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Current and Future Participation in Marine Recreational Fishing in the Pacific U.S. Region

J. Walter Milon



U.S. Department of Commerce
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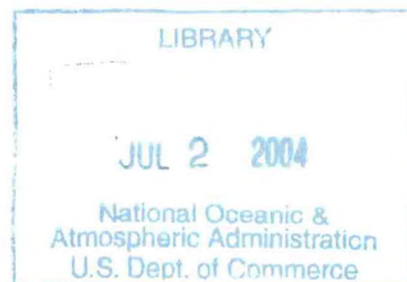
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EXECUTIVE SUMMARY

In order to supplement baseline data collected as part of the ongoing Marine Recreational Fisheries Statistics Survey (MRFSS), the National Marine Fisheries Service conducted an add-on survey during the January 1998 to December 1998 MRFSS telephone survey of households in coastal states in the Pacific region of the U.S. (California to Washington). Demographic data collected for the add-on survey were used to develop age, gender, and ethnicity profiles of resident marine recreational fishing participants for each coastal state within the region. These data were also used to develop population cohort participation rates that were combined with U.S. Census Bureau population projections to provide forecasts of marine recreational fishing participation for the period 2000 to 2025. Forecasts were developed for resident participation in each coastal state and for the region. These forecasts are comparable to forecasts developed for the Northeast region by Thunberg et al., 1999 and for the Southeast region (Milon, 2000). The forecasts do not include nonresident participants, but nonresidents have not been a major share of total participation in the region.

The survey data indicated that a large majority of participants in all coastal states were white males between the ages of 26 and 55. Most participants had household incomes greater than \$25,000 and less than \$60,000. Only a small percentage of participants in all states were of Spanish or Hispanic origin. This demographic profile of participants was consistent across all coastal states in the region.

The total number of resident participants in marine recreational fishing in the Pacific coast region averaged approximately 1.7 million residents in 1997 and 1998. California had the largest number of resident participants followed by Washington and Oregon. Based on the survey results and Census Bureau population projections, it is expected that the number of participants in the region will increase at an average annual rate of 1.96 percent through 2025. The total number of participants in the region would increase to approximately 2.6 million in 2025 with California continuing to have the largest number of resident participants. This increase in the number of participants is due to a general increase in the population throughout the Pacific coast region. As the population increases, the participation rate for marine recreational fishing is expected to increase through the year 2010. Then a gradual decline will occur as individuals in the prime participation cohort groups (white males, ages 26 to 55) become a smaller proportion of the total population in each coastal state in the region.

These forecasts are based on the assumption that the influence of age, gender and ethnicity on participation in marine recreational fishing will be the same in the future as in the survey year. While other influences such as income, access to fishing, and the quality of the fishing experience undoubtedly influence participation, past research has indicated that demographic factors exert the strongest influence on recreational fishing participation. Also, the forecasts depend on a gradual aging of the population in the Pacific coast region as the Baby Boom generation moves past 65 years of age. To the extent that these assumptions reflect future events, the forecasts in this report will provide a reliable guide to future trends in marine recreational fishing participation in the Pacific coast region.

CHAPTER 1

INTRODUCTION

The National Marine Fisheries Service, National Oceanic and Atmospheric Administration during January to December 1998 conducted a telephone survey of households in the Pacific coast region (California to Washington). The survey was designed to identify participation in marine recreational fishing during the prior 2 and 12-month periods from the date of the telephone interview. Only residents, 16 years of age or older, of each state were interviewed. For this survey, a participant is someone who engaged in saltwater fishing in the past 12 months.

In addition to marine recreational fishing participation, the survey also collected information on the socioeconomic characteristics of participants. This report presents results from this survey and develops participation rates for different socioeconomic cohort groups in each state within the region. The participation rate is the estimated number of fishing participants living in a state divided by the U.S. Census Bureau estimated state population (16 years and older). These participation rates were used to forecast marine recreational fishing participation by residents of each state through the year 2025. These forecasts of marine recreational fishing participation for the Pacific coast region are comparable to forecasts that have been developed for the Northeast (Thunberg et al., 1999) and Southeast (Milon, 2000) regions.

This chapter provides a brief review of marine recreational fishing participation in the Pacific coast region and other studies that have developed methods to forecast fishing participation. Chapter 2 describes the telephone survey methods and provides general information on the number of contacts and interview completion rates by state. A copy of the text for the interview is provided in Appendix C. Chapter 3 describes the methodology for developing participation rates for socioeconomic cohort groups and presents the results of this analysis for states within the Pacific region. Chapter 4 applies the cohort participation rates to forecast participation in each state through the year 2025 based on U.S. Census Bureau projections of population growth. Chapter 5 recaps the results and provides a comparison of forecasted marine recreational fishing participation in Pacific coast states with studies for other regions.

1.1 Trends in Marine Recreational Fishing Participation in the Pacific Region

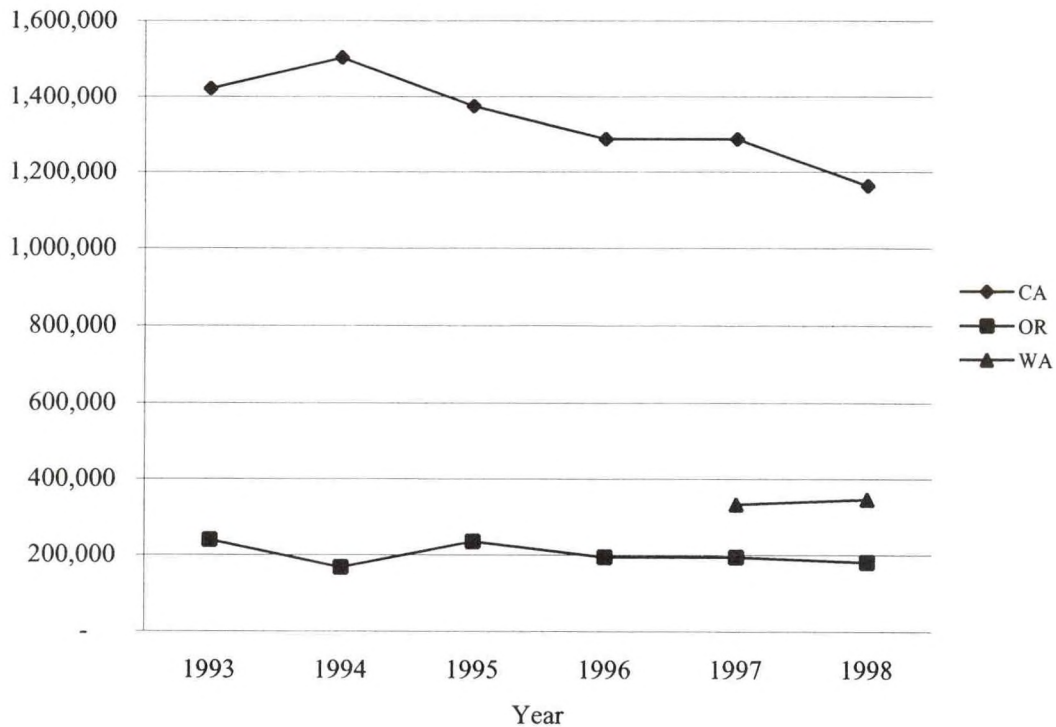
The National Marine Fisheries Service has developed estimates of marine recreational fishing participation in California and Oregon since 1993.¹ Estimates for Washington were added in 1997. These participation estimates are based on the Marine Recreational Fisheries Statistics Survey (MRFSS). Total participation estimates within a

¹More detailed information about the annual participation estimates is available from the National Marine Fisheries Service website: www.st.nmfs.gov/recreational.

state generally include coastal residents (people living in counties within 25 or 50 miles of ocean coastline), non-coastal residents, and out-of-state participants.

