

National Recreational Boating Survey

Supporting Statement for

1625-0089

SECTION B:

Collection of Information Employing Statistical Methods

The National Recreational Boating Survey is a statistical survey that is designed to collect data from a complex probability sample of recreational boating participants and owners of registered recreational vessels. The analysis of survey data will use state-of-the-art estimation methods developed in the area of finite population sampling and inference.

This document will address 5 OMB questions related to the design and the implementation of the National Recreational Boating Survey. Question 1 is about describing the respondent universe as well as providing the expected response rates. Question 2 is related to the sample size determination, as well as the sampling and estimation procedures. Question 3 requests a description of the procedures used for maximizing response rates. Question 4 on the other hand requests a description of pretest activities that are planned for the survey, while Question 5 asks for the contact information of individuals consulted on the statistical aspects of the survey design.

QUESTION 1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection methods 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.

AGENCY'S RESPONSE

I. Survey's Objectives

The National Recreational Boating Survey aims at answering the following two broad types of research questions:

- (i) Who are the recreational boating participants in the U.S.? Where do they boat? How long is their typical boating trip? What type of boat do they use? What type of activities are they involved in?
- (ii) Who are the users of specific boat types? Where are these boats being used? Who owns these boats? How often and how are these boats used and for what activity?

A key difference between the two types of questions is that while the first type focuses on the profile of individual recreational boating participants, the second type primarily targets the characteristics of the recreational vessels being used. To obtain accurate statistics for both types of questions, the Coast Guard (CG) will use a dual-frame three-component survey. The first

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survey component will be a mail survey (MS) based on a stratified sample of registered recreational vessels selected from states boat registration databases. The second survey component is a Regular Household Telephone Survey (RHTS) based on a list-assisted Random Digit Dialing (RDD) sample, and aimed at collecting basic boating participation data only from households that do not own any registered recreational vessel, and in states where a mail survey was conducted. The third survey component is a Special Household Telephone Survey (SHTS) to be conducted in states that will not provide boat registration data. It aims at capturing boating participation data related to registered as well as unregistered boats.

Since states boat registration databases contain the registered boat owner's name, mailing address, as well as various characteristics of the boat, the mail survey sample will be stratified by boat type, size, and by geographic regions. More details on the stratification are provided later in this document. The regular telephone survey on the other hand is based on a two-phase sampling design where the second-phase sample will be stratified geographically only. The special telephone survey is based on a two-phase sampling design where the second-phase sample will be stratified geographically, by boat type, and by boat size. That is, both telephone surveys will be preceded by a screener survey using a large first-phase sample. This screener survey collects basic information necessary to determine household eligibility, and to stratify the first-phase sample.

The Coast Guard anticipates that a few states (3 to 7), which are unknown at the present time, will not provide their registration databases for sampling. Consequently, a mail survey will not be conducted in those states. This situation led to the development of the special telephone questionnaire that will collect boating data on both registered and unregistered recreational vessels. This special telephone survey will be preceded by a short screener survey necessary to determine the household eligibility, the number, type and size of all boats owned. In summary, the Coast Guard will conduct 3 detailed surveys and two screener (short) surveys for this data collection effort.

II. Description and Use of Survey Questionnaires

The following are the different survey questionnaires that the Coast Guard has developed:

◆ Short Surveys

1. Screener Questionnaire for identifying boating households that do not own any registered recreational vessel. These households cannot be reached by the mail survey, since this survey uses the states boat registration databases as its sampling frame. Therefore, only households in states providing registration data will be targeted by this short questionnaire.
2. Screener Questionnaire for all households in states for which registration databases are not available. The objective of this short questionnaire is to gather basic information about all boating households, whether they own a registered recreational vessel or not.

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◆ **Detailed Surveys**

1. Regular Household Telephone Survey (RHTS) questionnaire for states that will share their registration databases. This telephone survey will only target boating households that do not own any registered recreational vessel.
2. Special Household Telephone Survey (SHTS) questionnaire for states that did not provide any registration data.
3. Mail Survey (MS) questionnaire for registered boats selected from states boat registration databases.

Table 1 describes the use of the three detailed questionnaires according to the availability of registration data and the target households.

Table 1: Use of the Three Detailed Surveys by Target Population and Availability of Boat Registration Data

Target State Household Population	Boat Registration Data available from State	Boat Registration Data Not Available from State
Boating Households That Own No Registered Recreational Vessel	Regular RDD Survey	Special RDD Survey
Boating Households That Own At Least One Registered Recreational Vessel	Mail Survey	
Non-Boating Households	Ineligible	

Through stratification, the mail survey will allow for the analysis of boaters using a specific type of boats such as power boats that are 28 feet long or more for example. Such a group of boaters may not be well represented in an RDD sample-based household survey. However the telephone survey remains the only option for collecting data on unregistered boat. In fact there exists no known comprehensive database of unregistered boats that could be used as sampling frame for surveying unregistered boaters. The screener survey preceding the detailed survey will be based on a large screener sample of approximately 879,121 households.

III. Description of Respondent Universe and Stratification Variables

(i) The Household Telephone Survey

The general household telephone survey component of the National Recreational Boating Survey (NRBS) will be based on a geographically stratified RDD sampling design. Sixteen geographic regions representing distinct coastal and inland boating activity

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domains have been defined for the United States household population. These strata are defined by grouping coastal and inland counties as described in Table 2.

