noted that the overall amount of groundfish shown in the tables and figures includes all catches and revenues of groundfish not just the catch of rock sole.

Table 75. Total Catch and Wholesale Value of Groundfish in the AM80CP BSAI Rock Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	36,562	46,524	38,682	46,019	36,052	61,496	48,597	69,902	66,436	79,658
Wholesale $ Millions (2012)	$25.1	$35.1	$35.8	$44.9	$31.7	$50.6	$31.9	$49.4	$58.1	$68.5

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 76. Bycatch of Prohibited Species in the AM80CP BSAI Rock Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	959	534	766	802	905	621	559	879	453	383
PSC King Crab (#s)	56,072	43,563	48,445	60,529	80,974	43,512	44,069	36,262	26,667	20,749
PSC Bairdi Crab (#s)	33,865	185,914	587,380	73,316	68,400	9,957	8,491	10,591	10,463	8,001
PSC Opilio Crab (#s)	258,578	175,145	391,612	137,767	87,003	87,175	66,140	91,359	69,951	61,715
PSC Herring (kg)	3,719	5,691	15,298	2,800	5,664	478	184	452	196	114
PSC Chinook (#s)	630	664	325	123	839	82	110	463	19	51
PSC non-Chinook (#s)	-	-	-	716	259	643	36	171	78	-

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 77. Bycatch Rates in the AM80CP BSAI Rock Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0262	0.0115	0.0198	0.0174	0.0251	0.0101	0.0115	0.0126	0.0068	0.0048
PSC King Crab (#/mt)	1.5336	0.9364	1.2524	1.3153	2.2460	0.7076	0.9068	0.5188	0.4014	0.2605
PSC Bairdi Rate (#/mt)	0.9262	3.9961	15.1850	1.5932	1.8973	0.1619	0.1747	0.1515	0.1575	0.1004
PSC Opilio Rate (#/mt)	7.0724	3.7646	10.1240	2.9937	2.4133	1.4176	1.3610	1.3070	1.0529	0.7748
PSC Herring Rate (kg/mt)	0.1017	0.1223	0.3955	0.0608	0.1571	0.0078	0.0038	0.0065	0.0030	0.0014
PSC Chinook (#/mt)	0.0172	0.0143	0.0084	0.0027	0.0233	0.0013	0.0023	0.0066	0.0003	0.0006
PSC non-Chinook (#/mt)	-	-	-	0.0156	0.0072	0.0105	0.0007	0.0024	0.0012	-

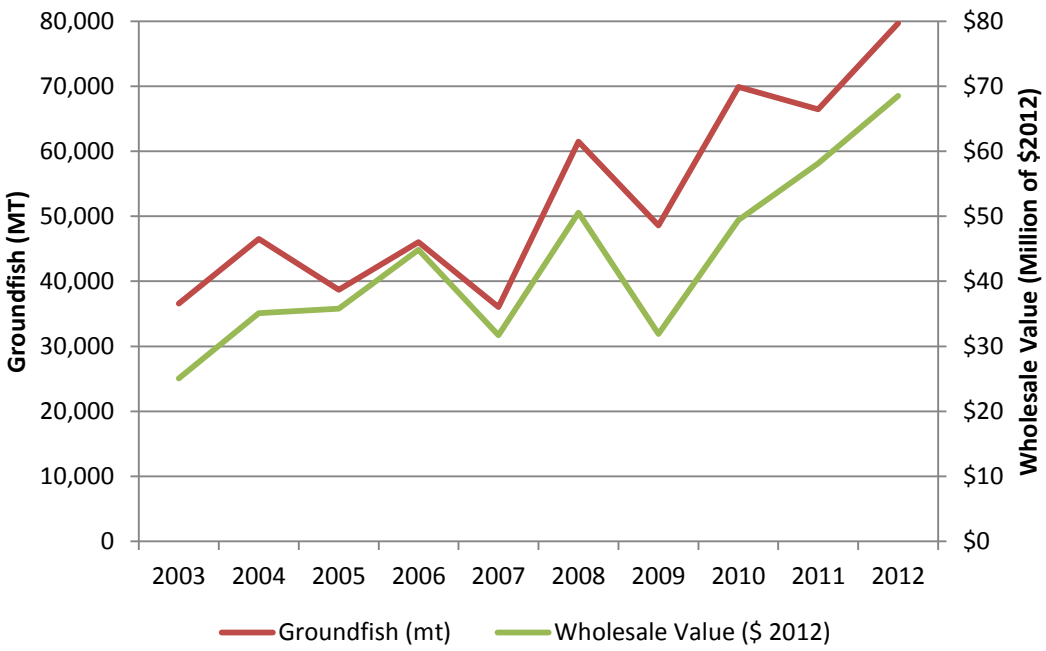
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 78. Groundfish Wholesale Value per Unit of PSC in the AM80CP BSAI Rock Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	$26,124	$65,822	$46,757	$55,933	$35,035	$81,502	$57,065	$56,274	$128,273	$178,835
PSC King Crab ($/#)	$447	$806	$739	$741	$391	$1,162	$724	$1,363	$2,180	$3,303
PSC Bairdi Crab ($/#)	$740	$189	$61	$612	$463	$5,079	$3,760	$4,668	$5,557	$8,565
PSC Opilio Crab ($/#)	$97	$201	$91	$326	$364	$580	$483	$541	$831	$1,110
PSC Herring ($/kg)	$6,737	$6,172	$2,341	$16,023	$5,596	$105,716	$173,915	$109,469	$296,611	$602,750
PSC Chinook ($/#)	$39,795	$52,868	$110,281	$365,520	$37,801	$616,976	$290,719	$106,882	$3,060,090	$1,343,924
PSC non-Chinook ($/#)	-	-	-	$62,651	$122,274	$78,655	$887,021	$289,107	$745,598	-

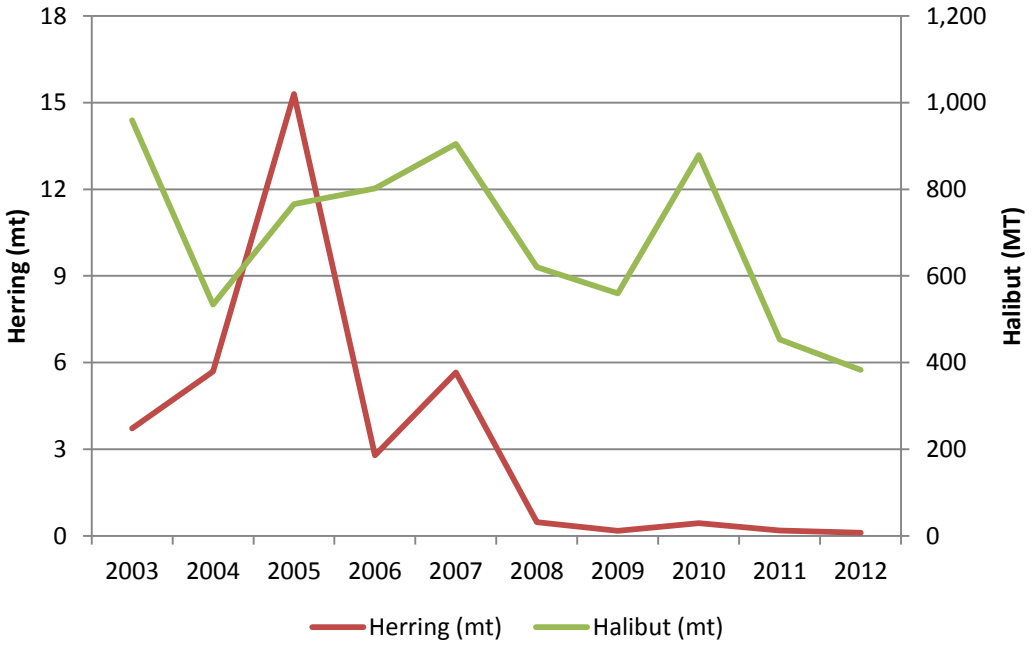
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 56. Total Volume and Wholesale Value of Groundfish Catch in the AM80CP BSAI Rock Sole Target Fishery, 2003–2012



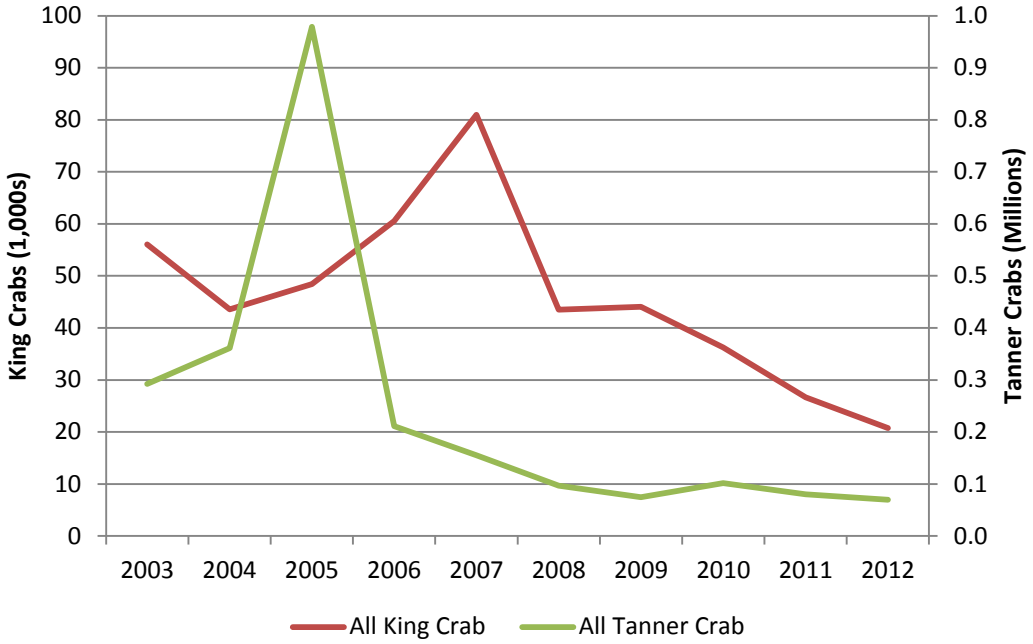
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 57. Herring and Halibut Bycatch in the AM80CP BSAI Rock Sole Target Fishery, 2003–2012



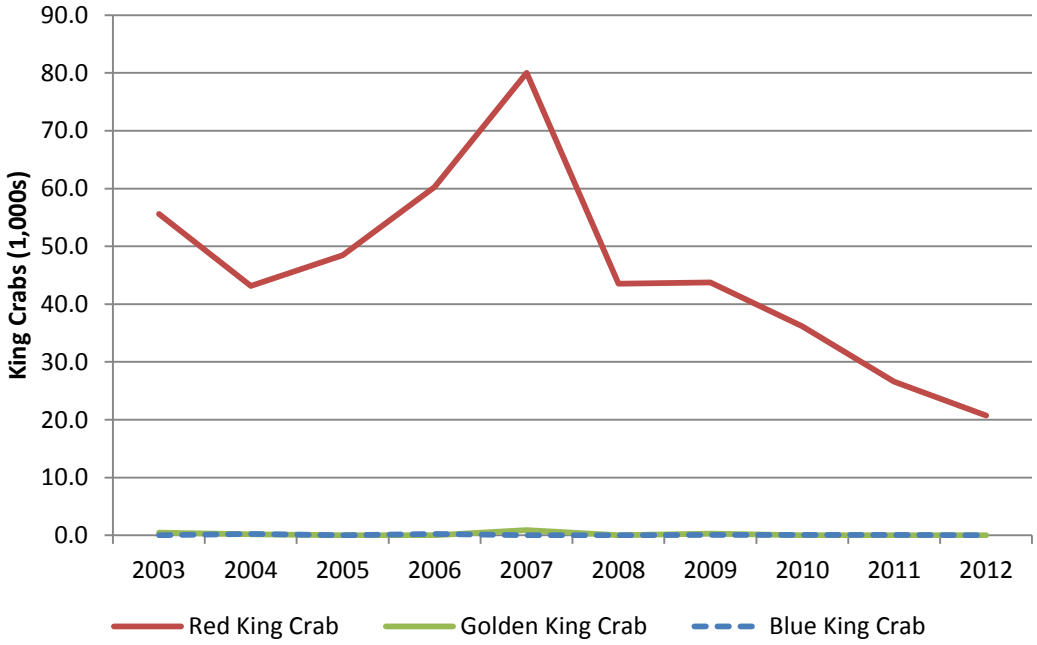
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 58. King Crab and Tanner Crab Bycatch in the AM80CP BSAI Rock Sole Target Fishery, 2003–2012



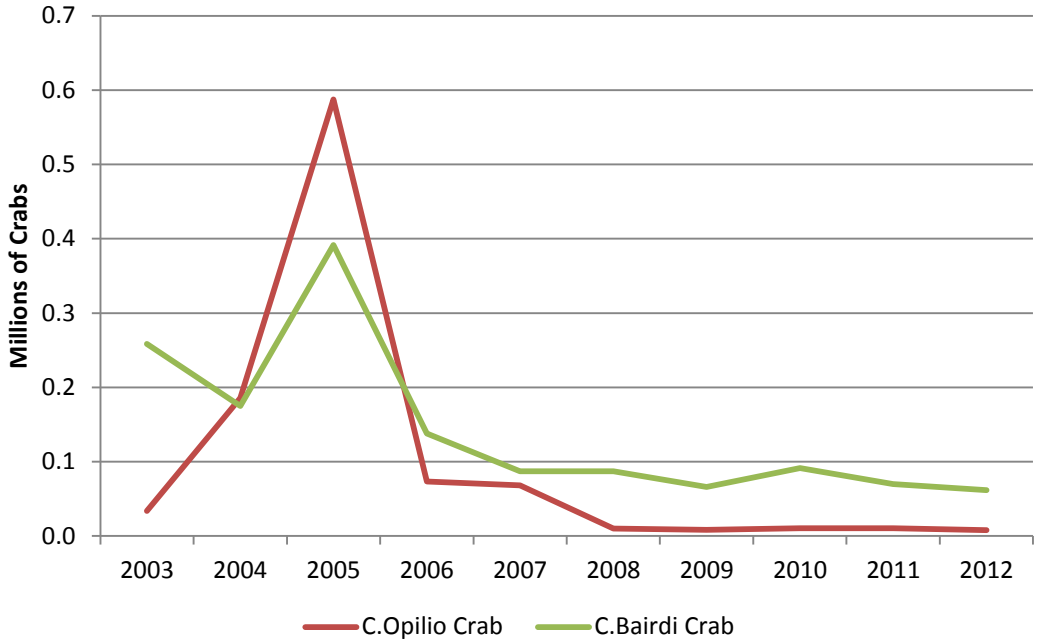
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 59. Bycatch of King Crab Species in the AM80CP BSAI Rock Sole Target Fishery, 2003–2012



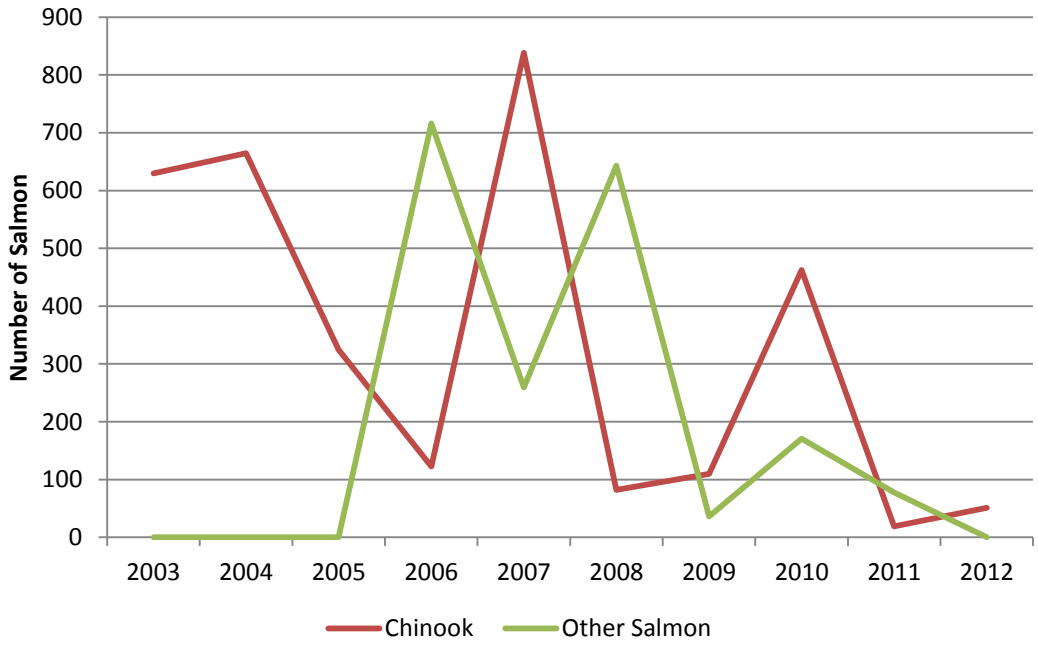
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 60. Bycatch of Tanner Crab Species in the AM80CP BSAI Rock Sole Target Fishery, 2003–2012



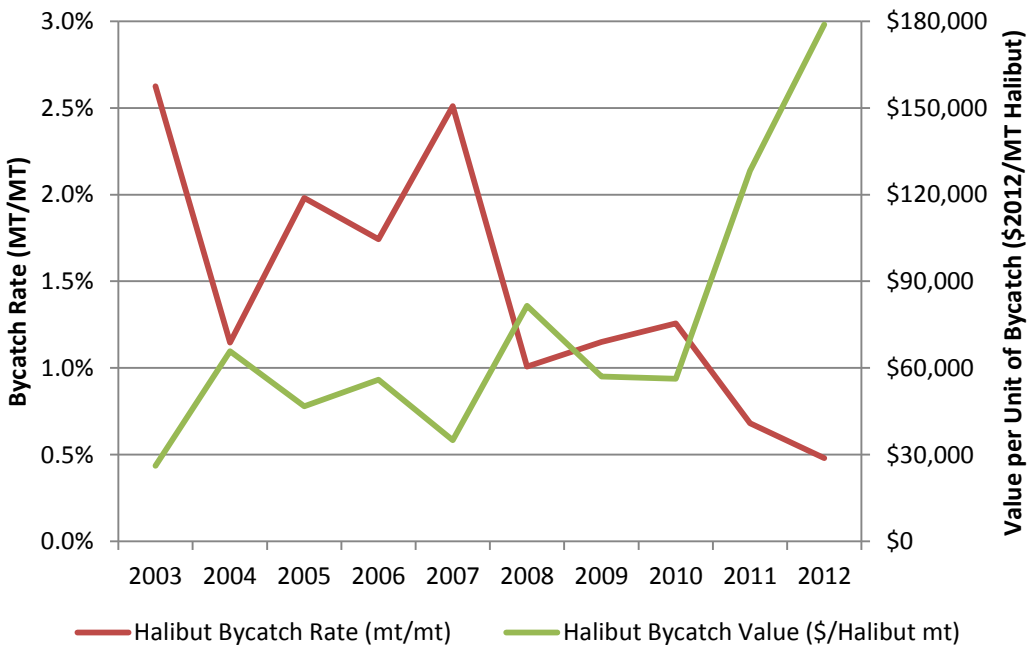
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 61. Bycatch of Salmon Species in the AM80CP BSAI Rock Sole Target Fishery, 2003–2012



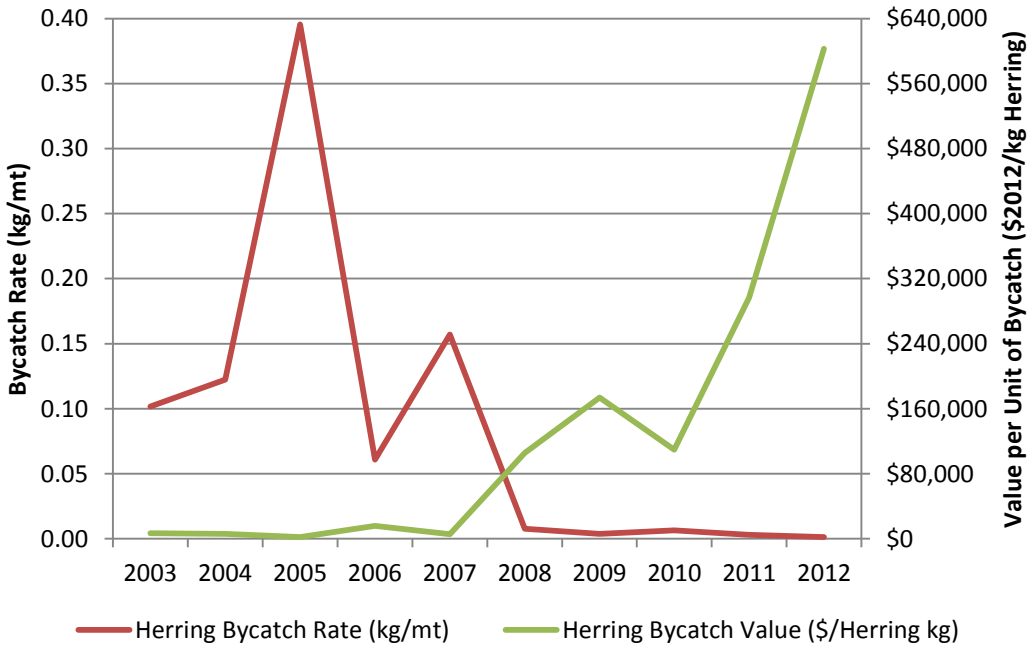
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 62. Bycatch of Halibut in the AM80CP BSAI Rock Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



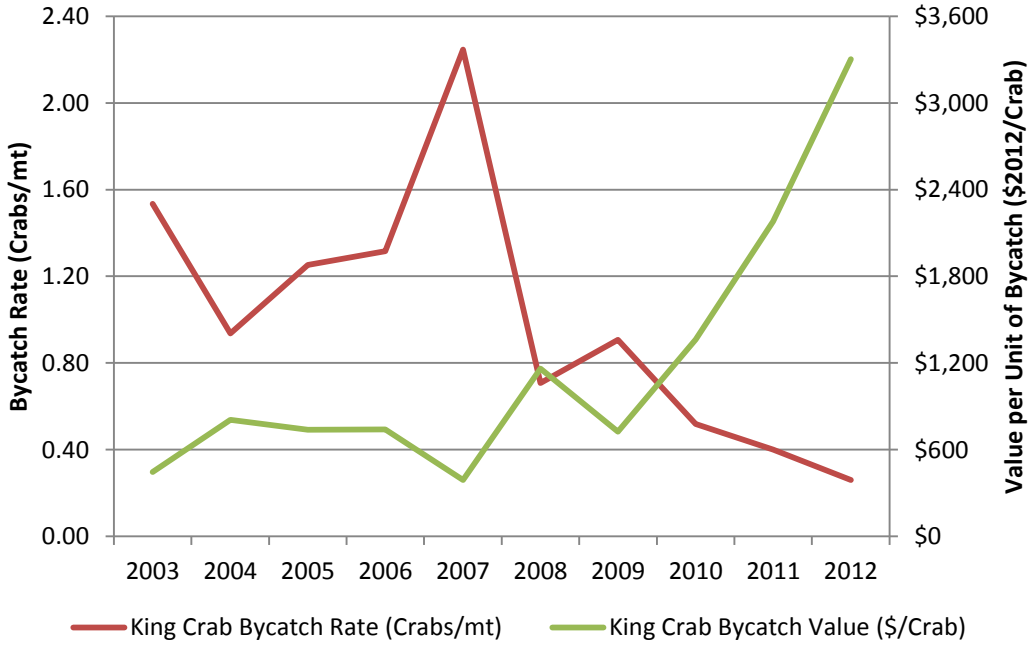
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 63. Bycatch of Herring in the AM80CP BSAI Rock Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



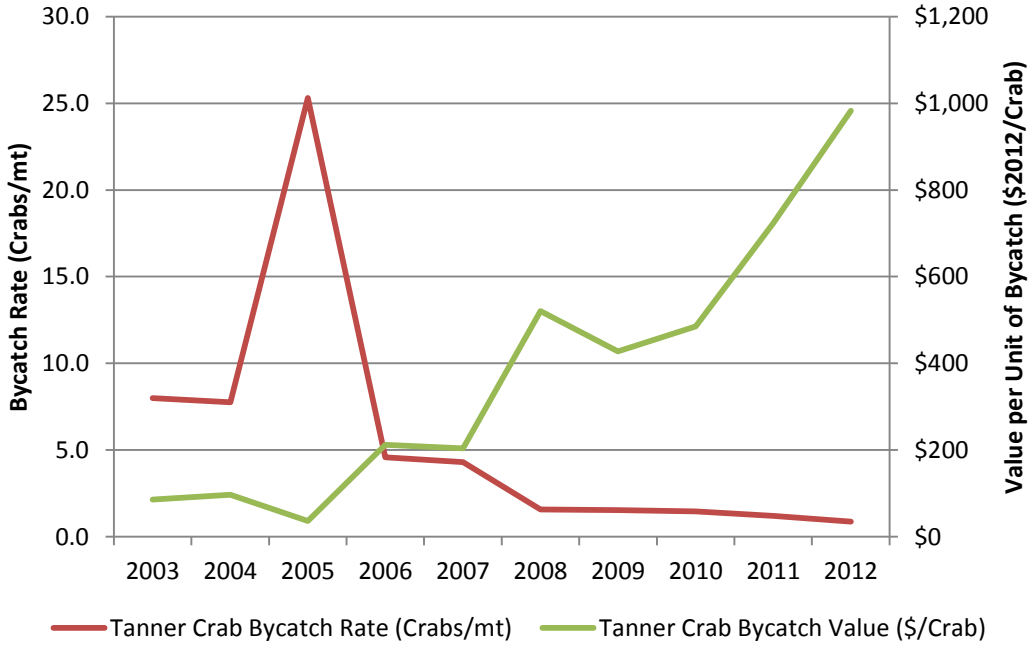
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 64. Bycatch of King Crab in the AM80CP BSAI Rock Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



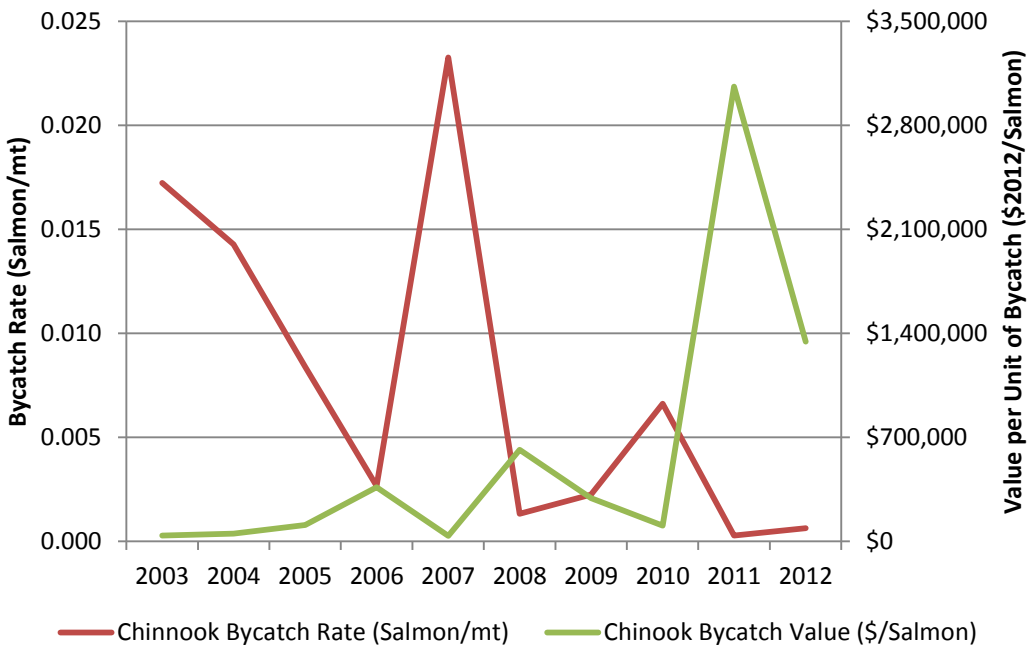
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 65. Bycatch of Tanner Crab in the AM80CP BSAI Rock Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



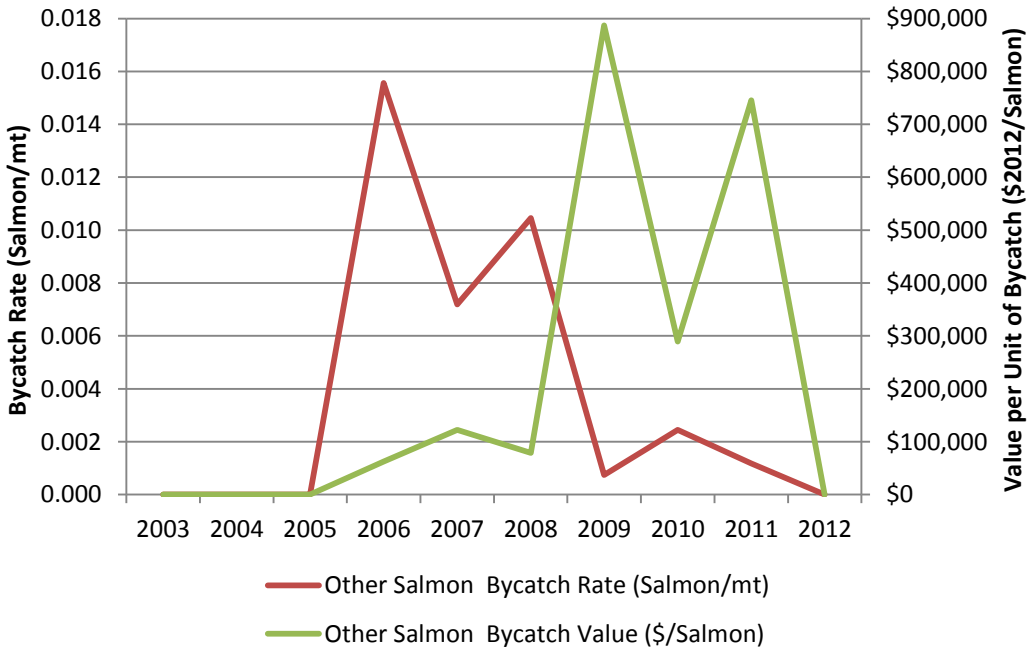
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 66. Chinook Bycatch in the AM80CP BSAI Rock Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 67. Non-Chinook Salmon Bycatch in the AM80CP BSAI Rock Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

AM80CP BSAI Flathead Sole

This section summarizes PSC bycatch of AM80-CPs in the target|fishery for flathead sole in the BSAI. The tables and figures excludes CDQ harvests and activities of AM80 vessels, while acting as motherships. It should also be noted that the overall amount of groundfish shown in the tables and figures includes all catches and revenues of groundfish not just the catch of flathead sole.

