SUPPORTING STATEMENT
ASSESSMENT OF THE SOCIAL AND ECONOMIC IMPACT OF HURRICANES AND OTHER CLIMATE-RELATED NATURAL DISASTERS ON COMMERCIAL AND RECREATIONAL FISHING INDUSTRIES IN THE EASTERN, GULF COAST, AND CARIBBEAN TERRITORIES OF THE UNITED STATES
OMB CONTROL NO. 0648-xxxx

B. COLLECTIONS OF INFORMATION EMPLOYING STATISTICAL METHODS

1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (e.g. establishments, State and local governmental units, households, or persons) in the universe and the corresponding sample are to be provided in tabular form. The tabulation must also include expected response rates for the collection as a whole. If the collection has been conducted before, provide the actual response rate achieved.

Target population

The respondent universe for this study includes a variety of sectors from the fishing industries in Maine through Texas, Puerto Rico, and U.S. Virgin Islands that can be impacted by hurricanes and other natural disasters. Types of respondents expected are commercial and recreational (for-hire) fishing vessel owners, bait and tackle shop owners and/or managers, seafood dealers, seafood processors, marina/boat repair/marine supply owners and/or managers, and aquaculture facilities. The different sectors targeted in this study were grouped into six categories identified in Table 4.

Table 4. Target population in each of the sector categories to be surveyed

Sector Categories	**Target Population**
Fishermen	• Individuals that own fishing vessels operating commercial or recreational (for-hire) businesses
Bait & Tackle Stores	• Individuals that own or manage bait & tackle stores
Marinas/ Boat Repair Yards/ Marine Supply Facilities	• Individuals that own or manage marinas, boat repair yards, and marine supply stores
Seafood Dealers	• Individuals that own or manage facilities dealing seafood
Seafood Processors	• Individuals that own or manage facilities operating seafood processors
Aquaculture Facilities	• Individuals that own or manage an aquaculture facility

Target population universe and sample size

In the context of this research, defining a numerical estimate of the respondent universe is challenging, due to the diversity of sectors that will be assessed and because there is no single source of information from which a respondent universe can be assembled. Therefore, values for calculating the respondent universe (Table 5) come from a combination of published data and information from personal communications.

The respondent universe for this study was assembled from a number of different sources including NOAA Fisheries license files, state license files, fishing industry organizations, prior NOAA Fisheries data collections, the internet, and other key informants. Specifically, published data for delimiting the number of permitted commercial and recreational (for-hire) vessels and seafood dealers came from the NOAA Fisheries Northeast Regional Office (NERO), the Southeast Regional Office (SERO), and the Atlantic Coastal Cooperative Statistics Program (ACCSP). The number of bait and tackle stores and seafood processing facilities are estimated based on previous data collection efforts by NOAA Fisheries Office of Science and Technology. The number of marina/boat repair/marine supply businesses in coastal counties is based on North American Industrial Classification System (NAICS) coded business location data from ESRI and personal communication.

The estimated respondent universe for Maine through Texas, Puerto Rico, and U.S. Virgin Islands are presented in Table 5. Note that any one disaster will affect only a limited subset of this overall population. Following a disaster, a specific frame will be assembled which will include only those individuals located in affected areas. Further it should be noted that any one disaster might only affect a part of a state or parts of multiple states. In such cases, we will use the available regional resolution (usually counties) to assemble the most appropriate frame. Sampling is only conducted among the potentially affected population the size of which is disaster specific and unknowable at this point.

To illustrate how sampling might look, samples are drawn for each sector for each state and territory in Table 5. The estimated minimum sample sizes (see table 5 below) were calculated using a 5% confidence interval and 95% confidence level for each strata, specifically each sector by state, using as basis the estimated universe population described in Table 5. The minimum statistical sample size is inflated by 20% to account for expected non-response. The minimum sample size for all sectors, states and U.S. Caribbean territories is 18,746.