Coastal counties are defined by the Strategic Environmental Assessments Division of the National Oceanic and Atmospheric Administration (NOAA). These are counties that meet one of the following criteria:

- ◆ At least 15 percent of a county’s total land area is located within the Nation’s coastal watershed;
- ◆ A portion of or an entire county accounts for at least 15 percent of a coastal cataloging unit. Any U.S. county that meets these criteria is classified as coastal.

Table 2: Geographic Strata for the 2007 National Recreational Boating Survey

Geographic Stratum	Description of the geographic stratum
1	Northeast Coastal Counties All coastal counties in the New England census division and <u>on the Atlantic coast</u> of New York state ¹ .
2	Mid-Atlantic Coastal Counties All coastal counties <u>on the Atlantic coast</u> of the following states: NJ, PA ² , MD, DE, DC
3	Southeast Coastal Counties All coastal counties in the following states: VA, NC, SC, GA
4	Florida Coastal Counties All coastal counties in the state of Florida
5	Gulf of Mexico Coastal Counties All coastal counties in the Gulf states that belong to the East South Central and the West South Central census divisions (i.e. AL, GA ³ , MS, LA, TX)
6	California Coastal Counties All coastal counties in the state of California
7	Northwest Coastal Counties All coastal counties in the Northeast coastal regions (i.e. states of OR, WA)
8	Great Lakes Coastal Counties All coastal counties in the Great Lakes coastal regions
9	New England – Middle Atlantic – East North Central inland counties All inland counties in the New England, Middle Atlantic, and East North Central <u>census divisions</u>
10	West North Central inland counties All inland counties in the West North Central census division
11	West South Central inland counties

¹ NY state has counties in the Mid-Atlantic coastal region as well as in the Great Lakes coastal region

² PA has counties in the Mid-Atlantic coastal regions as well as in the Great lakes coastal regions

³ GA has counties in the Gulf of Mexico as well as in the Southeast or South Atlantic

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	All inland counties in the West South Central inland counties
12	East South Central inland counties All inland counties in the East South Central census division
13	South Atlantic inland counties All inland counties in the South Atlantic census division
14	Mountain – Pacific inland counties All inland counties in the Mountain and Pacific census divisions
15	Alaska counties
16	Hawaii counties

Table 6 in the appendix defines all 16 strata using the county FIPS codes. That is, Table 6 lists all county FIPS codes pertaining to each of the 16 strata. This stratification is justified by the need to ensure a good representation of various parts of the country expected to have similar boating practices.

Table 3 presents the distribution of households, individuals, registered boats, recreational boating participants, and boating accident fatalities by stratum. While household and individual data are based on the 2000 US Census, the counts of registered boats, recreational boating participants, and deaths are those of the 2005 boating season.

Since the primary goal of the screener survey is to collect data to determine eligibility of households for the detailed survey, the screener sample will be allocated proportionally to the stratum size (measured by the number of registered boats) with an oversampling in strata 15 and 16. This approach is based upon the assumption that strata with more registered boats are also more likely to have households that do not own any registered boat. The screener sample data will provide the distribution of eligible households by stratum, which will allow for a proportional allocation of the detailed survey sample.

Table 3: Distribution of households, individuals registered boats, boating accident fatalities and hospital-admitted injuries by stratum

Stratum	Number of Counties		Number of Households	Number of Individuals	Number of Registered Boats (2005)	Estimated Number of Boaters	Number of Deaths (2005)
	Coastal	Inland					
1	63	0	9,898,760	26,341,955	841,414	6,848,908	40
2	56	0	7,577,441	20,281,821	600,009	5,273,273	34
3	145	0	3,487,199	9,253,028	453,804	2,405,787	25
4	61	0	6,175,999	15,567,687	948,978	4,047,599	62
5	102	0	4,152,133	11,754,467	523,782	3,056,161	47
6	29	0	10,104,880	29,660,164	846,629	7,711,643	46
7	31	0	2,518,502	6,395,134	313,519	1,662,735	26
8	158	0	10,401,208	27,324,463	1,682,063	7,104,360	58
9	0	405	12,121,304	31,269,770	1,363,318	8,130,140	49
10	0	614	7,388,790	18,989,314	1,656,575	4,937,222	58
11	0	391	7,808,966	21,085,447	910,186	5,482,216	60
12	0	344	6,115,849	15,722,382	832,296	4,087,819	53
13	0	356	7,905,878	20,629,351	976,899	5,363,631	48

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14	0	358	9,231,480	25,401,623	867,844	6,604,422	66
15	23	0	186,631	529,474	41,375	137,663	20
16	5	0	403,240	1,211,537	15,302	315,000	5
Total	673	2,468	105,478,260	281,417,617	12,873,993	73,168,579	697

The detailed household telephone survey based on the stratification described in Table 2 will collect data from about 20,000 respondents.

(ii) The Mail Survey of Registered Boat Owners

As for the mail survey designed to collect detailed data on specific types of boats used in recreational boating, the 16 strata of the telephone survey will each be further stratified on the type and size of registered boats as described in Table 4. Therefore, a total of 128 strata will be created for the mail survey. Stratum 1D for example comprises all registered Powerboats over 28 feet long in the Northeast coastal counties. About 30,000 registered boats will be sampled from states boat registration databases. The sample will also be allocated proportionally to the stratum size with possible oversampling in small strata. The sample allocation will be finalized as soon as all registered boat data are obtained from the states.

