SUPPORTING STATEMENT
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 individuals who participate in marine recreational fishing and the total number of private boat and shore-based recreational fishing trips taken by residents of coastal states. The FES utilizes address-based samples (ABS) that cover all residential addresses within the study states.

The sample universe for the FES includes all residential addresses within the study area that are serviced by the United States Postal Service (USPS). Sampling is stratified by coastal state and geographic proximity to the coast within each state. Specifically, counties with any border that is within 25 miles of the coast are in the coastal stratum, and all other counties are in the non-coastal stratum[1]. Geographic stratification within states provides an opportunity to sample different segments of the population at different rates, thereby increasing the efficiency of data collection. For example, historical estimates from the Marine Recreational Fisheries Statistics Survey (MRFSS) demonstrate that 65-90% of recreational saltwater fishing trips are taken by residents of coastal counties. Subsequently, addresses in coastal strata are sampled at a higher rate.

Each wave, a representative sample of addresses is selected for each stratum from the USPS Computerized Delivery Sequence File (CDS). In each state, sampled addresses are matched, by address and telephone number, to databases of anglers who are licensed to participate in saltwater fishing in the respective state. License databases are provided to NMFS by state natural resource agencies approximately one month prior to the beginning of data collection for each wave.

Matching addresses to license databases screens the ABS sample to identify households with (matched) and without (unmatched) licensed anglers, effectively stratifying the sample into matched and unmatched strata (Lohr, 2009). Augmenting the ABS sample in this manner provides an additional opportunity to optimize sampling - previous studies (Andrews et al., 2010, Brick et al., 2012a, Andrews et al., 2014) have demonstrated that residents of households that match to license databases respond to fishing surveys at a higher rate and are more likely to have fished during the reference wave than residents of unmatched households. Optimum sampling

[1] Florida is not stratified due to the relatively high rate of fishing across the state, and Connecticut, Delaware, and Rhode Island are not stratified due to the small geographic areas of the states.

allocations among matched/un-matched strata are obtained by sub-sampling the initial ABS.

Table 1 provides the sample universe, annual target sample sizes and estimated number of completed household interviews for each geographic stratum. Within each state, sample is optimally allocated among strata to maximize the precision of estimates of total fishing effort. The allocation and expected response rates are based upon results of previous FES administrations. Target sample sizes are expected to result in a completed number of household surveys that will achieve a coefficient of variation of 20% on annual estimates of total fishing effort for each state.

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

State	Stratum	Estimated Number of Households	Target ABS Sample Size	Expected Response Rate	Estimated Completed Interviews
AL	Coastal	1,661,055	8,389	35.3	2,961
	Non-Coastal	244,831	5,554	32.5	1,803
CT	Coastal	1,376,955	18,273	36.2	6,618
DE	Coastal	349,794	13,914	38	5,292
FL	Coastal	7,631,375	5,785	36.6	2,116
GA	Coastal	3,447,326	19,278	35.2	6,791
	Non-Coastal	247,113	10,685	35.6	3,805
LA	Coastal	466,705	3,799	37	1,406
	Non-Coastal	828,328	5,546	30.2	1,674
ME	Coastal	945,732	6,927	46.7	3,238
	Non-Coastal	631,148	500	48	240
MD	Coastal	244,923	16,637	38.8	6,456
	Non-Coastal	1,954,989	5,181	42.8	2,217
MA	Coastal	97,900	12,781	40.6	5,192
	Non-Coastal	462,106	1,605	38.8	623
MS	Coastal	948,126	3,691	34.1	1,257
	Non-Coastal	180,716	16,503	32.5	5,365
NH	Coastal	3,065,955	6,562	43	2,821
	Non-Coastal	787,088	514	44.8	230
NJ	Coastal	144,104	13,027	34.8	4,533
	Non-Coastal	378,763	1,046	50.5	528
NY	Coastal	142,908	23,751	30.2	7,173
	Non-Coastal	3,095,540	2,334	46.1	1,076
NC	Coastal	2,788,575	12,029	37.1	4,458
	Non-Coastal	4,620,155	4,362	40.4	1,761
RI	Coastal	413,196	13,929	39.2	5,455
SC	Coastal	1,254,690	7,557	42	3,177
	Non-Coastal	598,096	7,961	38.6	3,071
VA	Coastal	1,744,021	17,279	37.8	6,540
	Non-Coastal	1,393,148	10,355	40.8	4,228
TX	Coastal	2,485,530	15,791	35	5,527
	Non-Coastal	6,633,266	6,766	35	2,368
Total		51,264,157	298,311	36.8	110,000

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 follow-up thank you/reminder contact is initiated. For sample units with an attached landline telephone number (sample units for which a landline telephone number can be found through a lookup service), an automated voice message is delivered to remind sample units to complete and return the questionnaire. Previous studies have demonstrated that varying the delivery mechanism, for example, switching from regular first class mail to telephone or special mail, may improve response rates in mail surveys (Brick et al., 2012b). A thank you/reminder postcard is sent via regular fist 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

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

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 matching telephone status (whether or not the sampled address could be matched to a landline telephone number). 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

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

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

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

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 30-50%. 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 anglers and non-anglers. 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 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 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 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.

No additional testing is planned.

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
Dr. Nancy A. Mathiowetz, University of Wisconsin-Milwaukee, 414-229-2216

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

References

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