Table 5. Estimated respondent universe and estimated sample by sector for each state

	Commercial Permits		For-Hire Permits		Bait & Tackle Stores	
	Total	Sample	Total	Sample	Total	Sample
ME	6183	434	198	155	117	108
NH	386	232	166	139	153	132
MA	3989	420	1347	359	180	148
RI	1308	356	274	192	58	61
CT	333	215	224	170	151	131
NY	833	316	723	301	200	158
NJ	816	196	848	313	293	199
PA	9	11	3	4	5	6
DE	116	107	163	138	70	71
MD	4089	421	681	295	173	143
VA	2113	390	185	150	192	154
NC	3648	418	947	329	410	239
SC	801	312	560	274	192	154
GA	367	226	240	178	80	79
FL	6954	437	3614	416	914	325
AL	618	284	425	242	68	70
MS	231	173	94	91	28	31
LA	1455	365	490	259	257	185
TX	3333	414	1622	373	248	181
Puerto Rico	1263	354	47	50	NA	0
USVI	374	228	41	44	2	2
Totals	39219	6307	12892	4474	3791	2576

	Marinas, Boat Repair Yards, Marine Supply		Seafood Dealers		Seafood Processors	
	Total	Sample	Total	Sample	Total	Sample
ME	189	152	184	150	27	30
NH	20	23	13	16	3	4
MA	316	206	175	144	60	62
RI	134	120	40	43	8	10
CT	215	167	9	11	3	4
NY	105	100	84	83	12	14
NJ	329	212	72	73	14	17
PA	8	10	3	4	2	2
DE	33	36	10	12	1	1
MD	380	229	10	12	16	18
VA	202	160	21	24	18	20
NC	235	175	580	277	17	19
SC	146	127	196	156	2	2
GA	44	48	171	143	3	4
FL	1042	337	988	332	83	82
AL	76	77	83	82	43	47
MS	33	36	28	31	18	20
LA	131	118	1025	336	51	54
TX	252	182	267	190	22	25
Puerto Rico	41	44	55	58	NA	0
USVI	27	30	NA	0	NA	0
Totals	3958	2590	4014	2176	403	436

	Aquaculture Facilities		Sampling Universe (All Sectors) by State	Total Sample by State	Percent Sample
	Total	Sample	Total	Sample	% Sample by State
ME	21	24	6919	1054	15.2%
NH	0	0	741	545	73.5%
MA	20	23	6087	1362	22.4%
RI	7	8	1829	791	43.2%
CT	6	7	941	704	74.9%
NY	7	8	1964	980	49.9%
NJ	23	26	2395	1037	43.3%
PA	1	1	31	37	120.0%
DE	1	1	394	366	92.9%
MD	7	8	5356	1127	21.0%
VA	8	10	2739	907	33.1%
NC	6	7	5843	1464	25.1%
SC	3	4	1900	1028	54.1%
GA	0	0	905	677	74.8%
FL	40	43	13635	1973	14.5%
AL	0	0	1313	802	61.1%
MS	2	2	434	385	88.8%
LA	3	4	3412	1320	38.7%
TX	9	11	5753	1376	23.9%
Puerto Rico	NA	0	1406	506	36.0%
USVI	NA	0	444	305	68.6%
Totals	**164**	**188**	**64441**	**18746**	**29.1%**

*Note: The sample size numbers were inflated to include a 20% non-response rate.

Expected response rate

To maximize the response rate, we will work with state and local officials and organizations engaged with different sectors of the fishing industry in each state to broadly advertise the survey prior to implementation. As mentioned earlier the extent and type of damage to infrastructure such as phone lines, electrical power and cell towers will determine the most effective method for data collection. This study will make use of four methods for data collection: telephone, fillable-online, mail, and intercept, face-to-face surveys. Precise information on expected response rates are not currently available because researchers involved in this study have not previously conducted interviews with the fishing industry applying all four methods in one effort and potential response rates for each method are expected to differ.

While response rates for internet-based surveys tend to be lower than other modes (Cook et al., 2000; Couper, 2000), Dillman et al. (2009) found that a mixed-mode strategy of one data collection followed by another can substantially increase response rates. For example, they found that web-based surveys followed up with a telephone survey can improve response rates by 35%. Dillman et al. (2009) also found that mail surveys followed by telephone contact yielded a total response rate of 82%. Depending on the communication channels available after a disaster, telephone and internet may not be available, which will require employing in-person surveys to collect the data. Extensive previous experience by the researchers involved in this study justifies the use of in-person interviews to reach recreational and commercial fishermen. The intercept

method used previously by the investigators to reach fishermen in a study on job satisfaction and well-being in fishing communities in the Mid-Atlantic elicited an 85% response rate (Pollnac et al. 2014).

Based on this information, the overall response rate for this study is expected to be approximately 82% to 85%. The sample sizes described in Table 5 reflect the desirable sample sizes based on the calculation described under Section B, Question 2 below. Oversampling based on the estimated response rate may be employed to maximize the overall sample size.

Once the study is completed, we will calculate the final response rate using the appropriate American Association for Public Opinion Research (AAPOR) Response Rate Calculator.