Table 4: Watercraft Size-Type Strata for the registered Boat Owner Sample
Component of the National Recreational Boating Survey

Boat Type Stratum	Watercraft Type/Size
A	Power boat, <16 ft
B	Power boat, 16-20 ft
C	Power boat, 21-28 ft
D	Power boat, >28 ft
E	Sail, <25 ft
F	Sail, >25 ft
G	Pontoon boat
H	Personal Water Craft (PWC)

IV. Expected Response Rates

Based on the results of the 2002 National Recreational Boating Survey, we anticipate a response rate of about 35% from the mail survey. We expect to receive at least a 20% response to the first mailing and first reminder; a 15% response to the second reminder; and a 20% response to the third. If we have still not received a 35% response rate after 6 weeks, we will respond with a last reminder. While the response rate for the 2002 mail survey was about 49%, we expect it to decrease to about 35% with respect to initial contacts due to a lengthier questionnaire and an anticipated lower quality of the states boat registration databases.

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The response rate for the 2002 telephone survey was approximately 62%, and is expected to decrease to about 40% with respect to initial contacts, due to a lengthier 2007 survey questionnaire.

QUESTION 2. Describe the procedures for the collection of information including:

- ◆ **Statistical methodology for stratification and sample selection,**
- ◆ **Estimation procedure,**
- ◆ **Degree of accuracy needed for the purpose described in the justification,**
- ◆ **Unusual problems requiring specialized sampling procedures, and**
- ◆ **Any use of periodic (less frequently than annual) data collection cycles to reduce burden.**

AGENCY'S RESPONSE:

I. Data Accuracy and Justification of the Sample Size

The National Recreational Boating Survey will need a number of respondents that allows for state-level proportion estimates with an approximate 4% error margin at a 95% confidence level. However, for questions that are asked for only subgroups of the boating population, the error margin may be larger. The above assumptions lead to the following expression for the needed sample size:

$$n = \frac{1.96^2 \times 0.25}{0.04^2} DEFF,$$

where DEFF represents the design effect. The design effect represents the ratio of the variance under the complex sampling design to the variance under simple random sampling. We have assumed a very conservative design effect of approximately 1.5, which leads to the sample size of about 900 boaters per state. Therefore the total sample size required to achieve the desired precision is about 45,900 recreational boating participants (obtained as 900×51 since there are 50 states and one district). Consequently, the proposed sample sizes of 20,000 boaters for the household telephone survey and 30,000 for the mail survey are expected to produce the desired precision.

II. Sampling for the Mail Survey of Registered Boat Owners

Chapter 123 of Title 46, United States Code requires each undocumented vessel equipped with propulsion machinery to be numbered (registered) in the State in which it is principally operated. Each State maintains a list of registered recreational boat owners. Using boat registration data, a stratified random sample of registered boats will be selected in each State and a survey questionnaire will be mailed to the address associated with the selected boat.

For the mail survey, the 128 strata defined by Tables 3 and 4 will be considered for sampling. The general sampling approach is to allocate the sample to the 128 strata proportionally to their sizes, with the constraint of having at least 400 recreational boat owners per state. Then we will proceed with a simple random sampling within each of the 128 strata. The states'

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boat registration data are not available at the present time, and the allocation of the sample will be performed at a later time.

III. Sampling for the Telephone Survey of Non-Registered Boaters

In the absence of a comprehensive list of boaters owning unregistered boats, we will select a stratified random sample of US households for screening. A second-phase sample of recreational boating participants from households that do not own any recreational vessel will be selected. This approach is an effective way of obtaining a representative sample of individuals who have participated in recreational boating on an unregistered vessel in the past 12 months.

To obtain a representative sample of all boaters, RDD samples will be obtained from commercial vendors such as Genesys Sampling Systems or Survey Sampling Inc. who will provide a list-assisted sample per stratum, where the 16 strata to be used are those described in Table 3. We use a list-assisted sampling method that reduces the problems associated with both pure RDD and the Mitofsky-Waksberg method. The list-assisted sampling starts by defining primary sampling units in sets of 100 banks / clusters, a procedure also common to the Mitofsky-Waksberg method. The sampling frame is then constructed from all telephone numbers that are in 100 banks in which there is at least one listed telephone number in the white pages directories. Whether each of the 100 banks is included or excluded from the sampling frame can be determined with the assistance of commercially available lists.

List-assisted sampling often yields a percentage of calls to residential numbers that is higher than that of the Mitofsky-Waksberg method, and it also yields a lower variance estimate than the Mitofsky-Waksberg method because there is no clustering effect. In short, the list-assisted sampling design is appropriate for large-scale surveys because it is significantly more efficient than prior RDD techniques.

A screening survey will help us determine which households are eligible to complete the detailed survey. Once a household has been determined to be eligible, the detailed survey instrument will be completed for one adult and one child randomly selected within the household. As indicated earlier, the RDD telephone survey will collect data from about 20,000 recreational boating participants. The RDD sample will be allocated proportionally to the strata sizes so as to obtain at least 200 respondents per state.

IV. Weighting and Estimation Procedures

The National Recreational Boating Survey is based on a complex sample where the sampling units (boats for the mail survey and households for the telephone surveys) are selected with different inclusion probabilities. Moreover, it is anticipated that some households contacted initially will refuse to participate in the survey. This will lead to a nonresponse that has the potential of introducing a bias in the estimates. Some undercoverage of the boating

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population may also exist due to the fact that some boating households (registered and unregistered) may not have a working telephone number, making it impossible to reach them. To reduce the negative impact of these problems, weights will be applied to survey data to produce boating statistics at the state as well as at the national levels.

