SUPPORTING STATEMENT
U.S. Department of Commerce
National Oceanic & Atmospheric Administration
Socio-Economic Survey of Hired Captains and Crew in New England, Mid-Atlantic, South Atlantic and Gulf of Mexico Commercial Fisheries
OMB Control No. 0648-0636

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 government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection had been conducted previously, include the actual response rate achieved during the last collection.

Target and Sampling Populations

Table 1. Definitions of the target and sampling populations for the survey.

Category	Crew Survey
Target population – The population that the survey effort is interested in collecting data about.	Individuals who work as crew on commercial fishing vessels operating in the New England, Mid-Atlantic, South Atlantic, and Gulf of Mexico states.
Sampling population – The set of individuals from which the sample units are drawn.	Individual crew members that can be encountered on the public areas of docks.

Population and Sample Sizes

The target population for the Survey consists of individuals who work as hired captains and crew (here to for referred to as crew) on commercial fishing vessels operating in the New England, Mid-Atlantic, South Atlantic, or Gulf of Mexico states (Table 1). There is no available database of information on those who work as crew on commercial fishing vessels in the target regions. Therefore, the NEFSC and SEFSC will utilize estimates of employment in commercial fishing as the sampling frame from which to calculate an appropriate sample size. The employment estimates in New England and the Mid-Atlantic come from data made available to the NEFSC by IMPLAN (https://implanhelp.zendesk.com/hc/en-us/articles/115009505727-Data-Sets-Used-to-Create-IMPLAN-Employment-Data). IMPLAN derives estimates of employment

from three sources of data from 2014 (the most recent available data): 1) Census County Business Patterns (CBP), 2) Bureau of Labor Statistics (BLS) Covered Employment and Wages (CEW), and 3) Bureau of Economic Analysis (BEA) Regional Economic Accounts (REA). Employment estimates generated by IMPLAN include both wage and salary employees and self-employed persons in a region. Full-time, part-time and seasonal workers are measured to create an estimate of annual average jobs. These estimates of commercial fishing employment by state are provided in Table 2. The total estimated population of individuals employed in commercial fishing in New England and the Mid-Atlantic is 21,616. The commercial fishing employment population size is the estimated size of the universe from which our sample will be drawn. Since there is no sample frame, we calculate a sample size based on this estimated population size. The sample is not stratified because the population estimates are available only at broad geographic scales and are not specified at the fishery level. Table 1 describes the population universe and sample and Table 2 provides the estimated size of the population within the universe of potential respondents to be sampled.

Table 2. Commercial Fishing Employment Estimates by State for the Northeast and Southeast

State	Estimated Number Employed in Commercial Fishing
Maine	7,005
New Hampshire	408
Massachusetts	5,770
Rhode Island	1,435
Connecticut	464
New York	1,360
New Jersey	1,319
Delaware	191
Maryland	1,899
Virginia	1,765
Northeast Total	**21,616**
Texas	1,486
Louisiana	1,476
Mississippi	483
Alabama	545
Florida	5,261
Georgia	378
South Carolina	177
North Carolina	1,869
Southeast Total	**11,675***

**Due to rounding, some totals may not correspond with the sum of the separate figures*

Similar to the NEFSC approach, the SEFSC will utilize estimates of employment in commercial fishing in the South Atlantic and Gulf of Mexico states as the sampling frame from which to calculate an appropriate sample size. The commercial fisheries in the Southeast Region are divided by species groups based on separate fishery management plans. Those species groups include snapper-grouper (SG), reef fish (RF), coastal migratory pelagics (CMP), dolphin/wahoo(DW), shark (SHK), and other (OTH) fisheries. The Southeast Region also includes two shrimp fisheries –

South Atlantic and Gulf of Mexico – managed by separate management plans. Finally, the Southeast Region is home to a highly migratory species (HMS) fishery. The geographic distribution of participation in these species groups varies widely across the southeast region and it is not uncommon for licensed vessels to participate in multiple fisheries. The SEFSC expects that crew members may also participate in multiple fisheries across the region depending on the season, value of the fishery at the time, and opportunities for multiple trips/days at sea. The crew employment estimates in Table 2 come from Northern Economics, Inc., which provided a preliminary implementation plan for a Southeast Region crew survey and included a range of quantitative data on the various fisheries in the Southeast Region, including the number of vessels, average crew size, and geographic distribution of participant vessels. The total estimated population of individuals employed in the commercial fishing in the Southeast is 11,675.

