

Chapter 1: Introduction

This report describes the results of the 2005-2009 National Survey on Recreation and the Environment (*NSRE*) which was conducted between, 2005-2009. The *NSRE*, in general, was conducted to discover and describe: (1) participation by Americans in outdoor recreation activities, (2) opinions concerning management of both public and private forests and grasslands, (3) the importance and value of our natural environment, (3) uses and values of wildlife and wilderness, (4) people's lifestyles, and (5) recreational trips people take away from home. The *NSRE* data will be used by a variety of public and private organizations for both management and research purposes.

History of the NSRE

The 2005-2009 National Survey on Recreation and the Environment (*NSRE*) is the latest in a series of national surveys that was started in 1960 by the Outdoor Recreation Resources Review Commission (*ORRRC*). The federal government (*ORRRC*) initiated this National Recreation Survey (*NRS*) to assess outdoor recreation participation in the United States. Since that first in-the-home survey in 1960, six additional *NRS*s have been conducted -- 1965, 1970, 1972, 1977, 1982-83 and 1994-95. Over the years, the *NRS* surveys have changed in their methodology, composition, funding, and sponsorship.

In 1960, interviews were done in person over the four seasons of the year. In 1965, interviewing was done only in early fall. The 1970 survey instrument was a brief mailed supplement to the National Fishing and Hunting Survey. The 1982 survey was conducted in person in cooperation with the National Crime Survey, and the 1977, 1994, and 1999-2002 surveys were conducted by telephone.

In 1994 the *NRS* was renamed the National Survey on Recreation and the Environment (*NSRE*). This new name was introduced to reflect the growing interest and emphasis of the U.S. population about their natural environment. Accordingly, the *NSRE* was expanded to include questions concerning peoples' wildlife and wilderness uses, environmental values, and attitudes regarding public and management issues. Additional information pertaining to the recreational needs of people with challenging and disabling conditions was also included.

NSRE is the eighth in the continuing series of U. S. National Recreation Surveys. Although similar to the previous national surveys, *NSRE* explores the outdoor recreational needs and environmental interests of the American people in greater depth. The growth of the *NSRE* reflects the continuing growth of interest in our nation in outdoor recreation and our natural environment.

NSRE is an in-the-home phone survey of over 90,000 households across all ethnic groups throughout the United States. Questions from the *NSRE* broadly address such areas as outdoor recreation participation, demographics, household structure, lifestyles, environmental attitudes, natural resource values (for example, concerning Wilderness), constraints to participation, and attitudes toward management policies.

The funding and responsibility of the *NRS*'s have also changed quite considerably over the years. Initially the Outdoor Recreation Resources Review Commission, which did the first survey in 1960, recommended that subsequent surveys be completed at five-year intervals, but consistent funding and responsibility were not created. From 1965 through 1977, the research was done by the Bureau of Outdoor Recreation and its successor, the Heritage Conservation and Recreation Service. Those agencies were abolished in 1981, and responsibility fell to the National Park Service in the U.S. Department of the Interior (*USDI*). The National Park Service coordinated the development of a consortium that included itself, the Forest Service in the U.S. Department of Agriculture (*USDA*), the Department of Health and Human Service's Administration on Aging, and the *USDI*'s Bureau of Land Management.

By the late 1980's, it was clear that the National Park Service would no longer assume the financial and organizational demands of such a large survey. Park Service Officials asked the Forest Service to assume its coordinating role for the next National Recreation Survey. The Outdoor Recreation and Wilderness Assessment Group, a part of the research branch of the Forest Service, assumed this role jointly with the

National Oceanic and Atmospheric Administration (NOAA). This joint role between the Forest Service Outdoor Recreation and Wilderness Assessment Group in Athens, GA and NOAA has continued to the present day and includes responsibility for the current *NSRE* survey.

The present list of sponsoring agencies for the 2005-2009 *NSRE* effort includes the USDA Forest Service, NOAA, the USDA's Economic Research Service, the U.S. Environmental Protection Agency, USDI Bureau of Land Management, the National Park Service, the University of Georgia, and the University of Tennessee. In addition, valuable assistance and resources were also provided by the American Horse Council, the American Motorcyclist Association, the American Recreation Coalition, B.A.S.S., Inc., the Carhart Wilderness Training Center, the Corps of Engineers, the Forest Service (specifically the Carhart Wilderness Training Center, Ecosystem Management Coordination, Recreation Staff, the Rocky Mountain Research Station, and Wildlife Staff), the Motorcycle Industry Council, the National Association of Recreation Resource Planners, the National Association of State Outdoor Recreation Liaison Officers, the National Environmental Education & Training Foundation, the Natural Resources Conservation Service, the Outdoor Recreation Coalition of America, the Rails-to-Trails Conservancy, the Recreation Vehicle Industry Association, the Snow Sports Industries of America, the U.S. Orienteering Federation, and the Wilderness Society.

Instrumentation

The *NSRE* is not one survey but several versions of a survey. For instance, each version of the *NSRE* consists of approximately five modules of questions. In every version of the *NSRE* one module of questions always pertains to people's participation in recreation activities and a second module always pertains to their social-demographic characteristics (i.e., age, income, education level, etc). However, the three remaining modules of questions in each version could pertain to a myriad of topics from wilderness use, environmental opinions, attitudes to land management policies, wildfires, private lands, etc. Furthermore, each version of the *NSRE* has a target of 5,000 completed interviews. Once 5,000 interviews have been collected, a new version of the *NSRE* (with a recreation participation, demographic, and three other modules) is constructed and operated. Please see appendices for Version 18 of the *NSRE* (the Wisconsin Survey).