Table 79. Total Catch and Wholesale Value of Groundfish in the AM80CP BSAI Flathead Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	18,642	28,257	22,492	18,758	20,442	27,999	18,932	21,479	7,573	6,091
Wholesale $ Millions (2012)	$14.99	$22.18	$21.55	$19.35	$16.50	$22.51	$12.73	$15.25	$6.75	$5.40

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 80. Bycatch of Prohibited Species in the AM80CP BSAI Flathead Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	177	434	240	305	304	233	172	169	68	82
PSC King Crab (#s)	154	223	461	682	893	4,228	2,088	933	1,885	472
PSC Bairdi Crab (#s)	220,131	120,677	117,055	100,507	261,127	111,631	141,259	76,931	52,306	25,629
PSC Opilio Crab (#s)	338,279	166,231	269,949	219,505	147,077	116,360	41,440	65,546	31,885	25,335
PSC Herring (kg)	2,542	6,220	1,014	1,725	859	1,139	454	232	371	572
PSC Chinook (#s)	395	515	45	288	-	103	-	-	-	-
PSC non-Chinook (#s)	163	2,344	440	802	-	145	71	15	331	45

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 81. Bycatch Rates in the AM80CP BSAI Flathead Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0095	0.0154	0.0107	0.0162	0.0149	0.0083	0.0091	0.0078	0.0090	0.0135
PSC King Crab (#/mt)	0.0083	0.0079	0.0205	0.0364	0.0437	0.1510	0.1103	0.0434	0.2489	0.0776
PSC Bairdi Rate (#/mt)	11.8083	4.2707	5.2044	5.3581	12.7742	3.9869	7.4614	3.5817	6.9071	4.2081
PSC Opilio Rate (#/mt)	18.1459	5.8828	12.0022	11.7020	7.1949	4.1559	2.1889	3.0516	4.2105	4.1597
PSC Herring Rate (kg/mt)	0.1363	0.2201	0.0451	0.0920	0.0420	0.0407	0.0240	0.0108	0.0490	0.0939
PSC Chinook (#/mt)	0.0212	0.0182	0.0020	0.0153	-	0.0037	-	-	-	-
PSC non-Chinook (#/mt)	0.0087	0.0830	0.0196	0.0427	-	0.0052	0.0038	0.0007	0.0437	0.0074

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 82. Groundfish Wholesale Value per Unit of PSC in the AM80CP BSAI Flathead Sole Target Fishery

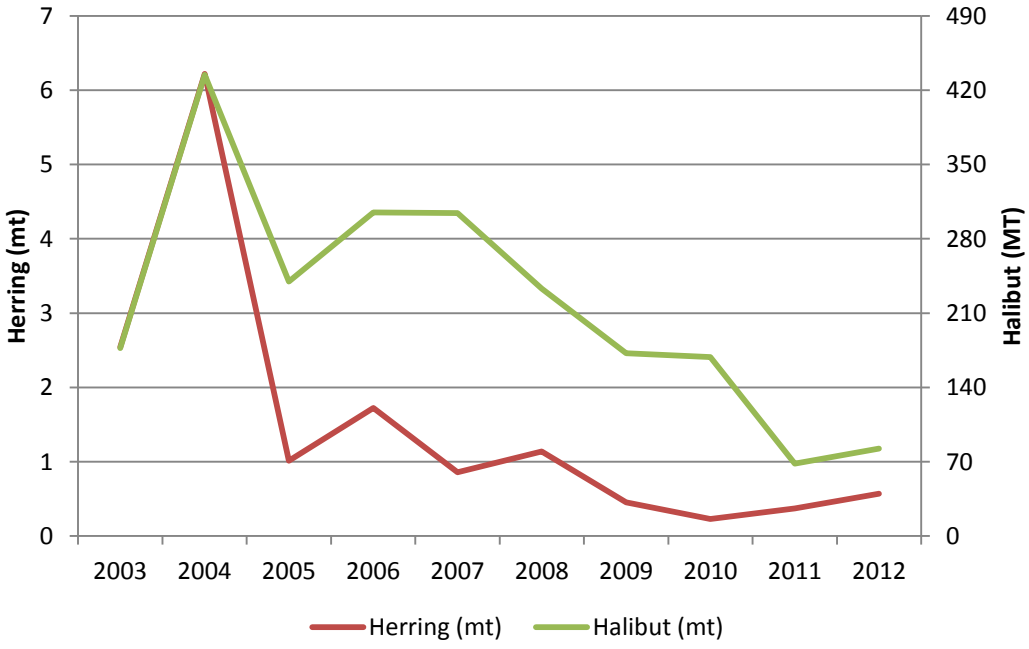
Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	$84,628	$51,046	$89,862	$63,487	$54,254	$96,560	$73,947	$90,467	$98,652	$65,512
PSC King Crab ($/#)	$97,449	$99,397	$46,725	$28,372	$18,483	$5,324	$6,097	$16,343	$3,580	$11,436
PSC Bairdi Crab ($/#)	$68	$184	$184	$193	$63	$202	$90	$198	$129	$211
PSC Opilio Crab ($/#)	$44	$133	$80	$88	$112	$193	$307	$233	$212	$213
PSC Herring ($/kg)	$5,897	$3,565	$21,250	$11,216	$19,201	$19,763	$28,057	$65,714	$18,166	$9,448
PSC Chinook ($/#)	$37,905	$43,042	$480,113	$67,240	-	$218,501	-	-	-	-
PSC non-Chinook ($/#)	$92,158	$9,459	$48,964	$24,133	-	$155,245	$179,122	$1,015,833	$20,390	$120,078

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 68. Total Volume and Wholesale Value of Groundfish Catch in the AM80CP BSAI Flathead Sole Target Fishery, 2003–2012

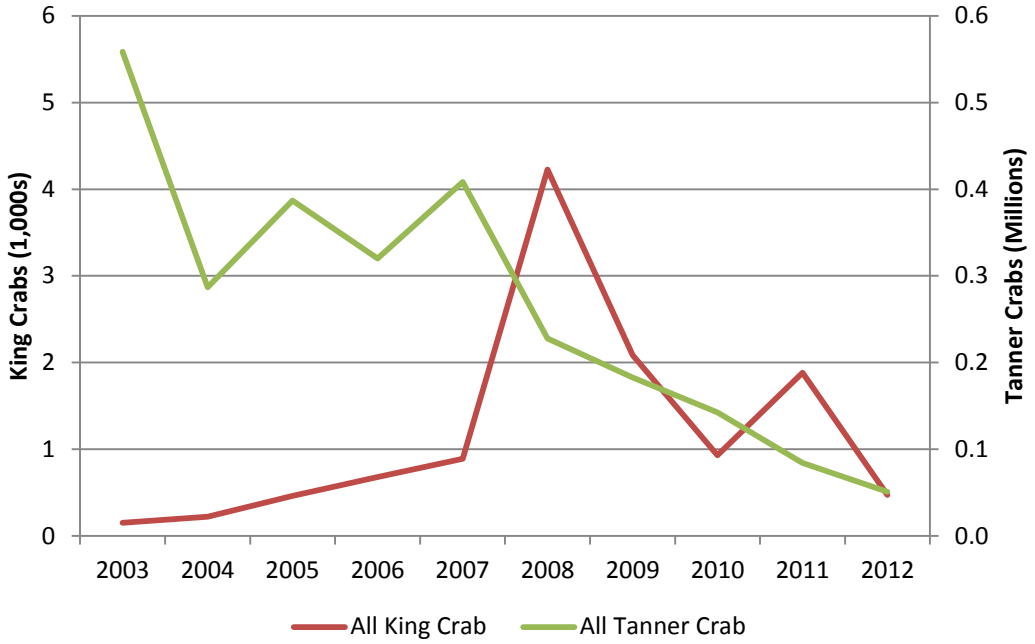
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 69. Herring and Halibut Bycatch in the AM80CP BSAI Flathead Sole Target Fishery, 2003–2012



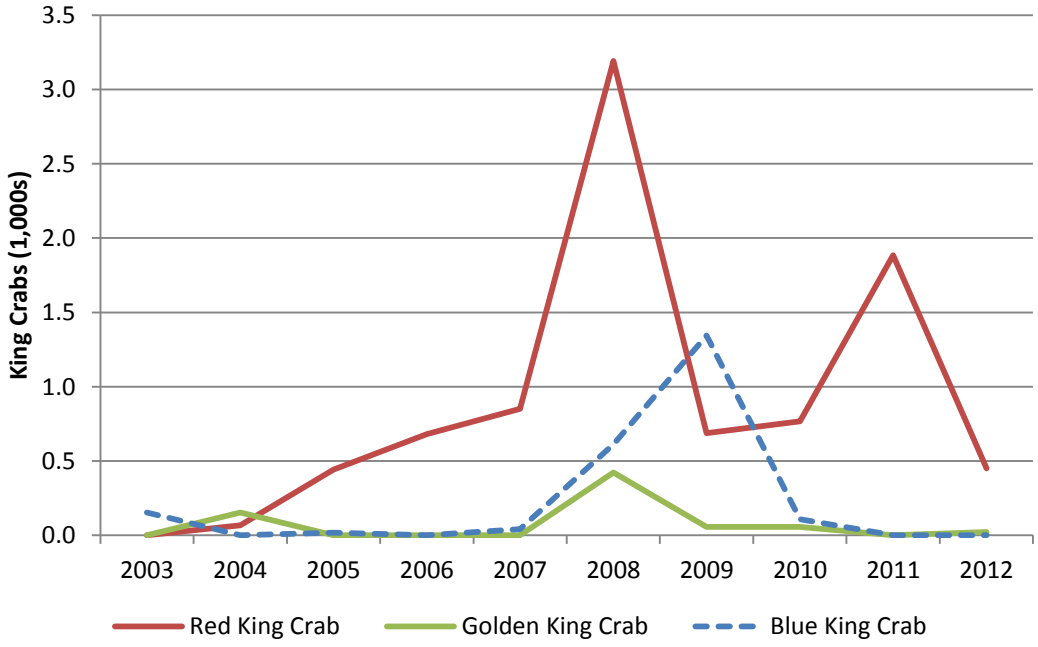
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 70. King Crab and Tanner Crab Bycatch in the AM80CP BSAI Flathead Sole Target Fishery, 2003–2012



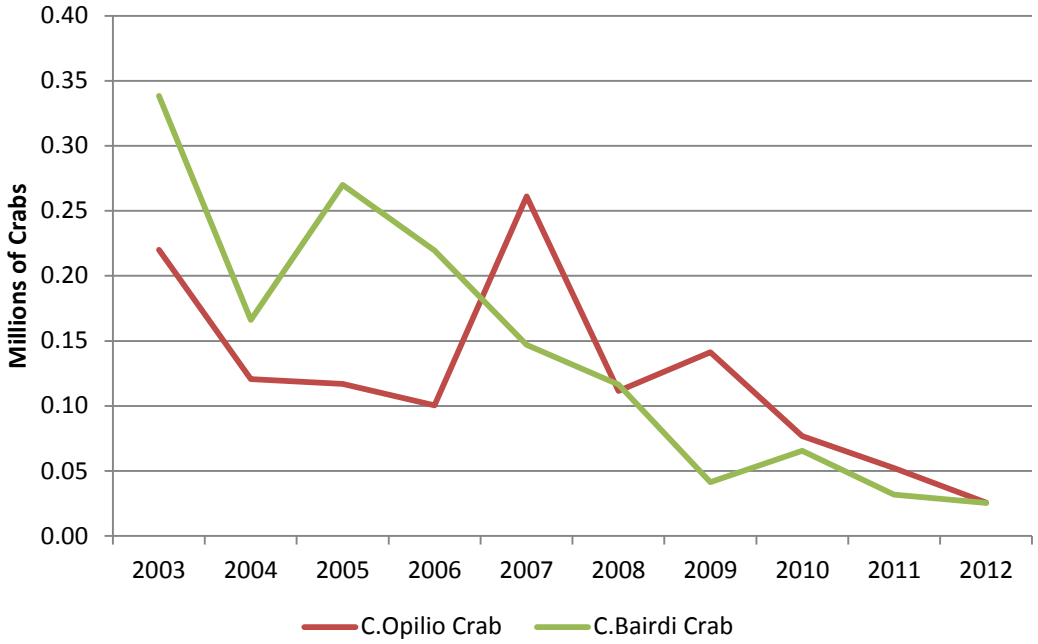
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 71. Bycatch of King Crab Species in the AM80CP BSAI Flathead Sole Target Fishery, 2003–2012



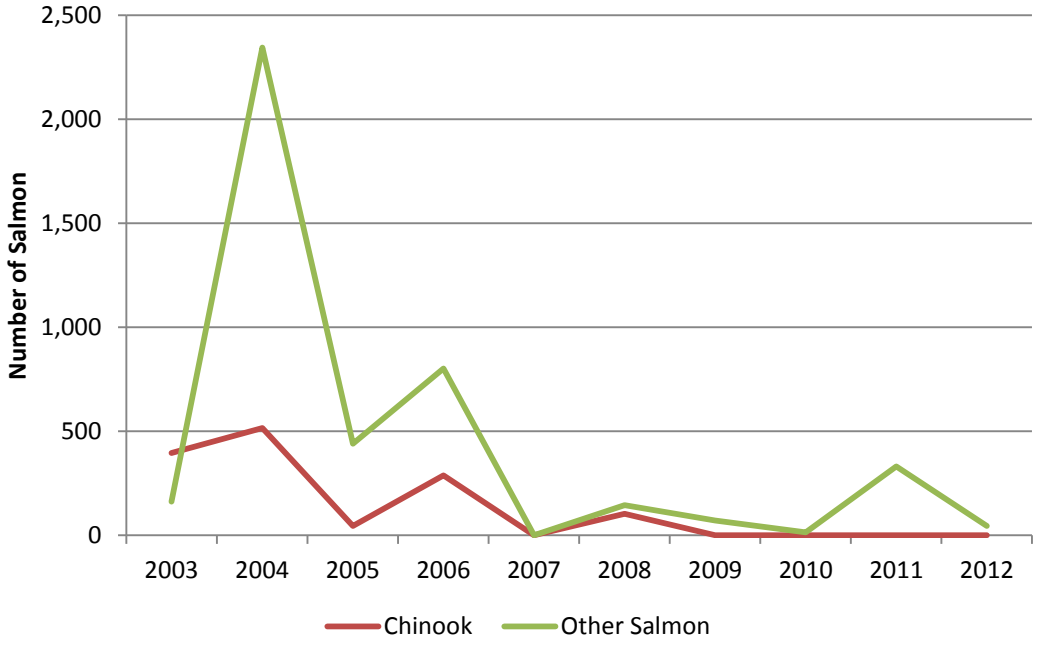
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 72. Bycatch of Tanner Crab Species in the AM80CP BSAI Flathead Sole Target Fishery, 2003–2012



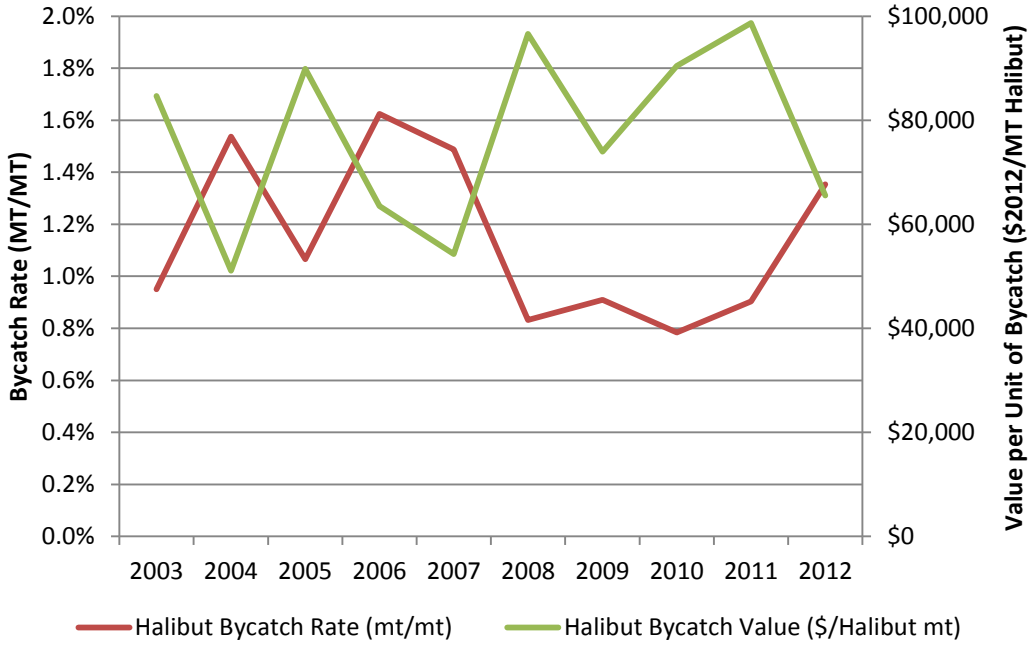
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 73. Bycatch of Salmon Species in the AM80CP BSAI Flathead Sole Target Fishery, 2003–2012



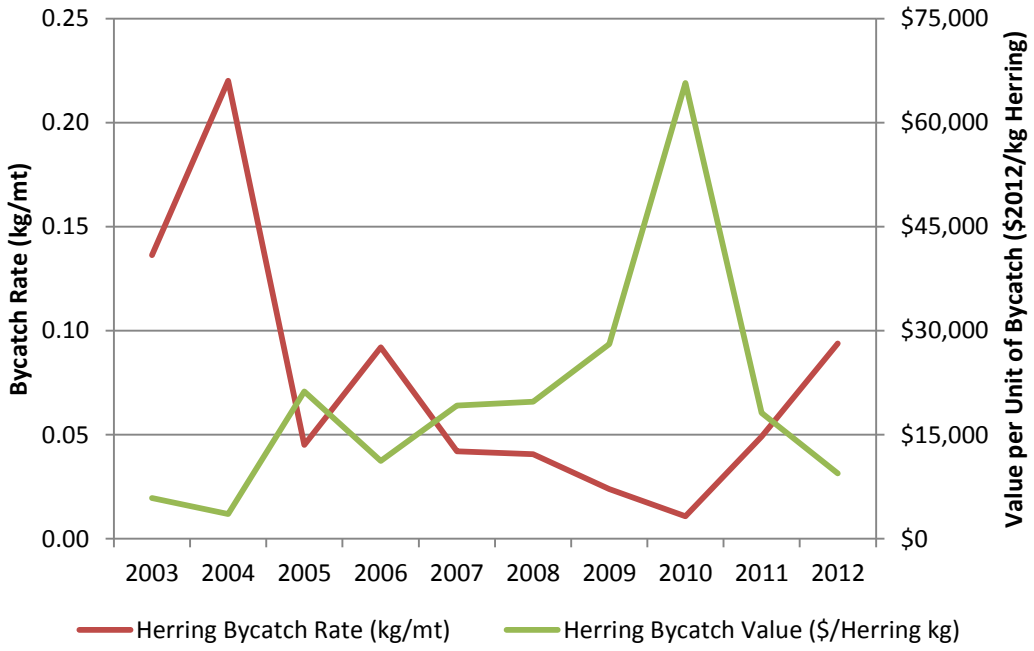
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 74. Bycatch of Halibut in the AM80CP BSAI Flathead Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



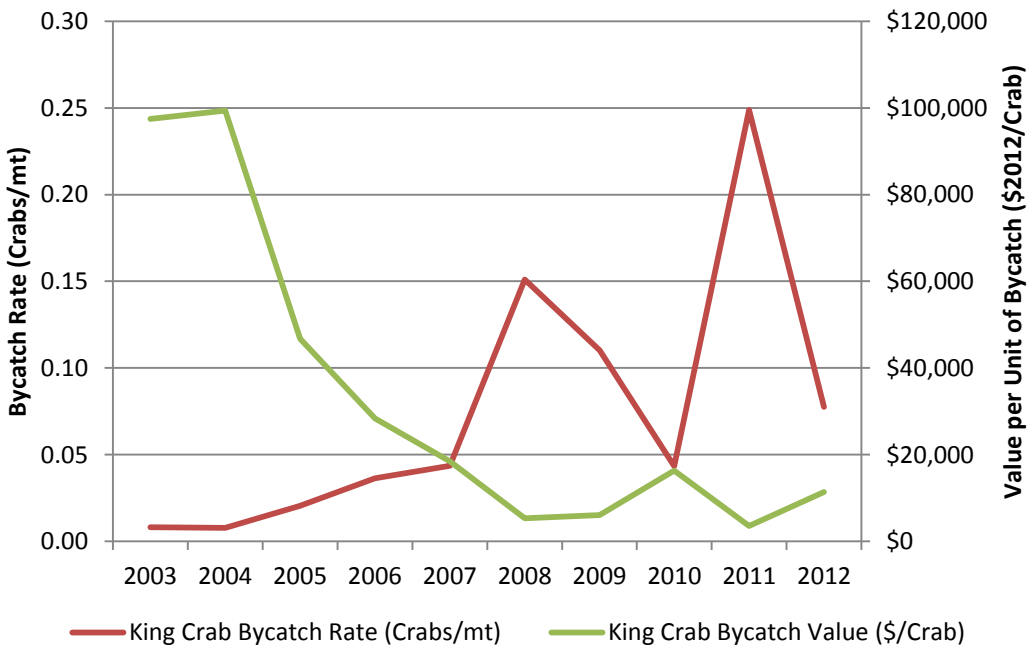
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 75. Bycatch of Herring in the AM80CP BSAI Flathead Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



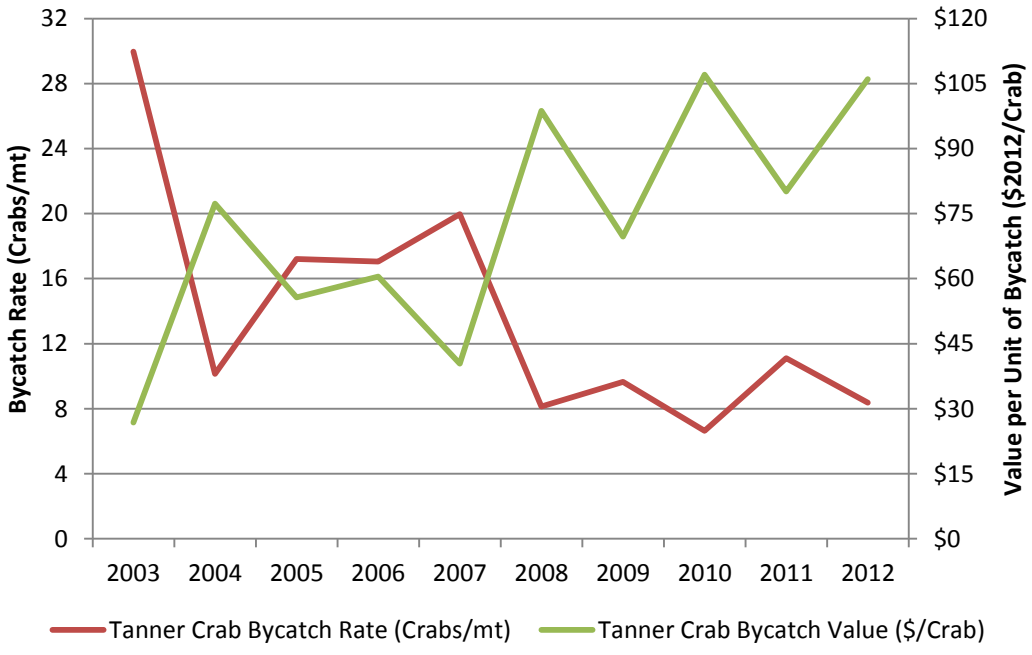
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 76. Bycatch of King Crab in the AM80CP BSAI Flathead Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



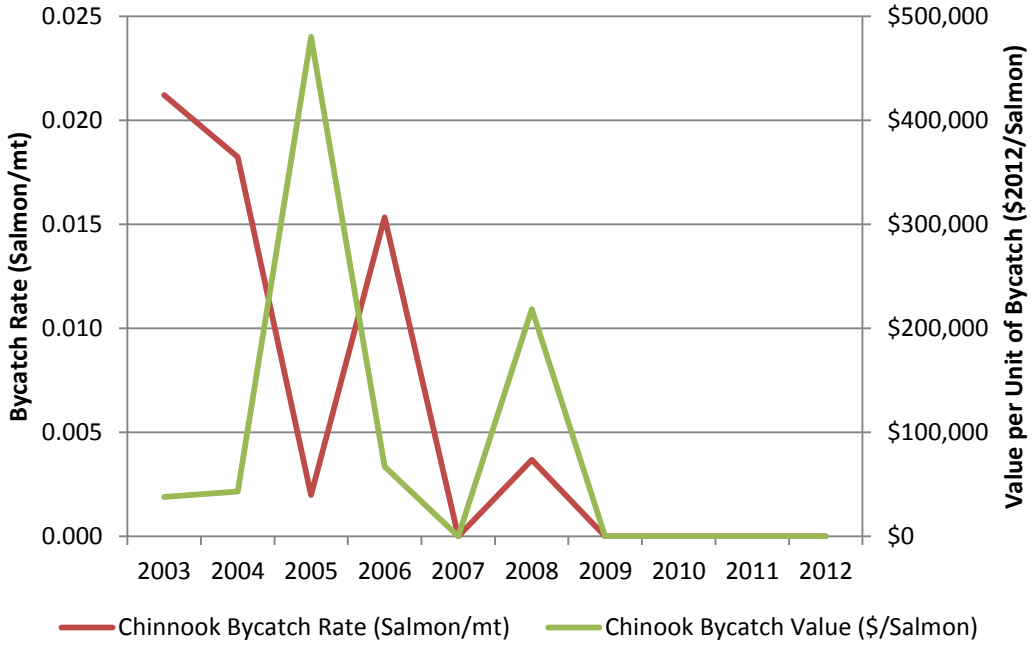
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 77. Bycatch of Tanner Crab in the AM80CP BSAI Flathead Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



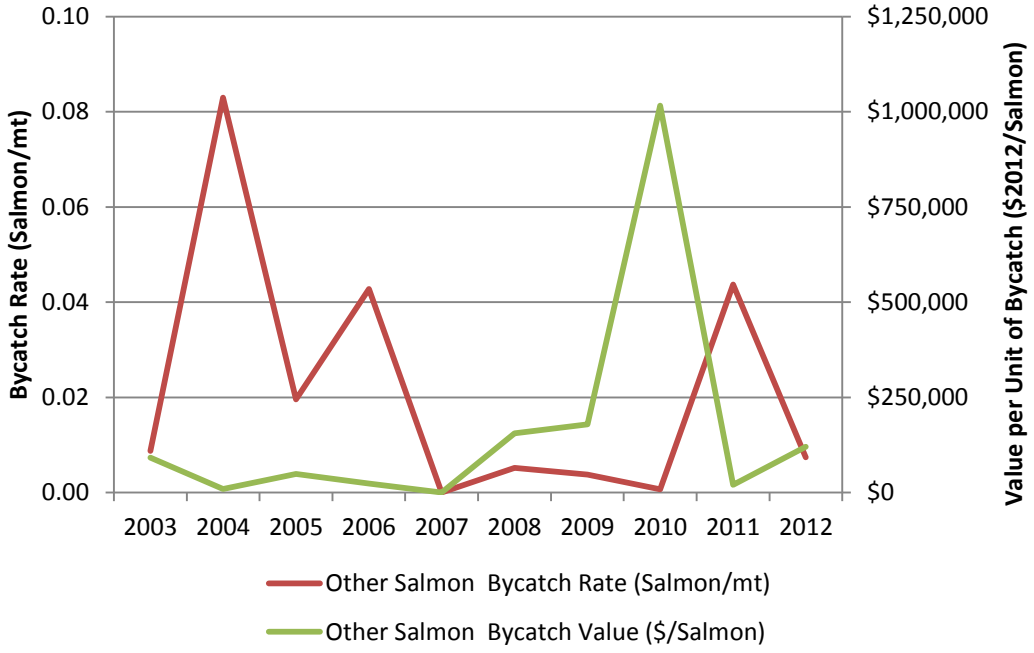
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 78. Chinook Bycatch in the AM80CP BSAI Flathead Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 79. Non-Chinook Salmon Bycatch in the AM80CP BSAI Flathead Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

AM80CP BSAI Atka Mackerel

This section summarizes PSC bycatch of AM80-CPs in the target|fishery for Atka mackerel in the BSAI. The tables and figures exclude CDQ harvests and activities of AM80 vessels while acting as motherships. It should also be noted that the overall amount of groundfish shown in the tables and figures includes all catches and revenues of groundfish not just the catch of Atka mackerel.

