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A Regional Analysis of Current and Future Florida Resident Participation in Marine Recreational Fishing

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Florida Department of Natural Resources

Florida Sea Grant College Program

Funded by Florida Saltwater Fishing License Revenues

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A Regional Analysis of Current and Future Florida Resident Participation in Marine Recreational Fishing

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A REGIONAL ANALYSIS OF CURRENT AND FUTURE FLORIDA RESIDENT PARTICIPATION IN MARINE RECREATIONAL FISHING

EXECUTIVE SUMMARY

This report describes and summarizes the results from a state-wide survey of Florida households concerning their participation in marine recreational fishing, their motivations for fishing, and attitudes toward management for Florida's fisheries. The survey was designed to identify current participants and to provide socioeconomic information about both participants and nonparticipants.

Data from the survey were used to estimate a forecasting model to project recreational fishing in different regions of Florida. The model was used to estimate participation in marine recreational fishing through the year 2010 for the state and for each of seven different regions within the state. These projections provide an indication of expected demands for Florida marine fishery resources due to population growth and other socioeconomic changes in different regions. Information on current participants' attitudes about Florida fisheries and estimates of future demands can be used by fisheries managers and the public to understand current and future trends affecting Florida's fisheries.

In this study, an add-on component (hereafter referred to as the University of Florida Participation Survey) to the Marine Recreational Fishing Statistical Survey (MRFSS) conducted by the National Marine Fisheries Service (NMFS) was used to gather data on fishing participants and nonparticipants. Additional information was elicited from participants who agreed to receive a mail questionnaire (referred to herein as the University of Florida Angler Survey). During the study period (July 1991 to June 1992), 76,549 telephone interviews were conducted by the NMFS and its contractor. Of this total, 7,164 households had participated in marine recreational fishing within the previous two months while 69,385 had not. Of the nonparticipants, 2,024 non-fishing adults were interviewed as part of this study to ascertain basic socioeconomic characteristics, recreational preferences, and reasons for not participating in saltwater fishing. Out of the 7,164 fishing households, 4,206 anglers were administered the Participation survey and were asked to participate in the Angler survey. The Angler survey was completed and returned by 2,349 anglers from whom motivations for fishing, species targeting preferences, and attitudes toward management were elicited.

Data from the Participation survey were used to estimate and project fishing participation rates for the state and on a regional basis. Statistical results showed that anglers were more likely to be white males, younger, come from larger households with more children, and have a higher income than non-anglers. Using the statistical results from the sample data along with 1990 U. S. Census data, the participation rate for marine recreational fishing was estimated to be 21.9 percent (2.3 million individuals) of Florida's population aged 15 years and older. The participation rate ranged across the various regions of the state from a low of 18.5 percent in

the 10 county region around Tampa Bay to a high of 25.9 percent in a 7 county region of northeast Florida.

The participation model and MRFSS data on individual fishing behavior were used to estimate the amount of effort directed toward Florida's saltwater fishery resources. The average annual number of fishing trips per resident angler for the 1991-92 fishing year was 8.7 trips. The average number of trips ranged between 4.1 and 15.0 trips per year across all regions. Within the entire state, an estimated 20.0 million trips were taken in 1991-92. Of these trips, 41 percent were taken from shore, and 56 percent were taken on a private boat. Only 3 percent of all Florida resident saltwater fishing trips were taken on charter boats. The distribution of trips by fishing area showed that 60.5 percent of all fishing trips were taken in in-shore or near-shore waters. These areas would typically be within the coastal waters of Florida and thus managed by the Florida Marine Fisheries Commission. Total fishing trips across modes and areas fished displayed substantial differences across the seven regions considered in the analysis. For example, in southeast Florida, a much higher percentage of total trips were taken in off-shore waters as compared to other regions. On the other hand, regions containing the Indian River and St. Johns River exhibited the highest proportion of trips taken in in-shore waters. The variation in the distribution of fishing trips exhibited in this study reenforces the need to take a regional approach to marine recreational fishery management in Florida.

Economic impacts of marine recreational fishing including economic output, personal income, and full-time-equivalent employment were also estimated. Total annual expenditures by all resident marine anglers were $1.3 billion 1991-92. The total value of economic output associated with marine recreational fishing for the 1991-92 fishing year was $949.1 million. This measure of economic output is lower than total expenditures due to the fact that only a portion of the value of wholesale and retail goods is produced in Florida. The economic output of $949.1 million represents that portion of total expenditures attributable to goods and services produced in Florida. Economic output attributable to marine fishing ranged from a low of $27.7 million in the Charlotte Harbor area to a high of $282.3 million in the Indian River area. The amount of personal income associated with marine recreational fishing amounted to $387.0 million and total full-time-equivalent employment was 22,887 individuals. Personal income and employment levels also varied considerably across the regions.

Data from the Participation survey were combined with MRFSS survey data to describe anglers' species targeting preferences. On approximately 25 percent of the trips, no target species was specified. For the 1991-92 fishing year, seatrout was the most popular species sought on trips when a target species was designated. Snook, redfish, grouper, and king mackerel rounded out the top five most popular target species. Each of these five species has been and continues to be a source of management concern. The preferred target species varied across seasons and areas fished. However, targeting behavior was consistent with seasonal patterns of availability and habitat in which a given species dominates. For example, species such as grouper, snapper, dolphin, and king mackerel were the most targeted species in deeper off-shore fishing areas. By contrast, species such as seatrout, redfish, and snook tended to dominate the in-shore and near-shore trips in which a target species was identified. The survey

findings show substantial regional diversity in species targeting within Florida. State and federal fishery managers should incorporate these differing patterns of regional species targeting, and likely catch, in the regulatory decisionmaking process.

The finding that redfish remains a popular target species in spite of the one-fish bag limit speaks to its popularity as a sportfish and provides evidence that angler's motivations for fishing go beyond keeping fish. Data on angler motivations for fishing corroborate this finding. When asked to rank 11 different motivations for fishing, respondents ranked "catching fish to eat" seventh overall. Enjoyment of nature, relaxation, and the challenge of catching fish all ranked higher than keeping fish to eat as motivations for fishing. Approximately 80 percent of the respondents indicated that they did not want to keep all the fish they caught. And, nearly two-thirds indicated they would still enjoy fishing if they had to release all fish caught. The same proportion of the sample also indicated that they preferred to catch one or two large fish rather than ten small ones. The majority of anglers preferred to catch and release fish and they supported the use of bag limits to control recreational catch.

Information provided through the MRFSS survey and the Angler survey was used to infer a compliance rate for recreational saltwater fishing license sales. The estimated compliance rate for the state was 87.1 percent and ranged from 84.3 to 90.1 percent across all regions. To check these calculations against actual license sales, the sample proportion of eligible anglers was multiplied by the projected number of participants to estimate the total number of participants that would be required to purchase a saltwater fishing license in 1991-92. The projected number of licenses sold (taking into account the compliance rate) exceeded the state's record of license sales by 39 percent. This overestimate of license sales may be due to the fact that not all license exemptions could be accounted for in the survey. Also, the compliance rate may be biased upwards due to the fact that individuals who responded to the Angler survey may have been more likely to comply with licensing requirements.

The Participation survey was used to project recreational fishing activity to the year 2010. Projected statewide participation rates for the years 1995, 2000, 2005, and 2010 show a general decline from 21.9 percent in 1991-1992 to 21.1 percent in 2010. However, population increases more than offset the decline in participation rates resulting in a net increase of 837.8 thousand anglers by the year 2010. On a regional basis, projected increases in the number of marine anglers range from a low of 18.7 percent in the Dade/Monroe region to a high of 63.6 percent in the Charlotte Harbor region.

The total number of fishing trips by Florida residents was projected to increase from 20.0 million trips in 1991-1992 to 27.9 million trips in 2010, a 39.7 percent increase. Increases in effort will be highest in the Charlotte Harbor region while the Dade/Monroe region will experience only a 26.5 percent increase. However, the Dade/Monroe region will continue to account for the highest number of resident fishing trips in the state.

Results from this study indicate that a growing number of Florida residents will engage in marine recreational fishing in the future. Rates of growth will reflect population changes

across regions and other factors that are unique to each region. Angler's preferences for different types of fishing and target species will also reflect the availability of fishing resource in each region. State and federal fishery managers should consider the regional diversity of fishing activity within the state and anticipate future demand for Florida's limited fishery resources.

A REGIONAL ANALYSIS OF CURRENT AND FUTURE FLORIDA RESIDENT PARTICIPATION IN MARINE RECREATIONAL FISHING

1. INTRODUCTION

1.1 Overview

This report describes and summarizes the results from a state-wide survey of Florida resident households concerning their participation in marine recreational fishing. The survey was designed to identify current participants and to provide socio-economic information about both participants and nonparticipants. As a part of the survey process, participants' attitudes and opinions about fisheries management were also elicited.

Data from the survey were used to estimate a forecasting model to project marine recreational fishing in different regions of Florida. The model was used to estimate regional participation in recreational fishing through the year 2010. These projections provide an indication of expected demands for Florida marine fishery resources due to population growth and other socioeconomic changes in different regions. Information on current participants' attitudes about Florida fisheries and estimates of future demands can be used by fishery managers and the public to understand current and future trends affecting Florida's fisheries.

This report is organized as follows. The remainder of this first section provides background information about prior studies of recreational fishing in Florida and provides definitions of the regions used in the remainder of the report. The second section presents the survey methodology used in the study and reports on the sample sizes and response rates for different components of the overall survey design. Section 3 describes the development of a forecasting model for marine fishing participation and presents estimates of current levels of participation in different regions and provides expenditure and total economic activity estimates for current levels of participation across regions. These expenditures are divided into trip related expenses and equipment investments. Section 4 presents information about anglers' species preferences across regions and fishing modes. The fifth section provides an analysis of anglers' motivations for marine fishing across regions. The sixth section describes anglers' attitudes about current and prospective fishery management regulations. This section also provides an analysis of current levels of compliance with Florida's marine fishing license requirements. Section 7 provides forecasts of future marine fishing participation and expenditures across regions for the years 1995, 2000, 2005 and 2010. Section 8 provides some concluding observations on past, present and future trends in resident participation in marine recreational fishing in Florida.

1.2 Background on Prior Studies of Recreational Fishing in Florida

Prior studies of resident saltwater fishing participation in Florida typically were based on relatively small samples and focused on state-level analysis. Some studies examined participation for the entire population while others only considered a portion of the population such as individuals 18 years and older. These differences make it difficult to directly compare prior studies and to identify trends in participation rates and the number of participants over time. A summary of these studies is provided in Table 1-1. Information provided in the table indicates the relevant population for each study. Estimates of either the participation rate or the number of participants were made for this comparison if both numbers were not provided in the original study. All estimates were based on population figures published in the Florida Statistical Abstract for the appropriate year.

In the earliest study of marine fishing participation in Florida, Ellis, Rosen, and Moffett (1958) estimated the participation rate was 33.8%. This was a time when most of the state's population was clustered near the coasts, many of the coastal areas were undeveloped, and Florida had not become the retirement mecca it would become in the 1970's and '80's.

The study by Bell, Sorensen, and Leeworthy (1982) was based on a state-wide telephone survey of 1,000 residents. Results indicated that 2.18 million, or 29.8 percent, of Florida residents (18 years and older) participated in marine fishing in 1981. Regional estimates of participation were provided but the regions were defined differently than this study. Also, due to the small sample size, these regional estimates were not statistically reliable. The researchers did not forecast future participation.

The Florida Department of Natural Resources conducts periodic surveys of Florida households to determine participation in different recreational activities. The most recent survey results published in 1989 indicated that 27.1% of all residents participated in saltwater boat fishing while 15.1% participated in non-boat marine fishing. These estimates are somewhat surprising considering that boat fishing is more expensive than fishing from shore and fewer people have access to boats. It was not clear in the study report whether the categories were mutually exclusive.

Another source of fishing participation estimates is the Marine Recreational Fisheries Statistics Survey (MRFSS) conducted by the National Marine Fisheries Service (NMFS). The MRFSS is an on-going effort that has provided fishing participation information annually since 1979. Estimates of the number of participants are provided for east and west coasts of Florida but not for smaller regions. The results in Table 1-1 show that participation estimates for the entire state have varied between 1.8 million and 2.9 million anglers of all ages in the 13 years between 1979 and 1991. There was considerable variability in the estimates during the early 1980s due to inconsistent surveying and small sample sizes. Many of these problems were reduced or eliminated in more recent years. The trend since 1985 has been toward fewer resident participants and a lower participation rate. The MRFSS does not provide projections of future participation.

TABLE 1-1. Summary of Prior Studies and Estimates of Florida Resident Marine Recreational Fishing Participation

Source	Year	Participation Rate	Number of Participants
Ellis, Rosen and Moffett	1958	33.8%	N/A
Bell, Sorensen and Leeworthy[a]	1981	29.8%	2,177,217
Florida Department of Natural Resources[b]	1987	27.1% (Boat) 15.1% (Non-Boat)	3,252,054* 1,812,030*
National Marine Fisheries Service (MRFSS)[b]	1979	28.0%*	2,646,000
	1980	27.9%*	2,718,000
	1981	11.7%[c]*	1,185,000[c]
	1982	17.4%*	1,812,000
	1983	18.1%*	1,934,000
	1984	22.3%*	2,453,000
	1985	26.4%*	2,990,000
	1986	20.8%*	2,422,000
	1987	18.1%*	2,176,000
	1988	17.8%*	2,196,000
	1989	14.9%*	1,883,000
	1990	13.9%*	1,798,000
	1991	16.0%*	2,076,000
Edwards[d]	1990	13.1%*	1,684,000
	2000	N/A	1,825,000
	2025	N/A	1,924,000
Bell[d]	1990	27.4% (Boat) 23.6% (Non-Boat)	2,884,084* 2,484,102*

[a]Based on adult population 18 years and older.
[b]Based on total state population.
[c]Partial results due to less than full year sampling.
[d]Based on adult population 16 years and older.
*Estimate
N/A - Not Available

The most recent study of Florida outdoor recreation preferences was Bell's 1990 survey of 1,000 residents (individuals 16 years and older). His findings indicated that 27.4% and 23.6% participated in boat and non-boat saltwater fishing, respectively. The report did not

clarify whether these activities were mutually exclusive. Based on 1990 population statistics, these rates imply that the number of participants in the two activities were 2.9 million and 2.5 million, respectively. These estimates are considerably higher than recent estimates from the MRFSS.

The only study to forecast future fishing participation in Florida was conducted by Edwards (1989). This study was based on state level data collected as part of the U.S. Fish and Wildlife Services' survey of hunting and fishing. Edwards estimated that 1.68 million residents (16 years and older) participated in 1990. He projected that the number of participants would increase to 1.9 million by 2025. Note that both estimates are lower than the NMFS estimates of participation for most of the 1980's and significantly lower than Bell's estimates of participation in 1990. Edwards' participation estimates were not disaggregated into different regions of the state.

This summary of existing studies of marine fishing participation by Florida residents indicates that there is considerable variation in the estimates and little agreement about whether participation is increasing or declining. The conflicting evidence is partly attributable to the fact that many of the previous studies were based on small sample sizes (typically 1,000 or less). The only study with relatively large sample size was the annual MRFSS but the survey design has not always been consistent. The present study uses data collected as part of the 1991-92 MRFSS study so the results cited in this report can be compared to prior year estimates from the MRFSS. Complete details about the survey methodology for this study are provided in Section 2.

1.3 Delineation of Regions Used in this Report

There are many possible ways to divide Florida into regions. For this study, regions were defined according to major estuarine areas and adjacent population centers. For example, the Charlotte Harbor estuarine area was defined as a region consisting of Charlotte, Collier and Lee counties. In all cases the combination of counties was selected which would provide the most consistent grouping of counties for fishery management purposes. Inland counties were grouped with coastal counties based on an inland county's proximity to the coast. The full regional classification system used for this study is shown in Table 1-2 and in Figure 1-1.

Also shown in Table 1-2 are the corresponding regional groupings that have been used recently by the Florida Marine Fisheries Commission (MFC, 1992). In most cases the regions defined for this study are very similar to the MFC regions. The exceptions are Region 1 which encompasses both the Big Bend and Panhandle regions as defined by the MFC. Also, Regions 2 (Tampa and Sarasota Bays) and 3 (Charlotte Harbor) are distinct regions rather than aggregated into the MFC's Southwest region.

The largest region is Region 2 which had a population of 2,481,172 residents or 23.6 percent of the total state population (ages 15 years and older). Region 1 has the largest number of counties of all the regions and covers the largest land area. This region spans several

TABLE 1-2. Classification of Regions Used in this Study and Relationship to Other Definitions of Regions in Florida

Regions	Coastal Counties	Counties Included			MFC Regions	1990 Population[a]
1	Hernando-North to Escambia	Alachua Bay Bradford Calhoun Citrus Columbia Dixie Escambia Franklin Gadsden Gilchrist	Gulf Hamilton Hernando Holmes Jackson Jefferson Lafayette Leon Levy Liberty Madison	Marion Okaloosa Santa Rosa Sumter Suwannee Taylor Union Wakulla Walton Washington	Big Bend (Hernando Co. to St. Marks R.) Panhandle (St. Marks to Escambia	1,450,276
2	Pasco - South to Sarasota	Desoto Hardee Highlands Hillsborough	Manatee Okeechobee Pasco	Pinellas Polk Sarasota	Part of Southwest	2,481,172
3	Charlotte, Lee, Collier	Charlotte Collier	Glades Hendry	Lee	Part of Southwest	526,695
4	Dade, Monroe	Dade	Monroe		Florida Keys	1,608,518
5	Broward, Palm Beach	Broward	Palm Beach		Southeast	1,754,970
6	Martin - North to Volusia	Brevard Indian River Lake	Martin Orange Osceola	Seminole St. Lucie Volusia	East Central	1,892,428
7	Flagler - North to Nassau	Baker Clay Duval	Flagler Nassau	Putnam St. Johns	Northeast	795,196

[a]Individuals 15 years and older.

estuaries including Pensacola Bay, Choctawhatchee Bay, Apalachee Bay and Waccassa Bay. The Indian River estuary system is included in Region 6 which is also the second largest region with 1,892,428 residents or 18.0 percent of the state population. The smallest region is Region 3 with 526,695 residents or 5.0 percent of the state population. Further discussion about the regions used for this study will be provided with the discussion of current participation in each region in Section 3.

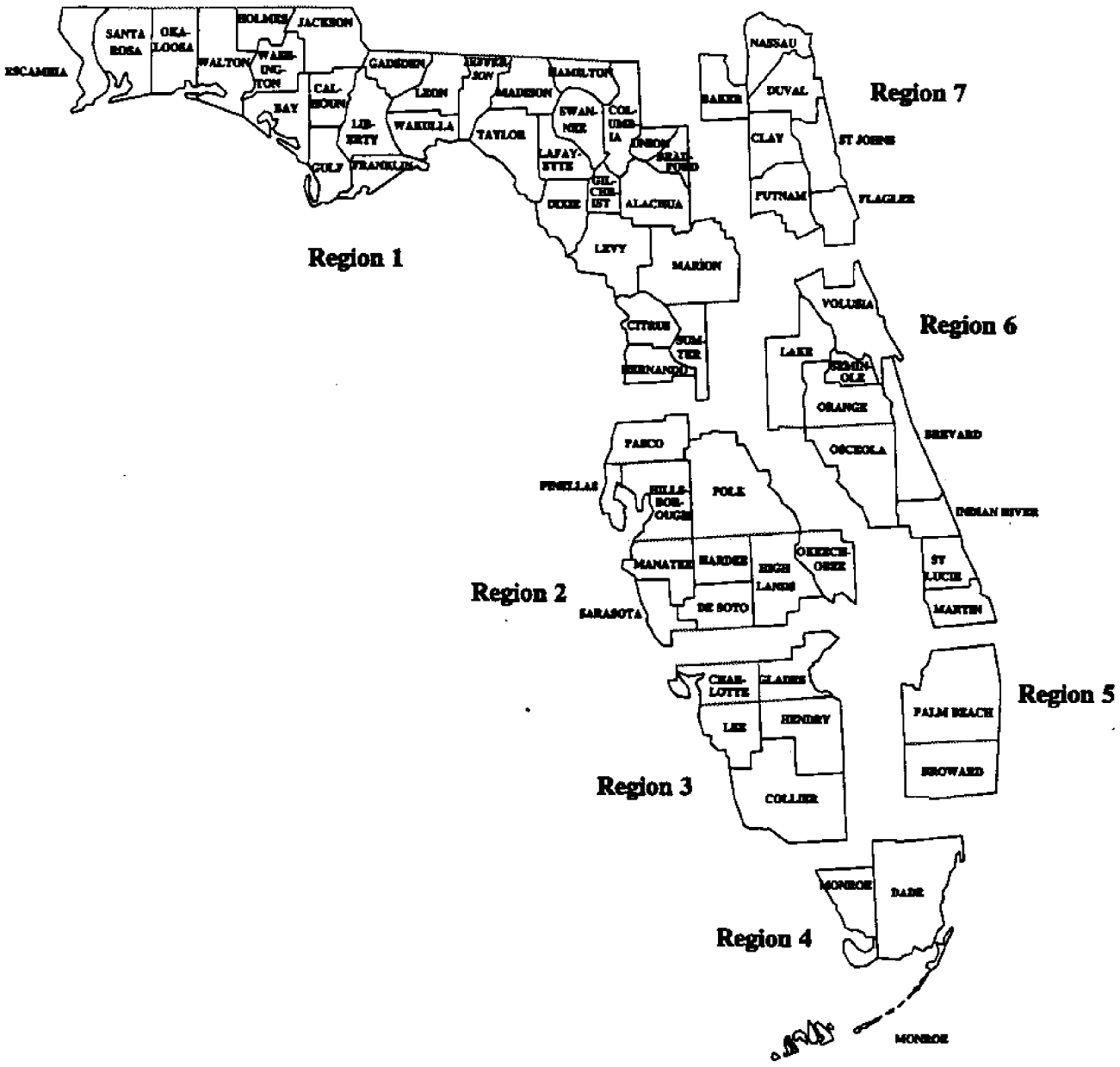


Figure 1-1. Classification of Study Regions

2. SURVEY METHODOLOGY

2.1 Survey Design and Procedures

Most prior surveys of marine recreational fishing in Florida have been based on relatively small samples. As a result, analyses and conclusions had a wide margin for error and were unreliable for any disaggregation below the state level. The only exception has been the Marine Recreational Fishing Statistics Survey (MRFSS) conducted annually by the National Marine Fisheries Service (NMFS). But, even this survey was concerned only with disaggregation for the east and west coasts of Florida. Only in the past few years has the MRFSS used a sufficiently large sample of Florida residents to permit statistically valid disaggregation to the regional level.

The plan for this study was to utilize the MRFSS telephone survey to identify fishing and nonfishing households and then conduct follow-up surveys to provide additional information. The MRFSS consists of two independent surveys: a telephone survey of households and an intercept survey of marine anglers. The telephone survey collects data from households about their participation in marine fishing and, if they participate, details about each of their fishing trips during the prior 2 months. Each 2 month block is considered a "wave" in the survey. The intercept survey collects data at fishing sites and boat ramps to document the actual catch of marine anglers. Because the intercept survey focuses on specific fishing sites and is subject to oversampling of more avid anglers, the telephone survey is generally considered to be a more representative sample of both fishing and nonfishing individuals. The MRFSS is conducted for states along the Atlantic and Gulf coasts of the U.S.

This study utilized the MRFSS telephone survey in Florida. This survey was stratified by county size and used random digit dialing. Only persons whose permanent, year-round residence was in Florida were interviewed. Interviews were conducted in Spanish, if appropriate. Working in conjunction with staff from the NMFS and their telephone survey contractor, additional questions were added to the telephone survey to provide information that has not been collected previously as part of the MRFSS. In addition, a mail survey was conducted based on contacts made in the telephone survey so that more detailed information could be collected. As a result, the survey design produced a large sample with detailed information about both anglers and non-anglers.

The basic structure of the survey design is illustrated in Figure 2-1. During the six waves from July 1991 to June 1992, the NMFS surveyed by telephone 76,549 resident households to determine whether anyone in the household had participated in marine fishing. Of this total, 7,164 households had participated in marine fishing during the prior 2 months while 69,385 had not. Of the 69,385 who had not participated during the prior 2 months, the NMFS interviewers conducted an additional stratified random survey of 2,024 persons (15 years or older) for this study. In this sample, 1,009 persons had fished during the prior 12 months (but not the prior 2 months) and 1,015 persons had not fished in the prior 12 months. The proportion of anglers and nonanglers in this survey was intended to meet specific sample design criteria and was not expected to reflect the true proportion of the two groups in the Florida population.

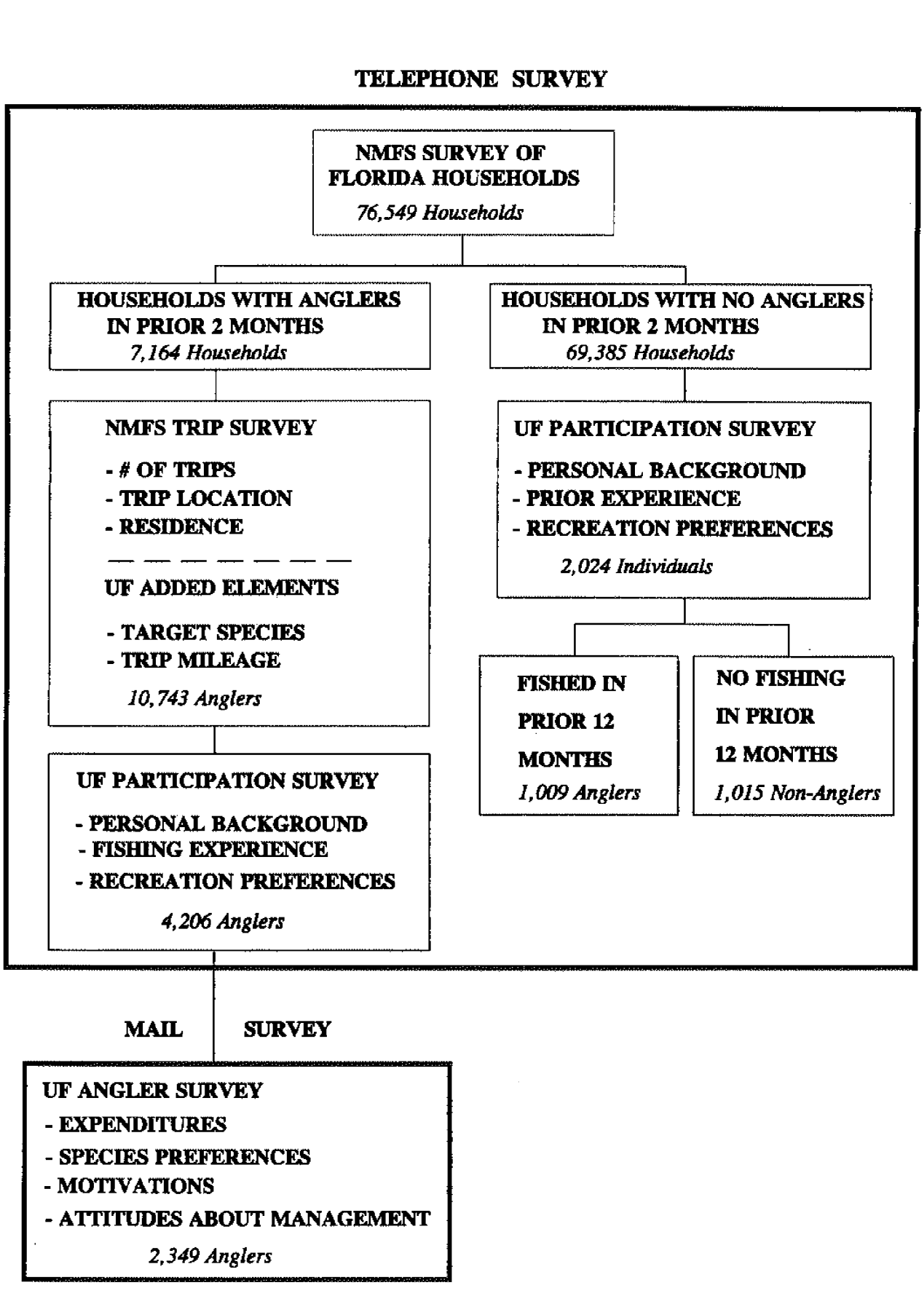


Figure 2-1. Overview of Survey Methodology and Sample Sizes.

