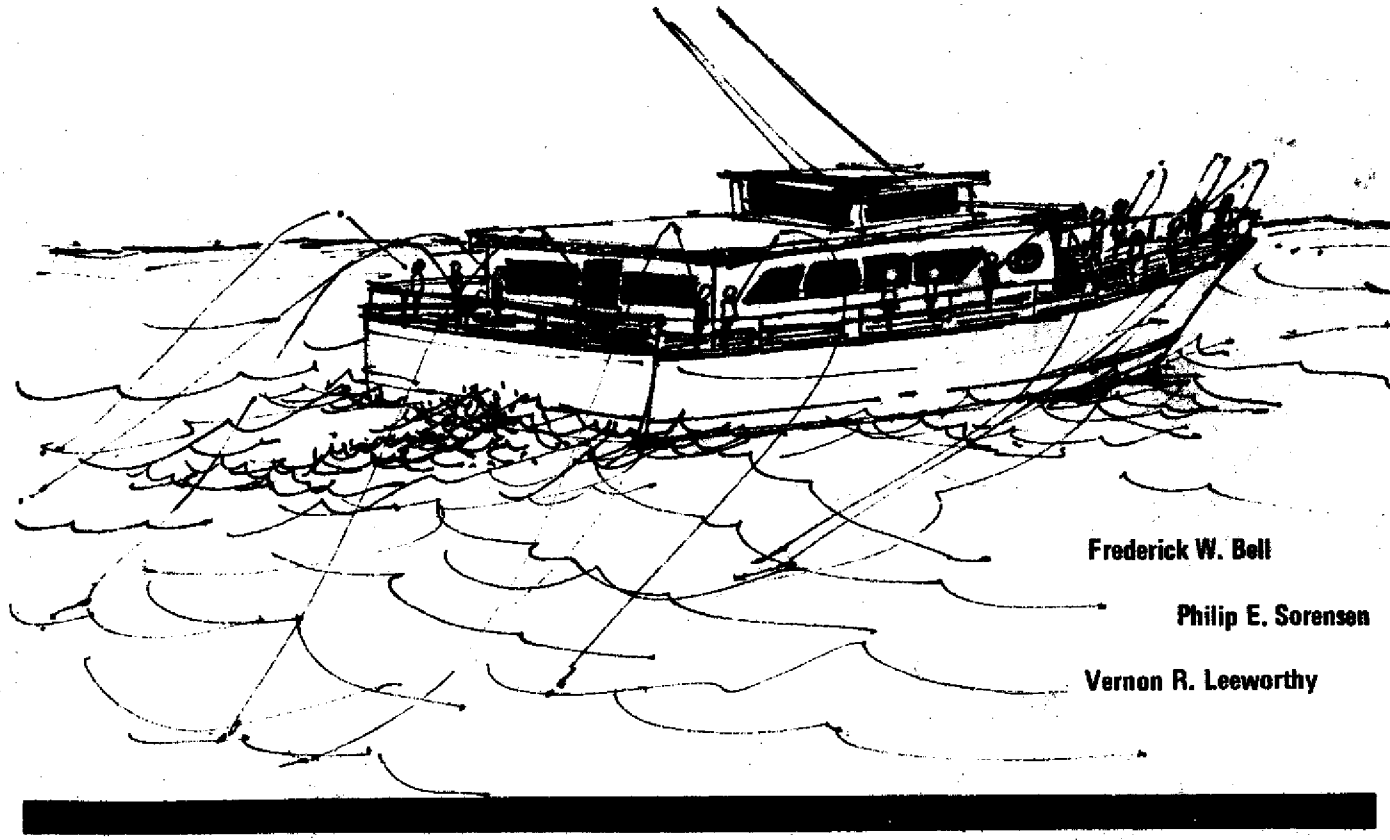
SGR-47

The Economic Impact and Valuation of Saltwater Recreational Fisheries in Florida



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August 1982

THE ECONOMIC IMPACT AND VALUATION OF SALTWATER RECREATIONAL FISHERIES IN FLORIDA

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Sea Grant Project No. R/FR-16
Grant Number NA80AA-D-00038

Report Number 47
Florida Sea Grant College
August 1982

Acknowledgements

Over the course of the last two years, many individuals have contributed to this manuscript. The Policy Sciences Program contributed resources to make possible the survey of resident saltwater anglers in Florida. We would like to thank Paul Beck, Anneliese Oppenheim, Thomas Dye and Jessie Taintor of that program. Rife Marketing Research helped us survey the tourist population. Mary Rife and Buny Abrahams were very helpful in their work on this project. Elizabeth Finn of the Florida Division of Tourism worked closely with us on tourist data. In the course of our investigation, Hugh Popenoe and William Seaman of the Florida Sea Grant Program made many useful suggestions and aided in reviewing the survey instruments. Don Duden and Albert Gregory of the Florida Department of Natural Resources also gave us support and helpful suggestions. We would also like to thank Bruce Austin and Vito Blomo of the Atlantic and Gulf of Mexico Fisheries Management Councils, respectively, and John Charbonneau of the U.S. Fish and Wildlife Service for their reviews of our survey instrument. Dave Deuel of the National Marine Fisheries Service was also very supportive. Lyman E. Rogers of the Florida League of Anglers was a constant source of encouragement. William Laird, Chairman of the Department of Economics, made this project possible through direct financial support in an amount far above our matching funds agreement with Sea Grant. Our hats are also off to Word Processor Operator Supervisor Martha Crow and to Word Processor Operators Cindy Spence, Cherie Dilworth and Susanne Miles, to Departmental Secretary Karen Roberts, and the Staff Assistant Cindy VanLandingham for their excellent professional services and understanding. Finally, we would like to thank Rollie Frazen of the Florida League of Angler; James C. Cato, Director, Florida Sea Grant College and six anynomous reviewers for their excellent critques of the preliminary manuscript. Finally, Matt Addison contributed to this effort in his capacity as a research assistant. Final responsibility for the manuscript rests with the authors.

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EXECUTIVE SUMMARY

PRINCIPAL OBJECTIVES OF STUDY

THE GOAL OF THIS PROJECT IS TO QUANTIFY BOTH THE MARKET AND NONMARKET VALUE AND ECONOMIC IMPORTANCE OF FLORIDA'S SALTWATER RECREATIONAL FISHERY, A SIGNIFICANT BUT POORLY DESCRIBED ELEMENT IN THE STATE'S ECONOMY AND MULTI-BILLION DOLLAR TOURIST INDUSTRY. THE OBJECTIVES ARE THE FOLLOWING:

1. TO PRODUCE STATISTICALLY RELIABLE ESTIMATES OF THE VALUE (PER RECREATIONAL DAY AND YEARLY) OF FLORIDA SALTWATER SPORT FISHING.

2. TO PROVIDE A DEMOGRAPHIC AND ECONOMIC PROFILE OF FLORIDA SPORT FISHERMEN (INSTATE AND OUT-OF-STATE).

3. TO DETERMINE THE IMPACT OF SALTWATER SPORT FISHING ON THE FLORIDA ECONOMY (I.E., INCOME, EMPLOYMENT INDUCED, TAXES GENERATED).

4. TO IDENTIFY REGIONS OF CRITICAL STATE CONCERN WITH RESPECT TO A DECLINE IN PRODUCTIVITY OF SALTWATER SPORT FISHING IN FLORIDA WATERS DUE TO OVERFISHING, POLLUTION, ETC.

RESIDENT SALTWATER FISHERMEN, 1980-81 (12 MONTHS)

1. 2,177,217 ANGLERS EIGHTEEN YEARS AND OLDER ENGAGED IN SALTWATER RECREATIONAL FISHING OR 29.8 PERCENT OF THE FLORIDA POPULATION OVER EIGHTEEN YEARS OF AGE;

2. 42,150,921 ANGLER DAYS WERE SPENT BY FLORIDIANS IN SALTWATER RECREATIONAL FISHING. THIS AMOUNTED TO 19.36 FISHING DAYS PER YEAR FOR THE AVERAGE ANGLER;

3. APPROXIMATELY 78 PERCENT OF ALL RESIDENT ANGLER FISHING DAYS WERE SPENT WITHIN THE TERRITORIAL WATERS OF THE STATE OF FLORIDA;

4. APPROXIMATELY $1.1 BILLION WERE SPENT BY RESIDENT SALTWATER ANGLERS AT THE RETAIL LEVEL FOR NONDURABLE GOODS RELATED TO FISHING (E.G., FUEL, BOAT MAINTENANCE, BAIT, ETC.)

5. $508.97 WERE SPENT ANNUALLY BY THE AVERAGE RESIDENT SALTWATER ANGLER. THIS AMOUNTED TO $26.29 PER FISHING DAY;

6. 20,368 RETAIL EMPLOYEES IN FLORIDA DEPEND ON RESIDENT SALTWATER RECREATIONAL FISHERIES FOR THEIR LIVELIHOOD. THEY RECEIVE NEARLY $173 MILLION IN WAGES AND SALARIES;

7. OVER $43.3 MILLION IN STATE TAXES WERE GENERATED BY ECONOMIC ACTIVITY RELATED TO SALTWATER RECREATIONAL FISHING BY RESIDENTS;

8. OVER $1.6 BILLION IN USER VALUE OR SATISFACTION RECEIVED FROM THE USE OF THE SALTWATER RECREATIONAL FISHERY RESOURCE ITSELF WAS GENERATED FOR FLORIDIANS. THIS AMOUNTS TO $38.38 PER FISHING DAY;

9. NEARLY 57 PERCENT OF ALL RESIDENT SALTWATER ANGLERS WERE WILLING TO PAY AT LEAST $6.75 (I.E., PRICE OF A FRESHWATER FISHING LICENSE) FOR A SALTWATER FISHING LICENSE WHERE THE PROCEEDS WOULD BE USED FOR FISHERY MANAGEMENT.

TOURIST SALTWATER FISHERMEN, 1980-1981 (12 MONTHS)

1. 3,047,322 ANGLERS EIGHTEEN YEARS AND OLDER ENGAGED IN SALTWATER RECREATIONAL FISHING OR 9.67 PERCENT OF ALL TOURISTS OVER EIGHTEEN YEARS OF AGE;

2. 16,431,160 ANGLER DAYS WERE SPENT BY TOURISTS IN SALTWATER RECREATIONAL FISHING. THIS AMOUNTED TO 5.39 FISHING DAYS PER YEAR FOR THE AVERAGE ANGLER;

3. APPROXIMATELY 79 PERCENT OF ALL TOURISTS FISHING DAYS WERE SPENT WITHIN THE TERRITORIAL WATERS OF THE STATE OF FLORIDA;

4. APPROXIMATELY $.763 BILLION WERE SPENT DIRECTLY BY TOURISTS SALTWATER ANGLERS AT THE RETAIL LEVEL FOR NONDURABLE GOODS RELATED TO FISHING (E.G., TRAVEL, LODGINGS, CHARTER BOATS, ETC.)

5. APPROXIMATELY $3.187 BILLION WERE INDIRECTLY GENERATED BY TOURIST DOLLARS VIA THE REGIONAL INCOME MULTIPLIER BY SALTWATER ANGLERS FOR ALL KINDS OF GOODS AND SERVICES;

6. APPROXIMATELY $3.95 BILLION WERE DIRECTLY AND INDIRECTLY GENERATED BY TOURISTS SALTWATER ANGLERS;

7. $250.24 WERE SPENT ANNUALLY BY THE AVERAGE TOURISTS SALTWATER ANGLER. THIS AMOUNTED TO $46.41 PER DAY;

8. 23,740 RETAIL EMPLOYEES IN FLORIDA DEPEND ON THE DIRECT TOURIST EXPENDITURES ON SALTWATER RECREATIONAL FISHING FOR THEIR LIVELIHOOD. THEY RECEIVED OVER $169 MILLION IN WAGES AND SALARIES;

9. 79,770 EMPLOYEES IN FLORIDA DEPEND ON INDIRECT EXPENDITURES GENERATED BY DIRECT TOURIST EXPENDITURES ON SALTWATER RECREATIONAL FISHING FOR THEIR LIVELIHOOD. THEY RECEIVE OVER $1.0 BILLION IN WAGES AND SALARIES;

10. 103,510 EMPLOYEES IN FLORIDA DEPEND ON DIRECT AND INDIRECT EXPENDITURES GENERATED BY TOURISTS ON SALTWATER RECREATIONAL FISHING FOR THEIR LIVELIHOOD. THEY RECEIVE $1.2 BILLION IN WAGES AND SALARIES;

11. OVER $105 MILLION IN STATE TAXES ARE GENERATED BY DIRECT AND INDIRECT EXPENDITURES RELATED TO TOURISTS SALTWATER RECREATIONAL FISHING;

12. OVER $.47 BILLION IN USER VALUE OR SATISFACTION RECEIVED FROM THE USE OF THE SALTWATER RECREATIONAL FISHERY RESOURCE ITSELF WAS GENERATED FOR TOURISTS VISITING FLORIDA. THIS AMOUNTS TO $28.64 PER FISHING DAY;

13. OVER 52 PERCENT OF ALL TOURISTS SALTWATER ANGLERS WERE WILLING TO PAY AT LEAST $10.50 (I.E., PRICE OF AN OUT-OF-STATE FRESHWATER FISHING LICENSE) FOR A SALTWATER FISHING LICENSE.

RESIDENT AND TOURISTS FISHERMEN COMBINED, 1980-81 (12 MONTHS)

1. 5,224,539 ANGLERS EIGHTEEN YEARS AND OLDER ENGAGED IN SALTWATER RECREATIONAL FISHING IN FLORIDA;

2. 58,582,081 ANGLER DAYS WERE SPENT BY FLORIDIANS AND TOURISTS IN SALTWATER RECREATIONAL FISHING. THIS AMOUNTED TO 11.21 FISHING DAYS PER YEAR FOR THE AVERAGE ANGLER;

3. APPROXIMATELY 78 PERCENT OF ALL ANGLER FISHING DAYS WERE SPENT WITHIN THE TERRITORIAL WATERS OF THE STATE OF FLORIDA;

4. APPROXIMATELY $1.871 BILLION WERE DIRECTLY SPENT BY SALTWATER ANGLERS AT THE RETAIL LEVEL FOR NONDURABLE GOODS RELATED TO FISHING;

5. APPROXIMATELY $3.187 BILLION WERE INDIRECTLY GENERATED BY TOURIST DOLLARS VIA THE REGIONAL INCOME MULTIPLIER BY SALTWATER ANGLERS FOR ALL KINDS OF GOODS AND SERVICES;

6. APPROXIMATELY $5.058 BILLION IN FLORIDA INCOME WAS DIRECTLY AND INDIRECTLY GENERATED BY SALTWATER ANGLERS;

7. $358.06 WERE SPENT ANNUALLY BY THE AVERAGE SATLWATER ANGLER. THIS AMOUNTED TO $31.93 PER DAY;

8. 44,108 RETAIL EMPLOYEES IN FLORIDA DEPEND ON THE DIRECT RESIDENT AND TOURIST EXPENDITURES ON SALTWATER RECREATIONAL FISHING FOR THEIR LIVELIHOOD. THEY RECEIVED OVER $342 MILLION IN WAGES AND SALARIES;

9. 123,878 EMPLOYEES IN FLORIDA DEPEND ON DIRECT AND INDIRECT EXPENDITURES GENERATED BY RESIDENTS AND TOURISTS ON SALTWATER RECREATIONAL FISHING FOR THEIR LIVELIHOOD. THEY RECEIVED ALMOST $1.4 BILLION IN WAGES AND SALARIES;

10. OVER $147 MILLION IN STATE TAXES ARE GENERATED BY DIRECT AND INDIRECT EXPENDITURES RELATED TO SALTWATER RECREATIONAL FISHING;

11. OVER $2.07 BILLION IN USER VALUE OR SATISFACTION RECEIVED FROM THE USE OF THE SALTWATER RECREATIONAL FISHERY RESOURCE ITSELF WAS GENERATED FOR FLORIDIANS AND TOURISTS. THIS AMOUNTS TO $35.65 PER FISHING DAY.

Chapter 1
Introduction

The Florida economy is highly dependent on natural resources. These resources range from beaches to deep sea fisheries. Florida is a traditional mecca for outdoor recreation seekers in the eastern United States, if not the entire United States. Residents delight in Florida's pleasant climate which provides year-round outdoor recreation. This report is limited to the economic and social importance of Florida's saltwater or marine recreational fisheries. As we shall shortly see, saltwater fisheries, as a renewable natural resource, make a significant contribution to Florida's income, employment, wages and taxes.

The output of a recreational fishery is "fishing," not just fish. Fishing is a recreational experience: that is, it embraces both subjective evaluations and also intrinsic characteristics of recreation sites. Thus, in the recreational experience, the consumer or recreationalist is willing to pay for many components or attributes (e.g., escapism) in addition to fish for food. This is in sharp contrast to commercial fishing, a business venture, where the main product is traded in the market place.

Of fundamental importance, saltwater fishery resources in Florida are common property. Like many common property resources, such as water and air, fisheries can be used without cost by economic enterprises. That is, no single user has to pay for the right to use the resource, nor does he have exclusive rights to the resource or the right to prevent others from sharing in its exploitation. This leads to many social conflicts. Essentially, common property resources may be subject to overexploitation or overfishing as is the case of saltwater fisheries. Recreational and commercial fishermen often compete for the same kind of fish. Since there is no market to allocate, for example, Spanish mackerel, between recreational and commercial use, the various parties to the problem turn to the State for solutions. On the one hand, Florida is endowed with exceptional outdoor recreational resources that contribute greatly to its economy; however, the common property nature of these resources creates many conflicting problems that are not and cannot be resolved by the private market.

In the early development of the State of Florida, resources were abundant relative to demands placed upon them. As the resident population grew and

tourism expanded, increasing pressure was placed upon renewable, but finite saltwater fishery resources. Correspondingly, the common property nature of fishery resources became an increasing problem.

In contrast to commercial fishing, little is known about the economic significance of saltwater recreational fishing in Florida. In the coming decades, Florida expects rapidly growing population and an increasing number of tourists. Further resource use problems are bound to develop. This report provides economic data on saltwater fishing that can serve as a baseline or reference point for Florida in the 1980's with respect to saltwater recreational fishing. The authors are cognizant of other studies that complement the results of this report. Two national studies are of interest: (1) The National Marine Fisheries Service survey of all states has determined the kinds and volume of recreational fish caught off Florida coasts; and (2) the U. S. Fish and Wildlife Service survey of all states has estimated the number of saltwater recreational anglers in Florida. We have been in close coordination with both Federal agencies. With this in mind, let us first specify the objectives and anticipated benefits of this research.

One of the main objectives of this study is to evaluate the economic impact of saltwater recreational fishing on the State of Florida in terms of income, employment, wages and taxes generated. The question of economic importance is fundamental and of critical interest to both government and industry leaders. The second objective is to provide a demographic and economic profile of both residents and tourists who use Florida's saltwater fisheries for recreation. This is of special interest to those doing marketing research in the area of recreation. What kind of people are attracted to Florida? In addition, it is necessary to know the characteristics of that segment of the resident population that use Florida's saltwater fishery resources. Third, we shall produce estimates of the value of a recreational day. The most pragmatic way of approximating a unit of recreation is by defining the experience in terms of time, or more specifically, a unit day measure. A unit of recreation is what economists call a "nonmarket" activity. That is, it is very difficult to directly estimate the value of a sport fisheries because the product is rarely marketed. Who is to market or sell access rights to a common property resource? The price charged for the right to fish in saltwater in Florida is

presently zero. However, the value is not zero as is easily shown by comparing the situation to that of a pay lake. Here, an owner charges for the right to fish on his property. People are willing to pay for the right to fish; therefore, they place a value on this right. Thus, it follows that the right to fish Forida's coastal area is worth something to the angler--it's just not measured! We shall estimate the user value for saltwater recreational fisheries. Finally, we are also interested in perceptions concerning the condition of the fishery stocks throughout the state. Could we identify regions within the state of critical concern (i.e., declining fish stocks)?

As we perceive it, several benefits will accrue from this study. First, we hope to improve knowledge upon which to make commercial and recreational resource management decisions. The common property nature of the fishery resource as mentioned above makes it imperative that government take some role in management. Second, we hope to identify the type and location of current constraints within recreational fishing to enable State agencies to plan for new State facilities to accomodate resident and nonresident user groups. Third, a quantification of the "user value" of the fishery resource itself will help in making trade-offs between coastal development (e.g., housing construction) and recreational fisheries. Finally, this analysis of the economics of saltwater recreational fishing will aid in state economic development planning.

There are four remaining chapters in this report. Chapter 2 deals with the economic impact of resident saltwater fishermen. Chapter 3 considers the direct and indirect or induced economic impact of tourist recreational fishermen. Chapter 4 aggregates the two sectors of recreational fishing into the total economic impact. Chapter 5 deals with the major policy implications of the study. This chapter highlights the implications of this study for the proposed Florida State Fishery Management Act. The Appendices contain a more detailed report and additional findings for use by other researchers in this area. These Appendices are published separately by the Florida Sea Grant College as technical notes. To obtain these technical notes the reader should write the Director of Florida Sea Grant College.

This report is written for the general reader, and technical jargon is minimized. Our central objective is to shed light on the present and probable future value of one of the unique and irreplaceable natural resources of Florida, its marine environment.

Chapter 2
The Economics of Resident Saltwater Recreational Fishing

Sample Design

Data on the resident saltwater recreational fishing sector were gathered through a telephone survey. The decision to make a telephone survey was partially dictated by a budget constraint, but also by the efficiency of this method of obtaining information. The survey procedure is called two stage random digit dialing. In the first stage, a large sample of households telephone numbers are obtained. The purpose here is to screen out businesses, government, etc. The second stage is a random dialing of households (i.e., obtained in stage 1). The survey was conducted so that anyone in the household who was a saltwater recreational fisherman had an equal chance of being selected providing he or she was 18 years or older. Thus, we restricted sampling to "adult" recreational fishermen. This is an important point to note since it restricts the sample to a sub-population of the state of Florida. The reason for making this decision is that individuals under 18 might not have either the information or sophistication to answer our questions. Consequently, the estimated economic impact will include only adults.

Who is a Florida resident? Because of the mobility of the population in and out of the state, this is not a simple question. To qualify as a resident of Florida, an individual had to be part of a household with a telephone number and reside in the state for at least 90 days or more. The typical tourist spends less than 20 days in the state according to the Florida Division of Tourism. We feel that this definition is reasonably fair.

The survey instrument or questionnaire was developed to obtain economic and other data relevant to the objectives discussed in Chapter 1. The entire questionnaire is presented in Appendix A.2. Generally, we wanted to obtain eight kinds of information:

1. Demographic information on respondents
2. Days fished by mode (e.g., charter boat vs. pier) and location (e.g., Atlantic vs. Gulf)
3. Expenditures per fishing day and a breakdown by categories (e.g., bait; fuel; etc.)

4. Valuation of a user day
5. Disposition of recreational fish caught (e.g., eaten; trophy; etc.)
6. Perception of fishery stocks (e.g., declining, constant)
7. Important recreational fish to the angler
8. Participation in other consumptive recreational activities in Florida (e.g., hunting)

In obtaining this information, the problem of recall became apparent. The survey was conducted in June of 1981. Respondents were asked to recall their saltwater recreational activities over the last 12 months. If they could recall with reasonable accuracy, then a telephone survey would also be more economical than going into the field. The U.S. Fish and Wildlife Service and many other individuals conducting studies of recreational fishing have employed a one year recall. A study conducted for the National Marine Fisheries Service (Hiett and J. Worrall, 1977) is often cited in evidence of the advantage of a 60-day maximum recall period. The results of this study are not conclusive. The report shows the greatest errors in recall after 15 days; the lowest errors after 30 days. It would appear that no recall period produces true catch statistics and that the relationship between accuracy of recall and elapsed time is not a regular one. In defense of the 12 month recall period, two findings are relevant. First, Sudman and Bradburn (1973) indicate that for small household expenditures, recall of purchase price is as good after 4-12 months as two weeks.[1] For large household expenditures, bias actually decreases with the length of recall. Thus, a recall question might ask the respondent to give all purchases of bait for recreational fishing made during the last two weeks and to give the price and outlet name. Typically, overreporting occurs because the respondent "telescopes time" by including purchases made more than two weeks previously. Second, all telephone interviews were evaluated by the interviewer with respect to (1) the respondent's understanding of the question and (2) respondent's interest in providing useful answers. In addition, interviews were monitored periodically by a third party to evaluate performance. About 94 percent of all interviews were rated excellent with respect to understanding while interest was rated excellent for 93 percent of those interviewed.