Table 83. Total Catch and Wholesale Value of Groundfish in the AM80CP BSAI Atka Mackerel Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	57,217	58,886	64,057	63,802	61,390	58,569	70,929	69,111	47,693	45,090
Wholesale $ Millions (2012)	$28.8	$36.5	$45.1	$43.4	$52.7	$45.6	$66.2	$68.1	$64.7	$60.3

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 84. Bycatch of Prohibited Species in the AM80CP BSAI Atka Mackerel Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	55	40	76	79	185	63	64	54	107	159
PSC King Crab (#s)	582	32	234	4,528	1,841	23,299	4,919	3,408	35,244	7,998
PSC Bairdi Crab (#s)	-	110	-	104	-	-	-	-	-	64
PSC Opilio Crab (#s)	193	503	1,752	-	275	74	-	53	682	-
PSC Herring (kg)	-	21	3	1,282	-	-	-	-	-	34
PSC Chinook (#s)	482	383	123	11	266	224	124	241	285	161
PSC non-Chinook (#s)	205	85	2,056	433	723	272	298	839	115	1,078

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 85. Bycatch Rates in the AM80CP BSAI Atka Mackerel Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0010	0.0007	0.0012	0.0012	0.0030	0.0011	0.0009	0.0008	0.0023	0.0035
PSC King Crab (#/mt)	0.0102	0.0005	0.0037	0.0710	0.0300	0.3978	0.0693	0.0493	0.7390	0.1774
PSC Bairdi Rate (#/mt)	-	0.0019	-	0.0016	-	-	-	-	-	0.0014
PSC Opilio Rate (#/mt)	0.0034	0.0085	0.0274	-	0.0045	0.0013	-	0.0008	0.0143	-
PSC Herring Rate (kg/mt)	-	0.0003	0.0000	0.0201	-	-	-	-	-	0.0008
PSC Chinook (#/mt)	0.0084	0.0065	0.0019	0.0002	0.0043	0.0038	0.0017	0.0035	0.0060	0.0036
PSC non-Chinook (#/mt)	0.0036	0.0014	0.0321	0.0068	0.0118	0.0046	0.0042	0.0121	0.0024	0.0239

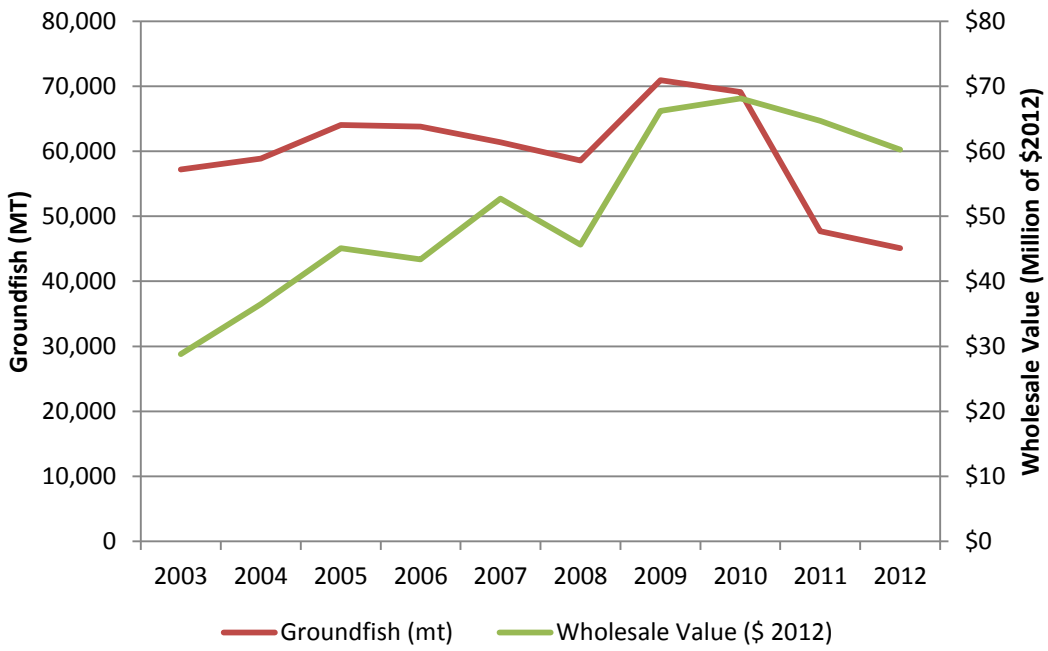
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 86. Groundfish Wholesale Value per Unit of PSC in the AM80CP BSAI Atka Mackerel Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	$519,670	$902,624	$593,428	$545,602	$285,268	$720,147	$1,038,294	$1,268,753	$602,745	$378,673
PSC King Crab ($/#)	$49,433	$1,146,472	$192,788	$9,574	$28,653	$1,958	$13,462	$19,985	$1,835	$7,533
PSC Bairdi Crab ($/#)	-	$332,958	-	$416,858	-	-	-	-	-	$941,558
PSC Opilio Crab ($/#)	$149,408	$72,507	$25,731	-	$191,727	$616,514	-	$1,284,824	$94,812	-
PSC Herring ($/kg)	-	$1,774,913	$16,160,340	$33,816	-	-	-	-	-	$1,767,390
PSC Chinook ($/#)	$59,703	$95,372	$367,730	$3,786,305	$197,997	$203,624	$534,702	$282,620	$227,283	$374,202
PSC non-Chinook ($/#)	$140,135	$431,452	$21,926	$100,162	$72,973	$167,724	$222,203	$81,175	$563,988	$55,893

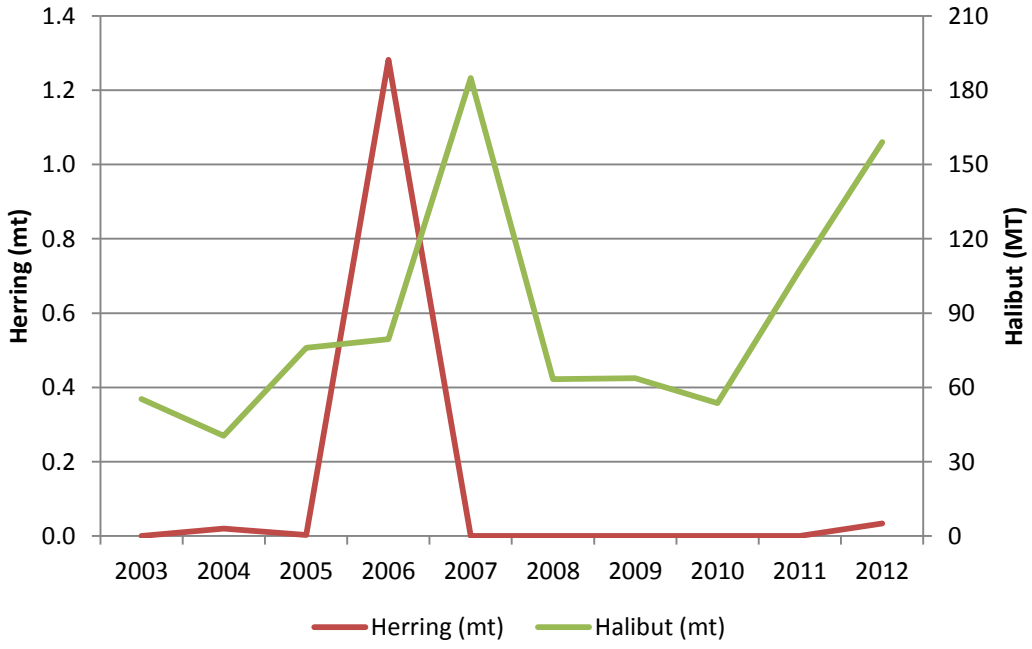
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 80. Total Volume and Wholesale Value of Groundfish Catch in the AM80CP BSAI Atka Mackerel Target Fishery, 2003–2012



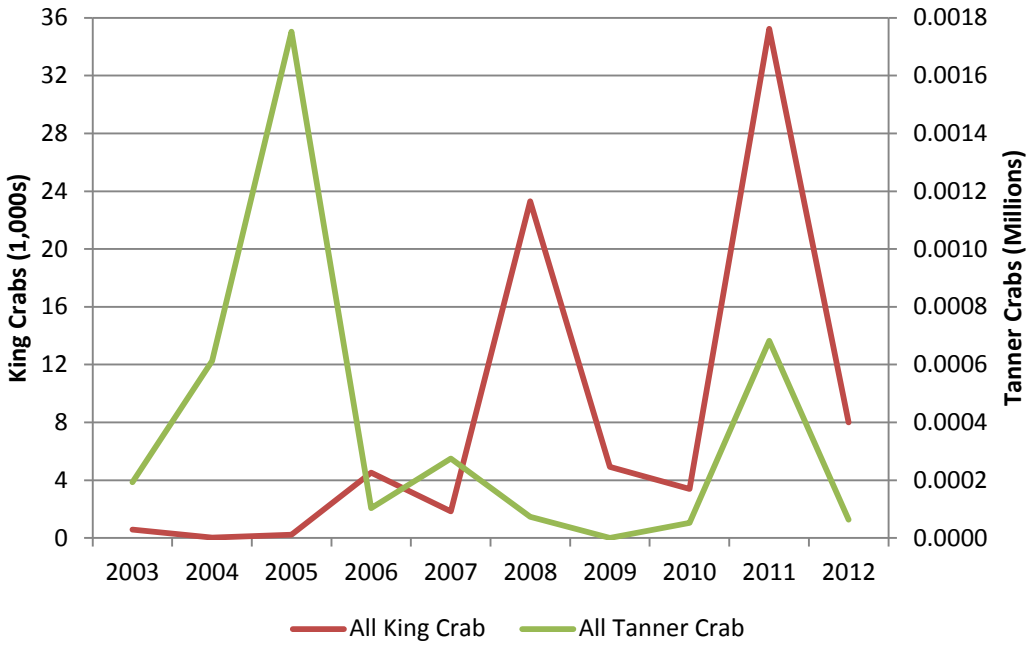
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 81. Herring and Halibut Bycatch in the AM80CP BSAI Atka Mackerel Target Fishery, 2003–2012



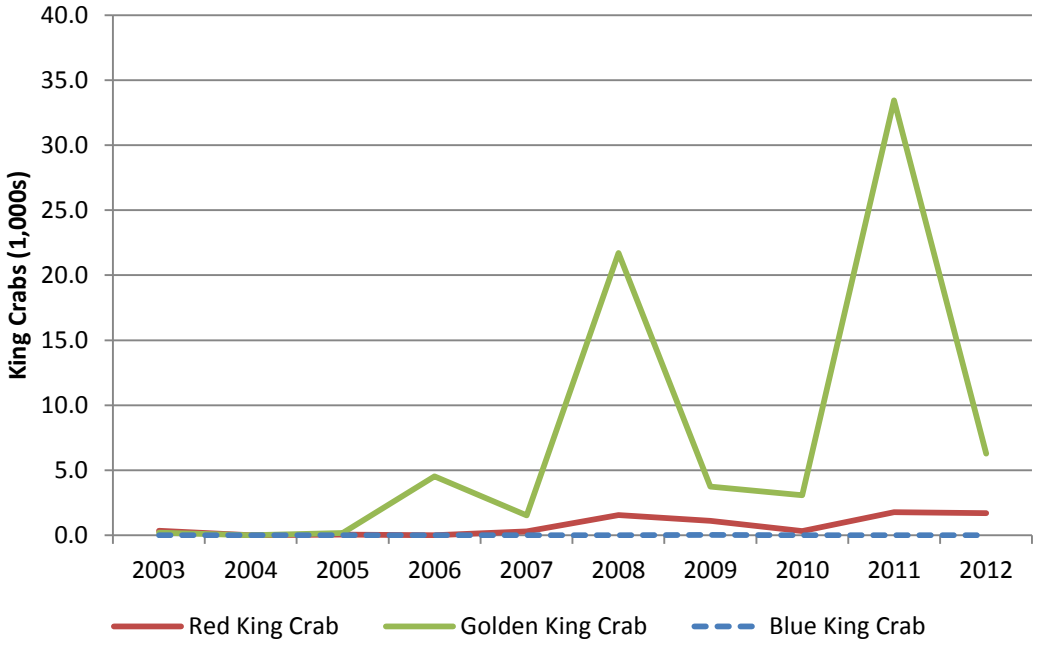
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 82. King Crab and Tanner Crab Bycatch in the AM80CP BSAI Atka Mackerel Target Fishery, 2003–2012



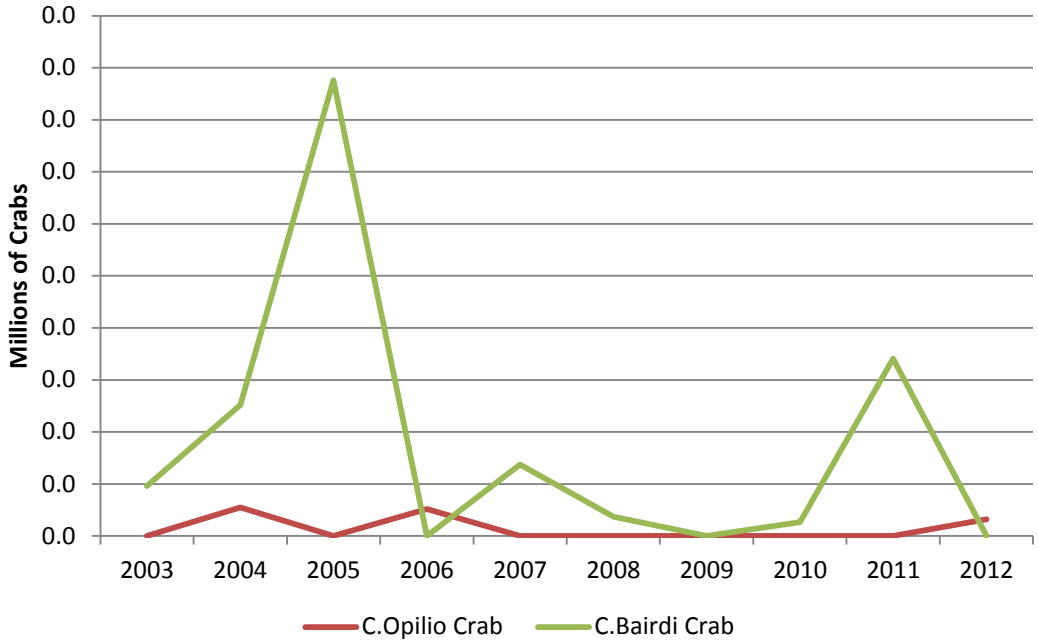
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 83. Bycatch of King Crab Species in the AM80CP BSAI Atka Mackerel Target Fishery, 2003–2012



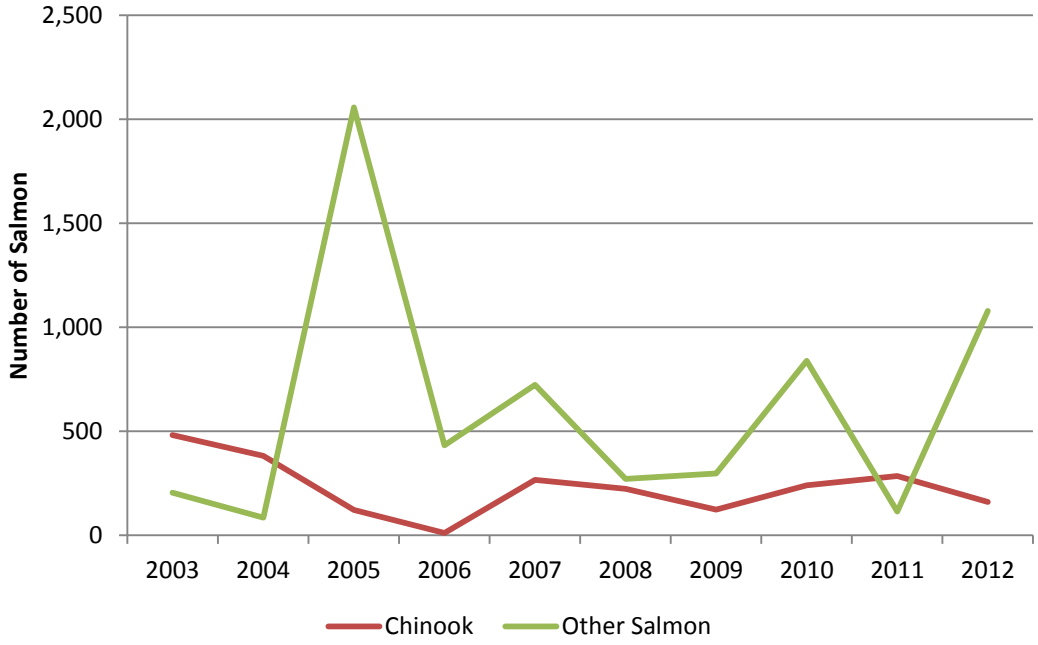
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 84. Bycatch of Tanner Crab Species in the AM80CP BSAI Atka Mackerel Target Fishery, 2003–2012



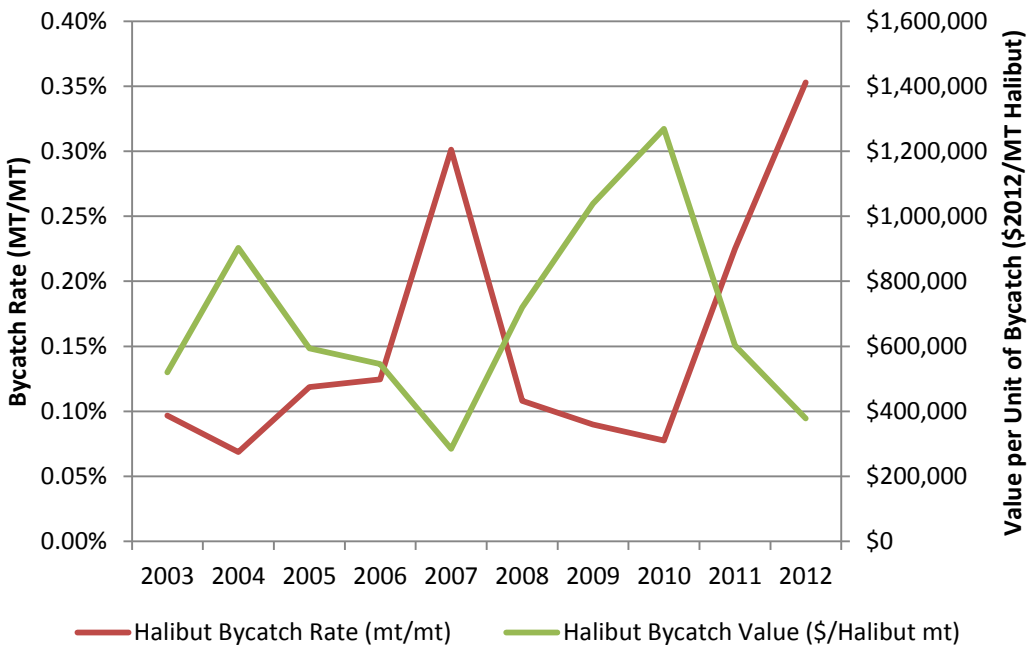
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 85. Bycatch of Salmon Species in the AM80CP BSAI Atka Mackerel Target Fishery, 2003–2012



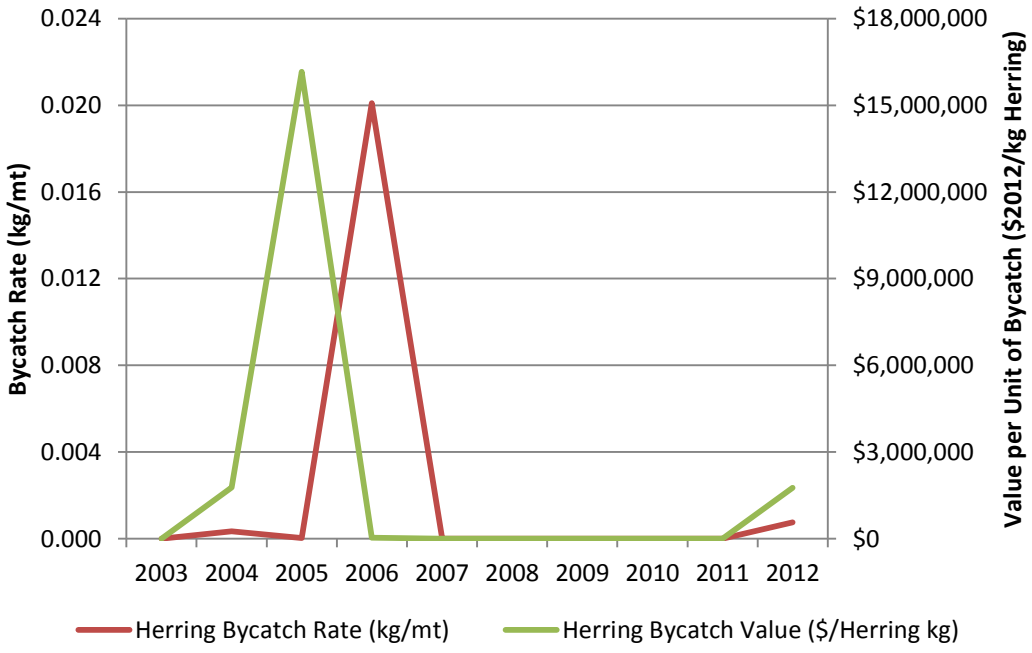
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 86. Bycatch of Halibut in the AM80CP BSAI Atka Mackerel Target Fishery as Share of Groundfish Catch and Value, 2003–2012



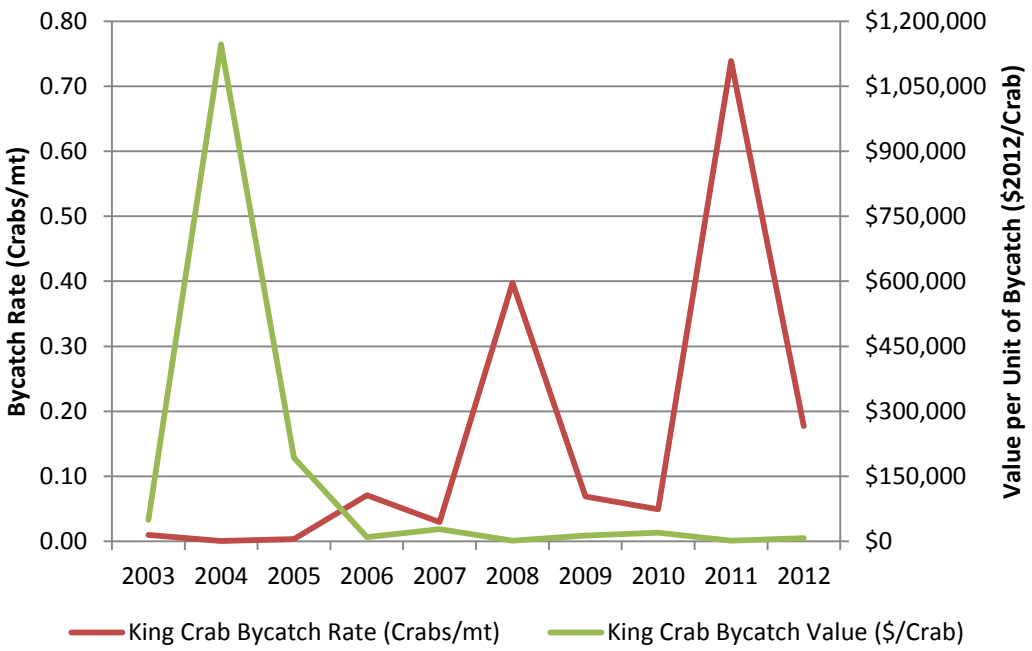
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 87. Bycatch of Herring in the AM80CP BSAI Atka Mackerel Target Fishery as Share of Groundfish Catch and Value, 2003–2012



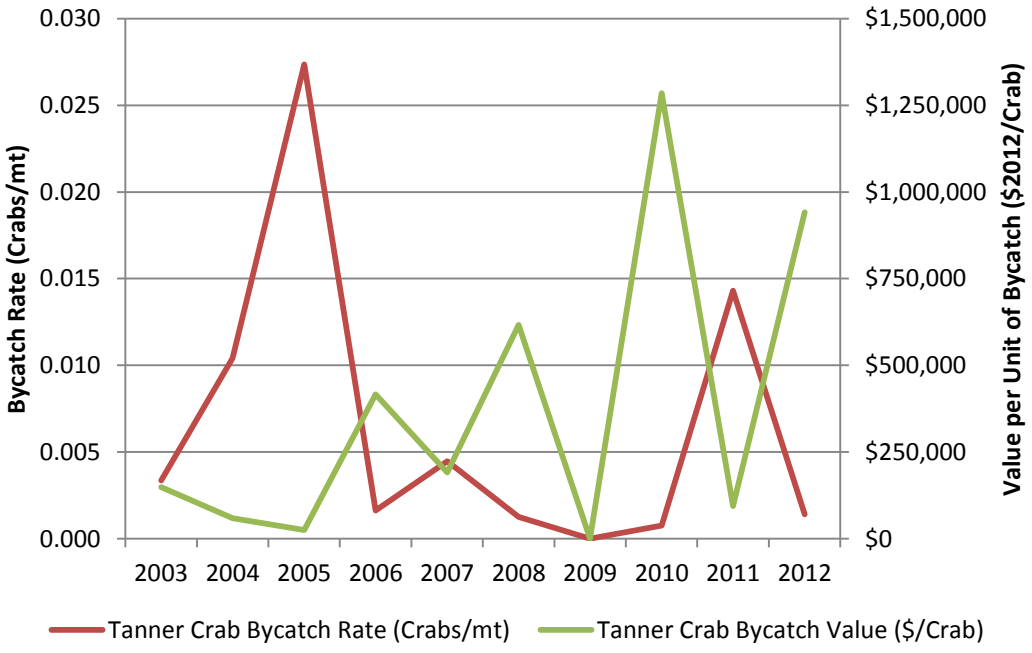
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 88. Bycatch of King Crab in the AM80CP BSAI Atka Mackerel Target Fishery as Share of Groundfish Catch and Value, 2003–2012



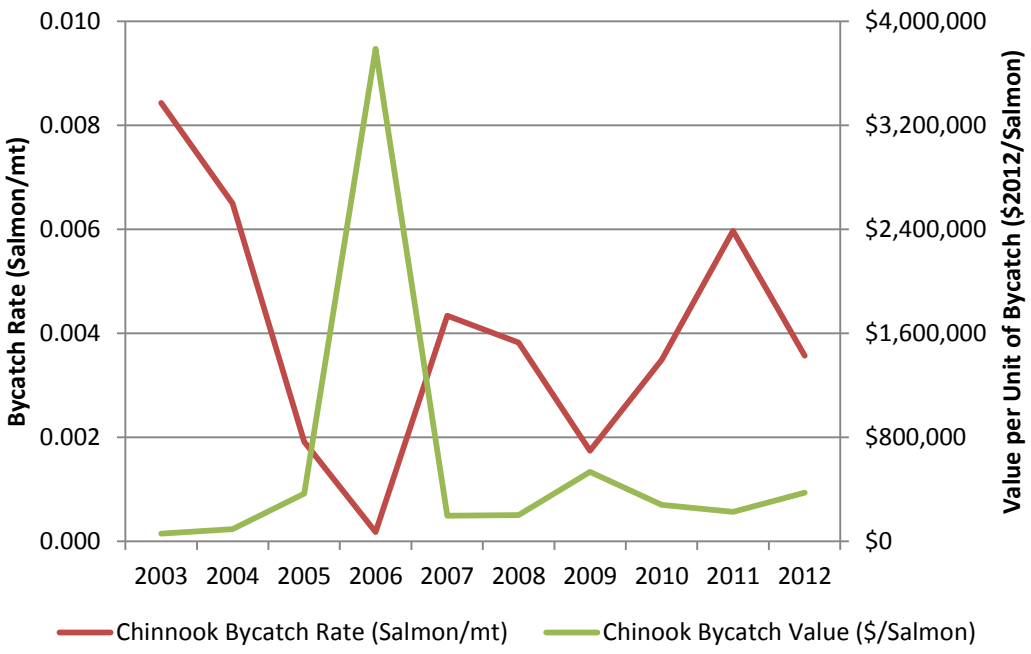
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 89. Bycatch of Tanner Crab in the AM80CP BSAI Atka Mackerel Target Fishery as Share of Groundfish Catch and Value, 2003–2012



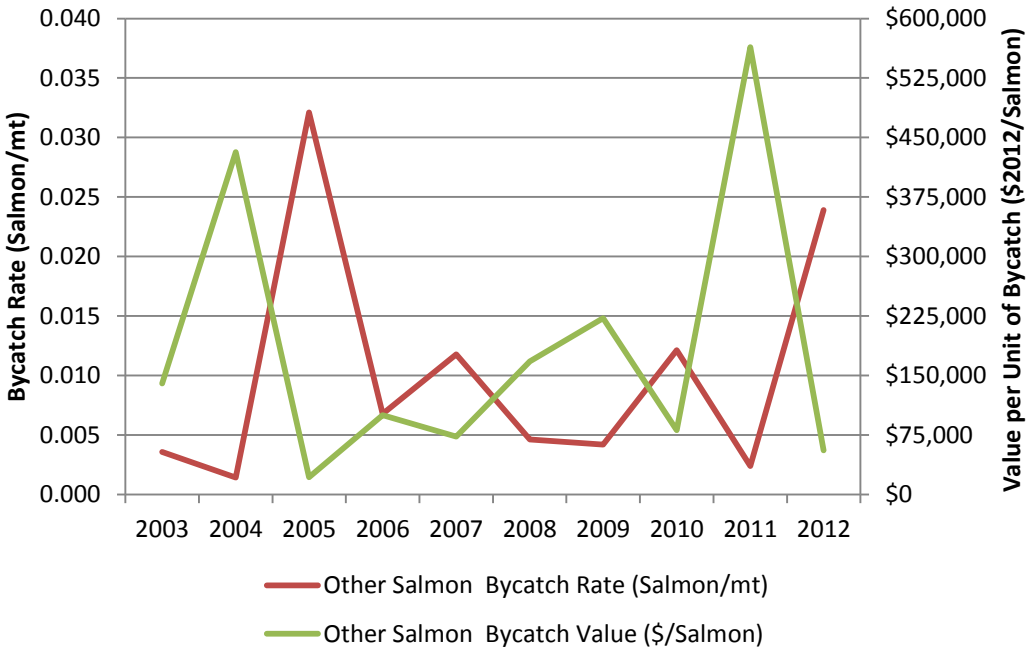
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 90. Chinook Bycatch in the AM80CP BSAI Atka Mackerel Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 91. Non-Chinook Salmon Bycatch in the AM80CP BSAI Atka Mackerel Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

AM80CP BSAI Pacific Cod

This section summarizes PSC bycatch AM80-CPs in the target|fishery for Pacific cod in the BSAI. The tables and figures exclude CDQ harvests and activities of AM80 vessels while acting as motherships. It should also be noted that the overall amount of groundfish shown in the tables and figures includes all catches and revenues of groundfish not just the catch of Pacific cod.