This additional survey, described as the University of Florida Participation Survey, was designed to identify reasons why an individual did not participate in marine fishing. This information can be used to develop a forecasting model to predict fishing participation. A copy of the Participation Survey is included in Appendix 2.

For the 7,164 households who had participated in the prior 2 months, the NMFS interviewers conducted the basic MRFSS with 10,743 anglers in those households. The higher number of anglers than households is due to the fact that a single household may have more than 1 angler. The MRFSS questions (Appendix 1) were supplemented with additional questions to provide more detail about individual fishing trips for this study (referred to in the text as MRFSS-UF). The University of Florida Participation Survey (Appendix 2) was also conducted with a subsample of 4,206 anglers to provide information about the reasons why individuals participated in marine fishing.

The subsample of 4,206 anglers who were administered the University of Florida Participation Survey were also asked if they would be willing to receive and respond to an additional mail survey. This survey, named the University of Florida Angler Survey (Appendix 3), was completed and returned by 2,263 anglers. These numbers yield a response rate of 53.8 percent; there were an additional 86 surveys that were undeliverable. Compared to other mail surveys, this is a relatively high response rate. The overall response rate would be even higher if initial refusals were accounted for in the number of potential respondents.

Since the MRFSS telephone survey was stratified by county population and the Participation Survey was administered to a subsample of all respondents during the survey period, a weighting procedure was developed to adjust the raw data. The weights adjust for differences in county populations, sampling effort in different months, and the proportion of fishing and non-fishing households in the survey. The adjusted data are representative of the Florida resident population. Complete details about the weighting procedure and a comparison of socioeconomic characteristics between the Participation Survey sample and the Florida population are provided in the Appendix to this section.

Data from the Participation Survey, the Angler Survey, and the basic MRFSS are used in this analysis and are reported in the following sections. The data base is the largest, most comprehensive source of information about marine fishing participation and the preferences of Florida residents available to date. The large size of the data base provides more statistical accuracy than has been possible in previous studies of marine recreational fishing. Most state level statistical estimates in this study have a sampling error of plus or minus 2 percent. Regional level estimates have a sampling error of approximately plus or minus 3 to 5 percent, depending on the region.

2.2 Socioeconomic Profiles of Survey Respondents

Information from the University of Florida Participation Survey can be used to provide profiles of anglers and non-anglers who participated in the survey and the subsample of anglers

who responded to the University of Florida Angler Survey. These profiles are reported in Table 2-1. For this analysis, individuals who had fished during the prior 2 or 12 months were classified as anglers. This classification resulted in sample subgroups of 5,215 anglers and 1,015 non-anglers before the data were weighted for statistical analysis.

Angler and non-angler respondents to the Participation Survey are represented in the first 2 columns in Table 2-1. Compared to non-anglers, anglers were younger, were more likely white males from larger households with more children, and had a higher income. Anglers were also more likely to have had moderate or extensive fishing experience as a child and to prefer outdoor recreation instead of indoor leisure activities. These differences between anglers and non-anglers will be evaluated in more detail in Section 3 in the process of developing a forecasting model for marine fishing participation.

Column 3 in Table 2-1 presents a socioeconomic profile of respondents to the University of Florida Angler Survey. The results in Column 3 are very similar to those in Column 2 reflecting the fact that respondents to the Angler Survey, conducted by mail, were drawn from the Participation Survey. The close similarity between the profiles indicates that the high response rate to the mail survey (53.8 percent) minimizes the possibility of nonresponse bias in the data collected with the mail survey. Thus, the Participation Survey provides a representative sample of angler and non-angler Florida residents and the Angler Survey provides a representative sample of resident anglers.

2.3 Socioeconomic Profiles by Region

The survey sample profiles presented in Table 2-1 describe the socioeconomic characteristics of the sample respondents. Socioeconomic information from the UF Participation Survey for each of the seven regions is provided in Table 2-2. Sample size for each region is shown in the bottom row. The table shows that respondents in each region were similar but there were some important distinctions. Region 4 had a much higher percentage who indicated they were Hispanic. Region 3 had the oldest average age, the smallest household size, and the lowest percentage with a child reflecting the retirement community orientation of the Charlotte Harbor area. Region 1 had the lowest percentage of respondents who had graduated college and the lowest share with incomes over $50,000. On the other hand, Region 1 had the highest share of respondents who indicated they had extensive fishing experience as a child and the highest share who owned a boat. These differences in socioeconomic characteristics across regions illustrate the diversity of Florida residents and some of the factors that may contribute to different rates of participation in marine recreational fishing.

Table 2-1. Summary Statistics for Socioeconomic Characteristics of Survey Subsamples

Variable	UF Participation Survey		UF Mail Survey
	Non-Angler	Angler	
Age	47.8 (44.1)[a]	41.4 (7.98)	43.4 (7.61)
Gender (% Male)	39.7%	77.2%	82.1%
Years in Florida			
Less than 5	14.2%[b]	12.9%	13.4%
5-10	15.3%	15.6%	15.2%
11-20	26.2%	24.3%	24.2%
More than 20	44.3%	47.2%	47.2%
Ethnic Group			
White	88.6%	92.8%	94.9%
Black	9.1%	4.5%	2.9%
Other	2.3%	2.7%	2.2%
Percent Hispanic	4.5%	4.3%	4.4%
Marital Status			
Single	16.5%	20.4%	18.8%
Married	59.5%	66.7%	69.9%
Other	24.0%	12.9%	11.3%
Number in Household	2.51 (2.71)	2.97 (0.67)	2.88 (0.62)
Percent With Children Under 18	31.2%	43.5%	39.8%
Education			
High School	12.2%	11.8%	9.2%
High School Graduate	35.1%	30.3%	29.2%
College	26.0%	28.8%	30.3%
College Graduate	17.0%	18.3%	20.2%
Post-Graduate	8.7%	9.6%	10.6%
Income			
Under $25,000	33.3%	21.7%	20.3%
$25,000-$49,000	35.6%	37.4%	39.7%
$50,000-$74,999	10.0%	14.2%	15.7%
Over $75,000	3.8%	8.8%	9.8%
No Response	17.3%	17.8%	14.5%
Fishing Experience as a Child			
None	33.5%	16.6%	16.1%
Little	10.7%	5.0%	5.1%
Moderate	25.3%	25.6%	25.6%
Extensive	30.5%	52.8%	53.2%
Leisure Preferences			
Indoor	24.2%	2.7%	2.0%
Moderate Outdoor	43.9%	34.2%	31.7%
Extensive Outdoor	31.9%	63.1%	65.7%

[a]Sample means reported with standard deviation in parentheses.
[b]Totals may not sum to 100% due to incomplete responses to all items and rounding.

Table 2-2. Summary Statistics for Socioeconomic Characteristics of UF Participation Survey by Region

Variable	Region 1	2	3	4	5	6	7
Age	46.7 (14.6)[a]	48.7 (24.4)	51.1 (20.0)	44.8 (26.5)	45.7 (20.6)	43.5 (18.2)	44.5 (14.1)
Gender (% Male)	44.2%	46.3%	55.3%	59.0%	47.1%	45.7%	45.9%
Years in Florida							
Less than 5	13.7%[b]	13.1%	24.7%	8.3%	11.3%	14.3%	14.5%
5-10	9.3%	18.0%	19.8%	20.2%	19.3%	16.9%	14.1%
11-20	18.9%	26.9%	26.4%	30.4%	25.2%	34.5%	19.7%
More than 20	58.2%	42.0%	29.1%	41.0%	44.2%	34.4%	14.7%
Ethnic Group							
White	87.4%	93.9%	92.7%	88.6%	89.5%	90.1%	91.5%
Black	11.4%	4.9%	5.3%	7.4%	7.5%	6.9%	6.8%
Other	1.2%	1.2%	2.0%	4.1%	3.0%	3.0%	1.7%
Percent Hispanic	1.2%	2.4%	0.4%	29.6%	4.4%	3.2%	1.2%
Marital Status							
Single	15.7	19.1	11.1	31.5	21.2	16.5	16.2
Married	65.4	54.7	62.9	48.9	50.4	66.2	68.1
Other	18.9	26.2	26.1	19.6	28.4	17.4	15.7
Number in Household	2.71 (1.00)	2.56 (1.51)	2.29 (1.08)	2.61 (1.73)	2.57 (1.52)	2.63 (1.10)	2.92 (1.23)
Percent With Children Under 18	35.7	30.4	24.8	32.9	30.4	32.7	40.8
Education							
High School	16.2%	12.3%	10.2%	13.3%	4.5%	9.1%	13.3%
High School Graduate	32.2%	34.7%	37.3%	36.5%	31.1%	35.4%	35.0%
College	34.1%	25.5%	29.2%	21.7%	23.6%	29.1%	24.7%
College Graduate	12.1%	14.8%	15.0%	17.5%	25.4%	16.5%	18.1%
Post-Graduate	4.8%	11.5%	6.0%	10.7%	13.6%	8.2%	8.5%
Income							
Under $25,000	38.3%	33.5%	26.7%	34.5%	19.4%	25.9%	26.9%
$25,000-$49,000	35.6%	31.5%	26.3%	36.1%	38.6%	39.7%	39.2%
$50,000-$74,999	7.6%	11.4%	14.6%	10.9%	15.5%	8.6%	14.1%
Over $75,000	2.3%	5.6%	6.6%	3.5%	7.4%	4.0%	6.1%
No Response	16.2%	18.0%	25.9%	14.9%	19.1%	21.8%	13.7%
Fishing Experience as a Child							
None	21.6%	37.4%	39.4%	32.3%	31.4%	29.7%	29.1%
Little	7.5%	3.5%	8.7%	18.8%	11.9%	10.7%	9.5%
Moderate	27.9%	28.1%	17.4%	11.8%	26.2%	26.0%	25.9%
Extensive	43.0%	31.0%	34.5%	37.0%	30.5%	33.7%	35.6%
Leisure Preferences							
Indoor	21.3%	20.3%	18.5%	31.6%	16.5%	17.4%	19.2%
Moderate Outdoor	39.4%	40.2%	36.2%	32.5%	48.0%	44.1%	42.6%
Extensive Outdoor	39.3%	39.5%	45.3%	35.8%	35.6%	38.5%	38.2%
Own boat	30.7%	22.5%	22.9%	19.2%	14.9%	21.7%	24.3%
Sample Size	1269	1148	470	495	581	1337	668

[a]Sample means reported with standard deviation in parentheses.
[b]Totals may not sum to 100% due to incomplete responses to all items and rounding.

2.4 Technical Appendix - Sample Weighting Procedures

The MRFSS Telephone Survey was not a random sample because the sample was stratified by the number of households in different counties. Also, the UF Participation Survey was not administered to all 2 month and 12 month anglers or all nonanglers because the cost of full sampling would have been prohibitive (see Figure 2-1 for the actual sample sizes). Therefore, it was necessary to weight the raw survey data to adjust for these sampling methods using standard statistical procedures (Scheaffer, Mendenhall, and Ott; Manski and McFadden).

The weighting procedure can be decomposed into two components. The first component can be expressed as:

(1) B_r/A_{wr}

where

$$B_r = \frac{\text{Number of households in region r}}{\text{Total number of households in Florida}},$$

$$A_{wr} = \frac{\text{Sample number of 2 month, 12 month, and nonfishing households in region r, wave w}}{\text{Sample number of 2 month, 12 month, and nonfishing households in Florida, wave w}}.$$

With 7 regions and 6 waves, there are 42 values for (1) to use in weighting the sample.

The second component can be expressed as:

$$(2)\quad D_{jwr} = \frac{\text{MRFSS sample proportion of fishing/nonfishing households in region r, wave w}}{\text{UF Participation Survey sample proportion of fishing/nonfishing households in region r, wave w}},$$

where j = 1 for a fishing household and j = 0 for a nonfishing household. The numerator of (2) is derived from the full MRFSS while the denominator is from the UF Participation Survey.

The weights from (1) were used to adjust all data reported. The product of (1) and (2) was used to weight the sample data used in the participation model reported in Section 3. A comparison of selected socioeconomic characteristics from the weighted UF Participation Survey sample and with U.S. Census data for the Florida population are reported in Table 2-3. The comparison show that the sample data are highly representative of the Florida population. Differences between the sample and the population data occur primarily for characteristics for which population statistics are not directly comparable to the sample.

Table 2-3. Comparison of UF Participation Survey Sample and Florida Population

Socioeconomic Characteristic	UF Participation Survey Sample	Florida Population[a]
AGE		
15-24 years	9.0%	16.0%
25-44 years	37.7%	37.3%
45-64 years	28.9%	24.3%
over 64 years	24.4%	22.4%
MARITAL STATUS		
Never married	19.9%	22.6%
Married	59.6%	58.6%
Divorced	11.0%	8.8%
Widowed	9.5%	10.0%
GENDER		
Male	48.6%	47.7%
Female	51.4%	52.3%
RACE[b]		
White	91.7%	83.1%
Black	7.0%	13.6%
All others	1.2%	3.3%
NUMBER OF PERSONS IN HOUSEHOLD[b]	2.6	2.5
EDUCATION[c]		
No high school diploma	11.4%	25.6%
High school diploma	34.9%	30.1%
Some college	27.0%	26.0%
College graduate	17.0%	12.0%
Graduate degree	9.7%	6.3%
INCOME[d]		
Less than $24,999	36.9%	34.6%
$25,000 - $49,999	43.2%	38.1%
Over $50,000	20.0%	27.3%

[a]Percentages are computed from 1990 U.S. Census counts for persons aged 15 years and older as reported in Florida Statistical Abstract 1992, University of Florida, Bureau of Economic and Business Research, except as noted.
[b]Percentages reported for Florida are for the total population.
[c]Percentages reported for Florida are for the population 25 years and older.
[d]Income categories are not directly comparable, see source documents for actual categories.

Predictions of the numbers of anglers in each region were generated from the participation model reported in Section 3. The formulas for these predictions using the weights described in (1) and (2) was:

(3) Predicted number of anglers$_r$ = Σ_g Population$_{rg}$ * Mean Predicted Probability$_{rg}$

$$= \Sigma_g \text{ Population}_{rg} * \left[\frac{\sum_i w_{rg} P_{irg}}{\sum_i w_{rg}} \right]$$

$$= \Sigma_g \text{ Population}_{rg} * \left[\sum_i w_{rg} \frac{\left[\frac{\exp(x_{ig}' \beta_g)}{1 + \exp(x_{ig}' \beta_g)} \right]}{\sum_i w_{rg}} \right]$$

where w_{rg} is the product of (1) and (2) above, x_{ig} is the vector of observed characteristics of respondent i in the age-gender group g, and β_g is the vector of estimated coefficients for the age-gender group g. The rationale for obtaining the weighted averages (the term in the brackets) was to make each respondent in the sample representative of the population. In addition, the vector of coefficient estimates reflected population parameters as the participation model was estimated with weighted sample data.

The sum of (3) across all regions became the predicted number of anglers at the state level. Finally, the predicted rate of participation was obtained by dividing (3) by the population at the corresponding level, i.e., region or state. The source for population estimates was Population Studies published by the University of Florida Bureau of Business and Economic Research.

3. STATE AND REGIONAL PARTICIPATION, EFFORT AND ECONOMIC ACTIVITY IN 1991-1992

3.1 Development of the Participation Model

The purpose of the participation model is to explain and predict individual resident participation in recreational fishing. Participation is defined as fishing in estuaries or marine waters during the prior 12 months preceding an interview for this study. Information about participants and nonparticipants is combined to build a statistical profile of the socioeconomic and demographic factors that influence the decision to go saltwater fishing. The statistical information provides an estimate of the probability that an individual participated in marine fishing. Once the statistical coefficients of the model have been estimated, the model can be used to predict the probability that an individual will participate in marine fishing in the future.

The basic participation model can be summarized in the equation:

$$P_i = P(S_i, D_i, R_i)$$

where P is the probability of participation by the ith individual, S is a vector of socioeconomic variables that describe an individual's background, D is a vector of demographic variables that characterize the individual's age and household size, and R is a vector of regional variables that describe the individual's geographic location in the state. While the recreation literature indicates some socioeconomic and demographic variables are important determinants of fishing participation, there is little consensus on the proper specification of S and D. The statistical distribution for P_i depends on the data since there are no initial reasons to expect that participation will follow a certain distribution.

Data for the participation model are derived from the University of Florida Participation Survey described in Section 2. Socioeconomic and demographic variables used in the participation model are the same as those listed in Table 2-1. Regional dummy variables were added to this list of variables to account for the location of an individual's residence in one of the regions defined for this study (Section 1.3). These regional variables were used because statistical tests indicated that a state-level model would provide better predictions than separate models for each region of the state. This result suggests that regional differences in participation are primarily attributable to socioeconomic characteristics of residents in each region.

Coefficient estimates for the participation model are provided in Table 3-1. The table lists the variables and their statistical significance in the model. The estimation procedure was based on a lognormal (logit) distribution of the errors since the participation decision was skewed toward nonparticipation. The weighting procedure described in the appendix to Section 2 was used to weight individual responses in the participation model. To improve the performance of the model and to facilitate forecasting, some of the variables were redefined from the description provided in Table 2-1. For example, age was redefined from a simple average to a categorical variable for age groups 15 - 24, 25 - 44, 45 - 64, and over 65. Also, an interactive variable between age and gender was created to account for differences in male

Table 3-1. Weighted Logit Estimates of the Participation Model

Variable	Coefficient	Std. Err.	T-Value	P	Mean	Std. Dev.
YOUNG (0=never taken fishing as a child or teenager, 1=was taken fishing once or twice, 2=was taken fishing occasionally, 3=was taken fishing frequently)	0.245**	0.039	6.238	0.000	1.618	1.247
OWNBOAT (1=owns a boat or boats, 0=No)	1.609**	0.102	15.730	0.000	0.228	0.420
LEISURE (1=indoor type, 2=moderate outdoor, 3=extensive outdoor)	0.777**	0.083	9.203	0.000	2.197	0.741
HHSIZE (1=one person HH, 2=two-person HH, 3=3 to 5 persons in HH, 4=more than 5 persons in HH)	0.292**	0.073	3.920	0.000	2.303	0.768
YRFL (1=less than 5 years in FL, 2=5 to 10 years, 3=11 to 20 years, 4=21 to 30 years, 5=more than 30 years)	0.030	0.033	1.022	0.307	3.318	1.330
FULLTIME (1=employed full-time, 0=otherwise)	-0.016	0.107	-0.167	0.867	0.503	0.500
MARRIED (1=married, 0=otherwise)	0.044	0.109	0.445	0.656	0.610	0.488
WHITE (1=white 0=other)	-0.057	0.175	-0.282	0.778	0.923	0.267
EDUCATION (1=some HS, 2=HS grad., 3=some college, 4=college grad., 5=post-grad.)	-0.017	0.045	-0.296	0.768	2.820	1.148
INCOME (1=less than $25,000, 2=$25,000 to $49,999, 3=$50,000 tp $74,999, 4=more than $75,000)	0.194**	0.054	3.518	0.000	1.908	0.864

Table 3-1. Weighted Logit Estimates of the Participation Model (Continued)

Variable	Coefficient	Std. Err.	T-Value	P	Mean	Std. Dev.
AGE2F (1=female of 25-44 years of age, 0=otherwise)	-0.071	0.315	-0.227	0.820	0.183	0.387
AGE3F (1=female of 45-64 years of age, 0=otherwise)	-0.467	0.333	-1.400	0.161	0.161	0.368
AGE4F (1=female of 65 and above, 0=otherwise)	-1.046**	0.406	-2.575	0.010	0.120	0.325
AGE1M (1=Male of 15 to 24 years of age, 0=otherwise)	1.230**	0.359	3.423	0.001	0.046	0.209
AGE2M (1=Male of 25 to 44 of age, 0=otherwise)	1.396**	0.315	4.439	0.000	0.215	0.411
AGE3M (1=Male of 45 to 64 years of of age, 0=otherwise)	0.710**	0.318	2.234	0.026	0.143	0.350
AGE4M (1=Male of 65 and above, 0-otherwise)	0.758**	0.332	2.285	0.022	0.100	0.301
REG1 (1=Region 1 respondent, 0=otherwise)	-0.519**	0.184	-2.822	0.005	0.130	0.336
REG2 (1=Region 2 respondent, 0=otherwise)	-0.368**	0.172	-2.134	0.033	0.269	0.443
REG3 (1=Region 3 respondent, 0=otherwise)	-0.328	0.212	-1.547	0.122	0.072	0.258
REG4 (1=Region 4 respondent, 0=otherwise)	-0.140	0.212	-0.661	0.509	0.150	0.357
REG5 (1=Region 5 respondent, 0=otherwise)	-0.062	0.200	-0.308	0.758	0.134	0.340
REG6 (1=Region 6 respondent, 0=otherwise)	0.216	0.178	1.209	0.227	0.168	0.374
COAST (1=Coastal county, 0=otherwise)	0.868**	0.111	7.179	0.000	0.736	0.441
Intercept	-6.113**	0.497	-12.299	0.000	1.000	0.000

McFadden's R^2=0.276; Correct Predictions = 51.22%; Female of 15-24 years of age is the base category for AGE- variables; Region 7 is the base category for REG- variables; ** denotes the estimate is significant at the 5% level.

and female participation across age groups. Further discussion about these age/gender categories is provided in Section 7 which describes the forecasting methodology.

The results in Table 3-1 show that many of the variables used in the model are highly significant determinants of participation behavior. The probability an individual participates in marine recreational fishing increases if the individual: was taken fishing as a child, owns 1 or more boats, prefers active outdoor leisure, lives in a multi-person household, is male, has above average income, and lives in a coastal county. The regional variables show that individuals who lived in Regions 1 or 2 were less likely to have participated in marine fishing than other regions of the state, all other effects held constant. This negative relationship for Regions 1 and 2 may be due to access limitations, weather, lower fishing quality, or other constraints that could not be directly accounted for in the participation model.

It is also useful to note the interrelationships between different age groups and gender in explaining marine fishing participation. The coefficients indicate that as women exceed 45 years of age they are increasingly less likely to participate than younger women. Men, regardless of age, are more likely to participate than women but the likelihood of participation begins to decrease after 45 years of age. Thus, the model results suggest that an aging resident population in Florida would be less likely to participate in marine fishing.

The overall explanatory power of the model, based on a R^2 of .276 and correct prediction rate of 51.22 percent (Table 3-1), is relatively good. Recreational participation models typically have had poor explanatory power (R^2 values less than .10) because all the factors that influence people to choose specific recreational activities are unknown. While this participation model does account for many factors, it is far from perfect and does not fully identify the reasons why people decide to go saltwater fishing.

The primary variable that is not included in the model that could influence participation in different regions is the availability or "quality" of fishing in each region. A fishing quality variable could not be included in the model because no single variable can adequately measure fishing quality. Fishing quality is also dependent on an angler's skill and knowledge so it is not very accurate to represent fishing quality in terms of average measures such as the number of fish caught on a typical trip. To the extent that fishing quality varies by different regions of the state, the regional variables used in the participation model will capture some of the differences in participation due to the availability of marine fish. The regional variables are clearly not perfect measures, however, since other factors such as the number of access points and weather will also account for regional differences in participation. Until a reliable indicator of overall fishing quality is available for different regions of Florida, it will be impossible to evaluate the effect of variations in fishing quality on marine fishing participation.

3.2 Estimated Participation for Florida and Each Region

The participation model was used to estimate saltwater fishing participation rates for Florida and regions within the state for the survey year 1991 - 1992. The participation rates were estimated using averages from the sample for each variable in the model. The participation rates were used to calculate the number of participants in marine recreational fishing based on 1990 U.S. Census data for the population, ages 15 years and over, as reported in Population Studies published by the University of Florida, Bureau of Business and Economic Research. Although the years do not match exactly, the Census data are the most reliable current population data available and population changes in 1 or 2 years are likely to be very small. The estimated participation rate (for the state or region) was multiplied times the state (or regional) population to determine the number of participants (see Section 2.4).

Participation rates from the sample data and from the participation model are presented for Florida and each region in Table 3-2; the table also provides the estimated number of marine fishing participants in 1991-1992. For Florida, the estimated participation rate of 21.9 percent compares with a weighted sample participation rate of 20.9 percent. The estimated participation rate indicates that 2,302,500 participants engaged in marine recreational fishing during the survey year. Comparing this estimate to prior estimates reported in Table 1-1, the 21.9 percent estimate is about halfway between Bell's estimate of 27.4 percent and Edwards' estimate of 13.1 percent, both for 1990. These estimates applied to persons 15 years and older, the same population group used for this study.

Table 3-2. Resident Marine Recreational Fishing Participation Rates and Number of Participants for Florida and by Region, 1991-1992

	Sample Participation Rate[a]	Estimated Participation Rate[b]	Estimated Number of Participants[c]
Florida	20.9%	21.9%	2,302,500
Region			
1	19.0%	21.1%	305,523
2	17.7%	18.5%	459,521
3	21.3%	21.4%	112,900
4	22.3%	20.6%	331,635
5	22.6%	23.0%	403,510
6	22.7%	25.5%	483,346
7	24.9%	25.9%	206,066

[a]Computed from weighted UF Participation Survey sample data.
[b]Estimated from the participation model for adults 15 years and older.
[c]Based on estimated participation rates and 1990 U.S. Census data for persons aged 15 years and older.

Also, the estimate of 2,302,500 participants is similar to the NMFS' estimate of 2,076,000 anglers in 1991. It should be noted, however, that the NMFS' estimate includes all ages whereas the estimate from the participation model applies to persons 15 years and older. This difference in population definitions leads to a lower participation rate for the NMFS estimate. But, this distinction is not very important since it is not likely that there is a large number of participants under 15 years of age. The similarity between these 2 estimates of the number of participants is very encouraging because the NMFS estimates are based primarily on the Intercept survey portion of the MRFSS while this study uses an enhanced version of the Telephone survey data (see Section 2). Both approaches have advantages and disadvantages, but the important point is that both procedures yielded similar results for almost the same period of time. Thus, the participation model estimated in this study appears to be a reliable tool to estimate marine fishing participation.

The regional participation estimates in Table 3-2 show considerable variation in participation behavior around Florida. Participation rates vary from 18.5 percent in Region 2 to 25.9 percent in Region 7. Three regions (5, 6 and 7) had participation rates above the state average while 4 regions (1, 2, 3 and 4) were lower than the state average. This variation reflects differences in individuals' socioeconomic characteristics across the regions, their preferences for leisure recreation, and their proximity to marine waters.

3.3 Estimated Total Marine Recreational Fishing Effort by Region in Florida

Participation in marine recreational fishing in different regions indicates the level of interest in the activity by residents in that region. Total fishing effort, however, also depends on the number of fishing trips taken by anglers. These trips may be to sites within the same region as an angler's residence or to other regions around the state. Table 3-3 shows the average annual number of fishing trips taken by anglers who resided in each region in 1991-1992. These averages included trips to all regions of Florida, not just trips to fishing sites within an angler's home region. The annual averages were computed by summing the average number of trips in each 2 month wave across all waves (with appropriate adjustments for nonparticipation in each wave). The procedure minimizes the problem of recall bias associated with 12 month recall periods. The results show that the average number of trips varied considerably across the state. The northern regions (1 and 7) had the lowest average while the other regions were relatively similar, with the exception of region 4. Participation rates and effort levels were not directly correlated since the region with the highest average number of trips (Region 4) had one of the lowest participation rates.