From these population estimates, a target number of responses of 749 was calculated using Cochran's (1977) formula for categorical data, described in detail in Question 2. Then, we re-calculated the sample size that we would expect to produce that number of responses allowing for a 20% nonresponse rate. The resulting sample size is 937.

Data collection will involve a random (i.e., times and locations) intercept survey method at docks where commercial fishing activity takes place "to maximize response rates for hard-to-find individuals" (Miller et al. 1997) such as crew for whom there is no registry from which to draw a strictly random sample (Pollnac et al. 2015). Pollnac and Poggie (1978) found this approach to be an effective method to achieve high response rates. Note that this approach was used for the second implementation of this study in 2018/2019, achieving over a 90% response rate (Silva et al., In press). For the intercept method process, interviewers approach individuals on the docks and vessels and ask whether they are crew or hired captains and then solicit for participation in this voluntary and anonymous survey. Our efforts to increase the likelihood of making contact include working with Port Agents and local stakeholders, and using vessel trip report data to identify the optimal times to find vessels in port.

To further maximize the response rate, the NEFSC and SEFSC will select a random sample of fishing ports from the universe of ports in the New England, Mid-Atlantic, South Atlantic, and Gulf of Mexico states. To ensure that the most active ports are selected, the NEFSC and SEFSC will employ a probability proportional to size (PPS) sampling method. Specifically, under a PPS approach a port's probability of being selected into the sample will be related to the "size" of the port, with larger ports being more likely to be selected into the sample. The PPS approach is necessary to ensure that selected ports are more active and thus, more likely to result in completed crew surveys. For this study, the size of the port will be assessed using the commercial fishing engagement index from the NOAA Fisheries Community Social Vulnerability Indicators (CSVIs) developed by NEFSC and SEFSC staff (Jepson and Colburn 2013) and implemented nationally at all NOAA Fisheries science centers (see CSVI list of publications here). The commercial fishing engagement index is reported by the community and is generated from a principal component factor analysis of variables associated with fishing activity. The "community level" here refers to data at the level of Census Designated Place

(CDP) nested within a set of counties designated as "coastal" by their connection to the ocean through a coastline, river, bay, or estuary. The variables used to determine commercial fishing engagement include the number of commercial fishing permits, the value of landings, dealers with landings, and the total landings in pounds. Community sample size may vary year to year due to variation in commercial engagement scores over time. We selected from "high" and "moderately high" commercial engagement communities in the target regions. Fifty communities were selected using the PPS approach.

The sample of individuals from each community is determined based on availability of crew during our port visits. We return to ports multiple times on different days of the week and at different times of day when crew will most likely be present. The sample size typically corresponds to the size of the port, such that New Bedford, MA, for example, generally represents a larger proportion of the responses relative to other ports in the sample. There is no exact target per port because our employment estimates do not go to that level of geographic resolution.

Response Rates

Although we expect that the response rate will be greater than 80 percent, we based the sample size on a response rate of 80 percent. The previous data collection effort achieved greater than a 90% response rate due to effective outreach through pre-survey correspondence with stakeholders and coordination with NMFS Port Agents who have substantial knowledge of the ports in our sample. We will once again conduct outreach prior to survey implementation and will work closely with Port Agents to engage with local stakeholders to boost response rates.

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.

Sample Selection

The sample size was calculated using Cochran's (1977) formula for categorical data (Bartlett et al. 2001). Determining sample size requires specifying acceptable margins of error for the "items that are regarded as most vital to the survey," (Cochran 1977). Since we will be collecting both categorical (e.g., educational level and ethnicity) and continuous (e.g., years of experience and five-point scales for attitudes, beliefs, and perceptions) data, the formula and procedures for categorical data will be utilized given that categorical data require larger sample sizes than continuous data.

In determining sample size, we will consider two key factors as derived from Cochran's formula: 1) an acceptable margin of error, and 2) an acceptable alpha level, or the probability of committing Type 1 error, i.e., incorrectly rejecting the null hypothesis (Bartlett et al. 2001). We will use the most common margin of error for categorical data (i.e., 5%) and the most common alpha level (i.e., .05) used in research in the social and behavioral sciences. The alpha level corresponds inversely to the confidence level such that increasing the alpha level will result in a decreased confidence level. The alpha level of .05 used in this sample selection method will mean a confidence level of 0.95,

or 95% confidence. Sample size determination also requires estimating the variance of the primary variables of interest in the study. We will employ the recommended .50 as an estimate of the population proportion (p) for categorical data.