Table 87. Total Catch and Wholesale Value of Groundfish in the AM80CP BSAI Pacific Cod Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	38,903	61,262	40,228	42,859	48,834	5,286	6,692	5,517	3,453	3,708
Wholesale $ Millions (2012)	$36.6	$50.3	$41.6	$53.1	$71.1	$9.5	$6.6	$6.0	$4.0	$4.5

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 88. Bycatch of Prohibited Species in the AM80CP BSAI Pacific Cod Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	577	1,129	782	833	613	44	75	35	29	86
PSC King Crab (#s)	3,476	2,582	1,738	7,837	4,513	116	1,509	427	422	132
PSC Bairdi Crab (#s)	60,304	66,503	33,194	75,096	263,214	4,169	6,348	531	3,930	1,242
PSC Opilio Crab (#s)	108,625	174,314	98,582	131,035	111,370	2,854	8,639	5,846	3,331	2,507
PSC Herring (kg)	12,736	8,363	17,552	7,782	503	379	2	71	-	22
PSC Chinook (#s)	1,864	2,986	1,642	1,943	2,606	97	232	123	320	269
PSC non-Chinook (#s)	241	5,945	319	6,092	823	153	3	-	127	-

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 89. Bycatch Rates in the AM80CP BSAI Pacific Cod Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0148	0.0184	0.0194	0.0194	0.0125	0.0083	0.0112	0.0063	0.0083	0.0232
PSC King Crab (#/mt)	0.0893	0.0421	0.0432	0.1829	0.0924	0.0219	0.2254	0.0774	0.1222	0.0356
PSC Bairdi Rate (#/mt)	1.5501	1.0856	0.8252	1.7522	5.3900	0.7887	0.9485	0.0963	1.1382	0.3348
PSC Opilio Rate (#/mt)	2.7922	2.8454	2.4506	3.0573	2.2806	0.5400	1.2910	1.0596	0.9646	0.6760
PSC Herring Rate (kg/mt)	0.3274	0.1365	0.4363	0.1816	0.0103	0.0717	0.0003	0.0129	-	0.0060
PSC Chinook (#/mt)	0.0479	0.0487	0.0408	0.0453	0.0534	0.0183	0.0347	0.0223	0.0928	0.0725
PSC non-Chinook (#/mt)	0.0062	0.0970	0.0079	0.1421	0.0169	0.0289	0.0005	-	0.0367	-

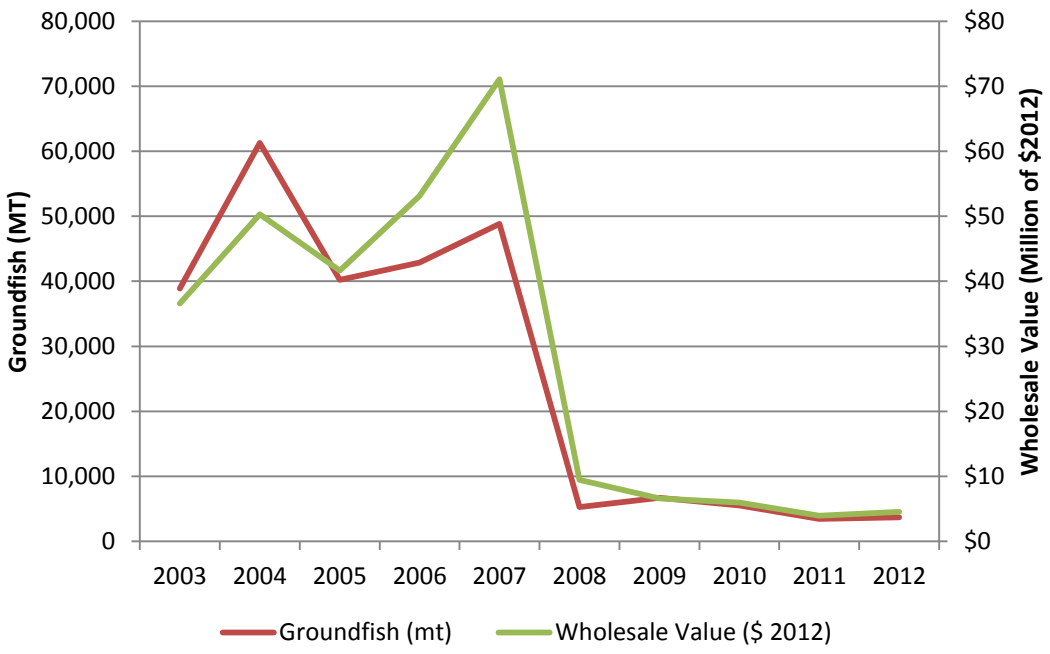
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 90. Groundfish Wholesale Value per Unit of PSC in the AM80CP BSAI Pacific Cod Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	$63,339	$44,551	$53,218	$63,779	$116,000	$216,496	$88,095	$171,332	$138,602	$52,754
PSC King Crab ($/#)	$10,519	$19,479	$23,961	$6,778	$15,747	$81,636	$4,375	$13,949	$9,375	$34,377
PSC Bairdi Crab ($/#)	$606	$756	$1,254	$707	$270	$2,271	$1,040	$11,220	$1,007	$3,657
PSC Opilio Crab ($/#)	$337	$289	$422	$405	$638	$3,317	$764	$1,019	$1,188	$1,811
PSC Herring ($/kg)	$2,871	$6,014	$2,372	$6,826	$141,411	$24,990	$3,250,946	$83,633	-	$202,537
PSC Chinook ($/#)	$19,618	$16,841	$25,355	$27,341	$27,275	$97,628	$28,389	$48,423	$12,347	$16,881
PSC non-Chinook ($/#)	$151,791	$8,460	$130,675	$8,719	$86,331	$61,889	$2,170,862	-	$31,189	-

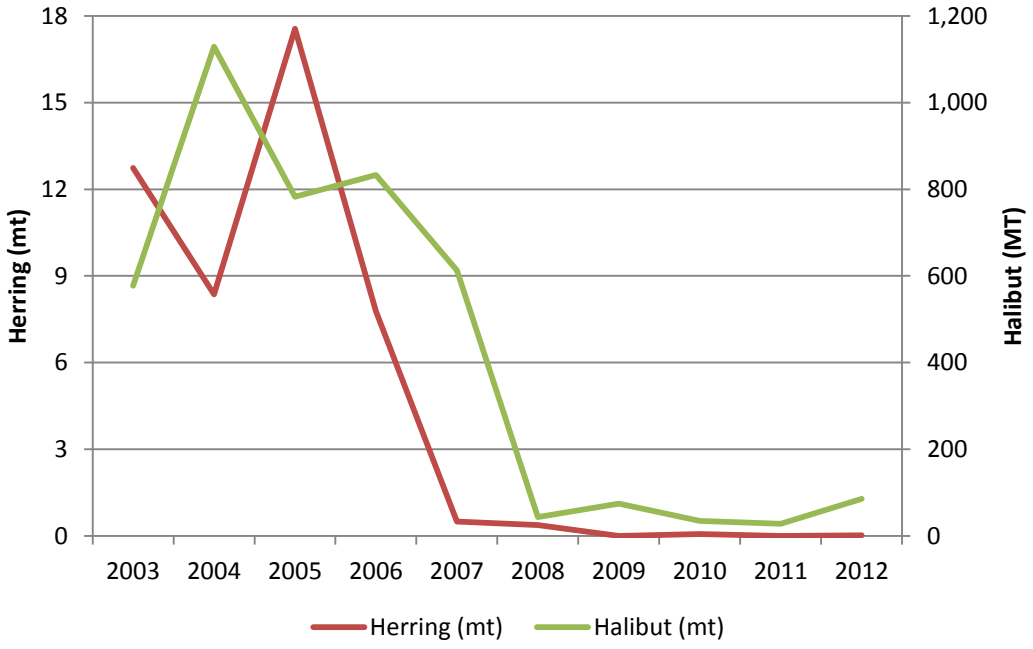
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 92. Total Volume and Wholesale Value of Groundfish Catch in the AM80CP BSAI Pacific Cod Target Fishery, 2003–2012



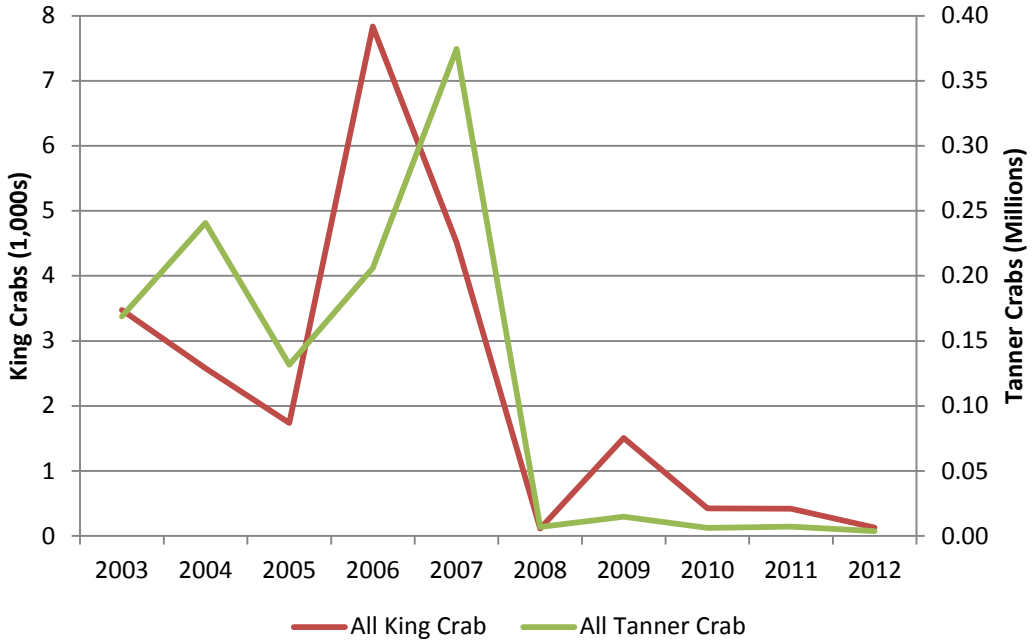
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 93. Herring and Halibut Bycatch in the AM80CP BSAI Pacific Cod Target Fishery, 2003–2012



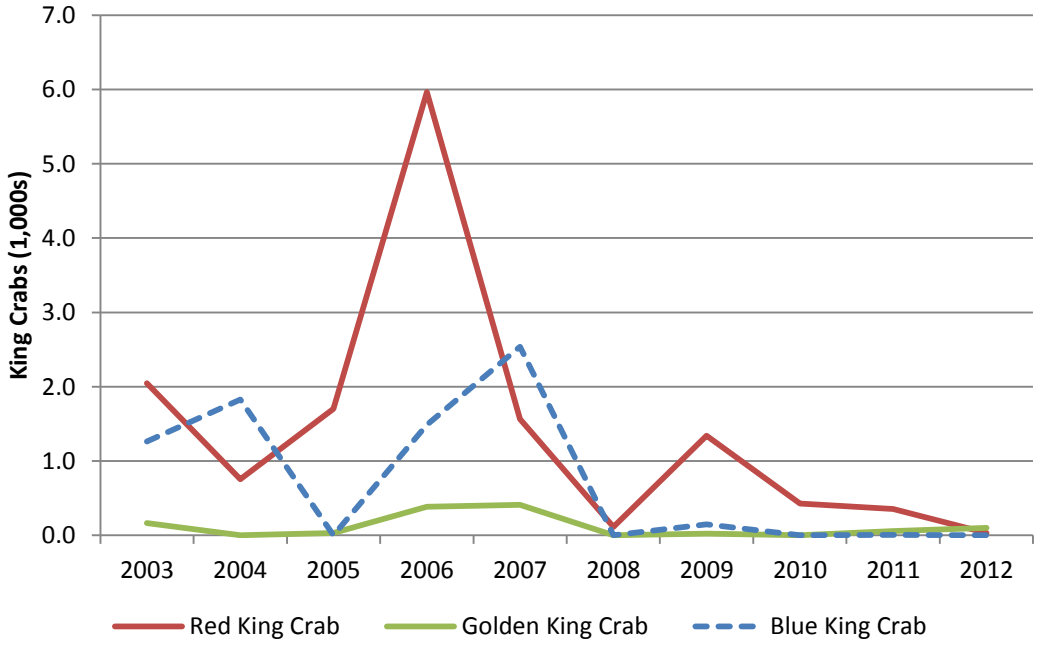
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 94. King Crab and Tanner Crab Bycatch in the AM80CP BSAI Pacific Cod Target Fishery, 2003–2012



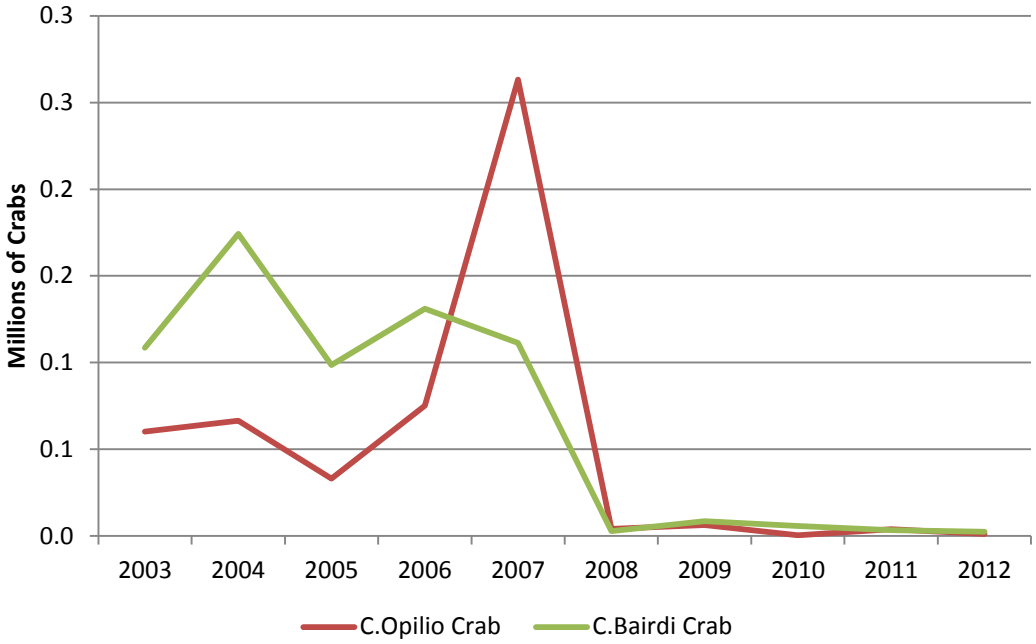
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 95. Bycatch of King Crab Species in the AM80CP BSAI Pacific Cod Target Fishery, 2003–2012



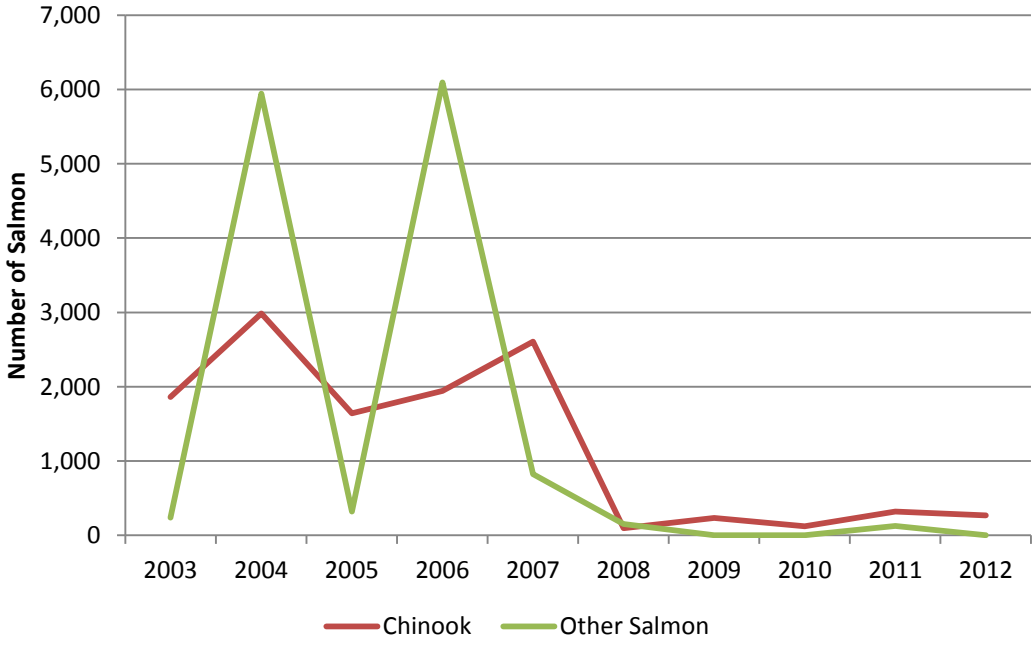
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 96. Bycatch of Tanner Crab Species in the AM80CP BSAI Pacific Cod Target Fishery, 2003–2012



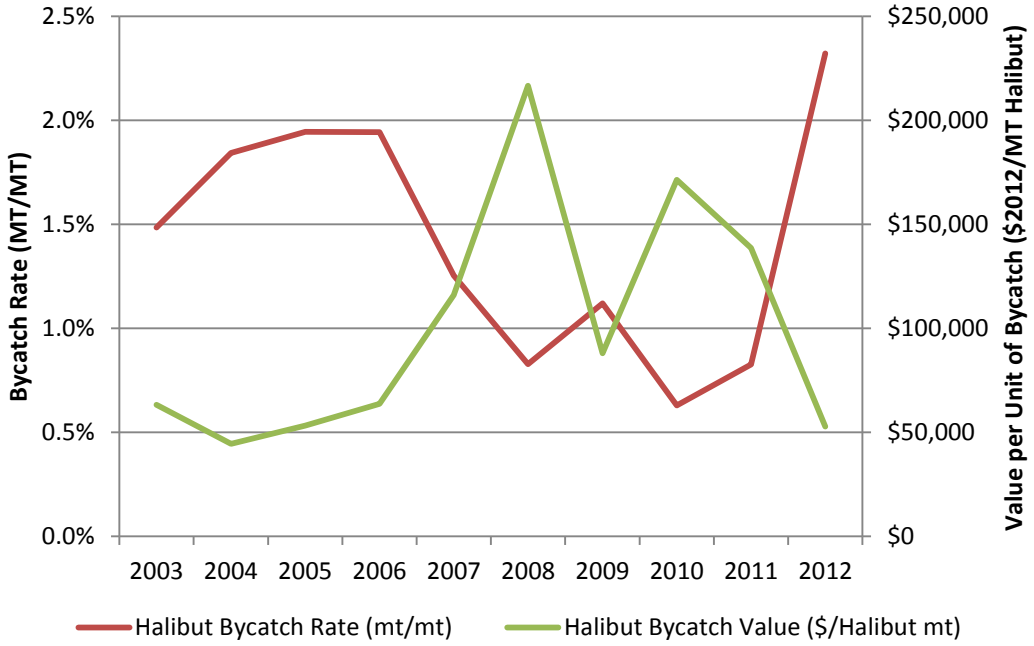
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 97. Bycatch of Salmon Species in the AM80CP BSAI Pacific Cod Target Fishery, 2003–2012



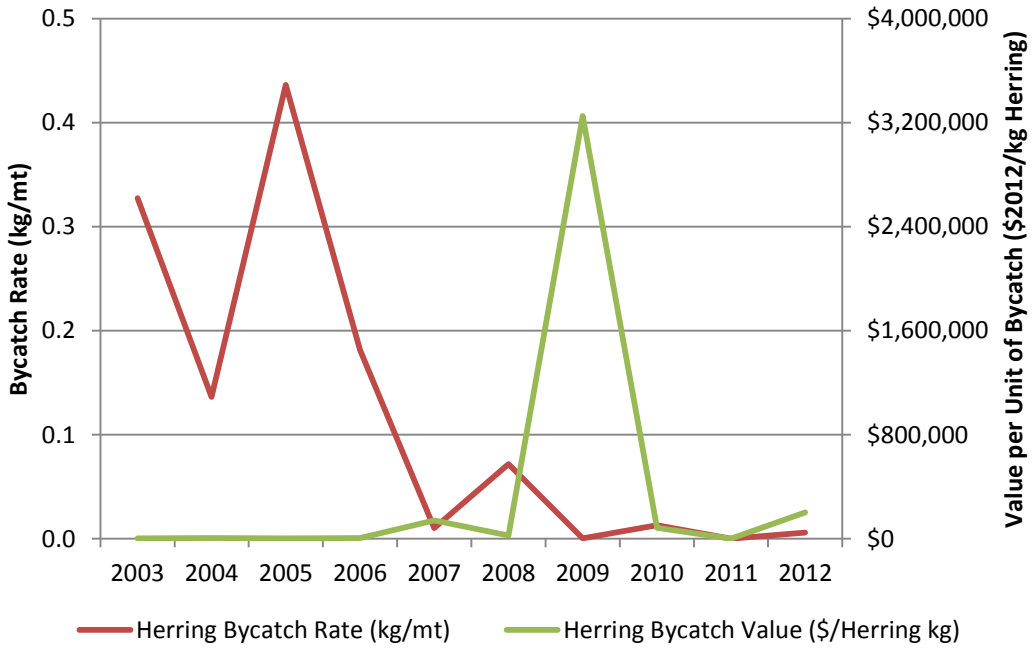
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 98. Bycatch of Halibut in the AM80CP BSAI Pacific Cod Target Fishery as Share of Groundfish Catch and Value, 2003–2012



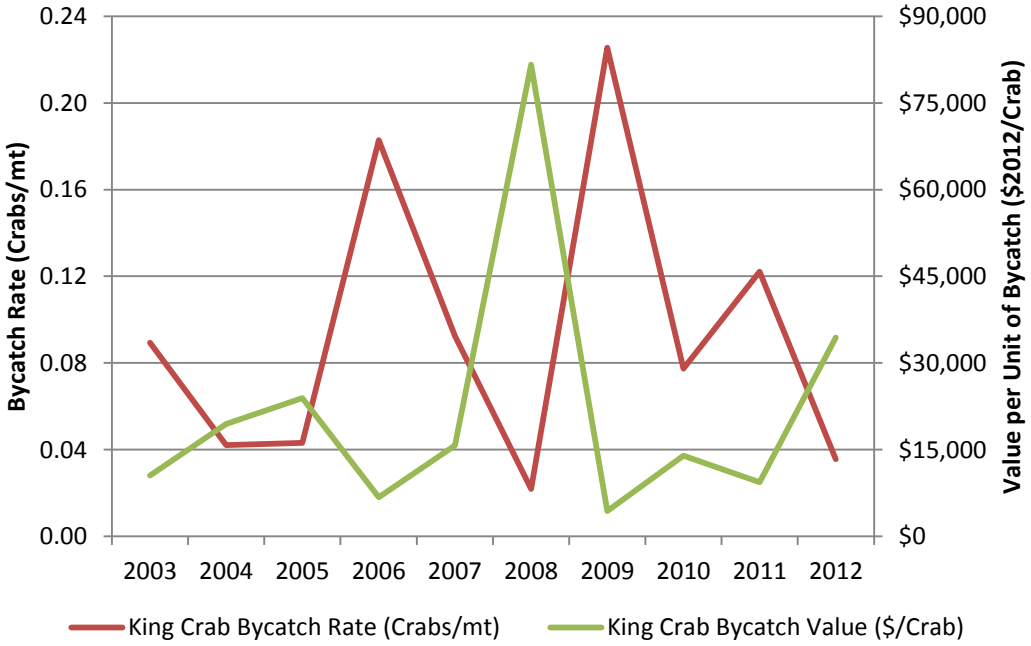
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 99. Bycatch of Herring in the AM80CP BSAI Pacific Cod Target Fishery as Share of Groundfish Catch and Value, 2003–2012



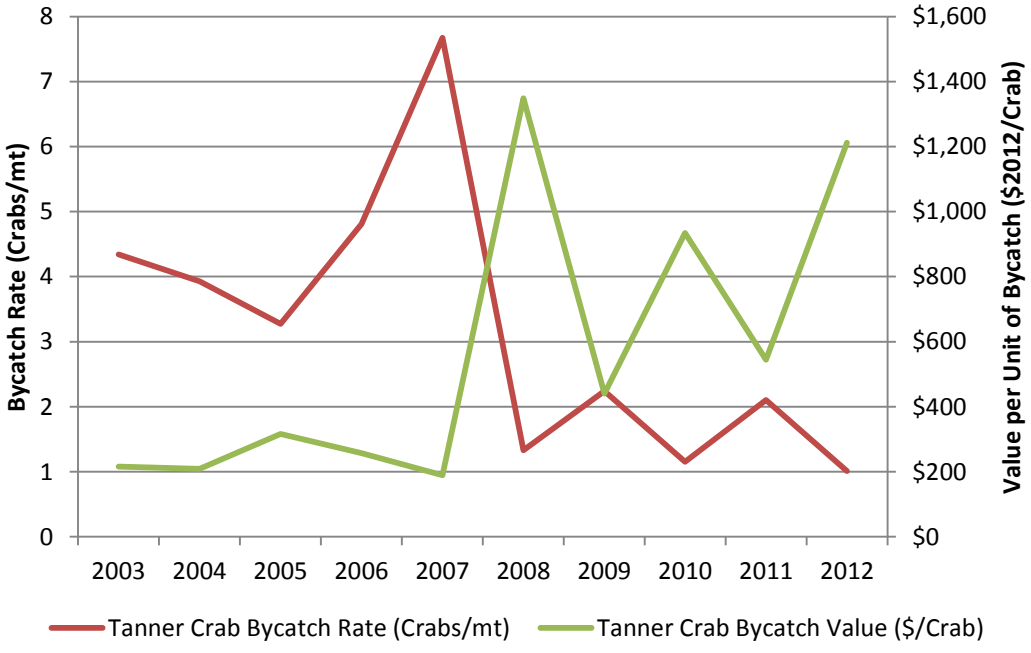
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 100. Bycatch of King Crab in the AM80CP BSAI Pacific Cod Target Fishery as Share of Groundfish Catch and Value, 2003–2012



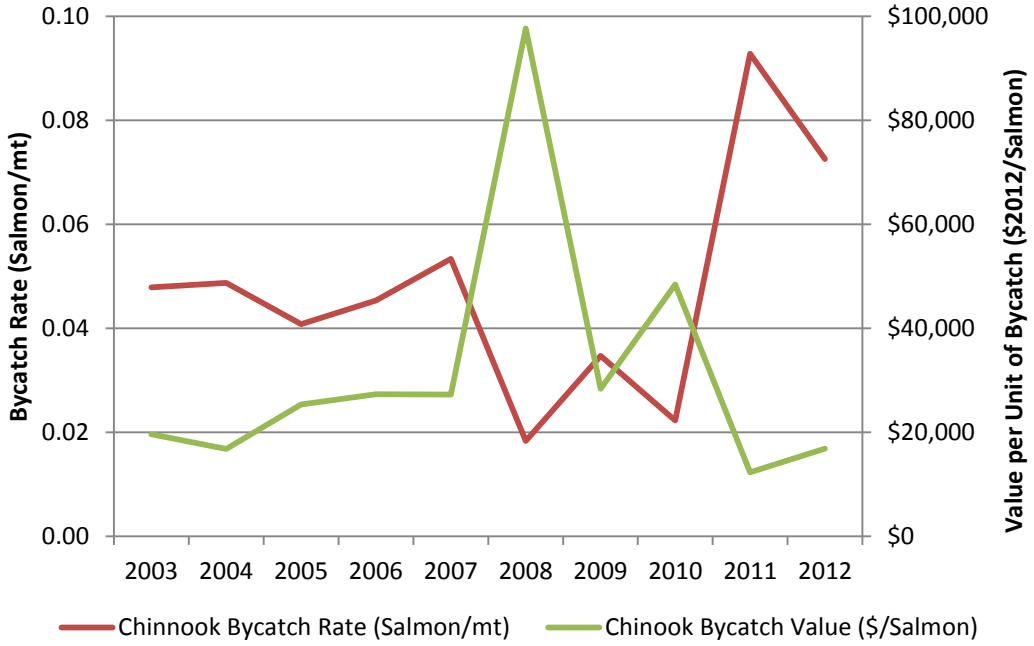
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 101. Bycatch of Tanner Crab in the AM80CP BSAI Pacific Cod Target Fishery as Share of Groundfish Catch and Value, 2003–2012



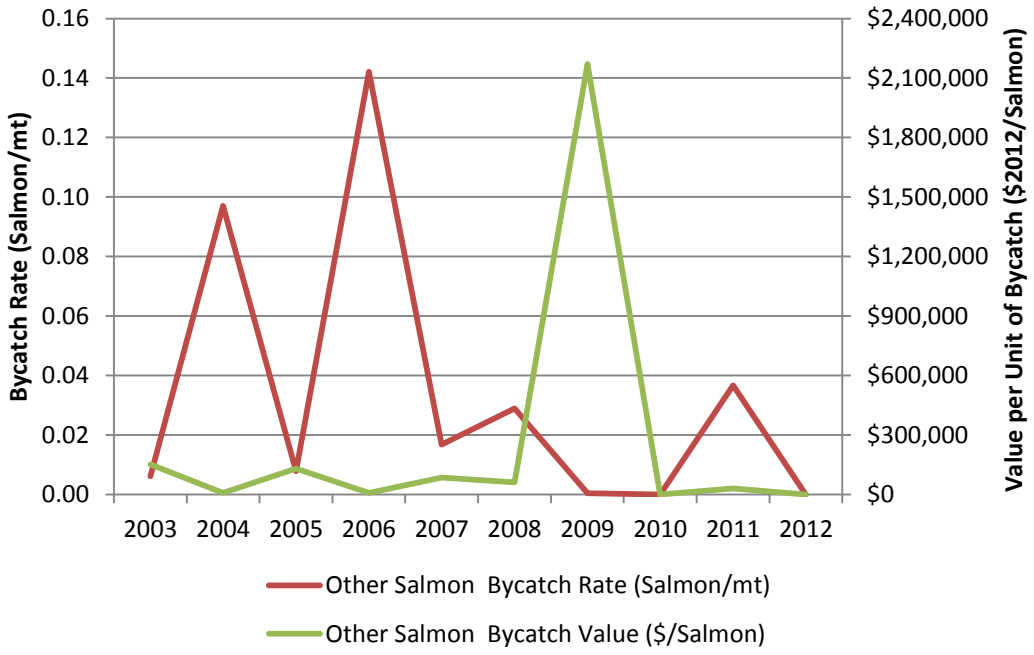
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 102. Chinook Bycatch in the AM80CP BSAI Pacific Cod Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 103. Non-Chinook Salmon Bycatch in the AM80CP BSAI Pacific Cod Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

AM80CP BSAI Rockfish

This section summarizes PSC bycatch AM80-CPs in the target|fisheries for all rockfish in the BSAI. The tables and figures exclude CDQ harvests and activities of AM80 vessels while acting as motherships. It should also be noted that the overall amount of groundfish shown in the tables and figures includes all catches and revenues of groundfish not just the catch of rockfish.