Table 3-3. Average Annual Number of Fishing Trips by Residents in All Regions of Florida, 1991-1992.

	Region						
	1	2	3	4	5	6	7
Average Annual Trips	4.1	10.8	9.3	15.0	9.4	6.3	4.8

Total fishing effort (number of trips) in any destination region, however, depends on participation by residents in that region and participation by residents from other regions who choose a site in that region as a destination for their fishing trip. The combination of local residents and residents from other regions will determine total fishing effort in any region. Table 3-4 presents estimates of total marine fishing effort (number of trips) by Florida residents in each destination region and a breakdown of total trips by mode and fishing area in 1991-1992. Trips in a destination region are the sum of trips by resident participants in that region and trips by participants from other regions who chose that region as their destination to fish. A trip is equivalent to a day of fishing regardless of the number of hours for the trip. Fishing journeys spanning 2 or more days are defined as 2 or more trips.

Looking first at total trips (fishing days) within Florida, the estimate of 20,013,856 trips from this survey can be compared to the most recent estimates of effort by the NMFS from the MRFSS. [See U.S. National Marine Fisheries Service, 1992, Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coast, 1990-1991, Current Fishery Statistics No. 9204.] The NMFS estimate for 1991 was 17,018,000 trips within Florida by Florida residents. The higher estimate from this survey can be explained in part by the fact that NMFS estimates are based on trips within either the Atlantic or Gulf coast regions. Trips across regions are not included in the NMFS estimation methodology. Also, the prediction error for both estimates is relatively large so that, on a statistical basis, the estimates are equivalent. Thus, the estimate of 20.0 million resident trips from this survey is consistent with prior NMFS estimates. None of the other breakdowns of fishing effort presented in Table 3-4 (e.g. by region, by mode, by fishing area) are available in the NMFS estimates of fishing effort in Florida from the MRFSS.

Another useful reference point is Bell, Sorenson, and Leeworthy's 1982 study, the only other independent statewide survey of marine fishing (see discussion in Section 1-2). They estimated that 2,177,217 anglers generated 42,150,921 days of fishing effort in 1980-81, an average of 19.4 days per angler. Their estimate for 1980-81 is signficantly higher than the 20,013,856 trips (days), or 8.7 trips per average angler, estimated in this study for 1991-92. While this comparison suggests there has been a significant decline in total recreational fishing effort over the past 10 years, there are several reasons to question Bell et al.'s estimate.

Table 3-4: Estimated Resident Marine Recreational Fishing Effort by Destination Region, Mode and Fishing Area in Florida, 1991-1992

Destination Region	Total[a] Trips	Mode			Fishing Area		
		Shore	Private Boat	Charter Party	In-Shore	Near-Shore	Off-Shore
1	1,256,741	519,365 (41.3%)	716,637 (57.0%)	20,739 (1.7%)	438,662 (43.5%)	346,676 (34.4%)	222,428 (22.1%)
2	4,481,131	2,206,655 (49.2%)	2,215,900 (49.5%)	58,084 (1.3%)	1,827,662 (51.8%)	841,441 (23.8%)	860,960 (24.4%)
3	1,330,675	551,886 (41.5%)	756,541 (56.9%)	22,248 (1.7%)	493,942 (49.6%)	291,992 (29.3%)	208,971 (21.0%)
4	5,419,332	1,173,401 (21.7%)	3,957,287 (73.0%)	288,644 (5.3%)	855,189 (17.9%)	1,352,540 (28.4%)	2,560,666 (53.7%)
5	3,350,727	1,434,825 (42.8%)	1,779,654 (53.1%)	136,248 (4.1%)	554,612 (24.0%)	196,723 (8.5%)	1,562,084 (67.5%)
6	3,138,228	1,633,956 (52.1%)	1,447,576 (46.1%)	56,115 (1.8%)	1,551,202 (65.5%)	188,393 (8.0%)	630,089 (26.6%)
7	1,037,022	654,403 (63.1%)	372,073 (35.9%)	10,546 (1.0%)	442,653 (70.2%)	66,132 (10.5%)	121,356 (19.3%)
Florida	20,013,856	8,174,491 (40.8%)	11,245,668 (56.2%)	592,625 (3.0%)	6,163,921 (39.5%)	3,283,897 (21.0%)	6,166,553 (39.5%)

[a] Numbers and precentages for modes and fishing areas, respectively, do not sum to total trips for each region due to incomplete reporting.

First, NMFS estimates of total fishing effort in 1980, based on the MRFSS, were 16,857,000 trips (days), or an average of 6.2 trips per angler (see U.S. National Marine Fisheries Service, 1984, Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts - 1980, Current Fishery Statistics No. 8322). Although the MRFSS had many problems in 1980 (e.g. inconsistent sampling, inadequate randomization across regions), total state level estimates are still quite plausible considering the consistency of the annual participation estimates (see Table 1-1). Second, Bell et al.'s survey used a 12 month recall period for fishing days. Most survey researchers believe a 2 month recall period (the same period used for both the telephone and intercept parts of the MRFSS) is best for travel related information and there is little evidence that 12 month recalls are accurate. Studies indicate that longer recall periods yield upwardly biased estimates of reported behavior (Beimer, Paul P. 1991. Measurement Error in Surveys, New York: Wiley Interscience). Third, Bell et al. had a small sample which would increase the significance of outliers in sample averages. To be specific, the average of 19.4 trips per angler per year in Bell et al. had a standard deviation of 35.63 (Appendix A.3, pp. 72). This statistic is almost twice as large as the average indicating that the average was not a very precise measure. Thus, Bell et al.'s estimate of fishing effort may have been upwardly biased and should not be compared with the results from this study to determine historical trends.

Returning now to the regional breakdown of total fishing effort by Florida residents, Table 3-4 shows that regions 2, 4, and 5 had the highest number of fishing trips to sites within these regions in 1991-1992. This is not surprising since the information presented in Table 1-2 showed that these regions also were among the largest in terms of population. This association indicates an important aspect of fishing behavior by Florida residents -- the vast majority of fishing trips by Florida residents were taken to sites within their own region. This implies that population growth within each region would be the most important determinant of future fishing effort in that region, if leisure preferences and travel behavior remain the same in the future.

The second, third and fourth columns of Table 3-4 show the distribution of residents' fishing trips in Florida and in each destination region by fishing mode. For the state as a whole, private boat fishing (which includes rental boats without captains) accounted for the majority (56.2 percent) of fishing trips with shore fishing (beaches, piers, bridges, etc.) a close second. Charter and party boat fishing accounted for only 3.0 percent of all trips by Florida residents. This distribution of fishing effort is important because it helps to determine local fishing pressure on particular species.

The averages of fishing effort in Florida by different modes do not reflect the considerable variability across regions. Table 3-4 shows that, in Region 4, private boat fishing accounted for 73.0 percent of all effort while shore fishing accounted for just 21.7 percent. This region also had the largest share of effort attributable to charter/party boat fishing. By contrast, Region 7 had 63.1 percent of all effort in the shore mode and 35.9 percent in the private boat mode. Other regions were more similar to the state averages.

The distribution of fishing effort by fishing area (in-shore means along the shore or in a bay or estuary, near-shore means shallow open water, off-shore means deep open water) on

the right side of Table 3-4 also reflects the variability of fishing effort in different regions. For the state as a whole, the majority of fishing effort occurred in in-shore waters (39.5 percent) and near-shore waters (21.0 percent) waters. [The reader should note that the number of trips by fishing area does not sum to the total trips in Florida due to incomplete reporting of fishing area by respondents in the telephone survey.] These areas would typically be within the coastal waters of Florida and thus managed by the Florida Marine Fisheries Commission. Regions 1, 2, and 3, which lie along the Gulf of Mexico coast of Florida, show a pattern similar to the state averages. On the other hand, Regions 4 and 5 along the southeast Florida coast, which are in close proximity to the Gulf Stream, had a much higher percentage of total effort in off-shore waters. Regions 6 and 7, which contain the Indian River and St. Johns River systems, respectively, had the largest percentage of effort in in-shore waters with much smaller shares of fishing effort in off-shore waters. These differences across regions highlight the importance of a regional approach to evaluate fishing effort in Florida and the need to identify trends within these regions in order to anticipate future growth in fishing effort.

An additional dimension of fishing effort is the travel behavior of Florida resident anglers. Table 3-5 shows the percentage distribution of trips within a destination region according to the region of anglers' residence. For example, reading across the row for Region 1, 97.6 percent of the trips in Region 1 were made by residents from that region. Residents from Region 2 made 0.7 percent of the trips in Region 1, residents from Region 6 made 0.9 percent of the trips, and so on. The fact that fishing effort in each region is dominated by residents from that same region is evident in the percentages along the diagonal in Table 3-5. In every

Table 3-5. Distribution of Fishing Effort in Destination Regions by Region of Residence

Destination Region	Region of Residence						
	1	2	3	4	5	6	7
	%						
1	97.6	0.7	0.0	0.0	0.0	0.9	0.8
2	1.9	95.1	0.8	0.3	0.0	1.7	0.2
3	0.9	7.4	87.5	0.7	0.6	2.7	0.2
4	1.4	3.9	2.0	80.0	7.5	4.3	0.9
5	0.9	1.8	0.3	0.7	92.1	3.8	0.4
6	1.0	3.0	0.1	0.1	1.6	93.3	0.9
7	3.6	1.1	0.0	0.0	0.1	2.6	92.6

destination region except two, residents from that region accounted for over 90 percent of the total trips. The only exceptions were Regions 3 (Charlotte Harbor) and 4 (Miami and the Keys). The table indicates that residents from other regions travel to Regions 3 and 4 to fish, but residents from Regions 3 and 4 rarely travel to other regions. These figures suggest that these two regions are the only ones where population growth in other regions of Florida would have any significant influence on fishing effort in another destination region, if current destination preferences continue in the future.

3.4. Economic Activity Associated with Florida Resident Saltwater Angling

In the University of Florida Angler Survey, respondents were asked to report the amount of money that he/she spent on a typical fishing trip taken during a given wave. The categories used in the survey were expenses for boat fuel, party fees, tackle, bait, ramp fees, equipment, and lodging. Respondents were also asked to report the cost of replacing equipment that they owned such as rods and reels, tackle, boats, motors, trailers, and electronic equipment. Since only one member of a fishing household completed the mail portion of the survey, the trip expenditures were assumed to be representative of average trip expenditures for all members of that household. However, the replacement cost of equipment used for saltwater fishing was assumed to be representative of the entire household. The average annual trip expenditures per angler for any given expense category were then calculated as:

$$Average\ Annual\ Expense_j = \sum_{k=1}^{6} \left[\frac{\sum_{h}^{m} Expenses_{hjk} * Trips_{hk}}{Total\ Anglers_k} \right]$$

where: m = the total number of two-month anglers in wave k, j = expense category, k = wave, h = household, $Expense_{hjk}$ = reported trip expenses by the household representative (survey respondent), $Trips_{hk}$ = the total number of trips taken during the wave by all household members, and Total Anglers = the total number of two-month and twelve-month anglers in the wave. Average annual expenses were calculated for Florida and for each region. Note, however, that regional averages are for average expenses incurred by a resident of that region, whether or not such expenses were incurred within or outside the region of residence. The estimated average annual expenditures per angler are reported in Table 3-6.

Table 3-6. Average Annual Expenditures Per Florida Resident Saltwater Angler (1991-92): Florida and Regions

Region		Expenditure Categories: Boat Fuel ($)	Party/ Charter Fees ($)	Tackle ($)	Bait ($)	Ramp Fees ($)	Equip-ment ($)	Lodging ($)	Total Expenses ($)
Florida		224.12	103.61	72.43	69.70	6.50	0.86	99.27	576.49
Region	1	200.99	79.42	77.81	51.77	7.89	0.53	59.29	477.70
	2	272.56	174.97	63.79	75.09	6.90	0.62	106.86	700.79
	3	232.97	68.62	56.41	46.19	3.71	0.00	15.17	423.07
	4	227.20	87.94	43.68	77.65	6.55	0.05	31.33	474.40
	5	258.85	83.85	74.66	56.98	3.99	0.00	91.72	570.05
	6	175.48	98.35	94.72	91.45	8.36	3.65	245.31	717.32
	7	146.67	31.76	103.72	58.53	4.71	0.11	36.94	382.44

State-wide, total average annual expenditures on saltwater recreational fishing was $576.49 per angler. This figure is comparable to that of Bell et al.'s 1981 estimate of $508.97 per angler. On a regional basis, average annual expenditures ranged from a high of $717.32 in region 5 to a low of $382.44 per angler in region 7. Overall, anglers in regions 5, 2, and 6 spent above the state average while average annual expenditures by anglers in all other regions were below the state average. On a state-wide basis, boat fuel was the largest single expense item followed by party fees, lodging, tackle, and bait. Payments for ramp fees and equipment purchased on a given trip constitute only a small proportion of total trip expenditures both on a state-wide and a regional basis. On a regional basis fuel expenses are highest in region 2 followed by regions 5, 3, 4, 1, 6, and 7. Fees paid to party boats are highest in region 2 followed by regions 6, 4, 5, 1, 3, and 7. Average annual expenses for tackle are highest in region 7 followed by regions 6, 1, 5, 2, 3, and 4. Expenses for bait were highest in region 6 followed by regions 4, 2, 1, 7, 5, and 3. Lodging expenses were highest in region 6 followed by regions 2, 5, 1, 7, 4, and 3. Lodging expenses in region 6 were higher than the other regions because region 6 had a large number of participants who lived in inland counties and spent more than 1 day fishing on the coast.

The total annual expenditures by all Florida saltwater anglers can be calculated by multiplying the average annual expenditures from Table 3-6 by the projected number of anglers for the state and for each region (provided earlier in Table 3-2). The results of these calculations are shown in Table 3-7.

Table 3-7. Total Annual Expenditures by Florida Resident Saltwater Anglers (1991-92): Florida and Regions

Region		Expenditures in $1,000's by Category							
		Boat Fuel	Party/ Charter Fees	Tackle	Bait	Ramp Fees	Equip-ment	Lodging	Total Expenses
Florida		516,045	238,562	166,776	160,481	14,973	1,988	228,578	1,327,405
Region	1	61,406	24,263	23,771	15,816	2,411	161	18,112	145,944
	2	125,247	80,401	29,313	34,504	3,170	283	49,104	333,024
	3	26,302	7,746	6,368	5,215	418	0	1,713	47,764
	4	75,347	29,163	14,485	25,750	2,173	16	10,390	157,327
	5	104,446	33,835	30,127	22,991	1,610	0	37,009	230,021
	6	84,816	47,534	45,781	44,202	4,043	11,762	118,570	346,711
	7	30,222	6,545	21,373	12,060	971	22	7,612	78,809

The estimated expenditures for all Florida resident saltwater anglers was $1,327,405,000 in 1991-92. This figure compares to expenditures in the amount of $1.11 billion reported by Bell in 1981. On a regional basis, total expenditures were highest in region 6 followed by regions 2, 5, 4, 1, 7 and 3. Due to regional differences in participation rates, the relative ranking of each region in terms of total amount spent by category differs in comparison to relative rankings based on average expenditures. For example, average fuel expenditures were highest in region 2 followed by regions 5, 3, 4, 1, 6, and 7. On the basis of total expenditures by all anglers, fuel expenses were highest in region 2 followed by regions 5, 6, 4, 1, 7, and 3. For tackle, average expenditures were highest in region 7 but expenditures by all anglers on tackle were highest in region 5.

Average household investment in gear, boats, and equipment was calculated as:

$$Average\ Equipment\ Investment_j = \sum_{k=1}^{6} \left[\frac{\sum_{h}^{m} Investment_{hjk}}{Total\ Angler\ Households_k} \right]$$

where: m = the total number of two-month anglers in wave k, j = expense category, k = wave, h = household, $Invest_{hjk}$ = equipment investment reported by the household representative, and Total Anglers = the total number of two-month plus twelve-month fishing households in the wave. To better reflect the difference between households that owned a boat

and households that do not own a boat, the data were sorted and average household equipment investment was calculated for boat and non-boat households. Estimated equipment investment for boat and non-boat households is reported in Tables 3-8 and 3-9 respectively.

Table 3-8. Average Fishing Equipment Investment Per Florida Resident Saltwater Angler Boat-Owner Households (1991-92): Florida and Regions

	Equipment Investment Category					
Region	Rod/ Reel ($)	Tackle ($)	Boat ($)	Electronic Equipment ($)	Other ($)	Average Total Investment ($)
Florida	974.27	377.89	17,105.87	1,165.32	460.14	20,083.49
Region 1	723.14	383.64	13,240.96	815.02	428.12	15,590.88
2	779.11	301.21	13,905.51	1,017.80	330.42	16,334.05
3	888.27	380.62	16,364.37	1,356.02	645.72	19,634.00
4	1,441.21	389.63	27,151.59	1,530.59	446.15	30.959.17
5	1,501.75	455.81	18,108.63	1,429.80	709.03	22,205.02
6	842.13	414.27	18,189.60	1,215.66	415.10	21,076.76
7	810.71	375.04	11,415.36	933.18	535.16	14,069.45

State-wide average total equipment investment was $20,083.49 per boat-owner household. Not surprisingly, the majority of equipment investment on a statewide and regional basis is in boats and related equipment (ie. boat motor and trailer). On a statewide basis, levels of equipment investment in rods and reels and in electronic equipment (depth finders, navigational aids etc.) were similar. This pattern is also observed on a regional basis. Investment in tackle and miscellaneous equipment were small relative to the other investment categories. On a regional basis, boat-owner household investment in rods and reels is highest in region 5 followed by regions 4, 3, 6, 7, 2, and 1. Equipment investment in tackle is highest in region 5 followed by regions 6, 4, 1, 3, 7, and 2. Investment in boats and related equipment is highest in region 4 followed by regions 6, 5, 3, 2, 1, and 7. Investment in electronics is highest in region 4 followed by regions 5, 3, 6, 2, 7, and 1. Miscellaneous equipment investment (SCUBA gear, boating safety equipment, cast nets, etc.) is highest in region 5 followed by regions 3, 7, 4, 1, 6, and 2.

Table 3-9. Average Fishing Equipment Investment Per Florida Resident Saltwater Angler Non-Boat-Owner Households (1991-92)

Region	Equipment Investment Category				Average Total Investment ($)
	Rod/ Reel ($)	Tackle ($)	Electronic Equipment ($)	Other ($)	
Florida	339.57	158.73	25.98	94.76	619.04
Region 1	316.86	204.76	67.90	347.31	936.83
2	337.04	174.96	22.20	22.48	556.68
3	304.23	168.90	9.37	73.16	555.66
4	462.91	163.17	2.21	20.80	649.09
5	354.38	136.50	65.06	72.25	628.19
6	318.93	139.38	3.26	26.81	488.38
7	273.44	125.37	8.19	317.70	724.70

Average fishing equipment investment for non-boat-owner fishing households differs markedly from that of boat-owner households. Average household investment for non-boat-owner households was $619.04 (Table 3-9) in 1991-92 as compared to $20,083.49 for boat-owner households (Table 3-8). Across all equipment categories and regions average fishing equipment for non-boat-owner households is considerably less than that for boat-owner households. For non-boat-owner households equipment investment is greatest in rods and reels at the state level and across all regions. Non-boat-owner household investment is greatest in region 1 followed by regions 7, 4, 5, 2, 3, and 6. Average household equipment investment in electronic equipment by non-boat-owner households was negligible averaging only $25.98 on a state-wide basis. Purchases of electronic equipment might be expected to be higher if such equipment were owned by a household and used on a rented boat. The results reported in Table 3-9 indicate that such activity is relatively infrequent.

Total fishing equipment investment by Florida resident saltwater anglers was calculated by summing equipment investment in each category and dividing by the total number of two-month and twelve-month anglers to compute equipment investment per angler. This quotient was then multiplied by the predicted number of anglers (Table 3-2) to compute total equipment investment by all Florida resident saltwater anglers. Since total equipment investment was calculated, no distinction was made on the basis of boat ownership. Total estimated equipment investment in 1991-92 was estimated to be $29.3 billion (Table 3-10). For all Florida saltwater anglers, total fishing equipment investment was highest in boats followed by electronic equipment, rods and reels, miscellaneous equipment, and tackle. On a regional basis, equipment

investment was highest in region 4 followed by regions 6, 5, 2, 1, 7, and 3. Across all regions, boat investment ranks highest among investment categories followed either by electronic equipment or rods and reels depending upon the particular region. In all cases, tackle and miscellaneous equipment ranked fourth or fifth in terms of total investment.

Table 3-10. Estimated Total Fishing Equipment Investment by Florida Resident Saltwater Anglers (1991-92)

	Fishing Equipment Investment in $1,000's by Category					
Region	Rods and Reels	Tackle	Boats	Electronic Equipment	Other	Average Total Investment
Florida	1,688,929	678,648	224,472,167	1,689,021	740,783	29,269,587
Region 1	183,301	100,639	2,824,520	180,118	123,348	3,411,928
2	275,979	114,981	3,809,387	282,945	94,688	4,577,982
3	78,093	34,927	1,232,688	102,498	51,389	1,499,596
4	382,723	107,171	6,361,386	357,963	106,551	7,315,795
5	389,723	123,578	3,884,796	319,027	165,761	4,882,301
6	302,825	145,482	5,178,361	346,733	123,340	6,096,742
7	123,637	57,105	1,429,725	117,537	92,702	1,820,708

3.5 Economic Multiplier Analysis

Saltwater anglers purchase equipment and supplies in order to engage in fishing. These expenditures play a role in state and regional economies. The magnitude of that role can be examined through the use of multipliers derived from input/output analysis. For this study, separate input/output models were constructed for the state and each region through the use of MICRO IMPLAN. IMPLAN (IMpact Analysis for PLANning) is a PC-based software program that permits the analyst to construct independent regional models using county level data for 572 different economic sectors (University of Minnesota IMPLAN Group).

In order to perform the multiplier analysis, the following modeling considerations were addressed. First, only reported trip expenditures were included in the analysis. Although equipment investment does play a role in state and regional economies, respondents were not asked about the age or condition of their equipment. Without such information, replacement schedules and actual equipment purchases could not estimated. Second, reported trip expenditures were assumed to have been associated with a trip taken within the region of the respondent's residence. As the results of angler's trip behavior reported in Table 3-5 indicate, in most cases over 90% of all trips were taken within anglers' region of residence. Therefore, the majority of trip expenditures were made within anglers' region of residence. Since, by

assumption, trip expenses were incurred within the respondent's region, they do not represent an increase in regional income. They are, instead, a transfer of money within a region which means that economic impacts, measured as changes in regional income, or zero. However, purchases from one sector still require the purchase of goods from other sectors resulting in an increase in economic activity. Thus, the direct purchase of fishing related equipment has an accompanying indirect effect.

However, since there is no increase in regional income there are no induced effects that are normally associated with increased household income. This does not mean that if there were an increase in recreational fishing expenditures by residents in a region that sales and incomes of employees working in sectors that service recreational anglers would not change. Indeed, certain economic sectors would benefit from such a change. However, since there has been no change in total regional income, increased sales in one sector due to greater recreational fishing expenditures would be offset by declines in spending in other sectors. The net effect on total regional income of the change in spending on recreational fishing would be zero. Therefore, the appropriate multipliers to be used in assessing the economic effects of resident saltwater fishing activity include only direct and indirect effects. These multipliers are termed Type I multipliers. For further information on the use of multipliers in recreational fishing analysis, see Milon (in press).

The final modelling consideration was to identify the appropriate IMPLAN sectoral multipliers to use for each of the study expenditure categories. To accomplish this, the following sectoral designations were made Part of the fuel expense was allocated to Other Retail Trade (BEA Commodity 69.0202) and part was allocated to Other Wholesale Trade (BEA Commodity 69.0102) with the following adjustment. Retail and wholesale trade was treated as a margin sector in input/output analysis. This means that since many of the items that are sold in retail and wholesale markets are actually manufactured in another sector or outside the region under consideration, only that portion of the retail and wholesale marketing margin that is associated with services provided within the sector or region is allocated to that sector. For this study it was assumed that fuel and other recreational related retail items were manufactured outside any given region and that a twenty percent marketing margin for all wholesale and retail sectors was attributable to services provided within the region. To compute the value of fuel expenditures for input/output analysis purposes, the total expenditure was multiplied by twenty percent. This product was then used in the multiplier analysis. A similar calculation was made for fuel expense allocated to Other Wholesale Trade. Expenses associated with tackle, bait, and equipment were allocated to Recreational Wholesale (BEA Commodity 69.0101) and Recreational Retail Trade (BEA Commodity 69.0201) with the same marketing margins used for fuel. Lodging expenses were allocated to Hotels and Lodging Places (BEA Commodity 72.0100). Last, party fees and ramp fees were allocated to Amusement and Recreation Services (BEA Commodity 76.0207). Output, personal income, and employment multiplier effects were calculated by region and economic sector using the appropriate Type I multiplier.

3.5.1 Output Multiplier Effects

An output multiplier measures the total value of goods and services produced in an economy in order to satisfy a specified amount of final demand in a specific sector. The output multipliers computed from the IMPLAN models are reported in the Appendix to this section. The computed multiplier effects for 1991-92 expenditures by resident saltwater anglers are reported in Table 3-11. On a state-wide basis, the total amount of economic activity associated with saltwater fishing was estimated to be $949,070,000. Economic activity was greatest in the amusement and recreation sector followed by lodging services, other retail trade, other wholesale trade, recreation related retail trade, and other wholesale trade sectors. On a regional basis, the total economic activity associated with resident expenditures on saltwater fishing is greatest in region 6 followed by regions 2, 5, 4, 1, 7, and 3. Economic activity in regions 2, 4, 5, and 6 are similar ranging between $282 and $154 million in 1991-92. Economic activity is considerably greater in region 6 than all other regions for two reasons. First, total annual expenses by region 6 residents were greater than all other regions. Second, the mix of expenditures by region 6 residents favors the lodging and amusement and recreation services sectors which yield larger economic impacts because they are not margin sectors. Thus, the full amount of resources used in these service oriented sectors are assumed to be purchased within the region. Economic activity associated with saltwater angling is considerably smaller in regions 1, 3, and 7 ranging between $98 and $27 million in 1991-92. In all but two regions either the lodging or amusement services sectors generate the highest or second highest level of economic activity as compared to other sectors considered in the analysis. This finding is due to the fact that retail and wholesale sectors are margin sectors so that only a portion of total sales in these sectors contribute to regional economic output.