Survey Methods

Computer-Aided Telephone Interviewing System(CATI)

The CATI system has two primary functions: (1) it facilitates the dialing and interviewing process; and (2) it manages the administrative functions associated with interviewing. For each interview, the CATI system randomly selects numbers for an interviewer, who then instructs the computer to dial that number.

The phone numbers for the *NSRE* survey were obtained from Survey Sampling, Inc (SSI). SSI subjects all their numbers to extensive cleaning and validation to ensure that all exchanges are currently valid. SSI provided the *NSRE* with a random-digit-dial (RDD) sample using a database of "working blocks." A block is a set of 100 contiguous numbers identified by the first two digits of the last four numbers (e.g., in number 559-4200, "42" is the block). A block is termed to be working if one or more listed telephone numbers are found in that block. Numbers are generated from all eligible blocks in proportion to their density of listed telephone households. As numbers are pulled, they are marked as used and are not available again during a nine-month period. Once numbers are selected, they are entered into the computer-aided telephone interviewing system (CATI).

Once the CATI system has randomly selected and dialed a telephone number, the interviewer, upon hearing someone answer, identifies the survey, its main purpose, and the name of the research laboratory (Presser, Blair, & Triplett, 1992). The interviewer then inquires how many people in the household are 16 years or older, and asks to speak to the person 16 or older who had the most recent birthday (Link & Oldendick, 1998; Oldendick, Bishop, Sorenson, & Tuchfarber, 1988). Upon reaching an appropriate person and receiving agreement to an interview, the interviewer reads the survey questions as they appear on the

computer screen. Using a computer to control the survey, skip patterns are executed as intended, responses are within range, there are no missing data, and data entry occurs as the survey is administered. As responses are fed through the programmed data entry and management system, they are reviewed to assure they are within the permissible range of values and missing data problems are resolved. If no person is contacted or an answering machine is obtained, the interviewer enters a code (e.g., busy or no answer). If the timing of the call is inconvenient, a call back is scheduled for another date and time (Presser et al., 1992).

Sampling

Sampling across the country's population and locations was designed to provide a minimum number of interviews for each state so that individual state reports on participation across all activities could be generated and so that reliable estimates of activity participation could be computed for activities with less than a 10% national participation rate. To achieve these objectives, an initial sampling strategy for a national sample of 50,000 completed interviews was developed. The strategy combined proportional nationwide population sampling aiming for 29,400 completed interviews and a quota sample (i.e., 65% urban, 25% near urban, and 10% rural) distributing 400 interviews to each state and totaling 20,600 completed interviews. The remaining 40,000 completed interviews were obtained using a national sampling strategy. Sampling occurred throughout the year(s) during which the NSRE was being conducted to minimize seasonal recall bias to the extent possible. For the 1,400 additional completed interviews collected in version 18 (i.e., the Wisconsin survey) a random statewide sampling strategy was employed.

General Overview of Methods Used to Maximize Response Rates and Control for Non-Response Bias

Carefully Design, Test and Revise the Survey Contents

In order to maximize response rates, the NSRE phone survey was carefully designed and endlessly refined through application and through careful attention to input from experienced phone interviewers at the University of Tennessee and elsewhere. Wording and ordering of questions was designed to ease flow, maximize interest in the questionnaire subject matter and maintain consistency over time.

Scheduling Callbacks

Each eligible number was attempted a minimum of 15-20 times at various time intervals of the day and on different days of the week in order to maximize the opportunity of interviewing an eligible member of an eligible household. To minimize respondent burden and encourage full involvement in the survey, each person was asked, "Is this a good time to answer a few questions or would another time be better for you?" The Computer Aided Telephone System (CATI) facilitated the scheduling of callbacks at a specific time if requested by the respondent. The computer managed the database of telephone numbers so that scheduled callbacks were distributed to the first available interviewer at the designated time and date.

Training

Interviewer training was a vital part of achieving maximum response rates. All interviewers underwent intensive and detailed training so that they had a high level of familiarity and practice with the survey. Each interviewer was monitored regularly for quality control purposes and additional training was provided as needed.

Minimize Language Barriers

In order to maximize response rates, the NSRE was also administered in Spanish. Interviewers screened for Spanish-speaking people at the beginning of the survey then transferred them to a Spanish-speaking interviewer as needed.

Meet AAPOR Quality Standards

Similar surveys repeated over a five-year period at the Human Dimensions Research Lab which used the same methods as the NSRE have been shown to produce very reliable results. (See Table 1.1 for the contact, cooperation, and response rates for the NSRE 2000 survey.) Response rates were calculated using the definitions of response rates established by the American Association of Public Opinion Research. The Lab followed the code of ethics set by the American Association of Public Opinion Research and constantly works to meet the AAPOR quality standards. Adherence to ethics and quality standards were basic to maintaining response rates and confidence by the interviewee.