Figure 1-1 presents the estimated number of participants and participation rates (based on the population 16 years of age and older) for marine recreational fishing by residents² in Pacific coast states for the period 1993 – 1998. California has the largest number of resident participants with an average of about 1.3 million anglers over the 1993 – 1998 period. The number of participants in California has been gradually declining since 1994. Washington had the second largest number of participants in 1997 and 1998 but the lack of data for prior years does not permit an overall trend to be identified. The number of participants in Oregon has been relatively constant at approximately 200,000 since 1993.

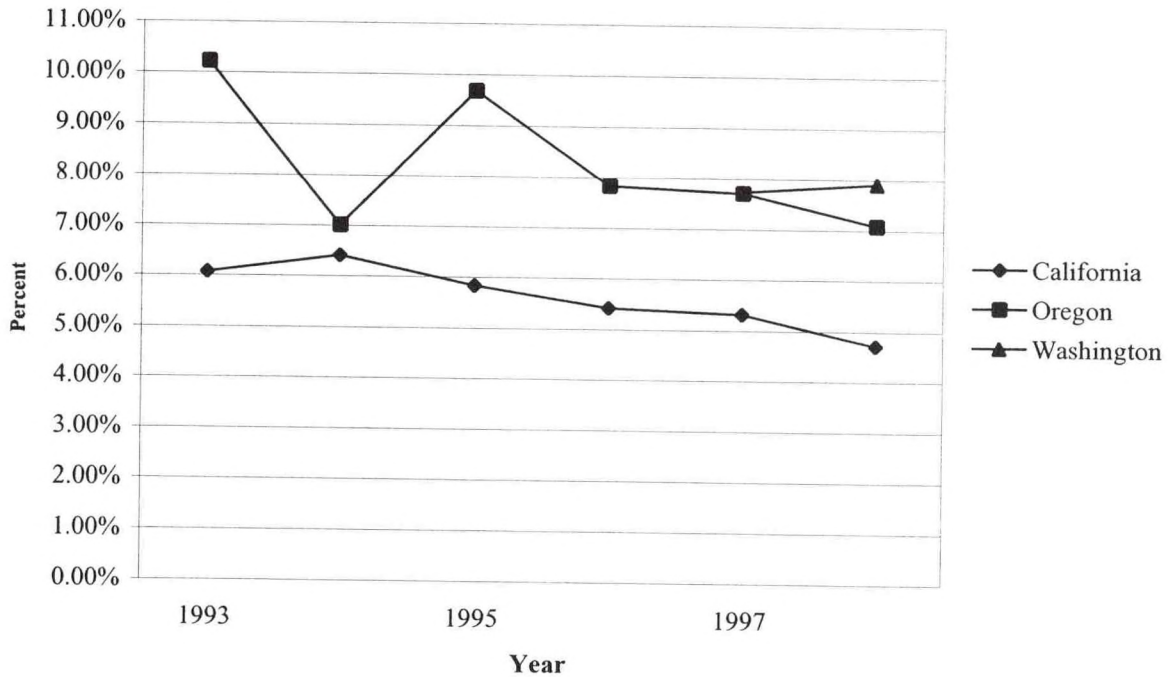
Figure 1-1. MRFSS Estimates of Resident Participants in Pacific Region States, 1993 - 1998



² In this analysis, participation is defined for residents only because the MRFSS data do not provide sufficient detail on the state of residence for nonresident participants. While some residents in one Pacific coast state may fish in another state, it is not possible to account for participation outside of a resident's home state. Also, the reader should note that the figures presented are point estimates that have some level of statistical error.

Participation rates, on the other hand, have shown a general downward trend in the Pacific region. Figure 1-2 shows that the resident participation rate for Oregon peaked at a little over 10 percent in 1993 and declined to about 7 percent in 1998. Similarly, the resident participation rate in California peaked at about 6.5 percent in 1994 and declined to slightly under 5 percent in 1998. The participation rate in Washington remained steady at slightly under 8 percent in 1997 and 1998.

Figure 1-2. Participation Rates in Pacific Coast States, 1993 - 1998



1.2 Forecasting Marine Recreational Fishing Participation

A number of studies have evaluated the factors that influence participation in marine recreational fishing. These factors may include social, cultural and demographic characteristics of individuals and/or specific constraints such as income, time, or knowledge about the activity (Searle and Jackson, 1985; Jackson, 1988; Kay and Jackson, 1991). As Thunberg et al. (1999) point out, demographic characteristics are generally not sufficient to fully explain individual behavior. But, a lack of information about the full set of constraints guiding leisure choice has often led researchers to rely on demographic data to predict future behavior. For example, Loomis and Ditton (1988), Edwards (1989), Murdock et al. (1992), and Milon and Thunberg (1993), and Thunberg et al. (1999) all developed approaches based on demographic data for recreational fishing participants to predict future participation. This approach also avoids the problem of predicting changes in factors that may constrain leisure participation decisions such as income levels, time availability, and other cultural influences.

The disadvantage of predicting future recreational participation choices on the basis of past behavior is that other factors that influence participation in specific activities may change. For example, fishing participation may change with changes in access, the levels of fishery stocks, and/or the cost of fishing equipment. Similarly, social and cultural norms may change over time leading to different participation behavior by various age, gender and ethnic groups. While these types of changes are inevitable, they most likely occur slowly. As a result, past trends may be reliable indicators for the foreseeable future and provide a means to anticipate how these trends may influence fishery resource management.

The remainder of this report describes the survey data that were collected for participants in marine recreational fishing in the Pacific coast region in 1998 and how these data were used to develop forecasts of participation throughout the region.

CHAPTER 2

SURVEY METHODS

2.1 Marine Recreational Fisheries Statistics Survey (MRFSS) Household Survey

The MRFSS household survey is designed to estimate the number of participants in marine recreational fishing within a given state. Information from the survey is also used to develop estimates of the number of trips by fishing mode (shore, party or charter boat, or private/rental boat) for these participants. Telephone interviews are conducted using a stratified random design to identify participation during the prior two-month period. Interviews only focus on residents 16 years or older who live in coastal counties within 25 or 50 miles of the coastline. For respondents who participated during the prior two months, detailed data are gathered on mode and primary fishing location (estuary, bay, sound, or distance from shore). To maintain temporal consistency, each 2-month period during the year is defined, as a “wave” so there are 6 waves during the year.

MRFSS telephone surveys collect detailed trip data for participants who fished within the prior 2 months. But, only basic demographic data such as state and county of residence are collected for participants. Respondents who may have fished within the previous 12 months or who did not fish at all are usually just tallied as part of the overall sample reporting.

2.2 MRFSS Add-on Participation Survey

An “add-on” participation survey was designed and implemented as part of the 1998 MRFSS Pacific region telephone survey. Each interview identified whether the respondent participated in marine recreational fishing within the prior 2 or 12 months, fished at some time in the past but not in the last 12 months, or never fished. For participants who fished during the prior 2 or 12 months, the add-on survey collected detailed data to provide a demographic profile of participants. No data were collected for respondents who had not fished within the past 12 months other than a record that they had not participated during the last 12 months. This feature of the add-on participation survey design differed from a similar survey that was conducted in 1994 in the Northeast region (Thunberg et al., 1999) in which demographic data were collected for both participants and non-participants. A copy of the survey instrument is provided in Appendix C.

Interviews for the add-on participation survey were conducted in the Pacific region from January through December 1998 (MRFSS waves 1 – 6). Sampling effort was allocated using the standard MRFSS sampling procedures and 100 percent of 2 and 12 month participants were administered the add-on survey questions.