3.5.2 Personal Income Multiplier Effects

Personal income multipliers measure the amount of personal income that is associated with an increase in final demand in a given sector. The amount of personal income in each region associated with saltwater recreational fishing activity was calculated in the following manner. First, the output multiplier effect was calculated. The economic output was then multiplied by the sectoral direct personal income coefficient to obtain an estimate of the proportion of the sectoral final demand that goes directly to households as income. This product

Table 3-11. Estimated Economic Output Associated with Florida Resident Saltwater Fishing (1992-93)

Region	Economic Output by Sector ($1,000's)						
	Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services	Total Economic Output
Florida	63,168	95,753	81,778	128,351	281,837	298,183	949,070
Region 1	7,663	11,281	9,798	15,155	22,158	30,898	96,953
2	12,332	23,180	15,875	31,061	60,144	98,339	240,931
3	2,175	4,793	2,836	6,447	2,078	9,410	27,738
4	7,742	13,827	9,759	18,285	12,445	36,188	98,246
5	9,987	19,156	13,050	25,694	45,015	41,118	154,020
6	17,312	15,698	22,729	21,041	145,308	60,243	282,332
7	6,328	5,589	8,298	7,506	9,311	8,797	45,830

Table 3-12. Personal Income Associated with Florida Resident Saltwater Fishing Expenditures (1991-92)

Region	Personal Income by Sector ($1,000's)						
	Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services	Total Personal Income
Florida	25,641	38,576	34,312	53,673	110,373	124,474	387,049
Region 1	2,959	4,258	3,644	5,966	8,124	12,036	36,987
2	4,287	8,782	6,415	12,274	22,109	37,486	91,352
3	733	1,950	1,128	2,552	758	3,857	10,978
4	3,032	5,254	3,928	7,073	4,641	13,335	37,264
5	3,955	7,248	5,162	10,047	16,620	16,636	59,668
6	6,012	5,935	8,731	8,328	53,297	23,880	106,182
7	2,840	2,109	3,001	2,943	3,425	2,868	17,185

was then multiplied by the appropriate sectoral Type I personal income multiplier to estimate the amount of personal income associated with saltwater recreational fishing. The IMPLAN direct personal income coefficients and personal income multipliers are reported in an Appendix to this section. The estimated personal income effects by region for the year 1991-92 are reported in Table 3-12.

The total amount of state income associated with economic activity attributable to marine recreational fishing in 1991-92 was $387,049,000. On a statewide basis, 1991-92 income earned was highest in the amusement and recreation services sector followed by the hotel and lodging, other retail, other wholesale, recreation related retail, and recreational related wholesale trade sectors. In regions 1, 2, and 5 the relative order of importance of each sector in income generation mirrors that of the state. In regions 3 and 7, the ordering of the sectors in terms of income generation is quite different from that of the rest of the state. This is due in large part to the fact that the mix of fishing expenditures in regions 3 and 7 differ somewhat from the state and other regions. In region 3 the most important sector is amusement and recreation services followed by other retail trade, other wholesale trade, recreation related retail trade, recreation related wholesale trade, and hotels and lodging establishments. By contrast, the most important sector in region 7 is lodging followed recreation retail trade by other retail trade, amusement and recreation services, recreation wholesale trade, and other wholesale trade.

3.5.3 Employment Multiplier Effects

Employment multipliers measure the number of individuals employed in an economy per million dollars in final demand for a given sector. The number of individuals employed in each sector were computed by dividing the output multiplier effects by 1,000,000. The quotient was then multiplied by the IMPLAN direct employment coefficients. Finally, this product was multiplied by the IMPLAN Type I employment multipliers (reported in the section appendix) to estimate the total number of individuals employed by region and sector for the 1991-92 period. The results of these calculations are reported in Table 3-13.

Total 1991-92 state employment associated with Florida resident saltwater fishing activity was estimated to be 22,887 full-time-equivalent people. The 1991-92 estimated state employment is distributed as follows: two-thirds of all employment was associated with the amusement and recreation services (7,855) and the lodging (7,259) sectors. These sectors were followed by other retail trade (3,108), recreation related retail trade (2,009), other wholesale trade (1,617), and recreation wholesale trade (1,040). On a regional basis, with the exception of region 3, the relative distribution of employment mirrors that of the state. In terms of total numbers of full-time-equivalent employees, region 6 tops all others with 6,924 followed by regions 2 (5,848), 5 (3,672), 4 (2,340), 1 (2,299), 7 (1,050) and 3 (643). Although a significant number of people were estimated to be employed in activities related to Florida resident saltwater fishing, 22,887 full-time-equivalent jobs represents less than 1% of Florida's 5.7 million person labor force.

Table 3-13. Estimated Full-Time-Equivalent Employment Associated with Florida Resident Saltwater Fishing (1991-92)

Region	Full-Time-Equivalent Employment by Sector						
	Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services	Total Full-Time-Equivalent Employment
Florida	1,040	1,617	2,009	3,108	7,259	7,855	22,887
Region 1	125	189	239	364	568	813	2,299
2	203	390	387	746	1,544	2,579	5,848
3	36	81	69	155	54	249	643
4	128	234	242	446	326	963	2,340
5	164	322	319	619	1,160	1,087	3,672
6	284	264	554	505	3,730	1,586	6,924
7	104	94	202	180	239	231	1,050

3.6 Technical Appendix - Output, Income, and Employment Multipliers by Region and Sector

The computed IMPLAN multipliers for Type 1 output, personal income, and employment multipliers are reported in Tables 3-A-1, 3-A-2, and 3-A-3 respectively. The IMPLAN direct personal income coefficients are reported in Table 3-A-4. The IMPLAN direct employment coefficients are reported in Table 3-A-5.

Table 3-A-1. IMPLAN Type I Output Multipliers By Region and Sector

		Economic Sector					
Region		Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services
Florida		1.1536	1.1597	1.2419	1.2436	1.2330	1.1761
Region	1	1.1404	1.1482	1.2325	1.2340	1.2233	1.1583
	2	1.1506	1.1567	1.2383	1.2400	1.2248	1.1767
	3	1.1324	1.1389	1.2241	1.2256	1.2128	1.1524
	4	1.1410	1.1469	1.2122	1.2134	1.1977	1.1548
	5	1.1405	1.1463	1.2284	1.2300	1.2163	1.1600
	6	1.1507	1.1568	1.2387	1.2404	1.2255	1.1680
	7	1.1496	1.1557	1.2401	1.2418	1.2231	1.1703

Table 3-A-2. IMPLAN Type I Personal Income Multipliers By Region and Sector

		Economic Sector					
Region		Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services
Florida		1.1224	1.1288	1.1528	1.153	1.1740	1.1153
Region	1	1.1056	1.1152	1.1471	1.137	1.1614	1.1002
	2	1.1325	1.1263	1.1421	1.145	1.1658	1.1194
	3	1.1171	1.1903	1.1299	1.130	1.1534	1.0914
	4	1.1131	1.1221	1.1341	1.140	1.1565	1.1140
	5	1.1065	1.1169	1.1389	1.140	1.1628	1.0989
	6	1.1301	1.1242	1.1482	1.143	1.1642	1.1050
	7	1.0996	1.1247	1.1626	1.148	1.1646	1.1320

Table 3-A-3. IMPLAN Type I Employment Multipliers By Region and Sector

Region		Economic Sector: Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services
Florida		1.1773	1.1790	1.1373	1.1404	1.1384	1.1061
Region	1	1.1572	1.1609	1.1196	1.1221	1.1249	1.0879
	2	1.1710	1.1727	1.1254	1.1281	1.1270	1.1016
	3	1.1496	1.1523	1.1145	1.1168	1.1198	1.0887
	4	1.1664	1.1682	1.1196	1.1221	1.1262	1.0974
	5	1.1598	1.1616	1.1199	1.1224	1.1239	1.0951
	6	1.1707	1.1724	1.1254	1.1280	1.1277	1.0979
	7	1.1688	1.1706	1.1257	1.1283	1.1267	1.0972

Table 3-A-4. IMPLAN Direct Personal Income Coefficients By Region and Sector

Region		Economic Sector: Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services
Florida		0.4172	0.4139	0.4520	0.4508	0.4113	0.4402
Region	1	0.3983	0.3886	0.3996	0.4269	0.3862	0.4101
	2	0.3532	0.3891	0.4381	0.4276	0.3862	0.4007
	3	0.3417	0.3892	0.4308	0.4292	0.3836	0.4328
	4	0.4015	0.3884	0.4302	0.4116	0.3862	0.3820
	5	0.4082	0.3883	0.4266	0.4216	0.3862	0.4271
	6	0.3536	0.3890	0.4144	0.4294	0.3861	0.4190
	7	0.4692	0.3878	0.3857	0.424	0.3863	0.3370

Table 3-A-5. IMPLAN Direct Employment Coefficients By Sector[a]

Region	Economic Sector					
	Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services
Employment per $1,000,000 in final demand	16.1372	16.6058	26.8276	26.4020	27.8952	28.0105

a The IMPLAN direct employment coefficients are invariant with respect to region.

4. SPECIES TARGETING BY RECREATIONAL FISHERMEN

Anglers who participated in the University of Florida (UF) Angler Survey and responded to the MRFSS-UF Survey were queried regarding individual species or species groups targeted during saltwater sport fishing trips. This information was solicited for various time periods (i.e. waves and seasons) and region of residence, where state regions are defined as previously discussed. The MRFSS-UF Survey consists of questions added onto the basic MRFSS telephone survey, whereas the UF Angler Survey solicited information (via mail) from a sample of the total number of anglers surveyed by the basic MRFSS survey.

Findings from these two surveys regarding species targeting are summarized in the following subsections. The MRFSS-UF Survey is discussed in subsection 4.1. MRFSS-UF respondents were asked to describe the individual species targeted, the mode for each fishing trip, and the area in which the fishing activities occurred for each trip taken. Individual species names were provided by the MRFSS-UF Survey respondent. The UF Angler Survey is discussed in subsection 4.2. Respondents were asked to allocate fishing time among species groups, within which the individual targeted species was likely to be contained. The UF Angler Survey did not solicit mode or area fished. The findings, which describe the survey samples, are summarized in the following subsections.

4.1. Individual Species Targeting (MRFSS-UF Survey) - Number of Fishing Trips Per Species

MRFSS-UF Survey respondents were asked to indicate the single most important individual target species for each trip taken during the past two months. This question was preceded by others which determined fishing mode, area fished, proximity to an artificial reef, and other information. The findings related to the targeting of individual species are summarized for the ten most frequently targeted species and presented by fishing mode, state region, season, and area fished.

As stated earlier, the reported species names were provided by the respondent. In certain cases, the reported term may in fact serve as a generic reference to a variety of individual species. For example, respondents often indicated that "trout" was the targeted species. Yet, the term trout is inclusive of several individual species, such as spotted seatrout and sand trout, which may have actually been targeted on the trip. If a more specific name was given, that name was reported. A more inclusive tally of trips targeting "trout" would, therefore, be the summation of those trips targeting all forms of trout, regardless of the species of trout. However, aggregating such responses would forfeit the information provided by the data applicable to the more species specific responses.

4.1.1. Species Targeting by Fishing Mode

The top ten individual species targeted across fishing modes are given in Table 4-1. The four modes include party boat, charter boat, private/rental boat, and shore. The shore mode refers to shore-based fishing activities, such as bridges, piers, jetties, beaches, and wading.

The number of trips on which an individual species was targeted is allocated across the four modes. The total number of targeted fishing trips (51,016) is the number of trips identified by anglers who responded to the MRFSS-UF Survey.

The most popular individual species identified in terms of number of targeted trips was "trout". This was followed in order of popularity by snook, redfish, grouper, king mackerel, and other species. The species referred to as "unspcf'd" was associated with the most trips. This species category, however, denotes those trips where no individual species was targeted or the target species was unknown. Trout, snook, redfish, and grouper collectively account for over one-half of the trips where an individual target species was designated.

Table 4-1. Number of Fishing Trips Spent Targeting Individual Species, By Fishing Mode for Top Ten Species (MRFSS-UF Survey)

Species	Mode[a]				Total
	Party Boat	Charter Boat	Private/Rental Boat	Shore	
Unspc'd	193 (1.5%)	108 (0.9%)	5414 (43.3%)	6763 (54.2%)	12481
Trout	12 (0.2%)	2 (<.1%)	4598 (60.8%)	2947 (38.9%)	7559
Snook	26 (0.5%)	12 (0.2%)	2063 (40.0%)	3057 (59.2%)	5160
Redfish	17 (0.4%)	10 (0.2%)	2122 (50.4%)	2062 (49.0%)	4211
Grouper	113 (3.6%)	99 (3.2%)	2719 (87.3%)	183 (5.9%)	3114
King Mackerel	55 (0.2%)	28 (0.1%)	1514 (51.3%)	1351 (45.8%)	2950
Snapper	127 (4.3%)	77 (2.6%)	1649 (56.2%)	1082 (36.9%)	2935
Dolphin	14 (0.6%)	53 (2.4%)	2119 (96.0%)	22 (1.0%)	2208
Flounder	8 (0.5%)	2 (0.1%)	582 (33.4%)	1153 (66.1%)	1745
Mullet	1 (0.1%)	0 (0%)	322 (34.9%)	601 (65.0%)	924
Others	87 (1.1%)	146 (1.9%)	3677 (47.6%)	3821 (49.4%)	7729
Total	653	537	26779	23042	51016

[a]Numbers denote trips and percentages denote percentage distribution of trips for each species across modes.

A total of 7,559 trips targeting trout were taken during the survey period. These trips were dominated by two modes. Of the trips which targeted trout, approximately 60 percent were taken in private/rental boats and 39 percent were shore-based trips. Few party boat and charter boat trips specifically targeted trout. When examined by mode, trips targeting trout represent almost 15 percent of the total number of targeted fishing trips, 17 percent of the total number of trips taken in private/rental boats, and about 13 percent of the total number of shore-based trips.

The distribution across modes was somewhat different for trips on which other species were targeted. For example, 66 percent of the trips targeting flounder were shore-based, with the remaining trips taken primarily on private/rental boats. In contrast, 87 percent of the grouper trips and 95 percent of the dolphin trips were taken via private/rental boat mode. Almost 60 percent of the snook trips, however, were shore-based. Similar information is provided for other popular targeted species.

Of the total targeted fishing trips across all species, 52 percent (26,779 trips) were taken in private/rental boats, while 45 percent (23,042 trips) were taken as shore-based trips. Charter boat (537 trips) and party boat (653 trips) fishing trips where a single species was targeted each represented less than three percent of the total number of trips.

4.1.2. Species Targeting by Region and Season

The percentage distribution of targeted fishing trips across the most popular species (in terms of numbers of targeted fishing trips) by region and season is reported in Table 4-2. Three seasons were identified: season 1 - July to October; season 2 - November to February; and season 3 - March to June. The two-month sampling wave made it possible to aggregate only three "seasons". The percentage distribution of targeted trips across species varies considerably when examined on a region and season basis.

Examining region 6 (Martin to Volusia Counties) across seasons provides an indication of how the number of trips which target specific species for a given region changes during the year. For example, during season 1 the top five individually targeted species categories were trout (15.4 percent), snook (9.1 percent) , king mackerel (7.7 percent), redfish (6.5 percent) and dolphin (5.4 percent). Thirty-six percent of the trips taken in season 1 were targeting unspecified species. However, in season 2, the top five targeted species include pompano (7.9 percent) and bluefish (7.0 percent). In season 3, snapper is the third most important designated species, while the number of fishing trips with no target species designated declines to 21.5 percent of the total. Examining other regions yields similar examples of seasonal variation across regions.

The mix of species also changes when examining regions within a given season. In season 2, for example, nearshore species such as redfish, trout, and/or snook were allocated the most targeted fishing trips in regions 1, 2, 3, 6, and 7. However, during the same time period, trips taken in regions 4 and 5 primarily targeted offshore species such as snapper and dolphin. The more popular targeted species in a region likely reflects proximity of the region to preferred

Table 4-2. Percent of Total Fishing Trips Spent Targeting Top 10 Individual Species by Recreational Fishermen in Each Region, By Season (MRFSS-UF Survey)

REGION												
1		2		3		4		5		6		7	
Season 1 (July - October)													
unspcf'd	30.4%	unspcf'd	34.2%	unspcf'd	34.9%	dolphin	31.5%	unspcf'd	29.6%	unspcf'd	36.0%	unspcf'd	45.0%
trout	20.3	redfish	11.9	redfish	16.3	snapper	28.8	dolphin	17.6	trout	15.4	kingmack	16.6
flounder	9.9	trout	10.5	snook	13.3	unspcf'd	17.9	snapper	16.8	snook	9.1	redfish	16.2
kingmack	9.8	snook	10.3	grouper	10.8	bonefish	8.2	snook	10.1	kingmack	7.7	trout	8.2
redfish	9.6	grouper	10.1	snapper	8.0	grouper	5.6	sp_trout	6.1	redfish	6.5	flounder	4.0
grouper	3.2	flounder	6.0	trout	7.6	catfish	1.0	kingmack	5.4	dolphin	5.4	sshead	2.0
mullet	3.1	tarpon	2.2	mullet	2.2	amberjac	1.0	trout	3.3	snapper	2.9	snapper	1.3
snapper	1.8	lm_bass	1.8	tarpon	1.7	snook	1.0	tarpon	3.1	tarpon	2.7	grouper	1.0
pompano	1.3	spanmack	1.6	dolphin	1.1	sp_trout	0.6	redfish	1.3	bluefish	2.7	marlin	0.8
spanmack	1.2	dolphin	1.5	sshead	1.1	barracud	0.6	sailfish	1.3	barracud	2.5	mullet	0.6
Season 2 (November - February)													
trout	26.9	unspcf'd	26.2	unspcf'd	23.0	snapper	30.1	unspcf'd	23.7	unspcf'd	30.3	trout	21.4
unspcf'd	23.0	redfish	15.8	trout	22.0	unspcf'd	28.5	dolphin	22.4	trout	14.9	unspcf'd	20.7
redfish	9.1	trout	14.6	snook	15.7	dolphin	11.9	snook	14.0	snook	9.9	redfish	19.1
grouper	6.8	grouper	11.8	grouper	12.2	grouper	6.9	snapper	10.0	pompano	7.9	snapper	8.0
mullet	6.3	snook	7.6	redfish	10.4	kingmack	4.8	kingmack	6.1	redfish	7.3	flounder	7.4
kingmack	5.8	sp_trout	5.8	sshead	4.2	bottom	4.5	sailfish	5.4	bluefish	7.0	kingmack	6.3
flounder	4.8	sshead	3.4	snapper	2.8	trout	2.6	trout	3.6	snapper	3.3	bluefish	4.0
pompano	3.1	mullet	3.3	sp_trout	2.5	redfish	2.0	bluefish	2.8	kingmack	3.1	sshead	2.4
snapper	2.5	snapper	2.6	tarpon	1.6	sailfish	1.7	perch	2.5	grouper	3.0	croaker	1.5
bluefish	2.1	blckdrum	1.7	dolphin	1.1	catfish	1.5	tarpon	2.5	flounder	2.6	mullet	1.5
Season 3 (March - June)													
trout	26.0	unspcf'd	23.3	snook	33.1	unspcf'd	25.2	unspcf'd	24.9	unspcf'd	21.5	unspcf'd	23.4
unspcf'd	16.9	snook	21.8	unspcf'd	13.3	snapper	25.0	dolphin	17.5	trout	17.9	kingmack	17.4
redfish	9.6	trout	15.4	trout	12.5	dolphin	17.3	snapper	17.3	snook	16.3	redfish	11.6
kingmack	8.2	grouper	11.0	redfish	11.0	grouper	7.9	snook	13.7	snapper	6.1	flounder	9.3
grouper	7.4	redfish	7.4	grouper	10.4	snook	5.6	kingmack	6.2	redfish	5.5	trout	7.9
flounder	6.1	kingmack	3.1	tarpon	3.0	sailfish	4.2	barracud	2.9	dolphin	5.1	sshead	5.0
spanmack	5.1	spanmack	2.9	kingmack	3.0	trout	2.3	bluefish	2.7	kingmack	3.8	bluefish	4.8
mullet	4.9	billfish	2.2	snapper	2.6	sp_trout	1.9	wahoo	2.3	bluefish	3.7	catfish	2.6
croaker	2.2	snapper	2.1	sp_trout	1.9	wahoo	1.8	grouper	2.0	grouper	3.7	croaker	2.5
snapper	2.1	mullet	1.7	sshead	1.6	bonefish	1.7	blckdrum	1.9	sshead	2.8	spanmack	1.7

habitat, local species abundance, and other factors. Similar information is yielded when examining regions within the other seasonal periods.

4.1.3. Species Targeting by Region and Area Fished

Individual species targeting was also examined on the basis of the region and fishing area in which trips were taken. As shown in Table 4-3, species targeted on trips taken within the delineated fishing areas tend to be dominated by species likely to found in those habitats. For example, species such as grouper, dolphin, snapper, and king mackerel, were the most targeted species in the deep offshore fishing area. Inshore species, such as trout, snook, and redfish, tend to dominate the targeting of shallow offshore and inshore fishing trips statewide. Relatively more inshore and shallow offshore trips targeted snapper in regions 4 and 5, which have a closer proximity to deep water and reef habitat and, thus, access to a species complement including offshore species.

4.2. Species Group Targeting (UF Angler Survey) - Percent of Fishing Time

UF Angler Survey respondents were asked to recall species groups targeted (as opposed to individual species as in the MRFSS-UF Survey), or those species upon which fishing time was focused, during the past 12 and two-month periods. Five designated species groups, as well as an "other" category, were offered as choices. The species groups include:

"Reef Fish" - grouper, snapper, cobia, amberjack;
"Nearshore Bottomfish" - redfish, sea trout, sheepshead, mullet, pompano;
"Offshore Small Game" - king mackerel, spanish mackerel;
"Offshore Big Game" - marlin, sailfish, dolphin;
"Inshore Game" - tarpon, snook, bonefish; and
"Other" - any other species.

The individual species were grouped based on similarities in habitat, fishing method, and/or other considerations. Each respondent was asked to consider those species groups toward which effort was focused and then allocate completely their total fishing time (in percentage terms) during the respective time period across the applicable groups. The percentage responses were then averaged across each species group.

4.2.1. Target Species Choices During the Past 12 Months

Respondents provided information regarding targeted fishing effort by species group during the 12-month period immediately preceeding the time of interview. Table 4-4 shows that, of the six groups, Nearshore Bottomfish species were allocated the highest average percentage share of targeted fishing effort on a statewide basis. An average 38.45 percent of the respondents' fishing effort was directed toward targeting that species group. The species group that garnered the next largest share of statewide targeted fishing effort was Reef Fish, with 23.38 percent. The remaining targeted fishing effort was distributed across the other four species groups in approximately equivalent percentage shares. (NOTE: Because the responses were averaged, the percentages may not add up to 100).

Table 4-3. Percent of Total Fishing Trips Spent Targeting Top 10 Individual Species by Recreational Fishermen in Each Region, By Area Fished

REGION												
1		2		3		4		5		6		7	
Area 1 (Inshore)													
trout	34.1%	unspcf'd	27.7%	snook	25.7%	unspcf'd	30.3%	snook	34.6%	trout	30.8%	unspcf'd	31.1%
unspcf'd	21.7	snook	21.0	unspcf'd	22.4	snapper	17.0	unspcf'd	26.6	unspcf'd	25.1	redfish	18.5
flounder	14.8	redfish	16.0	redfish	16.2	dolphin	16.5	snapper	17.8	snook	14.8	trout	16.0
redfish	9.8	trout	14.8	trout	16.0	snook	15.7	blckdrum	5.5	redfish	8.4	flounder	6.9
mullet	7.4	flounder	4.5	grouper	5.4	trout	4.7	tarpon	3.7	snapper	4.7	kingmack	4.7
spanmack	1.7	sp_trout	3.4	sshead	3.6	bonefish	4.4	trout	2.3	flounder	3.6	sshead	3.7
snapper	1.4	mullet	2.5	snapper	2.0	lm_bass	3.6	redfish	1.8	bluefish	2.9	catfish	3.3
snook	1.4	sshead	2.0	cobia	1.6	sp_trout	2.8	kingmack	0.9	sshead	2.1	croaker	3.1
sshead	1.3	spanmack	1.4	mullet	1.4	grouper	1.1	perch	0.9	tarpon	2.0	seabass	1.7
catfish	0.8	grouper	1.3	spanmack	1.1	barracud	0.9	dolphin	0.9	grouper	1.1	snapper	1.7
Area 2 (Shallow Offshore)													
trout	37.3	trout	28.2	snook	22.4	snapper	35.0	unspcf'd	31.6	snook	25.4	trout	23.5
unspcf'd	16.8	unspcf'd	22.2	trout	21.2	unspcf'd	22.5	snapper	18.9	unspcf'd	25.1	unspcf'd	19.1
redfish	12.1	snook	14.6	redfish	14.8	grouper	11.3	kingmack	14.8	trout	14.8	kingmack	17.4
kingmack	10.7	redfish	9.0	unspcf'd	14.4	bonefish	7.5	dolphin	9.1	snapper	7.4	spanmack	11.2
grouper	4.8	grouper	5.9	grouper	8.9	trout	4.9	redfish	7.0	cobia	5.0	redfish	6.9
spanmack	4.5	tarpon	4.9	snapper	7.3	dolphin	3.9	grouper	4.2	redfish	4.2	sp_trout	5.1
mullet	3.5	kingmack	3.5	tarpon	4.1	tarpon	2.9	snook	3.2	grouper	3.9	sshead	4.7
flounder	1.5	spanmack	3.3	sshead	2.0	bottom	2.8	sailfish	2.8	bluefish	2.6	flounder	4.0
cobia	1.3	mullet	1.5	sp_trout	1.9	snook	2.0	trout	2.5	sshead	2.4	cobia	3.6
pompano	1.1	flounder	1.1	kingmack	1.6	cobia	1.8	bonefish	2.1	wahoo	2.3	snapper	1.8
Area 3 (Deep Offshore)													
grouper	26.1	grouper	38.6	grouper	33.9	dolphin	33.3	dolphin	37.3	unspcf'd	22.3	kingmack	27.2
unspcf'd	18.4	unspcf'd	26.6	snook	21.0	snapper	23.6	unspcf'd	25.3	dolphin	20.9	redfish	15.3
kingmack	15.2	billfish	6.5	unspcf'd	14.1	unspcf'd	17.4	snapper	10.8	grouper	11.0	unspcf'd	12.5
trout	6.7	kingmack	5.7	kingmack	7.5	grouper	7.9	kingmack	9.1	snapper	9.3	grouper	8.5
amberjac	5.5	dolphin	4.6	snapper	4.8	sailfish	5.4	sailfish	4.7	wahoo	3.8	dolphin	7.3
snapper	4.8	snapper	3.4	tarpon	4.5	kingmack	2.8	wahoo	3.0	snook	3.2	snapper	6.8
redfish	3.7	snook	2.4	dolphin	4.4	wahoo	2.6	trout	1.9	kingmack	3.1	cobia	4.6
spanmack	3.6	sailfish	1.9	sp_trout	2.0	bottom	1.2	tarpon	1.7	redfish	3.1	marlin	2.9
dolphin	2.8	trout	1.5	seabass	1.9	barracud	1.0	grouper	1.1	tarpon	3.0	trout	2.2
trigger	1.7	spanmack	1.3	redfish	1.5	sp_trout	0.9	billfish	1.1	barracud	2.7	wahoo	2.2

Table 4-4 also shows some variation in the statewide percentage distribution when targeted species are examined on a regional basis. The Nearshore Bottomfish group remains the most important focus of fishing effort in regions 1, 2, 3, 6, and 7. However, Offshore Big Game species account for the largest percentage of targeted fishing effort in region 5, while Reef Fish are the most important targeted species group in region 4. In addition, Inshore Game species are relatively more important in regions 2, 3, and 6 (and much less so in regions 1 and 7). Offshore Small Game are of somewhat consistent importance across regions (with the possible exceptions of regions 3 and 4). Reef Fish are targeted more in regions 2 through 5, but noticeably less so in the other regions. These regional differences in species targeting highlight the proximity to each of the species' preferred habitats, relative local species abundance, demographics of each regional fishing population, and other factors.

4.2.2. Seasonal Target Species Choices

Respondents were also asked to indicate the species groups targeted during the same two-month interval during which the MRFSS-UF Survey contact occurred. The responses corresponding to these sampling waves were then aggregated by season, where seasons are as previously defined (in sec. 4.1.2). The findings are presented below by season and region.