Attempt to Convert Refusers

To help deal with non-response, at the end of each of version a random sample of immediate (“soft refusals,” including those who hung up immediately) and a sample of those not ever contacted were selected. These samples of refusals and non-contacts were limited to those for which an address could be obtained. They were sent an explanatory letter indicating the nature of the survey and its importance. The letter notified the household that a further callback would be made to solicit their participation. Their numbers were then attempted again, and the results of completed surveys from converted refusers were compared with the results from those who accepted the survey during the first rounds of calling. Any significant differences between acceptor and refuser/non-contact responses to the primary variables of this study, i.e., recreation participation rates, and if there were sufficient sample sizes for developing independent estimates of refuser/non-contact activity participation rates, weighting ratios were calculated. These weights were used to adjust estimates of acceptor activity participation rates for analysis and reporting.

Weight to Correct for over or under Representation of Population Strata

Survey respondents were weighted so that their distribution across socio-demographic strata mirrors the distribution of the U. S. population across the same strata. This is a widely accepted, non-controversial and necessary method for addressing non-response issues. The weights computed and applied to the NSRE 2000-04 survey were small indicating good sample distribution from the 19-to-20 percent response rates attained (see response rates in Table 1.1 and a comparison of sample and population distributions in Table 1.2). In addition, NSRE 2000-04 estimates of participation rates were generally in the same range of the estimates obtained from the 1994-95 NSRE. In neither survey did non-response bias seem to be significant. A sizeable number of refereed journal articles have been published using both the 1995 and 2000-04 NSRE surveys and in all cases, peer reviews were favorable and the articles accepted.

The U.S. Census Bureau advised us that the civilian non-institutionalized population was the best estimated population distribution for validating telephone-sampling frames. Table 1.2 compares the percentage distributions of the civilian non-institutionalized population of age 16 and older based on Census Bureau estimates with the NSRE sample distributions for Versions 1 through 6. Strata included sex, race/ethnicity, age, education level and urban/rural residence. Response rates were higher for females; non-Hispanic whites; and for those ages 25-34, 45-54, and 55-64. Response rates were slightly lower for those aged 35-44. Response rates were generally higher for higher levels of education. Differences between urban/rural strata were more related to intentional over sampling to meet different research needs than to differences in response rates.

Weighting Based on Multiple Regression Estimates of Coefficients

The primary approach to weighting and adjusting estimated participation rates marine recreation participation was development of multivariate models where estimated coefficients were used as weights for sex, race/ethnicity and age strata. Results are summarized in Table 1.3. Since the survey was designed so that, for some applications (modules), a version could be a stand-alone survey, there were constraints on how many cells could implement using multivariate weighting. For education level and urban/rural residence multiplicative weights were utilized.

Table 1.4 shows the effects of sample weighting of marine recreation activities. Comparison of the unweighted and weighted sample estimates of participation rates shows the potential extent of over or under representation of samples on estimated participation rates for marine recreation activities. Of the 19 activities/settings shown, 11 were corrected for over representation, 7 were corrected for under representation, and one remained uncorrected because sample and population percentages were the same. Given the small differences between weighted and unweighted estimates, it was concluded that the sample distribution generally represents well the distribution of the population. However, weighting was undertaken as one means for adjusting for potential non-response bias. The large sample sizes of the NSRE help make this approach to sample weighting more reliable.

An Additional Step for Identifying and Comparing Refusers

An additional step taken with regard to non-response effects was to include a follow-up to refusals to ask a very limited number of questions (e.g., age, sex and participation in any outdoor recreation). One could then analyze this to suggest something about the extent of non-response bias on estimates of participation. However, in the 1994-95 NSRE, this approach was attempted. The reason then was not to address non-response bias (RDD surveys were getting over 70 percent response rates in those days), instead the objective was to reduce burden on people that did not participate in outdoor recreation (by the use of a screening question) and to also save costs. A sample of 1,000 was chosen and the screening question was used. A significantly smaller proportion of people participated in outdoor recreation when the screening question was used. People did not know our definition of outdoor recreation unless they went through entire list of activities. Thus, any attempt to analyze non-response bias from a sample of refusals that employs a screening question would be invalid. Significantly lower participation rates from those receiving a screening question on outdoor recreation participation would also be expected.

A similar experiment was used in NSRE 2000-04. Attempts were made to use various screening questions for different groups of activities as an alternative to going through each separate activity. Again, the objective was to reduce burden and costs by shortening survey time. The screening question worked for boating activities (i.e., no significant differences in estimates of participation in boating), but it did not work for wildlife viewing activities (i.e., there were significant differences in participation rates for wildlife viewing using a screening question). So the screening question was used for boating activities, but not for wildlife viewing activities.

Our approach for addressing refusals was to ask for age and sex (actually not asked interviewer codes sex by their judgment). Analysis with respect to participation could then be done by relating age and sex, along with other factors, to participation. If there were different response rates by age and sex for the soft refusals sample versus the sample of complete surveys, and there was a significant relationship between age and sex and participation in outdoor recreation, then one might infer some level of non-response bias. However, the question was still one of extent of the bias and as previous analysis has demonstrated, the extent was relatively small and could be adjusted for by sample weighting. However, to further our ability to analysis non-response bias, two additional activity questions were used to ascertain some indication of recreation participation by soft refusals.

