SUPPORTING STATEMENT
U.S. Department of Commerce
National Oceanic & Atmospheric Administration
Marine Recreational Information Program Fishing Effort Survey
OMB Control No. 0648-0652

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.

The MRIP Fishing Effort Survey (FES) is a bi-monthly (wave), cross-sectional mail survey designed to estimate the total number of private boat and shore-based recreational, saltwater fishing trips taken by residents of coastal states. For each administration, the FES utilizes address-based samples (ABS) covering Hawaii and 16 coastal states along the Atlantic coast and Gulf of Mexico (Maine through Alabama). The sample frame is derived from the USPS Computerized Delivery Sequence File (CDS) and includes all full-time (non-seasonal), residential addresses, with the exception of PO boxes that are not flagged as the only way to get mail. Sampling is stratified both geographically and by angler license status. Within each state, sampling is stratified into coastal and non-coastal sub-state regions defined by geographic proximity to the coast. Generally, counties with borders that are within 25 miles of the coast are in the "coastal" stratum and all other counties are in the "non-coastal" stratum. Rhode Island, Connecticut, Delaware, and Florida are not geographically stratified due to relatively consistent rates of fishing among counties.

Within the geographic strata, addresses are matched to the National Saltwater Angler Registry (NSAR), which consists of state lists of licensed saltwater anglers. This creates two additional strata; license matched (households with one or more licensed anglers) and license unmatched (households that cannot be matched to NSAR). This stratification provides additional information to optimize sampling. Within each stratum, addresses are selected in a single stage using simple random sampling.

Table 1 provides the sample universe, annual target sample sizes, and estimated number of completed household interviews for each state. The sample sizes for each state and wave are expected to result in estimates of total fishing effort with coefficients of variation of 0.20 or less. Within each state and wave, sample are allocated using a Neyman approach, where the sample is distributed among strata in proportion to the product of the population size and the standard deviation. Standard deviations are based upon historical FES data and estimates.

Table 1. Estimated size of the sample universe, annual target sample sizes, expected response rates and estimated number of completed household surveys.

State	Estimated Number of Households	Target FES Sample Size	Expected Response Rate (%)*	Estimated Completed Interviews
AL	1,859,868	19,948	32.50	6,482
CT	1,357,269	23,015	32.73	7,533
DE	351,085	21,005	33.58	7,054
FL	7,574,766	9,948	31.60	3,144
GA	3,691,218	29,183	27.66	8,073
HI	455,868	13,213	37.76	4,989
ME	544,370	12,855	36.38	4,676
MD	2,192,996	20,529	31.46	6,458
MA	2,578,709	22,816	33.59	7,665
MS	1,103,089	16,960	31.79	5,392
NH	523,963	11,330	34.89	3,953
NJ	3,194,519	20,830	28.67	5,972
NY	7,216,340	27,830	24.66	6,862
NC	3,877,965	28,175	34.12	9,614
RI	408,220	22,718	34.08	7,742
SC	1,884,333	17,023	34.74	5,914
VA	3,124,333	25,597	33.12	8,477
Overall	41,938,911	342,975	32.07	110,000

*The denominator for the calculation of response rates includes all addresses, including those returned by the postal service as non-deliverable. Based upon historical FES administrations, approximately 6% of addresses will be returned as non-deliverable. In 2018, the overall response rate, excluding non-deliverable addresses, was approximately 34%.

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.

2.1. Data Collection Procedures

The FES is a self-administered mail survey. Data collection procedures have been extensively tested through several pilot studies (Andrews et al. 2010, 2014; Brick et al. 2012a). Each year, the survey is administered for six, two-month reference waves. The data collection period for each wave begins one week prior to the end of the wave with an initial survey mailing. The timing of the initial mailing is such that materials are received prior to the end of the reference wave. The initial mailing is delivered by regular first class mail and includes a cover letter stating the purpose of the survey, a survey questionnaire, a post-paid return envelope, and a prepaid cash incentive (as described in section A.9).

One week following the initial mailing, a thank you/reminder postcard is sent via first class mail to all sample units. Three weeks after the initial survey mailing, a follow-up mailing is delivered to all sample units that have not responded to the survey. The follow-up mailing is delivered via first class mail and includes a nonresponse conversion letter, a second questionnaire and a post-paid return envelope.

2.2. Estimation Procedures

The FES estimates fishing effort (angler trips) by residents of sampled states. An adjustment to account for non-resident fishing activity is derived from the MRIP Access-Point Angler Intercept Survey (APAIS, OMB Control No. 0648-0052).

Final FES weights are calculated in stages. In the first stage, base sample weights within each geographic stratum (state/sub-state region) are calculated as the inverse of the inclusion probabilities ($\omega_i = \pi_i^{-1}$, where π_i is the probability that unit i is included in the sample).