1Sudman and Bradburn (1973) only considered small and large household expenditures. Services comparable to sportfishing (i.e., charter boat) were not presented.

During the month of June 1981, the resident survey was conducted by the Florida State University Policy Sciences Program. The objective was to obtain a sample size of 1000 responses. Actually, 1002 usuable questionaires were obtained relating to the last twelve months of saltwater recreational fishing (July 1980 through June 1981). With this sample size, statistical estimates are plus or minus 5 percent with respect to accuracy.[2] The survey determined that 29.8 percent of the households contacted had an adult who engaged in saltwater recreational fishing in the state in the previous year. We will call this statistic the "participation rate". It will be discussed in greater detail below.

A Demographic Profile: Who Are They?

For the Florida residents survey, what is the demographic profile of the "typical" saltwater recreational fisherman? The following demographic data were obtained:

1. Age
2. Sex
3. Race
4. Occupation
5. Household Income
6. Years Saltwater Fishing in Florida

Table 2.1 shows the results from our survey. The typical resident angler is approximately forty years of age; male; caucasian; and has an average household income of $19,130 per year. The reader should note that all averages (i.e., means) and medians are for the segment of population 18 years and older. This is important in interpreting the demographics. For example, a large percent of people under 18 participating in saltwater fishing would certainly lower the average age of the entire population that participated. On the average, the typical angler has fished in Florida for approximately 13 years. Although almost 30 percent of the resident population over 18 years of age engage in saltwater fishing, this sub-population is somewhat different than the general population of Florida. Participation (or the decision to participate) is statistically linked with age, sex, race and income. Table 2.2 shows these relationships, where our sub-population of saltwater

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[2]The plus or minus five percent will only refer to aggregate categories from the sample such as days, expenditures, etc.

TABLE 2.1

Demographic Profile of Saltwater Recreational Fishing Residents, 1981

1. Age	Mean 40.4		Median 36.9	
2. Sex	Percent Male 74.5		Percent Female 25.5	
3. Race	Caucasian (%) 89.4	Black (%) 6.3	Other (%) 4.3	
4. Occupation			Percent	
	Professional-Executive		12.7	
	Management-White Collar		25.3	
	Blue Collar		29.3	
	Retired/Semi-Retired		12.0	
	Other		20.7	
5. Average Household Income	$19,130 (mean)			
6. Years Saltwater Fishing in Florida	Mean 13.3		median 10.1	

Source: Florida State University Saltwater Recreational Fishing Study (1982) (FSU-SRFS)

TABLE 2.2

A Comparison of Selected Socioeconomic Characteristics: Resident Saltwater Angler Versus the Overall Florida Population, 1981*

Characteristic	Resident Saltwater Angler[1]	Overall Population[2]
1. Age (yrs.)	40.4	47.0
2. Sex (Percent)		
Male	74.5	47.9
Female	25.5	52.1
3. Race (Percent)		
Caucasian	89.4	84.0
Black	6.3	9.3
Others	4.3	6.7
4. Average Houshold Income	$19,139	$18,352

*All figures refer to population 18 years or older

1. FSU-SRFS (1982)
2. Florida State Policy Sciences Survey

recreational fishermen is compared to the overall population in terms of socioeconomic characteristics, (i.e., all those 18 years or older). A Floridian who is a saltwater recreational fishermen is 6-7 years younger than the general population. Three out of four saltwater anglers are likely to be male compared to a fairly even division of males and females in the overall population. These anglers are more likely to be caucasian and have a higher level of household income ($778 higher than the overall population).

In a independent survey, the Policy Sciences Program at Florida State developed a second estimate of the participation rate. They estimated a participation rate of 29 percent which is very close to the estimate obtained in our Sea Grant Survey (29.8 percent). The data set obtained in the independent survey contained many additional socioeconomic variables. We were able to estimate a "participation function" using this information. This independent data set showed the same differences between our sub-population of saltwater fishermen and the general population. For a detailed description of this study, consult Appendix A.6. The participation function could be used to project increases (or decreases) in resident participation as demographic variables change. For example, holding everything constant, an increase in household income would increase the participation rate.

There is other evidence on saltwater recreational participation in Florida? In 1958, Ellis, Rosen and Moffett published the only in depth study of Florida recreational saltwater recreational fishing in the last 24 years. They determined that the participation rate for all ages (i.e., not just 18 years and older) was 33.8 percent, somewhat higher than our estimate. The National Marine Fisheries Service (1979) estimated the number of Florida resident saltwater anglers in 1979 to be 2,319,000 (all ages). With a resident population of 9,245,231 for 1979 (U. S. Bureau of Census) this yielded a participation rate of 25.1 percent. Finally, the Florida Department of Natural Resources (1980) estimated in a separate study that 34.9 percent of the resident population (all ages) participated in saltwater recreational fishing. Undoubtedly, the marine resources of Florida certainly provide recreational activities to a sizeable percent of the population. These other studies indicate that our estimated participation rate (29.8 percent) is reasonable and not seriously at variance with other inquiries.

Number of Participants and Recreational Days

Table 2.3 shows the estimated number of residents over 18 years of age who engaged in saltwater recreational fishing over the period July, 1980 through June, 1981 (i.e., 12 months). This was obtained by applying the participation rate (see above) to the Florida population over 18. There were 2,177,217 estimated saltwater resident anglers in 1981. Using our sample data, we found that the average saltwater resident fisherman spends 19.36 days per year fishing. Any part of a day is counted as a full day. This is fairly standard procedure in the literature. For residents, the number of fishing trips (i.e., independent visits to a site) was approximately equal to a fishing day. That is, there were 1.04 days per trip according to our sample. Thus, the "typical" resident made the entire fishing trip within a day.

The next step was to estimate the total number of fishing days. As indicated in Chapter 1, a fishing day is generally used as the unit of consumption within a recreational context. Also, fishing days are a measure of fishing effort. Placing aside the problem of "fine tuning" fishing days to standard fishing days, a growth in recreational fishing days places increasing pressure on a finite, but renewable fishery resource.[3] This will be discussed in Chapter 4. Multiplying the number of anglers by days fished per angler (Table 2.3), we estimate that 42,150,921 fishing days were expended by Florida residents over the 12 month period (i.e., July, 1980-June, 1981).

Next, we examined the distritubtion of fishing days by mode of fishing and location at sea. A mode of fishing is defined in terms of the structure (i.e., man made vs. natural) from which the fishing took place. Table 2.3 shows the following modes:

1. Pier, Jetty, Bridge
2. Surf and Shore
3. Charter Boats
4. Party Boats
5. Private Boats

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[3]One angler may be more efficient in catching fish (i.e., higher catch per day) than another due to differences in gear. Seining vs. hook and line for mullet would be a good illustration. Standard fishing days are calculated by setting a hook and line day equal to one standard day, for example, and then comparing the productivity (catch per day) of seining per day. If productivity were double (seining vs. hook and line), then a "seining day" would be counted as two standard fishing days.

TABLE 2.3

Estimated Total Number of Resident Saltwater Recreational Fishermen and Days Fished By Mode and Location In Florida, 1981

Florida population over 18	x	Res. participation rate	=	Res. Fishermen
7,306,097	x	29.8%	=	2,177,217

Avg. Fishing Days/Res.	x	Res. Fishermen	=	Fishing Days
19.36	x	2,177,217	=	42,150,921

All Modes	Percent	Days
Pier, Jetty, Bridge	28.56	12,038,303
Surf & Shore	19.33	8,147,773
Charter Boat	3.15	1,327,754
Party Boat	1.89	796,652
Private Boat	47.07	19,840,439
Total	100.00	42,150,921

Boat Modes	Percent	Days
Charter Boat	6.04	1,327,754
Party Boat	3.63	796,652
Private Boat	90.33	19,840,439
Total Boat Days	100.00	21,964,845

Location of Boat Fishing Days	Percent	Days
Brackish rivers & marshes	15.32	3,365,003
Bay, sound & along coast	42.20	9,269,507
Deep Sea		
(a) beyond 3 miles Atlantic	25.88	5,685,095
(b) beyond 10 miles Gulf	16.60	3,645,240
Total Boat Days	100.00	21,964,845
Days inside Florida territorial waters[1]	77.87	32,820,586
Days outside Florida territorial waters[2]	22.13	9,330,335

1. Days inside Florida territorial water = pier, jetty, bridge + surf & shore + brackish rivers & marshes + bay, sound & along coast.

2. Days outside Florida territorial waters = beyond 3 miles Atlantic + beyond 10 miles Gulf

Source: FSU - SRFS (1982)

Except for surf and shore, all other modes are man made "vehicles" to reach the fishery resource. The demand for boats is met by the private sector, whereas the state and smaller political units are responsible for piers, jetties, and bridges along with quantitative and qualitative dimensions of the "surf and shore". The supply of these modes as a public policy issue will be discussed in Chapter 5.

Using the distribution of days by mode obtained in our sample, we applied this to the estimated aggregate fishing days. In terms of fishing days, the leading mode of fishing by Floridians was private boat followed by pier/jetty/bridge and surf and shore. This is shown in Table 2.3. Less than 6 percent of all saltwater fishing days were spent on charter or party boats. These are very plausible findings since one would expect residents to use their own private boats rather than charter or party boats. As we shall discuss in Chapter 3, tourists use a higher proportion of party and charter boats. Without too much elaboration, we can see that piers, jetties and bridges have a definite social use in terms of recreational fishing. In Table 2.3, we make a distinction between shore (pier, jetty, bridge, surf and shore) modes and boat modes. Over ninety percent of the boat mode use was by private boats.

Finally, how are these days distributed by area at sea. We defined "at sea" to be only reachable by the boat mode. Of the 21,964,845 days spent via the boat mode, 42.2 percent was spent in bays, sounds and along the coast. The use of the term "deep sea" as shown in Table 2.3 could be defined in many ways. In our case, we were seeking an the answer to a specific question: How many fishing days are spent in Florida's territorial waters as opposed to the Fishery Conservation Zone (i.e., zone that was created as a result of the Fishery Conservation and Management Act which extended U.S. jurisdiction to 200 miles)? Florida has territorial waters of 3 miles on the Atlantic Ocean but 10 miles on the Gulf side, and this is what we call "deep sea". As shown at bottom of Table 2.3, 78 percent of saltwater fishing activity by Floridians is within the territorial waters of the State. Since Federal regulation and management plans only apply to the Fishery Conservation Zone, there is an obvious role for the State in the management of the fisheries. The reader should remember that these are summary statistics for the State. The data base does permit detailed disaggregation (e.g., county level); we shall restrict such disaggregation to regionalization within Florida for the purposes of this report. This will be discussed below.

Expenditures, Employment, and Wages Generated

As indicated in Chapter 1, one of the ways to look at the economic importance of saltwater recreational fishing is to estimate expenditures associated with fishing. Expenditures on recreational fishing can be split into two components: (1) fixed cost and (2) variable cost. Our survey questionnaire (Appendix A.2) contained questions on the annual purchase of such items as boats and motors. These durable goods were regarded as "fixed cost" since their cost did not vary with days fished. For those anglers owning boats, motors and other durable goods used in fishing, but not purchasing these items during the survey year, we obtained a fairly detailed description of such items as boats, motors, electronic equipment, etc. Since the purchase of durable goods fluctuates from year to year, these purchases are not dicussed in the main body of this report. However, the interested reader may consult Appendix A.7 for an analysis of these results. In essence, we felt that economic inferences regarding the purchase of durable goods for just one year might not reflect "normal" patterns. This does not, of course, preclude the reader from adding these estimates to variable expenditures. Finally, another component of fixed cost is depreciation. Fishing boats and other equipment have a life expectancy. In addition to survey questions on durable fishing equipment, we did an independent survey of the life expectancy of durable fishing equipment. Since depreciation is not a direct dollar outlay in any year, it is not included as part of cost for purposes of analysis in this section. Of course, depreciation is a real cost to the boat owner, as shown in the discussion in Appendix A.7. The exclusion of depreciation from the analysis in this section is based on the objective of identifying expenditures that generate wages and employment. Therefore, this section is confined to variable cost or expenditures made.

Table 2.4 shows the estimated variable expenditures by resident saltwater recreational fishermen. Over $1.1 billion was spent over the 1980-81 (12 months) period by saltwater resident anglers. This amounts to $26.29 per angler day. The most important component of expenditures is boat fuel and oil which constitutes over 27 percent of total expenditures. Expenditures on food and drink constitute over 18 percent. Automobile expenditures constitute approximately 17.4 percent of total expenditures and are consistent with the use of personal vehicles to travel to the fishery resource. The fourth

TABLE 2.4

Estimated Variable Expenditures for Resident Saltwater Recreational Fishermen In Florida 1980-81*

Variable Expenditures[1]	Dollars	%	Rank
Boat fuel	301,379,085	27.20	1
Food & drink	202,324,421	18.26	2
Automobile	192,629,709	17.38	3
Maintenance: boats & motors	165,653,120	14.95	4
Natural bait	85,144,860	7.68	5
Charter & party boats	73,342,602	6.62	6
Lodging	42,150,921	3.80	7
Other expenses	15,595,841	1.41	8
Private area access	8,430,184	.76	9
Public transportation	5,901,129	.53	10
Public area access	4,636,601	.42	11
Equipment rental	4,215,092	.38	12
Boat launch fees	4,215,092	.38	12
Guide fees	2,529,055	.23	13
Total	1,108,147,713	100.00	

*Specifically July 1980-June 1981

[1]Variable expenditures are those expenditures which vary in amount with the number of days saltwater fishing. Thus, expenditures on boats, motors, fishing gear and automobiles are excluded from variable expenditures since these expenditures do not vary in amount with the number of days spent saltwater fishing. However, maintenance expense on boats, motors, fishing gear and automobiles are included in variable expenditure since these expenditures will vary with the amount of use of these items.

Source: FSU - SRFS (1982)

TABLE 2.5

Estimated Variable Expenditures Per Day By Category For Resident Saltwater Recreational Fishermen In Florida, 1980-81

Variable Expenditures	Dollars	%	Rank
Boat fuel	$ 7.15	27.20	1
Food & drink	$ 4.80	18.26	2
Automobile	$ 4.57	17.38	3
Maintenance: boats & motors	$ 3.93	14.95	4
Natural bait	$ 2.02	7.68	5
Charter & party boats	$ 1.74	6.62	6
Lodging	$ 1.00	3.80	7
Other expenses	$ .37	1.41	8
Private area access	$ .20	.76	9
Public transportation	$ .14	.53	10
Public area access	$ .11	.42	11
Equipment rental	$ .10	.38	12
Boat launch fees	$ .10	.38	12
Guide fees	$ .06	.23	13
Total	$26.29	100.00	

Source: FSU - SRFS (1982)

largest expenditure category is the maintenance of boats and motors. This is consistent with the heavy dependence of the population on privately owned boats as shown in Table 2.3. Of course, boats may be used for a variety of recreational activities. To adjust for this, we asked the respondent what percentage of the total use of the boat is devoted to saltwater fishing? Therefore, the figure for maintenance in Table 2.4 reflects only that part of maintenance cost that can be attributed to the saltwater recreational fishing use of the boat. Table 2.5 shows expenditures per day for the categories shown in Table 2.4. This is discussed in some detail in Chapter 3.

What is the employment impact of the estimated sales or expenditures shown in Table 2.4? A rough estimate of the direct or primary impact of the resident fishing expenditures is shown in Table 2.6. Notice first that the categories are aggregates of individual items shown in Table 2.4. The reason for this is that we were only able to obtain sales to employment ratios for various categories at a more aggregated level. By dividing sales by the sales/employment ratio, we were only able to obtain rough estimates of the corresponding retail employment. At the retail level about, 20,368 jobs are directly attributable to expenditures by resident saltwater fishermen.[4]

These jobs generated almost $173 million in wages (or about $8,489 per employee). We regard these estimates as only approximations; however, they do give the reader an idea of the economic importance of the resident saltwater recreational fisherman. Those serving resident saltwater recreational fishermen constitute 2.8 percent of all retail employees in the State of Florida.

State Taxes Generated

The State of Florida imposes several taxes on consumers and businesses. Three taxes of major importance were singled out for analysis: (1) sales taxes, (2) gasoline taxes, and (3) corporate profits taxes. Over the 1980-81 period, a 4 percent sales tax was imposed in Florida upon items of personal consumption with an exemption for food and medicine. At today's prices, there is approximately a 10 percent tax on beer which is not considered a sales tax

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[4]This does not take into account employment in wholesaling and manufacturing, much of which is done within the state.

TABLE 2.6

Estimated Impact on Florida's Economy
by Saltwater Recreational Fishing Residents
on Sales, Employment and Wages & Salaries
(1980-81)

Category	Sales Impact (Dollars)	Sales to Employment Ratio 1	Employ-ment Impact	Wages & Salaries to Sales Ratio	Wages & Salaries Impact (Dollars)
Lodging	42,150,921	30,199	1,396	.186	7,840,071
Service Stations[2]	494,002,794	246,834	2,001	.025	12,350,220
Marinas[3]	285,783,244	62,032	4,607	.280	80,019,308
Food & Drink	202,324,421	22,497	8,993	.204	41,274,182
Charter & Party Boats	73,342,602	38,542	1,903	.319	23,396,290
Public Transportation	5,901,129	10,403	567	.574	3,387,248
Public Access	4,636,601	5,146	901	1.000	4,636,601
Total	1,108,147,713		20,368		172,900,920

1 Lodging, Service Stations and Food & Drink ratios were calculated as follows: Sales figures for 1980 were provided by Ed Stalvey, Florida Department of Revenue and employment figures were from the 1979 County Business Patterns. Marina and Charter Boat data came from the 1977 study "Economic Activity Associated with Marine Recreational Fishing" and updated to 1981 dollars. Public transportation data were furnished by the Florida Department of Commerce and include airline, taxi, bus, and rental car transportation. Public access data were as furnished by the Florida Division of Parks for fiscal year 1980.

2 This category includes data on both automobile and boat fuel.

3 This category includes data on maintenance equipment rentals, bait, private area access fees, guide fees.

Source: FSU - SRFS (1982)

(i.e., it is a beverage tax). We asked respondents for their expenditures on food and drink. If the food were purchased from restaurants, it would be subject to the sales tax. Since we did not obtain a detailed breakdown of the composition of food and drink, some simplifying assumptions were made. Since the residents were on a fishing trip, most purchases were probably made at restaurants and/or fast food places. All drink purchases were, of course, not beer. As a rough approximation, we applied the 4 percent sales tax to the total food and drink category. This is the only category of the expenditures by saltwater recreational fishing where some ambiguity exists which respect to the incidence of taxation (i.e., we simply do not know how much of the food and drink consumed by resident fishermen was taxable).

Florida gasoline taxes are 8 cents per gallon. We have two categories in Table 2.5 to which this tax applies: (1) boat fuel and (2) the fuel component of automobile expenditures. Since we estimated automobile expenditures indirectly through a question on mileage evaluated at $ .165 per mile (derived from published figures by the U.S. Department of Transportation, 1979), we also had estimates of the breakdown of the $ .165 per mile into gasoline as opposed to parts, accessories and general maintenance.[5]

Finally, businesses that sell to recreational fishermen pay a corporation income tax to the state. The corporation income tax is 5 percent of net income, less $5000 exemption per enterprise. There is no way of telling how many corporations are associated with each category in Table 2.5. This would take an extensive study in itself. However, we were able to use Corporate Income Tax Returns, Statistics of Income published by the U.S. Treasury Department (Dec. 1981). This gave us profit to sales ratios for the various sales or expenditure categories shown in Table 2.4. The actual computations are shown in Appendix A.10. Since the first $5000 of profits are exempt, we know that the effective Florida corporation profit tax rate is somewhat less than 5 percent. As an approximation, we applied a 4 percent corporate profits tax to estimated profits in each category to adjust somewhat for the $5000 exemption per firm.

Table 2.7 shows the results of our calculations. The gasoline tax generated over $24 million dollars, followed by the sales tax (with over $16

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[5]Cents per mile excludes depreciation and insurance.

TABLE 2.7

Estimated State Taxes Generated By Resident Saltwater Recreational Fishing Activity in Florida 1980-81*

Category	Sales Tax	Gasoline Tax	Corporate Tax
Boat Fuel		19,288,261	1,381,522
Food & Drink	$7,781,208	x	257,357
Automobile:			
(a) Gasoline	x	4,786,556	373,274
(b) Parts & Accessories	$2,296,739	x	91,484
Maintenance Boats & Motors	x	x	404,194
Natural Bait	$3,274,802	x	207,753
Charter-Party Boats	x	x	178,956
Lodging	$1,621,189	x	78,401
Other Fees	$599,840	x	38,054
Private Area Access	$178,331	x	20,570
Public Transportation	x	x	91,751
Public Area Access	x	x	x
Equipment Rental	$162,119	x	10,285
Boat Launch Fees	$162,119	x	10,285
Guide Fees	x	x	6,121
		x	
Total	$16,076,847	24,074,817	3,150,057

Total All Taxes: $43,301,817

*Taxes generated are not total taxes but only that portion of the total taxes which are generated from the variable portion of expenditures. Thus, sales and corporate taxes which could be attributed to outboard motor sales and other nonvariable expenditures are not included.

Source: FSU-SRFS (1982)

million) and the corporate profits tax (about 3 million). In total, over $43 million in tax revenue to Florida was estimated to be derived from resident saltwater fishermen. This estimate excludes local taxes such as property tax. Taxes derived from resident saltwater fishing constitute about 1.2 percent of all state taxes, not including the purchases of durable goods used in sports fishing. For a state such as Florida with a relatively low tax incidence, this source of tax revenue is significant.

Geographical Analysis: Five Regions

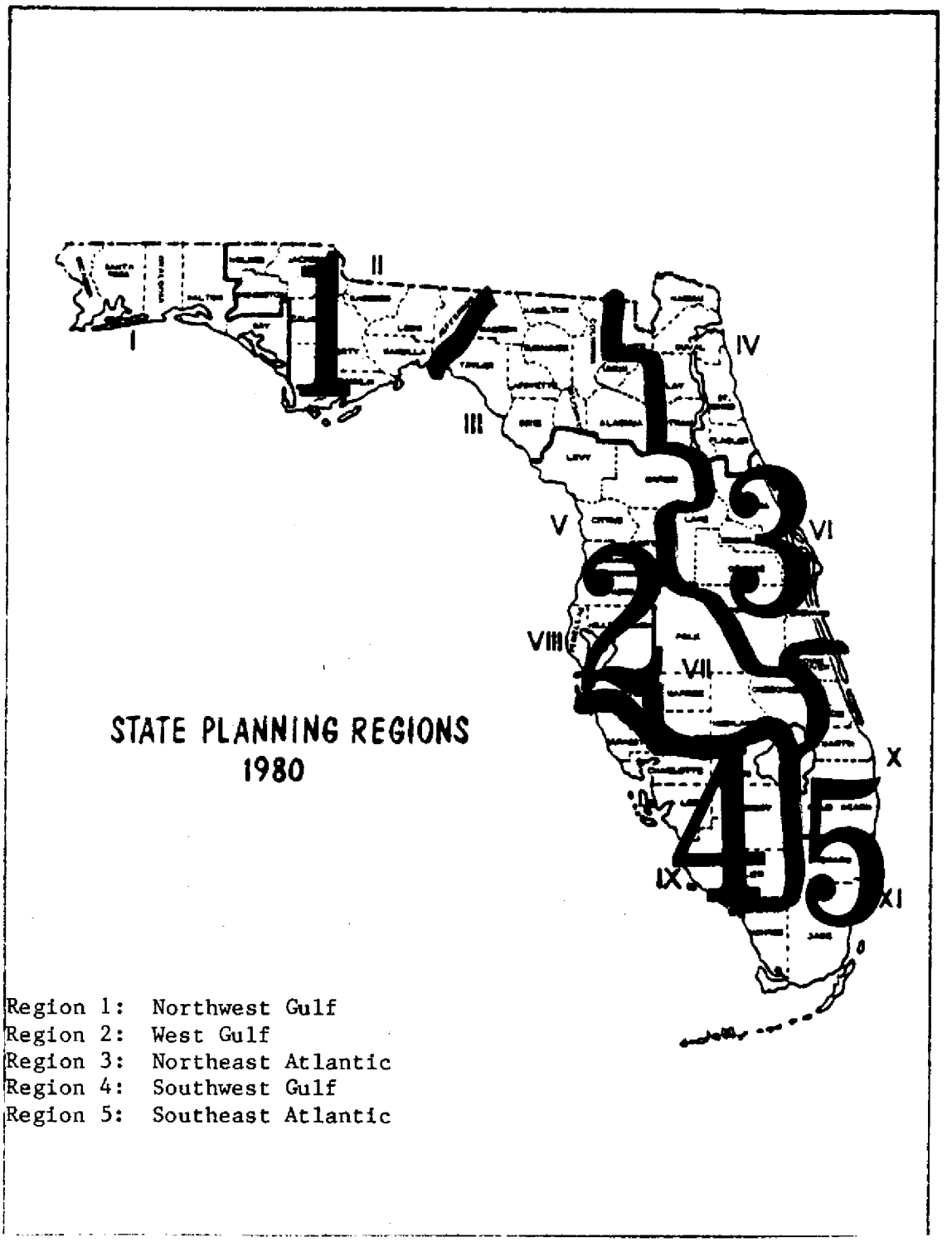
Although aggregate figures are useful for the state, it is desirable to present a regional breakdown within the state. This will give us some idea of differences among areas of a state which has approximately 1,000 miles of coastline. For example, is the mode of fishing fairly similar throughout the state? Does fishing effort within the territorial waters of the state vary significantly from region to region? In regionalizing, we do have one constraint and that is sample size. Obviously, regionalizing by counties would not be feasible since too few observations are available at the county level. Also, we wanted the regions to coincide with other published data so further comparisons and analyses could be made.