Table 2-1 provides a summary of the survey responses and overall completion rates for each state within the Pacific region. A total of 67,044 households were screened as part of the survey with the largest share of the interviews in California. As shown in

Table 2-1, the largest category of respondents in all states was individuals who had never fished. From the total number of households screened, 4,509 detailed interviews were completed with 2 and 12-month participants for the add-on survey. Completion rates varied from a low of 61.1 percent in California to a high of 75.2 percent in Washington.

Table 2-1 Summary of Participation Survey Completion Rates by State in the Pacific Region

	State		
	California	Oregon	Washington
Households Screened	45,142	12,682	9,220
Participants			
2-month	1,471	449	833
12-month	2,297	1,010	751
Never Fished	36,532	8,421	6,507
Fished but not in Past 12 Months	4,658	2,720	1,061
Don't Know	184	82	68
Completed Interviews^a	2,304	1,014	1,191
Percent Completed^a	61.1%	69.5%	75.2%

^aCompleted interviews includes both 2 and 12-month anglers.

Demographic information from the completed interviews with 2 and 12-month participants is presented in Table 2-2. Participants in all states were typically white males between the ages of 26 and 65. A relatively small fraction of the participants were of Spanish or Hispanic origin with California having the highest percentage of Spanish/Hispanic participants within the Pacific region. The majority of respondents had annual household incomes less than \$60,000. These patterns were relatively consistent across all the states and suggest that demographic factors such as gender and age are stable influences on marine recreational fishing participation throughout the region.

Table 2.2. Demographic Characteristics of Participation Survey Respondents by State in the Pacific Region

Variable	State			
	Pacific Region	CA	OR	WA
	%			
Gender				
Male	80.3	81.1	79.9	78.9
Female	19.7	18.9	20.1	21.1
Age Group				
16-25	12.6	14.5	11.6	9.8
26-35	18	19.9	15.7	16.4
36-45	25.6	26.6	22.7	26.2
46-55	20.1	19.6	20.9	20.6
56-65	13	11.9	14.1	14.2
66 and over	10.6	7.5	15.1	12.8
Ethnicity				
White, Non-Hispanic	88.4	83.8	93.6	92.6
White, Hispanic	3.3	5.2	1.3	1.3
Black	3.2	3.7	3.1	2.5
Asian	0.4	0.6	0	0.3
Other	4.8	6.7	1.9	3.4
Education				
Not High School Graduate	9.2	8.6	11.3	8.4
High School Graduate	24.4	22.5	28.2	24.8
Some College or Vocational	17.7	17.2	18.2	18.1
Two-year College Degree	15.3	15.7	14.7	14.9
Four-year College Degree	22.2	23.9	18.6	22.2
Postgraduate Degree	11.3	12.1	9	11.7
Household Income				
\$15,000 or less	7.2	7.8	8	5.5
\$15,001 to \$25,000	10.8	10.6	12.8	9.3
\$25,001 to \$35,000	14.4	12.8	17.3	14.9
\$35,001 to \$45,000	14.2	12.2	17	15.6
\$45,001 to \$60,000	18.8	15.8	20.9	22.9
\$60,001 to \$75,000	11.6	12.5	8.9	12.4
\$75,001 to \$100,000	10.7	12.8	8.4	8.7
\$100,001 to \$125,000	5.5	6.9	3.2	5
\$125,001 or greater	6.7	8.7	3.6	5.7

CHAPTER 3

PARTICIPATION COHORT METHODOLOGY

3.1 Participation Cohorts

To develop a participation forecasting methodology based on the Pacific region add-on survey data, anglers who had fished in marine waters within the prior 2 or 12 months were defined as participants. Because no demographic data were collected for individuals who had fished previously but not in the past 12 months or for individuals who had never fished, it was not possible to use these non-participant groups directly in the forecasting methodology. This differs from the approach adopted in Thunberg et al. (1999) in which a statistical model of participation behavior was developed from demographic data for participants and non-participants.

The methodology used in this report is similar to the population cohort group approach first developed by Loomis and Ditton³ (1988). Participation ratios were created for different age/gender/ethnic cohort groups within the sample for each of the states within the Pacific region. These demographic variables were selected to define the cohort groups because: a) previous research (Edwards, 1989; Milon and Thunberg, 1993; Aas, 1995), and Thunberg et al., 1999) has shown they are consistent predictors of marine fishing participation, b) these variables were included in the sample of participants for the Pacific region add-on survey, and c) U.S. Census Bureau projections were available for these demographic groups for each state within the region.

Mathematically, the sample participation ratio can be defined as:

$$P_{ij} = (\text{Participants in sample cohort}_{ij}) \div (\text{Participants in the sample for state } j)$$

where i ($i = 1, \dots, n$) represents age/gender/ethnic cohort groupings and j represents a state within the Pacific region. The product is the percentage of the total participant sample in each cohort. The sample participation ratio for each state can then be multiplied times the MRFSS estimate of the number of participants in the year of the add-on survey to determine the total number of participants (PT) in each cohort group:

$$PT_{ij} = P_{ij} \times \text{Number of MRFSS Resident Participants in state } j.$$

The sample information can then be extrapolated to the population of each state by computing population participation ratios (PR) as:

$$PR_{ij} = PT_{ij} \div \text{Population}_{ij}.$$

These population participation ratios provide the basis for forecasts of marine recreational participation in each state. The future number of participants in each cohort

³ Loomis and Ditton's approach was to project number of days fishing rather than participation. Also, their application only considered white males in Texas.

group (FPT_{ij}) can be calculated by applying the population cohort participation ratio to Census Bureau population forecasts for each cohort group:

$$FPT_{ij} = PR_{ij} \times \text{Forecasted Population}_{ij}.$$

By summing across all the FPT_{ij} for a given year, the total number of participants in each state can be estimated. Then, the overall population participation rate in each year can be calculated by dividing the estimated total number of participants in a year by the total population forecast for that year.

This participation ratio approach to forecasting future participation in marine recreational fishing requires several assumptions. First, it is assumed that the add-on MRFSS participation survey was a random sample of marine recreational fishing participants in each state. Because the add-on survey was administered to 100 percent of 2 and 12-month participants in coastal counties included in the base MRFSS survey for each state, this assumption is not a problem for coastal county participants. On the other hand, MRFSS participation estimates for each state include both coastal and non-coastal components.⁴ These non-coastal participants were not included in the add-on survey data. In order to use the participation rates from the sample for population estimates, it must be assumed that non-coastal participants have the same demographic profile as coastal participants. For all states in the Pacific region, coastal participants greatly outnumber non-coastal participants. Therefore, it is not likely that using the demographic profile of coastal participants as a proxy for non-coastal participants would cause a serious problem in the Pacific region.

A second important assumption for this forecasting methodology is that the pattern of participation in marine recreational fishing by cohort groups within each state will remain stable in the future. This is a much more difficult assumption to evaluate since no panel studies of marine fishing participation over prior years have been conducted and future behavior cannot be known with any certainty. While this assumption is more problematic, it is an assumption that is common to all forecasting approaches based on demographic data.⁵

⁴ Although the base MRFSS household survey does not include non-coastal counties, participation from non-coastal areas is estimated from sample data collected for the MRFSS intercept survey. For a complete description of the MRFSS participation estimation methodology, see Fisheries Statistics and Economic Division (1996).

⁵ The statistical approach used by Thunberg et al. (1999) has the advantage that participation ratios for different cohort groups are derived from sample observations of participation behavior (both participants and non-participants) over several states. This approach is desirable in that the pooled data may provide better predictions since more information is included. To the extent, however, that participation behavior is determined by state specific factors such as fishing quality, weather, etc., the two approaches may yield similar results. It was not possible to evaluate the merits of each approach in this analysis because the Pacific add-on data set did not include demographic information for non-participants.