Sample Proportionate to the Geographic and Demographic Distributions of the Population

RDD sampling was conducted proportionate to the distribution of the national population, geographically and demographically. Data was collected from a random sample of the population of individuals 16 years of age or older residing in the United States and the District of Columbia at the time of survey implementation. Sample households were selected by means of a Random Digit Dialing (RDD) technique, permitting a natural stratification of the sample by state, county, and area code (Frey, 1989; Groves and Kahn, 1979). RDD samples theoretically provided an equal probability sample of all households in the nation with a telephone access line (i.e., a unique telephone number that rings in that household only). This equal-probability sample included all households with telephones regardless of whether a phone number is published or unlisted (Lavrakas, 1987).

Table 1.1: Types of Response Rates for NSRE 2000-04

Type	ALL – Version 1 thru Version 13
Response Rate 1	
$I/(I+P) + (R+NC+O) + (UH+UO)$	0.191868
Response Rate 2	
$(I+P)/(I+P) + (R+NC+O) + (UH+UO)$	0.200296
Response Rate 3	
$I/((I+P) + (R+NC+O) + e(UH+UO))$	0.192627
Response Rate 4	
$(I+P)/((I+P) + (R+NC+O) + e(UH+UO))$	0.201088
Cooperation Rate 1	
$I/(I+P)+R+O)$	0.210388
Cooperation Rate 2	
$(I+P)/((I+P)+R+O))$	0.219629
Cooperation Rate 3	
$I/((I+P)+R))$	0.215806
Cooperation Rate 4	
$(I+P)/((I+P)+R))$	0.225286
Refusal Rate 1	
$R/((I+P)+(R+NC+O) + UH + UO))$	0.688781
Refusal Rate 2	
$R/((I+P)+(R+NC+O) + e(UH + UO))$	0.691505
Refusal Rate 3	
$R/((I+P)+(R+NC+O))$	0.697108
Contact Rate 1	
$(I+P)+R+O / (I+P)+R+O+NC+ (UH + UO)$	0.911975
Contact Rate 2	
$(I+P)+R+O / (I+P)+R+O+NC + e(UH+UO)$	0.915582
Contact Rate 3	
$(I+P)+R+O / (I+P)+R+O+NC$	0.923001

Response Rates—A necessary but not sufficient condition for non-response bias was that there is (are) a (some) factor (s) for which response rates in the sample were not proportional to their representation in the population surveyed. The U.S. Census Bureau advised us that the civilian non-institutionalized population best represents telephone-sampling frames. Table 1.2 below compared the civilian non institutionalized population years 16 and older with the NSRE 2000-04 sample for Versions 1 through 6 for sex, race/ethnicity, age, education level and urban/rural residence. Response rates were higher for females; white, not Hispanic; those ages 25-34, 45-54, and 55-64. Response rates were slightly lower for those ages 35-44. Response rates were generally higher for higher levels of education. Differences for urban/rural were probably more related to intentional rural over sampling than response rates.

Relationship Between Sample Characteristics and Participation in Marine Recreation—Response rates for selected sample characteristics established a difference in survey response rates for several important characteristics. Table 1.3 shows that these factors were also important in explaining participation in marine recreation. Table 1.3 shows a summary of probit and logit equations that were estimated for all 19 activities/settings for which we estimated participation rates for marine recreation. Estimates of

participation in marine recreation were dependent on factors for which there were biases in response rates. This finding provided sufficient conditions to conclude that potential for non-response bias exists.

Table 1.2: Population and Sample Comparisons: Demographics for Weighting

Demographic Characteristic	Census ¹	NSRE
Sex		
Male	47.8	43.6
Female	52.2	56.4
Race/Ethnicity		
White, Not Hispanic	74.2	83.0
Hispanic	10.2	6.6
Black, Not Hispanic	11.2	7.5
Other, Not Hispanic	4.3	2.9
Age		
16 – 24	16.1	14.0
25 – 34	17.9	18.5
35 – 44	21.4	21.0
45 – 54	17.4	19.6
55 – 64	11.3	12.8
65 +	15.9	14.1
Education Level		
8th Grade or less	7.56	2.22
9th - 11th Grade	14.71	8.26
High School Graduate or GED	31.49	26.50
Some College or Technical School	18.17	22.80
Associate's Degree or Technical School	6.64	7.70
Bachelor's Degree	14.35	19.83
Master's Degree	4.41	8.92
Professional Degree	1.23	1.54
Doctorate Degree	0.89	1.67
Other	0.56	0.56
Urban/Rural Residence		
Urban	80.04	65.68
Rural	19.96	34.32
Total Population/Sample	206,171,709	27,854

¹ U.S. Department of Commerce, Bureau of the Census, Civilian noninstitutionalized population 16 years of older, Sept. 1999, (<http://www.census.gov>) for multivariate on sex, age and race/ethnicity.

Sample Weighting to Correct for Non Response Bias—Sample weights were constructed by first developing multivariate weights for sex, race/ethnicity and age. Since the survey was designed so that, for some applications (modules), a version could be a stand-alone survey, some constraints were present on how many cells could be implemented using multivariate weighting. For education level and urban/rural residence multiplicative weights were used.