Table 4-5 shows that the statewide distribution of targeted fishing effort across species during each season mirrors the statewide distribution of targeted fishing effort corresponding to the previous 12 months. The Nearshore Bottomfish group was allocated the greatest share of targeted effort across seasons. Reef Fish received the next largest allocation, with an almost equal percentage distribution of smaller allocations across the other groups. The targeting of effort toward Nearshore Bottomfish species appears to peak during season 2 (November - February). Of the individuals that fished during season 2, about 45 percent of their effort was directed specifically toward the Nearshore Bottomfish species complement. Although of more equal distribution, the effort directed toward Reef Fish exhibits a slight peak in season 2. Effort directed toward Offshore Small Game, Inshore Game, and Others species groups peaks during season 3, whereas effort targeting Offshore Big Game peaks in season 1. These differing seasonal patterns of species targeting likely reflect seasonal abundance of the more important species within each group. In addition, seasonal fishing restrictions, such as the statewide March to May redfish possession closure, and seasonal weather conditions may also be determinants.

Table 4-6 shows the distribution of targeted effort by species group when examined on a seasonal basis, by region. The basic distribution of targeted effort for each species across regions, by season, is preserved. Some seasonal differences do appear, however, as in the case for Nearshore Bottomfish species. For example, the percentage of targeted effort allocated to Nearshore Bottomfish species peaks in all regions during season 2, except regions 4 and 5 which peak in season 1. Effort toward Reef Fish peaks in season 2 for regions 3, 4, and 5, while effort for regions 1, 6, and 7 peaks in season 3. Except for region 3, effort directed toward Offshore Big Game peaks during season 1. And except for regions 3 and 4, targeted effort directed toward Offshore Small Game peaks in season 3.

Table 4-4. Percent of Total Fishing Effort Spent Targeting Species Groups During Prior 12-Month Period (UF Angler Survey)

	Species Group					
Region	Reef Fish	Nearshore Bottomfish	Offshore Small-Game	Offshore Big-Game	Inshore Game	Others
State	23.38%	38.45%	9.05%	8.24%	9.52%	10.84%
1	19.84	49.92	13.46	2.38	1.40	12.44
2	26.63	39.27	9.06	2.73	14.37	7.98
3	28.49	36.85	3.94	2.84	21.47	5.38
4	43.95	7.36	4.63	26.27	7.88	7.31
5	27.61	12.34	10.99	28.34	11.63	8.72
6	18.60	39.20	6.01	10.43	13.79	11.58
7	14.42	50.77	10.85	3.89	0.99	19.07

Table 4-5. Percent of Total Fishing Effort Spent Targeting Species Groups Statewide During Each Season (UF Angler Survey)

	Species Group					
Season	Reef Fish	Nearshore Bottomfish	Offshore Small-Game	Offshore Big-Game	Inshore Game	Others
1	23.08%	37.77%	9.11%	9.57%	9.76%	10.01%
2	24.67	45.45	5.83	6.36	7.49	10.12
3	23.95	35.39	11.10	6.86	10.06	11.53

4.3. Implications

The species targeting information generated by the MRFSS-UF Survey and the UF Angler Survey tend to corroborate each other. In terms of time spent targeting species groups, the findings from the UF Angler Survey show that Nearshore Bottomfish and Reef Fish are, in general, the most popular species groups statewide. Offshore Big Game species are of greater relative importance to regions 4 and 5, as are Inshore Game species to region 3. The findings

of the MRFSS-UF Survey, in terms of number of trips targeting individual species, show that trout and redfish (i.e., Nearshore Bottomfish), snook (i.e., Inshore Game), and grouper and snapper (i.e., Reef Fish) are the more popular species. If grouped as in the UF Angler Survey, the findings of the two surveys would be very similar in terms of fishing effort, by species group, by region, and by season.

The findings of the two surveys also point out that substantial regional diversity exists within Florida in terms of species targeting. Florida's fishery managers should incorporate these differing patterns of regional species targeting, and likely species catch, into the regulatory decision-making process. NMFS currently divides the state into only two regions for the estimation of recreational catch. Given the above findings, however, the NMFS region definition omits information and may not be appropriate. Regional definitions of higher resolution, such as multi-county groupings as utilized in this study, would be more appropriate as additional information regarding recreational fishing patterns would be revealed. Such information would yield a more realistic assessment of effort directed toward individual species, by mode, season, and region in Florida waters.

Table 4-6. Percent of Total Fishing Effort Spent Targeting Species Groups During Each Season, By Region (UF Angler Survey)

		Species Group					
Season	Region	Reef Fish	Nearshore Bottomfish	Offshore Small-Game	Offshore Big-Game	Inshore Game	Others
1	1	20.51%	48.39%	13.84%	2.61%	0.78%	12.31%
	2	28.03	39.07	8.35	3.27	12.56	8.77
	3	30.31	37.19	2.08	2.08	23.02	5.31
	4	39.13	9.71	3.60	30.31	10.42	6.06
	5	24.59	14.79	11.89	31.28	13.52	4.84
	6	18.72	36.47	5.76	11.48	16.22	10.49
	7	10.70	52.67	11.72	5.47	1.33	16.41
2	1	18.33	63.18	4.41	0.58	1.85	13.19
	2	26.77	45.30	8.55	2.20	9.64	7.09
	3	34.40	38.81	5.95	3.41	11.67	3.69
	4	49.27	8.33	4.80	19.02	8.24	9.12
	5	32.51	13.65	7.92	22.11	15.00	8.78
	6	18.67	46.69	5.49	9.68	9.36	9.84
	7	12.28	64.89	2.83	0.11	1.41	18.48
3	1	20.82	45.45	17.40	1.87	2.21	11.16
	2	27.14	34.97	10.36	2.75	14.66	10.47
	3	26.01	36.22	4.55	1.15	22.44	8.40
	4	48.18	7.76	3.05	23.27	7.91	5.09
	5	27.68	9.84	13.16	27.29	12.41	9.26
	6	19.82	36.99	7.16	8.20	14.54	11.37
	7	17.24	42.05	14.72	3.55	0.88	21.16

5. MOTIVATIONS FOR RECREATIONAL FISHING

5.1 Overview

This section focuses on participant perceived reasons for marine fishing, lifecycle segments, fishing experience factors and attitudes on various factors related to fishing. Subsection 2 reviews in summary form the socio-demographic characteristics associated with marine anglers. Subsection 3 aggregates several socio-demographic factors to partition the sample into lifecycle segments and stratifies those segments by season and region. Subsection 4 presents tables and discussion about the relative importance of eleven reasons for fishing that helps us understand the psychological benefits sought by marine fishing participants. Subsection 5 presents responses to eight consumptive propensity questions that shed additional light on marine anglers' attitudes toward their catch. Subsection 6 reports results related to the importance of fishing compared to other activities and whether fishing affects life satisfaction, choice of residence location or choice of occupation. Subsection 7 summarizes perceived relative fishing skill level and reports the number of years of marine fishing experience for the sampled anglers. Subsection 8 highlights sources of information used by anglers to keep up with marine fishing. Subsection 9 summarizes reasons for not fishing for respondents who reported not fishing in the previous 12 months. Subsection 10 discusses some implications of the results reported in this chapter.

5.2 Participation in Fishing

Socio-demographic participation factors were discussed in Section 2. To set the stage for the motivational reasons and other factors summarized in this chapter, this brief narrative characterization is made. In this study, as indicated in Figure 2.1, about 19 percent of Florida households contacted in a random phone survey reported having a marine angler in the household. Table 2-1 presents a descriptive summary of the socio-demographic indicators of the marine anglers of Florida. Florida's marine angling public is dominantly male (77 percent), white (93 percent), married (67 percent) and has a preference for spending leisure time outdoors (97 percent). About half (47 percent) of the sample of anglers have lived in Florida for more than 20 years and 44 percent have children in the household. Anglers had higher than average education with 57 percent having at least some college. About 78 percent of responding anglers had incomes above $25,000, 41 percent over $50,000. About 78 percent had moderate to extensive fishing experience as a child.

5.3 Lifecycle Segments

Many forms of recreation participant segmentation have been used to delineate participation. Most commonly, demographic and socioeconomic variables are used. An extension of these is the family lifecycle concept which utilizes a combination of demographic and socioeconomic variables to develop a profile of participants. A basic premise is that income will rise as a person progresses in age. However, with marriage and the addition of children,

one's discretionary income varies throughout the lifecycle. This is relevent given that recreational expenditures tend to be related to discretionary income.

To partition the Florida angling public, eight "family life-cycle" segments were created by combining age, marital status, and presence of children in the household (Table 5-1). The eight components were labeled following conventional marketing categories.

Table 5-1. Distribution of Marine Anglers Lifecycle Stage

Lifecycle Stage	Frequency	Percent	Cumulative Percent
Bachelor (single, no children)	418	13.3	13.3
Newly Married (age=18-39, married, no children)	280	8.9	22.2
Full Nest (age=18-39, married, with children)	801	25.5	47.8
Full Nest II (age=40-49, married, with children)	410	13.1	60.8
Empty Nest (age=50+, married, no children)	826	26.3	87.1
Solitary Survivor (age=50+, widowed, no children)	260	0.8	88.0
Single Parent (age=18-49, divorced/ separated, with children)	123	3.9	91.9
Middle Aged/Childless (age=40-49, no children)	255	8.1	100.0

The four largest segments, accounting for 78 percent of the sample, were 1) married, age 50+ with no children (26 percent); 2) age 18-39, married with children (25 percent); 3) single, no children (13 percent); 4) married, age 40-49, with children (13 percent). The smallest segments were 1) 50+, widowed with no children (0.8 percent) and 2) single parents (3.9 percent). There are no census or state data sources which provide a standardized comparison for a random state population sample. There are no previous fishing studies which use these marketing segments to understand the social stratification of their participants.

These same family life cycle stage segments were distributed based on the season fished (Table 5-2). The variation across the year was minimal and participation was fairly constant. In other words, individual segments of anglers fished throughout the year at a consistent rate. Speculation that certain seasons of the year might appeal to one segment more than another was not supported.

Table 5-2. Distribution of Marine Anglers' Life Cycle Stage by Season Fished

Life Cycle Stage	Seasons[a] 1	2	3
	----------	%	----------
Bachelor (single, no children)	13.3	13.1	13.5
Newly Married (age=18-39, married, no children)	11.0	8.3	7.6
Full Nest (age=18-39, married, with children)	25.6	24.7	26.0
Full Nest II (age=40-49, married, with children)	13.3	12.9	13.0
Empty Nest (age=50+, married, no children)	23.7	29.3	26.6
Solitary Survivor (age=50+, widowed, no children)	0.8	0.6	1.0
Single Parent (age=18-49, divorced/ separated, with children)	4.3	3.8	3.6
Middle Aged/Childless (age=40-49, no children)	8.1	7.3	8.7

[a](1=July-October, 2=November-February, 3=March-June)

The family life cycle segments were distributed across region of residence (Table 5-3). For the most part, the distribution was fairly constant across all seven regions. However, Full Nesters (age 18-39, married with young children) was the largest segment of marine anglers in regions 5, 6 and 7 (Flagler - north to Nassau counties) as compared to being second in the sample at large and across the other six regions. Furthermore, regions 4 (Dade and Monroe) and 5 (Broward and Palm Beach) had a higher frequency of bachelors who saltwater fished as compared to the population as a whole and other regions in general. Lastly, Empty Nesters (age 50+, married, no children), was the largest segment across four of the seven regions. However, in region 3 (Pasco - south to Sarasota), they represented 37.6 percent of the sample as compared to 20.3 percent of the total estimated population of saltwater anglers as a whole. Thus, there are some differences in the marine angler population make-up across the regions.

Table 5-3. Distribution of Marine Anglers' Life Cycle by Region of Residence

Life Cycle Stage	Region[a]							
	Florida	1	2	3	4	5	6	7
	%							
Bachelor	13.3	12.5	14.0	13.3	19.4	17.5	11.3	11.2
Newly Married	8.9	6.8	11.0	6.7	6.3	10.5	9.2	10.3
Full Nest	25.5	24.4	24.5	20.8	19.4	24.1	28.7	30.3
Full Nest II	13.1	13.6	11.0	11.0	16.2	14.4	14.3	11.2
Empty Nest	26.3	30.2	26.2	37.6	24.1	20.3	24.9	23.3
Solitary Survivor	0.8	0.6	1.1	0.8	0.4	1.4	0.4	0.6
Single Parent	3.9	3.8	3.4	3.1	4.3	5.2	3.9	4.2
Middle Aged/ Childless	8.1	8.0	8.9	6.7	9.9	6.5	7.3	8.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a]For delineations of regions see section 1.3.

5.4 Benefits Sought

Florida's marine anglers can be further described in terms of the benefits they seek from marine fishing experiences. Respondents were asked to rank the top six items that motivated them to go marine fishing. Respondents who rated a given reason as their first, second, or third choice were aggregated and then listed in a frequency distribution in Table 5-4. Fifty-six percent of the respondents ranked to enjoy nature (22.0 percent), to relax (18.4 percent), and to enjoy a challenge (15.4 percent) as important benefits they sought from their sport fishing experiences.

Table 5-4. Distribution of Anglers Listing Selected Items as One of Their Top Three Reasons Florida Anglers Go Marine Fishing

Reason	Frequency	Percent	Cumulative Percent[a]
To enjoy nature and the outdoors	593	22.0	22.0
Relaxation	496	18.4	40.4
Excitement and challenge of catching fish	416	15.4	55.8
To be with friends	290	10.8	66.6
To escape work and life's pressures	267	9.9	76.5
To be with family	253	9.4	85.9
To catch fish to eat	246	9.1	95.0
To feel alive and energized	39	1.4	96.4
To catch and release fish	36	1.2	97.6
To be alone with thoughts and memories	32	1.2	98.8
To catch fish to sell	24	0.9	99.7

[a]Does not sum to 100.0 due to rounding

Table 5-5 summarizes the rating that respondents assigned eleven reasons for fishing. Among the reasons that more than 50 percent of the respondents said were important or very important were: to enjoy nature (87.9 percent); to relax (86.5 percent); to enjoy a challenge (80.4 percent); to escape pressures (69.7 percent); and to feel alive (53.9 percent).

Table 5-5. Distribution and Mean of Ratings of Reasons for Marine Fishing

Reason	Frequency	Rating[a]						
		1	2	3	4	5	6	Mean
		%						
To enjoy nature	1105	1.0	0.7	2.0	8.4	23.6	64.3	5.46
To relax	1104	1.3	1.0	2.1	9.1	25.2	61.3	5.40
To enjoy challenge	1100	1.6	1.3	4.2	12.5	25.3	55.1	5.24
To escape pressures	1096	8.2	3.1	6.4	12.6	20.0	49.7	4.82
To feel alive	549[b]	9.5	2.6	11.5	22.6	24.4	29.5	4.38
To be with friends	1093	11.0	6.2	12.5	26.2	20.4	23.7	4.10
To be with family	1086	12.8	7.6	12.3	20.8	17.7	28.7	4.09
To catch fish to eat	1102	10.2	9.0	15.9	26.0	15.7	23.2	3.98
To be alone	550[b]	22.7	10.0	13.1	19.3	14.2	20.7	3.54
To catch and release fish	543[b]	20.6	8.3	18.4	22.1	12.7	17.9	3.52
To sell catch	1091	88.5	3.9	2.3	1.8	1.7	1.6	1.29

[a]1=not important to 6=very important

[b]These three items were on only 50 percent of the surveys.

The reasons that were rated as not important or low importance by more than 25 percent were: to sell the catch (92.4 percent); to be alone (32.7 percent); and to catch and release fish (28.9 percent). There were fairly evenly distributed segments of anglers who ranged across the whole spectrum of "wanting to be alone," "wanting to catch fish to eat," and "to catch and release fish." The high negative skew of the distribution for "to sell the catch" among this recreational sample is a good indication that respondents were reading and reacting to each item.

It is clear from these responses that fishing is perceived by the majority of participants (~80 percent) as a recreational escape to a natural setting to focus on a limited goal that offers some stimulation. Substantial numbers (~65 percent) view fishing as an opportunity to socialize with family or friends and to catch fish to eat. Although small groups of "dissidents" from these popular reasons exist, they generally constitute a small minority, less than 5 percent for the top three rated reasons and less than 20 percent for most of the other reasons.

These findings are in line with previous studies of reasons for fishing. Generally, non-catch reasons are rated highly by almost all respondents while catch is very important for about a third of anglers and moderately important for about another third. For Florida anglers "enjoying nature" and "relaxing" rate highest of the eleven reasons for marine fishing. Since the largest segment of participants by mode is private boat (53.6 percent; see Table 3.4), there are opportunities for about half the sample to boat to a location where enjoying nature, relaxing on the water and escaping the pressure of everyday responsibilities is possible.

Previous studies have generally not asked motive questions about the disposition of catch that allow a comparison across anglers. In this study, about 31 percent gave "to catch and release fish" a score of 5 or 6 (very important), 39 percent gave "to catch fish to eat" this magnitude of scores and only 3.3 percent rated "to catch fish to sell" with high importance scores. Respondents could mark any of these with a high score so these proportions are not exclusive segments.

Table 5-6 compares subgroups of anglers (based on their disposition of catch) by their reasons for marine fishing. When the reasons for fishing are compared across these three segments, there are no major differences except on the three catch disposition items used to segment the sample. There is a modest indication that those anglers who catch to sell are a little less interested in the non-fish reasons (relaxation, challenge, nature, etc).

Table 5-6. Mean Reasons for Marine Fishing by Disposition of Catch Groupings

Reason	Disposition of Catch		
	Catch and Release Group	Catch to Eat Group	Catch to Sell Group
To enjoy nature	5.6	5.5	4.5
To relax	5.6	5.5	4.1
To enjoy challenge	5.5	5.4	4.4
To escape pressures	5.2	4.8	4.2
To feel alive	4.8	4.2	4.4
To be with friends	4.1	4.2	3.6
To be with family	4.2	4.2	3.6
To catch fish to eat	3.3	5.6	4.3
To be alone	4.0	3.2	4.1
To catch and release fish	5.6	2.3	2.2
To sell catch	1.3	1.2	5.5
	n=165	n=365	n=31

The eleven reasons for fishing were stratified by the seven state regions utilized in this study (Table 5-7).

Table 5-7. Mean Importance Ratings of Reasons for Marine Fishing by Region of Residence

Reasons	Florida	Regions[a] 1	2	3	4	5	6	7
	Rating[b]							
To enjoy nature and the outdoors	5.5	5.4	5.5	5.4	5.3	5.5	5.5	5.5
Relaxation	5.4	5.5	5.4	5.3	5.2	5.5	5.4	5.4
The excitement and challenge of catching fish	5.2	5.2	5.3	5.0	5.1	5.3	5.3	5.4
To escape work and life pressures	4.8	4.7	4.8	4.5	4.9	5.2	4.9	4.9
To feel alive and energized	4.4	4.4	4.2	4.5	4.6	4.3	4.5	4.5
To be with friends	4.1	4.2	4.1	4.2	4.2	3.9	4.1	4.0
To be with family	4.1	4.1	4.2	3.8	4.0	4.0	4.0	4.3
To catch fish to eat	4.0	4.1	3.8	3.8	3.9	4.0	3.9	4.2
To be alone	3.5	3.4	3.6	3.0	3.8	3.2	3.7	3.9
To catch and release fish	3.5	3.2	3.5	4.0	3.6	3.9	3.7	3.1
To catch fish to sell	1.3	1.3	1.3	1.3	1.7	1.2	1.9	1.1

[a]For delineation of regions, see section 1.3.
[b]1=not important to 6=very important.

In general, most of the regions were consistent and there were no large differences across regions. However, there were some moderate differences for five of the regions. Region 3 (Charlotte, Lee and Collier) mean importance of "to catch and release fish" was higher and the mean importance of "to be alone" was lower than state average. In region 4 (Dade, Monroe), the mean importance of "to catch fish to sell" was higher. For region 5 (Broward, Palm Beach), the mean importance of "to catch and release fish" and "to escape work and life pressures" was

higher. In region 6 (Martin - north to Volusia), the mean importance of "to catch fish to sell" was higher than the state average. Region 7 (Flagler - north to Nassau) exhibited a higher mean score on "to be alone" and a lower mean score on "to catch and release fish".

5.5 Disposition of Catch

Since fishery managers are primarily able to manage catch aspects of a fishing experience, a more detailed set of consumptive propensity items, cf. Graefe (1980) were included in the mail survey. These items elicit more detailed responses related to the catch dimension of fishing (Table 5-8).

Table 5-8. Distribution and Mean of Responses to Catch Related Statements

Statement	Frequency	Rating[a] 1	2	3	4	5	6	Mean
		%						
I should be able to sell all fish caught	2214	6.0	2.0	10.2	23.6	9.1	49.1	4.7
Want to keep all fish caught	2209	6.2	2.7	8.1	32.6	12.0	38.4	4.6
Only reason I fish is to catch to eat	2226	13.3	5.1	16.9	30.7	10.1	24.0	3.9
Doesn't matter what species I catch	2237	16.4	8.1	24.8	26.6	8.0	16.0	3.5
Still enjoy fishing if I had to release all fish	2242	31.6	11.2	24.1	16.2	4.1	12.9	2.9
I would rather catch 1 or 2 large fish than 10 small ones	2229	27.3	12.7	26.9	21.3	5.3	6.6	2.8
Usually fish for only 1 or 2 species on a typical trip	2214	29.9	16.2	27.9	15.1	4.3	6.6	2.7
More fish the happier	2206	36.4	11.5	32.0	12.5	2.7	5.0	2.5

[a]1=strongly agree to 6=strongly disagree

One set of items focused on a number of fish caught and kept dimension. In response to the item, "I should be able to sell all fish caught", only 17 percent agreed, while 83 percent disagreed. Another item inquired about retaining catch, "I want to keep all fish caught", with which 17 percent agreed and 83 percent disagreed. Yet, in response to the item, "the more fish I catch, the happier I am", about 80 percent agreed, while 20 percent disagreed. Thus, it would seem that there is a widespread desire to catch fish but not nearly as strong feelings about keeping them all, or being able to sell them. In response to the item, "I would still enjoy fishing if I had to release all the fish I caught", 67 percent agreed, while 33 percent disagreed.

A second set of items pertained to the type of fish targeted or caught. An almost perfect split was observed when asked about preference for specific types of fish. In response to the item, "it doesn't matter what species I catch", 49.4 percent agreed, while 50.6 percent disagreed. The degree of focusing on a narrow set of species as opposed to a broader selection was evaluated by asking if the respondent "usually fished for 1 or 2 species on a typical trip". A strong 74 percent agreed with this statement. In exploring preferences for size of fish caught, the respondents were asked if they "would rather catch 1 or 2 big fish than 10 small ones". About 27 percent strongly agreed with this, a total of 67 percent expressing some level of agreement while the other third disagreed, with only about 6.7 percent strongly disagreeing. Finally, one item focused on eating the catch with the statement "the only reason I fish is to catch fish to eat". About 35 percent agreed with this statement while 65 percent disagreed.

The preference for fewer larger fish compared to more smaller fish was further explored by stratifying this item across regions (Table 5-9)

Table 5-9. Mean Distribution of Preference for 1 or 2 Large Fish Over 10 Smaller Fish Groupings by Region

	Regions						
	1	2	3	4	5	6	7
Percent who prefer 1-2 large fish	65.5	65.5	63.0	64.7	65.5	70.5	70.3
Mean[a]	2.7	2.9	2.9	2.8	3.0	2.8	2.8
n	290	220	98	98	88	255	125

The distribution in preference for specific sized fish was fairly even across regions. No region varied from the other by more than 5 percent of anglers preferring larger or smaller fish.

In Table 5-10, the mean scores for the eleven reasons for fishing items were computed for those marine anglers who stated a strong to moderate preference catch for 1-2 large fish and for those anglers who expressed a moderate to strong preference for 10 smaller fish. No substantive differences were observed.

Table 5-10. Mean of Reasons for Marine Fishing by Preference for 1 or 2 Large Fish or 10 Smaller Fish Groupings

Reason	Prefer 1 or 2 Large Fish	Prefer 10 Smaller Fish
To enjoy nature	5.5[a]	5.5
To relax	5.4	5.5
To enjoy challenge	5.3	5.1
To escape pressures	4.9	4.8
To feel alive	4.4	4.4
To be with friends	4.1	4.1
To be with family	4.1	4.1
To catch fish to eat	4.0	3.9
To be alone	3.5	3.6
To catch and release fish	3.6	3.3
To sell catch	1.3	1.2
	n=742	n=366

[a]1=not important to 6=very important.

5.6 Importance of Fishing

Approximately one half (49.4 percent) of the respondents reported marine fishing as their most important outdoor recreation activity (Table 5-11). Only about a third (28.8 percent), say fishing is only another of many outdoor activities for them. When asked about the level of importance of fishing in their lives, about 57 percent consider marine fishing an important source of satisfaction (Table 5-12). Saltwater fishing was rated as an important consideration in choosing where to live by 47.1 percent of the respondents and in choice of occupation by only 15.9 percent. This is consistent with national outdoor recreation surveys carried out over the past 30 years indicating that fishing is consistently one of the top three outdoor recreation activities in number of people who participate.

Table 5-11. Distribution of Level of Importance of Marine Fishing as Compared to Other Outdoor Recreation Activities

Level of Importance	Frequency	Percent
Most important outdoor recreation activity	1158	49.4
Second most important activity	413	17.6
One of many outdoor activities	676	28.8

Table 5-12. Distribution of Ratings of Importance of Marine Fishing to Life Factors

	Ratings					
Life Factors	1	2	3	4	5	6
Importance of fishing as a source of life satisfaction	45	95	263	573	**607**[b]	664
Importance of fishing in choice of where to live	426	171	245	**345**	425	634
Importance of fishing in choice of occupation	1202	**232**	220	328	136	222

[a]1=not important to 6=very important
[b]Values in **BOLD** represent median scores.

5.7 Experience and Skill Level

Table 5.13 shows respondents self evaluation of their skills as saltwater anglers. Sixteen percent rated their skills as higher than the average angler while 23 percent rated their skills as being lower other anglers. Thus, the largest segment (55 percent) of the marine anglers rated their fishing skills equal to other anglers.

Table 5-13. Distribution of Marine Anglers Perceived Ability as Compared to Other Marine Anglers

	Frequency	Percent
Less skilled	548	23.4
Equally skilled	1298	55.4
More skilled	367	15.7
No Response	132	5.6

The level of experience with fishing in terms of time was high as respondents, on average, indicated 21.8 previous years of marine fishing experience; with 86.5 percent indicating that they have marine fished six or more years (Table 5-14).

Table 5-14. Distribution of Years of Previous Marine Fishing Experience by Marine Anglers

Years Fished	Frequency	Cumulative Percent
1-5	303	13.5
6-10	357	28.5
11-15	273	40.7
16-20	316	54.8
21-25	221	64.7
26-30	283	77.3
31-35	158	84.3
36-40	136	90.4
41-45	72	93.6
46-50	73	96.9
51+	70	100.0
	n=2,241	

Mean years fished 21.84 (S.D. 14.34)

5.8 Information Sources

Sources of information these anglers used in keeping up with marine fishing (Table 5-15) were fishing columns in newspapers (79 percent); fishing shows on television (77 percent), fishing magazines (63 percent); and fishing reports on radio (44 percent); fishing magazines, if used, are read most frequently once a month, followed by fishing columns in newspapers once a week, viewing of fishing shows on television once a week. Only 10 percent reported memberships in a fishing club.