1. Weighting

In order to account for the differential probability selection, to minimize the bias due to nonresponse, and to adjust for undercoverage in the sampling frames and in the conduct of the survey, the survey data will be weighted prior to producing national and state-level estimates. The objective is to create the following three sets of weights:

- ◆ Boat Weight
- ◆ Boater Weight
- ◆ Household Weight

The Boat Weights will be used to produce boat-related estimates such as the number canoes used in the state of Florida in 2007, or the number of power boats that were operated in California in 2007. The Boater Weights will be used to produce all individual-related statistics such as boating participation by state, by boat type, by age group, etc...The Household weight will be used to generate household weights. For example the estimated number of boating households by state, or the number of boating households with a member who has hunted from a boat. The Coast Guard does not plan to release child-specific or adult-specific statistics. Consequently, there is no need to create child weights and adult weights.

One should note that the weighting process will be implemented differently according to the sampling frame used to reach the unit of analysis being weighted. For example the boat data obtained with an RDD sample will be weighted differently from the data obtained with the mail survey. All survey data will be weighted following a two-step procedure, where the initial step will involve the weighting of the screener sample, while the second step will involve the nonresponse adjustment of the second-phase sample. A third step will be performed for registered boat weights that will be postratified using control totals from the state boat registration databases. Note that the control totals will be available from all states including the states that will not provide their boat registration data.

2. Weighting of the Mail Survey and the Short Telephone Survey (Screening)

a) Mail Survey Base Weights and Nonresponse Adjustment

- ◆ *Registered Boat Base Weight* (BBW_{hb}). Each registered boat b selected from a State boat registration database will be from one stratum h among the 128 strata defined in the stratification section of this document and will receive a base weight BBW_{hb} of

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$$BBW_{hb} = \frac{N_h}{n_h}, \quad (1)$$

where N_h the total number of registered boats in stratum $h = 1, \dots, 128$, and n_h the total number of boats selected from that stratum.

All boats selected from state's boat registration databases are expected to be eligible boats (i.e. recreational vessels). Therefore, there is no need to adjust the boat base weights for unknown eligibility status.

The boat base weight needs to be adjusted for screener nonresponse, and the adjustment will be performed with weighting classes defined by the 128 geographic and boat type strata. The nonresponse adjustment factor NRF_h is defined as the ratio of the weighted sum of responding and nonresponding households to the weighted sum of all responding households. Thus, nonresponse-adjusted base weight is given by:

$$ABBW_{hb} = BBW_{hb} \times NRF_h \quad (2)$$

The weight associated with each unregistered boat is the ratio HBW_{hl}/u_i , where u_i is the number of unregistered recreational vessels in the household, and HBW_{hl} the household weight to be defined next.

- ◆ *Household Base Weight* (HBW_{hl}). Each registered boat selected from the state boat registration database will lead to the household (l) of the boat owner. However, a registered boat may have several owners who may or may not belong to the same household. If a registered boat leads to several households, only one of the owners will be selected randomly. Let O_b be the number of households with a member who is registered as an owner of boat b . The Household Weight is given by:

$$HBW_{hl} = ABBW_{hb} \times O_b. \quad (3)$$

- ◆ *Boater/Individual Base Weight* (IBW_{li}). The selected household will have a total of M_i boaters of whom a maximum of 2 boaters (ideally one child and one adult or 2 adults in case the household does not have a child) will be selected. But if the household has only one boater, that boater will be the only survey participant. Let m_i be the total number of boaters selected from the household. Then the boater base weight is given by:

$$IBW_{li} = HBW_{hl} \times \frac{M_i}{m_i}, \quad (4)$$

b) RDD Survey Base Weights and Nonresponse Adjustment

- ◆ *RDD Base Weight* (BW_{RDD}). For both RDD surveys (RHTS and SHTS), the base weight of a telephone number is the ratio of the total number of telephone numbers in the sampled 100-banks with at least one listed telephone number to the number of telephone numbers sampled by state. For each state, the base weight is given by:

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$$BW_{RDD,i} = 100 \times \frac{N}{n}, \quad (5)$$

where N is the total number of listed 100-banks and n is the number of sampled telephone numbers in the state. This represents the base weight for the completed screening interview. These base weights will have to be adjusted for unknown residential status. The adjustment is justified by the fact that the residential status of some of the N , and n telephone numbers will be unknown. These base weights will also be adjusted for undercoverage, since some households do not have telephone numbers, and have no chance of being reached for a phone interview.

- ◆ *Nonresponse-Adjusted RDD Weight ($ABW_{RDD,i}$)*. For both RDD surveys (RHTS and SHTS), the base weight of the household needs to be adjusted for nonresponse. To this end a number of nonresponse adjustment cells (C) will be constructed using various exchange-level characteristics that could possibly affect households' propensity to respond (e.g. income, metropolitan status, etc...). This nonresponse adjustment is a two-step process where the base weight will first be adjusted for ineligibility status, then for nonresponse. The nonresponse-adjusted weight is given by:

$$ABW_{RDD,i} = BW_{RDD,i} \times INF_c \times REF_c, \quad (6)$$

where the ineligibility factor INF_c , and the response factor REF_c are obtained as follows:

⇒ INF_c is the ratio of the weighted sum of all selected telephone numbers (Eligible respondents (R), eligible non-respondents (N), Ineligible (I), Unknown eligibility status(U)) to the weighted sum of all selected telephone numbers with known eligibility status (i.e. R,N, and I). This adjustment factor will differ for the two RDD surveys. In fact an eligible telephone number for the RHTS should lead to a boating household with no member owning a registered/documentated recreational vessel.