In the second stage, base weights are adjusted to account for nonresponse. Specifically, the weights of nonresponding units are increased by the inverse of the weighted response rate within nonresponse adjustment cells

$$\omega_{ci}^{*} = \begin{cases} \omega_{ci}\hat{\varnothing}_c^{-1}, \wedge respondents \\ 0, \wedge nonrespondents \end{cases}$$

Where

$$\hat{\varnothing}_c = \frac{\sum \omega_{ci} r_{ci}}{\sum \omega_{ci}}$$

$$r_{ci} = \begin{cases} 1, respondents \\ 0, nonrespondents \end{cases}$$

r_{ci} is a categorical variable indicating response and $\sum \omega_{ci}$ is the sum of base weights within nonresponse adjustment cell c.

Nonresponse adjustment cells are defined by state of residence x sub-state region (coastal vs. non-coastal) x license match (matched vs. unmatched) x boat registration status (whether or not the sampled address could be matched to state databases of registered boats). Other potential criteria for defining nonresponse adjustment cells will be examined after each wave of data collection.

In the final weighting stage, non-response adjusted weights are post-stratified to control totals within each state x sub-state stratum. Control totals for the number of households are estimated from the most recent reliable data available from the American Community Survey.

Estimates of fishing effort by residents of coastal states, as well as associated estimates of variance, are calculated in SAS Version 9.4 using the surveymeans procedure. For each state and wave, total resident effort is calculated as a weighted sum over the sample

$$\hat{Y}_r = \sum_h \sum_j \omega_{hj}^{¿} y_{hj}$$

where $\omega_{hj}^{¿}$ and y_{hj} are the final weight and reported number of recreational fishing trips, respectfully, for address *j* in stratum *h*.

Variance is estimated using the Taylor series linearization

$$\hat{V}(\hat{Y}_r) = \sum_h \frac{n_h}{n_h - 1} \left(\sum_j w_{hj}^{¿} y_{hj} - \frac{1}{n_h} \sum_j w_{hj}^{¿} y_{hj} \right)^2$$

Adjustments to account for fishing activity by non-resident anglers are estimated from the APAIS. For each coastal state and wave, resident effort is adjusted by the inverse of the estimated proportion of fishing trips taken by resident anglers ($\hat{p}_r$) to estimate total effort ($\hat{Y}_t$¿

$$\hat{Y}_t = \hat{Y}_r \hat{p}_r^{-1}$$

and

$$\hat{V}(\hat{Y}_t) = \frac{\hat{V}(\hat{Y}_r)}{\hat{V}(\hat{p}_r)} = \frac{1}{\hat{p}_r^{\,2}} \hat{V}(\hat{Y}_r) + \frac{\hat{Y}_r^2}{\hat{p}_r^4} \hat{V}(\hat{p}_r)$$

where the proportion is estimated from APAIS data as the weighted mean of an indicator variable.

$$\hat{p}_r = \frac{\left(\sum_h \sum_i \sum_j w_{hij} p_{hij} \right)}{\sum_h \sum_i \sum_j w_{hij}}$$

$$p_{hij} = \begin{cases} 1, resident\ intercept \\ 0, non-resident\ intercept \end{cases}$$

and

$$\hat{V}(\hat{p}_r)=\sum_h \frac{n_h}{n_h-1}\sum_i \left(\frac{\left(\sum_j w_{hij}\left(p_{hij}-\hat{p}_r\right)\right)}{\sum_h \sum_i \sum_j w_{hij}} - \sum_i \frac{\left(\frac{\left(\sum_j w_{hij}\left(p_{hij}-\hat{p}_r\right)\right)}{\sum_h \sum_i \sum_j w_{hij}} \right)^2}{n_h} \right)$$

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.

Previous administrations of the FES resulted in response rates ranging from 25-40%. We expect similar response for future administrations of the survey.

The expected response rates will be achieved by using standard mail survey protocols (Dillman et al, 2008). An initial mailing will include an introductory letter stating the purpose of the survey, the survey questionnaire, a business reply envelope, and a prepaid, $2.00 cash incentive. During testing of the FES design, a $2.00 incentive was found to be optimal in terms of maximizing response and minimizing data collection costs. A thank-you/reminder postcard and/or automated voice message will be administered to all sample units one week following the initial mailing. A final mailing, including a second questionnaire, a nonresponse conversion letter, and a business reply envelope will be sent to all nonrespondents three weeks after the initial mailing.

We will minimize nonresponse bias by using a questionnaire that maximizes responses by the entire sample population, including both fishing and non-fishing households. Testing of the FES design included two versions of the survey instrument, a fishing-specific version and a more general version that included non-fishing questions. The FES will utilize the more general "Weather and Outdoor Activity Survey" instrument, which provided the most representative sample of the general population during testing.

FES testing also included a nonresponse follow-up study to assess nonresponse bias in the data collection design. Each wave, 400 nonrespondents were sampled for the follow-up study. Data collection for the nonresponse study was initiated six weeks after the final contact for the FES with the delivery of an advanced letter via regular first-class mail. Five days later, a survey packet, including a cover letter, questionnaire (the same questionnaire used in the FES), post-paid return envelope, and a $5.00 cash incentive was delivered via FedEx (USPS Priority Mail was used where FedEx is unavailable). A thank you/reminder postcard was delivered eight days after the FedEx.