For Table 1.3, the following definitions apply:

AGE = Age of respondent

AGESQ = Age of Respondent squared

MALE= Dummy variable for sex, 1=male 0=female

BLACK=Dummy variable for Race/Ethnicity, 1=black/African American, not Hispanic (White, not Hispanic is base or excluded category)

ASIAN=Dummy variable for Race/Ethnicity, 1=Asian or Pacific Islander, not Hispanic (White, not Hispanic is base or excluded category)

NATIVE=Dummy variable for Race/Ethnicity, 1=Native American or Native Hawaiian, not Hispanic (White, not Hispanic is base or excluded category)
HISPANIC=Dummy variable for Race/Ethnicity, 1=Hispanic (White, not Hispanic is base or reference category).
URBAN=Dummy variable for Urban/Rural residence, 1=Urban residence and 0=Rural residence
EDUCHS=Dummy variable for Education Level, 1=High School Graduate (those with less than a High School Graduate level of education and other in base or excluded category)
EDUCOL=Dummy variable for Education Level, 1=Some College or College Graduate (those with less than High School Graduate level of education and other in base or excluded category)
EDUCGRAD=Dummy variable for Education Level, 1=Masters, Doctorate or Professional degree (those with less than High School Graduate level of education and other in base or excluded category).
‘-‘ means factor is negatively related to participation.
‘+’ means factor is positively related to participation.
‘*’ means factor is statistically significant at 0.05 level of significance.
‘**’ means factor is statistically significant at 0.10 level of significance.
NOTE: Other factors, such as Household Income and residence in a coastal county, were other factors included in estimation equations. Those factors are not included here, but were significant in explaining participation for several marine recreation activities/settings.

Table 1.3: Results for Selected Participation Equations for Marine Recreation

Activity	AGE	AGESQ	MALE	URBAN	BLACK	ASIAN	NATIVE	HISPANIC	EDU CHS	EDU COL	EDU GRAD
Visit Saltwater Beaches	-*	+	-*	++	-*	-*	-*	-*	+	+	+
Visit Saltwater Watersides Besides Beaches	-*	+	++	++	-*	-*	-	-*	+	++	++
Swimming in Saltwater	-*	+	-*	++	-*	-*	-*	-*	+	+	++
Snorkeling in Saltwater	-*	-**	++	++	-*	-*	-*	-*	+	+	++
Scuba Diving in Saltwater	-*	-	++	++	-*	-*	-	-*	-	+	++
Surfing in Saltwater	-*	+	++	++	-*	+++	-	-*	+	++	++
Wind Surfing in Saltwater	-	-	++	+	-	+	++	-	-*	-	+
Fishing in Saltwater	-	-*	++	-	-*	-	+	-*	+	++	-*
Motorboating in	-	-	++	+++	-*	-*	-	-*	+	+	++

Activity	AGE	AGESQ	MALE	URBAN	BLACK	ASIAN	NATIVE	HISPANIC	EDU CHS	EDU COL	EDU GRAD
Saltwater											
Sailing in Saltwater	-*	+	-**	+	-*	-*	-	-*	-	+	+
Personal Watercraft Use in Saltwater	-*	+	+	+	-*	-	+	-**	+	+	+
Canoeing in Saltwater	-*	+	+	+	-*	+++	+	-*	-*	-	+
Kayaking in Saltwater	-**	-	+	+	-*	-*	-	-*	-	+	+
Rowing in Saltwater	-*	+	+	-	-	-	+	-	-**	+	+
Water skiing in Saltwater	-*	+	+	+	-*	-*	-	-**	+	+	+
Bird Watching in Saltwater Surroundings	+	-*	-*	+++	-*	-*	-	-*	+	+	+
Viewing Other Wildlife in Saltwater Surroundings	+	-*	-*	+	-*	-*	-	-*	+	+	+
Viewing or Photographing Scenery in Saltwater Surroundings	+	-*	-*	+	-*	-*	-	-*	+	+	+
Hunting Waterfowl in Saltwater Surroundings	-*	+	+	-	-*	-*	+	-*	+	-	-

Table 1.4 shows the effects of sample weighting. Comparison of the unweighted and weighted sample estimates of participation shows the potential extent of non-response bias on estimated participation rates in marine recreation. Of the 19 activities/settings, 11 would have been over estimated using unweighted data,

7 would have been under estimated using unweighted data, and for one the estimate was the same with weighted and unweighted data.

Table 1.4: Participation in Coastal/Marine Recreation ¹

Activity or Setting	Participation Rate (%) Unweighted	Participation Rate (%) Weighted ²	Over or Under Estimate ³
Visit Saltwater Beaches	31.99	30.03	+
Visit Saltwater Watersides Besides Beaches	4.50	4.50	same
Swimming in Saltwater	27.97	25.53	+
Snorkeling in Saltwater	5.80	5.07	+
Scuba Diving in Saltwater	1.46	1.35	+
Surfing in Saltwater	1.43	1.59	-
Wind Surfing in Saltwater	0.38	0.39	-
Fishing in Saltwater	10.13	10.32	-
Motorboating in Saltwater	7.93	7.11	+
Sailing in Saltwater	3.49	2.98	+
Personal Watercraft Use in Saltwater	2.39	2.57	-
Canoeing in Saltwater	0.98	1.05	-
Kayaking in Saltwater	1.51	1.33	+
Rowing in Saltwater	0.55	0.53	+
Water skiing in Saltwater	1.03	1.15	-
Bird Watching in Saltwater Surroundings	9.13	7.17	+
Viewing Other Wildlife in Saltwater Surroundings	7.68	6.45	+
Viewing or Photographing Scenery in Saltwater Surroundings	11.01	9.19	+
Hunting Waterfowl in Saltwater Surroundings	0.32	0.33	-
Any Coastal/Marine Recreation	45.33	43.30	+

¹ Civilian Non Institutionalized Population 16 years and Older, Sept. 1999 - NSRE 2000, Versions 1-6, Sample of 27,854 Households.