⇒ REF_c is the ratio of the weighted⁴ sum of all eligible responding, and eligible non-responding households (i.e. R, and N), to the weighted⁵ sum of all responding households (R).

- ◆ *Screener Subsampling Adjustment ($SABW_{RDD}$)*. For both RDD surveys (RHTS and SHTS, eligible responding households are likely to be sub-sampled depending on their numbers in the screener sample. Subsampling will be performed following the geographic stratification defined the stratification section of the present document.

$$SABW_{RDD,i} = ABW_{RDD,i} \times SF_c, \quad (7)$$

where the subsampling adjustment factor SF_c is the ratio of the weighted sum of all eligible households that responded to the screener survey to the weighted sum of all households that were subsampled. The adjustment cells used for subsampling adjustment will be different from those used for nonresponse adjustment.

⁴ The weight used here will be the ineligibility-adjusted status base weight (i.e. $BW_{RDD,i} \times INF_c$)

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3. Weighting of the Detailed Telephone Survey

a) Household Weights

For the RHTS and SHTS (i.e. surveys for states providing and not providing states registration data respectively), the initial household weight is obtained by multiplying the screener subsampling-adjusted weight $SABW_{RDD,i}$ by the number k_i of telephone numbers in the selected household. The initial household weight so obtained will be adjusted for nonresponse to the detailed survey (RHTS or SHTS) by multiplying it by a nonresponse adjustment factor REF_{2c} , where C represents the nonresponse adjustment cell. The nonresponse-adjusted household weight becomes:

$$HSW_{RDD,i} = SABW_{RDD,i} \times RESF_{2c} / k_i \quad (8)$$

b) Boat Weights

- ◆ For counties in the states providing registration data, the RHTS RDD survey is conducted to collect data about unregistered vessels. Consequently only unregistered/undocumented vessels are weighted to reflect the universe of unregistered recreational vessels in the stratum where the household was selected. For an unregistered recreational vessel j selected from household i , the boat weight is given by:

$$UBTW_{RDD,j} = HSW_{RDD,i} \times u_i, \quad (9)$$

where u_i represents the number of unregistered recreational vessels owned by household i .

This weight only applies to unregistered boats located in households that do not own any registered recreational vessel. For households that own at least one registered recreational vessel, each unregistered recreational vessel will carry the household weight derived from the mail survey divided by the number of unregistered vessels.

- ◆ For counties in states not providing registration data, the SHTS RDD survey will select (if possible) one registered boat and one unregistered boat from each household that owns them. The unregistered boat weight will be given by equation (8), while the registered boat weight is given by:

$$RBTW_{RDD,j} = HSW_{RDD,i} \times r_i, \quad (10)$$

where r_i is the number of registered recreational vessels owned by household i .

This weight will further be post-stratified to match control totals of registered boats. Note that even states not providing registration data will provide counts of registered boat owners. The final boat-level weight $FRBW_{RDD,b}$ is given by:

$$FRBW_{RDD,b} = RBTW_{RDD,b} \times \left(\frac{CT_c}{\sum_c RBTW_{RDD,b}} \right), \quad (11)$$

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where CT_c is the control total is obtained at the county level.

c) Boater Weights

The sampling is designed in such a way that if the household boating members are all adult, then only one boater will be selected. However, if the household has child and adult boaters, then one child and one adult will be selected. Let b_i be the number of boaters selected from the household ($b_i = 1, \text{ or } 2$), and B_i the number of boaters in the household. The initial boater weight is given by:

$$IBRW_{RDD,j} = HSW_{RDD,i} \times \frac{B_i}{b_i} \quad (12)$$

This weight will need to be adjusted for the detailed interview nonresponse.

4. State and National Weights

Table 2B summarizes the different survey weights that will be developed prior to producing state and national level estimates. It follows from Table 2B that each unit of analysis (household, boat, or boater) will receive a weight that depends on the sampling process that led to its selection. For example, a registered boat that is owned by a household living in a state that did not provide state registration data will receive the survey weight $FRBW_{RDD,b}$ (see equation 12).

The star symbol on some weight names indicates a SHTS survey weight, which is calculated using the same weighting approach (but different data) as the corresponding RHTS survey weight. For example a household in a state with no registration data and that does not own any registered boat will receive the weight $HSW_{RDD,i}^*$ calculated as $HSW_{RDD,i}$ (see equation (8)), but using SHTS survey data.

Table 5: Definition of the different types of survey weights

Household Type	Weight Type	State Provided Registration Data	State did not Provide Registration Data
Household(I) does not own any registered boat	Household	$HSW_{RDD,i}$	$HSW_{RDD,i}^*$
	Unregistered Boat	$UBTW_{RDD,b}$	$UBTW_{RDD,b}^*$
	Registered Boat	N/A	N/A
	Boater	$IBRW_{RDD,j}$	$IBRW_{RDD,j}^*$
Household (I) owns at least one registered recreational boat	Household	HBW_{kl}	$HSW_{RDD,i}^*$
	Unregistered Boat	HBW_{kl} / u_i	$UBTW_{RDD,b}^*$
	Registered Boat	ABW_{kl}	$FRBW_{RDD,b}$
	Boater	IBW_{kl}	$IBRW_{RDD,j}^*$

5. Estimation

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a) National and Stat-Level Statistics

National level boating statistics for the National Recreational Boating Survey will typically be obtained by summing state-level statistics. State-level statistics will be computed using weighted survey data where the weights are assigned according to Table 2B. For a particular state, the survey data will have been collected either by the Special Household Telephone Survey (SHTS) if no boat registration data were available or by the Regular Household Telephone Survey (RHTS) if the state provided registration data.