Also, as discussed in the prior chapter, other factors that influence marine recreational fishing participation such as income or access to marine fishing experiences cannot be included. While these factors are likely to have some influence, it is difficult for any forecasting procedure to account for these influences since they must be projected independently from fishing participation.

Finally, because the basis of this forecasting methodology is U.S. Census Bureau population projections for cohort groups within each state, it is assumed that these are the best available estimates of future population changes. While the Census Bureau does provide alternative projections (referred to as series 'A' and series 'B' estimates), there is no basis to reject these series. In the tables presented in the following chapter, all results are based on series 'A' estimates. Other estimates based on series 'B' population projections are reported in Appendix B.

3.2 Sample Cohort Participation Rates

To define cohort groups for the analysis, the following groupings were created for the add-on MRFSS survey data: gender – male or female, ethnicity – white or nonwhite, and age – 16 to 25 years, 26 to 45 years, 46-64 years, and over 65. The nonwhite ethnicity group was not desegregated (e.g. black, Asian) due to the relatively small number of participants from these groups (Table 2-2). The age groupings were determined in part by the age categories defined in the survey interview (see Appendix C). Prior studies have found a nonlinear relationship between age and participation. Generally, participation in marine recreational fishing increases through middle age and then decreases (Loomis and Ditton, 1988; Edwards, 1989; Milon and Thunberg, 1993) although Thunberg et al. (1999) found no statistically significant difference within the 25 to 64 year old grouping.

Table 3-1 presents the computed sample participation ratios (P_{ij}) for each cohort group and state within the Pacific region. As expected, the white, male cohorts in the 26-45 and 46-65 age groups had the highest participation ratios in all states. The share of total participants in these cohort groups were surprisingly consistent across the states indicating again that gender and age are powerful influences on participation in marine recreational fishing. Note also that participation by white males decreases dramatically after age 65 in all states.

The white, female cohorts in the 26-45 and 46-65 age groups in Table 3-1 had relatively high participation ratios compared to the nonwhite cohort groups. And, participation by white females declined after age 65. These ratios were also consistent across the states suggesting that the behavioral pattern of participation in marine recreational fishing in the region was not influenced by unique locational factors in each state.

Table 3-1 also shows that nonwhite female cohort groups had the lowest participation rates overall within the sample. As in the other cohorts, however, participation typically peaked in the 26-45 year old period and then declined. This pattern of participation behavior is particularly important because it suggests that overall participation in marine recreational fishing in the Pacific region will change as the age structure of the population changes.

Table 3-1. Participation Rates for Ethnicity, Gender and Age Cohorts by State in the Pacific Region^a

Cohort Group	State		
	California	Oregon	Washington
	%		
White Male			
16-25	9.2	8.51	6.88
26-45	29.65	27.15	29.97
46-65	21.44	25.63	24.48
66+	5.53	11.85	9.84
Total White Male	65.82	73.15	71.17
White Female			
16-25	1.9	2.13	1.39
26-45	6.84	7.7	8.45
46-65	4.9	5.88	6.18
66+	0.68	2.33	2.0
Total White Female	14.32	18.03	18.03
Non-White Male			
16-25	2.45	0.61	1.13
26-45	7.89	3.04	3.31
46-65	4.26	2.43	2.87
66+	1.09	0.91	0.87
Total Non-White Male	15.68	6.99	8.19
Non-White Female			
16-25	0.95	0.3	0.44
26-45	2.13	0.51	0.87
46-65	0.86	1.01	1.22
66+	0.23	0	0.09
Total Non-White Female	4.17	1.82	2.61

^a Percentage may not sum to 100% due to rounding.

CHAPTER 4

PARTICIPATION IN MARINE RECREATIONAL FISHING

4.1 Forecasting Participation

To forecast participation in marine recreational fishing in each state within the Pacific coast region, the participation ratios presented in Table 3-1 were combined with MRFSS resident participant estimates for 1998 in each state. The resulting population participation ratios (PR_{ij}) were then combined with comparable U.S. Census Bureau population forecasts for the ethnicity, gender, and age cohorts in each state.⁶ The forecasts were for 5-year increments from the year 2000 to 2025. The resulting forecasts of the number of participants in each cohort (FPT_{ij}) were then summed to provide forecasts of the total number of participants in each state.

Table 4-1 and Figure 4-1 presents the results of the forecasting methodology for states in the Pacific region. More detailed forecasts for the cohort groups in each state are presented in Appendix A. Alternative total and cohort group forecasts based on Census Bureau series B population projections are provided in Appendix B. The results in Table 4-1 show that the total number of participants in marine recreational fishing in the Pacific region is expected to increase to approximately 2.6 million by year 2025. The overall trend over time is positive reflecting increasing population in most cohorts throughout the region. The increase to 2.6 million participants in 2025 represents an increase of 52.9 percent over the MRFSS estimate of approximately 1.7 million anglers (Figure 1-1) in the Pacific region in 1998. By comparison, estimates using the series B population forecast result in approximately 2.3 million participants in the Pacific region in 2025 (Appendix B). The difference in results is due to different assumptions about changes in the composition of the population, particularly in California and Washington.

Figure 4-1 shows that California continues to be the state with the largest number of participants within the region. The total number of resident participants in California is projected to increase to nearly 1.8 million anglers in 2025 from approximately 1.2 million in 1998. Oregon and Washington are also expected to have increases in the number of participants through the year 2025.

⁶ Census Bureau forecasts were only available at the state level. Therefore it was not possible to disaggregate coastal from non-coastal population changes. Because the participation ratio approach used in this study assumes that coastal and non-coastal residents share the same participation behavior for marine recreational fishing, it was not necessary to prorate the population forecasts as in Thunberg et al. (1999).

Table 4-1. Projected Number of Marine Recreational Fishing Participants by State, 2000-2025

State	Year						
	1998	2000	2005	2010	2015	2020	2025
California	1,163,236	1,202,595	1,284,782	1,417,045	1,540,058	1,654,910	1,764,437
Oregon	181,024	204,438	224,843	242,522	256,330	268,385	278,881
Washington	346,758	387,087	426,048	463,544	493,597	519,594	541,533
Pacific Region	1,691,018	1,794,120	1,935,673	2,123,111	2,289,984	2,442,889	2,584,851
Regional Participation Rate	5.35%	5.72%	5.79%	5.81%	5.77%	5.70%	5.61%