² Weights included multivariate weights for Age, Race/Ethnicity and Sex and multiplicative weights for Education level and Urban/Rural place of residence.

³ + means unweighted sample estimate of participation greater than weighted estimate and - means unweighted sample estimate of participation is less than weighted estimate.

Specific Methods Used to Maximize Response Rates and Control for Non-Response Bias

Change Introduction

Identify survey sponsor—Response rates for *government-sponsored surveys* reportedly were higher (49% or better) than the response rates being achieved by the NSRE. The current introduction being used by the Human Dimensions Research Lab did not identify the survey as being government sponsored. Therefore, the opening statement was changed to the following:

Hello. My name is _____ and we are calling on behalf of the United States Forest Service.

Increase motivation for participating in the survey—The next statement in the introduction was shortened and made to the point, to gain the respondent’s attention and interest in completing the survey. Taking out the word “outdoor,” encouraged those who did not participate in outdoor recreation to continue with the survey versus opting out at the beginning due to lack of interest. Therefore, the next statement in the introduction was changed to the following:

We are asking a select sample of the public about recreation opportunities in the U.S.

Increase Level of Detail for Recording Call Dispositions

By keeping more detailed records regarding residential household status of non-contacted phone listings, the HD Lab was able to estimate the value of *e*, which was the estimated proportion of non-contacted cases which were eligible as household residents to be respondents to the survey. This parameter was used to calculate AAPOR’s Response Rate 3. All attempts coded as no answers and busy signals for the NSRE were recorded in the past as “Non-contact” in the AAPOR response rate calculations, with no distinction of potential eligibility. Therefore, all no answer and busy signal attempts were reviewed to determine whether the number was likely a residential listing. This enabled us to estimate likely residency rate for non-contacted phone listings of unknown eligibility for use in computing survey response rates (see separate spreadsheet for response rates).

Pre-notification Using Advance Letters

Experimental design and sampling—Some studies have shown increases in response rates resulting from sending in advance a letter notifying potential respondents that a phone contact will be attempted. Therefore advance letters were used to improve NSRE response rates. For the RDD sample drawn for the Wisconsin survey, a reverse appended was conducted, which provided the names and addresses for all numbers listed in the sample. There is no way to know exactly what percent of the sample would have addresses which could be listed. An average of a 40% match rate of names, addresses and numbers has been reported in other studies. This meant sending approximately 14,000 letters for the Wisconsin survey. For the approximately 40% of listings with names and addresses, response rates were calculated and compared (see separate spreadsheet).

Advance letter specifications—

- a. Official U.S. Forest Service stationery was used to identify the survey as government sponsored and the letter emphasized the importance of the survey. The letter was from Dr. Ken Cordell, Project Leader and Senior Scientist, with the USDA Forest Service.
- b. Since the survey was randomly selecting a person out of the household and not seeking a specific person, the advance letter was addressed to the “John Smith Household” and the salutation greeted the “residents at the John Smith household.” The person that was randomly select in the household to be interviewed may or may not have seen the letter.

Reducing Survey Length

The only way this step really helped was to ensure the survey length was kept to 15 minutes. Thus, the Wisconsin survey was limited to a 15-minute interview time on average. In any case, all versions of the NSRE were submitted to extensive testing and refinement before application. However, the Human Dimensions Research Lab at The University of Tennessee has shown that response rates improve with shorter interviews.

Strengthen Refusal Conversion Efforts

Training—The supervisory staff of the Human Dimensions Research Lab at the University of Tennessee reviewed interviewer training materials and looked for ways to improve overall training. The highest priority was given to more intensive refusal aversion and refusal conversion training.

Extend data collection period—Based on the time frame for overall data collection in order to meet agency data needs for resource planning, management and policy, there was limited allowance for extending the data collection time period. However, to the maximum extent possible, extra time was budgeted near the end of the data collection period in order to have a crew of interviewers work specifically on refusal conversions. At the end of these extended time periods, improvements in response rates and costs were evaluated and approaches refined in accordance with this evaluation.

Send follow-up letter to refusals—For those households for which addresses were obtained, a sample of those who refused were sent a letter on Forest Service letterhead prior to re-contact. In the cases for which a name was obtained, the letter was also personally addressed, rather than generally to the household. The letter again stressed the importance of the survey. Selection of this sample occurred at the end of each week's interviewing.

Weighting Procedures

As blocks of interviews were completed and compiled, they were examined to identify differences in demographic profiles between those surveyed and the overall population of the country as described in Bureau of Census website reports. Indeed, sufficient differences are typically found to require weighting adjustments for over or under sampling. Weighting was achieved using a composite of multi-variate and multiplicative weights to account for age, race, gender, education, and urban/rural differences. This composite weighting helped adjust estimates of recreation participation and other NSRE estimates to better represent what those estimates would have been had the sample been truly proportionately distributed across social strata.