- ◆ If the state provided registration data, then household-level statistics are computed by weighting households that own registered recreational vessel with the HBW_{kl} weight, while weighting boating households not owning any registered recreational vessel with the $HSW_{RDD,l}$ weight. Weighted data will subsequently be summed to obtain state-level estimates. For registered vessel level statistics only the ABW_{kl} weights will be used.
- ◆ If the state did not provide any registration data then there is no dual-frame problem, and all survey data are weighted using the weights in the leftmost column of Table 2B.

b) Change Estimates

The National Recreational Boating Survey will collect boating data every two years. However, the NRBS is not designed as a longitudinal survey. Consequently, only estimates of net changes are going to be possible. For example one may want to estimate the difference in boating participation between 2007 and 2009. This is not a limitation since the Office of Boating Safety is primarily interested in net change estimates for studying trends in the boating population. The NRBS will not produce estimates of gross changes such as the percent of boaters who experienced a change in their boating activity type between 2007 and 2009.

Net change estimates will be produced essentially by taking the difference of the cross-sectional estimates under consideration. The annual cross-sectional estimates will be weighted estimates using weights calculated for each year.

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

AGENCY'S RESPONSE:

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Procedures for achieving a high response rate will include the following:

- ◆ Sending each respondent a letter identifying the Coast Guard as the sponsor of the survey. The respondent letter will discuss the importance of the survey for improving boating safety and the benefits of participation. The letter will explain that respondent participation is voluntary, but most appreciated.
- ◆ For the mail survey, each potential respondent will be provided with a postage paid envelope in which the completed questionnaire can be mailed.
- ◆ We plan to send two reminders at approximately 2 to 3-week intervals to sampled respondents. The first reminder will be a postcard after 2 weeks thanking those that had completed the questionnaire and encouraging those respondents who had not to complete theirs as soon as possible. After two additional weeks, the third reminder sent will be a complete packet with a second copy of the survey. There is also the possibility of a telephone follow up for respondents with a known telephone number. Although the states boat registration databases generally contain only owners' addresses, match services provided by commercial vendors could be used to obtain phone numbers.
- ◆ For the mail as well as for the telephone surveys additional replicate samples will be released if necessary to obtain a sufficiently large sample to produce reliable state-level boating statistics.

QUESTION 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.

AGENCY'S RESPONSE:

The survey questionnaires used for this Information Collection Request (ICR) are based partly on the 2002 questionnaires and partly on questionnaires used on an on-going basis at the Recreation Marine Research Center by Pr. Mahoney and his staff. These are questionnaires that have been tested repeatedly for several years. Therefore, the Coast Guard does not plan to further test the current National Recreational Boating Survey questionnaires.

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Moreover, the current National Recreational Boating Survey is based on a modified version of the sampling design used for the 2002 survey. Consequently, the 2002 experience was used to some extent as a test for the sampling design developed for this survey.

QUESTION 5. Provide the name and telephone number of individuals consulted on 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

AGENCY'S RESPONSE:

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Washington, DC 20593-0001
Phone: 202-372-1102
E-mail: Philippe.Gwet@uscg.mil

- ◆ Dr. Steven Heeringa
Director of the Statistical Design Group
Research Scientist
University of Michigan Institute for Social Research (ISR)
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Phone: 734-647-4621

- ◆ Pr. Daniel Stynes
Professor Emeritus, Department of Park, Recreation and Tourism Resources
Michigan State University
E-mail: stynes@msu.edu

- ◆ Dr. Ed Mahoney
Community, Agriculture, Recreation and Resource Studies
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Natural Resources Building
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East Lansing, Michigan
Phone (Office): 517-432-0270
E-mail: mahoneye@carrs.msu.edu

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APPENDIX

Table 6: Geographic Strata for the 2007 National Recreational Boating Survey Defined by the County FIPS Code