2. Describe the procedures for the collection, including: the statistical methodology for stratification and sample selection; the estimation procedure; the degree of accuracy needed for the purpose described in the justification; any unusual problems requiring specialized sampling procedures; and any use of periodic (less frequent than annual) data collection cycles to reduce burden.

Commercial and recreational fishermen, the largest number of respondents in these data collections, will be contacted predominantly through the telephone survey. Unlike the other businesses in this study whose work place is stationary, fishermen are generally hard to locate as they work at sea, often out of cell phone range, and under conditions that would make interviews unsafe.

Following a disaster, communities most affected by the disaster and most dependent on fishing will be visited by NOAA Fisheries social scientists to conduct general reconnaissance, conduct ethnographic research and collect qualitative information. Ports will be systematically selected using indices of community dependence on commercial and/or recreational fishing developed using factor analysis (Jepson and Colburn 2013). As part of these visits, in-person surveys (of the quantitative economic information) might be conducted with selected, location-based respondents (dealers, processors, etc.).

The estimated sample sizes (see table 5 above) were calculated using a 5% confidence interval and 95% confidence level for each strata, specifically each sector by state, using as basis the estimated universe population described in Section B, Question 1 above. The required statistical sample size is inflated by 20% to account for expected non-response. The sample selection process will be a random sample approach in each stratum. In other words, each individual commercial and for-hire vessel owner, bait and tackle store owner/manager, dealer, marina, boat repair and marine supply store owner/manager and aquaculture facility owner/manager is considered one respondent unit and each one, in the fishing industries of each state and/or U.S. Caribbean Territory will have an equal chance of being selected within each stratum. Note that due to the selected statistical precision, in many smaller strata we will in fact be conducting a census.

No unusual problems are expected; therefore, specialized sampling procedures will generally not be needed. An exception might be, if a disaster involves a particularly large population (with

substantially different damage profiles in different areas, as is usual), we might stratify the population further based on expected disaster impact (e.g., high impact, category 5 storm impact areas vs. lower impact, category 4 impact areas). This will allow us to adjust our sampling intensity by impact-strata to a) stay in budget while b) still achieving adequate coverage of the high impact areas.

This is an as-needed data collection intended to capture information regarding the impacts of hurricanes and other natural disasters either shortly after the event or one-year, post impact.

3. Describe the methods used to maximize response rates and to deal with nonresponse. The accuracy and reliability of the information collected must be shown to be adequate for the intended uses. For collections based on sampling, a special justification must be provided if they will not yield "reliable" data that can be generalized to the universe studied.

Various steps will be taken to maximize response rates. NOAA Fisheries will work with state agencies to coordinate press releases notifying the public of the survey, its purpose, and the different ways it will be administered. To maximize response rates survey administrators will conduct the survey in four ways: over the phone, online, mail and in-person. Name, address and phone number of potential respondents will be assembled from existing sources including federal and state agencies, fishing businesses, and fishing organization membership lists. For the rapid assessment, the telephone will be used as the primary way to survey the entire sample population with a telephone number. An online survey will be made available to potential respondents that do not want to complete the survey over the telephone. In-person interviews will be conducted in conjunction with site visits; when telephone service is not available, or to specifically target respondents who are not responding to the other methods of contact. For the long-term assessment, telephone in conjunction with mail will be used to survey the entire sample population with an address and phone number. In this study, a mixed mode survey approach will be used because there is evidence that response rates will increase if a respondent who did not complete a survey with one mode is offered a different mode (de Leeuw 2005: 233-255).

For the telephone interview, each potential respondent will be called up to five times before he/she is recorded as a non-respondent. Following the Pew Research Center's approach, the calls will be staggered over times of day and days of the week (including at least one daytime call) to maximize the chances of making contact with a potential respondent. Interviewing will also be spread as evenly as possible across the survey period. The number of calls where contact was made, a survey was successfully completed, and refusals will be recorded (Pew Research Center 2013). Telephone respondents will also have the opportunity to complete the survey online rather than over the phone if they prefer.

To decrease the potential for nonresponse, the survey instrument has been carefully designed to ensure that questions are posed in simple and straightforward language and are as brief as possible without compromising the quality of information obtained. Moreover, prior to the implementation of the survey, interviewers will explain that the survey is anonymous, participation is voluntary and that the interview can be stopped at any point. It will also be explained that participants can skip questions they do not want to answer.