This type of weighting procedure, referred to as *post-stratification* (Holt & Smith, 1979), is the most widely accepted method for adjusting sample proportions to mirror population distributions (Zhang, 2000). Post-stratification has been successfully applied in similar national surveys in the U. S. and in other countries (Thomsen & Halmoy, 1998). For NSRE, a total of 60 strata (6 age x 2 gender x 5 race) were identified to match identical strata in the U.S. Census. Each individual strata weight, S_{wi} , is the ratio of the Census population proportion to the NSRE sample proportion:

$$S_{wi} = P_i / p_i$$

where P_i = U.S. Census proportion for strata i

p_i = NSRE 2000 sample proportion for strata i

A weight $S_{wi} > 1.0$ indicated that the particular strata was a smaller proportion of the sample than of the U. S. population based on Census estimates. Likewise, weights with a value less than 1.0 indicated that the strata was randomly sampled in greater numbers than its proportion of the U.S. population age 16 and over. A unitary weight (i.e., no adjustment) means the sample strata was sampled at the same rate as its proportion of the population. Each individual respondent was assigned to one and only one of the 60 age-gender-race strata and thus assigned an S_{wi} for that strata.

We took an additional step to account for the sampling proportions of two other socioeconomic strata: educational attainment and place of residence (rural/urban). Weights for each of these were calculated separately in a similar fashion to the age-gender-race weight. The education weight, E_{wi} , is the ratio of Census: sample proportions for nine different levels of educational attainment, ranging from "8th grade or less" to "Doctorate Degree." The residence weight, R_{wi} , is simply the ratio of the percentage of the U.S. population living either in metropolitan statistical areas or not divided by their counterparts in the NSRE data. This was adjusted for the fact that urban or metropolitan residents were slightly under sampled in the survey. A single weight, W_i , for each individual survey respondent was then calculated as the product of the three intermediate weights:

$$W_i = S_{wi} \times E_{wi} \times R_{wi}$$

The largest composite weights, therefore, were applied to respondents whose numbers were under represented in the total sample. The smallest weights were applied to strata which were over represented. The sample had a potential total of 1,080 (60 x 9 x 2) unique weights, with each individual assigned a weight, W_i , depending on his or her combination of the three intermediate weights.

Sources of Error

There are many potential sources of error or bias in a large survey of human subjects. The principal sources of bias for the NSRE include recall and digit preference among the response biases, and refusal, avidity, and incomplete listings among the non-response biases. As with any survey, regardless of scope or complexity, bias is a reality to be recognized and dealt with early on to the extent affordable through design of the sample and survey content. Brief descriptions of principal anticipated sources of bias in the NSRE are presented below.

Recall bias is simply an inability of a respondent to recall accurately or to recall at all whether they participated in recreational activities or to recall the number of or places where these activities were undertaken. There is no conclusive evidence regarding optimum recall period (one week, one month, six months, etc.) or methods of correcting recall bias. Digit preference bias is related to recall bias, but more specifically is a participation rounding bias. For example, for activities of frequent participation, such as walking or running/jogging, respondents often round to the nearest five or ten, such as twenty-five, thirty, or forty, rather than accurately reporting actual number of occasions, such as twenty-eight times during the past twelve months.

Principal sources of nonresponse bias include avidity and incomplete phone listings. Avidity bias is the tendency of persons who do not participate or who participate only infrequently in outdoor leisure activities to refuse participation in the survey. Left unaccounted for, avidity bias can result in seriously inflated estimates of population participation rates and biased estimates of participation differences by social group. Incomplete phone listings, like any other incomplete sampling frame, can occur for many reasons. More frequently encountered reasons include institutionalization, persons not having a phone, and persons having access only to pay phones or other non-individualistic arrangements. For the NSRE, an attempt to estimate avidity and listing bias was made by asking two key questions of persons who refuse the survey. Those questions are age and whether or not the respondent participated in outdoor recreation in the last twelve months. Additionally, the sex of the respondent was recorded when recognizable. The estimated proportions of non-respondents, relative to respondents, was combined with weights derived from the 2000 U.S. Census of Population to weight each observation to correct for over or under representation by social group characteristics in the sample.

The NSRE included a more comprehensive listing of outdoor recreation activities than any of the previous national surveys. The activities list for the NSRE included seventy explicitly named activities. Some of these listed activities have always been relatively vague. Examples are sightseeing and walking for pleasure. Others are much more specific and have relatively precise technical definitions. Examples of specific activities include snorkeling and rock climbing. Respondents are left to determine, by their own definition of the activities listed, whether or not they have participated. For the NSRE, several new activities were listed, largely driven by newly available or vastly improved technologies, such as jet skiing, rock climbing, and orienteering. To the extent that respondents understand the activities they are being asked about, valid responses are recorded. However, little exists in the literature to guide or control for this potential source of error in collecting data on participation.