Table 5-15. Distribution of Marine Anglers Using Sources of Information to Keep Up with Marine Fishing

Sources	Access Rates				
	Don't use	Use once a month	Once a week	Daily	NR
	%				
Fishing magazines	26.6	45.5	14.7	2.6	10.6
Fishing column in newspaper	12.9	13.6	44.3	21.3	7.8
Fishing report on radio	43.0	14.8	20.5	8.3	13.4
Fishing show on television	15.4	28.8	44.1	4.4	7.3

5.9 Reasons for Not Fishing

Thus far, this report has focused on variables related to participation on fishing. This section reports the results of the Florida participation phone survey where respondents who reported that they had not fished were asked to give reasons for their non-participation. Table 5-16 summarizes fishing constraints that were reported broken out by the total sample of non-anglers, those that had never fished, those that had not fished in the last 1-5 years, and those that had not fished in 5 or more years.

Table 5-16. Distribution of Reasons Why Non-Anglers Have Not Fished

	Total non-anglers		Never fished		Not fished last 1-5 years		Not fished >5 years	
Reason	Freq	%	Freq	%	Freq	%	Freq	%
No interest	518	51.0[a]	279	5.0	82	25.9	57	52.2
No time	265	26.1	59	1.1	129	40.7	77	25.6
Poor health	71	7.0	13	0.2	33	10.4	25	8.3
No equipment	56	5.5	13	0.2	23	7.3	20	6.6
No money	29	2.8	5	0.1	17	5.4	7	2.3
Poor catch	21	2.1	1	<0.0	16	5.0	4	1.3
Too many regulations	20	2.0	2	<0.0	15	4.7	3	1.0
Don't know how to fish	17	1.7	9	0.2	3	0.9	5	1.7
Congestion or overcrowding	2	<0.1	1	<0.0	1	0.3	0	0.0
n =	1015		382		317		301	

[a]Respondents could give more than one response, so additive statistics are not possible.

Lack of interest and lack of time clearly stand out as the dominant reasons for non-participation for the majority of respondents. Lack of interest was the most frequently indicated reason for those who had never fished. Those that had not fished in the last 1-5 years, lack of time (40.7 percent) and no interest (25.9 percent) were the dominat reasons. Furthermore, those respondents that had not fished in more than 5 years indicated a lack of interest (52.2 percent) and lack of time (25.6 percent) were their primarily reasons for not participating: poor catch, too many regulations, lack of fishing skills, and congestion or overcrowded fishing conditions were the least indicated reasons for not fishing among all segments.

Table 5-17 stratifies these nine reasons for non-participation across the seven state regions to explore differences. Six regions seem to show some differences for other areas. Regions 2 (Pasco - south to Sarasota) and 3 (Charlotte, Lee, Collier) seem to have an under reporting of "no equipment" and region 3 also shows a lower level of "no interest". Region 4 (Dade, Monroe) show a lower proportion of their sample indicating "poor health" than in other regions. Finally, "poor catch" varies across regions with almost no one indicating this constraint in regions 3 and 7 (Flagler - north to Nassau), while region 5 (Broward, Palm Beach) had a higher level of reports, though still by relatively few people.

Table 5-17. Distribution of Reasons Why Non-Anglers Have Not Fished By Region

	Region						
Reason	1	2	3	4	5	6	7
	-------------------- % --------------------						
No interest	8.6	9.3	6.2	7.1	7.7	8.8	8.1
No time	4.2	4.4	3.6	4.0	4.6	4.3	4.3
Poor health	1.5	1.2	1.7	0.4	1.2	0.7	1.0
No equipment	1.2	0.4	0.2	1.0	1.0	1.0	1.2
No money	0.6	0.4	0.4	0.4	0.3	0.4	0.4
Poor catch	0.2	0.0	0.4	0.8	1.2	0.1	0.4
Too many regulations	0.6	0.4	0.0	0.2	0.2	0.2	0.1
Don't know how to fish	0.3	0.5	0.0	0.0	0.0	0.2	0.4
Congestion or overcrowding	0.1	0.0	0.0	0.0	0.0	0.0	0.1

5.10 Implications

Those who participate in the sport of marine fishing do seem to match the stereotype of a white male who enjoys the outdoors. Since the resource is physically open to all interested participants, the reason for relatively less female or black participation is likely related to the finding that more of the active anglers report some exposure to fishing as a child and higher average income level among anglers. Statewide participation among Hispanic segments is approximately proportional to Florida's population in general though there are regional variations (see Section 2).

Among marine fishing participants, the largest segments are married individuals over age 50 with no children at home (26.3 percent) and individuals between the ages of 18 and 39 with children (25.5 percent). Most adults had moderate to extensive fishing experience as a child. The fact that one of the largest fishing segments has children suggests that there is potential for a continued supply of anglers, if the children are introduced to fishing. The magnitude of the population segment of post-fifty, married with no children couples is an indication of Florida's large mature population which seems to be a relatively active participant in the fishery.

The family lifecycle partitions indicated some variation across regions although there was more consistency than variation (see Table 5.3). The higher level of "empty nest" respondents in region 3, higher levels of "bachelors" in regions 4 and 5 and higher levels of families with children (e.g., regions 6 and 7) may call for different approaches to fisheries development and conservation. For example, conservation education targeted to young children would be more cost effective in those regions where those anglers with children reside.

The relative rating of the 11 reasons for fishing indicates that marine angling is primarily a recreational endeavor offering relaxation in a natural environment. The possibility of a catch offers a challenge while escaping the pressures of everyday roles and responsibilities. About two-thirds of the respondents hope to catch fish they can eat and want to socialize with family or friends while about one-third prefer to release the fish or to be alone. These factors would support the idea that Florida's marine environment be preserved and conserved with minimal future development that would interfere with the natural experience. Factors that would enhance the ability to relax such as reducing noise and irritant pollution, minimizing congestion, or reducing conflict in the multiple use coastal zone, would presumably facilitate greater satisfaction for most participants. Maintaining the ability to keep some fish for eating would also address a motivation rated high for most participants. Since a relatively large group of respondents (70 percent) indicated fishing was either their first or second most important recreational activity and 82 percent said fishing was a relatively important source of satisfaction in their life, maintaining the quality of fishing experiences would seem to be fairly important.

The distribution of reasons for fishing did show some moderate variation by region (see Table 5.7). Regions 4 and 6 had a higher proportion interested in catching fish "to sell" while regions 3 and 5 showed a higher proportion wanting to "catch and release". None of the differences were very large and there seem to be incidences of each reason for fishing in every region.

Eighty percent of the respondents expressed they did not want to keep all the fish caught. Two-thirds indicated that they still would have an enjoyable experience even if they were required to "release all fish caught." About two-thirds indicated they would prefer keeping 1-2 larger fish over 10 smaller. Also there was a 50-50 split on "it doesn't matter which species I catch." Thus, at least in reported attitudes, the majority would prefer to catch and release many fish while keeping just one or two. About half of the respondents do not have a strong species preference, so some substitution among species seems possible for many anglers. The data support the conclusion that those who want to keep a large number of fish are a minority. Thus, bag limits which allow anglers to keep a few large fish would seem to be acceptable to the majority of Florida anglers.

6. LICENSE PURCHASING AND COMPLIANCE, AND ATTITUDES TOWARD REGULATION METHODS

6.1. License Purchasing and Compliance

University of Florida (UF) Angler Survey respondents were asked if they had purchased any of Florida's various "sporting" licenses during the past two years. The license choices included general recreational fishing and hunting licenses, specialty permits and stamps, and commercial licenses. The latter would be required of any fisherman who wishes to sell a catch to a shoreside buyer. An assessment of the level of compliance with recreational saltwater license eligibility criteria was also attempted. The findings are presented on a statewide (Florida) and regional basis.

6.1.1. Purchases of Various Licenses Statewide

Of the total number of respondents statewide (2,349), Table 6-1 shows that approximately two-thirds of the respondents indicated they purchased a saltwater fishing license. A number of exemptions apply, however, regarding saltwater fishing license eligibility. Persons who are exempt include anyone under 16 years of age, any Florida resident fishing in saltwater from land or from a structure fixed to land, any person fishing from a boat which has a valid recreational vessel saltwater fishing license, any Florida resident 65 years old or older, and anyone fishing from a pier which has been issued a pier saltwater fishing license. Other exemptions apply to persons on active military duty and those engaged in certain Florida Health and Rehabilitative Services programs.

Only about 43 percent had purchased a freshwater fishing license, which would be needed when keeping a freshwater species caught on a "saltwater" trip while fishing brackish-water habitat, such as an estuary, bay, river mouth, etc. Almost 13 and 21 percent of the respondents indicated they purchased a spiny lobster and snook stamp, respectively. Approximately 18 percent of the respondents purchased a game hunting license. Less than ten percent of the respondents indicated they purchased any of the remaining types of licenses, permits, or stamps.

6.1.2. Purchases of Various Licenses by Region

License, permits, and stamps purchased by the respondents are provided on a regional basis in Table 6-1. Regional differences in the percentage distribution of those purchasing and not purchasing a saltwater license may depend on the availability of shoreside fishing opportunities, demographic characteristics of local populations, and other factors. However, when examining the regional percentages of respondents who purchased saltwater fishing licenses, the values are about equal. Region 1 had the largest percentage of respondents purchasing saltwater fishing licenses, while region 3 had the smallest percentage. In regions 1 and 7, over one-half of the respondents purchased a freshwater license. In regions 2, 3, 5, and 6, more respondents purchased snook stamps, while respondents in regions 4 and 5 purchased more spiny lobster stamps than other regions of the state. Many of these regional differences in specialty license purchases are likely linked to local species abundance.

Table 6-1. License Purchases During Last Two Years, By Type of License and Region of State[a]

	REGION							
	FLORIDA	1	2	3	4	5	6	7
	%							
Saltwater Fishing	65	71	63	58	66	64	63	65
Freshwater Fishing	43	56	36	35	15	34	45	54
Tarpon Permit	1	1	2	3	3	2	2	1
Snook Stamp	21	4	34	35	16	32	30	3
Spiny Lobster Stamp	13	4	11	7	36	27	16	7
Saltwater Products	3	4	2	1	7	4	3	1
Restricted Species	1	2	1	1	1	2	1	1
Game Hunting	18	28	13	10	6	8	17	25
Turkey Stamp	7	12	4	2	3	4	6	9
Duck Stamp	5	8	4	1	2	4	5	6
Archery Stamp	7	11	3	3	3	3	5	13

[a]Values represent percentage of respondents who purchased license.

6.1.3. Respondent Compliance with Saltwater Fishing License Requirements

UF Angler Survey respondents were evaluated based on trip information provided via the MRFSS-UF survey to ascertain their eligibility for holding a valid saltwater recreational fishing license. Those UF Angler Survey respondents who indicated in the MRFSS-UF component of the interview process that they had saltwater fished at least once during the prior two months were considered eligible to purchase a Florida saltwater fishing license if they had: (1) fished from a private/rental boat, and (2) were between the ages of 16 and 64, inclusive.

Of the 882 eligible sample respondents statewide, Table 6-2 shows that approximately 87.1 percent indicated they purchased a saltwater license during the past two years. The remaining 12.9 percent reported they had not purchased a license during the past two years, although they indicated engaging in saltwater recreational fishing from a private/rental boat during the previous two months. The latter group are considered not to be complying with the recreational saltwater fishing license requirements, given the above definition of eligibility criteria. These values may tend to overestimate noncompliance as certain exemptions previously discussed could not be considered because this information regarding exemptions was not included in the survey.

Table 6-2. Apparent Compliance with License Requirement Regulation by Participating and Eligible Recreational Saltwater Fishermen, By Region

Region	Eligible	Purchased
Florida	882	768 (87.07%)
Region 1	242	218 (90.08%)
2	161	140 (86.67%)
3	75	65 (86.67%)
4	83	70 (84.34%)
5	79	68 (86.08%)
6	163	140 (85.89%)
7	79	67 (84.81%)

The 882 participants eligible for a saltwater fishing license represents 37.5 percent of the total UF Angler Survey sample size of 2,349 respondents. Applying this eligibility percentage to the total estimated population statewide of recreational saltwater fishing participants (2,302,500) generated from the participation model (Table 3-2) yields an estimated number of eligible participants of 863,438. This value represents an upper bound on the number of eligible saltwater recreational fishermen in Florida. The product of the estimated compliance rate (87.1 percent) and the maximum eligible participant estimate (863,438) yields an apparent statewide compliance estimate of 752,054 participants for the 1991-92 survey period. This estimate exceeds by approximately 39 percent the actual reported saltwater recreational fishing license sales in Florida of 538,213 during the 1991-92 period, as provided by the Florida Department of Natural Resources (1992). The difference can be somewhat explained by the survey not accounting for a variety of eligibility exemptions. In addition, the estimated compliance rate may be subject to potential over-reporting bias because respondents who returned the mail survey may be more likely to comply with state fishery regulations. This latter source of bias can not be tested.

The estimated statewide "noncompliance" percentage varies slightly across regions. Table 6-2 shows the percentage of eligible respondents who did not purchase a saltwater fishing

license ranges from 9.9 percent in region 1 to 15.7 percent in region 4. The only region which had a non-compliance percentage below the statewide estimate was region 1, which also had the largest number of eligible participants.

6.2. Attitudes Regarding Regulation Methods

The UF Angler Survey sought to solicit respondents' opinions regarding a variety of regulatory methods which could be used to reduce the catch of species they target. Respondents were asked to indicate their preference for several alternative techniques by which recreational fisheries regulations could be imposed. Each alternative was rated based on a Likert rating scale where 1 = strongly support and 6 = strongly oppose. The question was posed to respondents in two versions to test the hypothesis that respondents would rate the regulatory techniques differently if described as "conservation measures" versus "catch regulations". Although not tested for statistical difference, the responses for both versions of the question were comparable. Thus, for the purposes of this report the data for both versions of the question were aggregated. The response ratings are averaged on a statewide, region, and targeted species group basis. The findings are presented below.

6.2.1. Statewide and Regional Responses

The responses were averaged across all respondents on a statewide basis. Table 6-3 shows that respondents indicated relatively higher support for minimum size limits and restrictions on the number of fish allowed to be kept. Regulations directed at establishing a maximum size limit and seasonal catch-retention restrictions were supported somewhat less. Restrictions on allowable bait and tackle received very little support.

The same statewide ordinal ranking of average ratings for the five alternative regulations was preserved across regions. Regions 1 and 7, however, appeared to offer slightly less support for each of the five regulatory alternatives.

6.2.2. Statewide and Regional Responses by Primary Species Group Targeted

The responses were also compiled on the basis of primary species groups targeted during the past 12 months. The species groups are defined as in Section 4. The ratings were averaged across species groups that received the single highest percentage of each respondent's targeted fishing time. In the case of a tie across two or more species groups for a given respondent, the observations were retained for each species group. The findings are presented on a statewide and region basis, by species group, in Table 6-4.

On a statewide basis, the ordinal ranking of the average ratings for the alternative regulatory methods show little differences across species groups. For example, for those respondents that primarily targeted Nearshore Bottomfish species, minimum size (1.8) and bag limits (2.2) were more preferred to seasonal retention restrictions (2.8) and maximum limits

Table 6-3. Average Ratings* of Alternative Recreational Fishing Regulation Methods, By Region

		REGION						
REGULATION METHOD	FLORIDA	1	2	3	4	5	6	7
Minimum Size Limit	1.7	1.9	1.6	1.5	1.5	1.5	1.6	1.9
Maximum Size Limit	2.9	3.2	2.7	2.5	2.8	2.9	2.9	3.2
Bag Limits	2.1	2.3	2.0	1.8	1.9	2.0	2.0	2.5
Seasonal Retention Restrictions	2.7	3.0	2.5	2.3	2.5	2.6	2.6	3.1
Bait/Tackle Restrictions	3.4	3.6	3.3	3.2	3.5	3.3	3.4	3.7

*1=strongly support to 6=strongly oppose.

(3.0). Restrictions on the kinds of allowable bait and tackle were opposed (3.6). This ranking pattern applies to the other targeted species groups statewide.

The ranking pattern found on a statewide basis by species group is generally the same across regions. However, some minor exceptions do exist. For example, fishermen who target Reef Fish, Offshore Small Game, and Other species in region 7 showed a slight preference to maximum size limits over seasonal retention restrictions. Also, fishermen who target Offshore Small Game in region 5 and Inshore Game in region 4 prefer seasonal retention restrictions over maximum size and bag limits.

6.3. Implications

Little variability exists across state regions in the percentage of respondents who purchased a saltwater fishing license compared those who did not. In addition, the estimated participant compliance with Florida's saltwater recreational fishing license eligibility criteria is approximately the same across regions. Also, the survey respondents' support of various common techniques for imposing regulations exhibits little change when examined across regions of the state and species group typically targeted. However, respondents did offer varying degrees of support for each of a selection of regulatory methods. Minimum size limits and bag limits received the highest level of support by respondents, while maximum size limits and bait/tackle restrictions received little support. This would suggest that Florida's recreational saltwater fishing participants basically support the more common regulatory methods currently being implemented by the Florida Marine Fisheries Commission. Attempts to implement additional restrictions on types of terminal tackle and allowable baits, as well as create more seasonal closures, may be met with less support.

Table 6-4. Average Ratings* of Alternative Recreational Fishing Regulation Methods by Species Targeted and Region

REGULATION METHOD	FLORIDA	REGION 1	2	3	4	5	6	7
				Reef Fish				
Minimum Size Limits	1.8	1.9	1.8	1.9	1.7	1.8	1.7	2.0
Maximum Size Limits	3.3	3.4	3.3	3.0	3.3	3.3	3.4	3.1
Bag Limits	2.3	2.6	2.2	2.0	2.3	2.6	2.1	2.6
Seasonal Retention Restrictions	3.1	3.3	3.0	2.8	3.1	3.1	2.9	3.3
Bait/Tackle Restrictions	3.7	3.6	3.8	3.8	3.9	3.4	3.9	3.6
				Nearshore Bottomfish				
Minimum Size Limits	1.8	1.9	1.8	1.9	1.7	1.8	1.7	2.0
Maximum Size Limits	3.0	3.4	3.3	3.0	3.3	3.3	3.4	3.1
Bag Limits	2.2	2.6	2.2	2.0	2.3	2.6	2.1	2.6
Seasonal Retention Restrictions	2.8	3.3	3.0	2.8	3.1	3.1	2.9	3.3
Bait/Tackle Restrictions	3.6	3.6	3.8	3.8	3.9	3.4	3.9	3.6
				Offshore Small Game				
Minimum Size Limits	1.9	2.0	1.8	1.7	0.8	2.0	1.5	2.2
Maximum Size Limits	3.1	3.2	2.9	2.6	3.2	3.0	3.2	3.0
Bag Limits	2.2	2.3	2.2	1.7	2.4	2.4	1.9	2.4
Seasonal Retention Restrictions	2.9	3.2	2.5	2.0	3.6	2.3	2.9	3.1
Bait/Tackle Restrictions	3.7	3.8	3.6	4.1	5.0	2.6	3.2	4.3
				Offshore Big Game				
Minimum Size Limits	1.6	1.5	1.9	2.0	1.4	1.6	1.6	2.0
Maximum Size Limits	3.0	3.3	3.2	2.4	3.0	3.0	3.0	3.5
Bag Limits	2.0	1.7	2.1	2.4	1.9	1.9	2.0	2.2
Seasonal Retention Restrictions	2.7	2.3	3.1	2.8	2.6	2.6	2.9	3.1
Bait/Tackle Restrictions	3.7	3.9	3.9	3.9	4.1	3.5	3.4	3.9
				Inshore Game				
Minimum Size Limits	1.5	1.8	1.6	1.4	1.4	1.5	1.6	3.0
Maximum Size Limits	2.7	3.0	2.5	2.5	2.5	2.9	2.9	4.0
Bag Limits	1.8	1.8	1.8	1.7	2.1	1.7	1.8	3.0
Seasonal Retention Restrictions	2.3	2.2	2.1	2.2	1.9	2.3	2.4	6.0
Bait/Tackle Restrictions	3.4	2.2	3.3	3.3	2.9	3.4	3.5	6.0

*1 = strongly support to 6 = strongly oppose.

7. PROJECTED RESIDENT MARINE RECREATIONAL FISHING PARTICIPATION, EFFORT, AND ECONOMIC ACTIVITY IN 1995, 2000, 2005, AND 2010

7.1 Procedures and Assumptions to Use the Participation Model for Forecasting

The participation model described in Section 3.1 also can be used to forecast residents' future participation in marine recreational fishing. This is more complicated than estimating the current level of participation as was reported in Section 3.2. First, the variables used in the participation model must be adjusted for socioeconomic and demographic changes in the population over time in order to recompute state and regional participation rates. Next, changes in the number of residents in the state and each region must be estimated so that the projected participation rate can be multiplied times the state or regional population. Finally, several assumptions about future conditions in Florida must be made, either explicitly or implicitly, to justify the participation estimates. Each of these elements of the forecasting procedure are now addressed in more detail.

The only independent forecasts of socioeconomic and demographic changes in the Florida resident population are provided by the Bureau of Business and Economic Research at the University of Florida (Population Studies, Vol. 25, No. 3-4, 1992). These forecasts are made as part of the statewide population forecasts developed from U.S. Bureau of the Census' population statistics. Unfortunately, the only variables used in the participation model (see Table 3-1) that have been projected at the regional level are population size, age (by age group), gender and ethnic composition. Other variables such as household size, employment and marriage status, income and leisure preferences have not been forecasted at the regional level. Therefore, in order to compute changes in future participation rates, the only variables in the participation model that were assumed to change over time were the age and gender composition of the resident population in each region. Ethnic composition forecasts were not used because ethnic status was not a statistically significant determinant of resident participation (see Table 3-1).

Other variables such as income, boat ownership, and prior fishing experience were held constant at the sample means which implies that there would be no change in these characteristics of the population for the forecast period. Holding income constant at 1991-1992 levels means that average income would change at the same rate as the rate of inflation; thus, there would be no change in purchasing power (real income) from 1991-1992 levels. This is a conservative approach to forecasting which is warranted by the lack of regional level forecast information. The effects of real income changes on participation rates at the state level are considered after the baseline forecasts are presented.

Changes in the number of residents in each region were computed based on population size forecasts from the Bureau of Business and Economic Research. Although the Bureau provides high, medium, and low estimates to reflect potential prediction error, only the medium estimates are used for this report since these are considered the most likely prediction. The reader should understand, however, that the forecasts of resident fishing participation provided in this report are highly dependent on population forecasts. And, these population forecasts are

subject to prediction error. These errors increase as the prediction interval increases, especially at the regional level.

Finally, there are several assumptions about general conditions in Florida that must be made. First, it is assumed that fishing quality across the state does not change during the forecast interval. This is a strong assumption given potential rates of resident and tourist growth and related impacts on the marine environment. Fishing quality may decline due to fish stock reductions from overharvesting, habitat destruction, or water quality degradation. Similarly, fishing quality can decline as a result of stricter regulations or overcrowding. Since there are many dimensions of fishing that contribute to the quality of the experience, it is not possible to predict how fishing quality in Florida will change.

A closely related assumption is the expectation that access conditions in each region will not change over the forecast period. This means that opportunities to fish from piers, boats, or other modes will be comparable to the current situation and access points such as marinas and boat ramps will be available to meet demand.

One last assumption about general conditions relates to living standards and the quality of life in each region. With population growth and urbanization proceeding at different rates across the state, it is possible that relative living standards across the regions will change over time. These types of changes can influence growth patterns and leisure preferences but it is impossible to predict such changes. Thus, the forecasts presented in this report assume that the relative distribution of living conditions across Florida will remain the same.

7.2 Projected Changes in Participation Rates and Number of Participants

Using predicted age and gender changes across each region from projections reported in Population Studies, forecasts of marine recreational fishing participation rates for years 1995, 2000, 2005, and 2010 were computed from the participation model (see Table 3-1). These participation rate forecasts were then combined with population size projections for age groups 15 and older in each region to forecast the total number of marine recreational anglers. For Florida as a whole, the population (all ages) is expected to increase from 12.9 million in 1990 to 15.6 million in 2000 and to 18.0 million in 2010. For age groups 15 and older, the population is expected to increase from 10.5 million in 1990 to 12.6 million in 2000 and to 14.9 million in 2010.

Forecasts in Table 7-1 show the effects of different population growth rates across Florida and changes in the composition of the population. Considering the participation rate forecasts first (in parentheses below the number of participants in Table 7-1), the dominant influence of age and gender changes across the state is a reduction in future participation rates. At the state level, the rate declines from 21.9 percent in 1991-1992 (see Table 3-2) to 21.1 percent in 2010. This decrease is due to a gradual aging of the population, especially in the 65 years and older category, and a declining percentage of males in the total population. These changes are expected to be relatively uniform across the state, however, so that changes in the participation rates in each region are similar in magnitude. In every region the predicted change

in the participation rate is less than 1.5 percent from 1995 to 2010. These relatively small changes indicate that age and gender changes in the population are not likely to have much effect on future marine fishing participation rates.

Table 7-1. Predicted Resident Marine Recreational Fishing Participation Rates and Number of Participants (15 years and older) for Florida and Regions in 1995, 2000, 2005, and 2010.

	Year				
	1995	2000	2005	2010	% Change 1991-2010[a]
Florida	2,500,624 (21.7%)[b]	2,720,444 (21.6%)	2,939,567 (21.3%)	3,140,306 (21.1%)	36.4%
Region 1	332,953 (20.9%)	360,594 (20.7%)	386,585 (20.4%)	410,246 (20.2%)	34.3%
2	492,260 (18.5%)	531,207 (18.4%)	569,427 (18.3%)	603,767 (18.2%)	31.4%
3	130,655 (21.1%)	149,080 (20.9%)	167,562 (20.6%)	184,653 (20.4%)	63.6%
4	342,477 (20.3%)	358,032 (20.1%)	376,104 (19.9%)	393,723 (19.7%)	18.7%
5	435,745 (22.7%)	470,276 (22.4%)	502,999 (21.9%)	532,290 (21.4%)	31.9%
6	546,660 (25.2%)	615,749 (25.0%)	686,095 (24.8%)	749,693 (24.6%)	55.1%
7	219,872 (25.6%)	235,505 (25.2%)	250,795 (24.8%)	265,935 (24.4%)	29.1%

[a] Computed from 1991-1992 participation estimates in Table 3-2.
[b] Participation rate prediction in parentheses.

Despite the projected decline in future participation rates, forecasts of the total number of resident marine anglers in Table 7-1 show the significant influence of population growth throughout Florida. The total number of marine anglers in Florida increases from 2.3 million in 1991-1992 (Table 3-2) to 2.7 million in 2000 and to 3.1 million in 2010. The same general trend is apparent in each region although the rates of growth reflect differences in population growth across regions. For example, the number of anglers in Region 3 increases from 112,900 in 1991-1992 to 184,653 in 2010, a 63.6 percent increase. Similarly, Region 6 would experience an increase in the number of marine anglers to 749,693, an increase of 55.1 percent from 1991-1992 levels. Other regions, however, would experience much slower growth. Region 4, for example, the region with the largest number of anglers in 1991-1992, would only

increase by 18.7 percent in 2010. Region 6 would remain the region with the largest number of anglers in 2010.

To evaluate how participation would change if real income was not held constant at 1991-1992 levels, rates of real income (based on the average income in the UF Participation Survey) growth of 1 and 3 percent per year were used to recompute participation estimates. Age and gender changes used for the forecasts in Table 7-1 were kept the same so that the effects of real income changes could be isolated. The results in Table 7-2 show the percentage changes in the total number of participants in the state as a whole assuming 1 and 3 percent real income growth per annum. The percentages would be negative numbers if real income were assumed to decline by 1 and 3 percent per annum.