Figure 2.1 shows the State Planning Regions used by the Florida Department of Natural Resources. The DNR uses 11 planning areas. One of these areas is in the interior of the state (Region 7). For our purposes, we divided the state into five regions. The region is defined in terms of where an angler fished rather than where he lived. Thus, an angler traveling from Tallahassee (Region 1 -Northwest Gulf) to the Florida Keys is counted as participating in Region 5 (Southwest Atlantic). The five regions used for this study are shown in Figure 2.1 and are defined in the following manner:

Region 1: Northwest Gulf
Region 2: West Gulf
Region 3: Northeast Atlantic
Region 4: Southwest Gulf
Region 5: Southeast Atlantic

The Gulf side of Florida has three regions while the Atlantic side has two regions. Region 5 includes Monroe County, although much of the shoreline

FIGURE 2.1
Saltwater Recreational Fishing Planning Region



Region 1: Northwest Gulf
Region 2: West Gulf
Region 3: Northeast Atlantic
Region 4: Southwest Gulf
Region 5: Southeast Atlantic

borders on the Gulf. However, the Florida Keys are more ambiguous with respect to Atlantic versus Gulf. In fact, the Gulf and South Atlantic Fishery Management Councils (see Chapter 5) have disputed just where one draws the line between Atlantic and Gulf.[6] From an economic and to a great extent geographic point of view, we feel that Monroe County should be included in the Southeast Atlantic. This is also consistent with the classification used by the Florida Department of Natural Resources (i.e., Region XI). As designated in Figure 2.1, regions can be directly compared to DNR planning regions, possibly making the data derived here more useful to the state as a guide to planning.

Before discussing results, we should mention that the survey questionnaire was designed to obtain fishing days by the county where the angler fished. Anglers, of course, could fish in several of the five designated regions. Expenditure data were gathered on all fishing days and the respondent was not asked to allocate expenditures among counties. This was done to keep the questionnaire short. Analysis of the sample (1002 observations) revealed the following.

1. 86 percent of those interviewed lived and fished entirely within the designated regions
2. 9.1 percent of those interviewed fished entirely in one of the designated regions, but lived in another region.

Therefore, over 95 percent of the sample anglers could unambiguously be placed in the region where they fished with respect not only to days fished, but to expenditures as well. With five large regions as defined, we did not expect major interregional flows of resident anglers. For the balance of the sample, we made the following decision rule: If an individual fished in two contiguous regions, all his fishing activity (i.e., days) and expenditures were placed in the region where more than 50 percent of his fishing activity took place. In most of these cases, individuals would fish in two contiguous counties, each county being in a different region. 4.9 percent of the anglers in the sample fell into this classification. Of the 4.9 percent, most were actually placed in the region where they live based on the decision rule of

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[6]The dispute was recently settled by drawing a North-South line through Monroe County (i.e., U. S. 1)

where fished. Thus, the residence/where fished is much higher than 86 percent (i.e., 88-89%). In using this procedure, we found that 99 percent of all the fishing days (i.e., not numbers of anglers) in the sample fell into the regions in which they were fished. In this way, persons were not counted in more than one region nor did this complicate the questionnaire by asking the individual to allocate expenditures by counties. We feel fairly confident that the regionalization is reasonably accurate in terms of reflecting any differences between regions.

Table 2.8 shows the five designated regions and the corresponding Florida Department of Natural Resources Planning regions along with the estimated number of saltwater fishing anglers. Region 5 (Southeast Atlantic) contained 35.5 percent of all the resident anglers in the state. This conforms fairly well to the distribution of the state's population. Region 3 (Northeast Atlantic) and Region 2 (West Gulf) contained 22.4 and 21.3 percent, respectively, of the state's saltwater anglers. Again, this is in conformity with the distribution of population within the state. Nearly 58 percent of the saltwater anglers fish in the Atlantic Ocean while 42 percent fish in the Gulf. Whether these findings might change in the future will depend on the future distribution of population in the state and the demographic factors that bear upon the participation rate. Of great importance, the condition of the fishery stocks themselves will have a heavy bearing on the distribution of anglers or their effort within the state. This will be discussed below and in Chapters 4 and 5.

In this section on regionalization within the state, we shall only consider the following: (1) demographic characteristics (2) mode and location of fishing, and (3) expenditures. This information relates to people who fished in the region. Any other regionalization will be considered under the appropriate subjects that remain to be discussed in this chapter. Table 2.9 shows the variation in demographic characteristics among the five regions. Region 2 (West Gulf) had the highest percentage (77%) of males participating in saltwater recreational fishing while Region 1 (Northwest Gulf) showed the lowest percentage (68.8%). Male dominance in this recreational activity is evident among the regions; however, the authors have no basis upon which to explain regional variations. Further study of the overall demographics of the entire population (i.e., not just anglers) would be needed in each region.

TABLE 2.8

Estimated Number of Resident Saltwater Recreational Fishermen in Florida by Aggregate State Planning Region (1980-81)

Aggregate State Planning Regions	Department of Natural Resources State Planning Regions Included	Gulf of Atlantic	Number of Fishermen	Percent of Total
Region 1	I II	N.W. Gulf	202,481	9.3
Region 2	III V VII VIII	West Gulf	463,747	21.3
Region 3	IV VI	N.E. Atlantic	487,697	22.4
Region 4	IX	S.W. Gulf	250,380	11.5
Region 5	X XI	S.E. Atlantic	772,912	35.5
TOTAL			2,177,217	100.0

Source: FSU-SRFS (1982) and Florida Department of Natural Resources, Division of Recreation and Parks, Outdoor Recreation in Florida October 1980.

TABLE 2.9

Demographic Profile of Resident Saltwater Recreational Fishermen in Florida by Aggregated State Planning Regions (1980-81)

	Region 1	Region 2	Region 3	Region 4	Region 5	All Regions
	Percent	Percent	Percent	Percent	Percent	Percent
1. Sex						
Male	68.8	77.0	73.2	70.4	76.5	74.5
Female	31.2	23.0	26.8	29.6	23.5	25.5
2. Race						
Caucasian	93.5	93.9	96.0	95.7	79.6	89.4
Black	6.5	3.3	3.6	2.6	10.9	6.3
Hispanic	0.0	2.3	.4	1.7	8.7	3.9
Other	0.0	.5	0	0	.8	.4
3. Occupation						
Professional	11.8	12.7	11.6	8.8	14.9	12.7
Management/White Collar	22.6	20.2	29.5	22.8	27.2	25.3
Blue Collar	23.7	34.7	27.7	26.3	29.8	29.3
Retired/Semi Retired	6.5	15.5	10.7	23.7	8.4	12.0
Other	35.4	16.9	20.5	18.5	19.0	20.7
4. Age	Mean Median	Mean Median	Mean Median	Mean Median	Mean Median	Mean Median
	39.60 37.00	41.30 38.25	39.10 35.60	45.97 45.00	38.96 35.45	40.40 36.90
5. Years Saltwater Fishing in Florida	14.88 10.15	11.94 9.77	14.77 11.62	12.04 8.60	13.14 10.22	13.30 10.10
6. Household Income	$17,250 (Mean)	$18,425 (Mean)	$18,950 (Mean)	$18,900 (Mean)	$20,715 (Mean)	$19,130 (Mean)

Source: FSU-SRFS (1982)

With respect to racial characteristics, only Region 5 (Southeast Atlantic) showed considerable deviations from the other regions. Blacks and Hispanics were a considerably higher percentage of the population of saltwater anglers (19.6%) than in the overall state (10.2%). This is to be expected given the known demographic characteristics of Dade County. The occupational profile of the sample also reflects the characteristics of particular regions. For example, in Region 1 (Northwest Gulf) retirees are a relatively small fraction of saltwater anglers (6.5%) while Region 4 (Southwest Gulf) shows an amazingly high percentage (23.7%) of retirees who are saltwater anglers. The resident saltwater fishing retirees show a much higher participation along the Gulf Coast (Regions 2 and 4) compared to the state as a whole. Region 5 (Southeast Atlantic) shows a considerably higher proportion of professional and management/white collar workers than other regions and this is reflected in the high level of average household income. Again, the reader should be reminded that the demographics refer to those fishing, but not necessarily living in the region. As discussed above, there is a high correlation between the two. The mean age (45.97) was much higher for saltwater anglers in Region 4 (Southwest Gulf) than any other region undoubtedly reflecting the high participation of retirees. However, anglers in Region 4 still have a lower average age than the state as a whole (see Table 2.2). Thus, saltwater anglers in Florida are a relatively youthful group.

Table 2.10 contains a regionalization of fishing days by mode and fishing location. Let us first consider variations in the mode among the five regions. Those that fished Region 4 (Southeast Gulf) utilized jetty and bridge fishing more than other regions, with almost 38 percent of their total fishing days concentrated in this mode. Region 2 (Northeast Atlantic) followed with nearly 31 percent of the fishing days concentrated in the pier, jetty and bridge mode. As expected, the most frequently used mode (i.e., in terms of days) was private boats, varying from a high of 50.6 percent in Region 5 (Southeast Atlantic) to 40.81 percent in Region 1 (Northwest Gulf). As shown under boat modes alone in Table 2.10, residents rarely used charter and/or party boats. Only in Region 5 (Southeast Atlantic) did those who fished show a significant demand for charter and party boats (over 16 percent of fishing days). From a potential fishery management point of view, it is important to know the location of boat fishing days (as opposed to pier,

TABLE 2.10

Estimated Total Number of Resident Saltwater Recreational Fishing Days By Mode, Location and Region in Florida 1980-81*

	Region 1		Region 2		Region 3		Region 4		Region 5		All Regions	
	Days	%	Days	%	Days	%	Days	%	Days	%	Days	%
All Modes:												
Pier, Jetty, Bridge	999,300	28.18	3,194,500	30.83	2,348,355	24.97	2,278,838	37.99	3,217,310	25.05	12,038,303	28.56
Surf & Shore	1,003,661	28.31	2,049,703	19.79	2,265,852	24.09	945,018	15.75	1,883,539	14.67	8,147,773	19.33
Charter Boat	28,279	0.80	265,059	2.56	191,200	2.03	123,818	2.06	719,398	5.60	1,327,754	3.15
Party Boat	67,292	1.90	93,341	.90	93,341	1.00	19,536	.32	523,142	4.08	796,652	1.89
Private Boat	1,446,812	40.81	4,757,534	45.92	4,505,537	47.91	2,632,936	43.88	6,497,620	50.60	19,840,439	47.07
Total Days	3,545,344	100.00	10,360,137	100.00	9,404,285	100.00	6,000,146	100.00	12,841,009	100.00	42,150,921	100.00
Boat Modes:												
Charter Boat	28,279	1.83	265,059	5.18	191,200	3.99	123,818	4.46	719,398	9.29	1,327,754	6.04
Party Boat	67,292	4.37	93,341	1.82	93,341	1.95	19,536	.70	523,142	6.76	796,652	3.63
Private Boat	1,446,812	93.80	4,757,534	93.00	4,505,537	94.06	2,632,936	94.84	6,497,620	83.95	19,840,439	90.33
Total Boat Days	1,542,383	100.00	5,115,934	100.00	4,790,078	100.00	2,776,290	100.00	7,740,160	100.00	21,964,845	100.00
Location of Boat Fishing Days:												
Brackish Rivers & Marshes	119,480	7.75	467,060	9.13	1,768,310	36.92	482,266	17.37	527,886	6.82	3,365,003	15.32
Bay, Sound, & along coast	906,859	58.80	2,731,436	53.40	1,175,115	24.53	1,881,053	67.76	2,575,044	33.27	9,269,507	42.50
Deep Sea												
(a) beyond 3 miles Atlantic	0	0	0	0	1,846,653	38.55	0	0	3,611,567	46.66	5,685,095	25.88
(b) beyond 10 miles Gulf	516,044	33.46	1,917,438	37.47	0	0	412,971	14.87	1,025,663	13.25	3,645,240	16.60
Total Boat Days	1,542,383	100.00	5,115,934	100.00	4,790,078	100.00	2,776,290	100.00	7,740,160	100.00	21,964,845	100.00
Days inside Florida Territorial Waters	3,029,308	85.45	8,442,745	81.50	7,557,522	80.37	5,587,222	93.12	8,203,789	63.89	32,820,586	77.87
Days outside Florida Territorial Waters	516,036	14.55	1,917,392	18.50	1,846,763	19.63	412,924	6.88	4,637,220	36.11	9,330,335	22.13
Total Days	3,545,344	100.00	10,360,137	100.00	9,404,285	100.00	6,000,146	100.00	12,841,009	100.00	42,150,921	100.00

*Percents are rounded to two decimal places. Also, some figures may not be exactly identical where they should be due to percentage rounding.

Source: FSU-SRFS (1982)

jetty, bridge and surf and shore). Also, the extent of fishing from the shore is important. With the regionalization, we do see a greater utilization of fishing along the coast as opposed to deep sea fishing as we have defined it. In Region 4 (Southwest Gulf), not quite 15 percent of the boat days were spent in deep sea fishing compared to the state average of almost 43 percent. Remember that the deep sea category is really the Federal Fishery Conservation Zone. The bottom of Table 2.10 shows that Region 4 (Southwest Gulf) contains over 93 percent of its fishing days in State territorial waters, while Region 5 (Southeast Atlantic) contains less than 64 percent of its total fishing days in state territorial waters. Should a State Fishery Management Act emerge, this information would greatly assist managers in coming to grips with enforcement in certain areas of the state.

The reader should be reminded that the regions are drawn on the basis of what we feel to be distinct areas of the state. Others may wish to draw the lines differently. The data base is capable of being manipulated into other regional formats, but it is doubtful that a further increase in the number of regions is feasible given the sample size.

Table 2.11 is a regionalization of the total number of anglers, total annual expenditures, expenditures per fishing day, expenditures per angler, and days fished per angler. Over $454 million was spent on saltwater recreation fishing in Region 5 (Southeast Atlantic) or approximately 41 percent of total state expenditures. This region contains 35.5 percent of total anglers and almost 30 percent of total fishing days in the State of Florida. One factor contributing to the large expenditures in Region 5 is the high level of daily expenditures--$35.38, nearly 35 percent above the state average. Since we are dealing with regions within the state, all the expenditures indicated in Table 2.11 may not be spent in the region, especially automobile expenditure. To the extent that recreational fishermen come from other regions, some money may be spent along the way. In analyzing the sample, we found this to be minimal. Expenditures per day may vary because of higher prices and the kind of fishing in which the angler is engaged. It is beyond the scope of this report to analyze all of these differences; however, such analysis is possible combining the data set with published data. In contrast to Region 5 (Southeast Atlantic), only about $67.5 million was spent in Region 1 (Northwest Gulf) by saltwater anglers.

TABLE 2.11

Estimated Number of Resident Saltwater Recreational Anglers Expenditures, and Days in Florida By Aggregate State Planning Region 1980-81

	Region 1	Region 2	Region 3	Region 4	Region 5	All Regions
Number of Anglers	202,481	463,747	487,697	250,380	772,912	2,177,217
Annual Total Expenditures	67,513,295	218,093,895	250,089,032	118,148,348	454,303,143	1,108,147,713
Total Days	3,545,344	10,360,137	9,404,285	6,000,146	12,841,009	42,150,921
Expenditures Per Day	$19.04	$21.05	$26.59	$19.69	$35.38	$26.29
Annual Expenditures/Angler	$1,333.43	$470.29	$512.79	$471.88	$587.78	$508.97
Days Per Angler	17.5	22.3	19.3	24	16.6	19.36

Source: FSU-SREA (1982)

Expenditures per day were only $19.04 in this region or about 72 percent of the average for the state. Annual expenditures per angler were highest in Region 5 (Southeast Atlantic) at $587.78 per year, followed fairly closely by Region 3 (Northeast Atlantic) at $512.79 per angler yearly. The reason Region 3 (Northeast Atlantic) is not far behind Region 5 (Southeast Atlantic) with respect to annual angler expenditures is because of a higher number of days per angler in Region 3. Region 4 (Southwest Gulf) anglers were most active with 24 days fished per year. Regionalization may be helpful to regional planners who wish to use the averages for their areas rather than those for the overall state. Appendix A.9 contains a regional breakdown of expenditures by category with related employment, wages, and generated state taxes.

User Day Value: The Concept

As indicated in Chapter 1, the output of a sport fishery is fishing, not fish. This is true of Florida's saltwater recreational fisheries. An example will illustrate this point. Crutchfield and MacFarlain (1968) estimated that in 1962 recreational fishermen spent $50 million dollars in the State of Washington fishing for salmon. They caught an estimated 7,358,246 pounds of salmon which worked out to $6.80 per pound. The retail price of commercially caught salmon was less than $1 a pound. This example illustrates that recreational fishing involves far more than the capture of food. People fish to be outdoors, to take it easy, to get rid of tension. Recreational fishing is in one sense a completely different commodity than that provided by commercial fishing. The most pragmatic way of approximating a unit of recreation is by defining the experience in terms of time, or more specifically, a unit-day measure.

Not only is it difficult to define a unit of recreation, but outdoor recreation is what economists call an "extra or nonmarket activity." That is, it is very difficult to directly estimate the value of the sport fishery, because the "product" is not directly marketed in the United States. Since no one person owns the resource, a charge cannot be levied upon the use of this resource. One might ask why any charge should be levied upon the right to fish? Doesn't everyone have an inalienable right to fish without charge? We run into a paradox here. If the right to fish has zero price, then the value of the fishery resource is apparently zero. An owner of an apartment building who charges no rent will find that his "asset" is worthless.

Environmentalists, biologists and ecologists often point to the immense "value" of a fishery resource. But the questions is: What is value? Many are quick to say that expenditures on fishing as presented above in some way measure the value of the fishery resource. However, the logic here is flawed since variable expenditures are merely the vehicle to enable one to fish. As Crutchfield (1962) has argued, if the fishery resource vanished tomorrow, we would merely spend our money on some other form of recreation. Crutchfield has argued that the actual value of the fishery resource may be measured by the charge which might be made for the right to fish, which is omitted from variable expenditures. This section is not concerned with the policy issue of "to charge or not to charge," but how technically to measure the value of a fishery resource. Both economists and environmentalists would, we think, agree that a technique for measuring this important intangible value is a necessary prelude to policy analysis.

First, the fishery resource is a renewable resource and an input to producing recreation. The investment in a plant to produce steel is an input called capital. Capital is also an asset which can be rented or sold. A fishery resource is an asset which could also be rented or sold; the analogy is very solid. The value of any asset (input) is determined by the flow of earnings over a period of time. Capital invested in a steel plant will produce a flow of profits. But, how did we jump from the steel business to saltwater recreational fishing? There are ways of simulating the "earnings" produced yearly from the asset called a fishery resource. If a fishery resource were privately owned, one would expect a charge or more specifically a user charge for the right to fish. Given the reality that fishery resources are common property, consider Figure 2.2.

FIGURE 2.2

Hypothetical Demand for Saltwater Recreational Fishing in Florida

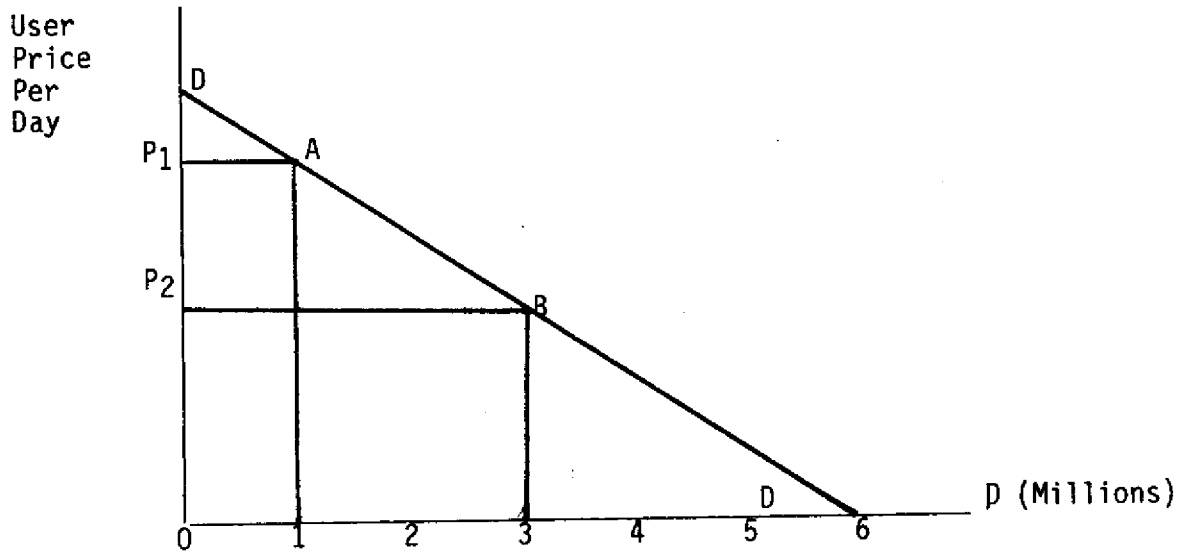
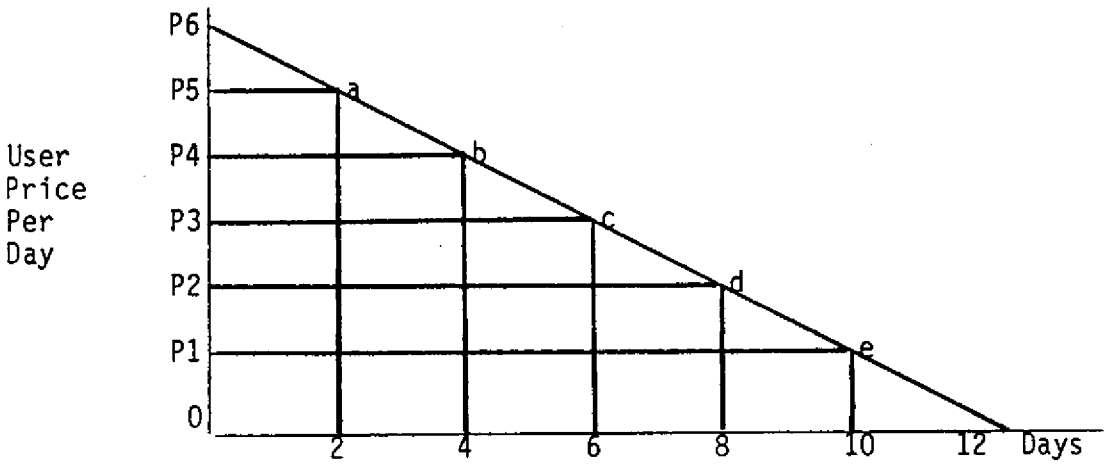


Figure 2.2 shows a hypothetical aggregate demand curve for recreational fishing. If a user charge of P_1 were placed on every recreational day, individuals would choose to "consume" one million recreational saltwater fishing days. If the user charge were lowered to P_2, saltwater anglers would find that fishing in Florida, for example, is relatively cheaper than in neighboring states such as Georgia or Alabama. Anglers would be encouraged to visit Florida at the lower user price if everything else remained constant. Three million saltwater days would be demanded. Under common property, no charge is made for the use of the resource; therefore, six million saltwater fishing days will be spent in Florida. One of the obvious simplifications here is that six million fishing days has no appreciable impact on the fishery resource. That is, as fishing days expand from one to six million days, this has no appreciable impact on the "success rate" or catch per day. If the success rate were to decline with an increasing number of fishing days, this might negatively impact demand, thereby shifting the demand curve for Florida's fishery resource down and to the left. So, are we left with the conclusion that at a zero user price the resource has no value? Assuming the "success rate" is not a factor, the resource will have a value equal to the area under the demand curve, called consumer surplus. What is the rationale for this? Consumers could be forced to pay P_1 per fishing day, but the price

is zero. Similarly, P_2 could be charged. Consumers' surplus is simply the difference in what could be charged consumers and the actual price. As we have stated, a common property resource has a zero user price per day. Consumers gain a surplus. Consider Figure 2.3

FIGURE 2.3

Demand For A Single Saltwater Fishing Angler



Saltwater Recreational Fishing Days

Since the price is zero, 12 days will be consumed by the angler. At a price of P_5, one surplus will exist (the area of the triangle P_5P_6a). As the price falls, the fisherman's surplus increases to P_4P_6b, P_3P_6c, and so on. At a zero price, the surplus reaches a maximum. This surplus is the equivalent of the amount of money the fisherman would pay for the right to fish for 12 days (or the total user charge which might be extracted from him before he would cease fishing entirely). Thus the area under the demand curve measures the economic value to the fisherman of the right to fish at a zero price.[7] Economists call this consumer's surplus.