Sources of bias were addressed through data weighting and other approaches as necessary. For example, equally distributing a quota of 400 across the 50 states results in over-sampling of rural areas (e.g., 65% Urban, 25% Near Urban, and 10% Rural). Thus, we used a sampling strategy that combined the quota of 400 per state with a proportional nationwide sample (e.g., 64.6% Urban, 27.4% Near Urban, and 8.0% Rural). In addition, random digit dialing reaches a random sample of telephone numbers, rather than of people. Affluent families are virtually certain to have a telephone number (97%), often more than one. At the other end of the scale, many low-income households do not have a telephone (ranging from 8 to 23%

depending on geographic area). As a result, affluent people are likely to be somewhat over represented in the survey sample (Bowen, 1994; Groves, 1990; Tucker, Lepkowski, Casady, & Groves, 1992). To compensate for these types of sampling biases, the NSRE data set was weighted based on comparisons with 2000 Census data.

Another source of bias comes from language barriers through the undesirable but unavoidable exclusion of people who cannot speak either English or Spanish. According to the 2000 Census, 12.5 % of the U.S. population is Hispanic. For the non-English speaking segment of the Hispanic population, the NSRE was conducted in Spanish. The most difficult part of this process was getting the translation generic enough for overall comprehension by all the various Hispanic dialects. Other non-English speaking U.S. residents were excluded from the survey. The complexity of the translation and interviewing processes made interviewing in all languages prohibitively costly.

All results provided within this paper are based upon the number of NSRE survey's completed at the time the analysis for this paper was conducted. As of the writing of this report, data collection for the NSRE was still on-going. Obviously, then, as more data are collected final estimates of the percentages and numbers of people participating in different activities may change slightly from those reported in this paper.

In viewing the results presented in this report, it is important to remember that individuals were asked about their personal participation in specific recreation activities. To date, versions one to twelve of the *NSRE* have been completed, which means participants have answered questions pertaining to approximately 80 outdoor recreation activities. For analysis and description of results, it was useful to place these activities into 12 groups. For simplicity, each activity was placed in only one category. In many cases, however, activities could have been placed in more than one category. Hiking, for example, was classed as an individual activity, which it is for many people. For others, however, hiking might best be classed as a backpacking and camping activity.

Social Implications

Like the rest of the United States, the Wisconsin region represents a diversity of cultures. This report has been generated with respect to various social characteristics namely: gender, age, race, education, income, and employment status. The different divisions of these categories are described in chapter 2.

Also, please note that with a maximum sample of approximately 3000 respondents in Wisconsin alone not all combinations of social characteristics may be present in the analyses investigated in this study. The weighting will help compensate for this by correcting for over or under representation by the respondent's social group in the sample

Participation Questions and Possible Responses

Because the NSRE will be used for many different purposes, the level of detail needed to describe participation in the activities varied. For each activity, a categorical yes/no answer recorded whether or not the respondent participated in the activity at least once in the past twelve months.

Activities Covered

<i>Individual Activities</i>	<i>Outdoor Team Sports</i>	<i>Hunting</i>
Bicycling	Softball or baseball	Big game
Mountain biking	Football	Small game
Walking for exercise or pleasure	Basketball outdoors	Waterfowl
Horseback riding	Soccer outdoors	
Day Hiking	Handball, racquetball, or squash outdoors	
Running or jogging	Yard games - horseshoes, badminton, croquet, frisbee	
Golf	Attend outdoor sports events as a	
Tennis outdoors		
Gardening or landscaping		

<p>Inline skating or rollerblading Orienteeering Visiting a farm or other rural land setting</p>	<p>spectator Volleyball outdoors</p>	
<p><i>Snow and Ice Activities</i> Ice skating outdoors Sledding Snowshoeing Downhill skiing Snowboarding Cross country skiing Snowmobiling</p>	<p><i>Boating/Floating/Sailing</i> Sailing Canoeing Kayaking Rowing Motor boating Water skiing Personal water craft such as jet skis, wave runners Sailboarding or windsurfing Rafting, tubing, or other floating Surfing</p>	<p><i>Traditional Activities</i> Gathering of family or friends Picnicking</p>
<p><i>Swimming</i> Swimming in streams, lakes, or the ocean Swimming in an outdoor pool Snorkeling Scuba diving Visiting a beach Visiting a waterside</p>	<p><i>Outdoor Adventure Activities</i> Exploring caves Backpack camping on trails Camping at developed sites Camping at primitive sites Visiting a wilderness or other primitive, roadless area Gather mushrooms, berries, firewood or other natural products Mountain climbing Rock climbing</p>	<p><i>Visiting Educational Sites</i> Visiting nature center, nature trail, visitor center, or zoo Attend outdoor concerts, plays or other outdoor performances Visit prehistoric structures or archaeological sites Visiting historic sites, buildings, or monuments</p>
<p><i>Driving for Pleasure</i> Sightseeing Driving for pleasure on country roads or in a park 4-wheel drive, ATV or motorcycle driving off-road Riding motorcycles for pleasure on a highway</p>	<p><i>Viewing or Photographing</i> Viewing, identifying, or photographing birds Viewing, identifying or photographing fish Viewing, identifying or photographing other wildlife Viewing, identifying or photographing wildflowers, trees or other natural vegetation Viewing or photographing natural scenery</p>	<p><i>Fishing</i> Fishing in coldwater such as Mountains rivers or streams Fishing in warm rivers and lakes Ice fishing</p>