The results in Table 7-2 show that, with 1 percent per year real income growth, the total number of participants would be 3.6 percent larger in 2010 than with the base forecast (which assumed constant real income). Similarly, with 3 percent real income growth, participation would increase by 2.6 percent by 1995 and by 13.7 percent by 2010. These results indicate that income growth in Florida would have a positive influence on marine fishing participation. But, income changes are not likely to have a major influence on future participation. Three percent growth, sustained on an annual basis, would be rapid income growth given historical rates. Yet, even with this level of real income growth, total participation would be only 13.7 percent higher in 2010 than the baseline forecast (Table 7-1). Thus, the results reenforce the conclusion that the most important determinant of the number of resident marine fishing participants in Florida will be population growth. There is no statistical basis to believe that other factors such as aging of the population or income growth will have a more significant influence on marine fishing participation by Florida residents.

Table 7-2. Percentage Change in Base Projections of the Number of Resident Fishing Participants in Florida Due to Real Income Growth.

	Annual Real Income Growth Rate	
Year	1%	3%
1995	0.8%	2.6%
2000	1.7%	5.7%
2005	2.6%	9.3%
2010	3.6%	13.7%

7.3 Projected Changes in Recreational Fishing Effort by Region in Florida

The projected changes in the number of resident marine recreational fishing participants in Florida can be used to forecast fishing effort in each region of the state. As with forecasting participation, effort forecasts also require some fairly strong assumptions. One important assumption is that the pattern of travel to different destination regions in 1991-1992 (described

in Section 3.3) would continue to prevail over the forecast period. This means that the majority of anglers in each region would fish primarily within their own region, but some would fish in other destination regions. The pattern of trip allocation across different destination regions that prevailed in 1991-1992 would continue into the future.

A second important assumption is that the average number of fishing trips made by anglers in each region would remain the same. This means that the average number of trips by anglers in each region (see Table 3-5) would not change. While it is possible to develop a predictive model to estimate future trip behavior as a function of various socioeconomic variables, the development of such a model is beyond the scope of this project.

There are of course several implicit conditions underlying these two assumptions. First, changes in fishing quality could change the level of effort by anglers leading to more (less) trips per year by the average angler. As with the forecasts of participation discussed in Section 7.1, it is impossible to predict how changes in fishing quality will impact fishing effort. Second, growth in personal income and other socioeconomic changes could lead to changes in the level of fishing effort. It is possible that these changes could have a significant effect on average levels of **effort**, even though the preceding analysis in Section 7.2 indicated that these changes would not have a significant effect on **participation**. Finally, the assumption of constant effort over the forecast period also implies that access conditions will remain the same. Congestion at boat ramps and fishing piers due to greater numbers of marine anglers could lead to fewer trips by the average angler even though the number of anglers may not be effected. The reader should be cognizant of these explicit and implicit assumptions in the following forecast results.

Forecasts of resident marine fishing effort in each destination region (see the definition of a destination region in Section 3.2) for 1995, 2000, 2005, and 2010 are presented in Table 7-3. The results show that the total number of fishing trips in Florida increases from 19.8 million in 1991-1992 to 21.8 million in 1995 and to 27.9 million in 2010. Overall growth in fishing effort during the period 1991-1992 to 2010 is 39.7 percent. Projected increases in effort vary across different regions of the State. Due to above average increases in the number of participants in region 3 and in the region 6, these regions will account for a much larger share of total effort in the year 2010 than they did in 1991-92. By contrast, below average increases in participants in regions 4 and 7 mean that these regions will account for a smaller share of total effort in 2010 than they did in 1991-92.

Table 7-3 also shows some changing patterns of fishing effort across the regions. Region 4 would remain the largest in terms of effort although Region 6 would have the largest number of participants. Effort would increase faster than participants in Region 4 because of the number of anglers coming from other regions to fish in this destination region. Finally, it is important to note that Regions 2, 4, and 7 grow at slower rates than the state average.

Table 7-3. Predicted Resident Marine Recreational Fishing Effort (Trips) by Destination Region in Florida in 1995, 2000, 2005, and 2010.

Destination Region	Year 1995	2000	2005	2010	% Change 1991-2010[a]
Florida	21,803,517	23,805,207	25,924,489	27,967,649	39.7%
Region					
1	1,382,673	1,512,530	1,642,824	1,766,096	40.5%
2	4,818,181	5,211,753	5,623,679	6,015,686	34.2%
3	1,533,878	1,745,481	1,964,182	2,175,920	63.5%
4	5,708,644	6,060,621	6,459,452	6,854,605	26.5%
5	3,664,675	4,015,012	4,388,659	4,750,013	41.8%
6	3,571,504	4,035,844	4,517,602	4,975,964	58.6%
7	1,123,963	1,223,965	1,328,091	1,429,365	37.8%

[a] Computed from 1991-1992 effort estimates in Table 3-4.

7.4. Projected Economic Activity

Increases in the number of Florida resident saltwater anglers will effect both state and regional economies. In this section, the projected numbers of resident saltwater anglers (reported in Table 7-1) are used to compute projected expenditures, fishing equipment investment, economic output, personal income, and full-time-equivalent employment for the years 1995, 2000, 2005, and 2010.

7.4.1. Projected Annual Fishing Expenditures

Assuming average annual fishing expenditures remain constant at 1991-92 levels, annual expenditures by all Florida resident saltwater anglers can be computed by multiplying the average annual expenditures reported in Section 3.4 (Table 3-6) by the projected number of anglers. The results of these calculations are presented in Table 7-4. Projected total annual expenditures by all Florida resident saltwater anglers are $1,441,625,000 in 1995 and increase to $1,810,405,000 in the year 2010. On a state-wide basis, and across all time periods, expenditures for boat fuel represent the largest expense category followed by lodging, party/charter boat fees, tackle, bait, ramp fees, and equipment. On a regional basis, total 1995 annual expenditures are greatest, in region 6 followed by regions 2, 5, 4, 1, 7, and 3. However, by the year 2000, the ranking of regions from highest to lowest annual saltwater

fishing expenditures changes to 6, 2, 5, 1, 4, 7, and 3. The relative positioning of regions 1 and 4, and 7 and 3 change due to projected changes in saltwater anglers by 1995. In region 1 fuel represents the highest expense category followed by party/charter boat fees, tackle, lodging, bait, ramp fees and equipment. In region 2 fuel is the highest expense item followed by party fees, lodging, bait, tackle, ramp fees and equipment. Expenses on fuel lead all categories in region 3 followed by party fees, tackle, bait, lodging, ramp fees, and equipment. In region 4 fuel represents the largest expense category followed by party fees, bait, tackle, lodging, ramp fees, and equipment. For region 5 fuel is the highest expense followed by lodging, party fees, tackle, bait, ramp fees, and equipment. In region 6 lodging expense leads all other expense categories followed by fuel, party fees, tackle, bait, ramp fees, and equipment. Boat fuel expense represents the largest expense category in region 7 followed by tackle, bait, lodging, party fees, ramp fees and equipment. As was the case for region 1, in all regions the relative rankings of expense categories were invariant over all projected time periods.

7.4.2. Projected Economic Output

The multiplier analysis conducted in Section 3.5 for 1991-92 can be applied to estimate projected economic output associated with Florida resident saltwater fishing. The projected value of economic output associated with saltwater fishing was computed by multiplying projected fishing expenditures reported in Table 7-4 by the appropriate output multiplier (Table 3-A-1). The results of these calculations are presented in Table 7-5. The results reported in Table 7-5 must be interpreted with some caution as they are based on the assumption that: 1) average annual fishing expenditures per angler are constant at 1991-1992 levels, and 2) the output multipliers are constant over time.

Table 7-4. Projected Annual Expenditures by Florida Saltwater Resident Anglers (1995-2010)

			Expenditures in $1,000's by Category							
Year	Region		Boat Fuel	Party/ Charter Fees	Tackle	Bait	Ramp Fees	Equip-ment	Lodging	Total Expenses
1995	Florida		560,449	259,089	181,127	174,290	16,261	2,159	248,246	1,441,625
	Region	1	66,919	26,441	25,906	17,236	2,628	176	19,739	159,047
		2	134,170	86,129	31,401	36,962	3,396	303	52,603	344,967
		3	30,438	8,965	7,370	6,035	484	0	1,982	55,276
		4	77,811	30,117	14,959	26,592	2,244	16	10,730	162,470
		5	112,790	36,538	32,534	24,828	1,738	0	36,966	248,397
		6	95,926	53,761	51,778	49,992	4,572	1,993	134,102	392,127
		7	32,247	6,984	22,805	12,868	1,036	24	8,122	84,090
2000	Florida		609,716	281,865	197,049	189,611	17,690	2,349	270,069	1,568,352
	Region	1	72,475	28,636	28,056	18,666	2,846	191	21,377	172,251
		2	144,785	92,944	33,886	39,886	3,665	327	56,765	372,261
		3	34,731	10,229	8,409	6,886	552	0	2,262	63,071
		4	81,345	31,484	15,638	27,800	2,346	17	11,217	169,849
		5	121,728	39,434	35,112	26,795	1,876	0	43,133	268,081
		6	108,049	60,555	58,322	56,310	5,150	2,245	151,050	441,685
		7	34,540	7,480	24,427	13,783	1,110	26	8,700	90,068
2005	Florida		658,827	304,568	212,921	204,884	19,115	2,538	291,822	1,694,678
	Region	1	77,699	30,701	30,079	20,012	3,051	204	22,918	184,666
		2	155,203	99,631	36,324	42,756	3,928	351	60,849	399,045
		3	39,036	11,497	9,452	7,740	621	0	2,542	70,890
		4	85,451	33,074	16,427	29,203	2,464	18	11,784	178,423
		5	130,198	42,178	37,555	28,660	2,007	0	46,134	286,735
		6	120,393	67,474	64,985	62,744	5,739	2,502	168,307	492,146
		7	36,783	7,966	26,013	14,678	1,182	27	9,265	95,916
2010	Florida		703,817	325,367	227,461	218,875	20,421	2,711	311,750	1,810,405
	Region	1	82,454	32,580	31,920	21,237	3,238	217	24,321	195,969
		2	164,562	105,639	38,514	45,335	4,165	372	64,519	423,110
		3	43,018	12,670	10,416	8,529	684	0	2,801	78,121
		4	89,454	34,623	17,197	30,571	2,579	19	12,336	186,781
		5	137,780	44,634	39,742	30,329	2,124	0	48,821	303,432
		6	131,553	73,728	71,009	68,560	6,270	2,734	183,908	537,765
		7	39,003	8,447	27,583	15,564	1,253	29	9,824	101,706

Table 7-5. Projected Economic Output Associated with Florida Resident Saltwater Fishing (1995-2010)

			Economic Output By Sector ($1,000's)						
Year	Region		Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services	Total Economic Output
1995	Florida		68,603	103,993	88,815	139,395	306,088	323,840	1,030,735
	Region	1	8,351	12,294	10,678	16,516	24,147	33,672	105,658
		2	13,211	24,831	17,006	33,274	64,429	105,346	258,097
		3	2,517	5,547	3,282	7,461	2,404	10,889	32,100
		4	7,995	14,279	10,078	18,883	12,852	37,371	101,457
		5	10,785	20,687	14,093	27,746	48,611	44,402	166,324
		6	19,579	17,755	25,707	23,797	164,342	68,134	319,314
		7	6,752	5,963	8,854	8,009	9,935	9,386	48,900
2000	Florida		74,634	113,134	96,622	151,649	332,996	352,308	1,121,343
	Region	1	9,045	13,315	11,565	17,887	26,151	36,467	114,429
		2	14,256	26,796	18,352	35,907	69,526	113,680	278,517
		3	2,872	6,329	3,745	8,513	2,744	12,425	36,627
		4	8,358	14,927	10,535	19,741	13,436	39,068	106,066
		5	11,640	22,326	15,210	29,945	52,463	47,921	179,504
		6	22,054	19,999	28,956	26,805	185,113	76,745	359,671
		7	7,233	6,387	9,484	8,578	10,642	10,054	52,377
2005	Florida		80,645	122,247	104,405	163,864	359,817	380,685	1,211,633
	Region	1	9,697	14,274	12,398	19,176	28,036	39,095	122,677
		2	15,282	28,724	19,672	38,490	74,529	121,860	298,556
		3	3,227	7,113	4,209	9,569	3,084	13,966	41,168
		4	8,780	15,681	11,067	20,737	14,114	41,040	111,419
		5	12,449	23,879	16,268	32,029	56,113	51,255	191,995
		6	24,573	22,283	32,264	29,867	206,261	85,513	400,761
		7	7,702	6,802	10,099	9,135	11,332	10,706	55,777
2010	Florida		86,152	130,595	111,535	175,054	384,389	406,682	1,294,406
	Region	1	10,290	15,148	13,157	20,350	29,752	41,488	130,186
		2	16,203	30,456	20,859	40,812	79,023	129,208	316,561
		3	3,557	7,839	4,638	10,545	3,398	15,390	45,367
		4	9,192	16,415	11,586	21,709	14,775	42,963	116,639
		5	13,174	25,270	17,215	33,894	59,381	54,240	203,175
		6	26,851	24,349	35,254	32,636	225,380	93,439	437,910
		7	8,167	7,212	10,709	9,687	12,017	11,353	59,145

Total economic output associated with Florida resident saltwater fishing is projected to be $1,030,735,000 in 1995. By the year 2010 economic output is projected to increase 26.86% to $1,294,406,000. On a state-wide basis, economic output is greatest in the amusement and recreation services, followed by lodging sector, other retail trade, other wholesale trade, recreation related retail and recreation related wholesale trade. Across all years, regions 6, 2, 5, 1, and 4 rank in descending order in terms of the level of economic output associated with resident saltwater fishing. In 1995, regions 3 and 7 rank second to last and last, respectively, in terms of economic output. In the majority of regions, the amusement and recreation services and lodging sectors generate the largest amount of economic output associated with saltwater fishing. In most instances, the other retail trade and other wholesale trade sectors rank either third or fourth in terms of economic value of output associated with saltwater angling with the recreation related retail and wholesale sectors ranking last or next to last.

7.4.3. Projected Personal Income

Projected levels of personal income associated with Florida resident saltwater fishing were calculated using the projected number of anglers reported in Table 7-1 and the computational procedure described in Section 3.5.2. Once again the same cautions are relevant due to the assumption that the direct personal income coefficients and personal income multipliers remain constant over time.

Personal income associated with saltwater fishing is projected to be $420,345,000 in 1995. By the year 2010, personal income is projected to increase to $527,884,000. Across all years, personal income generation is highest in region 6 followed by regions 2, 5, 1, 4, 7, and 3. On a state-wide basis, personal income associated with saltwater angling is highest in the amusement and recreation services sector followed by the lodging, other retail trade, other wholesale trade, recreation related retail trade and recreation related wholesale trade sectors. In regions 1, 2, and 5, the relative ranking of economic sectors in terms of personal income levels is the same as that for the state. In regions 3 and 4, the amusement and recreation services ranks highest in personal income associated with saltwater fishing followed by the other retail trade, other wholesale trade, recreation related retail trade, lodging and recreation related wholesale trade sectors. Regions 6 and 7 are the only regions in which the lodging sector ranks first in terms of personal income associated with Florida resident saltwater fishing. In region 6 the lodging sector is followed by the amusement and recreation services, recreation related retail trade, other retail trade, recreation related wholesale trade, and other wholesale trade sectors. In region 7 the lodging sector leads all other sectors in terms of personal income attributable to saltwater recreational fishing followed by the recreation related retail trade, other retail trade, amusement and recreation services, recreation related wholesale trade, and other wholesale trade sectors. In all cases the relative rankings of each sector remain constant across all years.

Table 7-6. Projected Personal Income Associated with Florida Resident Saltwater Fishing (1995-2010)

			Personal Income by Sector ($1,000's)						
Year	Region		Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services	Total Personal Income
1995	Florida		27,847	41,896	33,264	58,292	119,870	135,185	420,354
	Region	1	3,225	4,640	3,971	6,502	8,854	13,116	40,308
		2	4,593	9,408	6,872	13,148	23,684	40,156	97,861
		3	848	2,256	1,305	2,954	877	4,463	12,704
		4	3,132	5,426	4,056	7,305	4,793	13,771	38,482
		5	4,271	7,827	5,574	10,850	17,948	17,965	64,434
		6	6,799	6,712	9,875	9,419	60,279	27,008	120,091
		7	3,030	2,250	3,202	3,140	3,654	3,060	18,337
2000	Florida		30,295	45,579	40,540	63,416	130,407	147,069	457,305
	Region	1	3,493	5,025	4,301	7,041	9,589	14,205	43,654
		2	4,956	10,152	7,415	14,189	25,558	43,334	105,603
		3	968	2,574	1,489	3,370	1,001	5,093	14,496
		4	3,274	5,672	4,240	7,637	5,010	14,397	40,230
		5	4,610	8,447	6,016	11,709	19,370	19,389	69,540
		6	7,659	7,560	11,123	10,609	67,897	30,422	135,269
		7	3,246	2,410	3,429	3,363	3,914	3,277	19,640
2005	Florida		32,735	49,250	43,805	68,524	140,911	158,915	494,140
	Region	1	3,744	5,388	4,611	7,549	10,280	15,229	46,800
		2	5,313	10,883	7,949	15,209	27,396	46,451	113,201
		3	1,088	2,893	1,674	3,788	1,125	5,724	16,293
		4	3,439	5,959	4,454	8,022	5,263	15,123	42,261
		5	4,930	9,035	6,434	12,524	20,718	20,738	74,379
		6	8,534	8,424	12,393	11,821	75,654	33,897	150,723
		7	3,457	2,567	3,652	3,582	4,168	3,490	20,916
2010	Florida		34,971	52,613	46,797	73,203	150,534	169,767	527,884
	Region	1	3,973	5,717	4,893	8,011	10,909	16,161	49,665
		2	5,633	11,539	8,428	16,127	29,049	49,253	120,028
		3	1,199	3,189	1,844	4,175	1,240	6,308	17,954
		4	3,600	6,238	4,663	8,398	5,510	15,832	44,240
		5	5,217	9,561	6,809	13,253	21,924	21,946	78,711
		6	9,325	9,205	13,542	12,917	82,667	37,039	164,694
		7	3,665	2,722	3,872	3,798	4,420	3,701	22,178

7.4.4. Projected Full-Time-Equivalent Employment

The multiplier analysis conducted in Section 3.5 for 1991-92 can be applied to estimate projected full-time-equivalent employment associated with Florida resident saltwater fishing. The projected employment associated with saltwater fishing was computed by following the computational procedures outlined in Section 3.5.3 and the projected number of anglers reported in Table 7-1. The results of these calculations are reported in Table 7-7.

In 1995 the projected number of full-time-equivalent individuals employed in activities associated with Florida resident saltwater fishing on a state-wide basis is 24,857. This state-wide employment estimate is projected to increase 26.8% to 31,215 full-time-equivalent employees by the year 2010. In 1995, regional employment is projected to be greatest in region 6 followed by regions 2, 5, 1, 4, 7, and 3. On a state-wide basis employment associated with Florida resident saltwater fishing activity is greatest in the amusement and recreation services followed by the lodging sector, other retail trade, recreation related retail trade, other wholesale trade, and recreation related wholesale trade sectors. Regions 1 and 2 follow the same pattern as that of the state. Across all sectors and all years, the amusement and recreation services sector ranks either first or second in employment associated with saltwater recreational fishing. By contrast, in the majority of cases, both wholesale trade sectors rank last or second to last in saltwater recreational fishing generated employment. The remaining sectors rank anywhere from first to fifth in terms of saltwater fishing associated employment depending upon the region. In all regions the relative rankings across sectors remains constant over time.

Table 7-7. Projected Employment Associated with Florida Resident Saltwater Fishing (1995-2010)

			Full-Time-Equivalent Employment by Sector						
Year	Region		Recreation Related Wholesale Trade	Other Wholesale Trade	Recreation Related Retail Trade	Other Retail Trade	Hotels and Lodging Places	Amusement and Recreation Services	Total Employment
1995	Florida		1,130	1,756	2,182	3,375	7,883	8,531	24,857
	Region	1	137	206	260	397	619	886	2,505
		2	217	418	415	799	1,654	2,762	6,265
		3	41	93	80	180	62	288	744
		4	132	242	250	461	337	995	2,416
		5	177	348	345	668	1,253	1,174	3,965
		6	321	299	627	571	4,219	1,794	7,831
		7	111	100	216	192	255	246	1,121
2000	Florida		1,229	1,910	2,374	3,672	8,576	9,281	27,042
	Region	1	148	224	282	429	671	959	2,713
		2	234	451	447	862	1,785	2,981	6,761
		3	47	106	91	205	71	329	849
		4	138	252	261	482	352	1,040	2,526
		5	191	376	372	721	1,352	1,267	4,280
		6	362	337	706	644	4,752	2,021	8,820
		7	119	107	231	206	273	264	1,200
2005	Florida		1,328	2,064	2,565	3,967	9,267	10,029	29,220
	Region	1	159	240	302	460	719	1,029	2,909
		2	251	484	480	925	1,913	3,195	7,247
		3	53	120	103	230	79	370	954
		4	145	265	274	506	370	1,092	2,653
		5	204	402	398	772	1,446	1,355	4,577
		6	403	375	786	717	5,295	2,251	9,828
		7	126	114	246	219	291	281	1,278
2010	Florida		1,419	2,205	2,740	4,238	9,900	10,713	31,215
	Region	1	169	254	321	489	763	1,091	3,087
		2	266	513	509	980	2,028	3,388	7,684
		3	58	132	113	254	88	407	1,052
		4	152	278	287	530	388	1,144	2,778
		5	216	425	421	817	1,531	1,434	4,844
		6	441	410	859	784	5,785	2,460	10,739
		7	134	121	261	232	309	298	1,355

8. CONCLUDING OBSERVATIONS

8.1 The Past and Present of Resident Marine Fishing Participation

Typically it is very difficult to make historical comparisons for recreational activities because data collection and research have been inconsistent or nonexistent. Marine recreational fishing in Florida is no exception. There have been few detailed studies of recreational fishing. And, the only ongoing study, the Marine Recreational Fishing Statistics Survey (MRFSS) conducted by the National Marine Fisheries Service (NMFS), provides aggregate indicators of participation and effort that lack detail about regional trends and other fishery management concerns.

Comparing the results from this study with the few previous studies does provide some useful observations about trends in marine recreational fishing. First, it appears that the percentage of the population that participates in marine fishing has declined over the past decade. Studies in the early 1980's indicated that the participation rate was in the range of 25 - 30 percent while this study, and other recent estimates, indicate the current rate is around 21 percent of the adult population. There have been no prior studies on participation rates in different regions of Florida so it is not possible to determine whether the decline has been uniform across the state.

While the decline in participation rates could be attributed to growing urbanization, increasing harvesting pressure on fishery stocks, reduced access to fishing sites, or general fluctuations in economic conditions and leisure preferences, this decline is most likely a product of all these factors. On the role of changes in fishing quality, the only comprehensive study of sport fishing catch rates in Florida during the decade of the 1980's found no discernible trend except for a decline in "big game" (billfish, dolphin, etc.) catch along the southern Atlantic coast (Strand et al.). Unfortunately, the west coast of Florida was not studied. However, it is interesting to note that the vast majority of survey respondents who did not fish indicated they were not interested or had no time for the activity; less than 5 percent indicated poor catch or burdensome regulations as their reason for not participating in marine fishing (see Section 5).

Second, although the number of residents in Florida has increased continuously over the past decade, this growth has not led to an increase in the total number of resident anglers. The estimated number of marine fishing participants from this study was 2.3 million; estimates from the MRFSS indicate that the number of participants has fluctuated in a range slightly below this level over the past 5 years. Thus, population growth did not offset declines in the participation rate during this period.

A third observation is that it appears total fishing effort, measured by the number of resident fishing trips, has increased over the past decade. But, effort has been relatively constant at approximately 18 to 20 million trips annually for the past few years. This observation is based on a comparison with NMFS effort estimates reported in Marine Recreational Fishery

Statistics Survey, Atlantic and Gulf Coasts (various issues). The only other independent estimate of effort by Bell et al., who estimated effort levels of 42.2 million days (trips) in 1980-1981, appears to have been an overestimate. Due to the lack of prior regional effort estimates, it is not possible to evaluate how effort has changed in different regions of the state.

A related comment concerns the estimates of marine fishing participation and effort from the MRFSS. During the early 1980's when the MRFSS was first initiated, there was considerable concern that the survey was not statistically reliable. In recent years, MRFSS survey procedures have been standardized, the surveys have been completed on schedule, and sample sizes in Florida have been increased substantially. The estimates of resident participation and effort in Florida from this study are consistent with recent estimates from the MRFSS. This is significant because, while this study used data from the telephone survey portion of the MRFSS, this study used very different estimation procedures than the NMFS has used to estimate participation and effort. The most important differences in procedures were the sole reliance on the telephone survey and the decomposition of estimates by subregions within the state. The analysis showed that there were important variations in anglers' participation levels, mode choices, and species preferences across the regions. These variations may provide useful information for evaluating and managing recreational fishing pressure in different estuary systems around Florida. Future modifications in the MRFSS in Florida should consider adapting the survey and estimation procedures to provide regional level fishery management information.

The study results also indicate that the majority of fishing effort, in all regions, occurred in areas that would be considered "state waters" managed by the Florida Marine Fisheries Commission and the Department of Natural Resources. Thus, these agencies' management decisions have a direct influence on the fishing activities of most resident anglers and they influence more resident anglers than the federal councils combined. (The South Atlantic and Gulf of Mexico Fishery Management Councils regulate fishing in the "federal waters" around Florida.)

Another observation from this study is that marine recreational fishing by Florida residents generates a significant amount of economic activity in Florida. But, the level of activity in 1991-1992 is similar to previous estimates by Bell et al. for 1980-1981. Both studies estimated direct expenditures for resident recreational fishing to be approximately $1.2 billion although there was an approximately 33 percent increase in the general level of prices during the two survey periods. This study used a detailed sector-specific multiplier analysis to estimate that $852.6 million in economic output could be attributed to these expenditures. This economic output is less than direct expenditures of $1.2 billion because a large share of recreational fishing expenditures are for goods and services that are not produced in Florida. These expenditures provide retail sales and income to retail workers but they generate little new production by businesses in Florida. Employment and employees' personal income attributable to resident recreational fishing expenditures in 1991-1992 were estimated to be 20,562 jobs and $347.7 million in income, respectively. The replacement value of anglers' fishing equipment, boats, and related gear was estimated to be $25.1 billion.

This study also indicates that many anglers across Florida participate in marine fishing primarily as a recreational diversion from their normal activities. Catching fish to eat is an important motive but it is secondary to other objectives. A majority of respondents indicated that fishing was an important source of personal enjoyment in their lives and was important in their choice of where to live. A small number of anglers fished for the sole purpose of selling their catch. Most anglers did not target a specific species. There was some variation in these attitudes in different regions but the differences were minor. It is not possible to say whether anglers' attitudes and motivations for recreational fishing have changed over the past years since there are no prior studies in Florida that measured these preferences. However, the vast majority of respondents indicated they had been fishing for more than 10 years so it is not likely that these responses reflect the preferences of new participants.

An additional result from the analysis is that most anglers across Florida generally support the current management system of size and bag limits to control recreational harvests. There also appears to be a relatively high compliance rate with marine fishing license requirements. There was very little difference in these results across the state. Thus, most Florida resident anglers accept the management measures that have been instituted for recreational fishing in recent years.

Finally, the regional analysis employed in this study shows there are some important differences in marine recreational fishing activities across regions. Some regions, primarily in South Florida, are attractive destination regions for resident anglers from other regions. While almost all of the fishing effort in other regions comes from residents within that region, effort in the South Florida regions is influenced by residents from other parts of the state. There are also important differences in mode choices and target species preferences across regions; these differences reflect the variation in marine environments around Florida and the availability of species in different seasons. This regional diversity should be considered in future fishery statistical reporting and in fishery management decisions.