User Day Value: Empirical Estimation

To approximate the total user day value, we asked a hypothetical question to each saltwater angler in the sample (See Appendix A. 2.). The following question was asked:

> "Now I would like to ask you a hypothetical question. This question presupposes that you have a limited source of income. Thus, you must make a decision on how to allocate your limited income amongst various uses.

[7] In terms of Fig. 2.3, this is the area of the triangle OP_612

> Having thought about how much saltwater fishing in Florida cost you in the last 12 months, how much more would the annual cost have to increase before you would decide to stop doing it because it is too expensive?"

The angler was given the following explanation or clarification before he or she answered:

> "Too expensive meaning, too expensive in relation to how you value saltwater fishing as compared to other uses of your income, such as, more trips to Disney World, more days golfing, more clothing, etc."

What we are attempting to measure is the dollar value of the saltwater angler's satisfaction or total user value (i.e., consumer's surplus) obtained from a resource that has a zero user price. For saltwater fisheries in Florida, no license is required; therefore, even a nominal license price is not facing the angler. But, how accurate is a hypothetical question such as the one posed above? Perhaps the source of bias in such a question results from "gamesmanship." People who are asked hypothetically what they would be willing to pay for nonmarket goods may recognize two different incentives to distort their responses. Perceiving that they will not actually have to pay and that their responses may influence the supply of a nonmarket good (through fishery management, etc.), people may respond in ways that are more indicative of what they would like to see done than how they would behave in an actual market. On the other hand, if people believe (correctly or incorrectly) that their responses will influence actual fees charged in the future they may be more concerned about keeping their estimates low than revealing their true values to the investigator.

Furthermore, the hypothetical nature of the transactions may not be at all indicative of how people would behave in an actual market even if gamesmanship is not a major problem. When people buy things in a market, they may go through weeks or months of considering the alternatives. The process will often involve consultations with friends and may also involve professionals such as lawyers or bankers. It may also entail shopping around for the best deal on the product in question. And, for the majority of times in the consumer's budget, there is a whole history of past experience in the market to base the decision on. All this is markedly different than spending an hour or two at most with a mail survey or a personal interviewer attempting to discern how one might behave in a market for a commodity for which one has never actually paid more than a nominal fee (e.g., fresh water fishing licenses in Florida).

The above arguments would tend to indicate a downward bias in answers to our hypothetical question since people may perceive charges in the future. Therefore, any estimates would be expected to be conservative. In an experiment using actual market transactions, Bishop and Herberlein (1979) showed that "willingness to pay" questions (i.e., the survey question) measured only 28 percent of actual consumer surplus. The direction of the bias may be correct, but this one isolated experiment is hardly sufficient to make any generalization as to the exact magnitude of the downward bias.[8]

Table 2.12 shows a tabulation of the results of the willingness to pay question for the state and the five regions as discussed above. On a per fishing day basis, saltwater fishermen received $38.38 in value. This, as discussed above, is the user value per day for all the saltwater fishery resources fished by residents of the state and amounts to over $1.6 billion per year. User value per day varied from $22.91 per day in Region 1 (Northwest Gulf) to a high of $57.99 in Region 5 (Southwest Atlantic). One economic factor that explains variations in user value per day is income per capita or household. Higher incomes shift the demand curve for recreation outward and to the right (See Figure 2.3). The user value per day is lowest in Region 1 (Northwest Gulf) where income per household is the lowest (see Table 2.9). It is highest in Region 5 where income per household is highest. Other factors do enter into this relation such as "success rate" with the resource. For an extended discussion, see Hammack and Brown (1974).

Remember, that the figures in Table 2.12 illustrate an estimate of a value derived (but not paid) from the fishery resource. These estimates are probably downward biased; therefore, we probably have a lower bound. It should be pointed out that an annual flow or value may change from year to year depending on the level of demand for recreational saltwater fishing. For the state, saltwater anglers derive $743.15 per year from the use of the resource. Therefore, the physical proximity to ocean fishery resources increases the incomes (i.e., explicit and implicit) of saltwater anglers. This annual flow of benefits must be distinguished from the value of the fishery resources off the coast of Florida. In Chapter 4 we shall look at the implied value of this important asset to the state.

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[8]One reviewer has suggested an opposite interpretation. If respondents know that higher reported values enhance the estimated value of their activity, and that value might be used to partition the resource in their favor (at no cost to them), they might over estimate.

TABLE 2.12

Willingness to Pay For the Saltwater Recreational Experience by Florida Resident Anglers by Aggregate State Planning Regions 1980-81

	Region 1	Region 2	Region 3	Region 4	Region 5	All Regions
Number of Anglers	202,481	463,747	487,697	250,380	772,912	2,177,217
Annual Willingness to Pay	$81,223,798	$293,505,916	$240,111,786	$258,557,031	$744,605,416	$1,618,003,947
Total Days	3,545,344	10,360,137	9,404,285	6,000,146	12,841,009	42,150,921
Willingness to Pay Per Day	$22.91	$28.33	$25.53	$43.09	$57.99	$38.38
Annual Willingness to Pay Per Angler	$401.14	$632.90	$492.34	$1,032.66	$963.38	$743.15
Willing to Pay as Much as $6.75 for a Saltwater Fishing	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
License-Funds to be Used for Fishery Management	55.9 44.1	57.3 42.7	53.6 46.4	58.8 41.2	58.1 41.9	56.8 43.2

source: FSU-SRFS (1982)

Since there is presently no fishing license required to fish in saltwater, we asked a question to the residents on their willingness to pay for a saltwater fishing license. The question was the following:

> "Would you be willing to pay as much as $6.75 for a saltwater fishing license to provide funds for fishery management?"

This is somewhat different from the valuation question discussed above since it represents an actual tax or fee in the form of a license. Also, the purpose of the license is to provide ". . . for fishery management" which may have the negative connotation of an onerous regulation restricting individual action. We picked $6.75 since this is the present fee for a freshwater fishing license in Florida. As expected, results were split. For the entire state, 56.8 percent were willing to pay $6.75 for such a saltwater fishing license while 43.2 percent opposed this measure. Sentiment was generally the same among the five regions. As we shall see in Chapter 3, there are negative connotations flowing from the term "fishery management." Still, a majority of Floridians would apparently agree to saltwater fishing licenses. This should be taken into account if legislation is introduced to require a saltwater fishing license in Florida's territorial waters.

Kinds of Fish Caught

It may seem strange that in a report on recreational fishing we have not talked about the fish themselves. The intent of this report was not to estimate the recreational fish catch. This has been and is presently being done by the National Marine Fisheries Service. Also, we had to delimit the telephone interview to primarily the economics of fishing or expenditures by various categories as discussed above. However, we did make an attempt to find out which species of fish were caught in Florida. We asked the respondent the following question: "Over the last 12 months, what kind of species of saltwater fish did you usually catch? Give the top three only." The respondent did not rank the top three species. The interviewers were told that we wanted the top three species which the respondent usually caught. The number of fish or weight of fish was necessarily used as a criterion. The question was not in any way intended to reflect what anglers would like to catch, but what leading fish they actually caught.

Table 2.13 shows the results of the survey using the six top species mentioned by respondents.[9] Snappers were mentioned more often in the top three than any other fish. Specifically, about 30 percent of the sample anglers mentioned snappers among the top three species. Snappers were followed by seatrout, grouper, king mackerel, dolphinfish, and catfish. Are these species the most popular sport fish in Florida? In 1979, the National Marine Fisheries Service made estimates of the number of fish by species caught by anglers in Florida. This is shown in columns two and three in Table 2.13.[10] In terms of the number of fish, the NMFS data agrees with our survey on catfish and seatrout. Using weight as a criterion, more agreement is observed (i.e., catfish, seatrout, dolphinfish and grouper or four of the NMFS top fish by weight coincide with our list). The NMFS top six by weight is in better agreement with our list. We place snappers and king mackerel in the top six while the NMFS finds bluefish and drum to be in the top six by weight. It is well known that snappers and king mackerel are highly desirable sport fish in Florida, but bluefish and drum are also. The identification of the leading six sport fish was but the first step in learning more about these fish. The top six was arbitary, we could easily have taken the top eight or ten.

Disposition of the Top Six Species

One controversy that rages today is what anglers do with their fish. Commercial fishermen charge that sports fishermen sell their catch to fish houses and directly to retail markets, thereby undermining commercial fish prices. For each species mentioned by the respondent, we asked them about the disposition of the fish. The following categories were given on the questionnaire, which exhausts practically all possibilities:

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[9] In reality we are using species-categories rather than individual species. The remainder of this report shall refer to the general categories. For example, grouper refers to all species that are categorized as groupers.

[10] It should be pointed out that the catch data published by the NMFS was for residents and tourists combined. In this chapter, we are comparing the resident survey only with the combined catch reported by the NMFS. To the extent that the resident/tourist mix of species varies, this may bias the comparisons.

TABLE 2.13

A Comparison of Top 6 Species Caught by Recreational Saltwater Resident Anglers in Florida -- FSU-SRFS and NMFS*

Rank[1]	FSU-SRFS Species	Rank[2]	NMFS Species	Rank[3]	NMFS Species
1.	Snappers	1.	Catfish	1.	Catfish
2.	Seatrout	2.	Seatrout	2.	Seatrout
3.	Grouper	3.	Croaker	3.	Bluefish
4.	King Mackerel	4.	Pinfish	4.	Drum
5.	Dolphin Fish	5.	Spot	5.	Dolphin Fish
6.	Catfish	6.	Grunt	6.	Grouper

1 Rank based on the number of people reporting the species as one of the top species they usually caught.

2 Rank based on total number of fish caught.

3 Rank based on pounds. For the sports fishery, data were used from the NMFS (1980). No direct information is given on the weight of the catch by species for the Atlantic and Gulf sides of Florida. However, the number of fish caught and released is published by the NMFS for these areas by species. For each species, we calculated the average weight per fish by dividing the published weight by the number of fish caught for the South Atlantic and Gulf regions. Then, the average weight per fish was multiplied by the number of fish for each species reported for Florida (i.e., Atlantic and Gulf treated separately). This gave us a rough estimate of the weight of the sport catch. The researcher has no other alternative in making comparisons since the NMFS does not report the weight of the catch by state.

*Source: FSU-SRFS (1982) and National Marine Fisheries Service (NMFS)

1. Eat
2. Give Away
3. Trophy
4. Live Release
5. Sell
6. Discard
7. Bait

Give away and sell may not be distinguishable.[11] Table 2.14 shows the results for the top six species. Except for catfish, anglers overwhelmingly report that they ate their catch. Table 2.14 can be interpreted as follows. Three hundred respondents in a sample of 1002 reported snappers as one of their top three fish actually caught. Of these three hundred reports, 94.33 percent said they ate the fish. On a percentage basis (but far behind), "give away" and "live release" were the second and third categories of disposition. Live release is an important policy variable since more fishermen can share in "success" if this method is prevalent. This does not seem to be the case for the top five species. In contrast, saltwater catfish is apparently not a desirable fish to eat as only a little over 25 percent of the respondents listed this method of disposition. The data indicate that most (53.51 percent) catfish are released alive. This finding is consistent with common observation throughout the state. Finally, for residents selling of sport fish was extremely uncommon despite allegations to the contrary. Of course, people might not tell the truth concerning this activity; however, no interviewed individual could be easily traced by name.

Perception of the Status of Fishery Stocks

Perceptions are sometimes more important than reality. We asked respondents to rate the fishery stocks for the major species as follows:

1. Declining
2. Increasing
3. Stable
4. Don't Know

The rating was based upon their own personal knowledge. This type of

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[11]"Give away" and "sell" categories may not be easily separated. "Give away" is in fact "sale" when it brings forth (as it usually does) a "reciprocal gift". In the case of charter boats "give away" (boat keeps the fish) accounts for a large part of their operating revenue and influences the charter fee. See Edgar Gentle, University of Miami M.S. Thesis (1977). It could be that "give away" and "sale" are the same thing. People catch more fish than they want for themselves, so they exchange fish for other things of value (money or barter gifts).

TABLE 2.14

Top 6 Species Caught By Resident Saltwater Anglers And The Disposition Of The Catch

Species	Number Reporting In Sample	Percent Of Sample[1]
1. Snapper	300	29.94
2. Seatrout	281	28.04
3. Grouper	239	23.85
4. King Mackerel	185	18.46
5. Dolphin Fish	131	13.07
6. Catfish	114	11.38

Disposition Of Top 6 Species

	Percent Distribution						
Species	Eat	Give Away	Trophy	Live Release	Sell	Discard	Bait
1. Snapper	94.33	3.00	0	1.67	1.00	0	0
2. Seatrout	93.24	2.85	0	2.85	1.06	0	0
3. Grouper	93.72	3.36	0	1.25	1.25	.42	0
4. King Mackerel	91.89	4.33	.54	1.08	2.16	0	0
5. Dolphin Fish	93.13	3.05	.77	3.05	0	0	0
6. Catfish	26.31	7.02	.88	53.51	0	10.53	1.75

[1]Percent of anglers in our sample of 1002 reporting the fish in question.

Source: FSU-SRFS (1982)

question should reflect the current success rate or catch per unit of effort relative to prior years. Table 2.15 shows the results. Remember, these are not meant in any way to reflect a scientific biological inquiry; however, perceptions and reality do sometimes coincide. Around 50 percent of the respondents felt snapper, seatrout, and grouper stockers were on the decline. From 36 to 41 percent said these stocks were increasing or stable. Somewhat more people thought king mackerel stocks were increasing and stable than declining. Also, slightly less of the respondents rated the dolphinfish as a declining than increasing and stable. Finally, catfish was rated as either increasing or stable by 69 percent of those catching these fish. For seatrout and grouper a majority of anglers who caught these species "perceive" the fishery stocks to be in jeopardy. This is indeed a critical policy issue.

If a respondent rated one of these stocks as "declining," we inquired further to discover the reason(s) why. It should be pointed out that when the fishery stock is perceived to be declining it is necesary to pursue the reasons behind these perceptions. That is, increasing stocks (or stable) are less of a social problem than declining ones and this is the reason for the inquiry on these negative aspects (i.e., declining stocks). The respondent was given six categories for reasons of decline:

1. Water pollution
2. Too many recreational fishermen
3. Too many commerical fishermen
4. Habitat destruction
5. Lack of sufficient piers, artificial reefs or species enchancing mechanisms

Table 2.15 shows the results. The two leading reasons indicated for declining stocks were (1) water pollution and (2) too many commercial fishermen. Too many commercial fishermen was listed as the number one cause of a decline in stocks for snappers, seatrout and king mackerel. Water pollution was somewhat more important for grouper and dolphinfish. Those that thought catfish were on the decline blamed mainly water pollution. These findings are perceptions which may be very subjective. However, these perceptions do raise the question of research to establish the factual basis, if any, for these claims. If these individuals are incorrect, public education is indeed needed.

TABLE 2.15

Resident Anglers Perceptions of the Availabilty of the Top 6 Species and Reasons Species Declining[1]

Availability Top 6 Species

	Species	Percent Distribution			
		Declining	Increasing	Stable	Don't Know
1.	Snappers	49.00	7.00	34.33	9.67
2.	Seatrout	52.31	6.05	33.46	8.18
3.	Grouper	50.63	4.18	32.64	12.55
4.	King Mackerel	40.00	9.73	38.92	11.35
5.	Dolphin Fish	38.17	4.58	45.04	12.21
6.	Catfish	21.05	28.07	41.23	9.65

	Species	Percent Distribution					
		Water Pollution	Too Many Recreational Fishermen	Too Many Commercial Fishermen	Habitat Destruction	Lack of Facilities	Don't Know
1	Snappers	25.85	14.29	36.05	12.24	5.45	6.12
2	Seatrout	29.25	11.56	40.14	14.97	1.36	2.72
3	Grouper	33.06	11.57	29.75	14.88	8.26	2.48
4	King Mackerel	27.03	9.46	37.84	12.16	8.11	5.40
5	Dolphin Fish	38.00	8.00	32.00	10.00	6.00	6.00
6	Catfish	61.50	8.33	25.00	12.50	8.33	8.33

[1] Respondent was asked to give his/her perception of the availability of each of the top species he or she caught. Then for those species the respondent indicated as declining, the respondent was then asked the reasons they thought the species were declining.

Source: FSU-SRFS (1982)

Deserting Mecca

We have every reason to believe that despite the perception that some stocks are declining, Florida is probably the number one saltwater recreational fishing state in the nation. See Bell and Canterbery (1975) for the magnitude of saltwater recreational fisheries for all coastal states. Florida attracts its residents to the sea and a significant proportion of its tourists. Florida is a mecca for saltwater anglers.

However, we did ask residents about their participation in saltwater fishing outside the state. We found the following:

1. 9.6 percent of resident anglers do leave the state for saltwater fishing somewhere else, however;
2. 3.3 percent of all saltwater angler days were spent outside the state.

So even though about one-tenth of the residents desert mecca, it is a rather trivial transgression since only 3.3 percent of all their saltwater fishing days are spent outside the State of Florida. We did not obtain their expenditures or state fished, but merely fishing days.

Other Consumptive Recreation

Consumptive recreation is defined as any form of recreation where some animal species is actually consumed in the process. Saltwater fishing is consumptive recreation whereas pleasure boating is not. Some may feel that such activities as hunting, freshwater fishing and saltwater fishing are fairly close recreational substitutes. Depending on the consumer, they might even be complements, In completing the survey, we asked respondents whether they participated in other forms of consumption recreation. This is shown in Table 2.16.

TABLE 2.16

Participation in Other Consumptive Recreation by Resident Saltwater Fishermen

			Number	Percent
1.	Freshwater Fishing	YES	381	38
		NO	621	62
			1002	100
2.	Hunting	YES	122	12
		NO	880	88
			1002	100

Source: FSU-SRFS (1982)

It would appear that freshwater fishing might be a substitute for saltwater fishing since 38 percent did both. However, saltwater fishermen do not seem to have a high participation in hunting. For these alternative consumptive activities the low percentage of participation by saltwater anglers may be dictated by the population concentration in the coastal zone despite an abundance of lakes, streams, rivers and hunting areas in Florida. In the chapter which follows, we will turn to the tourist or nonresident component of saltwater sport fishing in Florida.

Chapter 3
The Economics of Tourist Saltwater Recreational Fishing

Sample Design

Under the supervision of the authors, the field work for the tourist sector was conducted by Rife Marketing Research, Inc. of Miami, Florida, under contract to Florida State University.[12] Rife Marketing has a statewide organization of interviewers that have access to airports and the main arteries leading in and out of Florida.

The survey instrument for the tourist sector is shown in Appendix A.2. It was approved by the Florida Sea Grant Office in August of 1980. We selected all tourists visiting Florida as the population to be sampled. Obviously, we are interested in a sub-population of these tourists: those over 18 years of age who, as part of their trip to Florida, participated in saltwater recreational fishing. A decision was made to sample from the general tourist population used by the Division of Tourism. The entire four quarter sample was intended to be 1,205 observations distributed by quarter in the following manner:

		Quota	Actually Received
1980	1st Quarter (Aug.-Oct.)	283	283
1980-1	2nd Quarter (Nov.-Jan.)	279	284
1981	3rd Quarter (Feb.-April)	348	281
1981	4th Quarter (May-July)	288	286
		1205	1134

This report will discuss findings based upon the 1134 actual observations over the 1980-81 period. The number of observations in each quarter was determined in accordance with the allocations made by the Florida Division of Tourism. Their methodology will not be discussed here, but we have followed their procedures for sample stratification both spatially and temporally since

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[12]Rife Marketing also carries out the annual Florida Division of Tourism Survey.

there is no practical way of identifying the sub-population (i.e., saltwater recreational fishing tourists) directly. However, each tourist contact was tallied so that we were able to obtain the percentage of all tourists who engaged in saltwater fishing.

Table 3.1 shows the questionnaires (interviews) completed per sampling site along with the a priori quota based upon the general tourist pattern. With respect to highway traffic, we exceeded the overall quota by 19 percent (i.e., 143 interviews). However, interviews of tourists traveling by air only reached 52 percent of the quota. This does not mean that the sample is distorted. It merely means that saltwater recreational fishing tourists as a subset of all tourists had a somewhat different mode of entry. To some, the deviation from the planned quota may seem considerable and possibly impact sampling accuracy. The planned quota is for the general tourist population; therefore, it is evident that tourist saltwater recreational fishermen have a different configuration of entry modes. No prior information was available to the researchers on this sub-population. These findings may be helpful for future research. The use of the planned or proposed sample by entrance mode does not bias the results since they are based upon the actual finding that could not have been known in advance. Therefore, no weighting factors were used for the mode strata to force the obvious sub-population to the general population. The sample size of 1205 observations was established with the objective of obtaining at least 1000 completed interviews. Because the survey was "piggy-backed" on the overall tourist survey conducted annually for the state by Rife Marketing, we were able to obtain 1134 completed interviews within the budget.

Let us describe some of the mechanics of the survey. Two methods were used to contact tourists on the highways. First, highway patrolmen would set up orange cones on the highway to indicate that traffic should slow down. At random, individual cars would be stopped to determine whether they contained tourists. A tourist was defined as an individual 18 years of age or older whose principal voting residence was not in Florida. Second, individuals would be approached at rest stops and interviewed there. Air travelers were contacted at airport concourses to ascertain, first, whether they were tourists (and could be interviewed) and then if they were saltwater anglers. The car was the unit from which the interviews were made. Only one fisherman

TABLE 3.1

Number of Questionnaires Received Per Site

Site	Annual Total		
	Number Received	Proposed	Deviation from Prior Design
Highways:			
I-10	103	147	-44
US-231	133	72	+61
I-75	93	216	-123
US1-301	107	85	+22
I-95	466	239	+227
Total Highways	902	759	+143
Airports:			
Miami	78	147	-69
Ft. Lauderdale	81	68	+13
W. Palm Beach	46	29	+17
Orlando	0	79	-79
Tampa	26	87	-61
Jacksonville	0	22	-22
Sarasota	1	14	-13
Total Airports	232	446	-214
Total Highways and Airports	1134	1205	-71

Source: FSU-SRFS

could be interviewed per car. With respect to saltwater fishing, a tally was made on contacts of tourists and those that identified themselves as saltwater anglers.

To obtain the 1134 completed questionnaires, 15,879 contacts with tourists were made at airports and highways. The tally sheet (See Appendix A.2) is divided as follows:

1. Contacts not participating in saltwater fishing (14,343)
2. Contact who participated in saltwater fishing, but did not know their expenditures (402)
3. Contacts who participated and who were interviewed (1134)

Thus, those participating in saltwater fishing in Florida is the sum of those interviewed (i.e., 1134) plus those that participated, but did not know their expenditures (i.e., 402).[13] These statistics indicate that approximately 9.67 percent of all tourists to Florida during these four quarters participated in saltwater recreational fishing.