Table 91. Total Catch and Wholesale Value of Groundfish in the AM80CP BSAI Rockfish Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	13,037	10,070	8,156	10,009	14,882	12,685	10,535	12,407	20,639	20,387
Wholesale $ Millions (2012)	$10.7	$9.3	$11.3	$15.7	$19.7	$11.9	$10.3	$14.4	$34.0	$26.8

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 92. Bycatch of Prohibited Species in the AM80CP BSAI Rockfish Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	48	50	13	29	17	33	30	56	96	68
PSC King Crab (#s)	3,000	1,944	4,933	2,758	3,203	3,343	2,329	3,476	5,344	7,414
PSC Bairdi Crab (#s)	-	-	-	-	-	-	-	103	-	-
PSC Opilio Crab (#s)	313	1,248	-	-	-	9	80	660	406	102
PSC Herring (kg)	-	8	-	-	-	-	-	-	-	-
PSC Chinook (#s)	-	-	-	-	-	5	-	540	359	273
PSC non-Chinook (#s)	-	-	-	-	-	3	7	-	-	76

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 93. Bycatch Rates in the AM80CP BSAI Rockfish Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0037	0.0049	0.0016	0.0029	0.0011	0.0026	0.0028	0.0045	0.0046	0.0033
PSC King Crab (#/mt)	0.2301	0.1930	0.6048	0.2756	0.2153	0.2636	0.2211	0.2802	0.2590	0.3637
PSC Bairdi Rate (#/mt)	-	-	-	-	-	-	-	0.0083	-	-
PSC Opilio Rate (#/mt)	0.0240	0.1239	-	-	-	0.0007	0.0076	0.0532	0.0197	0.0050
PSC Herring Rate (kg/mt)	-	0.0008	-	-	-	-	-	-	-	-
PSC Chinook (#/mt)	-	-	-	-	-	0.0004	-	0.0435	0.0174	0.0134
PSC non-Chinook (#/mt)	-	-	-	-	-	0.0002	0.0007	-	-	0.0037

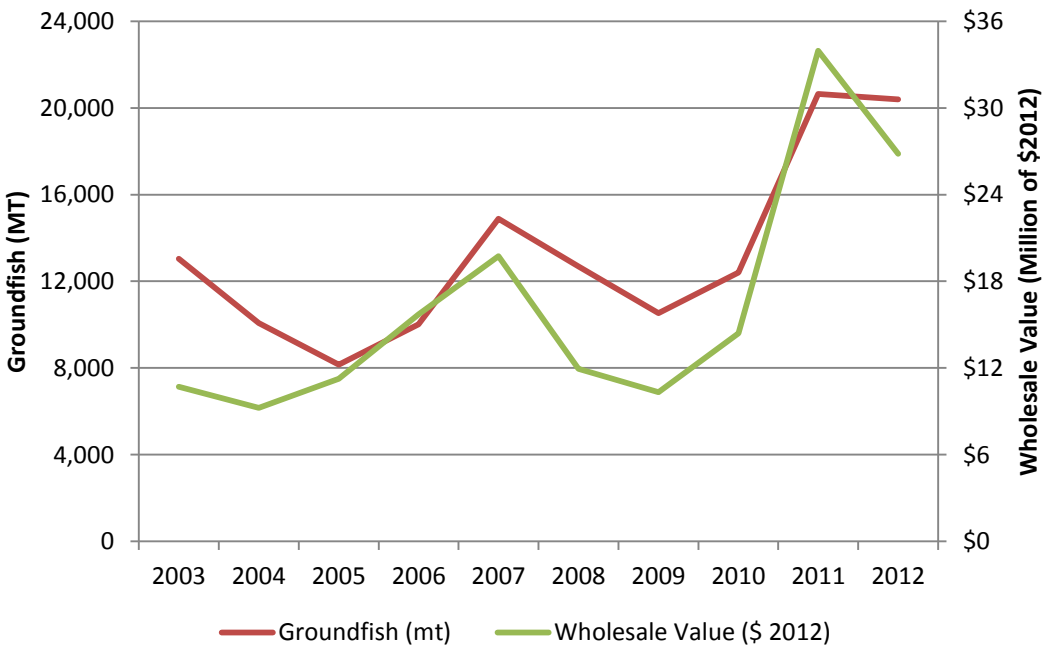
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 94. Groundfish Wholesale Value per Unit of PSC in the AM80CP BSAI Rockfish Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	$220,882	$186,038	$857,667	$545,917	$1,176,823	$356,741	$350,085	$257,598	$353,985	$397,273
PSC King Crab ($/#)	$3,565	$4,760	$2,282	$5,692	$6,162	$3,571	$4,435	$4,144	$6,354	$3,618
PSC Bairdi Crab ($/#)	-	-	-	-	-	-	-	$139,866	-	-
PSC Opilio Crab ($/#)	$34,181	$7,413	-	-	-	$1,326,610	$129,102	$21,824	$83,701	$262,945
PSC Herring ($/kg)	-	$1,152,175	-	-	-	-	-	-	-	-
PSC Chinook ($/#)	-	-	-	-	-	$2,378,384	-	$26,673	$94,592	$98,264
PSC non-Chinook ($/#)	-	-	-	-	-	$3,993,140	$1,473,528	-	-	$352,935

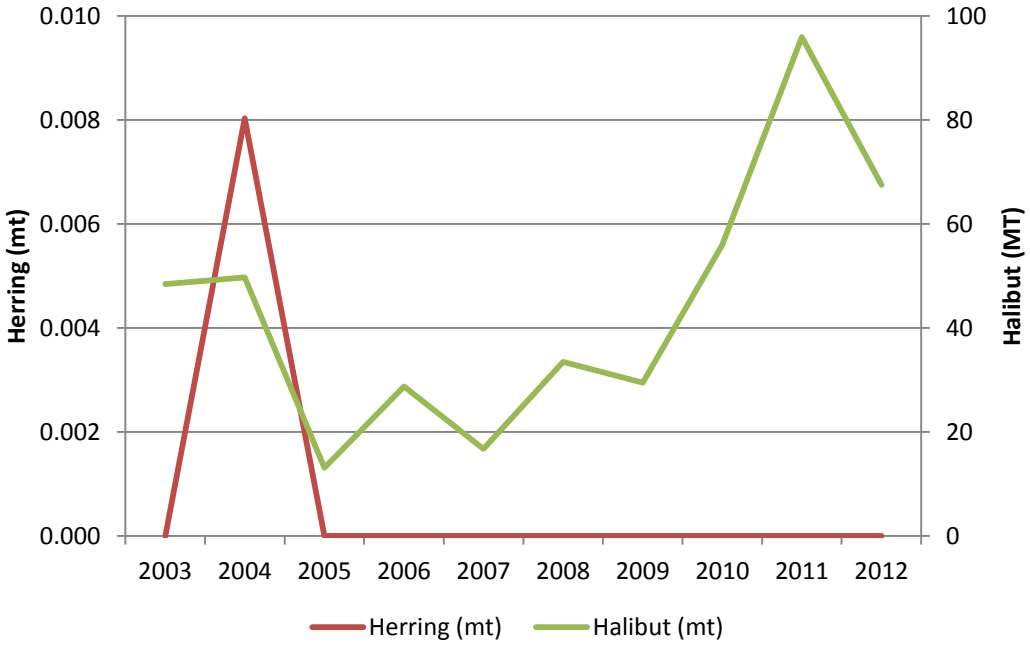
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 104. Total Volume and Wholesale Value of Groundfish Catch in the AM80CP BSAI Rockfish Target Fishery, 2003–2012



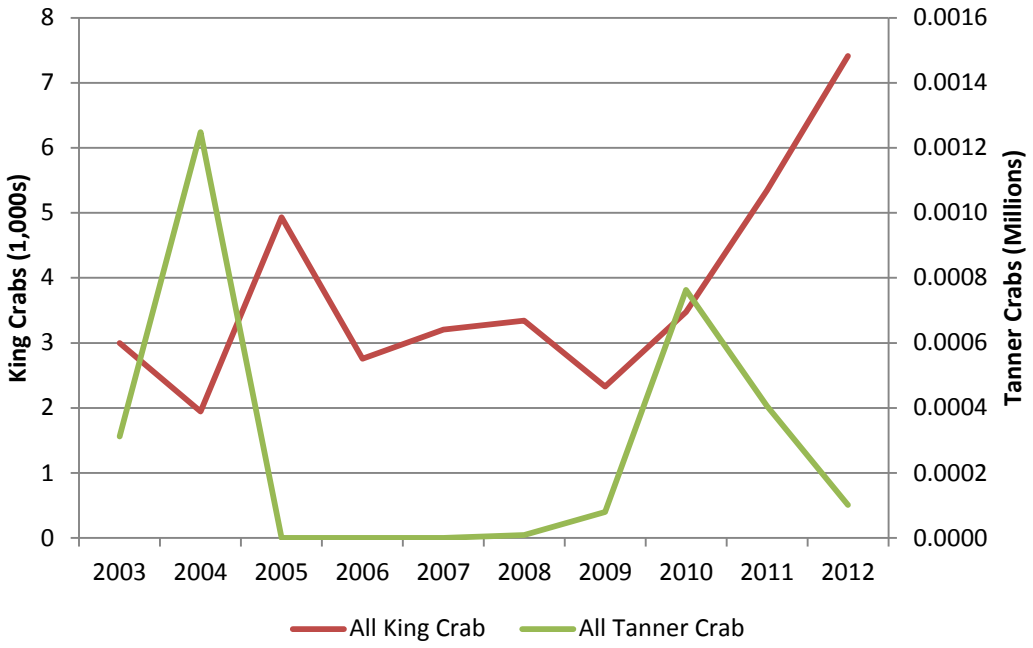
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 105. Herring and Halibut Bycatch in the AM80CP BSAI Rockfish Target Fishery, 2003–2012



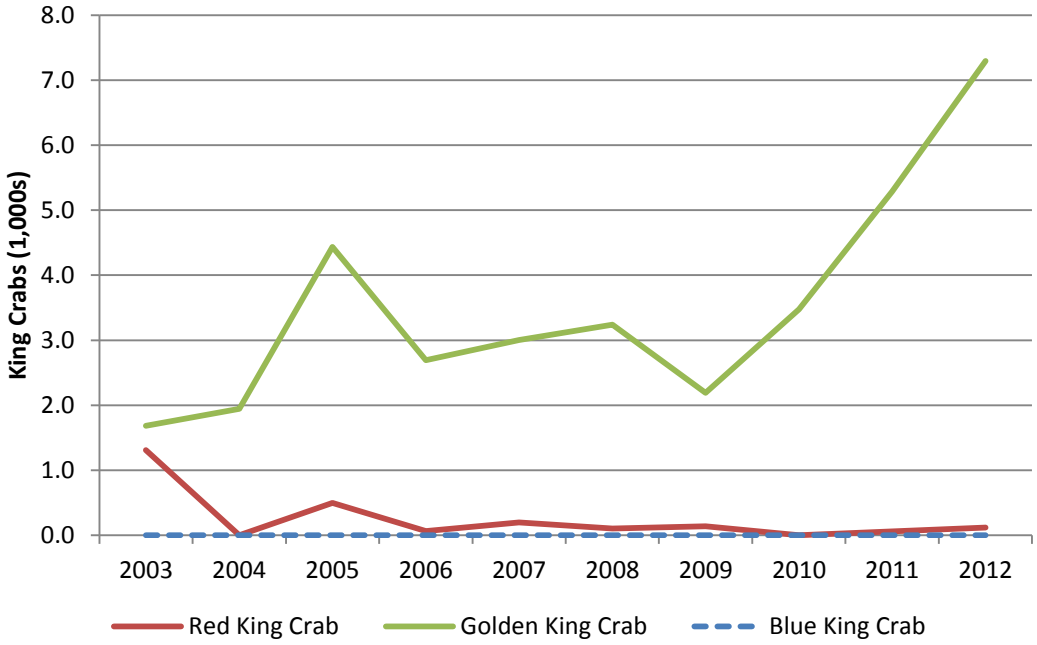
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 106. King Crab and Tanner Crab Bycatch in the AM80CP BSAI Rockfish Target Fishery, 2003–2012



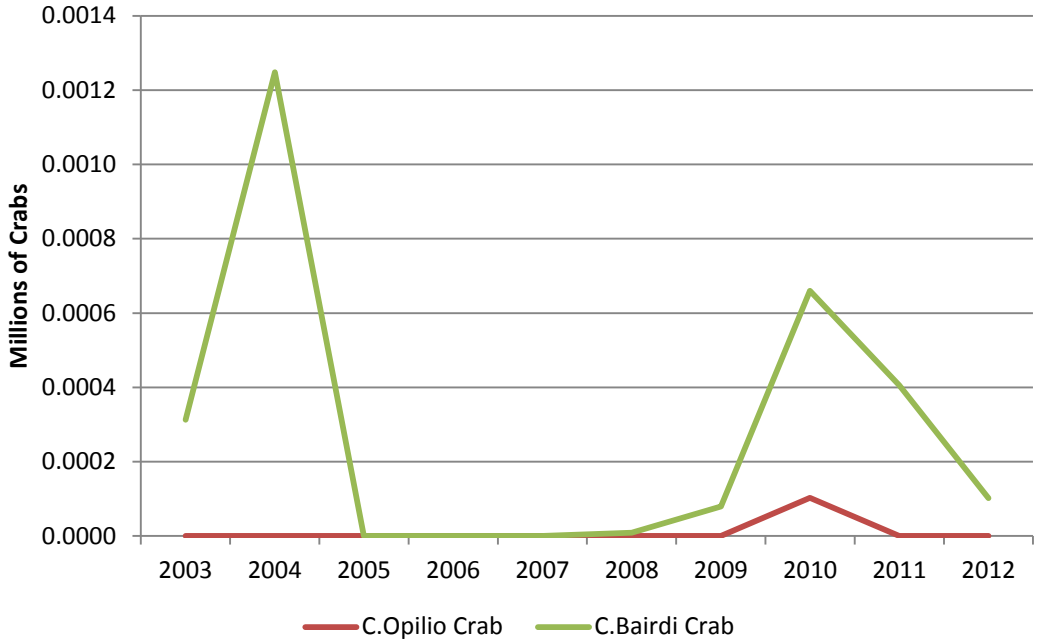
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 107. Bycatch of King Crab Species in the AM80CP BSAI Rockfish Target Fishery, 2003–2012



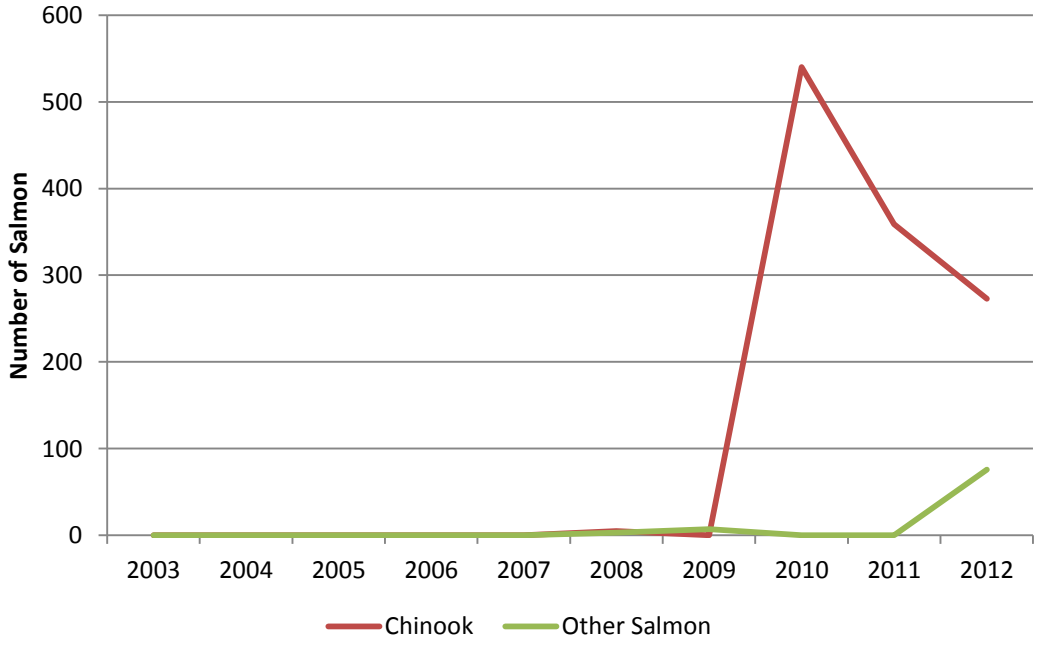
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 108. Bycatch of Tanner Crab Species in the AM80CP BSAI Rockfish Target Fishery, 2003–2012



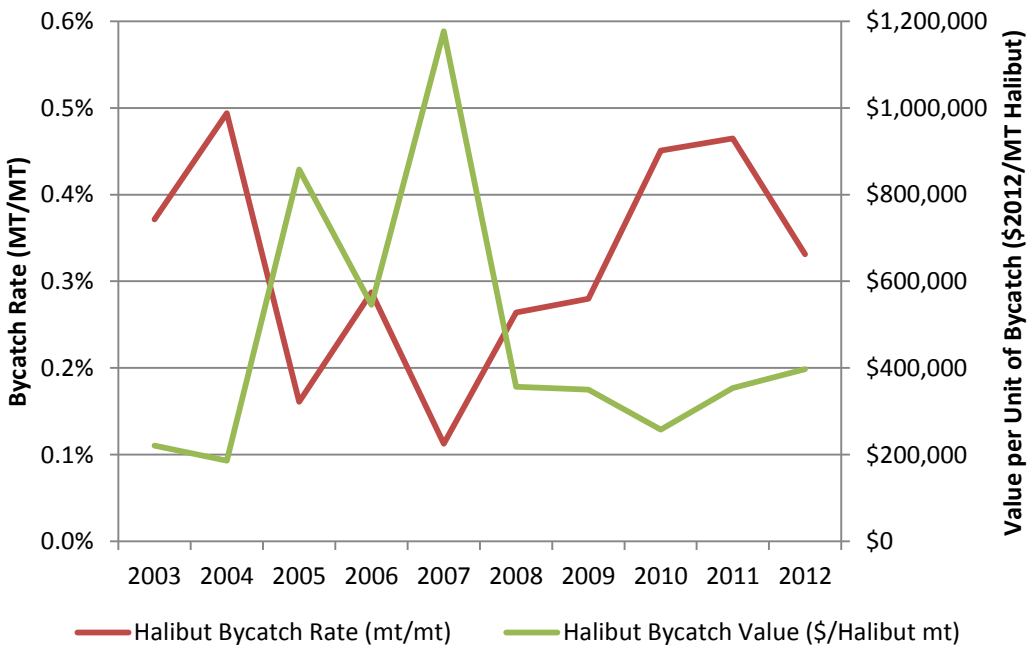
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 109. Bycatch of Salmon Species in the AM80CP BSAI Rockfish Target Fishery, 2003–2012



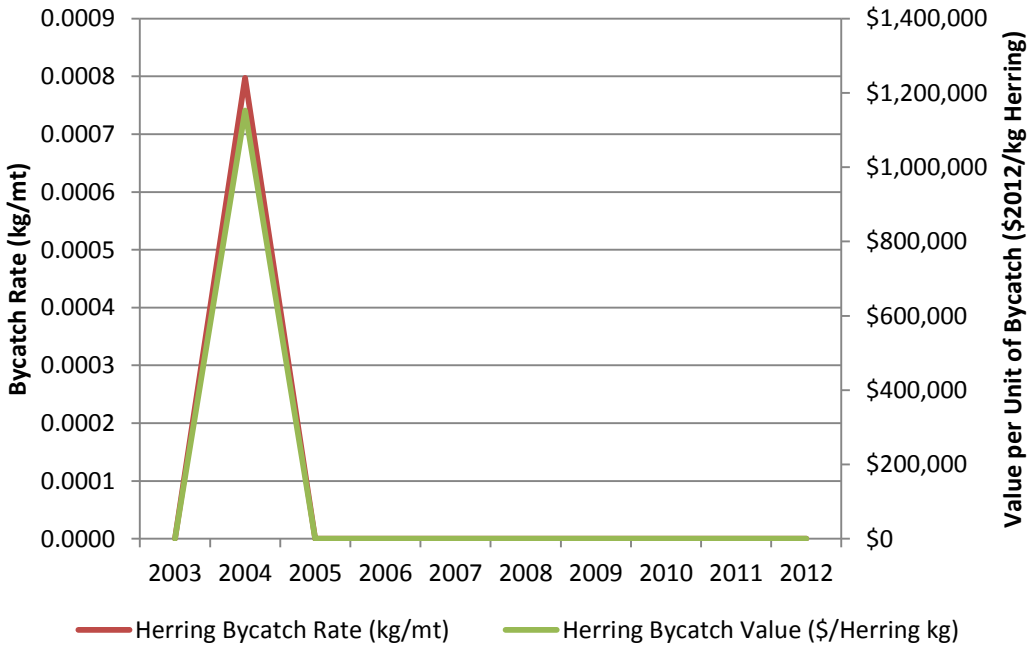
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 110. Bycatch of Halibut in the AM80CP BSAI Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



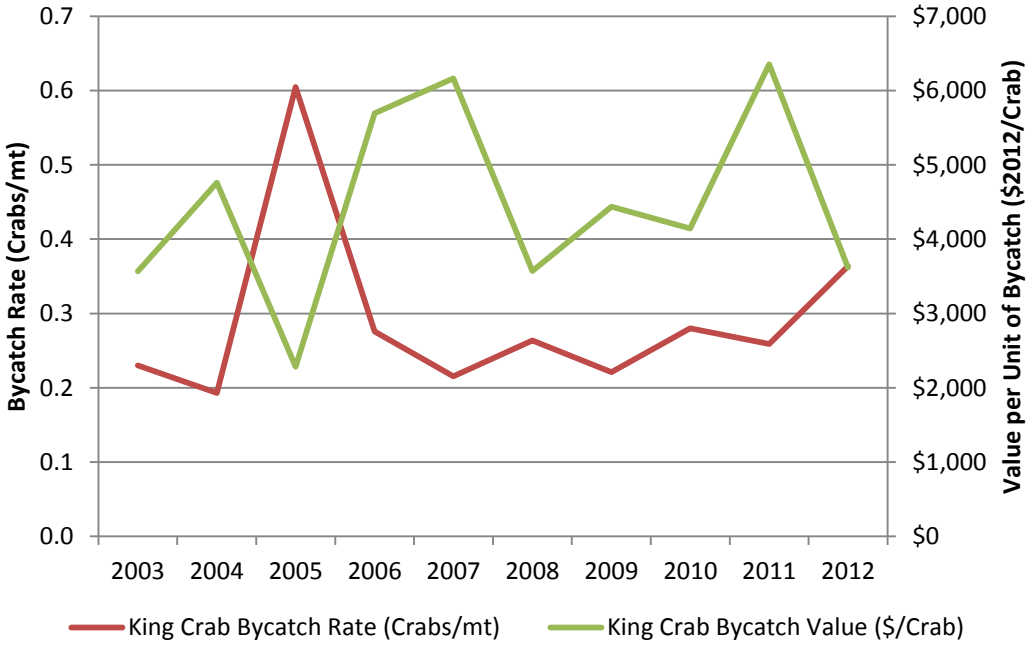
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 111. Bycatch of Herring in the AM80CP BSAI Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



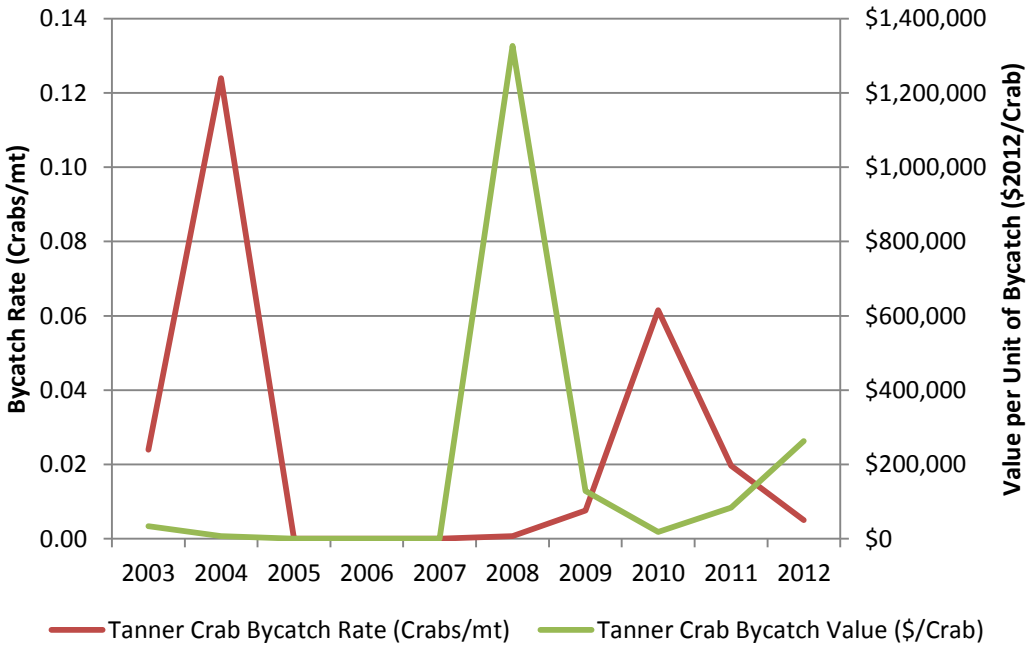
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 112. Bycatch of King Crab in the AM80CP BSAI Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