Figure 4-1. Projected Number of Resident Participants by State, 2000 - 2025

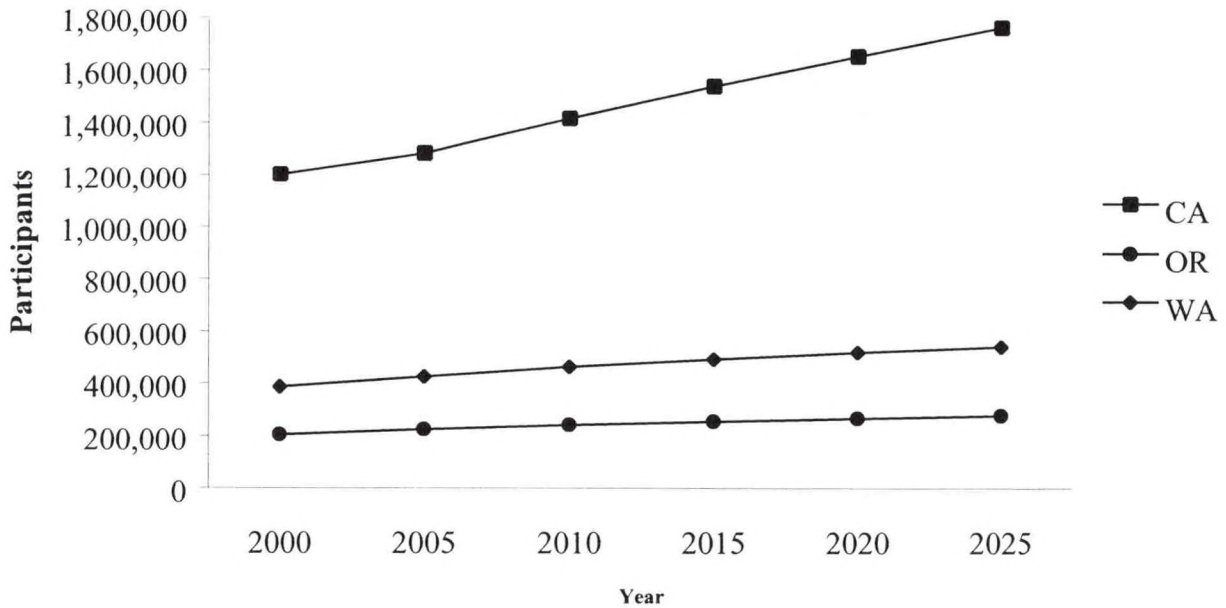


Figure 4-2 shows the rate of change (over 5 year intervals) in the number of resident participants over the 2000 – 2025 period. With the exception of California, the rate of change in the Pacific coast states is greatest at the beginning of the period and then declines over time. All of the states are expected to increase by more than 6 percent in the 2000 – 2005 period. California has the highest rate of change after 2005 but the growth rate declines from over 10 percent in the 2005 – 2010 period to 6.5 percent in the 2020 – 2025 period. The growth rate in Oregon and Washington declines from around 10 percent in 2000 – 2005 to about 4 percent in 2020 – 2025.

Figure 4-2. Percent Change in Resident Participation by State, 2000 - 2025

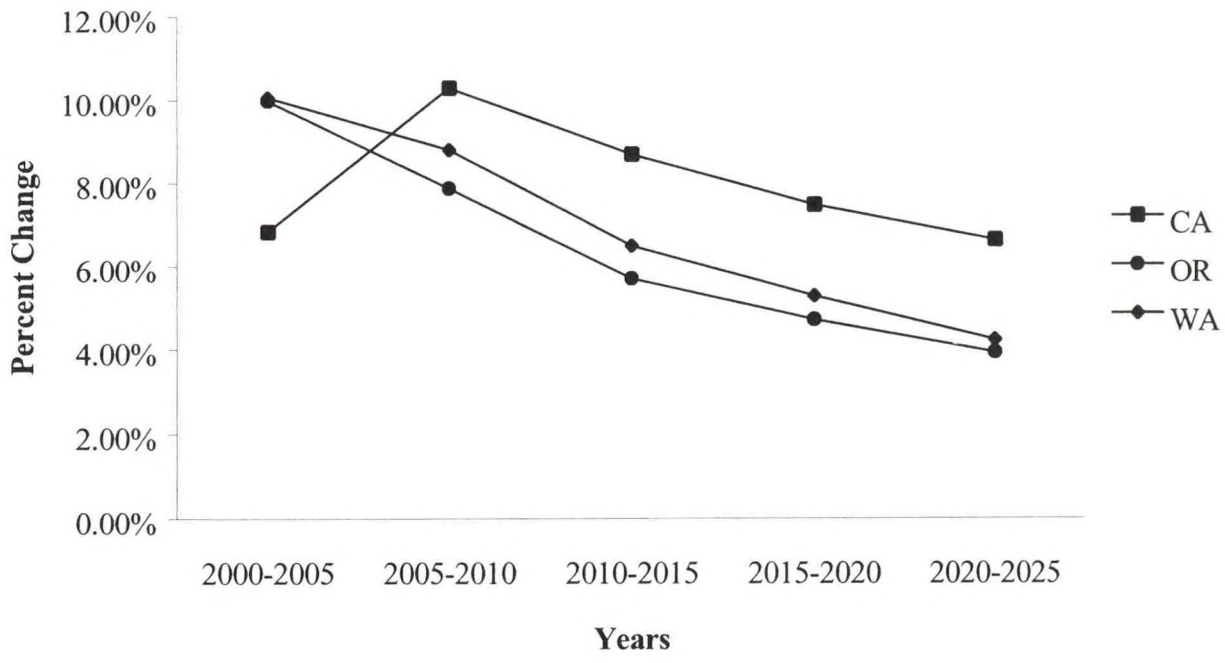
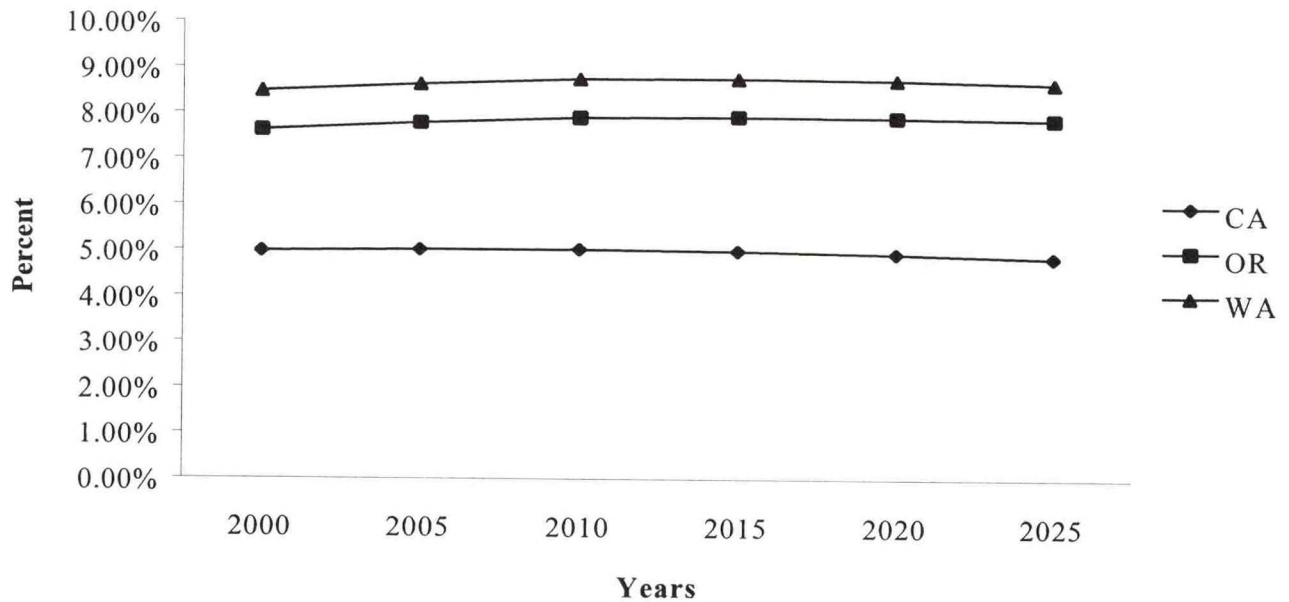


Figure 4-3 presents the trends in participation rates (based on the population 16 years of age or older) for states in the Pacific region for the 2000 – 2025 period. Participation rates in Oregon and Washington remain constant or increase slightly throughout the 2000 –2025 period. California, on the other hand, has an increasing participation rate through 2010 but then declines throughout the forecast period. This pattern can be attributed to a gradual aging of residents and new migrants in the region as the Baby-Boom generation (individuals born between 1946 and 1964) matures. As these individuals move out of the prime participation age group of 26 to 65, their participation in marine recreational fishing is expected to decline (Thunberg et al., 1999). States that have relatively more Baby-Boom individuals now would be expected to show the greatest change over the next two decades. Note that despite the underlying changes in the number and composition of the population within the region, the overall changes in participation rates for individual states are relatively small.