$$n = \frac{(t)^2 * (p)(q)}{(d)^2}$$

Where t = the t-value derived from selected alpha level,
(p)(q) = estimate of variance (using the proportion of the population (p) with a certain characteristic of interest and q = (1-p),
and d = margin of error

Hence, the minimum estimated sample size is:

$$n = \frac{(1.96)^2 * (.5)(.5)}{(.05)^2} = 384$$

Using the above outlined variables of measurement and the estimated population sizes (N) for the Northeast and Southeast regions, we calculated the sample size based on Cochran's finite population correction formula for final sample size determination (Bartlett et al 2001):

$$n' = \frac{n}{1+\frac{n}{N}}$$

Cochran's correction for an estimated Northeast population of 21,616 is:

$$n' = \frac{384}{1+\frac{384}{21,616}} = 377$$

Similarly, Cochran's correction for an estimated Southeast population of 11,675 is:

$$n' = \frac{384}{1+\frac{384}{11,675}} = 372$$

Therefore, the total target number of responses for all regions combined is 749 and given a response rate of 80 percent, a sample size of 937 is sufficiently large to estimate the true values of the primary variables of interest in this population.

Unusual Problems

We expect to encounter no unusual problems.

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.

The crew survey will be implemented as an intercept approach in which interviewers will intercept crew at the docks. A random intercept survey is being used to maximize response rates and is a method used for studies of hard-to-find individuals (Miller et.al. 1997) such as crew, who may not have a permanent address or phone number or may live aboard the vessel on which they work (Kitner 2006). A study similar to this one involved a 90 percent response rate from 350 fishermen in New England in 2009 and 2010 (Pollnac et al. 2015). Additionally, the prior 2018-2019 survey wave of this information collection effort was also able to achieve greater than a 90% response rate, as noted above.

To maximize response rates, surveys will be conducted in-person. Face-to-face interviews are an effective method for the collection of information from people such as individuals who may not be able to participate using other methods (Bernard 2006). Face- to- face interviews also make it possible to probe for more in-depth answers and clarify respondent questions (Bernard 2006). In addition, the individuals participating in the research have the opportunity to communicate with the researcher and provide additional information that is useful to the overall objectives of the study. We will coordinate follow-up phone calls with crew who may be interested in completing the survey but are not immediately available during the dockside intercept.

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.

The NEFSC and SEFSC will work with town harbor commissioners and NMFS port agents in sample ports to determine the best times of the year and day to perform an intercept survey of crew. We will use an electronic vessel tracking system so that we have information on when vessels are departing/arriving. To foster “buy-in” to the project ahead of time, we will also conduct workshops/webinars leading up to deployment of the survey so that fishing industry members have some knowledge of the purpose of the survey. In addition, the NEFSC and SEFSC will advertise the survey in newsletters and on social media such as Facebook and Twitter. An example of a web based newsletter used during the 2018-2019 implementation is included in this PRA package.

The NEFSC and SEFSC have employed the following practices to maximize response rate:

- Survey length—NMFS has limited the length of the survey to ensure it can be completed in a reasonable amount of time. The survey questionnaire is expected to take approximately 20 minutes to complete due to its focused topics and limited use of Likert-style questions, open-ended questions, and loaded or double-barreled questions.
- Best-practices design—NEFSC and SEFSC staff have expertise in survey design, including question sequencing, wording, and graphic elements on the

survey. Staff also have experience programming many different survey software platforms to allow for question branching, skip patterns, and ideal question presentation for ease of interpretation and response (i.e., clear instructions, menu options, response formatting restrictions and error messaging, etc.).

4. Describe any tests of procedures or methods to be undertaken. Testing is encouraged as an effective means of refining collections of information to minimize burden and improve utility. Tests must be approved if they call for answers to identical questions from 10 or more respondents. A proposed test or set of tests may be submitted for approval separately or in combination with the main collection of information.

The majority of the survey questions in this study are based on the previous wave of data collection (OMB Control No. 0648-0636), which was implemented by NEFSC in the Northeast region in 2018-2019 resulting in over 400 completed interviews. Only new questions were tested 9 times in the Northeast region whereas all questions were tested by the SEFSC in the Southeast region.

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 following individuals were involved in the statistical aspects of the design and will be responsible for the collection and analysis of data generated from this study.

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Lisa Colburn, Northeast Fisheries Science Center	401-782-3253	lisa.l.colburn@noaa.gov
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