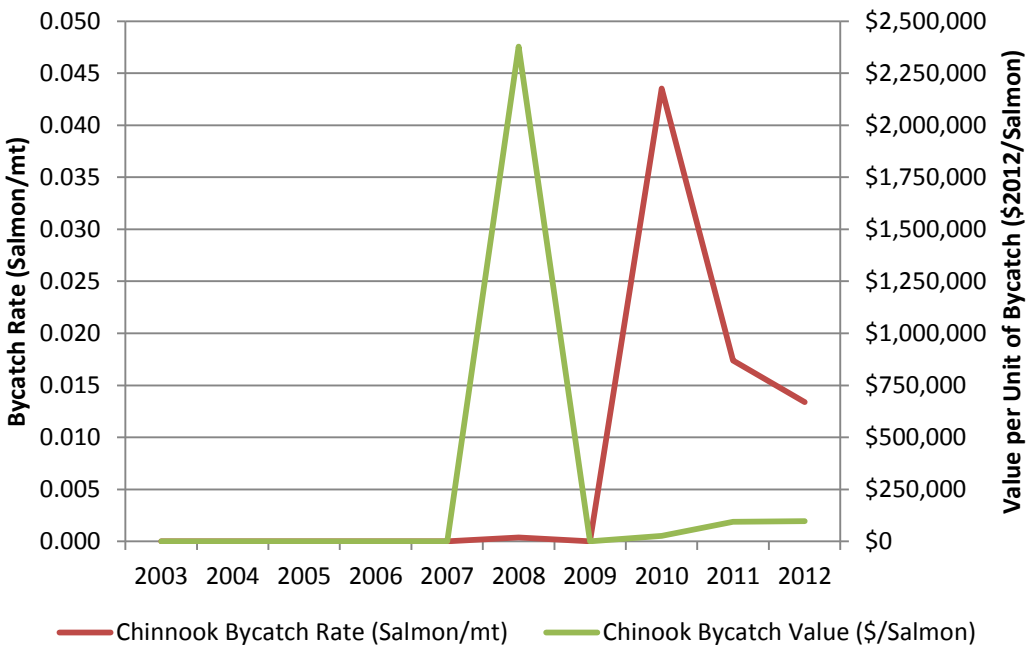
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 113. Bycatch of Tanner Crab in the AM80CP BSAI Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



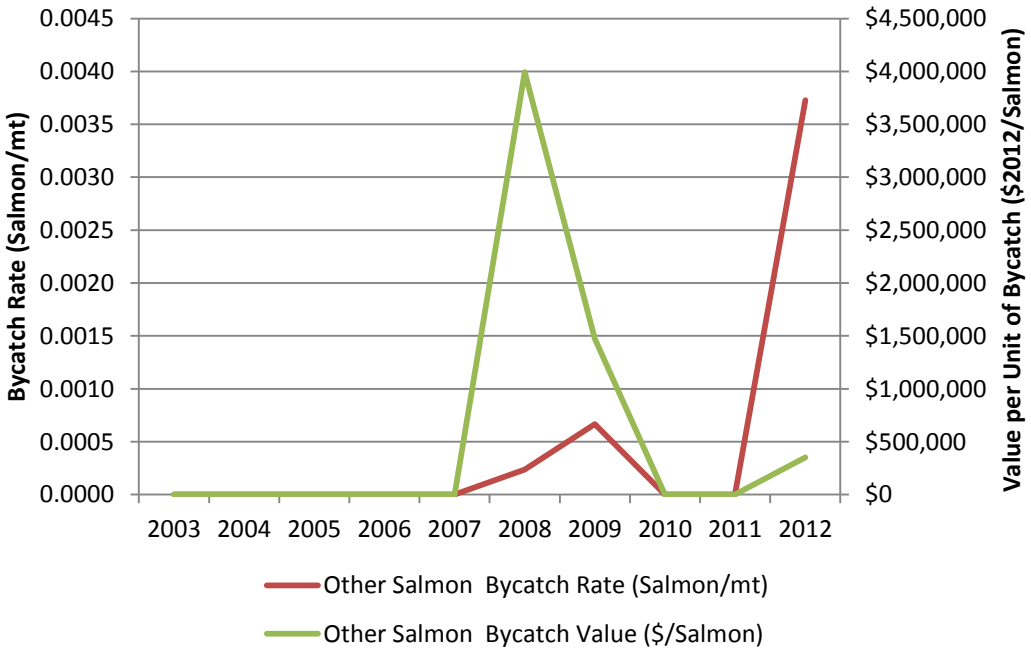
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 114. Chinook Bycatch in the AM80CP BSAI Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 115. Non-Chinook Salmon Bycatch in the AM80CP BSAI Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

AM80CP BSAI Arrowtooth and Kamchatka Flounder

This section summarizes PSC bycatch AM80-CPs in the target|fishery for arrowtooth and Kamchatka flounder in the BSAI. Arrowtooth and Kamchatka have been combined for all years, noting that it was not until 2011 that the differences between the two species were recognized in the reporting system. The tables and figures exclude CDQ harvests and activities of AM80 vessels while acting as motherships. It should also be noted that the overall amount of groundfish shown in the tables and figures includes all catches and revenues of groundfish not just the catch of arrowtooth and Kamchatka flounder.

Table 95. Total Catch and Wholesale Value of Groundfish in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	2,732	3,314	5,604	3,877	1,243	15,340	22,594	30,661	26,804	30,148
Wholesale $ Millions (2012)	$2.7	$2.5	$4.8	$2.6	$0.9	$12.3	$18.0	$24.1	$22.7	$26.4

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 96. Bycatch of Prohibited Species in the AM80CP BSAI Arrowtooth & Kamchatka Flounder Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	53	88	200	123	17	127	223	179	258	504
PSC King Crab (#s)	467	730	260	835	199	3,461	8,193	6,328	13,495	11,398
PSC Bairdi Crab (#s)	71	-	596	5,840	4,635	6,985	2,474	432	1,975	2,871
PSC Opilio Crab (#s)	6,012	3,732	10,487	25,418	21,913	34,058	2,663	819	2,860	1,834
PSC Herring (kg)	87	104	39	146	25	2,019	55	9	177	93
PSC Chinook (#s)	1,597	930	1,923	259	108	-	-	27	-	4
PSC non-Chinook (#s)	2	-	136	5,369	-	142	135	-	111	148

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 97. Bycatch Rates in the AM80CP BSAI Arrowtooth & Kamchatka Flounder Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0195	0.0267	0.0356	0.0317	0.0134	0.0083	0.0099	0.0058	0.0096	0.0167
PSC King Crab (#/mt)	0.1711	0.2204	0.0463	0.2153	0.1603	0.2256	0.3626	0.2064	0.5035	0.3781
PSC Bairdi Rate (#/mt)	0.0262	-	0.1064	1.5062	3.7296	0.4554	0.1095	0.0141	0.0737	0.0952
PSC Opilio Rate (#/mt)	2.2008	1.1262	1.8714	6.5560	17.6344	2.2203	0.1179	0.0267	0.1067	0.0608
PSC Herring Rate (kg/mt)	0.0320	0.0314	0.0070	0.0376	0.0201	0.1316	0.0025	0.0003	0.0066	0.0031
PSC Chinook (#/mt)	0.5847	0.2806	0.3431	0.0668	0.0870	-	-	0.0009	-	0.0001
PSC non-Chinook (#/mt)	0.0006	-	0.0242	1.3847	-	0.0093	0.0060	-	0.0041	0.0049

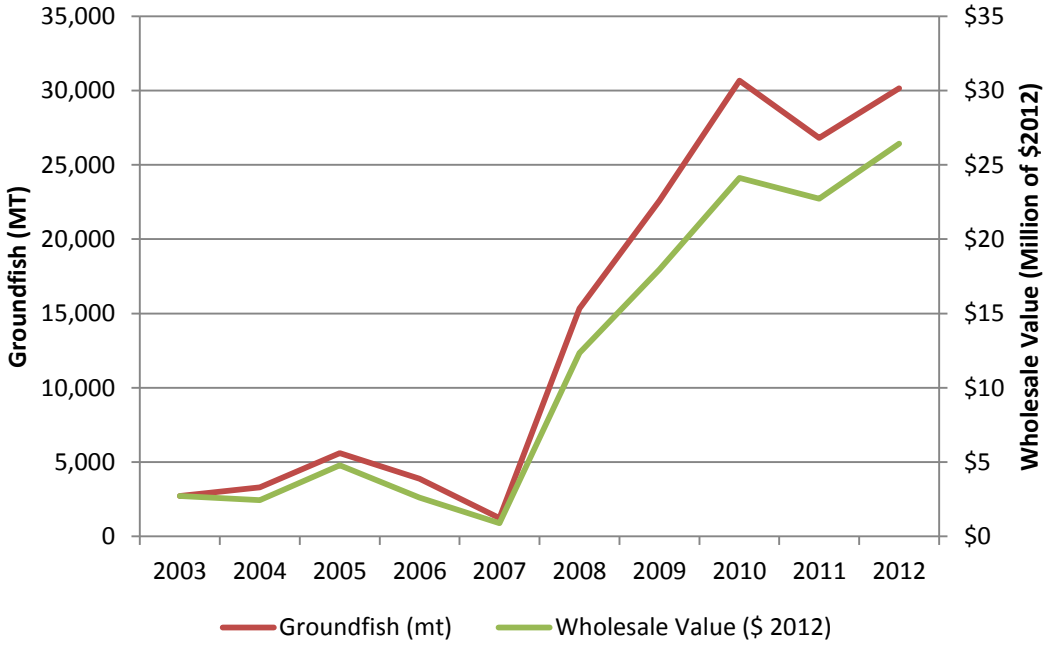
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 98. Groundfish Value per Unit of PSC in the AM80CP BSAI Arrowtooth & Kamchatka Flounder Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	$51,028	$27,734	$24,030	$21,268	$53,319	$97,092	$80,549	$134,831	$88,065	$52,421
PSC King Crab ($/#)	$5,804	$3,356	$18,493	$3,131	$4,445	$3,564	$2,191	$3,810	$1,683	$2,319
PSC Bairdi Crab ($/#)	$37,965	-	$8,047	$447	$191	$1,766	$7,257	$55,801	$11,500	$9,205
PSC Opilio Crab ($/#)	$451	$657	$458	$103	$40	$362	$6,742	$29,442	$7,941	$14,411
PSC Herring ($/kg)	$31,047	$23,582	$121,740	$17,908	$35,410	$6,112	$324,114	$2,652,380	$128,225	$283,535
PSC Chinook ($/#)	$1,698	$2,635	$2,496	$10,091	$8,192	-	-	$892,968	-	$6,607,067
PSC non-Chinook ($/#)	$1,706,030	-	$35,417	$487	-	$86,900	$132,963	-	$204,642	$178,569

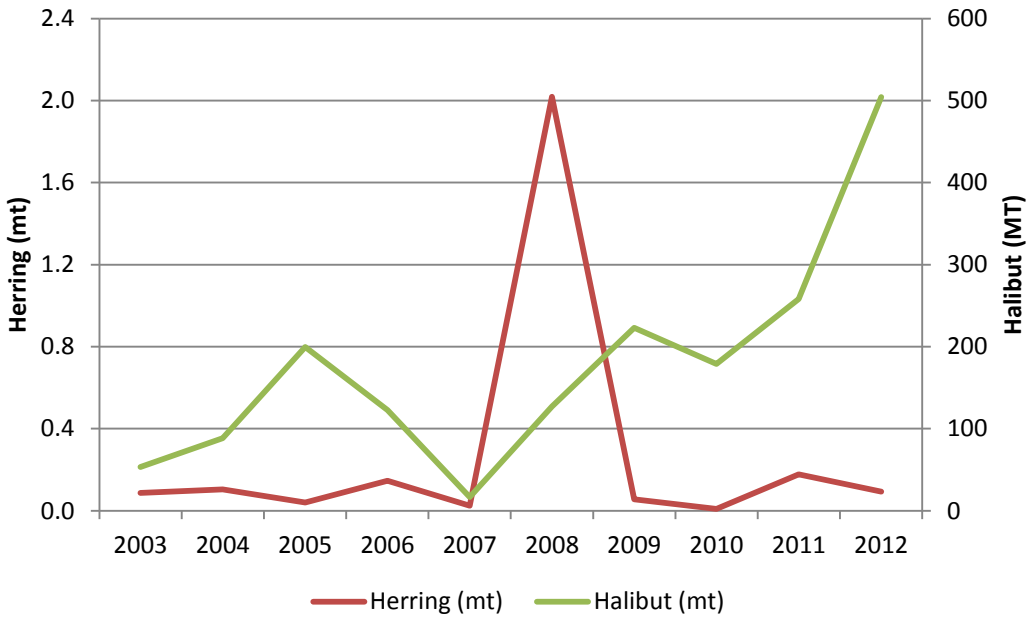
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 116. Total Volume and Wholesale Value of Groundfish Catch in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery, 2003–2012



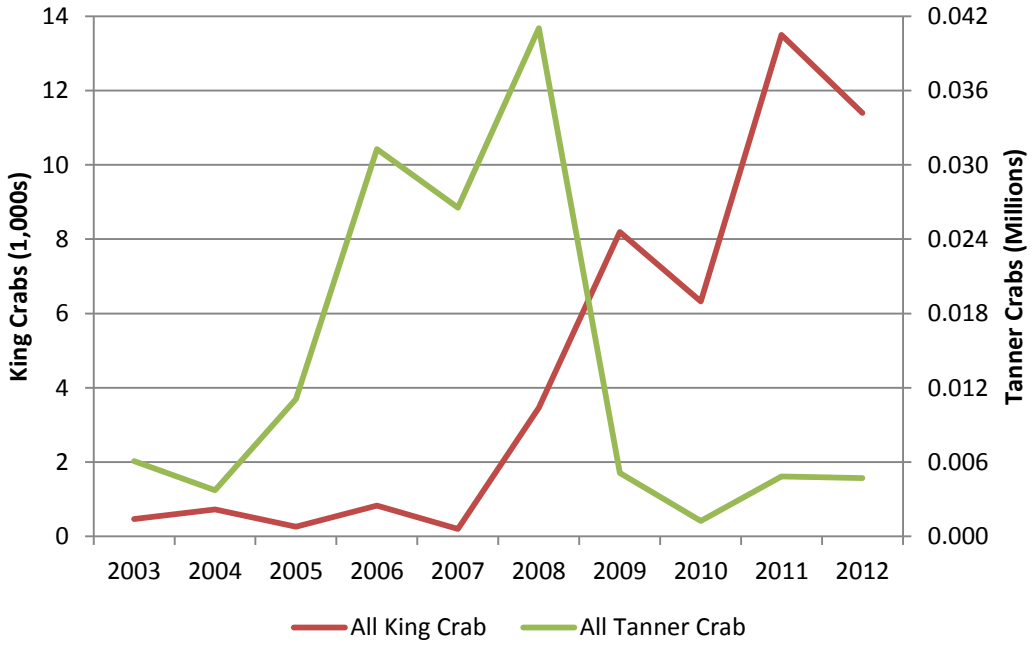
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 117. Herring and Halibut Bycatch in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery, 2003–2012



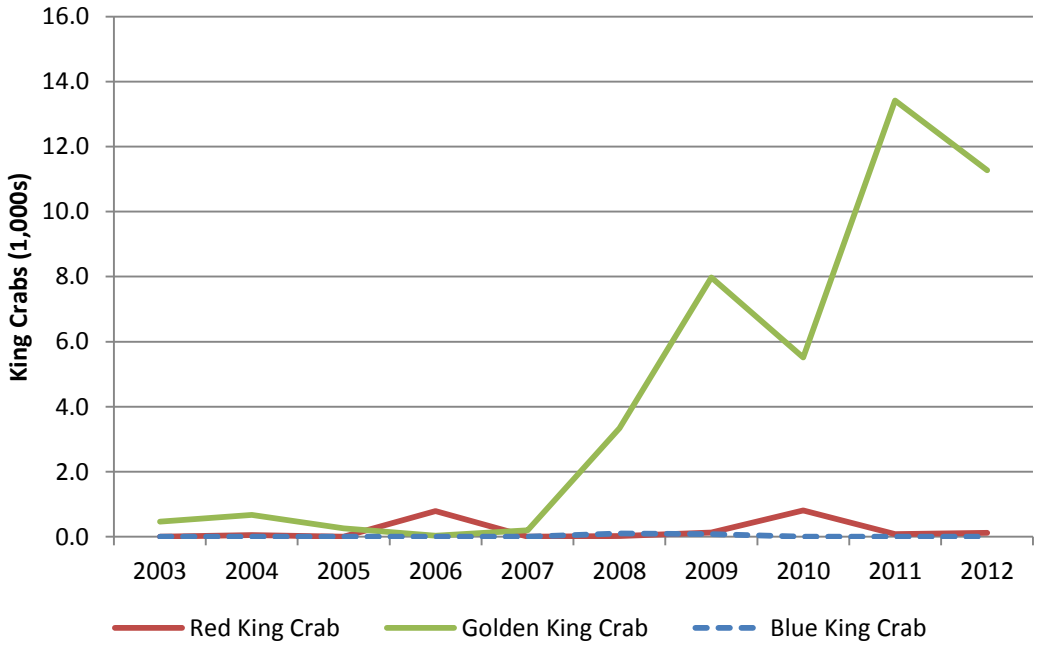
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 118. King Crab and Tanner Crab Bycatch in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery, 2003–2012



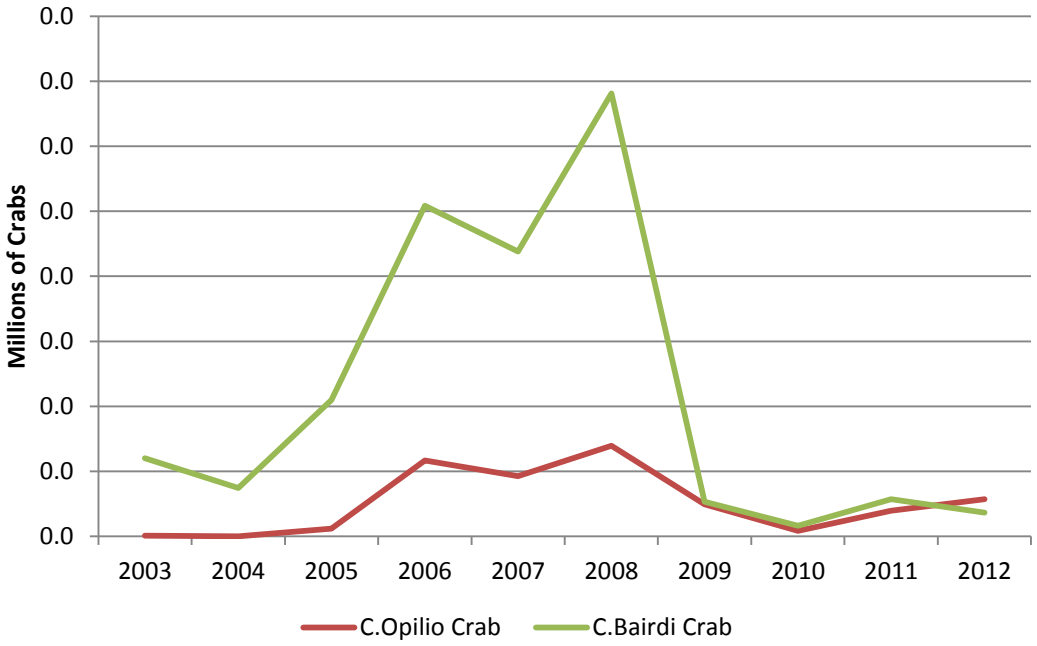
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 119. Bycatch of King Crab Species in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery, 2003–2012



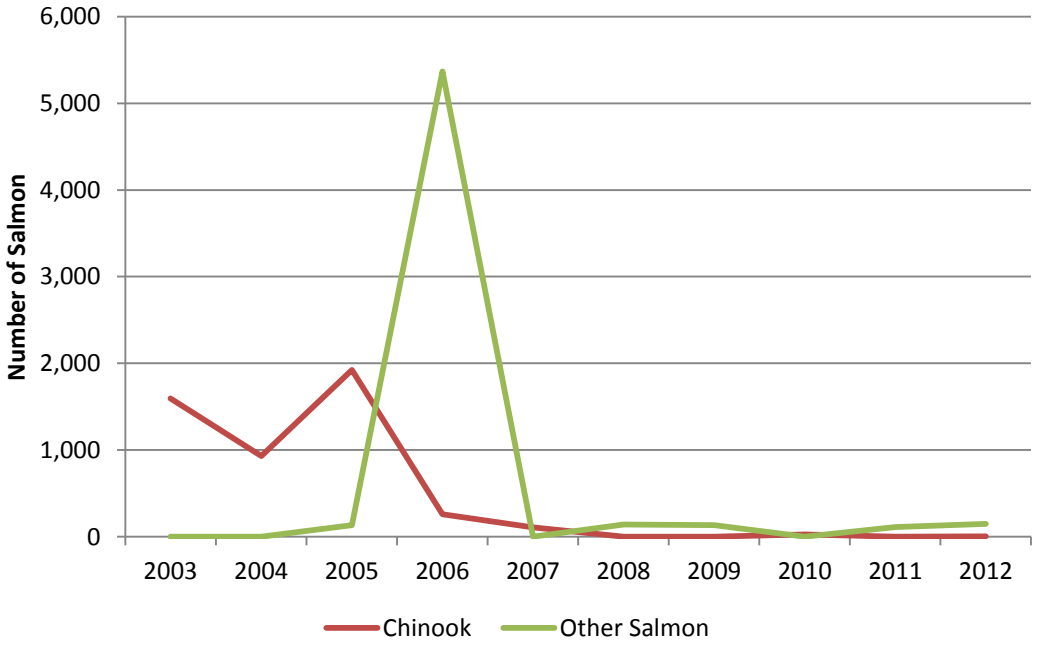
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 120. Bycatch of Tanner Crab Species in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery, 2003–2012



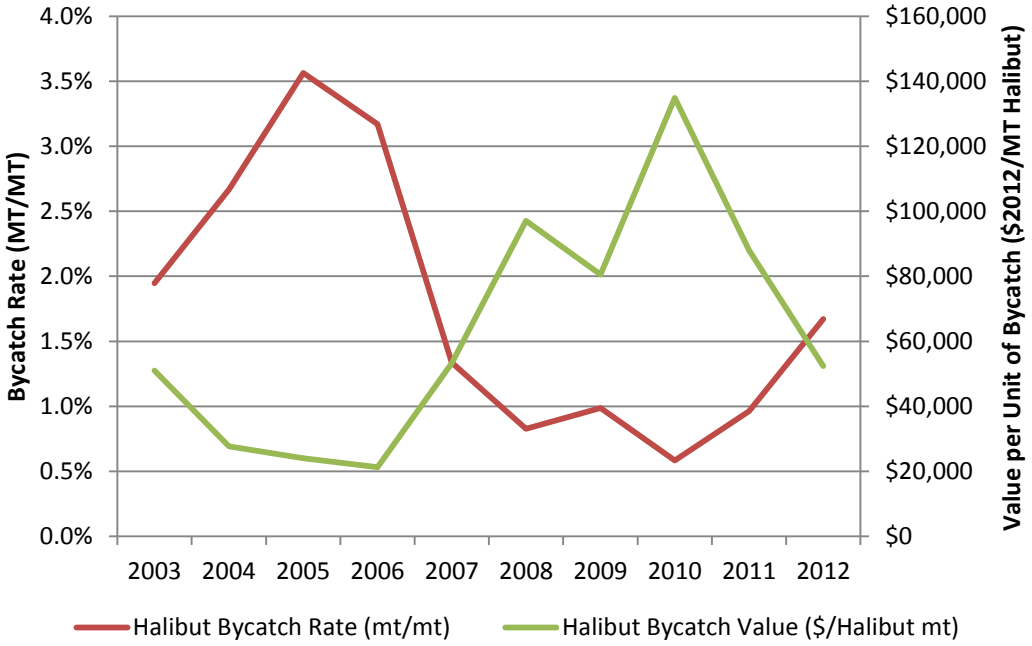
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 121. Bycatch of Salmon Species in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery, 2003–2012



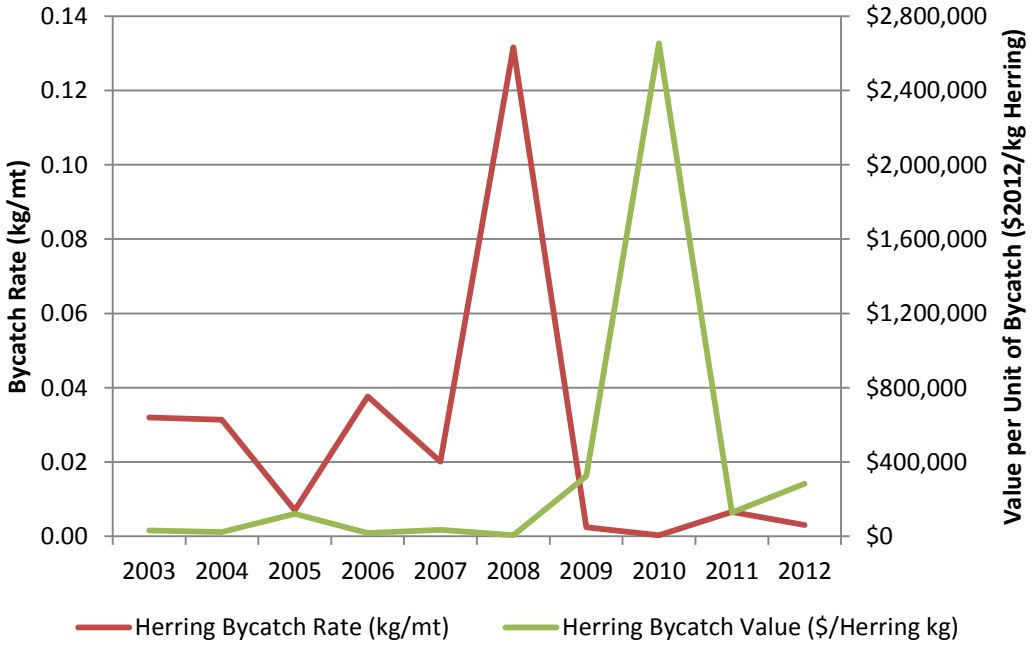
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 122. Bycatch of Halibut in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 123. Bycatch of Herring in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery as Share of Groundfish Catch and Value, 2003–2012

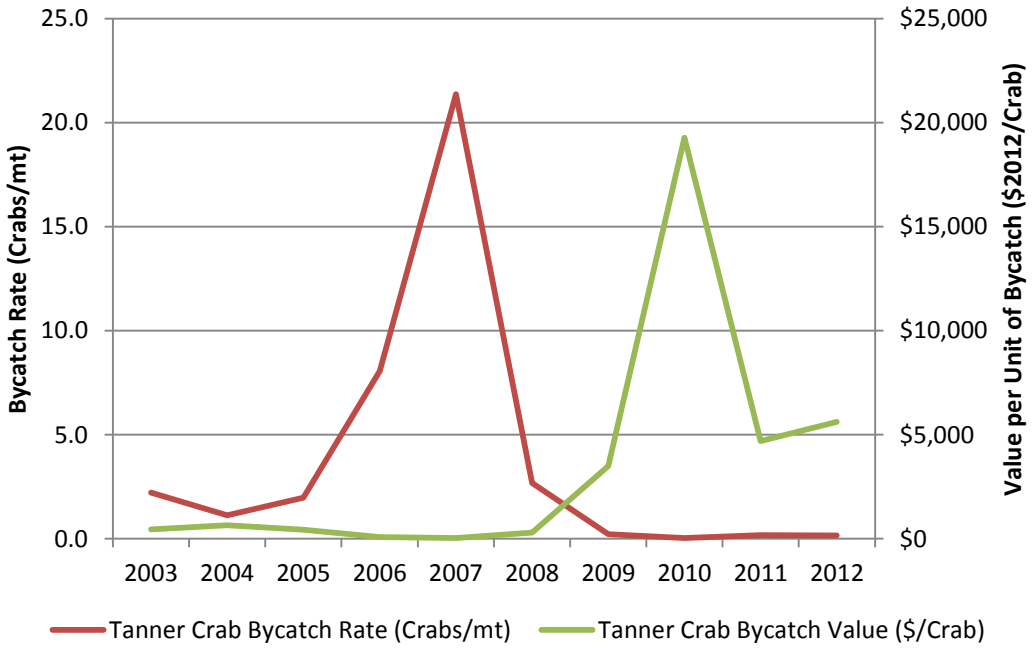


Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 124. Bycatch of King Crab in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery as Share of Groundfish Catch and Value, 2003–2012

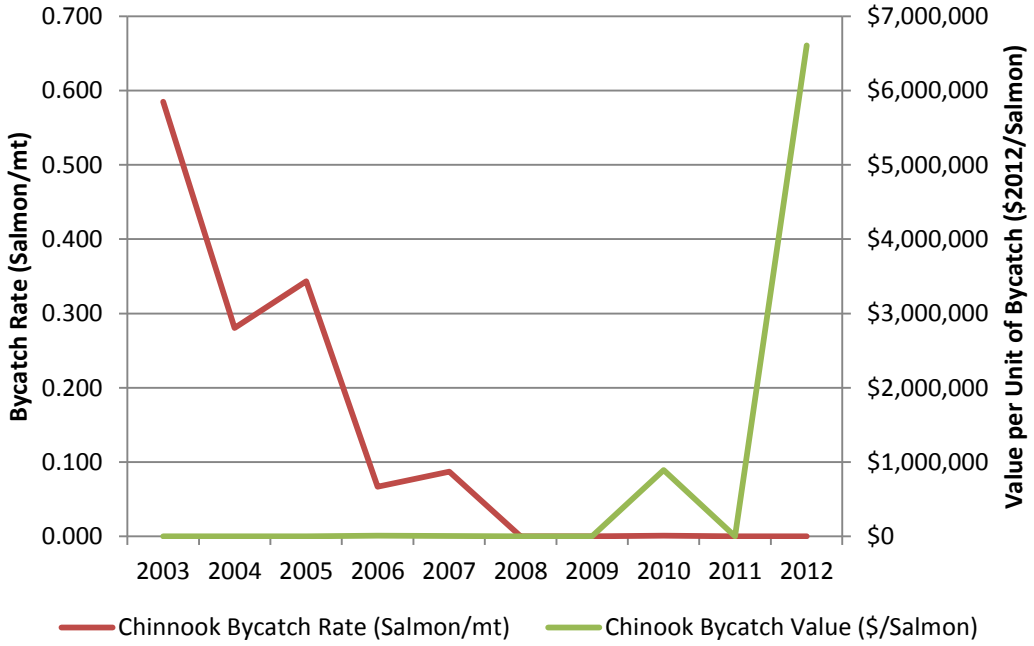
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 125. Bycatch of Tanner Crab in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery as Share of Groundfish Catch and Value, 2003–2012



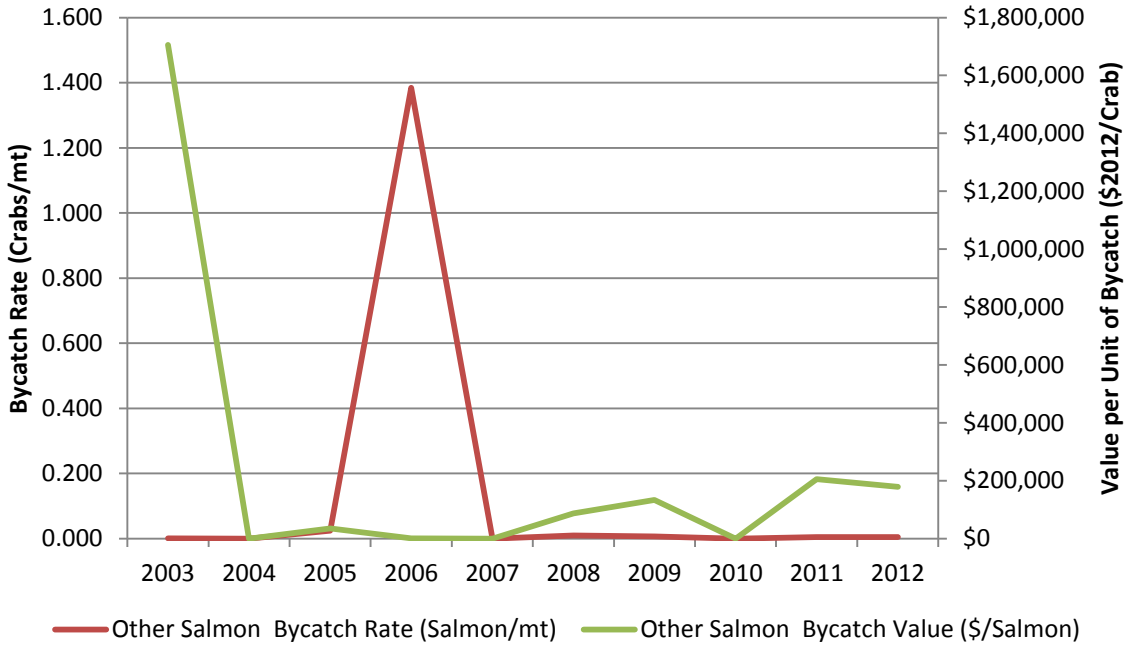
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 126. Chinook Bycatch in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 127. Non-Chinook Bycatch in the AM80CP BSAI Arrowtooth and Kamchatka Flounder Target as Share of Groundfish Catch and Value, 2003–2012



AM80CP GOA Rockfish

This section summarizes PSC bycatch of AM80-CPs in the target|fisheries for all rockfish in the GOA. The tables and figures exclude activities of AM80 vessels while acting as motherships. It should also be noted that the overall amount of groundfish shown in the tables and figures includes all catches and revenues of groundfish not just the catch in the GOA rockfish fishery.