The nonresponse follow-up study achieved a 40% response rate, and respondents to the nonresponse follow-up study were not significantly different from FES respondents in terms of recreational fishing activity. These findings suggest that nonresponse bias in the FES is minimal. We are planning to administer a second nonresponse follow-up study in 2020.

We will continue to assess nonresponse bias in future administrations of the FES. First, we will compare early and late responders with respect to reported fishing activity. This analysis will identify differences in respondents based upon the level of effort required to solicit a response. Previous studies (Brick et al., 2012, FES pilot study) demonstrated that early and late responders are similar in terms of reported recreational fishing activity.

We will also utilize information from survey sample frames to define weighting classes for post-survey weighting adjustments. Weighting classes will be defined such that response rates and fishing activity are similar within classes. Nonresponse bias will be measured by comparing unadjusted estimates to estimates that have been adjusted to account for differential nonresponse among weighting classes. Previous studies identified differential nonresponse and reported fishing activity between households with and without licensed anglers and demonstrated that nonresponse weighting adjustment decreased estimates of fishing effort by 25% over unadjusted estimates (Andrews et al., 2010).

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.

Nonresponse Follow-Up Study: A 2017 review of MRIP by the National Academies of Sciences, Engineering and Medicine recommended that NOAA Fisheries conduct annual studies to evaluate nonresponse. A previous Nonresponse Follow-up Study (NRFU), administered during FES field testing in 2012-2013, found no significant differences in fishing activity between FES and NRFU samples. We plan to repeat the NRFU in the states where the FES was initially tested, MA, NY, NC, and FL during the 2020 FES administration to re-evaluate nonresponse bias. The NRFU will be administered during the wave 3 (May/June) and wave 4 (July/August) FES administrations.

All households that did not respond to the FES will be included in the NRFU sample. Based upon anticipated 2020 FES sample sizes and historical response rates, we estimate a total NRFU sample of 14,376 addresses. Data collection will be initiated six weeks after the final FES contact with the delivery of an advanced letter via regular first-class mail. Five days later, a survey packet, including a cover letter, questionnaire, post-paid return envelope, and a $5.00 cash incentive will be delivered via FedEx. The NRFU will utilize the FES, “Weather and Outdoor Activity Survey” instrument. With 80 percent power and a significance level of 0.05, the NRFU sample size will allow a minimum detectible difference in fishing prevalence between the base FES sample and NRFU sample of approximately 2 percentage points.

Recreational Saltwater Boat Fishing Survey: A Recreational Saltwater Boat Fishing Survey (RBFS) will be field tested during wave 4 (July/August) 2020 in AL, FL, and MD to collect more detailed information about boat fishing activities. Specifically, the RBFS will quantify different types of boat fishing activity (e.g., powerboat, canoe, kayak, sailboat, personal

watercraft, pontoon boat, rowboat), fishing areas (inland waters, state ocean waters, federal ocean waters), and fishing access point characteristics (personal residence or dock, private community marina or dock, commercial marina or public boat ramp).

The RBFS will utilize FES sampling, data collection and estimation procedures. The total sample size will be 31,250 addresses. Table 2 provides the sample universe, target sample sizes, estimated number of completed household surveys, and estimated number of completed surveys with reported boat fishing trips for each state. For an estimated proportion of 0.20, (e.g., 20% of boat trips fishing in ocean > 3 miles from shore) the overall sample size will result in a coefficient of variation of less than 10%.

Table 2. Estimated size of the sample universe, annual target sample sizes, expected response rates, estimated number of completed household surveys, and estimated completed surveys with reported boat fishing activity.

State	Estimated Number of Households	Target Sample Size	Expected Response Rate (%)*	Estimated Completed Interviews	Estimated Completed Interviews with Boat Fishing
AL	1,859,868	9,961	30.7	3,063	682
FL	7,574,766	7,525	33.3	2,507	637
MD	2,192,996	13,764	34.3	4,721	518
Overall	11,627,630	31,250	32.9	10,291	1,837

*The denominator for the calculation of response rates includes all addresses, including those returned by the postal service as non-deliverable. Based upon historical FES administrations, approximately 6% of addresses will be returned as non-deliverable. During wave 4, 2018, the overall response rate, excluding non-deliverable addresses, was approximately 35% in AL, FL, and MD%.

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.

Statistical support was provided by the following:
Dr. J. Michael Brick, Westat, 301-294-2004

Rob Andrews, Fisheries Biologist, NOAA Fisheries Service, Office of Science and Technology, 301-427-8105 is the point-of-contact for the Agency.

John Foster, Chief, Recreational Fisheries Statistics Branch, NOAA Fisheries Service, Office of Science and Technology, 301-427-8130.

References

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