In the Florida 1980 Tourist Study, approximately 16 percent of the respondents listed "fishing" as one of the things they liked about Florida. This survey did not distinguish between fresh and saltwater fishing. However, if we accept the finding from the sample that the tourist participation rate in saltwater fishing is 9.67 percent, and apply this statistic to 1980-81 during which 31,513,150 tourists visited the state, we may estimate that about three million tourists engaged in saltwater recreational fishing over that 12-month period. This finding will be discussed in some detail below.

A Demographic Profile: Who Are They?

Table 3.2 shows the demographic profile of saltwater recreational fishing tourists. The following variables or characteristics were obtained:

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[13]In the pre-test of the survey instrument, it was discovered that a large percentage of tourists engaging in saltwater fishing had all expenses prepaid (e.g. employer) and had no idea of the cost.

TABLE 3.2

Demographic Profile of Saltwater Recreational Fishing Tourists in Florida

	First Quarter (Aug. 80-Oct. 80)		Second Quarter (Nov. 80-Jan. 81)		Third Quarter (Feb. 81-Apr. 81)		Fourth Quarter (May 81-July 81)		Annual (Aug. 80-July 81)	
	Percent		Percent		Percent		Percent		Percent	
1. Sex:										
Male	94.0		95.4		93.2		88.1		92.7	
Female	6.0		4.6		6.8		11.9		7.3	
2. Race:										
Caucasian	92.6		93.3		96.8		90.9		93.8	
Black	5.3		4.2		2.8		9.1		5.4	
Hispanic	-		1.4		0.4		-		0.5	
Other	2.1		1.1		-		-		0.3	
3. Occupation:										
Professional	24.7		19.0		16.0		10.8		17.7	
Management-White Collar	24.0		22.5		17.1		19.9		21.0	
Blue Collar	24.4		22.5		23.1		30.1		25.1	
Retired/Semi-Retired	18.4		24.6		28.8		23.1		23.8	
Other	8.5		11.2		15.0		16.0		12.4	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
4. Age	45.9	46.4	50.41	54.50	58.0	53.3	47.6	48.2	48.78	50.01
5. Years Saltwater Fished in Florida	8.98	4.83	7.78	4.46	8.16	4.81	5.72	5.68	8.33	4.82
6. Household Income	$25,000-$29,999 (mean)		$25,000-$29,999 (mean)		$25,000-$29,999 (mean)		$20,000-$24,999 (mean)		$25,000-$29,999 (mean)	
	$25,970		$25,425		$25,585		$23,620		$25,335	

Source: FSU-SRFS

1. Sex
2. Race
3. Occupation
4. Age
5. Household income
6. Number of years saltwater fished in Florida
7. Location of primary residence

The first six of these characteristics are listed by quarters in Table 3.2. The sample was dominated by males (92.7 percent) and caucasians (93.8 percent). There was a decided shift in the occupational categories over the four quarters surveyed from professional (first quarter) to the non-professional categories. The average age was 48-49 years, with age increasing during the two "winter quarters" (second and third) as "retirees" increased as a percent of the occupational categories. Mean household income for the year was $25,335. It would probably be fair to characterize this saltwater fishing tourist group as relatively affluent white males who are somewhat older and more likely to be retired compared to the general U. S. population.

The typical tourist angler was not a newcomer to Florida, having spent an average of a little over eight years saltwater fishing in the State. This would indicate a strong attachment to Florida's fishing environment. This statistic is important since a decline in "fishing success" as discussed in Chapter 2 could adversely impact nearly 10 percent of the total tourist population.

Table 3.3 shows the primary place of residence for the 1134 individuals sampled. The greatest proportion of tourists had their primary residence east of the Mississippi River. Georgia (15.9 percent); New York (9.0 percent) and Ohio (7.70 percent) were the three leading states from which tourist saltwater anglers came. These three states alone comprise nearly one-third of the sample. Nearly three percent of the anglers come from foreign countries, with Canada being the leader.

Number of Participants and Recreational Days

The Florida Division of Tourism has estimated that 31,513,150 tourists visited the State during the 1980-81 season (12 months). This is the

TABLE 3.3

Primary Place of Residence For
Saltwater Recreational Fishing Tourists
in Florida 1980-81

	State	Number in Sample	Percent of Sample
1.	Georgia	180	15.90
2.	New York	98	9.00
3.	Ohio	97	7.70
4.	Pennsylvania	78	6.88
5.	Alabama	67	6.00
6.	Michigan	58	5.11
7.	Tennessee	53	4.70
8.	North Carolina	52	4.59
9.	New Jersey	48	4.23
10.	Maryland (D.C.)	36	3.20
11.	Illinois	35	3.09
12.	Indiana	33	2.91
13.	South Carolina	33	2.91
14.	Virginia	25	2.20
15.	West Virginia	23	2.02
16.	Kentucky	22	1.94
17.	Missouri	19	1.70
18.	Louisiana	17	1.50
19.	Massachusetts	17	1.50
20.	Texas	15	1.32
21.	Connecticut	15	1.32
22.	Wisconsin	13	1.20
23.	Minnesota	8	.71
24.	Colorado	8	.71
25.	California	7	.62
26.	Iowa	6	.53
27.	Missisippi	5	.44
28.	New Hampshire	5	.44
29.	Arizona	4	.40
30.	Arkansas	4	.40
31.	Oklahoma	3	.30
32.	Kansas	2	.20
33.	Maine	2	.20
34.	Vermont	2	.20
35.	Utah	1	.09
36.	Rhode Island	1	.09
37.	Wyoming	1	.09
38.	Delaware	1	.09
39.	Nebraska	1	.09
(Outside U.S)			
1.	Canada	23	2.03
2.	England	2	.20
3.	Columbia S.A.	1	.09
4.	Bahama	1	.09
5.	Puerto Rico	1	.09
6.	Oman	1	.09
7.	Sweden	1	.09
8.	Ireland	1	.09
9.	Brazil	1	.09
	Unreported	7	.62
	TOTAL	1134	100.00

Source: FSU-SRFS

population from which we sampled, as discussed above. Of the sample of 15,879 tourists leaving the state (see Table 3.1), 9.67 percent engaged in saltwater recreational fishing while in Florida. This is roughly the same participation rate as was obtained in an independent survey conducted by the Florida Department of Natural Resources in 1980 (i.e., 10 percent). Table 3.4 shows that we estimate that out of the entire tourist population, 3,047,322 engaged in saltwater recreational fishing during part of their trip(s) to Florida. Eighty-five percent of saltwater angler tourists made only one trip to Florida within the last 12 months (i.e., that being the trip on which the interview was based). In fact, 94 percent of the sample tourists made not more than two trips during an annual period. For 85 percent of the interviews, there should be little controversy surrounding the question of recall.

In the sample, the days spent in Florida for the average tourist angler over the previous 12 months were as follows (using sample averages):

Total Days in Florida	19.22
Total Days Saltwater Fishing	5.39
Total Days in Other Recreation	13.83

Thus, only 28 percent of the days in Florida by the saltwater angler tourists were spent fishing, indicating that the visit to Florida was generally for a combination of recreational activities. These figures should not be confused with a single trip to Florida. The average tourist made 1.37 trips to Florida lasting about 14 days each (14 x 1.37 = 19.22 total days) and about four days were spent in saltwater recreational fishing. Although we were asking questions about individual participation, we found that the average number of individuals in the fishing party was 1.52.

Table 3.4 indicates that the tourists in total spent 16,431,160 days saltwater fishing during the 12 month period. We asked respondents to distribute these days by fishing mode. Nearly half of the fishing days (46.6 percent) were spent in the pier, jetty, or bridge mode of fishing. We expected charter or party boats to be more popular. Less than 11 percent of fishing days were spent in this mode. In terms of the subset "boat mode", private boats were used for most of the days (about 70 percent). Saltwater fishing in Florida attracts a higher proportion of auto tourists than air tourists as compared with the general tourist population. Many of these auto tourists bring their private boats with them to Florida. The location of boat fishing

TABLE 3.4

Estimated Total Number of Tourist Saltwater Recreational Fishermen and Days Fished By Mode and Location In Florida, 1981

Total Population over 18	x	Tourist Participation Rate	=	Total Tourist Fishermen
31,513,150	x	9.67	=	3,047,322

Avg. Days Fished	x	Tourist Fishermen	=	Total Days
5.392	x	3,047,322	=	16,431,160

All Modes	Percent	Total Days
Pier, Jetty, Bridge	46.60	7,658,022
Surf & Shore	18.56	3,049,774
Charter Boat	4.18	685,191
Party Boat	6.33	1,039,879
Privata Boat	24.33	3,998,294
Total	100.00	16,431,160

Boat Modes	Percent	Days
Charter Boat	11.99	685,191
Party Boat	18.18	1,039,879
Private Boat	69.83	3,998,294
Total Boat Days	100.00	5,723,364

Location of Boat Fishing Days	Percent	Days
Brackish rivers & marshes	15.40	309,008
Bay, sound & along coast	34.55	1,977,651
Deep Sea		
(a) beyond 3 miles Atlantic	30.52	1,746,566
(b) beyond 10 miles Gulf	29.53	1,690,139
Total Boat Days	100.00	5,723,364

	Percent	Days
1 Days Fished inside Florida territorial waters	79.08	12,994,455
2 Days Fished outside Florida territorial waters	20.92	3,436,391
Total Days	100.00	16,431,160

1. Days inside Florida territorial water = Pier, Jetty, Bridge + Surf & Shore + Brackish rivers & marshes + Bay, sound & along coast.

2. Days outside Florida territorial waters = beyond 3 miles Atlantic + beyond 10 miles Gulf

Source: FSU-SRFS

by tourists is of interest. Among tourists using the boat mode, nearly 60 percent of the days were expended in deep sea fishing or in the Fishery Conservation Zone (FCZ). However, when all modes are considered, less than 21 percent of the days are expended in the FCZ. From a potential fishery management point of view, it would appear that the State of Florida has a major role since tourists concentrate so heavily within state territorial waters.[14] This conclusion is strengthened by the finding that over 65 percent of the total tourist fishing days were expended without the use of a boat.

Direct Expenditures, Employment, Taxes and Wages Generated

As with the resident survey, we divided tourist expenditures into two categories: (1) durable goods and (2) nondurable goods. We did not expect tourists to be investing heavily in durable goods (such as boats and motors) while in Florida; however, we felt it was important to explore this question. The survey results indicate that there is very little expenditure by tourists in this category (See Appendix A.7). Therefore, we shall only concern ourselves with variable expenditures in this report.

Tables 3.5 and 3.6 report the aggregate variable expenditures by tourists and variable expenditures by tourists per day respectively. The variable expenditures reported in these tables are those actually occurring in the State of Florida. Although we obtained information on total miles traveled by an auto tourist, for example, only mileage and corresponding automobile expenditures in Florida were counted. This was done in order to retain the definition of the tourist sector as an export industry which has a multiplier effect on the state economy. Airline fares were excluded also for the reason that the point of purchase is generally outside the state. This will be explained further below.

Total variable tourist expenditures on saltwater fishing were estimated at approximately $763 million. Food and drink, lodging and charter and party boat expenditures comprise 59 percent of total expenditures in the state.

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[14]Management responsibilities are also related to the total catch as well as total anglers. NMFS(1980) indicates that for the South Atlantic Region 63 percent of the total number of recreational fish is caught in state (Non FCZ) waters. In the Gulf Region, 59 percent of the recreational fish were caught within 3 miles.

TABLE 3.5

Estimated Variable Expenditures
For Tourist Saltwater Recreational
Fishermen in Florida 1980-81

Variable Expenditures[1]	Dollars	%	Rank
Food & Drink	178,606,709	23.42	1
Lodging	167,433,520	21.96	2
Charter & Party Boat	104,666,489	13.73	3
Boat Fuel	76,733,517	10.06	4
Maintenance Boats & Motors	59,973,734	7.86	5
Automobile	57,673,372	7.56	6
Public Transportation	42,556,704	5.58	7
Natural Bait	37,955,980	4.98	8
Boat Storage Fees	19,717,392	2.59	9
Other Expenses	5,750,906	.75	10
Equipment Rental	5,586,594	.73	11
Public Area Access	4,107,790	.54	12
Boat Launch Fees	985,870	.13	13
Private Area Access	657,246	.09	14
Guide Fees	164,312	.02	15
Total	762,570,135	100.00	

Source: FSU-SRFS

Since only the portion of automobile travel within the state was counted, automobile expenditures (at $.165 per mile) made up only 7.56 percent of total variable expenditures.

Table 3.6 reports daily expenditures. On average, a saltwater fishing day cost the tourist angler $46.41. The tourist spent almost $11 per day for food, but only $10.19 for lodging. The latter figure might seem extremely low; however, 39 percent of the tourist in the sample paid no lodging expense. Many tourists stayed with friends or relatives and incurred no lodging expense. This lowers the daily averages for lodging.

The reader should not interpret Table 3.6 as reflecting the daily prices for these services in Florida, but the average for the sample. As indicated earlier, the most utilized mode of fishing for the saltwater angling tourist is not by boat (see Table 3.4); therefore, most tourists would not incur boat fuel expenditures. We did check the "reasonableness" of expenditures for those that reported specific expenditures on a per day basis, such as lodging. This check agreed extremely well with "daily prices" (e.g. motel room, etc.).

In making the daily expenditure computations, we tried to follow the methodology of the Florida Division of Tourism. This agency has estimated that the average tourist in Florida spent approximately $38 per day in 1980. Our data indicate that saltwater sport fishermen -tourists spent somewhat more than the general tourist visiting Florida. This may be explained by the unique expenditure categories found among tourist saltwater anglers. Even though these tourists spent only 28 percent of their entire stay in Florida engaged in fishing, they contributed about 4.5 percent of all tourist expenditures based upon 1980 data ($762 million ÷ $17,080 million).

Table 3.7 translates saltwater angler tourist expenditures into estimates of employment and related economic impacts. These estimates relate to employment and wages directly supported by tourist expenditures. We shall explain below the special importance of tourist dollars as compared with resident dollars. Table 3.7 indicates that 23,740 employees are supported by tourist variable expenditures on saltwater recreational fisheries in Florida at the retail level only. We are not including the wholesaling or manufacturing employees that are supported by retail sales to saltwater anglers. The problem of employment generated is complicated by the fact that many of the affected employees may not be employed in the State of Florida.

TABLE 3.6

Estimated Variable Expenditures (Per Day)
For Tourist Saltwater Recreational
Fishermen In Florida 1980-81

Variable Expenditures	Dollars	%	Rank
Food & Drink	$10.87	23.42	1
Lodging	10.19	21.96	2
Charter & Party Boat	6.37	13.73	3
Boat Fuel	4.67	10.06	4
Maintenance Boats & Motors	3.65	7.86	5
Automobile	3.51	7.56	6
Public Transportation	2.59	5.58	7
Natural Bait	2.31	4.98	8
Boat Storage Fees	1.20	2.59	9
Other Expenses	.35	.75	10
Equipment Rental	.34	.73	11
Public Area Access	.25	.54	12
Boat Launch Fees	.06	.13	13
Private Area Access	.04	.09	14
Guide Fees	.01	.02	15
Total	$46.41	100.00	

Source: FSU-SRFS

TABLE 3.7

Estimated Impact on Florida's Economy
of Saltwater Recreational Fishing Tourists
(Sales, Employment, and Wages & Salaries)
(1980-81)

Category	Sales Impact (Dollars)	Sales to Employment Ratio [1]	Employment Impact	Wages & Salaries to Sales Ratio	Wages & Salaries Impact (Dollars)
Lodging	167,433,520	30,199	5544	.186	31,142,635
Service Stations[2]	134,406,889	246,834	544	.025	3,360,172
Marinas[3]	130,792,034	62,032	2108	.280	36,621,769
Food & Drink	178,606,709	22,497	7939	.204	36,435,769
Charter & Party Boats	104,666,489	38,542	2716	.319	33,388,610
Public Transportation	42,556,704	10,403	4091	.574	24,427,548
Public Access	4,107,790	5,146	798	1.000	4,107,790
Total	762,570,135		23,740		169,484,293

[1] Impact only includes direct retail impact.

Lodging, service stations and food & drink ratios were calculated as follows: Sales figures for 1980 were provided by Ed Stalvey, Florida Department of Revenue. Employment figures were from the 1979 County Business Patterns. Marina and charter boat data came from the 1977 study "Economic Activity Associated with Marine Recreational Fishing", updated to 1981 dollars. Public Transportation data were furnished by the Florida Department of Commerce, and include airline, taxi, bus and rental car transportation. Public access data were furnished by the Florida Division of Parks for fiscal year 1980.

[2] This category includes data on both automobile and boat fuel.

[3] This category includes data on maintenance, equipment rentals, bait, private area access fees, guide fees, boat storage and other.

Source: FSU-SRFS

TABLE 3.8

Estimated State Taxes Generated By Tourist Saltwater Recreational Fishing Activity in Florida 1980-81*

Category	Sales Tax	Gasoline Tax	Corporate Tax
Food & Drink	6,869,4899	X	227,188
Lodging	6,439,751	X	311,426
Charter-Party Boats	X	X	255,386
Boat Fuel	X	4,910,945	351,746
Maintenance Boats & Motors	X	X	146,336
Automobile:			
(a) Gasoline	X	1,433,0965	111,751
(b) Parts & Accessories	687,644	X	27,390
Public Transportation	X	X	661,671
Natural Bait	1,459,845	X	92,612
Boat Storage Fees	X	X	48,110
Other Expenses	221,189	X	14,032
Equipment Rental	214,869	X	13,631
Public Area Access	X	X	X
Boat Lauch	37,918	X	2,405
Private Area Access	25,279	X	1,604
Guide Fees	X	X	401
Total	15,955,984	6,344,041	2,265,689

Total All Taxes: $24,565,714

* Taxes generated are not total taxes but only that portion of the total taxes which are generated from the variable portion of expenditures. Thus, sales and corporate taxes which could be attributed to outboard motor sales and other nonvariable expenditures are not included.

Source: FSU-SRFS

For example, boat fuel is imported into Florida; therefore, manufacturing jobs are probably created in Louisiana or Texas. However, many non-retail jobs that are related to tourist fishing expenditures probably do exist in Florida. On the retail level alone, the employment created by saltwater fishermen-tourists generated an estimated $169,484,293 in wages or $7,139 per employee.

As with the residents in Chapter 2, we made an estimate of the state taxes generated by saltwater angler tourists. This is shown in Table 3.8. The sales, gasoline and corporate taxes generated $24,565,714 for the state. Again, this comprises direct taxes from retail establishments selling to saltwater angling tourists.

The Regional Multiplier Concept

To analyze a regional economy such as the State of Florida, we must first identify what is called its economic base. The economic base of the state is divided into two segments: (1) firms and individuals serving markets outside the community; and (2) firms and individuals serving markets within the community. The goods and services which the community sells outside its boundaries are considered "exports", whether sold to residents of other states or in trade with foreign nations. The remaining goods and services go to the local market, defined to mean the geographical region being studied. In the case of Florida, agricultural commodities (mainly citrus) and phosphates are physically exported to other states. However, it is not necessary for an exported commodity to cross the state's border. Tourist activities attract buyers of goods and services to the state. Even though these services and products are sold to tourists within the state, they are regarded as exports. For example, the state's fishery resources are used for recreation which attract both residents and tourists. The residents (Chapter 2) represent the local market. The tourists represent markets originating outside the state.

Implicit in the division of markets (i.e., local vs. export) is a cause and an effect relationship. Export markets are considered the prime mover of a local economy. If employment serving the export market rises or falls, employment serving the local market is presumed to move in multiplier fashion in the same direction. Because of this prime mover role, export employment is considered as "basic." Employment which serves the local market is considered adaptive or "non-basic."

The multiplier relationship between export sales and local sales grows out of the fact that export sales create new direct primary sales and indirect spending as well. Those employed in the tourist sector spend their wages on housing, food and personal services such as medical, legal and educational in the local market. Tourist dollars injected from outside the regional economy thus set in motion a cycle of spending, but this cycle does not run on indefinitely. The reason the cycle comes to an end in time is due to leakage from the region or purchases outside the region. Mathematically, the regional multiplier impact may be expressed as follows:

$$\text{Total Sales Increase} = \text{Increase in Export Sales} \times \frac{1}{1 - \frac{\text{Non-Basic Income}}{\text{Total Income}}}$$

If, for example, non-basic income is $80 million while total income is $100 million, the multiplier will be:

$$\frac{1}{1 - \frac{\$80 \text{ million}}{100 \text{ million}}} = 5.0$$

This means that for every $1 increase in export income, $5 in total income will be generated. The total increase is divided into $4 in local and, of course, $1 in export income. Another way of looking at the income multiplier is to merely divide non-basic income ($80 million) by basic income ($20 million). The result (4.0) indicates that every dollar of export income supports four dollars of non-basic income. For more discussion of these concepts, see Tiebout (1962).

Canterbery (1977) has calculated an income multiplier for Florida of 5.18. Therefore, to assess the total impact of saltwater fishing tourist expenditures on the State of Florida, we will multiply the estimated expenditures by 5.18

Tourist Angler Expenditures*	x	Multiplier	=	Total Impact
$762,570,135	x	5.18	=	$3,950,113,200

*(see Table 3.4)

We have estimated the total impact of tourist saltwater fishing expenditure in Florida to be a little over $3.9 billion. Most residents of Florida are

benefited by this increase in state income, including resident saltwater recreational fishermen who are able to spend money on the local activity because of spending by the prime mover or basic sector.

Total (Direct and Indirect) Expenditures, Employment, Wages and Taxes Generated by Saltwater Fishing Tourists

In this section, we shall be concerned with the direct and indirect impacts of tourist expenditures related to saltwater recreational fisheries. Let us first consider the indirect impact. As discussed in the last section, a tourist dollar has a multiplier effect on a regional economy such as Florida. Consider Table 3.9. About $.76 billion in direct expenditures produces a total (direct and indirect) impact of $3.95 billion given a multiplier of 5.18. There may be some dispute concerning the actual value of the multiplier. Other estimates may be lower or higher than the one accepted here.[15] In any case, we estimate that almost 80,000 jobs are created in Florida as a result of indirect sales. The multiplier includes jobs created at all levels (retailing, wholesaling, manufacturing, etc.), but these jobs cannot be uniquely identified with specific industries. Further research using an input-output table for Florida would be needed. This is not within the scope of this study. Over $1 billion in wages would be generated by indirect sales, or $13,147 per employee. Finally, we estimate that taxes generated by these indirect sales would be almost $80 million. This includes sales, corporate, beverage and gasoline taxes but not property taxes, documentary stamp taxes or taxes on intangible income. Increased sales may affect these other taxes, but we have no way of estimating these more remote tax impacts.

Table 3.10 shows the total sales of over $3.9 billion associated with total employment of 103,510. These employees generated over $1.2 billion in wages and the sales produced almost $124 million in taxes. Wages per employee were much lower in the sector directly servicing saltwater recreational tourists than in the overall economy in Florida. This is to be expected since

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[15]If the multiplier were 2.59 rather than 5.18, our indirect estimates of sales, employment, wages and taxes would decrease by 50 percent.

TABLE 3.9

Estimated Indirect Economic Impact of Tourist Saltwater Recreational Fishing

Estimated Total Impact[1]	$3,950,113,200
Estimated Direct Impact[2]	762,570,135
Estimated Indirect Impact	$3,187,543,065
Estimated Indirect Employment[3]	$ 79,770
Estimated Indirect Wages[4]	$1,048,701,647
Estimated Wages Per Employee	$ 13,147
Estimated Indirect State Taxes[5] (Corporate, sales, beverage and gasoline taxes only)	$ 79,592,950

[1]$762,570,135 (direct retail sales) x 5.18 (multiplier)
[2]See Table 3.7.
[3]In 1981, gross sales were $147,487,489,85 in Florida with employment of 3,691,000 or $39,959 per employee. Estimated indirect impact divided by sales per employee yielded employment estimates.
[4]State wages ($48,519,840,000) divided by gross sales (see Footnote 33) is .329. Multiplying this times indirect sales impact yielded an estimate of indirect wages.
[5]For 1980-81, the four taxes generated revenue of $1,113,024,000 or 2.497 percent of gross sales. The latter was multiplied times the estimated indirect employment.