Table 99. Total Catch and Wholesale Value of Groundfish in the AM80CP GOA Rockfish Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	11,916	13,482	13,033	15,766	14,584	15,764	17,266	18,036	14,718	16,796
Wholesale $ Millions (2012)	$12.8	$14.9	$18.5	$21.7	$15.5	$15.8	$15.1	$19.1	$25.3	$21.7

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 100. Bycatch of Prohibited Species in the AM80CP GOA Rockfish Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	101	83	108	95	71	95	62	76	46	61
PSC King Crab (#s)	59	522	-	49	129	339	3,246	2,988	129	102
PSC Bairdi Crab (#s)	-	-	-	-	-	-	-	-	-	-
PSC Opilio Crab (#s)	7	-	175	129	81	-	34	100	-	19
PSC Herring (kg)	-	-	-	-	-	-	4	66	-	-
PSC Chinook (#s)	119	75	352	-	1,533	645	534	595	642	884
PSC non-Chinook (#s)	29	181	107	195	438	363	160	177	139	194

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 101. Bycatch Rates in the AM80CP GOA Rockfish Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0085	0.0062	0.0083	0.0060	0.0049	0.0060	0.0036	0.0042	0.0031	0.0036
PSC King Crab (#/mt)	0.0049	0.0387	-	0.0031	0.0089	0.0215	0.1880	0.1657	0.0088	0.0061
PSC Bairdi Rate (#/mt)	-	-	-	-	-	-	-	-	-	-
PSC Opilio Rate (#/mt)	0.0006	-	0.0134	0.0082	0.0056	-	0.0020	0.0056	-	0.0011
PSC Herring Rate (kg/mt)	-	-	-	-	-	-	0.0002	0.0037	-	-
PSC Chinook (#/mt)	0.0099	0.0056	0.0270	-	0.1051	0.0409	0.0309	0.0330	0.0436	0.0527
PSC non-Chinook (#/mt)	0.0025	0.0134	0.0082	0.0124	0.0300	0.0230	0.0093	0.0098	0.0094	0.0116

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 102. Groundfish Wholesale Value per Unit of PSC in the AM80CP GOA Rockfish Target Fishery

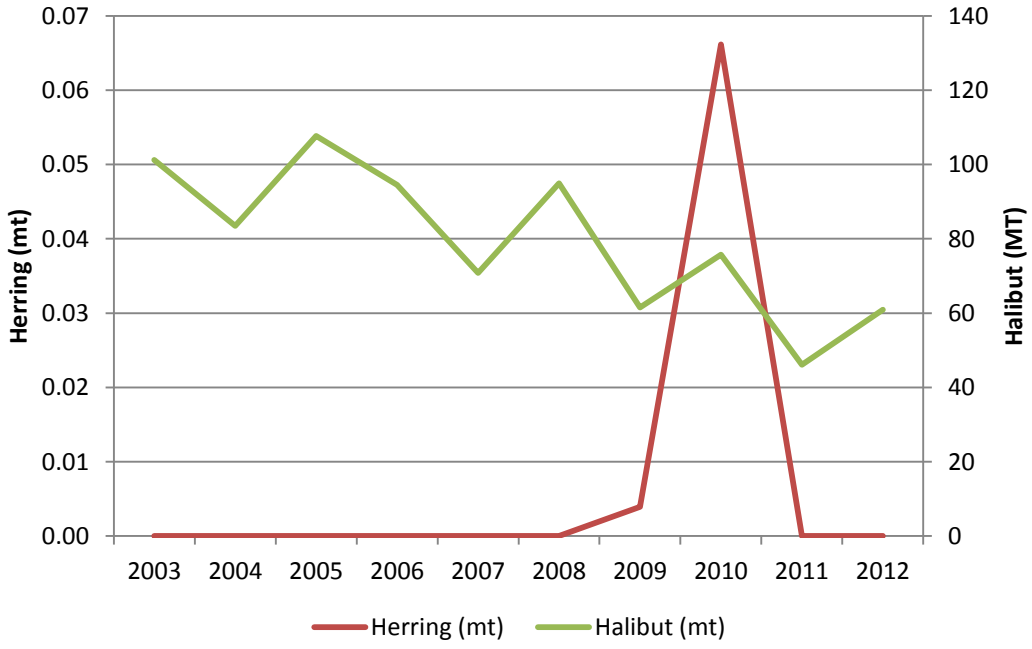
Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	$126,054	$178,011	$171,929	$229,425	$219,250	$166,712	$245,824	$251,719	$548,951	$355,822
PSC King Crab ($/#)	$218,036	$28,487	-	$443,512	$120,228	$46,664	$4,660	$6,380	$196,104	$212,568
PSC Bairdi Crab ($/#)	-	-	-	-	-	-	-	-	-	-
PSC Opilio Crab ($/#)	$1,743,392	-	$105,953	$167,849	$191,561	-	$444,762	$190,265	-	$1,138,867
PSC Herring ($/kg)	-	-	-	-	-	-	$3,858,767	$288,289	-	-
PSC Chinook ($/#)	$107,639	$198,021	$52,606	-	$10,124	$24,510	$28,342	$32,015	$39,415	$24,518
PSC non-Chinook ($/#)	$435,550	$82,121	$173,030	$111,191	$35,434	$43,598	$94,434	$107,856	$181,944	$111,762

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 128. Total Volume and Wholesale Value of Groundfish Catch in the AM80CP GOA Rockfish Target Fishery, 2003–2012

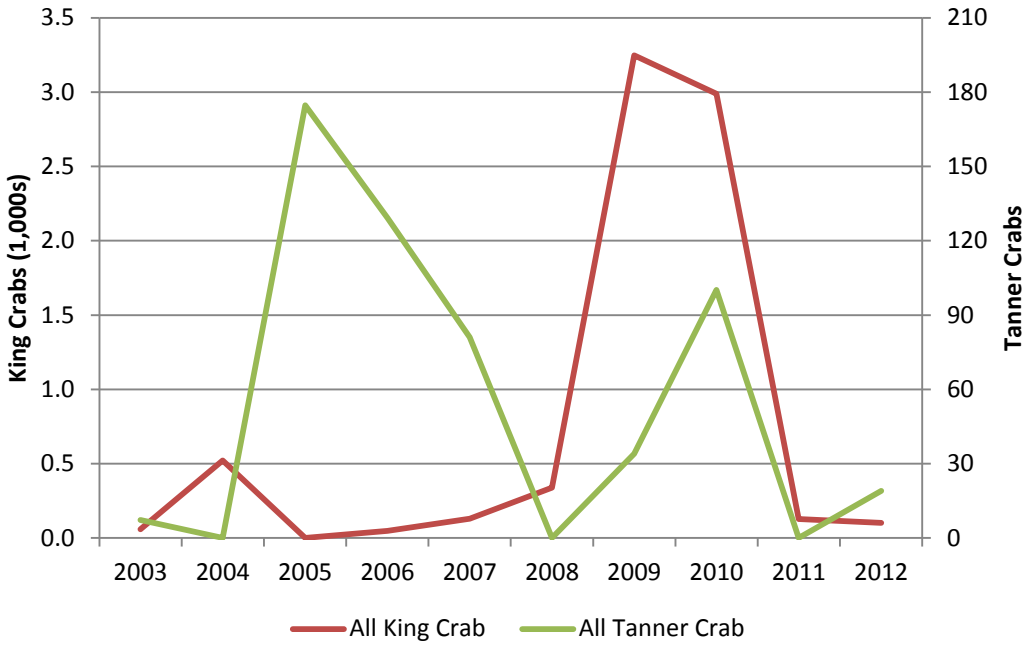
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 129. Herring and Halibut Bycatch in the AM80CP GOA Rockfish Target Fishery, 2003–2012



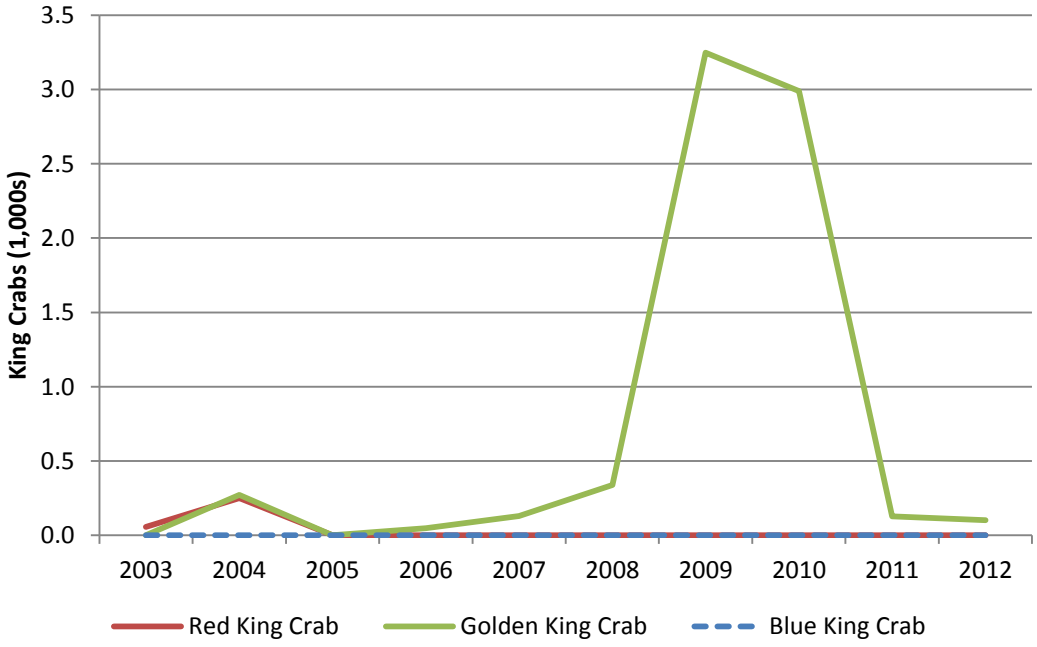
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 130. King Crab and Tanner Crab Bycatch in the AM80CP GOA Rockfish Target Fishery, 2003–2012



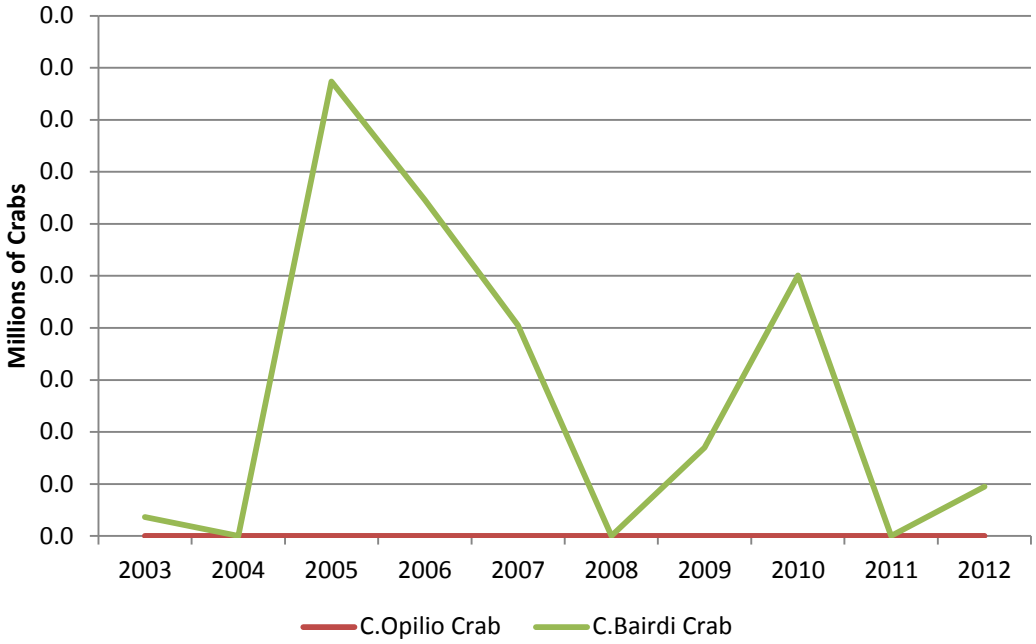
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 131. Bycatch of King Crab Species in the AM80CP GOA Rockfish Target Fishery, 2003–2012



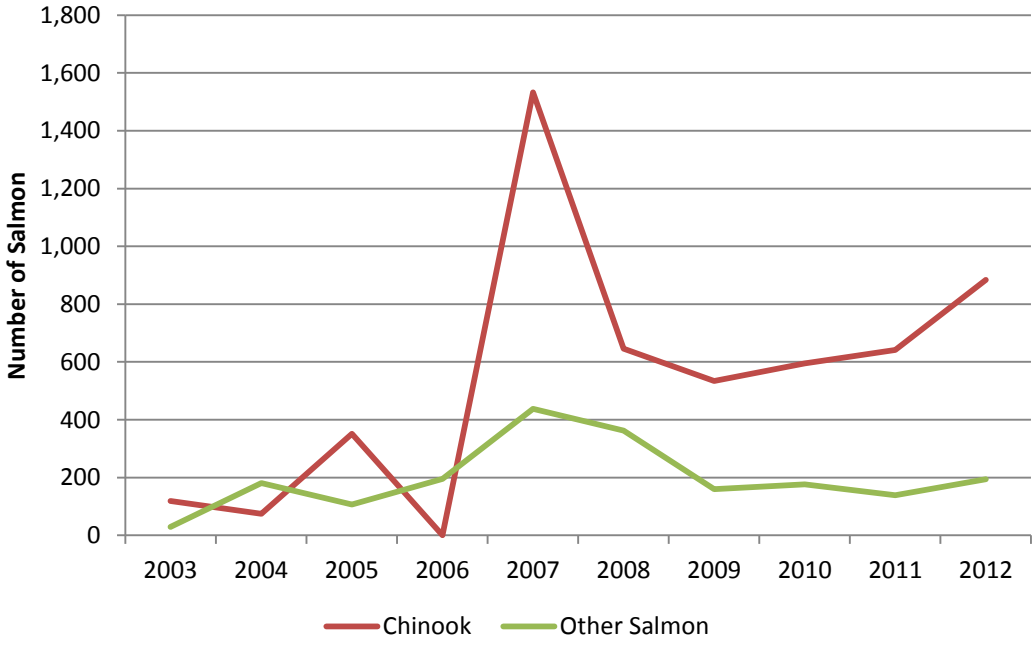
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 132. Bycatch of Tanner Crab Species in the AM80CP GOA Rockfish Target Fishery, 2003–2012



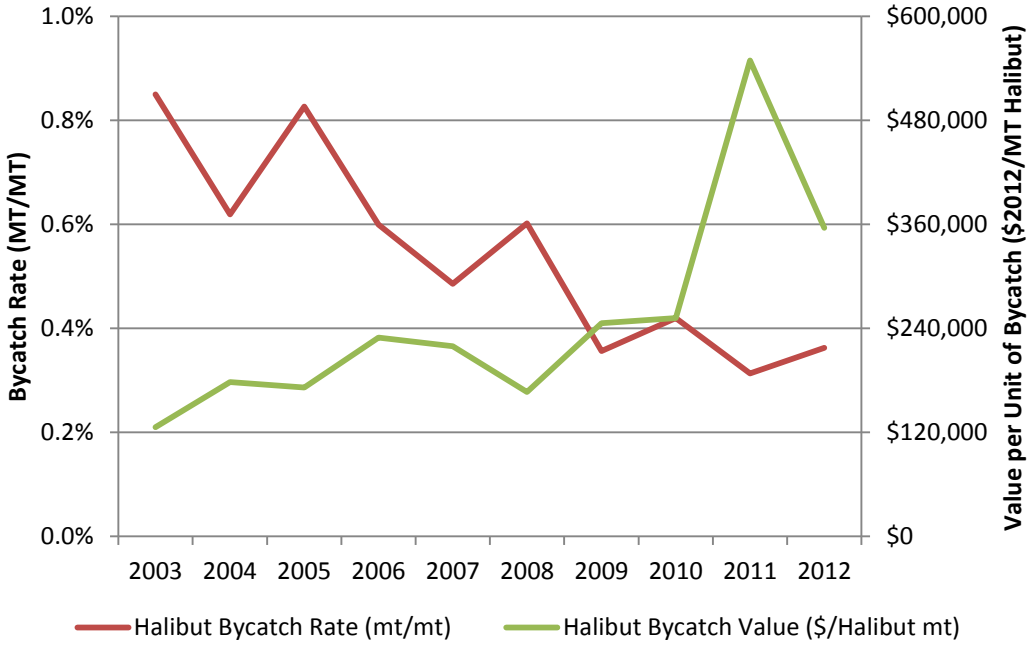
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 133. Bycatch of Salmon Species in the AM80CP GOA Rockfish Target Fishery, 2003–2012



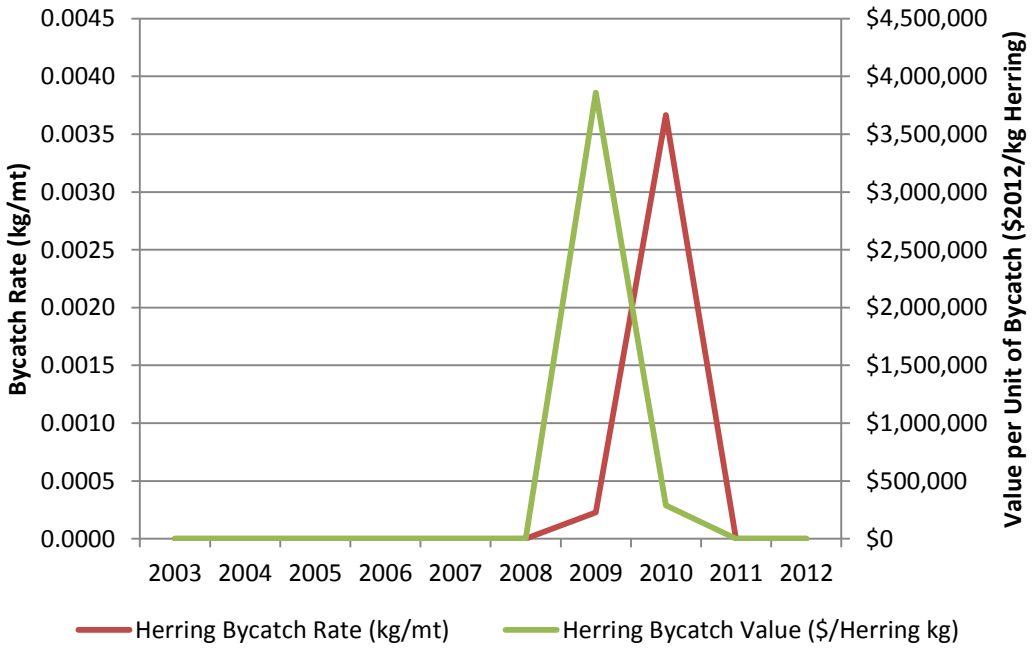
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 134. Bycatch of Halibut in the AM80CP GOA Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



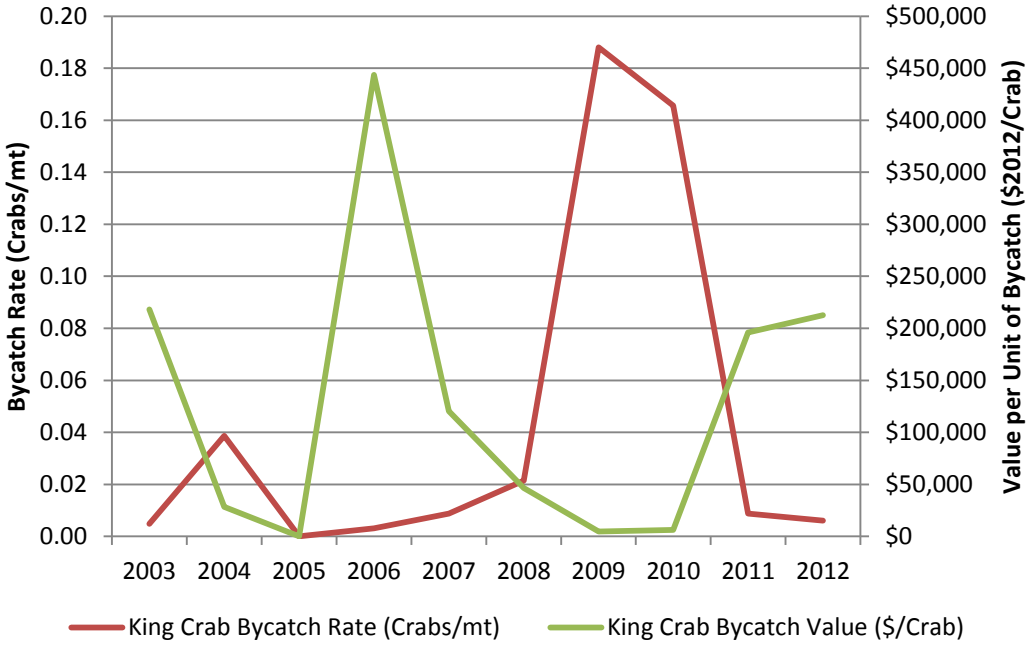
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 135. Bycatch of Herring in the AM80CP GOA Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



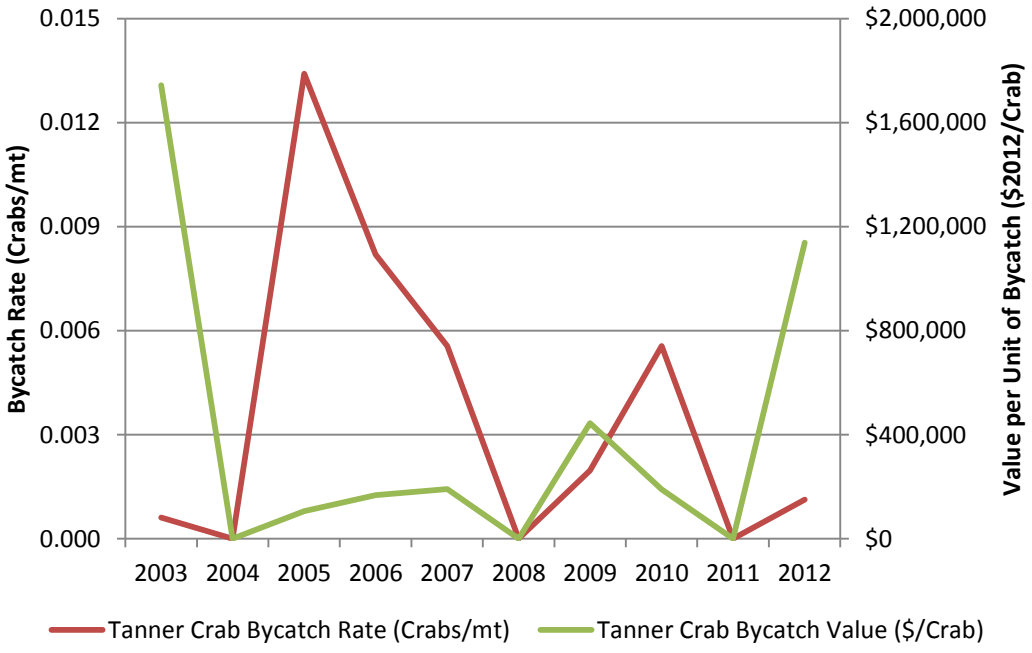
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 136. Bycatch of King Crab in the AM80CP GOA Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



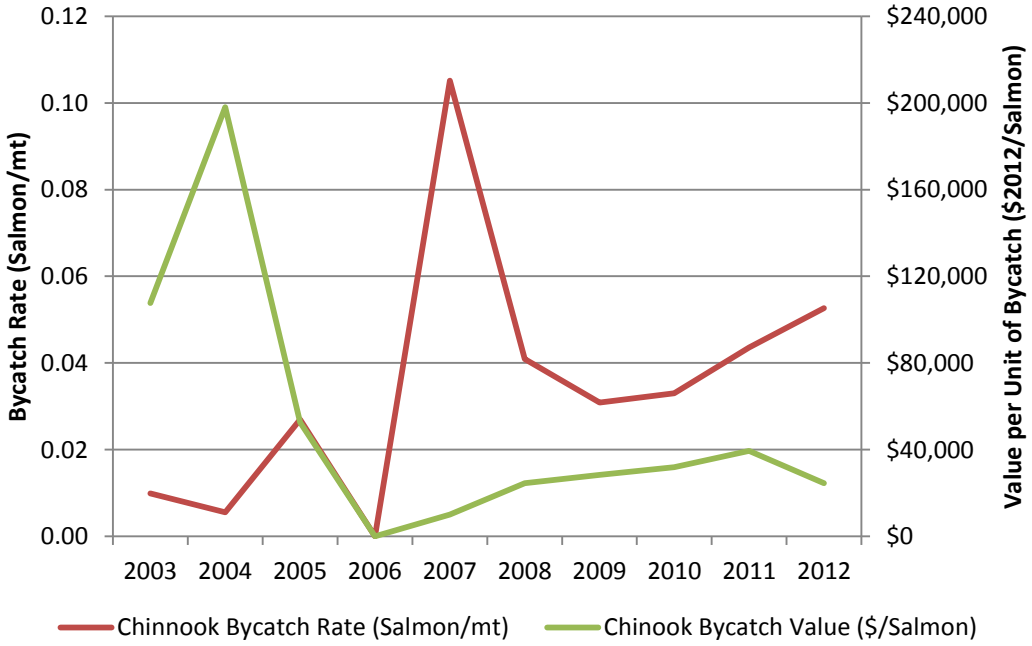
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 137. Bycatch of Tanner Crab in the AM80CP GOA Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