Geographic Stratum	Description of the geographic stratum
1	09001, 09003, 09005, 09007, 09009, 09011, 09013, 09015, 25001, 25003, 25005, 25007, 25009, 25013, 25017, 25019, 25021, 25023, 25025, 25027, 23001, 23005, 23007, 23009, 23011, 23013, 23015, 23017, 23019, 23023, 23025, 23027, 23029, 23031, 33001, 33003, 33011, 33013, 33015, 33017, 36001, 36005, 36021, 36027, 36039, 36047, 36059, 36061, 36071, 36079, 36081, 36083, 36085, 36087, 36093, 36103, 36111, 36119, 44001, 44003, 44005, 44007, 44009
2	11001, 10001, 10003, 10005, 24003, 24005, 24009, 24011, 24013, 24015, 24017, 24019, 24025, 24027, 24029, 24031, 24033, 24035, 24037, 24039, 24041, 24045, 24047, 24510, 34001, 34003, 34005, 34007, 34009, 34011, 34013, 34015, 34017, 34019, 34021, 34023, 34025, 34027, 34029, 34031, 34033, 34035, 34037, 34039, 42001, 42011, 42017, 42029, 42045, 42071, 42075, 42077, 42091, 42101, 42107, 42133
3	13001, 13003, 13005, 13025, 13029, 13031, 13039, 13049, 13051, 13069, 13103, 13127, 13155, 13161, 13165, 13179, 13183, 13191, 13209, 13229, 13251, 13267, 13279, 13299, 13305, 37007, 37013, 37015, 37017, 37019, 37029, 37031, 37041, 37047, 37049, 37051, 37053, 37055, 37061, 37065, 37073, 37083, 37091, 37095, 37103, 37107, 37117, 37129, 37131, 37133, 37137, 37139, 37141, 37143, 37147, 37153, 37163, 37165, 37177, 37187, 37191, 37195, 45005, 45013, 45015, 45019, 45025, 45027, 45029, 45031, 45033, 45035, 45041, 45043, 45049, 45051, 45053, 45055, 45057, 45061, 45067, 45069, 45085, 45089, 51001, 51007, 51011, 51013, 51029, 51033, 51036, 51041, 51049, 51053, 51057, 51059, 51061, 51065, 51073, 51075, 51085, 51087, 51093, 51095, 51097, 51099, 51101, 51103, 51109, 51115, 51119, 51127, 51131, 51133, 51135, 51137, 51145, 51147, 51149, 51153, 51159, 51177, 51179, 51181, 51193, 51199, 51510, 51550, 51570, 51600, 51610, 51630, 51650, 51670, 51683, 51685, 51700, 51710, 51730, 51735, 51740, 51760, 51800, 51810, 51830
4	12003, 12005, 12009, 12011, 12013, 12015, 12017, 12019, 12021, 12027, 12029, 12031, 12033, 12035, 12037, 12039, 12041, 12043, 12045, 12049, 12051, 12053, 12057, 12059, 12061, 12063, 12065, 12067, 12069, 12071, 12073, 12075, 12077, 12079, 12081, 12083, 12085, 12086, 12087, 12089, 12091, 12093, 12095, 12097, 12099, 12101, 12103, 12105, 12107, 12109, 12111, 12113, 12115, 12117, 12119, 12121, 12123, 12127, 12129, 12131, 12133
5	01003, 01025, 01039, 01053, 01061, 01097, 01099, 01129, 13087, 13131, 13275, 22001, 22005, 22007, 22009, 22011, 22019, 22023, 22033, 22037, 22039, 22045, 22047, 22051, 22053, 22055, 22057, 22063, 22071, 22075, 22077, 22079, 22085, 22087, 22089, 22091, 22093, 22095, 22097, 22099, 22101, 22103, 22105, 22109, 22113, 22115, 22117, 22121, 22125, 28005, 28039, 28045, 28047, 28059, 28073, 28091, 28109, 28113, 28131, 28147, 28157, 48007, 48015, 48025, 48039, 48047, 48057, 48061, 48071, 48089, 48123, 48131, 48149, 48157, 48167, 48175, 48201, 48215, 48239, 48241, 48245, 48247, 48249, 48261, 48273, 48285, 48291, 48297,