Figure 4-3. Projected Participation Rates by State, 2000 - 2025



CHAPTER 5

SUMMARY AND CONCLUSIONS

This study used a population cohort methodology to forecast marine recreational fishing participation in the Pacific coast region. For the region and each state within the region, the number of marine anglers is expected to increase throughout the period 2000 to 2025. The total number of anglers is expected to increase from approximately 1.7 million in 1998 to nearly 2.6 million in 2025. The overall increase in the region would be 52.9 percent, or an annual average rate of 1.96 percent per year. California is expected to continue to have the largest number of resident participants in the region followed by Washington and Oregon, respectively. California is also expected to have the largest increase in the number of anglers over the period. The rate of growth in the number of participants throughout the region is expected to be the greatest prior to 2010 as the Baby-Boom generation reaches maturity. After 2010, the overall rate of growth in the number of participants declines as this population cohort moves past 65 years of age and their participation in marine recreational fishing decreases.

Participation rates over the 2000 to 2025 period reflect these same general trends. Participation rates in the region increase through the year 2010 and then gradually decline as an increasingly larger share of the total population becomes 65 years of age and older. In both Oregon and Washington, however, the participation rate in 2025 is expected to be higher at the end of the forecast period than at the beginning.

These projections are based on the assumption that people in different age groups will behave in the future in the same way as in the past. To the extent that advances in life expectancy and changes in life style may influence future recreation decisions; future behavior may differ from the past. Thus, the socioeconomic profile of future participants in marine recreational fishing may be different from the present.

The results of this study are similar to studies for other areas but show that participation in marine recreational fishing in the Pacific coast region is likely to be the fastest growing region of the U.S. Thunberg et al. (1999) predicted that marine recreational fishing in the Northeast region would increase at an average annual rate of 0.5 percent (from 3.2 million in 1995 to 3.7 million in 2025). Milon (2000) estimated that marine recreational fishing in the Southeast region would increase at an average annual rate of 1.34 percent (from 4.0 million in 1997 to 5.5 million in 2025). At the national level, Edwards (1989) projected an annual growth rate of less than 0.6 percent for all coastal states (except Alaska) over the 1985 to 2025 period. And, Murdock et al. (1992) estimated that participation in all recreational fishing (marine and freshwater) would increase at an annual rate of less than 0.5 percent through 2050. Thus, the rate of growth of marine recreational fishing in the Pacific region is expected to be significantly higher than most other coastal areas of the U.S.

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APPENDIX A

**PARTICIPATION FORECASTS BY COHORT GROUP FOR PACIFIC
REGION STATES**

Table A-1. Projected Number of Marine Recreational Fishing Participants by Ethnicity, Gender and Age Cohorts in California, 2000-2025

Cohort Group	Year					
	2000	2005	2010	2015	2020	2025
White Male						
16-25	107,041	121,332	142,742	153,099	154,661	164,535
26-45	327,326	308,693	306,911	323,291	358,746	390,188
46-65	280,810	325,247	373,070	398,180	402,521	394,025
66+	62,035	62,525	68,589	81,284	97,842	118,176
Total White Male	777,212	817,798	891,311	955,855	1,013,770	1,066,925
White Female						
16-25	23,393	27,175	32,091	34,497	34,848	37,074
26-45	74,975	71,005	71,978	77,394	87,174	95,426
46-65	63,849	73,874	84,340	89,466	90,124	88,820
66+	7,438	7,240	7,617	8,641	10,055	11,805
Total White Female	169,654	179,295	196,027	209,997	222,201	233,125
Non-White Male						
16-25	30,293	36,032	41,967	47,428	52,048	57,262
26-45	95,007	96,443	103,371	115,159	130,098	147,472
46-65	62,080	77,037	93,644	106,079	115,049	120,298
66+	14,294	16,901	20,350	25,650	32,448	40,426
Total Non-White Male	201,674	226,413	259,331	294,316	329,644	365,458
Non-White Female						
16-25	12,496	15,085	17,486	19,743	21,679	23,828
26-45	25,791	26,672	29,244	32,869	37,087	41,649
46-65	12,711	15,915	19,290	21,792	23,659	25,030
66+	3,056	3,604	4,355	5,486	6,869	8,422
Total Non-White Female	54,054	61,276	70,376	79,890	89,295	98,930
Grand Total	1,202,595	1,284,782	1,417,045	1,540,058	1,654,910	1,764,437

Table A-2. Projected Number of Marine Recreational Fishing Participants by Ethnicity, Gender and Age Cohorts in Oregon, 2000-2025

Cohort Group	Year					
	2000	2005	2010	2015	2020	2025
White Male						
16-25	16,846	17,519	17,585	17,404	17,025	17,268
26-45	48,109	46,445	45,464	46,186	47,910	49,094
46-65	59,357	70,966	78,409	78,446	75,285	71,264
66+	23,731	26,510	31,392	39,423	48,560	57,452
Total White Male	148,042	161,440	172,851	181,460	188,780	195,078
White Female						
16-25	4,209	4,399	4,430	4,376	4,276	4,338
26-45	13,713	13,260	12,981	13,198	13,728	14,095
46-65	13,427	16,034	17,796	17,892	17,194	16,270
66+	4,614	5,020	5,677	6,780	8,050	9,306
Total White Female	35,963	38,713	40,884	42,247	43,248	44,009
Non-White Male						
16-25	1,183	1,340	1,421	1,501	1,600	1,728
26-45	6,372	6,728	7,012	7,361	7,839	8,520
46-65	6,327	8,366	10,313	1,759	12,748	13,172
66+	227	2,911	3,774	5,033	6,617	8,354
Total Non-White Male	13,098	19,346	22,520	25,654	28,805	31,774
Non-White Female						
16-25	628	706	750	788	835	900
26-45	1,088	1,198	1,288	1,380	1,481	1,594
46-65	2,618	3,440	4,229	4,801	5,236	5,527
66+	0	0	0	0	0	0
Total Non-White Female	4,335	5,344	6,267	6,969	7,552	8,020
Grand Total	207,738	224,843	242,522	256,330	268,385	278,881

Table A-3. Projected Number of Marine Recreational Fishing Participants by Ethnicity, Gender and Age Cohorts in Washington, 2000-2025

Cohort Group	Year					
	2000	2005	2010	2015	2020	2025
White Male						
16-25	26,090	27,885	28,797	28,888	28,381	28,898
26-45	103,043	99,145	97,152	99,683	104,556	108,057
46-65	105,921	128,090	144,672	147,510	143,625	136,642
66+	37,455	41,783	49,607	62,264	77,019	92,514
Total White Male	272,508	296,904	320,227	338,346	353,581	366,111
White Female						
16-25	5,308	5,683	5,889	5,908	5,795	5,899
26-45	29,050	27,999	27,500	28,258	29,741	30,792
46-65	26,744	32,523	36,925	37,839	36,796	34,998
66+	7,417	7,944	8,952	10,690	12,812	15,061
Total White Female	68,520	74,148	79,266	82,695	85,144	86,751
Non-White Male						
16-25	4,303	4,906	5,335	5,780	6,219	6,744
26-45	12,815	13,426	14,173	15,183	16,467	18,099
46-65	13,683	17,877	21,954	24,925	27,114	28,165
66+	3,883	4,989	6,450	8,563	11,196	14,209
Total Non-White Male	34,684	41,197	47,911	54,452	60,996	67,218
Non-White Female						
16-25	1,764	1,998	2,149	2,323	2,499	2,707
26-45	3,430	3,721	4,027	4,378	4,757	5,176
46-65	5,770	7,552	9,289	10,521	11,482	12,159
66+	410	528	675	883	1,134	1,412
Total Non-White Female	11,374	13,799	16,139	18,104	19,873	21,454
Grand Total	387,087	426,048	463,544	493,597	519,594	541,533

APPENDIX B
PROJECTED NUMBER OF RESIDENT PARTICIPANTS USING CENSUS
BUREAU SERIES B

Table B-1. Projected Number of Marine Recreational Fishing Participants by State, 2000-2025, With Census Bureau Series B Population Estimates

State	Year					
	2000	2005	2010	2015	2020	2025
California	1,199,036	1,250,558	1,317,519	1,372,519	1,426,664	1,482,102
Oregon	204,421	225,539	244,595	259,086	270,746	279,915
Washington	385,426	421,670	455,199	480,757	502,216	519,835
Pacific Region	1,788,884	1,897,766	2,017,312	2,112,361	2,199,627	2,281,852
Regional Participation Rate	5.70%	5.68%	5.52%	5.32%	5.14%	4.95%

APPENDIX C

ADD-ON TELEPHONE SURVEY INSTRUMENT

TELEPHONE SURVEY INSTRUMENT

Questions marked by an * denote screening questions.