Source: FSU-SRFS

TABLE 3.10

Estimated Total Economic Impact of Tourist Saltwater Recreational Fishing

Category	Direct[1]	Indirect[2]	Total
Sales	$762,570,135	$3,187,543,065	$3,950,113,200
Employment	$ 23,740	$ 79,770	103,510
Wages	$169,484,293	$1,048,701,647	$1,218,185,940
Wages Per Employee	$ 7,139	$ 13,147	
Taxes	$ 44,101,721	$ 79,592,950	$ 123,694,671

[1]Table 3.7
[2]Table 3.9

Source: FSU-SRFS

wages are generally lower in the services sector which caters to tourist. The indirect estimates must be considered to be approximations. We have not carried out any new multiplier analysis, but it is felt the estimate used is reasonable.

Geographical Analysis: Five Regions

Using the formulation discussed earlier for residents, we divided Florida into five planning regions (shown in Figure 2.1 Chapter 2). These regions are consistent with the planning regions used by the Florida Department of Natural Resources. The tourist survey was designed to obtain fishing days by the county where the angler fished. Expenditure data were gathered on all fishing days but the respondent was not asked to allocated expenditures among counties. Thus the question arises as to how many tourists fished in more than one of the five regions. Analyzing the sample, we found the following:

1. 98 percent of those interviewed fished entirely within one of the designated regions.
2. Over 98 percent of all fishing days fell entirely within one of the designated regions.

Therefore, about two percent of the sample of saltwater recreational tourists fished in more than one of the five regions. As with residents, the following decision rule was used: tourists who fished in more than one region were placed in the region where more than 50 percent of their fishing days were spent. This minor adjustment has little impact on the results of regionalization.

In this section on regionalization, we shall consider the following: (1) demographic characteristic, (2) mode and location of fishing, and (3) expenditures. Consider Table 3.11. The demographic characteristics of tourist saltwater anglers are shown for the five regions. Some differences among regions are worth noting. Region 1 (Northwest Gulf) deviated considerably from the other regions in that a much higher percentage of females participated in recreational fishing (11.7 percent compared to the state-wide average of 7.3 percent). Region 1 (Northwest Gulf) and 3 (Northeast Atlantic) show the highest percentage of blacks participating in recreational fishing. Since the southern regions of the state are dominated

TABLE 3.11

Demographic Profile of Tourist Saltwater Recreational Fishermen in Florida by Aggregated State Planning Regions (1980-81)

	Region 1	Region 2	Region 3	Region 4	Region 5	All Regions
	Percent	Percent	Percent	Percent	Percent	Percent
1. Sex					92.8	92.7
Male	88.3	95.1	93.4	93.6	7.2	7.3
Female	11.7	4.9	6.6	6.4		
2. Race						
Caucasian	88.3	97.2	90.0	99.3	97.9	93.8
Black	11.2	2.1	9.8	0	.4	5.4
Hispanic	.5	.7	.2	0	1.7	.5
Other	0	0	0	.7	0	.3
3. Occupation						
Professional	10.6	14.6	10.3	16.4	33.9	17.7
Management/White Collar	22.3	25.7	21.4	20.0	17.6	21.0
Blue Collar	38.5	16.7	32.7	16.4	15.2	25.1
Retired/Semi Retired	14.5	31.9	23.5	35.0	20.4	23.8
Other	14.1	11.1	12.1	12.2	12.9	12.4
	Mean Median	Mean Median	Mean Median	Mean Median	Mean Median	Mean Median
4. Age	44.5 45.2	51.8 54.1	49.2 50.3	53.1 56.2	47.3 48.4	48.78 50.01
5. Years Saltwater Fishing in Florida	7.2 3.9	8.97 5.0	8.6 5.0	7.0 3.7	8.9 5.1	8.33 4.82
6. Household Income	$21,650	$24,470	$24,470	$24,645	$29,530	$25,335

Source: FSU-SRFS

by saltwater anglers who are caucasian males, one hypothesis might be that females and blacks find it easier to reach the northern parts of Florida from Georgia and Alabama, more than likely traveling by automobile. This type of demographic profile is further reinforced by Region 5 (Southeast Atlantic) which has the highest percentage of tourists who are professional people by occupational category (33.9 percent compared to a state-wide average of 17.7 percent). Retirement areas such as Region 2 (West Gulf) and 4 (Southwest Gulf) attracted a higher percentage of tourists who were retired (an average of 35 percent compared to 23.8 percent state-wide). Correspondingly, the average age of the tourist was higher in Regions 2 and 4 as compared to the other three regions. In terms of years fishing in Florida, tourists going to Region 2 (West Gulf) and Region 5 (Southeast Atlantic) had more experience in the past with Florida than the other three regions. All regions did seem to command considerable "loyalty" in terms of previous years spent in Florida saltwater fishing. Finally, the "highroller" tourist in terms of household income appeared in Region 5 (Southeast). This is consistent with the earlier comments regarding occupation (i.e., professionals visiting the Southeast). As might be expected, tourists visiting Region 1 (Northwest Gulf) had the lowest household income of all regions.

Table 3.12 shows the mode of fishing and location of fishing by region. Consider all modes first. Region 1 (Northwest Gulf) and Region 5 (Southeast Atlantic) stand in sharp contrast with respect to the mode employed by tourists in saltwater fishing. Nearly 74 percent of all fishing days in Region 1 (Northwest Gulf) are conducted through some kind of shore fishing (pier, shore, etc.) whereas only 35 percent of days in Region 5 (Southeast) are conducted via shore modes. Since shore fishing is less expensive than boat fishing, we would expect that the lower incomes of tourists in Region 1 as compared to Region 5 would help explain this differential.

Regions 1, 2, 3, and 4 show a majority of the tourists fishing effort (i.e., days) expended from shore and shore type structures. Charter and party boat fishing seems relatively more popular in Region 2 (West Gulf) and Region 5 (Southeast). In Region 5, the Florida Keys seem to be a mecca for party and charter boats. Tourists visiting Region 5 overwhelmingly choose private boats as the mode of fishing (43.03 percent vs. a statewide average of 24.33 percent) when compared to other modes. Private boats make up the highest

TABLE 3.12

Estimated Total Number of Resident Saltwater Recreation Fishing Days By Mode, Location and Region in Florida 1980-81

	Region 1		Region 2		Region 3		Region 4		Region 5		All Regions	
	Days	%	Days	%	Days	%	Days	%	Days	%	Days	%
All Modes:												
Pier, Jetty, Bridge	2,523,117	64.94	999,573	55.27	1,123,177	40.08	2,348,460	58.97	663,695	16.79	7,658,022	46.60
Surf & Shore	338,565	8.71	177,344	9.81	846,413	30.20	948,520	23.82	738,932	18.69	3,049,774	18.56
Charter Boat	123,603	3.18	91,359	5.05	13,435	.48	59,115	1.49	397,679	10.07	685,191	4.18
Party Boat	128,977	3.32	209,588	11.59	110,168	3.93	139,725	3.51	451,421	11.42	1,039,879	6.33
Private Boat	771,176	19.85	330,504	18.28	709,375	25.31	486,352	12.21	1,700,887	43.03	3,998,294	24.33
Total Days	3,885,438	100.00	1,808,368	100.00	2,802,568	100.00	3,982,172	100.00	3,952,614	100.00	16,431,160	100.00
Boat Modes:												
Charter Boat	123,603	12.07	91,359	14.47	13,435	1.61	59,115	8.63	397,679	15.59	685,191	11.99
Party Boat	128,977	12.60	209,588	33.19	110,168	13.22	139,725	20.39	451,421	17.71	1,039,879	18.18
Private Boat	771,1762	75.33	330,504	52.34	709,375	85.17	486,352	70.98	1,700,887	66.70	3,998,294	69.83
Total Boat Days	1,023,756	100.00	631,451	100.00	832,978	100.00	685,192	100.00	2,549,987	100.00	5,723,364	100.00
Location of Boat Fishing Days:												
Brackish Rivers & Marshes	0	0.00	10,748	1.70	123,603	14.84	128,978	18.82	45,679	1.79	309,008	15.40
Bay, Sound, & Along Coast	231,084	22.57	223,023	35.32	507,848	60.97	327,817	47.84	687,879	26.98	1,977,651	34.55
Deep Sea												
(a) beyond 3 miles Atlantic	0	0	0	0	201,527	24.19	0	0	1,386,505	54.37	1,588,032*	27.75
(b) beyond 10 miles Gulf	792,672	77.43	397,680	62.98	0	0	228,397	33.34	429,924	16.86	1,848,673*	32.30
Total Boat Days	1,023,756	100.00	631,451	100.00	832,978	100.00	685,192	100.00	2,549,987	100.00	5,723,364	100.00
Days inside Florida Territorial Waters	3,092,766	79.60	1,410,688	78.00	2,601,041	92.81	3,753,775	94.56	2,136,185	54.04	12,994,455	79.08
Days ouside Florida Territorial Waters	792,672	20.40	397,680	22.00	201,527	7.19	228,397	5.74	1,816,429	45.96	3,436,705	20.92
Total Days	3,885,438	100.00	1,808,368	100.00	2,802,568	100.00	3,982,172	100.00	3,952,614	100.00	16,431,160	100.00

* This number differs from that in Table 3.4 since 1.7% of total days had to be allocated to regions based on decision rules. Region 1 for instance reported some days in the Atlantic. These represent days spent in another region but were placed in Region 1 because the preponderance of days were spent in Region 1.

Source: FSU-SRFS

percentage of fishing days among those tourists employing the "boat mode" of fishing in Region 3 (Northeast Atlantic). This is due to a shift in composition in the boat modes among regions. That is, Regions 5 (Southeast Atlantic) and 2 (West Gulf) used charter and party boats extensively; therefore, the percentage of days spent using private boats was lowered for the boat mode category.

The location of the days fished is extremely important. Tourists in Regions 3 (Northeast Atlantic) and 4 (Southwest Gulf) spent the majority of their boat fishing days in brackish rivers, bays, sounds and along the cost. In sharp contrast, deep sea fishing was chosen by tourists using the "boat mode" in Regions 1 (Northwest Gulf); 2 (West Gulf) and 5 (Southeast Atlantic).

Of more importance is the location of total fishing days. This is shown at the bottom of Table 3.12. Region 1 (Northwest Gulf) is an area where fishing days are heavily concentrated in the territorial waters of Florida (about 80 percent). Regions 2, 3, and 4 show even higher percentages of fishing days spent in territorial waters. Thus, when compared to Region 1, the State of Florida has a considerable role to play in fishery management due to the concentration of fishing effort in territorial waters. Tourists in Region 5 (Southeast Atlantic) spend only 54 percent of their fishing days in state territorial waters as compared to a state-wide average of over 79 percent. Despite this lower percentage, the absolute number of fishing days spent in territorial waters in Region 5 is very large (1.8 million). This should be considered in making judgments regarding fishery management efforts by the State.

Table 3.13 shows the number of tourist anglers by region and their associated expenditures. Of the three million estimated saltwater fishing tourists, over one million or 33.5 percent engage in saltwater fishing in Region 3 (Northeast Florida) followed by 783,000 in Region 5 (Southeast Atlantic) or 25.7 percent. Expenditures per day were the highest in Region 5 (Southeast Atlantic) at nearly $77 per day (66 percent higher than the state average). Region 4 (Southwest Gulf) showed the lowest daily expenditure ($27.42), possibly due to the high percentage of retirees visiting that region.

It should be noted that these regional numbers are not as statistically reliable as those for the state in total, due to smaller sample sizes. Regional data must, therefore, be used with some caution.

TABLE 3.13

Estimated Number of Tourist Saltwater Recreational Anglers, Expenditures, and Days in Florida by Aggregate State Planning Region 1980-81

	Region 1	Region 2	Region 3	Region 4	Region 5	All Regions
Number of Anglers	481,477	387,010	1,020,853	374,820	783,162	3,047,322
Annual Total Variable Expenditures	$168,871,007	$68,713,143	$111,936,988	$109,176,455	$303,872,542	$762,570,135
Total Days	3,885,438	1,808,368	2,802,568	3,982,172	3,952,614	16,431,160
Expenditures Per Day	$ 43.46	$ 38.00	$ 39.94	$ 27.42	$ 76.88	$ 46.41
Annual Expenditures Per Angler	$ 350.74	$ 177.55	$ 109.65	$ 291.27	$ 388.00	$ 250.24
Days Per Angler	8.1	4.7	2.7	10.6	5.1	5.392

* One person in our sample accounted for approximately 5% of total days and 26.81% of total expenditures in Region 1. The questionnaire was closely scrutinized but found to be realistic. Thus, we decided to maintain this observation in the sample. However, when regionalizing the entire sample the Region 1 estimate was found to be sensitive to inclusion of this observation. Elimination of this observation yields an expenditure per day in Region 1 of $33.49.

Source: FSU-SRFS

User Day Values: Empirical Approximation

In Chapter 2, we discussed the concept of user day value. This value is essentially the consumer surplus or the dollar value of satisfaction obtained by the angler for the right to fish without any charge imposed upon him. To measure this satisfaction, we asked the angler the following question:

> "Having thought about how much saltwater fishing in Florida cost you in the last 12 months, how much more money would you spend annually before deciding to stop doing it because it is too expensive."

As extensively discussed in Chapter 2, this question is very hypothetical.[16] Table 3.14 shows the regionalization of the willingness to pay question. The largest willingness to pay per day was in Region 5 ($50.27 per day). This was almost double the state average of $28.64 per day. Regions 1, 2, 3, and 4 ranged from $19.11 per day to $26.74 per day. Therefore, four of the regions were fairly consistent with respect to willingness to pay. In light of some other published estimates (see Appendix A.1), these results seem very conservative (See Horvath 1974). Tourists visiting Region 5 (Southeast) have, on average, $5,000 more in annual household income than tourists visiting all of the other four regions. This would be a contributory factor in elevating the willingness to pay, since higher personal income tends to shift the demand curve for recreation outward. The prevalence of deep sea fishing might also increase the willingness to pay per day in Region 5.

We have included in Table 3.14 the regional results on the question dealing with tourists willingness to pay $10.50 for a saltwater fishing license (i.e., the cost of a nonresident fresh water fishing license). In Regions 1, 4, and 5 a majority of the tourists would be willing to pay $10.50 for a saltwater fishing license. In Regions 2 (West Gulf) and 3 (Northeast Atlantic) the measure would not be supported by a majority of the tourists visiting those regions. As noted in Chapter 2, the saltwater fishing license had majority support among residents fishing in all regions.

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[16] As with the resident survey tourists were told they were operating under an income constraint and faced alternative uses of this limited income.

TABLE 3.14

Willingness To Pay For The Saltwater Recreational Experience By Florida Tourist Anglers By Aggregate State Planning Region 1980-81

	Region 1	Region 2	Region 3	Region 4	Region 5	All Regions
Number of Anglers	481,477	387,010	1,020,853	374,820	783,162	3,047,322
Annual Willingness to Pay	$103,912,644	$34,146,658	$57,557,426	$76,089,840	$198,682,684	$470,557,252
Total Days	3,885,439	1,808,368	2,802,567	3,982,172	3,952,614	16,431,160
Willingness to Pay Per Day	$ 26.74	$ 18.97	$ 20.54	$ 19.11	$ 50.27	$ 28.64
Annual Willingness to Pay Per Angler	$ 215.82	$ 88.67	$ 56.38	$ 203.00	$ 253.69	$ 154.41
Willing to pay as much as $10.50 for a saltwater fishing licence; funds to be used to preserve fisheries (first half survey); funds to be used for fishery management (second half survey)	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
	56.4 / 43.6	47.9 / 52.1	47.6 / 52.4	52.1 / 47.9	58.4 / 41.6	52.4 / 47.6

Source: FSU-SRFS

Of some significance is the way in which the question concerning a saltwater fishing license was asked. We began the tourist survey in August of 1980. For the first and second quarters, we asked whether people would be willing to pay for a saltwater fishing license if the funds were used "to preserve the fishery." At a conference on our first quarter results, it was suggested that we change the language of the question to suggest that the funds would be used "for fishery management". This change in wording was proposed because the phrase "to preserve the fishery" may be a bit like mom and apple pie --who would oppose it? In the third and fourth quarters, we changed the wording (to "for fishery management") and the results were as follows:

	% Yes	% No	
1st Quarter	66.4	33.6	} Preserve the fishery
2nd Quarter	54.9	45.1	
3rd Quarter	46.3	53.7	} Fishery Management
4th Quarter	42.0	58.0	

The effect of the change was dramatic. The words "fishery management" apparently have a negative connotation. Management adds regulations which may be perceived as a violation of certain freedoms, while "preservation of a fishery" implies only biological enhancement.

Kind of Fish Caught

For the tourist survey we collected very detailed data on species caught. The respondent was not only asked what species were caught, but the number and live weight.[17] As indicated in the first part of this chapter, 85 percent of the tourists made only one trip to Florida; therefore, most of the interviews were conducted within 15 days of the actual fishing experience. Thus, we felt more confident that tourists (as compared to residents surveyed) could recall details of their catch. Also, these interviews were face-to-face; time was not as important a factor as in telephone interviews. Although the average tourist had fished in Florida for over eight years, we also showed pictures of

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[17]Although the data were collected on number and weight no analysis was done due to budget constraints. The controversy surrounding the issue of whether fishermen can identify species, or estimate length and weight will not be considered here.

some fish in these interviews to help in recall. The actual questionnaire is included in Appendix A.2.

We use the same format in discussing species caught as employed in Chapter 2. Table 3.15 shows the most frequently caught fish by saltwater recreational tourists. Almost 20 percent of the tourists indicated they caught saltwater catfish. Between 16-18 percent of the tourists caught seatrout, snappers and bluefish. Compared to residents, tourists had less of a propensity to eat their catch. Catfish was rarely eaten, but generally released alive. Over 28 percent of the bluefish caught was given away rather than eaten personally by the tourist angler. On an a priori basis, we might expect that tourists visit Florida for the adventure of catching tropical fish rather than fishing for food. These findings are consistent with this hypothesis. Table 3.16 compares the findings of this survey with those of a National Marine Fisheries Service survey. Remember, that the NMFS data is for residents and nonresidents combined. This may bias the comparison if species mix varies between the two groups.

Perception of the Status of Fishery Stocks

As with residents, we attempted to ascertain the tourist's perception of the fishery stocks. It might be argued that the tourists are in a poorer position to evaluate fishery stocks than residents. Residents do spend approximately four times as many of days per angler in fishing. However, the average tourist has been fishing in Florida for over eight years. Again, we must emphasize that perceptions concerning stocks are not necessarily objective and scientific; however, they may be very important in determining the tourist's willingness to choose Florida as the site for recreational fishing.

About 25 percent of all tourists catching seatrout, snapper, kingfish (i.e., whiting) or grouper felt the stocks were declining. On the other hand for the same species 41 to 62 percent perceived the stocks to be increasing or stable. Except for catfish, around 25 percent of sampled tourists were pessimistic with respect to the status of the stocks. Of course, over 50 percent of those catching bluefish and kingfish thought that these stocks were at least stable. This survey is an attempt to get at attitudes, and we think it is a fairly accurate expression of the perceptions of the stocks.

Finally, we asked the tourists to list the factors they thought were responsible for the decline in the fishery stocks for the species they had

Table 3.15

Top 6 Species Caught By Tourist Saltwater Anglers and the Disposition of the Catch--Florida 1980-81

Species	Number Reporting in Sample	Percent of Sample
1. Catfish	217	19.14
2. Seatrout	199	17.55
3. Snapper	194	17.11
4. Bluefish	189	16.67
5. Kingfish (Whiting)	170	14.99
6. Grouper	144	12.70

Disposition of Top 6 Species

Species	Eat	Give Away	Trophy	Live Release	Sell	Discard	Bait
1. Catfish	8.1	4.5	--	71.5	.5	14.5	.9
2. Seatrout	85.0	8.1	--	4.4	--	1.0	1.5
3. Snapper	81.2	12.3	--	5.0	1.0	.5	--
4. Bluefish	68.8	28.1	--	2.6	--	.5	--
5. Kingfish (Whiting)	78.3	20.0	.6	1.1	--	--	--
6. Grouper	79.9	13.4	--	6.0	.7	--	--

Source: FSU-SRFS

Table 3.16

A Comparison of Top Six Species Caught by Tourist Saltwater Anglers in Florida--FSU-SRFS and NMFS

FSU-SRFS		NMFS	
Rank[1]	Species	Rank[2]	Species
1	Catfish	1	Catfish
2	Seatrout	2	Seatrout
3	Snapper	3	Croaker
4	Bluefish	4	Pinfish
5	Kingfish (Whiting)	5	Spot
6	Grouper	6	Grunt

[1]Rank based on the number of people reporting.

[2]Rank based on total number of fish caught resident and nonresidents.

Source: FSU-SRFS and National Marine Fisheries Service (NMFS 1980)

Table 3.17

Tourist Anglers Perceptions of the Availability of the Top Six Species in Florida 1980-81

Availability Top Six Species

Species	Percent Distribution			
	Declining	Increasing	Stable	Don't Know
Catfish	4.1	30.3	40.3	25.3
Seatrout	28.2	5.8	38.3	27.7
Snapper	24.8	6.4	35.1	33.7
Bluefish	17.7	3.6	53.6	25.1
Kingfish (Whiting)	22.9	3.4	58.3	15.4
Grouper	22.2	6.0	36.9	34.9

Reason for all Species Declining*

	% of Total Sample Responding
Water Pollution	9.7
Too Many Recreational Fishermen	4.8
Too Many Commercial Fishermen	15.6
Habit Destruction	14.7
Lack of Facilities such as Artificial Reefs	10.2

*More than six species were identifed as declining. These percentages apply to all such species.

Source: FSU-SRFS

caught. Unlike the resident survey, we did not ask the tourist to give a reason for each species; the reasons given apply to all the species caught. For example, in the lower half of Table 3.17 we report that of 1134 tourists who responded to the survey, 15.6% and 14.7% believed that the reasons for this decline was "too many commercial fishermen" and habitat destruction respectively.[18]

Other Consumptive Recreation

Finally, we wanted to know the extent to which tourists engaged in freshwater fishing or hunting as either substitute or complementary activities with saltwater fishing. We obtained the following results shown in Table 3.18.

TABLE 3.18

Participation in Other Consumptive Recreation by Tourist Saltwater Fishermen

			Number	Percent
1.	Freshwater Fishing	YES	26	2.3
		NO	1108	97.6
			1134	100.0
2.	Hunting	YES	1	.09
		NO	1133	99.91
			1134	100.00

Source: FSU-SRFS

It is quite obvious that other forms of consumptive recreation are neither substitutes nor complements for the saltwater tourist angler. Since saltwater fishing makes up only 28% of the total number of days spent in Florida for the saltwater angling tourists we surveyed, it is readily apparent that nonconsumptive recreation plays a major part in the motivation to vacation in Florida.

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18 A complete species-specific analysis of the reasons for the decline in fishery stocks as perceived by tourists would not be statistically reliable because of small sample size.

Chapter 4
Total Overall Economic Importance of Saltwater Recreational Fishing

Introduction

The purpose of this chapter is to draw together the information developed in Chapters 2 and 3. This chapter will not only combine the resident and tourist sectors; but will compare and contrast the two sectors which make up saltwater recreational fishing in Florida. We shall also extend the analysis of the valuation of the fishery resource itself.