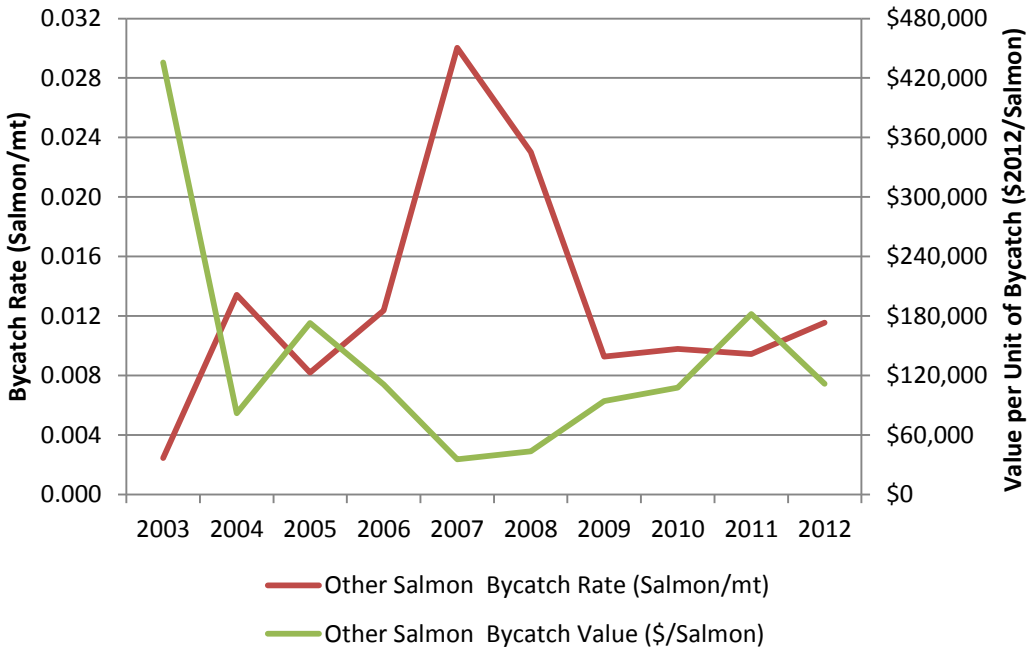
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 138. Chinook Bycatch in the AM80CP GOA Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 139. Non-Chinook Salmon Bycatch in the AM80CP GOA Rockfish Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

AM80CP GOA Rex Sole

This section summarizes PSC bycatch of AM80-CPs in the target|fishery for rex sole in the GOA. The tables and figures exclude activities of AM80 vessels while acting as motherships. It should also be noted that the overall amount of groundfish shown in the tables and figures includes all catches and revenues of groundfish not just the catch in the GOA rex sole fishery

Table 103. Total Catch and Wholesale Value of Groundfish in the AM80 GOA Rex Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Groundfish (mt)	5,374	2,106	1,221	2,600	749	653	5,470	3,569	1,844	1,200
Wholesale $ Millions (2012)	$3.7	$1.8	$1.3	$1.8	$0.9	$0.6	$3.8	$2.0	$1.5	$1.1

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 104. Bycatch of Prohibited Species in the AM80 GOA Rex Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PSC Halibut Mortality (mt)	98	111	32	67	33	25	128	132	53	50
PSC King Crab (#s)	-	-	-	-	-	-	-	-	-	-
PSC Bairdi Crab (#s)	-	-	-	-	-	-	-	-	-	-
PSC Opilio Crab (#s)	6,515	5,915	258	20,495	487	255	54	545	2,146	-
PSC Herring (kg)	4	-	7	-	-	-	-	-	-	-
PSC Chinook (#s)	1,632	302	370	656	149	-	992	1,761	772	887
PSC non-Chinook (#s)	232	588	66	23	69	40	90	82	105	81

Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 105. Bycatch Rates in the AM80 GOA Rex Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All rates are measured as the total units of PSC ÷ mt of Groundfish.									
PSC Halibut Rate (mt/mt)	0.0183	0.0528	0.0266	0.0257	0.0436	0.0385	0.0235	0.0370	0.0288	0.0419
PSC King Crab (#/mt)	-	-	-	-	-	-	-	-	-	-
PSC Bairdi Rate (#/mt)	-	-	-	-	-	-	-	-	-	-
PSC Opilio Rate (#/mt)	1.2123	2.8081	0.2116	7.8833	0.6505	0.3908	0.0098	0.1528	1.1638	-
PSC Herring Rate (kg/mt)	0.0007	-	0.0055	-	-	-	-	-	-	-
PSC Chinook (#/mt)	0.3037	0.1432	0.3034	0.2523	0.1996	-	0.1813	0.4935	0.4187	0.7394
PSC non-Chinook (#/mt)	0.0432	0.2794	0.0543	0.0087	0.0915	0.0618	0.0164	0.0229	0.0569	0.0679

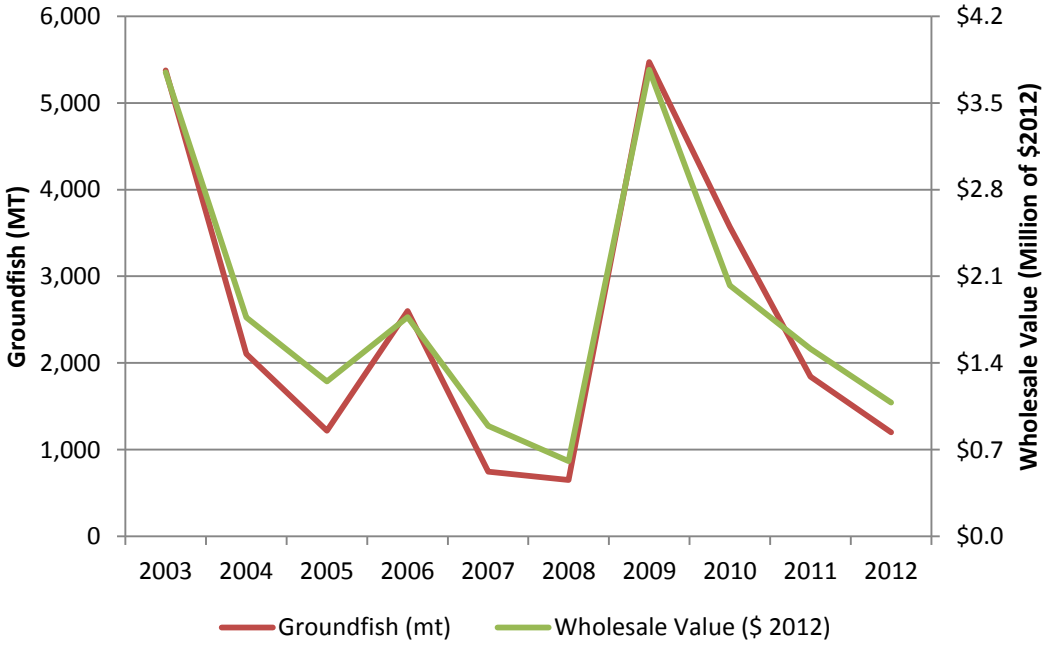
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Table 106. Groundfish Wholesale Value per Unit of PSC in the AM80 GOA Rex Sole Target Fishery

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	All values shown are calculated as: total wholesale value in 2012 $ ÷ total PSC units									
PSC Halibut ($/mt)	$38,165	$15,881	$38,488	$26,446	$27,337	$24,259	$29,370	$15,330	$28,496	$21,493
PSC King Crab ($/#)	-	-	-	-	-	-	-	-	-	-
PSC Bairdi Crab ($/#)	-	-	-	-	-	-	-	-	-	-
PSC Opilio Crab ($/#)	$575	$299	$4,842	$86	$1,833	$2,387	$70,188	$3,713	$706	-
PSC Herring ($/kg)	$1,061,149	-	$187,202	-	-	-	-	-	-	-
PSC Chinook ($/#)	$2,295	$5,859	$3,377	$2,698	$5,974	-	$3,800	$1,150	$1,963	$1,219
PSC non-Chinook ($/#)	$16,123	$3,003	$18,881	$78,205	$13,024	$15,104	$41,889	$24,727	$14,434	$13,274

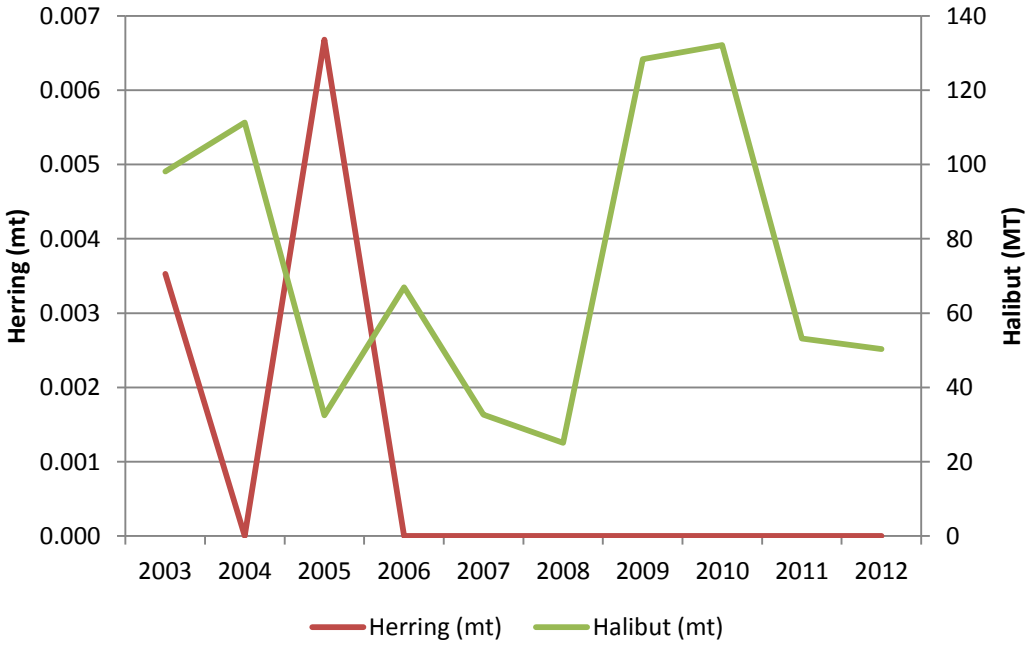
Source: Table developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 140. Total Volume and Wholesale Value of Groundfish Catch in the AM80CP GOA Rex Sole Target Fishery, 2003–2012



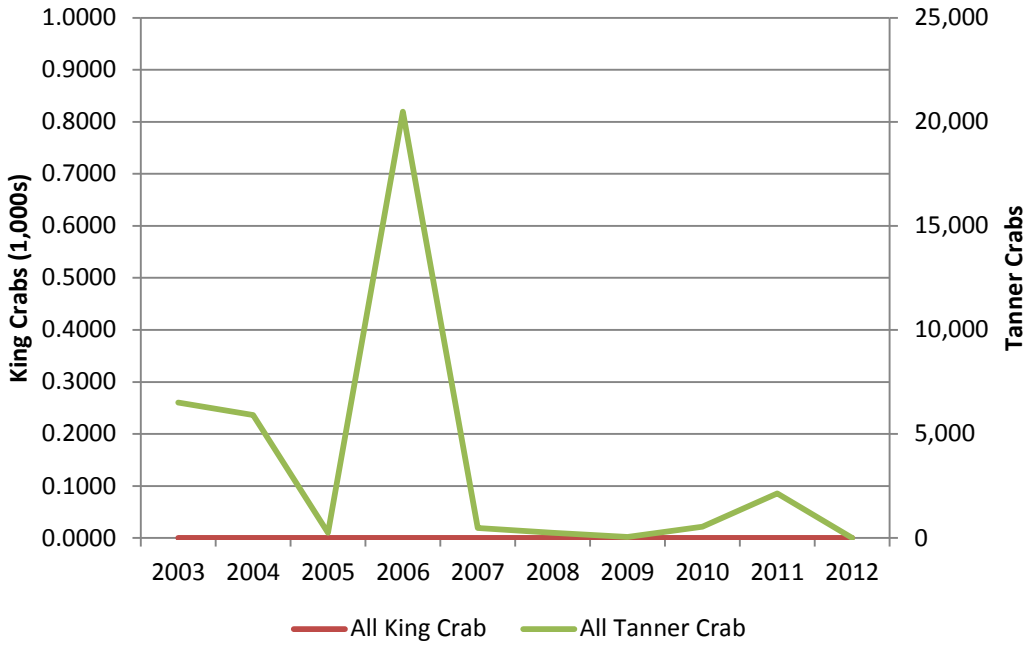
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 141. Herring and Halibut Bycatch in the AM80CP GOA Rex Sole Target Fishery, 2003–2012



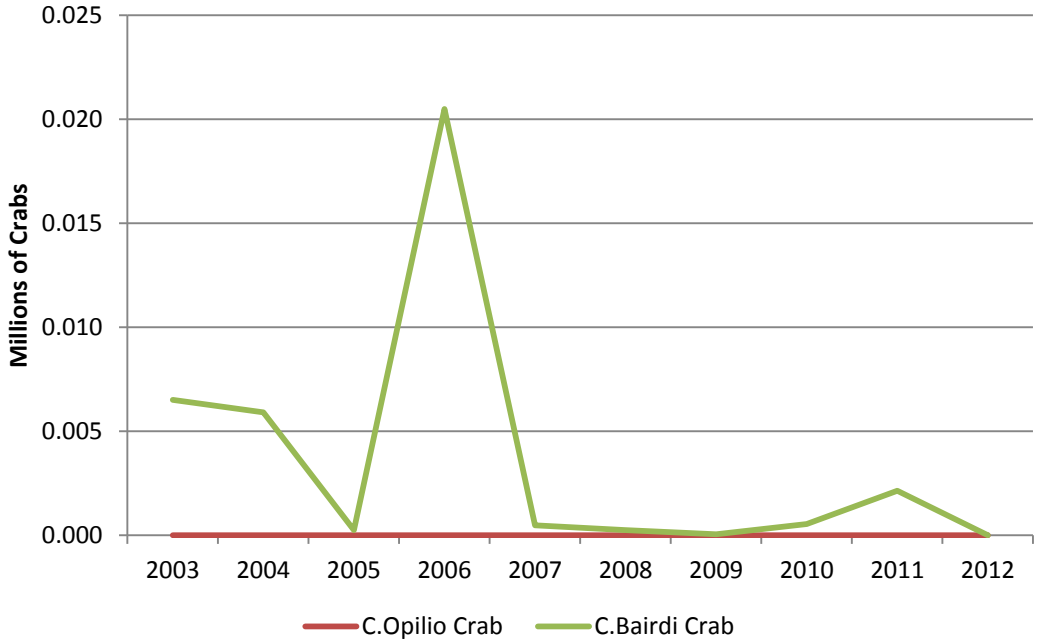
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 142. King Crab and Tanner Crab Bycatch in the AM80CP GOA Rex Sole Target Fishery, 2003–2012



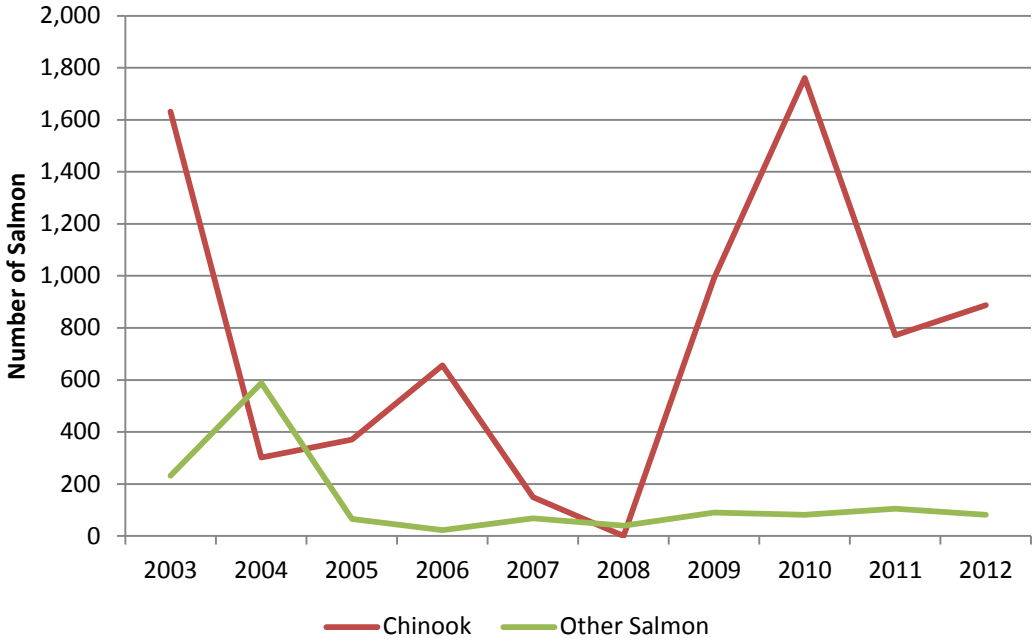
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 143. Bycatch of Tanner Crab Species in the AM80CP GOA Rex Sole Target Fishery, 2003–2012



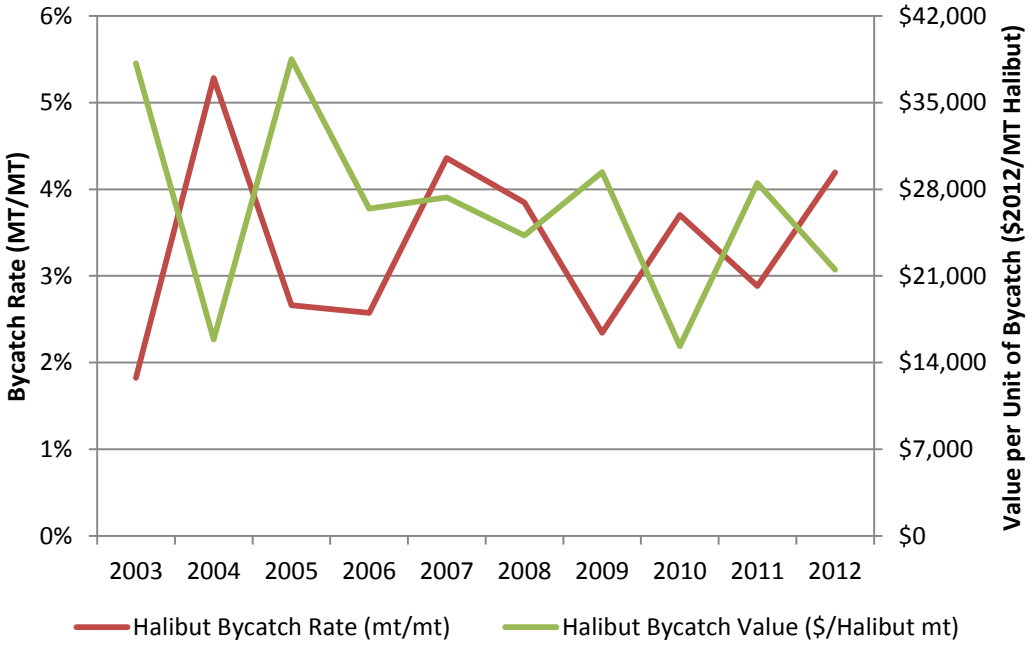
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 144. Bycatch of Salmon Species in the AM80CP GOA Rex Sole Target Fishery, 2003–2012



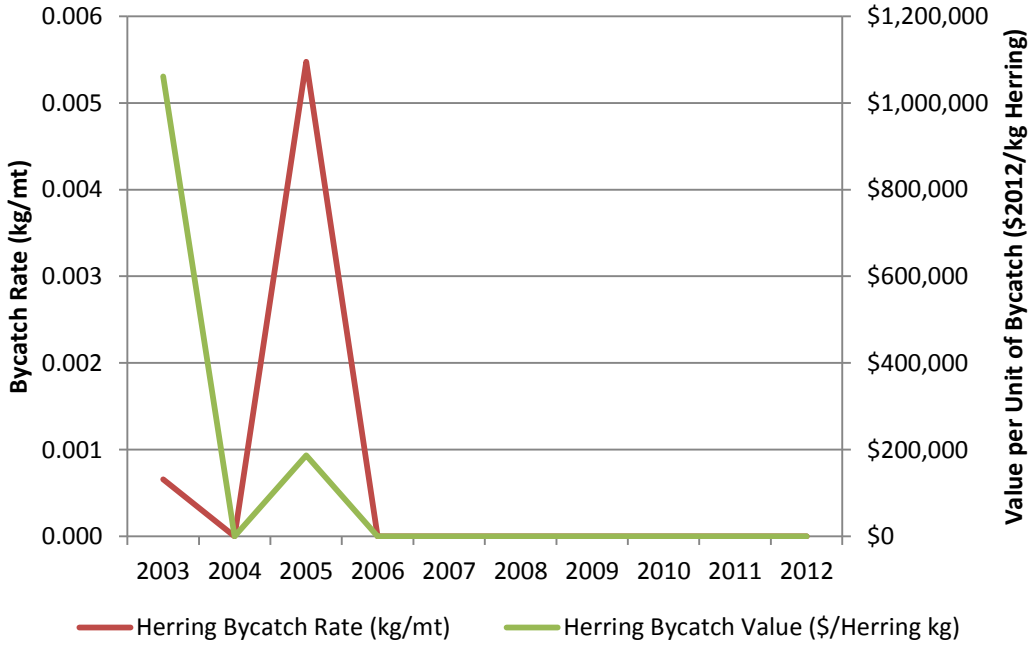
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 145. Bycatch of Halibut in the AM80CP GOA Rex Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



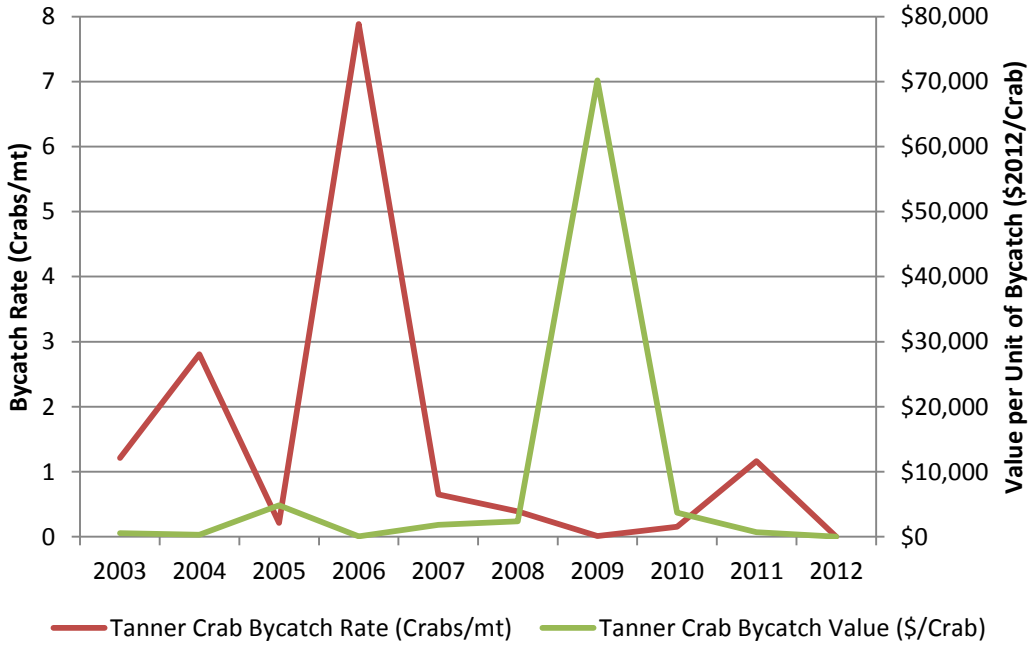
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 146. Bycatch of Herring in the AM80CP GOA Rex Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



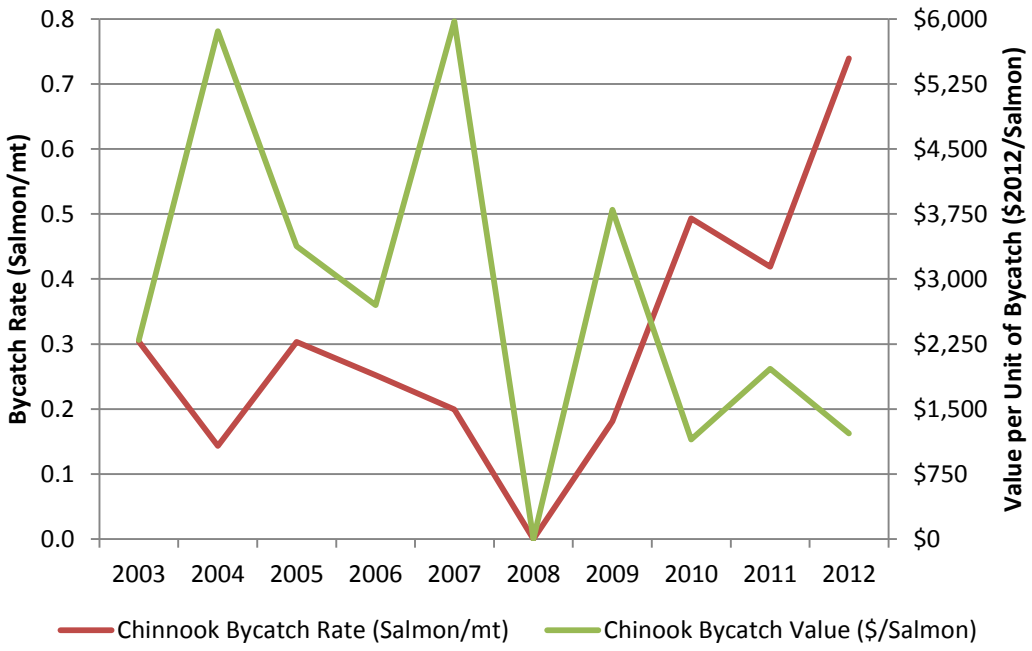
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 147. Bycatch of Tanner Crab in the AM80CP GOA Rex Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



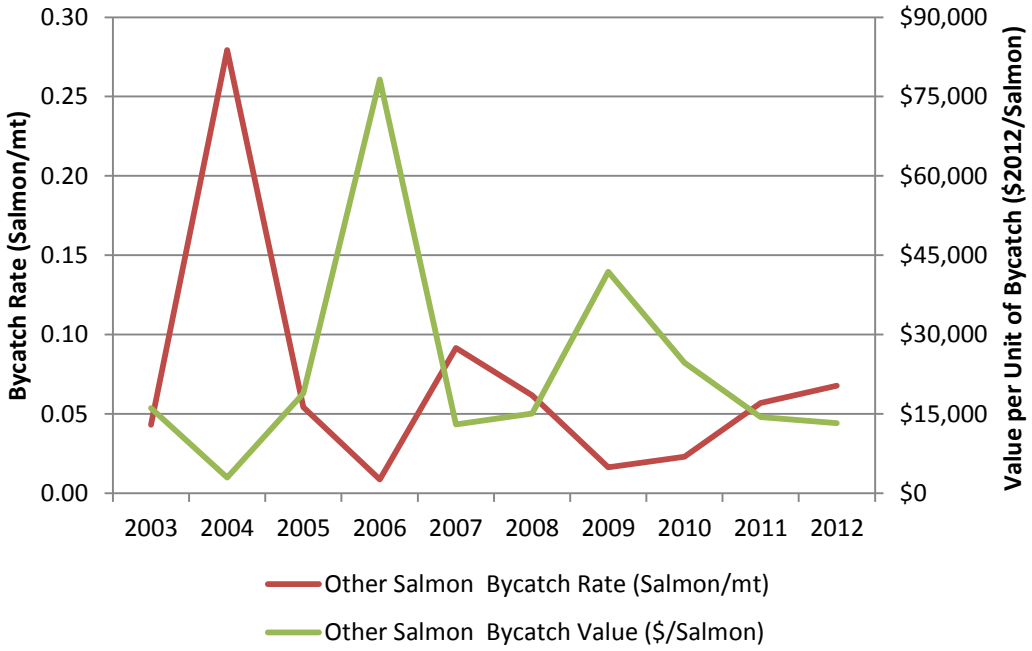
Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 148. Chinook Bycatch in the AM80CP GOA Rex Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Figure 149. Non-Chinook Salmon Bycatch in the AM80CP GOA Rex Sole Target Fishery as Share of Groundfish Catch and Value, 2003–2012



Source: Developed by Northern Economics from CAS data provided by AKFIN (Fey, 2014).

Appendix D: Example Product Transfer Report

Revised 04/03/2012

OMB No. 0648-0213
Expiration Date: 03/31/2015

PRODUCT TRANSFER REPORT

☐ Original Report

☐ Revised Report

NOAA Fisheries
Office for Law Enforcement
P.O. Box 21767
Juneau, AK 99802

Submit by FAX to Data Clerks at:
FAX: 907-586-7313
Telephone: 800-304-4846 (option 1)
E-Mail: enf.dataclerk@noaa.gov

Shipper	Federal Fisheries or Processor permit No. IFQ Registered Buyer Permit No. RCR Permit No.	Representative Name Telephone No. Fax No.	Date and Time of Product Transfer Start Finish
Receiver	Federal Fisheries or Processor Permit No. (if any)	Position of Product Transfer (Lat/Long) ***(Mothership or Catcher/processor Only)***	Port or Location of Transfer
Mode of Transportation and Intended Route			

PRODUCTS SHIPPING						Is this a ☐ TOTAL OFFLOAD or a ☐ PARTIAL OFFLOAD ***Mothership or Catcher/Processor ONLY*** **If partial offload, record amount and type of product remaining onboard after this transfer**					
Species Code	Product Code	Species Weight*	No. of Units	Unit Wt. ☐lb or ☐kg	Total Weight ☐lb or ☐kg	Species Code	Product Code	Amount ☐lb or ☐kg	Species Code	Product Code	Amount ☐lb or ☐kg

*This column to be used only for scale weight of multiple species within one unit only