- **Version A and B (asked of those anglers that have either been fishing but not in the last 12 months or been fishing in the last 12 months but not in the last two months).**

Ask if non-12 month fisher in the base questionnaire

*Does anyone in your household go saltwater sportfishing?

- 1 yes
- 2 no (terminate interview)
- 99 Don't Know/Refused (terminate interview)

Ask if non-12 month fisher in the base questionnaire

*Are you one of the people who has been saltwater fishing but has not fished within the past 12 months?

- 1 yes
- 2 no
- 99 Don't Know/Refused {thank and terminate}

Ask if non-2 month fisher in the base questionnaire

*Are you one of the people who has gone saltwater fishing in the past 12 months but has not fished within the past 2 months?

- 1 yes {set nontwo=1}
- 2 no
- 9 Don't Know/Refused {thank and terminate}

*May I please speak with one of those people?

- 1 yes, transferring
- 2 no {thank and terminate}
- 99 Don't Know/Refused {thank and terminate}

*Hello, I'm conducting a survey of saltwater sport anglers for the National Marine Fisheries Service. We are collecting demographic information on saltwater sport anglers. This survey is being conducted in accordance with the Privacy Act of 1974. Therefore, you are not obligated to answer any question if you find it to be an invasion of your privacy. I understand that you participate in saltwater fishing, but that you have not done so within the past {RESTORE 12 OR 2} months. Is this correct?

- 01 Yes
- 02 No
- 98 Don't Know {thank and terminate}
- 99 Refused {thank and terminate}

*When was the last time you went saltwater sportfishing? Would you say it was ...

- 01 within the last 2 months
- 02 not within the last 2 months but within the last 12 months
- 03 more than 12 months ago, or
- 04 never {thank and terminate}
- 08 Don't Know {thank and terminate}
- 09 Refused {thank and terminate}

*Are you at least 16 years of age?

- 1 Yes
- 2 No {thank and term}
- 8 Don't Know {thank and term}
- 9 Refused {thank and term}

*Record Gender: Voice Recognition Only ... Do not ask.

- 01 Male
- 02 Female

*What was the last year in which you went saltwater sportfishing?

- 01 Record response: 19__ {range = 00 to 97}
- 98 Don't Know
- 99 Refused

1. How many days would you say you fished in {restore YEAR}? Would you say ... [Read]

- 01 1 day
- 02 2 to 3 days
- 03 4 to 6 days
- 04 7 to 12 days
- 05 more than 12 days
- 98 Don't Know
- 99 Refused

2. Did you do most of your fishing in {restore YEAR} from a boat or from the shore?

- 01 Boat (skip Q4)
- 02 Shore (skip Q3)
- 98 Don't Know
- 99 Refused

3. And was that from a party boat, charter boat, private boat, rental boat, or some other kind of boat?

- 01 Party or head boat
- 02 Charter boat
- 03 Private or rental boat
- 04 Some other kind of boat
- 98 Don't Know
- 99 Refused

4. And was that from a beach, pier, dock, jetty, bridge, some other manmade structure?

- 01 Pier/Dock
- 02 Jetty / Breakwater / Beachway
- 03 Bridge / Causeway
- 04 Other manmade structure
- 05 Bank / beach
- 98 Don't Know
- 99 Refused

5. Of the fishing trips that you made in {restore YEAR}, did you mainly ... [Read]

- 01 target some particular type of fish, or
- 02 did you fish for whatever you could catch, or (skip Q6)

- 03 did you do some of both?
- 98 Don't Know
- 99 Refused

6. What were the main kinds of fish you targeted in {restore YEAR}? {Multiple responses allowed - 2} [RECORD UP TO TWO RESPONSES; DO NOT PROMPT!!]

- 01 Display fish list
- 98 Don't Know
- 99 Refused

7. What is the PRIMARY reason you have not gone saltwater fishing more recently (than {restore year})? [DO NOT READ LIST -- RECORD ONLY ONE PRIMARY RESPONSE]

- 01 Preferred target species out of season
- 02 Management/restrictive regulations
- 03 Don't catch enough fish
- 04 Concerned about low abundance of fish stocks
- 05 Concerned about seafood safety
- 06 Poor weather conditions {SKIPTO Q10}
- 07 Too many people {SKIPTO Q10}
- 08 Too expensive {SKIPTO Q10}
- 09 Too far to travel {SKIPTO Q10}
- 10 Don't care much about fishing anyway/enjoy fishing only on occasional basis {SKIPTO Q10}
- 11 Not enough free time {SKIPTO Q10}
- 12 Poor health {SKIPTO Q10}
- 13 Other {SKIPTO Q10}
- 98 Don't Know {SKIPTO Q10}
- 99 Refused {SKIPTO Q10}

8. Does your concern pertain to any particular kind of fish?

- 01 Yes
- 02 No {SKIPTO Q10}
- 98 Don't Know {SKIPTO Q10}
- 99 Refused {SKIPTO Q10}

9. What kind of fish?

- 01 Display fish list
- 98 Don't Know
- 99 Refused

These final questions are for statistical purposes to ensure we've spoken with a random sample of anglers. I appreciate your continued cooperation.

10. Do you own a boat that could be used for saltwater sport fishing?

- 01 Yes
- 02 No
- 98 Don't Know
- 99 Refused

11. How many years of saltwater sportfishing experience do you have?

- 01 Record number of years {range = 0 to 90}
- 98 Don't Know
- 99 Refused

12. How would you rank your saltwater fishing ability on a scale of 1 to 5 where 1 is a novice and 5 is an expert?

- 01 novice
- 02
- 03
- 04
- 05 expert
- 98 Don't Know
- 99 Refused

13. In what year were you born?

[IF RESPONDENT HESITATES, QUICKLY RECORD AS REFUSED.]

- 01 Record year of birth {range is 00 to 82}
- 98 Don't Know
- 99 Refused

Ask if refused to provide birth year;

13a. Then would you mind telling me in which of the following age groups do you belong?