Demographics

Table 4.1 presents the demographic characteristics of tourists and residents. As might be expected, females are a much larger fraction of the resident saltwater anglers than of the tourists. More than a quarter of the resident anglers are women. This is fairly substantial since saltwater angling is usually perceived as a "man's sport". For the tourists this generalization seems to be appropriate; less than one in ten women tourists participate. With respect to race, there is strong similarity between residents and tourists. The single difference between the two groups is the higher participation of hispanics among residents. This is what might be expected given the higher percentage of hispanics in Florida compared to the U.S. population. With respect to occupation, tourist anglers show a higher percentage of professionals as compared to residents. Of considerable interest, nearly one quarter of the tourist anglers are retired. This is significant in Florida which has a large retirement community. Tourist anglers are on average nearly 8 years older than their resident counterparts. As might be expected, residents have been fishing in Florida about 5 years longer than the tourist anglers. Finally, the average household income is significantly higher among the tourist anglers ($25,335 as compared to $18,848 for residents). Three factors may explain the difference. First, there is a higher percentage of professionals among tourists. Second, many of the tourists are from northern states where wages tend to be higher than in Florida. Third, the higher percentage of males in the tourist sample may also

TABLE 4.1

Demographic Profile of Residents and Tourists Saltwater Recreational Fishermen in Florida (1980-81)

	RESIDENTS		TOURISTS	
	Percent		Percent	
1. Sex:				
Male	73.2		92.7	
Female	26.8		7.3	
2. Race:				
Caucasian	90.4		93.8	
Black	5.3		5.4	
Hispanic	2.6		.5	
Other	1.7		.3	
3. Occupation:				
Professional	12.0		17.7	
Management-White Collar	24.5		21.0	
Blue Collar	28.4		25.1	
Retired/Semi-Retired	13.0		23.8	
Other	22.1		12.4	
	Mean	Median	Mean	Median
4. Age	41.0	38.3	48.78	50.01
5. Years Saltwater Fished in Florida	13.35	10.07	8.33	4.82
6. Household Income (average)	$18,848		$25,335	

Source: FSU-SRFS

contribute to the income differential, since there would be a lower probability of interviewing a tourist whose household was headed by a woman.

Number of Anglers and Recreational Days

Resident and tourist saltwater anglers numbered an estimated 5,224,539 in Florida over the 1980-81 period (12 months) of this study. Table 4.2 shows these comparisons. Tourist anglers comprised 58 percent of the total anglers. But in terms of fishing days, the story was quite different. Tourists accounted for 16,431,160 fishing days, or only 28 percent of total fishing days which numbered 58,582,081.[19] Even though tourist anglers outnumbered resident anglers, the latter spend almost four times as many days per year fishing than the former. Therefore, in terms of fishing pressure as measured by fishing days, residents are the dominant force.

Let us now consider mode of fishing as shown in Table 4.2. "Private boat" and "pier, jetty, and bridge" were the two most important modes of fishing measured in terms of fishing days for both tourist and resident anglers in Florida. However, there are significant differences between residents and tourists anglers with respect to mode of fishing. For example, over 47 percent of resident fishing days are spent via the private boat mode compared to about 24 percent for tourist anglers. Over 65 percent of tourist angler days were spent fishing from structures (i.e., pier, jetty and bridges) and shore compared to 48 percent for residents. As expected, tourist anglers spent more of their time on charter and party boats than residents. But we again see the dominance of private boat use among residents who used the boat mode (over 90 percent) and tourists also (about 70 percent).

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[19]The reader should recognize that the estimated number of total fishing days in this report will necessarily be at variance with that reported on "user occasions" by the Florida Department of Natural Resources. In 1980, DNR (1980) reported 23,938,000 user occasions for saltwater recreational fishing, when residents and tourists are combined. The DNR "user occasion" is participation by one person in one type of activity one time. Conceptually, on the same day a recreationalist may participate in more than one activity. Therefore, that day may be counted more than one time in saltwater fishing not to mention other recreational activities. Thus, the saltwater recreational day in this study is not comparable to a "user occasion". One might expect DNR user occasions to be more numerous than the days reported in this study (i.e., one day can be counted more than one time in recreational fishing). Since the researchers could not obtain the methodology for blowing up DNR's sample, we can go no further in this analysis.

TABLE 4.2

Estimated Total Number of Resident and Tourist
Saltwater Recreational Fishermen and Days Fished
By Mode and Location in Florida 1980-81

	Residents		Tourists		Total	
Participants	2,177,217		3,047,322		5,224,539	
Days	42,150,921		16,431,160		58,582,081	
	Days	%	Days	%	Days	%
All Modes:						
Pier, Jetty, Bridge	12,038,303	28.56	7,658,022	46.60	19,696,325	33.62
Surf & Shore	8,147,773	19.33	3,049,774	18.56	11,197,547	19.11
Charter Boat	1,327,754	3.15	685,191	4.18	2,012,945	3.44
Party Boat	796,652	1.89	1,039,879	6.33	1,836,531	3.13
Private Boat	19,840,439	47.07	3,998,249	24.33	23,838,688	40.70
Total Days	42,150,921	100.00	16,431,160	100.00	58,582,081	100.00
Boat Modes:						
Charter Boat	1,327,754	6.04	685,191	11.99	2,012,945	7.27
Party Boat	796,652	3.63	1,039,879	18.18	1,836,531	6.63
Private Boat	19,840,439	90.33	3,998,294	69.83	23,838,733	86.10
Total Boat Days	21,964,845	100.00	5,723,364	100.00	27,688,209	100.00
Location of Boat Fishing Days:						
Brackish Rivers & Marshes	3,365,003	15.32	309,008	15.40	3,674,011	13.27
Bay, Sound, & along coast	9,269,507	42.20	1,977,651	34.55	11,247,158	40.62
Deep Sea						
(a) beyond 3 miles Atlantic	5,685,095	25.88	1,747,153	30.56	7,432,248	26.84
(b) beyond 10 miles Gulf	3,645,240	16.60	1,690,479	29.53	5,335,719	19.27
Total Boat Days	21,964,845	100.00	5,723,364	100.00	27,688,209	100.00
Days inside Florida Territorial Waters	32,820,586	77.87	12,994,455	79.08	45,815,041	78.21
Days ouside Florida Territorial Waters	9,330,335	22.13	3,436,705	20.92	12,767,040	21.79
Total Days	42,150,921	100.00	16,431,160	100.00	58,582,081	100.00

Source: FSU-SRFS

With respect to the location of fishing days by the boat mode, tourists spent about 60 percent of their fishing days in deep sea fishing while residents spent only 43 percent. Deep sea fishing is apparently more attractive to tourists than residents. Resident anglers are, in general, in close proximity to the coast and make frequent trips to fish, spending about 57 percent of their time fishing in rivers, bays and along the coast.

Finally, it is of interest that in terms of all fishing days (and all modes), tourists and resident spend about 78 and 79 percent, respectively, in the State of Florida's territorial waters. Tourists and residents spent only about one-fifth of their fishing effort or days in the Fishery Conservation Zone (i.e., beyond 3 miles in the Atlantic and 10 miles in the Gulf).

Direct Expenditures

Table 4.3 shows the direct expenditures of tourist and resident anglers. Collectively, these groups spent $1.87 billion dollars in Florida over the 1980-81 period. Resident anglers spent about $1.11 billion dollars on items which make up the variable cost of a fishing trip while tourists spent over $760 milllion. Residents spent more total money on fishing than tourists because of the greater number of days they fished, overcoming the higher expenditures per day for the tourists (i.e., $46.41 for tourists compared to $26.29 for residents).

There is a considerable difference in the mix of expenditures for the two groups. This is indicated by a ranking of these expenditures on the basis of total dollars spent, as shown below:

	Residents	Percent		Tourists	Percent
1.	Boat Fuel	27.2	1.	Food and Drink	23.4
2.	Food and Drink	18.3	2.	Lodging	22.0
3.	Automobile	17.4	3.	Charter and Part Boats	13.7
4.	Boat and Motor Maintenance	15.0	4.	Boat Fuel	10.0
5.	Natural Bait	7.7	5.	Boat and Motor Maintenance	7.9
6.	All Other	14.4	6.	All Other	23.0
		100.0			100.0

TABLE 4.3

Estimated Variable Expenditures For
Resident and Tourist Saltwater Recreational
Fishermen In Florida 1980-81

Variable Expenditures[1]	Resident Dollars	Tourist Dollars	Total Dollars
Food & Drink	202,324,421	178,606,709	380,931,130
Boat Fuel	301,379,085	76,733,517	378,112,602
Automobile	192,629,709	57,673,372	250,303,081
Maintenance Boats & Motors	165,653,120	59,973,734	225,626,854
Lodging	42,150,921	167,433,520	209,584,441
Charter & Party Boat	73,342,602	104,666,489	178,009,091
Natural Bait	85,144,860	37,955,980	123,100,840
Public Transportation	5,901,129	42,556,704	48,457,833
Other Expenses	15,595,841	5,750,906	21,346,747
Boat Storage Fees[2]	0	19,717,392	19,717,392
Equipment Rental	4,215,092	5,586,594	9,801,686
Public Area Access	4,636,601	4,107,790	8,744,391
Private Area Access	8,430,184	657,246	9,087,430
Boat Launch Fees	4,215,092	985,870	5,200,962
Guide Fees	2,529,055	164,312	2,693,367
Total	1,108,147,713	762,570,135	1,870,717,847

[1]See footnote on Table 2.4 for definition of variable expenditures.

[2]Boat Storage Fees are included in Other Expenses for Residents.

Source: FSU-SRFS

As indicated in Table 4.2, residents spend over 47 percent of their fishing days (i.e., all mode) using private boats as compared to over 24 percent for tourists. Therefore, it is not surprising that boat fuel and boat maintenance are two of the top four expenditure categories for residents. Since residents generally used automobiles to get to the fishing site (while a larger percentage of tourists used airlines), it is not surprising that expenses associated with automobile travel is the third leading category for residents. Also, users of private boats (as opposed to charter and party boats) require higher bait expenditures (the fifth leading expenditure category for residents). Food and drink are among the top two expenditure categories for both residents and tourists. Expenditures for lodging and for charter and party boat fees are much higher for tourists than for residents, as expected.

Finally, although residents make greater use of private boats, we find that a large percentage of tourist anglers either bring their own boats into the state or keep a boat in a Florida marina. Nearly 25 percent of tourist angler days are spent using private boats. This is reflected in the tourists' expenditures on boat fuel and boat/motor maintenance, the fourth and fifth leading categories of costs among tourist anglers. Overall, expenditure categories seem logical and differences between resident and tourist categories are as expected. The pattern of expenditures of both groups indicates that restaurants, convenience stores, motels and hotels and supplies of boat fuel and maintenance benefit most significantly from saltwater fishermen. Charter and party boat operators and bait dealers are also important beneficiaries of the spending generated by Florida's saltwater fisheries.

Anglers, Expenditures and Days by Region

Table 4.4 presents a comprehensive summary of anglers, expenditures and days divided among the five major regions (as defined in Figure 2.1, Chapter 2). Let us consider anglers first. Total number of anglers (residents plus tourists) are greatest in Regions 5 (Southeast Atlantic) and 3 (Northeast Atlantic). In fact, nearly 59 percent of all anglers fish along the Atlantic Coast of Florida. In terms of tourist/resident composition, tourists overwhelmingly dominate Region 1 (Northwest Gulf), comprising over 70 percent

TABLE 4.4

Estimated Total Number of Resident and Tourist Saltwater Recreational Anglers, Expenditures, and Days in Florida By Aggregate State Planning Region 1980-81

	Region 1		Region 2		Region 3		Region 4		Region 5		All Regions	
Number of Anglers:		%		%		%		%		%		%
Residents	202,481	29.60	463,747	54.51	487,697	32.33	250,380	40.05	772,912	49.67	2,177,217	41.67
Tourists	481,477	70.40	387,010	45.49	1,020,853	67.67	374,820	59.95	783,162	50.33	3,047,322	58.33
Total	683,958	100.00	850,757	100.00	1,508,550	100.00	625,200	100.00	1,556,074	100.00	5,224,539	100.00
Annual Total Variable Expenditures:	$	%	$	%	$	%	$	%	$	%	$	%
Residents	67,513,295	28.56	218,093,895	76.04	250,089,032	69.08	118,148,348	51.97	454,303,143	59.92	1,108,147,713	59.24
Tourists	168,871,007	71.44	68,713,143	23.96	111,936,988	30.90	109,176,455	48.03	303,872,542	40.08	762,570,135	40.76
Total	236,384,302	100.00	286,807,038	100.00	362,026,020	100.00	227,324,803	100.00	758,175,685	100.00	1,870,717,848	100.00
Total Days:		%		%		%		%		%		%
Residents	3,545,344	47.71	10,360,137	85.14	9,404,285	77.04	6,000,146	60.11	12,841,009	76.46	42,150,921	71.95
Tourists	3,885,438	52.29	1,808,368	14.86	2,802,568	22.96	3,982,172	39.89	3,952,614	23.54	16,431,160	28.05
Total	7,430,782	100.00	12,168,505	100.00	12,068,853	100.00	9,982,318	100.00	16,793,623	100.00	58,582,081	100.00
Expenditures Per Day:												
Residents	$19.04		$21.05		$26.59		$19.69		$35.38		$26.29	
Tourists	$43.46		$38.00		$39.94		$27.42		$76.88		$46.41	
Total[1]	$31.81		$23.57		$29.65		$22.77		$45.15		$31.93	
Annual Variable Expenditures Per Angler:												
Residents	$333.43		$470.29		$512.79		$471.88		$587.78		$508.97	
Tourists	$350.74		$177.55		$109.65		$291.27		$388.00		$250.24	
Total[2]	$345.61		$337.12		$239.98		$363.60		$487.24		$358.06	
Days Per Angler:												
Residents	17.5		22.3		19.3		24.0		16.6		19.36	
Tourists	8.1		4.7		2.7		10.6		5.1		5.39	
Total[3]	10.9		14.3		8.1		15.9		10.8		11.20	

[1]Weighted Average
[2]Weighted Average
[3]Weighted Average

Source: FSU-SRFS

of the total. In only one region, do residents outnumber tourists. This is Region 2 (West Gulf).

With respect to total annual expenditures (residents and tourists), over three quarters of a billion dollars are spent in Region 5 (Southeast Atlantic). This is the leading region by far with respect to both tourist and resident expenditures. Put differently, over 40 percent of all saltwater angler expenditures in the state are concentrated in the Southeast Atlantic Region. Region 3 (Northeast Atlantic) is the second leading region in terms of total expenditures with over one-third of a billion dollars spent in the 12 month period 1980-81. Residents spent more than tourists in all regions except Region 1 (Northwest Gulf) where only 28.56 percent of the expenditures were derived from residents. As discussed in Chapter 3 on the regional multiplier, we would expect that the economy of Region 1 would show a relatively greater impact from tourist expenditures.

With respect to total days, Region 5 (Southeast Atlantic) again was the leading area with 16,793,623 days fished or 28.7 percent of all saltwater fishing days. Residents contributed over 76 percent of the total days in the Southeast Atlantic. Tourist days predominated in only one region, Region 1 (Northwest Gulf). This is consistent with other findings regarding the Northwest Gulf Region. These statistics indicate that Florida is not homogeneous in terms of patterns of fishing. Regionalization (although limited by sample sizes) reveals considerable variations.

Tourist expenditures per day were uniformly higher than resident expenditures per day among all regions. For the state as a whole, expenditures per day for both tourists and residents were $31.93. Expenditures per day are about twice as high for tourists as compared to residents in Region 1 (Northwest Gulf); Region 2 (West Gulf); and Region 5 (Southeast Atlantic).

Despite uniformly lower expenditures per day by residents, annual expenditures per angler tourist and resident showed a different pattern due to the greater number of total fishing days per year for residents. For the entire state, expenditures per angler resident were more than double that of tourists ($508.97 vs. $250.24). Except in Region 1, resident expenditures per angler were significantly higher than those of tourists. The difference in Region 1 is explained by the fact that Northwest Gulf tourists spent a high number of days per year at a high expenditure per day as compared to other

regions. Also, the residents of Region 1 recorded a relatively low number of days per angler as compared to other regions. In Region 1 the ratio of resident to tourist days per angler is about 2 to 1 while in Region 3 (Northeast Atlantic) this ratio is over 7 to 1. Despite differences in this ratio among regions, residents universally recorded much higher numbers of annual fishing days per angler as compared to tourists.

Direct and Indirect Employment, Wages and State Taxes

Table 4.5 provides a summary of the estimated employment, wages and taxes generated by the expenditures of tourists and residents on saltwater recreational fishing. Direct employment is generated by tourist and resident expenditures at the retail level. Although residents spend more dollars on saltwater recreational fisheries than tourists (45 percent more), we estimate that tourists generate somewhat more employment. Tourist expenditures generate 23,740 jobs as compared to 20,368 jobs for resident expenditures for a total of 44,108 direct jobs. Tourist expenditures are focused on labor intensive activities such as lodging and party and charter boat operations. Resident anglers spend a large part (45 percent) of their dollars on boat fuel and auto related costs (mostly gasoline). The sale of fuel or gasoline generates fewer jobs in Florida since much of the money goes to out-of-state refineries. As discussed in Chapter 3, tourist dollars have a multiplier impact on the Florida economy since this is part of the economic base (or the export sector). A great deal of indirect employment is generated by the tourist sector. We estimate that these indirect dollars create 79,770 jobs. We cautioned in Chapter 3 that this estimate is subject to some variability depending on the regional multiplier and how typical this tourist sector is in terms of its impact on all the Florida economy when compared to other export industries. We estimate that by combining residents and tourists 123,878 jobs are created by the existence of Florida's saltwater recreational fishery resources.

The wages generated by tourist anglers are almost $173 million dollars while more than $169 million dollars are generated by resident anglers, for a total of $343 million dollars in direct wages. When indirect wages are considered, almost $1 billion in wages must be added. Overall, $1.391 billion in wages are generated by tourist and resident anglers.

TABLE 4.5

Direct and Indirect Employment, Wages & Salaries, and State Taxes Generated By Resident and Tourist Saltwater Recreational Fishermen In Florida 1980-81

	Residents	Tourists	Total
Sales:			
Direct	$1,108,147,773	$762,570,135	$1,870,717,848
Indirect	--	$3,187,543,065	$3,187,543,065
Total	$1,108,147,713	$3,950,113,200	$5,058,260,913
Employment:			
Direct	20,368	23,740	44,108
Indirect	--	79,770	79,770
Total	20,368	103,510	123,878
Wages & Salaries:			
Direct	$172,903,920	$ 169,484,293	$ 342,388,213
Indirect	--	$1,048,701,647	$1,048,701,647
Total	$172,903,920	$1,218,185,940	$1,391,089,860
State Taxes:			
Direct	$ 43,301,817	$ 24,565,714	$ 67,867,531
Indirect	--	$ 79,592,950	$ 79,592,950
Total	$ 43,301,817	$ 104,158,664	$ 147,460,481

Source: FSU-SRFS

All of these expenditures on saltwater recreational fishing create state taxes. Considering only sales, beverage, gasoline and corporate profit taxes (which vary directly with retail sales), we estimate that tourist and resident anglers generated over $147 million in state taxes over the 12-month survey period.

User Value by Regions

Table 4.6 presents a summary of the willingness to pay or user value question which was described in Chapters 2 and 3. As shown in Table 4.6 (combining angler days per year and average willingness to pay per day) tourists and residents combined would be willing to pay more than $2.088 billion annually for the right to use the saltwater fisheries in Florida. User value varies considerably by region. For residents, user value was highest in Region 5 (Southeast Atlantic) and lowest in Region 1 (Northwest Gulf). For tourists, user value was highest in Region 4 (Southwest Gulf) and lowest in Region 2 (Northeast Atlantic). Remember, user value is an annual flow of value from the fishery resources. The saltwater fishery resource is an important natural resource asset to the State of Florida, and this asset value is an addition to the fishery's effects in stimulating expenditures. What is the asset value of the state's recreational saltwater fisheries? And what can be done with knowledge of the value of this asset?

The value of an asset is defined as follows:

$$(1) \quad V = \frac{R_1}{(1+n)^{t_0}} + \frac{R_2}{(1+n)^{t_1}} + \cdots \frac{R_k}{(1+n)^{t_k}}$$

where,

V = value of the asset
R = returns to the asset
n = discount rate
t = time
k = number of periods
t = 0, 1....k

If the returns, R, flow for a large number of periods ($k \to \infty$), then equation (1) can be simplied where the returns are constant into the future ($R_1=R_2=\ldots R_k$).

$$(2) \quad V = \frac{R}{n}$$

TABLE 4.6

Estimated Total Number of Resident and Tourist Saltwater Recreation Anglers, Expenditures, and Days in Florida By Aggregate State Planning Region 1980-81

	Region 1		Region 2		Region 3		Region 4		Region 5		All Regions	
Number of Anglers:		%		%		%		%		%		%
Residents	202,481	29.60	463,747	54.51	487,697	32.33	250,380	40.05	772,912	49.67	2,177,217	41.67
Tourists	481,477	70.40	387,010	45.49	1,020,853	67.67	374,820	59.95	783,162	50.33	3,047,322	58.33
TOTAL	683,958	100.00	850,757	100.00	1,508,550	100.00	625,200	100.00	1,556,074	100.00	5,224,539	100.00
Annual Variable Expenditures:	$	%	$	%	$	%	$	%	$	%	$	%
Residents	81,223,798	43.87	293,505,916	89.53	240,111,786	80.66	258,557,031	77.26	744,605,416	78.94	1,618,003,947	77.47
Tourists	103,912,644	56.13	34,314,658	10.47	57,557,426	19.34	76,089,840	22.74	198,682,684	21.06	470,557,252	22.53
TOTAL	185,136,442	100.00	327,820,574	100.00	297,669,212	100.00	334,646,871	100.00	943,288,100	100.00	2,885,561,199	100.00
Total Days:		%		%		%		%		%		%
Residents	3,545,344	47.71	10,360,137	85.14	9,404,285		6,000,146	60.11	12,841,009	76.46	42,150,921	71.95
Tourists	3,885,438	52.29	1,808,368	14.86	2,802,568		3,982,172	39.89	3,952,614	23.54	16,431,160	28.05
TOTAL	7,430,782	100.00	12,168,505	100.00	12,068,853	100.00	9,982,318	100.00	16,793,623	100.00	58,582,081	100.00
Willingness to Pay Per Day:												
Residents	$22.91		$28.33		$25.53		$43.09		$57.99		$38.38	
Tourists	$26.74		$18.97		$20.54		$19.11		$50.27		$28.64	
TOTAL[1]	$24.91		$26.94		$24.39		$33.52		$56.17		$35.65	
Annual Willingness To Pay:												
Residents	$401.14		$632.90		$492.34		$1,032.66		$963.38		$743.15	
Tourists	$215.82		$ 88.67		$ 56.38		$203.00		$253.69		$154.41	
TOTAL[2]	$270.68		$385.33		$197.32		$535.26		$606.20		$399.76	
Willing to Pay As Much As (Below) For a Saltwater Fishing License Funds to be used to Preserve Fisheries (Tourists 1st & 2nd Quarters) Funds to be used for Fishery Management (Tourist 3rd & 4th Quarters & Resident Survey)	Percent		Percent		Percent		Percent		Percent		Percent	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Residents ($6.75)	55.9	44.1	57.3	42.7	53.6	46.4	58.8	41.2	58.1	41.9	56.8	43.2
Tourists ($10.50)	56.4	43.6	56.4	52.1	47.6	52.4	52.1	47.9	58.4	41.6	52.4	47.6

[1] Weighted Average
[2] Weighted Average

Source: FSU-SRFS

The U. S. Water Resources Council currently recommends under its Principles and Standards for valuing water resources such as fisheries a discount rate of 7.625 percent. Using equation (2) and the estimated user value or R for both residents and tourists we have the following:

$$(3) \quad V = \frac{\$2.088561199 \text{ billion}}{.07625} = \$27.391 \text{ billion}$$

The analysis indicated that fishery resources used for saltwater recreational fishing in Florida have an asset value of $27.391 billion. How is such a number useful? In a potential trade-off situation, for example, where wetlands might be destroyed which support fisheries, one could point to the role of wetlands in supporting the value of the recreational fisheries. This amount would then be added to the wetland contribution to commercial fisheries. Now we would have an estimate of the value of both extramarket economic activity and market activity. Other applications of asset value uses suggest themselves naturally from this example.

A statistic that is widely used is the user value per day. Once this is known, we can estimate user value when the number of days varies. Table 4.6 gives the per day user values. For residents, user value per day is amazingly uniform for Regions 1 (Northwest Gulf); 2 (West Gulf) and 3 (Northeast Atlantic). This uniformity of $22.91 to $28.33 per day is found in "Northern" Florida for residents. The user value per day is considerably higher in Regions 4 (Southwest Gulf) and 5 (Southeast Atlantic). The latter region had a daily user value of $57.99. Generally, user values per day were lower in each region for the average tourist angler, except Region 1 (Northwest Gulf). On the state level, user day values were $38.38 and $28.64 for residents and tourists respectively. Table 4.6 also shows annual user value per angler.

Finally, we asked respondents their willingness to pay for a saltwater fishing license. Generally, residents were more willing to pay for such a license than tourists (see Chapter 3 for details on phrasing questions on licensing).