8.2 Future Directions

Results from the participation model and forecasting analysis indicate that the number of resident recreational anglers will increase slowly in the future. The number of anglers will increase from 2.3 million in 1991-1992 to approximately 3.1 million in 2010, an average increase of around 1.7 percent per year. This is slightly lower than the most likely rate of increase in the population and reflects a gradual aging and increasing proportion of females in the population. It is not likely that participation will be influenced by whether population growth is due to natural increases or net migration. Also, changes in real income in Florida may alter the participation growth rate but the effect is likely to be minor unless real income changes occur at much higher rates than the past decade. These projections of future marine fishing participation are highly dependent on population predictions that are subject to forecast error. Thus, the potential for unforeseen and unexpected events that could influence population growth in Florida should be considered.

Changes in the number of participants are likely to be much more significant in regions that are expected to have more rapid population growth. The Charlotte Harbor region and the counties around the Indian River system are likely to experience the most rapid increases in the number of participants with growth rates almost twice the state average. Other population centers such as the Dade/Monroe region and the Tampa/Sarasota Bay region will experience recreational fishing growth rates less than the state average.

In this study it was assumed that effort levels and destination preferences in 1991-1992 would remain constant over the forecast period. As a result, total effort projections closely follow participation forecasts. Total effort in Florida increases at a faster rate than total participation because a larger share of the participation growth occurs in regions that had higher average levels of effort than other regions. Some regions such as Dade/Monroe had faster effort growth than participation due to a growing number of trips by anglers from other regions. Effort level increases in other regions such as Charlotte Harbor will fall below participation level increases due to the number of trips taken outside the region.

These projections of future marine recreational fishing activity depend on residents' preferences for outdoor leisure such as sport fishing and their beliefs about the quality of the fishing experience. Unfortunately, it is impossible to do little more than speculate how these preferences and beliefs may change in the future. Current participants were strongly influenced by fishing experiences they had as children so one would expect that any programs to promote fishing by children could increase future participation. The Sport Fishing Institute's national campaign to "Take a Kid Fishing" is an example of such a program. On the other hand, growing concern about atmospheric changes, UV radiation levels, and skin cancers could discourage outdoor leisure interests leading to lower future participation.

Future perceptions about the quality of fishing in Florida, or in particular regions, are also open to speculation. Despite widespread public perceptions that fishing catch rates have deteriorated in recent years, there are no statistical studies that support, or refute, these perceptions. The only near-shore species that have had clear overharvesting problems, most notably redfish, are now managed under strict recreational and commercial quotas by state and federal agencies. Whether this new era of stock management will positively or negatively influence perceptions of fishing catch rates is unknown. Furthermore, the interaction between catch rate perceptions and other components of fishing quality such as access and congestion makes it even more difficult to anticipate changes that could have a major impact on marine fishing participation.

Thus, the reader who has ventured this far should be aware of the inherent limitations in the statistical methods used to forecast fishing participation. Like any crystal ball, statistical models are only as reliable as the soothsayers who interpret them. As the authors of this study, we believe we have interpreted the data as carefully and fairly as possible. We hope that this information provides a useful benchmark for discussions about current and future resident participation in marine recreational fishing in Florida.

REFERENCES

Beimer, Paul P. 1991. Measurement Error in Surveys. New York, Wiley Interscience.

Bell, F.W. 1990. Florida Recreation Survey -- 1990. State of Florida, Department of Natural Resources, Division of Recreation and Parks. Tallahassee, FL.

Bell, F.W., P.E. Sorensen, and V.R. Leeworthy. 1982. The Economic Impact and Valuation of Saltwater Recreational Fisheries in Florida. Florida Sea Grant College Report No. 47. Gainesville, FL.

Department of Natural Resources, Division of Recreation and Parks, State of Florida. 1989. Outdoor Recreation in Florida - 1989. Tallahassee, FL.

Edwards, S.F. 1989. "Forecasts of In-state Participation in Marine Recreational Fishing." Transactions of the American Fisheries Society 118:564-572.

Ellis, R.W., A. Rosen, and A.W. Moffett. 1958. A Survey of the Number of Anglers and of their Fishing Effort and Expenditures in the Coastal Recreational Fishery of Florida. State of Florida Board of Conservation Technical Series No. 24. Tallahassee, FL.

Manski, C. and D. McFadden. 1981. "Alternative Estimates and Sample Designs for Discrete Choice Analysis." In Structural Analysis of Discrete Data With Econometric Applications, Boston, MIT Press.

Marine Fisheries Commission, State of Florida. 1992. "Gear Regulation." (Unpublished manuscript).

Milon, J. Walter. 1993 (in press). A Guide to Understand the Economic Impacts of Fisheries Management. Florida Sea Grant College Report. University of Florida, Gainesville, FL.

Scheaffer, R., W. Mendenhall, and L. Ott. 1979. Elementary Survey Sampling, Second Edition. Duxbury Press.

Strand, I.E., K.E. McConnell, N.E. Bockstael, and D.G. Swartz. 1991. Marine Recreational Fishing in the Middle and South Atlantic - A Descriptive Study. University of Maryland, Dept. of Agricultural and Resource Economics.

University of Florida, Bureau of Business and Economic Research. 1992. Population Studies, Vol. 25, No. 3-4, Bulletin No. 101-102.

University of Minnesota IMPLAN Group. 1993. Micro IMPLAN User's Guide, Version 91-F. St. Paul, MN.

U.S. National Marine Fisheries Service. 1979 - 1991. Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts. Department of Commerce. Washington, DC.

APPENDIX 1

MARINE RECREATIONAL FISHING STATISTICS SURVEY (MRFSS-UF) TELEPHONE QUESTIONNAIRE

RECREATIONAL FISHING QUESTIONNAIRE
SCREENING QUESTIONNAIRE

Hello, I'm calling long distance for a survey being conducted for the National Marine Fisheries Service of the U.S. Department of Commerce. We're surveying recreational fishermen in various counties. Your telephone number has been selected at random.

Q1. To help me assign your information to the correct location, do you live in _____ county? **(WRITE COUNTY # ON COUNTY LINE)**

Q2. Is this your permanent, year-round residence? **(CHECK PERMANENT RESIDENCE BOX)**

Q3. Does anyone in this household go fishing? **(IF NONE, GO TO SHELLFISH QUESTIONNAIRE)**

Q3a. We want to gather information from people who have been saltwater sportfishing for finfish, not shellfish, in the last 12 months. Saltwater fishing includes fishing in oceans, sounds or bays, or in tidal or brackish portions of rivers. How many people in your household have been saltwater sportfishing in the last 12 months in this state or from a boat launched from this state? **(RECORD IN 12-MONTH BOX; IF NONE, SKIP TO SHELLFISH QUESTIONNAIRE)**

Q4. Thinking just about the past 2 months, how many people in your household have been saltwater sportfishing in this state or from a boat launched from this state? **(RECORD IN 2-MONTH BOX; IF NONE, SKIP TO SHELLFISH QUESTIONNAIRE)**

Are you that fisherman/one of the fishermen? **(GO TO APPROPRIATE INTRODUCTION)**

(INTRODUCTION WHEN RESPONDENT IS FISHERMAN)

I'd like to ask you a few questions about your most recent finfishing trips. 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. **(TURN PAGE OVER)**

(INTRODUCTION WHEN OTHER FISHERMAN IN HOUSEHOLD COMES TO THE PHONE)

Hello, I'm conducting a survey on saltwater sportfishing for the National Marine Fisheries Service. By saltwater fishing, I mean fishing in oceans, sounds or bays, or in tidal or brackish portions of rivers. For the purpose of this survey, it includes only fishing for finfish, not shellfish. I understand that you've been saltwater fishing in the past 2 months, and I'd like to ask you a few questions about your most recent trips. 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.

Again, we're interested in those trips where you went after finfish, whether you caught any or not, and in those trips where you might have been going after shellfish but caught finfish. We're not interested in any trips where your main purpose was to catch fish which you would sell to make money. Please list the dates of your saltwater sportfishing trips for the past 2 months, starting with your most recent trip and working backwards in time. I have a calendar here in front of me so I can help you with the dates.

Q1. When did you last go finfishing? (How Many Times Did You Go Fishing in The Last 2 Months?) **(ASSIGN TRIP # & RECORD DATE OF TRIP ON TRIP FORM. IF DK DATE, ASK MONTH & THEN ASK IF WEEKDAY OR WEEKEND).**

Q2. Were you fishing from a pier, a jetty, a bridge, a beach, a bank, or a boat? **(IF MORE THAN ONE MODE WITHIN A MODE CATEGORY (A,B,C,D) CODE THE ONE USED LAST THAT DAY. IF MORE THAN ONE MODE CATEGORY, CODE AS 2 SEPARATE TRIPS WITH THE SAME DATE).**

(REPEAT QUESTIONS 1 & 2 UNTIL ALL TRIPS FOR THE PAST 2 MONTHS HAVE BEEN COVERED. THEN GO ON TO Q3+)

Now I'd like a little more information about each of the trips you just mentioned. **(STARTING WITH THE 1ST TRIP MENTIONED, ASK Q3-12 FOR EACH TRIP BEFORE GOING ON TO THE NEXT TRIP)**

Q3. **(IF PRIVATE BOAT, ASK:)** Thinking about your trip on (date), does the public have access to the place where your boat left from or is it private?

(IF PUBLIC, ASK:) Was it a launch ramp, boat slip, moored from a dock or something else?

(IF PRIVATE, ASK:) Was it from a personal residence or dock, a private locked gate marina, a private property unlocked marina or something else?

(ALL OTHER MODES, ASK:) Thinking about your trip on (date), does the public have access to this fishing site or is it private?

Q4. **(IF BOAT, ASK:)** What time did your boat return? **(IF NOT BOAT, ASK:)** What time did you stop fishing?

Q5. Was most of your effort that day in the ocean, sound, river or bay?

(PROBE RIVER:) Were you fishing in the lower part of the river which is brackish or affected by the tide? **(IF NO, DISREGARD TRIP; IF YES, CHECK BOX & CONTINUE)**

(PROBE BAY:) Was that an open bay or an enclosed bay?

(PROBE INLET:) Were you more toward the outside or more toward the inside of the inlet?

Q6. **(IF BOAT, ASK:)** To what coastal county did your boat return? **(IF NO BOAT, ASK:)** In what coastal county were you fishing?

Q7. Was most of your fishing during this trip within 200 feet of an artificial reef?

Q8. Were you fishing in a saltwater tournament on that trip?

Q8a. **(IF YES, ASK:)** Was that a tournament lasting 7 days or less and directed at one or more gamefish? Gamefish would include King Mackerel, Spanish Mackerel, Dolphin, Tuna, Sharks, Wahoo and Billfish.

Q9. On that trip, what were you primarily fishing? **(IF KINGFISH, PROBE:)** Was it Kingfish or King Mackeral? **(IF RED FISH, PROBE:)** Was it Red Drum or something else? **(IF NONE OF ANYTHING, ASK:)** Is there a particular group or family of fish you were fishing for?

Q10. **(IF OCEAN/BOAT, ASK:)** Were you primarily fishing in shallow water near-shore or in deep water offshore?

Q11. How many miles is that site from your home?

(IF MORE THAN 1 FISHERMAN, DON'T FORGET TO ASK ABOUT OTHERS)
(DON'T FORGET TO ASK SHELLFISH QUESTIONS AT END OF SURVEY)
(VERIFY PHONE # AT END OF INTERVIEW)

APPENDIX 2

UNIVERSITY OF FLORIDA PARTICIPATION SURVEY (TELEPHONE)

UNIVERSITY OF FLORIDA PARTICIPATION SURVEY

(ASK FOR HEAD OF HOUSEHOLD OR ADULT WHO ORGANIZES FISHING TRIPS.)

You've completed the National Marine Fisheries Service portion of our survey. I'd like to ask you a few questions for a research study being conducted by the University of Florida. Your answers are confidential and will only be used by researchers to provide better information about saltwater fishing in Florida.

(2-MONTH & 12-MONTH FISHERMEN, SKIP TO Q4. NON-FISHING HOUSEHOLDS, CONTINUE:)

QA. What's the ZIP code at your permanent residence? **(RECORD ZIP HERE AND IN FISHERMAN COLUMN ON TRIP FORM IF THERE IS ONE.)**

ZIP _____

Q1. You indicated that you had not fished in the last year. How long has it been since you last went saltwater fishing?

_____years __0__never

Q2. Why have you (not fished since then/never been fishing)? **(DO NOT READ CHOICES. CHECK ALL THAT APPLY).**

__1__no interest
__2__no money
__3__no time
__4__poor health
__5__too many regulations
__6__poor/no catch when I fished
__7__no equipment
__8__don't know how
__10__congestion/overcrowding
__*__other (SPECIFY) _____
__9__DK/refused

Q3. Do you plan to go saltwater fishing in the future? __1__yes __2__no __9__don't know **(NOW SKIP TO Q5.)**

(Q4 & Q5 SHOULD BE ASKED ABOUT THE FISHERMAN, IF THERE IS ONE)

Q4. How many saltwater fishing trips have you (the fisherman) taken in the past 12 months?

___trips

Q5. When you (the fisherman) were a child or teenager, did anyone take you (them) fishing?

__1__yes **(ASK Q5A)** __2__no **(SKIP TO Q6)**

Q5A. Were you taken fishing . . . **(READ CHOICES)**

__1__once or twice __2__ occasionally, or __3__frequently?

Q6. Does anyone in your household own any boats? __1__yes**(CONT)** __2__no**(SKIP TO Q7)**

Q6A. How many boats does your household currently own? ___boats

Q6B. How many of these boats are power boats 12 feet or longer?

____boats **(IF NONE, SKIP TO Q7)**

Q6C. What is the length of each of these power boats?

boat #1: _____ boat #2: _____ boat #3: _____

Q6D. What is the horsepower rating for each of these power boats?

boat #1: _____ boat #2: _____ boat #3: _____

Q6E. Does each boat have electronic navigation equipment?

boat #1: 1 yes 2 no
boat #2: 1 yes 2 no
boat #3: 1 yes 2 no

Q6F. Is each boat used for saltwater fishing?

boat #1: 1 yes 2 no
boat #2: 1 yes 2 no
boat #3: 1 yes 2 no

Q7. Would you describe yourself as . . . **(READ CHOICES; ONE ANSWER ONLY)**

1 a very active, outdoors type of person,
2 a somewhat active, outdoors type of person, or
3 a person who prefers indoor leisure activities

Q8. These last few questions will help us group your answer with those of others. How many people live in your household?
_____people **(IF MORE THAN 1, ASK Q8A, OTHERWISE, SKIP TO Q9).**

Q8A. Are there any children under 18 years of age in your household?

1 yes **(ASK Q8B)** 2 no **(SKIP TO Q9)**

Q8B. What is the age of each child?

#1___ #2___ #3___ #4___ #5___ #6___ #7___ #8___

Q9. How many years have you lived in Florida? ____years or ____months

Q10. Are you currently . . .
1 employed full-time **(ASK Q10A)** 9 **(REFUSED)**
2 employed part-time **(ASK Q10A)**
3 not employed in a regular job, disabled, or
4 retired?

Q10A. About how many hours a week do you spend at your job? ____hours

Q11. What year were you born? year ____ -1 **(REFUSED)**

Q12. Is your martial status . . . 1 single 9 **(REFUSED)**
2 married
3 separated or divorced, or
4 widowed

(SEX OF RESPONDENT: 1 male 2 female)

Q13. Would you describe your ethnic background as . . . **(READ CHOICES)**

1 white 9 **(REFUSED)**
2 black **(ASK Q13A)**
3 asian, or
4 other **(SPECIFY)** _____ **(IF HISPANIC, ASK IF BLACK OR WHITE)**

Q13A. Do you consider yourself to be Hispanic? 1 yes 2 no

Q14. What is the highest educational level you have completed? Is it . . . **(READ CHOICES)**

1 less than a high school degree 9 **(REFUSED)**
2 high school graduate
3 some college
4 college graduate
5 post-graduate or professional degree

Q15. Which category includes your total household income before taxes in 1990?

1 under $25,000 9 **(REFUSED)**
2 $25,000 to $49,000
3 $50,000 to $74,999
4 $75,000 or more

(IF RESPONDENT IS A 2-MONTH FISHERMAN, CONTINUE. ALL OTHER, THANK & TERMINATE.)

The University of Florida would like to get your opinions about saltwater fishing in Florida. They'd like to mail you a questionnaire that you could fill out and return to them in a prepaid envelope. In return for your time, they will send you a Guide to Select and Prepare Florida fish and Shellfish. Your responses will only be used for research and your name and address will not be used to sell you anything. Are you willing to participate in a mail survey on recreational fishing? **(IF YES, CONTINUE; IF NO, THANK & TERMINATE.)** Thank you. Would you please give me your name and address so I can have them send you the survey? You should receive it in 2-4 weeks.

Name _____

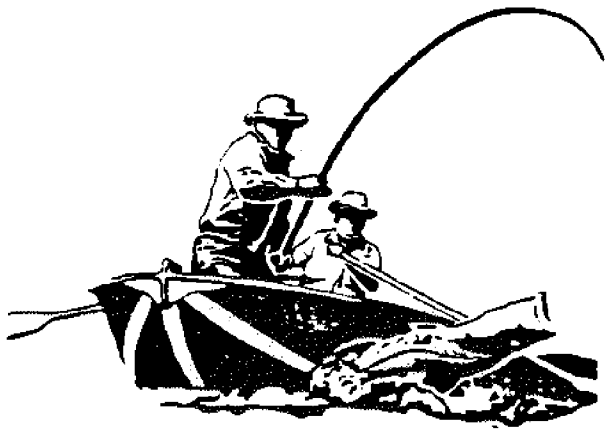
Address _____

City/State/ZIP _____

APPENDIX 3

UNIVERSITY OF FLORIDA ANGLER SURVEY (MAIL)

FLORIDA SALTWATER SPORT FISHING SURVEY



This survey will assist fisheries managers by providing information on the attitudes and experiences of Florida resident fishermen, like yourself, on a variety of fishing issues. The responses you provide to these questions will not be connected with you in any way. Your responses will be combined with the responses of other sports fishermen to insure confidentiality. Thanks for helping us in this research project. Please use the enclosed postage paid envelope to return your completed survey.

Department of Recreation, Parks and Tourism
University of Florida
Gainesville, FL 32611-2034

In this section we'd like to know a few things about you and the reasons why you go fishing.

I-1. How many years have you been a saltwater fisherman? (FILL IN THE BLANK)

_____ YEARS

I-2. Has the amount of time you've spent saltwater fishing over the last two years: (PLEASE CIRCLE ONE)

1 INCREASED
2 STAYED ABOUT THE SAME
3 DECREASED

I-3. Compared to your other outdoor recreation activities (such as swimming, golf, etc.), would you rate fishing as: (PLEASE CIRCLE ONE)

1 YOUR MOST IMPORTANT OUTDOOR ACTIVITY
2 YOUR SECOND MOST IMPORTANT OUTDOOR ACTIVITY
3 ONLY ONE OF MANY OUTDOOR ACTIVITIES

I-4. Using the following scale, how important is fishing as a source of satisfaction in your life? (PLEASE CIRCLE ONE)

NOT IMPORTANT 1 - - - 2 - - - 3 - - - 4 - - - 5 - - - 6 VERY IMPORTANT

I-5. How important was your interest in fishing in your choice of occupation? (PLEASE CIRCLE ONE)

NOT IMPORTANT 1 - - - 2 - - - 3 - - - 4 - - - 5 - - - 6 VERY IMPORTANT

I-6. How important was your interest in fishing in your choice of where to live? (PLEASE CIRCLE ONE)

NOT IMPORTANT 1 - - - 2 - - - 3 - - - 4 - - - 5 - - - 6 VERY IMPORTANT

I-7. Are you a member of a fishing club? 1 NO 2 YES

I-8. How often do you use the following sources of information to keep up with saltwater fishing: (PLEASE CIRCLE ONE FOR EACH SOURCE)

	Don't Use	Once a Month	Once a Week	Daily
READ A FISHING MAGAZINE(S)	1	2	3	4
READ A NEWSPAPER FISHING COLUMN	1	2	3	4
LISTEN TO A FISHING RADIO REPORT	1	2	3	4
WATCH A FISHING TV SHOW	1	2	3	4

** PLEASE CONTINUE TO THE NEXT PAGE **

I-9. How do you compare your fishing ability to that of other saltwater fishermen?

1 LESS SKILLED
2 EQUALLY SKILLED
3 MORE SKILLED

I-10. If you had to replace all your saltwater fishing equipment you use with similar equipment, how much would it cost for each of the following items? (PLEASE WRITE IN A 0, IF YOU DO NOT OWN THAT TYPE OF EQUIPMENT.)

RODS AND REELS $_____

TACKLE (lures, lines, nets) $_____

BOAT, MOTOR, AND TRAILER $_____

ELECTRONIC EQUIPMENT (radios, depth finder, fish locator) $_____

OTHER EQUIPMENT: (Please specify)

_____ $_____

I-11. On your typical saltwater fishing trip in June or July how much did you pay for each of the following trip expenses? (PLEASE WRITE IN A 0 IF YOU DID NOT PAY THE TYPE OF EXPENSE INDICATED)

	Expenses on Typical Trip
FUEL AND OIL FOR PRIVATE BOAT	$_____
FEES FOR PARTY, CHARTER OR RENTAL BOAT	$_____
TACKLE	$_____
BAIT	$_____
BOAT RAMP FEES	$_____
EQUIPMENT RENTAL	$_____
LODGING	$_____

I-12. Did you give up any wages, salary or income to go on your typical fishing trip over the last two months?

1 NO

2 YES

If you said YES, approximately how much money did you lose when you went on your typical trip?

$_____

** PLEASE CONTINUE TO THE NEXT PAGE **

I-13. Did you purchase any Florida sport licenses during the past two years?

1 NO

2 YES

If you said YES, please circle the type of licenses you have purchased in the list below.

1 SALTWATER FISHING LICENSE
2 FRESHWATER FISHING LICENSE
3 TARPON PERMIT
4 SNOOK STAMP
5 SPINY LOBSTER STAMP
6 SALTWATER PRODUCTS LICENSE
7 RESTRICTED SPECIES ENDORSEMENT
8 GAME HUNTING LICENSE
9 TURKEY STAMP
10 DUCK STAMP
11 ARCHERY STAMP

In the next section we'd like to know the species you fished for and some of the reasons why you fished for these species.

2-1. During this past June and July, what percent of the time that you spent fishing was focused on each of the following groups of fish (the column of percents should total 100%).

a. GROUPER, SNAPPER, COBIA, AMBERJACK _____ %

b. REDFISH, SEA TROUT, SHEEPSHEAD, MULLET, POMPANO _____ %

c. KING MACKEREL, SPANISH MACKEREL _____ %

d. MARLIN, SAILFISH, DOLPHIN _____ %

e. TARPON, SNOOK, BONEFISH _____ %

f. OTHER _____ %

TOTAL 100 %

2-2. Now, over the past 12 months, what percent of the time that you spent fishing was focused on targeting the following groups of fish (the column of percents should total 100%).

a. GROUPER, SNAPPER, COBIA, AMBERJACK _____ %

b. REDFISH, SEA TROUT, SHEEPSHEAD, MULLET, POMPANO _____ %

c. KING MACKEREL, SPANISH MACKEREL _____ %

d. MARLIN, SAILFISH, DOLPHIN _____ %

e. TARPON, SNOOK, BONEFISH _____ %

f. OTHER _____ %

TOTAL 100 %

** PLEASE CONTINUE TO THE NEXT PAGE **

2-3. Below is a list of statements about fishing. Please circle the number which indicates whether you STRONGLY AGREE = 1 or STRONGLY DISAGREE = 6 with each statement. (CIRCLE ONE NUMBER FOR EACH STATEMENT)

	Strongly Agree		Agree	Disagree		Strongly Disagree
The more fish I catch the happier I am	1	2	3	4	5	6
I want to keep all the fish I catch	1	2	3	4	5	6
I usually fish for only 1 or 2 species of fish on a typical trip	1	2	3	4	5	6
The only reason I go fishing is to catch fish to eat	1	2	3	4	5	6
I would rather catch 1 or 2 large fish than 10 small ones	1	2	3	4	5	6
I would still enjoy fishing even if I had to release all the fish I caught	1	2	3	4	5	6
I should be able to sell all of the fish I catch	1	2	3	4	5	6
It doesn't matter to me what species of fish I catch	1	2	3	4	5	6

2-4. Because so many people fish in Florida and fishery stocks are not unlimited, fishery managers may need to reduce the total number of fish caught. The following is a list of catch regulations that can be used to reduce total catch. Considering the species you typically fish for, please circle the number which indicates whether you STRONGLY SUPPORT = 1 or STRONGLY OPPOSE = 6 the use of these regulations.

	Strongly Support		Support	Oppose		Strongly Oppose
Limits on the minimum size of fish you can keep	1	2	3	4	5	6
Limits on the maximum size of fish you can keep	1	2	3	4	5	6
Limits on the number of fish you can keep	1	2	3	4	5	6
Limits on the months in the year when you can keep the fish you catch	1	2	3	4	5	6
Limits on the kinds of bait and tackle you can use to catch fish	1	2	3	4	5	6

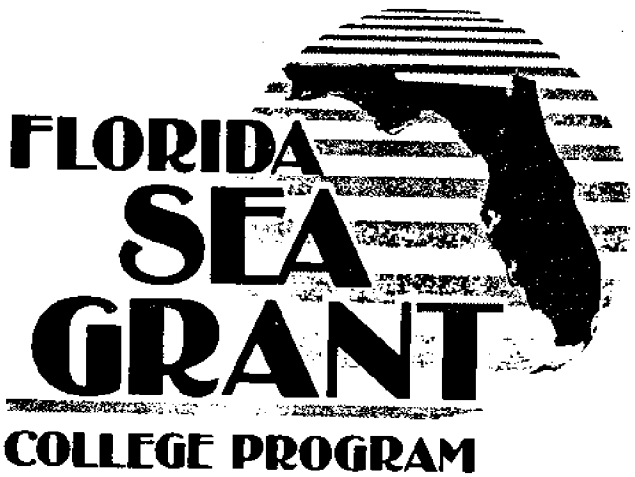
**PLEASE CONTINUE TO THE NEXT PAGE **

3-6. Below is a list of reasons why some people go saltwater fishing. Please rate each item as to how important it is to you in your fishing trips. (CIRCLE ONE NUMBER FOR EACH STATEMENT).

		Not Important					Very Important
___	TO BE WITH FRIENDS	1	2	3	4	5	6
___	TO ENJOY NATURE AND THE OUTDOORS	1	2	3	4	5	6
___	TO CATCH FISH TO EAT	1	2	3	4	5	6
___	RELAXATION	1	2	3	4	5	6
___	TO ESCAPE WORK AND/OR LIFE PRESSURES	1	2	3	4	5	6
___	THE EXCITEMENT OR CHALLENGE OF CATCHING FISH	1	2	3	4	5	6
___	TO BE WITH FAMILY	1	2	3	4	5	6
___	TO CATCH FISH TO SELL	1	2	3	4	5	6
___	TO BE ALONE WITH THOUGHTS OR MEMORIES	1	2	3	4	5	6
___	TO FEEL ALIVE AND ENERGIZED	1	2	3	4	5	6
___	TO CATCH AND RELEASE FISH	1	2	3	4	5	6

Now, please re-read the list and indicate on the left-hand side the top "five" items that are <u>most important</u> to you by placing a "1" by the item which is most important to you, "2" by the item second in importance, and so on through the item that is fifth in importance to you.

Please use the remaining space to write down any additional thoughts or comments that you might have about fisheries management in Florida.



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