- 01 16 to 25
- 02 26 to 35
- 03 36 to 45
- 04 46 to 55
- 05 56 to 65
- 06 66 and over
- 98 Don't Know
- 99 Refused

14. Of the {restore from base questionnaire} people who live in your household, how many are under the age of 16?

- 01 record response {range is 0 to Q5A-1}
- 98 Don't Know
- 99 Refused

15. What is your ethnic background? Do you consider yourself ... [Read]

- 01 Non-Hispanic White
- 02 Hispanic White
- 03 Black
- 04 Asian
- 05 American Indian/Native American
- 06 Other - Specify: {30 Characters}
- 98 Don't Know
- 99 Refused

16. What is the highest level of education you've attained?

- 01 <12 years
- 02 High school graduate or GED
- 03 Some college or technical/trade school
- 04 2-year college degree
- 05 4-year college degree
- 06 Postgraduate degree
- 98 Don't Know
- 99 Refused

17. Which of the following best describes your employment status? Would you say...

- 01 Employed full-time, including self-employment
- 02 Employed part-time, including self-employment
- 03 Retired
- 04 Full-time homemaker
- 05 Student
- 06 Disabled
- 07 Other - Specify: {30 characters}
- 98 Don't Know
- 99 Refused

18. What is your total annual household income before taxes? Would you say ... [Read]

- 1 Less than \$15,000
- 2 \$15,001 to \$25,000
- 3 \$25,001 to \$35,000
- 4 \$35,001 to \$45,000
- 5 \$45,001 to \$60,000
- 6 \$60,001 to \$75,000
- 7 \$75,001 to \$100,000
- 8 \$100,001 to \$125,000
- 9 \$125,001 to \$150,000
- 10 \$150,001 to \$175,000
- 11 Greater than \$175,000
- 98 Don't Know
- 99 Refused

19. How many household members, including yourself, contribute to your household's income?

[Respondent said there were {restore from base questionnaire} people in household.]

- 01 record response {range = 1 to Q5A response}
- 98 Don't Know
- 99 Refused

END OF VERSION A

Version C (asked of those anglers that have been fishing in the last two months).

*Ask if 2 month fisher

1. On the fishing trips that you made between {restore TODAY-61} and {restore TODAY-1}, did you mainly ...
[Read]

- 01 target some particular type of fish, or
- 02 did you fish for whatever you could catch, or (Skip to END)
- 03 did you do some of both?
- 98 Don't Know {skip to END}
- 99 Refused {skip to END}

2. What were the main kinds of fish you targeted between {restore TODAY-61} and {restore TODAY-1}?
{Multiple responses allowed - 2}
[RECORD UP TO TWO RESPONSES; DO NOT PROMPT!!]

- 01 Display fish list
- 98 Don't Know
- 99 Refused

3. About how many of the {restore total number of days fished in-state and out-state} days that you fished in the last 2 months did you fish for {restore species 1 from Q2}?

- 01 record number of days {range = 1 to in-state days + out-state days}
- 98 Don't Know
- 99 Refused

4. About how many of the {restore total number of days fished in-state and out-state} days that you fished in the last 2 months did you fish for {restore species 2 from Q2}?

- 01 record number of days {range = 1 to in-state days + out-state days}
- 98 Don't Know
- 99 Refused

The remaining questions in this section are to be asked after all trips have been discussed with the 1st person in the 2-month fishing HH, before transferring to next fisher in HH or terminating the call; these questions are only asked of the first fisher in the HH

*Record Gender: Voice Recognition Only ... Do not ask.

- 01 Male
- 02 Female

*Are you at least 16 years of age?

- 1 Yes
- 2 No {thank and term}
- 8 Don't Know {thank and term}
- 9 Refused {thank and term}

Now I have a few more general questions about your fishing activity.

5. In addition to the fishing trips that you made in the past 2 months, did you make any other saltwater fishing trips in the past 12 months?

- 01 yes
- 02 no {skip to Q6}
- 98 Don't Know {skip to Q6}
- 99 Refused {skip to Q6}

6. Including the {restore from base questionnaire} days that we've already discussed, how many days did you fish in the past 12 months? [Note: You must enter at least {restore from base questionnaire} trips.]

- 01 record #of days fished in last 12 months {range is # of 2-month trips+1 to 305}
- 98 Don't Know
- 99 Refused

7. Did you do most of your fishing in the last 12 months from a boat or from the shore?

- 01 Boat (go to Q8)
- 02 Shore (go to Q9)
- 98 Don't Know
- 99 Refused

8. And was that from a party boat, charter boat, private boat, rental boat, or some other kind of boat?

- 01 Party or head boat
- 02 Charter boat
- 03 Private or rental boat
- 04 Some other kind of boat
- 98 Don't Know
- 99 Refused

9. And was that from a beach, pier, dock, jetty, bridge, some other manmade structure?

- 01 Pier/Dock
- 02 Jetty / Breakwater / Beachway
- 03 Bridge / Causeway
- 04 Other manmade structure
- 05 Bank / beach
- 98 Don't Know
- 99 Refused

10. Of the fishing trips that you made in the last 12 months, did you mainly ... [Read]

- 01 target some particular type of fish, or
- 02 did you fish for whatever you could catch, or
- 03 did you do some of both?
- 98 Don't Know
- 99 Refused

11. What were the main kinds of fish you targeted in the last 12 months? {Multiple responses allowed - 2}
[RECORD UP TO TWO RESPONSES; DO NOT PROMPT!!]

- 01 Display fish list
- 98 Don't Know
- 99 Refused

These final questions are for statistical purposes to ensure we've spoken with a random sample of anglers. I appreciate your continued cooperation.

12. Do you own a boat that could be used for saltwater sport fishing?

- 01 Yes
- 02 No
- 98 Don't Know
- 99 Refused

13. How many years of saltwater sportfishing experience do you have?

- 01 Record number of years {range =0 to 90}
- 98 Don't Know
- 99 Refused

14. How would you rank your saltwater fishing ability on a scale of 1 to 5 where 1 is a novice and 5 is an expert?

- 01 novice
- 02
- 03
- 04
- 05 expert
- 98 Don't Know
- 99 Refused

15. In what year were you born? [IF RESPONDENT HESITATES, QUICKLY RECORD AS REFUSED.]

- 01 Record year of birth {range is 00 to 82}
- 98 Don't Know
- 99 Refused

15a. Then would you mind telling me in which of the following age groups do you belong?

- 01 16 to 25
- 02 26 to 35
- 03 36 to 45
- 04 46 to 55
- 05 56 to 65
- 06 66 and over
- 98 Don't Know
- 99 Refused

16. Of the {restore from base questionnaire} people who live in your household, how many are under the age of 16?

- 01 record response {range is 0 to response from base questionnaire}
- 98 Don't Know
- 99 Refused

17. What is your ethnic background? Do you consider yourself... [Read]

- 01 Non-Hispanic White
- 02 Hispanic White
- 03 Black
- 04 Asian
- 05 American Indian/Native American
- 06 Other - Specify:
- 98 Don't Know
- 99 Refused

{30 Characters}

18. What is the highest level of education you've attained?

- 01 <12 years
- 02 High school graduate or GED
- 03 Some college or technical/trade school
- 04 2-year college degree
- 05 4-year college degree
- 06 Postgraduate degree
- 98 Don't Know
- 99 Refused

19. Which of the following best describes your employment status? Would you say...

- 01 Employed full-time, including self-employment
- 02 Employed part-time, including self-employment
- 03 Retired
- 04 Full-time homemaker
- 05 Student
- 06 Disabled
- 07 Other - Specify:
- 98 Don't Know
- 99 Refused

{30 characters}

20. What is your total annual household income before taxes? Would you say ... [Read]

- 1 Less than \$15,000
- 2 \$15,001 to \$25,000
- 3 \$25,001 to \$35,000
- 4 \$35,001 to \$45,000
- 5 \$45,001 to \$60,000

- 6 \$60,001 to \$75,000
- 7 \$75,001 to \$100,000
- 8 \$100,001 to \$125,000
- 9 \$125,001 to \$150,000
- 10 \$150,001 to \$175,000
- 11 Greater than \$175,000
- 98 Don't Know
- 99 Refused

21. How many household members, including yourself, contributed to your household's income?
[Respondent said there were {restore from base questionnaire} people in household.]

- 01 record response
- 98 Don't Know
- 99 Refused

{range = 1 to Base response}