In the face of an unexpected and significant frequency of nonresponse that could lead to potentially biased results, the data in-hand on respondents and non-respondents will be compared to investigate differences that could indicate biased results. If bias is suspected, demographic and other relevant information about the specific target sectors, available prior to contact and obtained through the surveys, will be used to adjust weights for non-response. This approach has been extensively used to address non-response bias (Carlson and Williams 2001, Little and Vartivarian 2003). The type and extent of information that is readily available on the target populations as well as information that will be obtained during the data collection are considered appropriate to adjust the weights of respondents presenting similar characteristics to non-respondents if such approach is necessary. If a strong bias is suspected, a brief non-response telephone survey might be conducted to roughly quantify the impact of the bias.

Contact has been made with key members of NOAA Fisheries, academia, and industry to better understand the study universe.

4. Describe any tests of procedures or methods to be undertaken. Tests are encouraged as effective means to refine collections, but if ten or more test respondents are involved OMB must give prior approval.

A review of the study description, the study methodology, and the survey instrument has been undertaken. NOAA Fisheries personnel in the Northeast and Southeast regions have reviewed the survey tool and provided comments on both the survey tool and the study.

The survey questions in this project are based on a Hurricane Sandy one-year assessment (OMB Control No. 0648-0686), which was tested and implemented in 2013-2014. A total of 952 interviews were conducted with commercial and recreational fishermen/vessel owners (N=522), seafood dealers (N=87), Bait and tackle stores (N=94), Marina owners/managers (N=235), and aquaculture facilities (N=14). The results of the Hurricane Sandy assessment (Colburn et al. 2015 NOAA Tech Memo; Clay, Colburn, & Seara 2016; Seara, Clay, & Colburn 2016) were used to improve the clarity of questions for both the rapid and long-term surveys of the proposed study.

Statistical tests employed in the proposed assessments are expected to be similar to those used in the above Colburn et al. 2015 NOAA Tech Memo. For example, the Mann-Whitney U statistic was used for all mean value comparisons between two independent groups involving total value of physical damages/losses and percent revenue lost. Comparisons involving multiple groups were conducted using Kruskal-Wallis one-way analysis of variance. Non-parametric tests were chosen in order to account for non-normality of data distribution and the presence of outliers. In addition, where appropriate, the total and average value of impacts by sector may be reported.

5. Provide the name and telephone number of individuals consulted on the statistical aspects of the design, and the name of the agency unit, contractor(s), grantee(s), or other person(s) who will actually collect and/or analyze the information for the agency.

The internal NOAA Fisheries design, development, and review team including statistical

analysis includes the Principal Investigators Dr. Mathew McPherson (Southeast Fisheries Science Center; 646-289-2235), Dr. Michael Jepson (Southeast Regional Office; 727-551-5756) and Dr. Lisa L. Colburn (Office of Science and Technology; 401-782-3252).

The primary individuals expected to collect the data will be NOAA Fisheries social scientists and contractor social scientists from the Southeast Fisheries Science Center, Southeast Regional Office and Northeast Fisheries Science Center.

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APPENDIX A

Table 6: Hurricane direct hits on the mainland U.S. coastaline and for individual sates 1851-2017 by Saffir/Simpson Cateogry.

AREA	CATEGORY						Major Hurricanes
	1	2	3	4	5	ALL	
U.S. Coastline (Texas to Maine)	121	80	64	24	3	292	91
Texas	29	16	12	7	0	64	19
North	14	10	3	3	0	30	6
Central	12	5	3	2	0	22	5
South	11	4	7	2	0	24	9
Louisiana	23	14	14	2	1	54	17
Mississippi	5	6	7	0	1	19	8
Alabama	14	5	5	0	0	24	5
Florida	47	36	24	11	2	120	37
Northwest	35	17	13	0	0	65	13
Southwest	21	12	9	6	1	49	17
Southeast	18	14	8	7	2	49	16
Northeast	19	6	1	0	0	26	1
Georgia	16	3	2	1	0	22	3
South Carolina	17	8	2	3	0	30	5
North Carolina	30	12	6	1	0	55	7
Virginia	10	2	0	0	0	12	0
Maryland	2	0	0	0	0	2	0
Delaware	2	0	0	0	0	2	0
New Jersey	4	0	0	0	0	4	0
Pennsylvania	1	0	0	0	0	1	0
New York	9	3	3	0	0	15	3
Connecticut	7	2	2	0	0	11	2
Rhode Island	5	2	3	0	0	10	3
Massachusetts	7	4	1	0	0	12	1
New Hampshire	0	1	0	0	0	1	0
Maine	2	1	0	0	0	3	0

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