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	48321, 48351, 48355, 48361, 48391, 48409, 48427, 48457, 48469, 48473, 48477, 48479, 48481, 48489
6	06001, 06013, 06015, 06023, 06037, 06041, 06045, 06053, 06055, 06059, 06065, 06067, 06069, 06071, 06073, 06075, 06077, 06079, 06081, 06083, 06085, 06087, 06093, 06095, 06097, 06101, 06105, 06111, 06113
7	41003, 41005, 41007, 41009, 41011, 41015, 41019, 41033, 41039, 41041, 41051, 41057, 53009, 53011, 53015, 53027, 53029, 53031, 53033, 53035, 53041, 53045, 53049, 53053, 53055, 53057, 53059, 53061, 53067, 53069, 53073
8	17031, 17097, 18039, 18085, 18087, 18089, 18091, 18113, 18127, 18141, 18151, 26001, 26003, 26005, 26007, 26009, 26011, 26013, 26015, 26017, 26019, 26021, 26023, 26025, 26027, 26029, 26031, 26033, 26035, 26039, 26041, 26043, 26045, 26047, 26053, 26055, 26059, 26061, 26063, 26067, 26069, 26075, 26077, 26079, 26081, 26083, 26085, 26087, 26089, 26091, 26093, 26095, 26097, 26099, 26101, 26103, 26105, 26107, 26109, 26113, 26115, 26117, 26119, 26121, 26123, 26125, 26127, 26129, 26131, 26133, 26135, 26137, 26139, 26141, 26143, 26145, 26147, 26149, 26151, 26153, 26157, 26159, 26161, 26163, 26165, 27017, 27031, 27075, 27137, 36009, 36011, 36013, 36019, 36029, 36033, 36037, 36041, 36043, 36045, 36049, 36051, 36055, 36063, 36067, 36069, 36073, 36075, 36089, 36117, 36121, 39005, 39007, 39033, 39035, 39039, 39043, 39051, 39055, 39063, 39069, 39077, 39085, 39093, 39095, 39101, 39103, 39123, 39133, 39143, 39147, 39153, 39155, 39173, 39175, 42049, 55003, 55007, 55009, 55015, 55029, 55031, 55037, 55039, 55041, 55051, 55059, 55061, 55071, 55075, 55078, 55079, 55083, 55087, 55089, 55101, 55115, 55117, 55131
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	39139, 39141, 39145, 39149, 39151, 39157, 39159, 39161, 39163, 39165, 39167, 39169, 39171, 42003, 42005, 42007, 42009, 42013, 42015, 42019, 42021, 42023, 42025, 42027, 42031, 42033, 42035, 42037, 42039, 42041, 42043, 42047, 42051, 42053, 42055, 42057, 42059, 42061, 42063, 42065, 42067, 42069, 42073, 42079, 42081, 42083, 42085, 42087, 42089, 42093, 42095, 42097, 42099, 42103, 42105, 42109, 42111, 42113, 42115, 42117, 42119, 42121, 42123, 42125, 42127, 42129, 42131, 50001, 50003, 50005, 50007, 50009, 50011, 50013, 50015, 50017, 50019, 50021, 50023, 50025, 50027, 55001, 55005, 55011, 55013, 55017, 55019, 55021, 55023, 55025, 55027, 55033, 55035, 55043, 55045, 55047, 55049, 55053, 55055, 55057, 55063, 55065, 55067, 55069, 55073, 55077, 55081, 55085, 55091, 55093, 55095, 55097, 55099, 55103, 55105, 55107, 55109, 55111, 55113, 55119, 55121, 55123, 55125, 55127, 55129, 55133, 55135, 55137, 55139, 55141
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	48315, 48317, 48319, 48323, 48325, 48327, 48329, 48331, 48333, 48335, 48337, 48339, 48341, 48343, 48345, 48347, 48349, 48353, 48357, 48359, 48363, 48365, 48367, 48369, 48371, 48373, 48375, 48377, 48379, 48381, 48383, 48385, 48387, 48389, 48393, 48395, 48397, 48399, 48401, 48403, 48405, 48407, 48411, 48413, 48415, 48417, 48419, 48421, 48423, 48425, 48429, 48431, 48433, 48435, 48437, 48439, 48441, 48443, 48445, 48447, 48449, 48451, 48453, 48455, 48459, 48461, 48463, 48465, 48467, 48471, 48475, 48483, 48485, 48487, 48491, 48493, 48495, 48497, 48499, 48501, 48503, 48505, 48507
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	13211, 13213, 13215, 13217, 13219, 13221, 13223, 13225, 13227, 13231, 13233, 13235, 13237, 13239, 13241, 13243, 13245, 13247, 13249, 13253, 13255, 13257, 13259, 13261, 13263, 13265, 13269, 13271, 13273, 13277, 13281, 13283, 13285, 13287, 13289, 13291, 13293, 13295, 13297, 13301, 13303, 13307, 13309, 13311, 13313, 13315, 13317, 13319, 13321, 24001, 24021, 24023, 24043, 37001, 37003, 37005, 37009, 37011, 37021, 37023, 37025, 37027, 37033, 37035, 37037, 37039, 37043, 37045, 37057, 37059, 37063, 37067, 37069, 37071, 37075, 37077, 37079, 37081, 37085, 37087, 37089, 37093, 37097, 37099, 37101, 37105, 37109, 37111, 37113, 37115, 37119, 37121, 37123, 37125, 37127, 37135, 37145, 37149, 37151, 37155, 37157, 37159, 37161, 37167, 37169, 37171, 37173, 37175, 37179, 37181, 37183, 37185, 37189, 37193, 37197, 37199, 45001, 45003, 45007, 45009, 45011, 45017, 45021, 45023, 45037, 45039, 45045, 45047, 45059, 45063, 45065, 45071, 45073, 45075, 45077, 45079, 45081, 45083, 45087, 45091, 51003, 51005, 51009, 51015, 51017, 51019, 51021, 51023, 51025, 51027, 51031, 51035, 51037, 51043, 51045, 51047, 51051, 51063, 51067, 51069, 51071, 51077, 51079, 51081, 51083, 51089, 51091, 51105, 51107, 51111, 51113, 51117, 51121, 51125, 51139, 51141, 51143, 51155, 51157, 51161, 51163, 51165, 51167, 51169, 51171, 51173, 51175, 51183, 51185, 51187, 51191, 51195, 51197, 51515, 51520, 51530, 51540, 51580, 51590, 51595, 51620, 51640, 51660, 51678, 51680, 51690, 51720, 51750, 51770, 51775, 51790, 51820, 51840, 54001, 54003, 54005, 54007, 54009, 54011, 54013, 54015, 54017, 54019, 54021, 54023, 54025, 54027, 54029, 54031, 54033, 54035, 54037, 54039, 54041, 54043, 54045, 54047, 54049, 54051, 54053, 54055, 54057, 54059, 54061, 54063, 54065, 54067, 54069, 54071, 54073, 54075, 54077, 54079, 54081, 54083, 54085, 54087, 54089, 54091, 54093, 54095, 54097, 54099, 54101, 54103, 54105, 54107, 54109
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	32003, 32005, 32007, 32009, 32011, 32013, 32015, 32017, 32019, 32021, 32023, 32027, 32029, 32031, 32033, 32510, 41001, 41013, 41017, 41021, 41023, 41025, 41027, 41029, 41031, 41035, 41037, 41043, 41045, 41047, 41049, 41053, 41055, 41059, 41061, 41063, 41065, 41067, 41069, 41071, 49001, 49003, 49005, 49007, 49009, 49011, 49013, 49015, 49017, 49019, 49021, 49023, 49025, 49027, 49029, 49031, 49033, 49035, 49037, 49039, 49041, 49043, 49045, 49047, 49049, 49051, 49053, 49055, 49057, 53001, 53003, 53005, 53007, 53013, 53017, 53019, 53021, 53023, 53025, 53037, 53039, 53043, 53047, 53051, 53063, 53065, 53071, 53075, 53077, 56001, 56003, 56005, 56007, 56009, 56011, 56013, 56015, 56017, 56019, 56021, 56023, 56025, 56027, 56029, 56031, 56033, 56035, 56037, 56039, 56041, 56043, 56045
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16	15001, 15003, 15005, 15007, 15009