Kinds of Fish Caught

Table 4.7 presents a list of recreational fish in Florida which are most frequently caught by tourists and residents. Four fish are mentioned on both the tourist and resident list:

TABLE 4.7

A Comparison of the Top 6 Species Caught by Resident and Tourist Recreational Saltwater Anglers in Florida -- FSUSRFS and NMFS

FSU-SRFS				NMFS	
Resident		Tourists			
Rank[1]	Species	Rank[2]	Species	Rank[3]	Species
1.	Snappers	1.	Catfish	1.	Catfish
2.	Seatrout	2.	Seatrout	2.	Seatrout
3.	Grouper	3.	Snapper	3.	Croaker
4.	King Mackerel	4.	Bluefish	4.	Pinfish
5.	Dolphinfish	5.	Kingfish (Whiting)	5.	Spot
6.	Catfish	6.	Grouper	6.	Grunt

1 Rank based on the number of people reporting the species as one of the Top 3 species they usually caught.

2 Rank based on total number of people reporting.

3 Rank based on total number of fish caught. Includes residents and tourist catch.

Source: FSU - SRFS (1982) and NMFS (1980)

1. Snapper
2. Seatrout
3. Grouper
4. Catfish

Residents list king mackerel and dolphinfish among their top six while tourists list bluefish and kingfish (whiting). We checked this list with data published by the National Marine Fisheries Service for 1979. The NMFS used number of fish caught as an indicator rather than number of people reporting. Only two species - catfish and seatrout - were in agreement with our two lists. The NMFS list includes croaker and pinfish which are usually not sought for their "good eating". Of course, many fish may be caught while fishing (e.g., catfish), but not really desired.

Disposition of Fish

Table 4.8 shows the comparative disposition of the six leading fish among residents and tourists. For residents, over 90 percent of the top five fish are eaten. The lone exception is catfish. Tourists are less likely to eat the fish they catch. They are more likely to give the fish away or release them alive. For residents, 94 percent of snapper, seatrout and grouper are eaten, only 3.1 percent are given away, and a little over one percent are released alive. For tourists, 84 percent of the same three species are eaten while over 11 percent are released alive. As might be expected, many tourists do not take their fish home and they may lack the necessary facilities for preparing fish for eating.

Perception of the Status of the Fishery Stocks

The final comparison between residents and tourists involves the perception of the fishery stocks. Let us consider the four species on both lists, as shown in Table 4.9. Forty-nine percent of the residents felt that snapper stocks were declining while only 24.8 percent of the tourists had this perception. This is quite surprising given the fact that the average tourist has been fishing for over eight years in Florida. About 50 percent of the residents felt seatrout and grouper were declining stocks, while only about a quarter of the tourists held this opinion. Generally, tourists were less pessimistic about the Florida fishery stocks than residents.

TABLE 4.8

Top 6 Species Caught By Resident and Tourist Saltwater Anglers And Disposition Of The Catch

Residents

	Species	Percent Distribution						
		Eat	Give Away	Trophy	Live Release	Sell	Discard	Bait
1.	Snapper	94.33	3.00	0	1.67	1.00	0	0
2.	Seatrout	93.24	2.85	0	2.85	1.06	0	0
3.	Grouper	93.72	3.36	0	1.25	1.25	.42	0
4.	King Mackerel	91.89	4.33	.54	1.08	2.16	0	0
5.	Dolphinfish	93.13	3.05	.77	3.05	0	0	0
6.	Catfish	26.31	7.02	.88	53.51	0	10.53	1.75

Tourists

	Species	Percent Distribution						
		Eat	Give Away	Trophy	Live Release	Sell	Discard	Bait
1.	Catfish	8.1	4.5	0	71.5	.5	14.5	.9
2.	Seatrout	85.0	8.1	0	4.4	0	1.0	1.5
3.	Snapper	81.2	12.3	0	5.0	1.0	.5	0
4.	Bluefish	68.8	28.1	0	2.6	0	.5	0
5.	Kingfish (Whiting)	78.3	20.0	.6	1.1	0	0	0
6.	Grouper	79.9	13.4	0	6.0	.7	0	0

Source: FSU-SRFS

TABLE 4.9

Resident and Tourists Anglers Perceptions of the Status of Stocks of the Top 6 Species in Florida 1980-81

Residents

Species	Percent Distribution			
	Declining	Increasing	Stable	Don't Know
1. Snapper	49.00	7.00	34.33	9.67
2. Seatrout	52.31	6.05	33.46	8.18
3. Grouper	50.63	4.18	32.64	12.55
4. King Mackerel	40.00	9.73	38.92	11.35
5. Dolphinfish	38.17	4.58	45.04	12.21
6. Catfish	21.05	28.07	41.23	9.65

Tourists

Species	Percent Distribution			
	Declining	Increasing	Stable	Don't Know
1. Catfish	4.1	30.3	40.3	25.3
2. Seatrout	28.21	5.8	38.3	27.7
3. Snapper	24.8	6.4	35.1	33.7
4. Bluefish	17.7	3.6	53.6	25.1
5. Kingfish (Whiting)	22.9	3.4	58.3	15.4
6. Grouper	22.2	6.0	36.9	34.9

Source: FSU-SRFS

Chapter 5
Policy Implications of the Study

Introduction

It is the primary purpose of this study to establish a data base on recreational fishing in the state of Florida to aid in fishery management. We believe that Chapters 1-4 do provide a good summary of the social and economic dimensions of the impact of saltwater anglers on the state. Modes of fishing have been identified and quantified with respect to use (i.e., fishing days). This may be helpful to the state in planning new facilities or the private market in expanding existing facilities. Also, we have identified and quantified user value which can be useful in evaluating the economic significance of extra or nonmarket goods. It is not the purpose in this chapter to promulgate policy, but to point out areas of critical state concern regarding recreational saltwater fishing. The most important concern is the resource itself.

The Status of the Fishery Resource

There is much controversy surrounding the condition of various fishery stocks in Florida. Many of the fishery stocks are located both in state territorial waters and the Fishery Conservation Zone (FCZ). Therefore, two jurisdictions are involved. The data indicate that the management role in terms of a fishing day of the State of Florida is preeminent for the recreational fishing sector.

Before looking at individual stocks, let us first consider some aggregate statistics. Table 5.1 presents some fragmentary data on recreational catch in the Southeast (North Carolina to Texas) from various surveys. The reliability of these data is open to some question, especially the early years.[20] Direct catch data were available by state for only 1979, as will be discussed below.

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[20]In a paper by North (1976), there is much controversy surrounding the temporal data published in the 1970 Saltwater Angling Survey (1973). Researchers will tend to use these data especially since the National Marine Fisheries Services compares the trend in number of anglers, number of fish caught and weight of fish caught by region for 1960, 1965 and 1970 in a published table. No qualification to this table (i.e., Table 1, p. 9 SWAS, 1973) is given. We shall still use these data to look at broad trends in spite of government officials that have repudiated their own work.

TABLE 5.1

Historical Recreational Catch
in the Southeast and Gulf States Compared
to Fishing Days in Florida
(1955-1980)

	Catch [1] (000 lbs)	Index	Fishing Days (000)	Fishing Days Index
1955	N/A	N/A	19,480[2]	1.00
1960	781,222	1.00	N/A	N/A
1965	767,408	.98	N/A	N/A
1970	889,641	1.14	N/A	N/A
1975	352,458	.45	N/A	N/A
1979	320,381	.41	58,582[3]	3.01

[1] 1960-70: 1970 Saltwater Angling Survey (U.S. Department of Commerce, 1973); 1975: private communications with National Marine Fisheries Service; 1979. Computations from Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts 1979 (U. S. Department of Commerce, 1980).

[2] A Survey of the Number of Anglers and of their Fishing Effort and Expenditures in the Coastal Recreational Fishery of Florida (Board of Conservation, 1958).

[3] FSU-SRFS.

Starting in 1960, recreational catch has appeared to decline by almost 3 percent a year up through 1979 in the Southeast and Gulf areas. Fishing effort or days increased by 12 percent annually over the 1955-1979 period in Florida. Given the finiteness of the fishery resource or the maximum sustainable yield (MSY) it would seem that recreational fishing effort is growing while catches have not changed appreciably (or even declined). Although not all species are at maximum sustainable yield or overfished, it seems clear that the "success rate" or catch per day for many anglers has probably been falling.

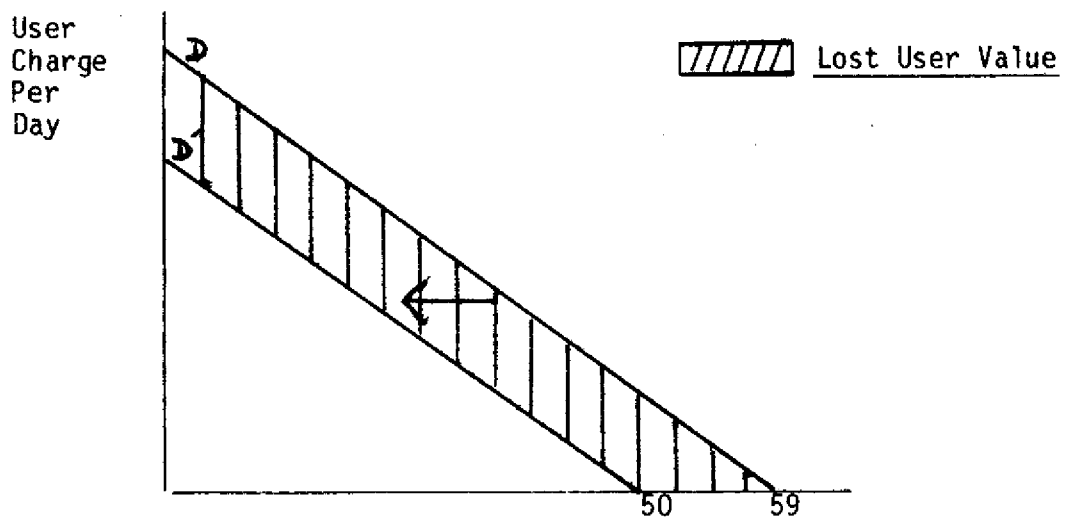
The Atlantic and Gulf of Mexico Regional Fishery Management Councils report that the following recreational/commercial fisheries are harvested at or near MSY[21]:

1. King Mackerel (Atlantic and Gulf)
2. Spanish Mackerel (Atlantic and Gulf)
3. Cobia (Gulf)
4. Red Snapper (Gulf; near shore)
5. Grouper (Gulf; near shore)

Further increases in fishing effort may not only decrease total catches, but further depress a falling "success rate" for anglers. Consider Figure 5.1.

FIGURE 5.1

Potential Economic Impact of a Decline in the Success Rate for Saltwater Anglers



[21]Personal communication with Dr. Vito Blomo, Gulf of Mexico Fishery Management Council

Assume that the current success rate declines by 20 percent. Before the decline, 59 million recreational days were spent by tourists and residents.[22] Assume further that tourists and residents cut back their recreational fishing days due to the poor fishing in the same proportion. Using the user value per day from Table 4.6, we have the following loss:

Lost User Value = 9 million days x $35.65 = $321 million.

There would be further losses to the economy in terms of annual variable expenditures. A loss of nine million fishing days would decrease resident and tourist expenditures on industries involved in serving saltwater recreational fishermen. The following possible losses would be involved:

Resident Expenditure Decline = 9 million days x $26.29 per day
= $237 million

Tourist Expenditure Decline = 9 million days x $46.41 per day
= $418 million

A decline in these sectors might have differential effects on the Florida economy. Residents may transfer their $237 million dollars to other recreation in Florida. The net impact would be a short run dislocation of capital and labor that service fishermen. In the long run, the net impact might be minimal. However, residents may leave the state for saltwater fishing elsewhere. In this case, the negative economic impact would be severe since lost income (i.e., expenditures) from the state would result in lost jobs. The loss of $418 million in tourist expenditures could be even more catastrophic if they were completely withdrawn from the state. That is, a negative multiplier impact would be present. A decline in tourist dollars ($418 million x the multiplier of 5.18) means a $2.16 billion decline in state income. Needless to say, many jobs would be lost in the state.

This discussion has been largely theoretical in that we assumed that a drop in the "success rate" would deter residents and tourists from

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[22] In reality, an interaction may take place. That is, the surge in fishing pressure will reduce catch per unit of effort or "success". If this is a deterrent to fishermen, a reduction in fishing effort will take place. In the long run, catch per unit of effort would then rise. Whether losses would be temporary or permanent would depend on future perceptions.

participating in saltwater recreational fishing by 9 million days. If this were a known fact, then the values (e.g., expenditures per day) generated in this study could be used to estimate the economic impact. Unfortunately, little is known about the relationship between the success rate and the recreational demand curve. Even though catching fish is usually not listed as the number one reason for engaging in the recreational experience, it is obvious that the expected probability of catching a fish cannot fall indefinitely without, at some point, impacting the angler's decision to fish. Steven (1966) has investigated the empirical importance of angler success per unit of effort as a quality determinant of recreational values (i.e., user value). He found the following:

1. A ten percent increase in salmon angling success would induce a long run increase in angling effort of approximately ten percent;

2. Bottom fish (sea perch, etc.) angling effort seems to be considerably less responsive to changes in success.

In Chapter 4, we indicated that many tourists and anglers perceive the fishery stocks to be declining. For example, 49 percent of the resident saltwater fishermen felt that the snapper stocks were on the decline, and over 50 percent felt seatrout and grouper were declining. The tourist were less aware of a decline than residents. For tourists, success rates may be relatively high in Florida compared to elsewhere; therefore, they may respond more positively or optimistically. For the most part, residents have been fishing the resource for a greater number of years and visit it more frequently each year. For these reasons, one might want to weight resident opinions more heavily.

What does the future hold with respect to increased fishing effort? We made some rough projections assuming two things: (1) the participation rates for tourists and residents do not change and (2) the days fished per year remain constant for residents and tourists. The following projections follow from growth in population (residents) and in tourists visiting Florida (based on 1970-80 growth rates):

	1980-81 (millions)	1990 (millions)	Percent Change
Tourist Fishing Days	16.431	28.984	+ 76
Resident Fishing Days	42.150	67.469	+ 60
Total Days	58.581	96.453	+ 65

Over the 1970-80 period, the number of tourists grew by 4.36 percent per year according to the Florida Division of Tourism. We used this rate to project the number of tourists and corresponding angler days to 1990. For the residents, we used population projections to the year 1990 furnished by the Bureau of Business and Economic Research (University of Florida). As one can see, a sizeable increase in fishing effort is expected, amounting overall to a 65 percent increase over the next 10 years. It is quite obvious that for desired fish species, catch rates or success rates will probably fall. The inflexibility of the supply of traditional sport fish will be a major factor in the future of the saltwater recreational fishing sector. For this reason there may be greater emphasis on under-utilized species to take up the slack. This is certainly a critical policy area.

The following policy options are presently under debate:

1. Fish hatcheries to expand the fishery stock where economically feasible
2. Bag limits per angler where economically feasible
3. Licensing of all saltwater fishermen, both residents and tourists

A discussion of the implications of the above measures in great detail is beyond the scope of this report. One factor is fundamental. Any regulations or measures should be subject to a benefit-cost analysis to see if the action is economically beneficial. This is in keeping with the Florida Economic Impact Disclosure Act. Finally, we hope that this study will serve as a valuable input in addressing the policy issues discussed above.

Conflicts with Commercial Fisheries

One of the fundamental problems in managing Florida's fishery resources is a long term conflict between recreational and commercial fishermen over the use of various species. Recreational fishermen feel that commercial fishermen are a threat to the resource, especially where technologically advanced gear is introduced. In Chapter 2, we found that resident saltwater anglers who perceived some fishery resource to be declining felt that one of the main reasons was "too many commercial fishermen". Saltwater tourist anglers (Chapter 3) gave the same reason as number one. With the large number of recreational fishermen documented in this study, we would not be surprised to find that commercial fishermen feel threaten by recreational fishermen.

During 1980-81, there were nearly five and quarter million recreational fishermen in Florida of which 40 percent are residents. In 1975, there were only 11,139 individuals employed in the harvesting of commercial fish in Florida.

The fundamental problem of the fisheries is the common property nature of the resource. This is why overfishing occurs and also why the commercial-recreational fishery conflict exists. There is no market mechanism to allocate fishery resources among alternative demanders or users. Neither sports nor commercial fishermen are at fault. If a private individual owned, the red snapper resource, for example, he would rent it to commercial and recreational fishermen based upon their relative demand. The proportions used by each group would be chosen to maximize the resource's highest economic use. We do not want to imply that the highest economic use of the fishery resources in Florida is always recreational. This decision requires careful study on a species-by-species basis and most probably would require locational analysis. Obviously, our data would be very helpful in dealing with this policy issue. The Regional Fishery Management Councils have allocated the various fishery resources to recreational and commercial uses. The allocation criteria are usually based on historical shares or the political power of the groups in question. This may be at great variance with basing allocation on the "highest economic use". Some data from Florida may be enlightening. Table 5.2 shows the top ten species measured by weight for both commercial and recreational users in the most recent years for which we could obtain reliable data.[23]

For the sports fishery, data were used from the NMFS (1980). No direct information is given on the weight of the catch by species for the Atlantic and Gulf sides of Florida. However, the number of fish caught and released is published by the NMFS for these areas by species. For each species, we calculated the average weight per fish by dividing the published weight by the number of fish caught for the South Atlantic and Gulf regions. Then, the average weight per fish was multiplied by the number of fish for each species reported for Florida (i.e., Atlantic and Gulf treated separately). This gave us a rough estimate of the weight of the sport catch. The researcher has no

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[23]We are comparing the estimated 1979 recreational catch with the published 1978 commercial catch. 1979 commercial catch statistics were not available at the time of this writing, but this should not change the analysis much.

TABLE 5.2

A Comparison of the Top 10 Species
For the Commercial and Sports Fishery
Gulf and Atlantic Coast of Florida

Florida Atlantic

Sports Fishery (1979)		Commercial Fishery (1978)	
Species	Pounds	Species	Pounds
1. Dolphinfish	14,134,173	Menhaden	13,034,474
2. Catfish	5,485,580	Spanish Mackerel	5,510,538
3. *Bluefish	5,117,897	King Mackerel	3,401,502
4. *Snapper	3,782,417	Mullet	2,353,292
5. *King Mackerel	3,759,782	Bluefish	1,335,623
6. *Mullet	2,931,908	Spot	993,860
7. Grunt	2,833,118	Grouper	961,333
8. *Grouper	2,719,694	Snapper	942,283
9. Drum	2,597,933	King Whiting	680,373
10. *Spanish Mackerel	2,004,821	Swordfish	536,293

Florida Gulf

Sports Fishery (1979)		Commercial Fishery (1978)	
Species	Pounds	Species	Pounds
1. *Jack	16,823,889	Mullet	24,977,291
2. *Grouper	10,617,312	Snapper	4,904,354
3. *Seatrout	5,583,842	Grouper	4,851,447
4. Catfish	4,791,513	Sardine	2,352,281
5. *Snapper	4,181,480	Ladyfish	2,282,137
6. Shark	3,125,962	Seatrout	2,232,428
7. Grunt	2,930,160	Jacks	1,774,108
8. *Mullet	2,910,328	King Mackerel	1,745,191
9. *Bluefish	1,599,951	Spanish Mackerel	1,600,292
10. *King Mackerel	1,570,526	Bluefish	850,121

* Species that are starred are species which are among the top ten in both commercial and recreational fisheries.

Source: Sport Fishery: National Marine Fisheries Service, U.S.D.C., Marine Recreational Fishery Statistics Survey, Atlantic and Gulf 1980.

Commercial Fishery: National Marine Fisheries Service, U.S.D.C., Current Fisheries Statistics No. 7819, Florida Landings Annual Summary 1978.

other alternative in making comparisons since the NMFS does not report the weight of the catch by state. The reader should be aware that the NMFS (1980) estimates of the recreational catch for 1979 are apparently in conflict with their earlier study NMFS (1973) for 1970. King and Spanish mackerel are good illustrations. The following data are taken from Exhibit 8-9 Mackerel Fishery Management Plan (April, 1982):

	1970 (1000's lbs.)	1979 (1000's lbs.)
South Atlantic		
King Mackerel	34,942	4,033
Spanish Mackerel	14,623	2,098
Gulf of Mexico		
King Mackerel	27,459	5,931
Spanish Mackerel	7,808	2,257

The Mackerel FMP indicates the 1970 survey is generally considered an over estimate of the recreational catch due to alledged recall problems. See Hiett and Worral (1977). We discussed this problem in Chapter 2. Through a number of questionable assumptions (e.g., catch in Mississippi and Louisiana east of the Mississippi River was equal to the Alabama catch; Bay County, Florida catch is 25 percent of West Florida excluding the Keys, etc.) the Mackerel FMP adjusts the NMFS (1973) data (Atlantic and Gulf) downward arriving at a recreational catch of 23.7 million pounds of King Mackerel in 1975. This is extrapolated to 28 million pounds in 1980 based upon the erroneous assumption that catch will increase "...at the same rate as the estimated 10.3 percent annual increase in recreational fishing pressure" (p. 8-32). Since catch per unit effort falls with increasing effort, catch could not increase in the same proportion as effort. The Mackerel FMP states that "the 1979 survey was designed to solve most of the problems associated with previous studies.... The resulting catch estimates are believed to be more accurate than earlier estimates" (p. 8-12). This is the primary reason we used the NMFS (1980) recreational catch for 1979 shown in Table 5.2 For Florida (Atlantic and Gulf), we estimate a King Mackerel recreational catch of 5.33 million pounds using NMFS (1980). Based upon the number of fish, Florida accounts for 50.8 percent of the total recreational catch of King Mackerel in the Atlantic and Gulf. Using NMFS (1980), we estimate about 10 million pounds of King Mackerel caught in the Atlantic and Gulf compared to 23.7 to 28 million pounds in the Mackerel FMP in 1980. The fundamental difference in

these estimates is the great decline in catch of King Mackerel shown by the two surveys despite efforts to scale down the 1970 recreational catch.

In the case of Spanish Mackerel, the same problems exist. The Mackerel FMP (April, 1982) reports a catch of 8.4-15.1 or an average of 12 million pounds for the Atlantic and Gulf in 1981. The same procedures of reducing the NMFS (1973) published catch were employed even though the assumptions used were very arbitrary (i.e., see above). For Florida (Atlantic and Gulf), we estimated a catch of 3.068 million pounds using NMFS (1980) which measured in terms of the number of fish was 64.2 percent of the South Atlantic and Gulf regions. For Spanish Mackerel, the total catch for both regions would be 4.78 million pounds. Although the recreational catch for King and Spanish Mackerel used in this report differs from the Mackerel FMP, we would defend our choice which is based upon the most recent data and improved survey design (i.e., no recall controversy). Finally, we have no reason to believe that the controversy surrounding King and Spanish mackerels applies in any way to other recreational catch published in NMFS (1980).

On the Atlantic side of Florida, six out of the ten recreational species are also in the top ten commercial species as shown in Table 5.2 Bluefish, snapper, king mackerel, mullet, grouper and Spanish mackerel were of great importance to both recreational and commercial users as measured by the weight of the catch. Obviously, this would be the starting point for any sport-commercial trade-off analysis. On the Gulf side of Florida, seven out of the top ten recreational species are also in the top ten commercial species. Jack, grouper, seatrout, snapper, mullet, bluefish and king mackerel are common to both commercial and recreational users.

Table 5.3 is even more meaningful since it shows the degree to which a specific species is used for sport as opposed to commercial fishing on the Atlantic side of Florida. Over 92 percent of the total catch is caught by saltwater anglers for dolphinfish, catfish, grunt and drum. The major conflicts are among those species used to a substantial extent by both groups which include the following: snapper, bluefish, grouper, mullet, and king mackerel. Menhaden and swordfish were reported as exclusively commercial although the latter is certainly fished by anglers. The statistics themselves are of great interest; however, the reader should be cautioned that they deserve further study. For example, Spanish mackerel is predominantly a commercial fish (i.e., approximately 26 percent is taken by saltwater anglers). Is this becasue Spanish mackerel is less preferred than snapper by

TABLE 5.3

A Comparison of the Commercial and Sports Fishery Catch for the Atlantic Coast of Florida

Species or Group	Sport Catch (Pounds)	Commercial Catch (Pounds)	Total Catch (Pounds)	Sport Catch As Percent of Total
A. Primarily Sport:				
Dolphinfish	14,134,173	56,503	14,190,676	99.60
Catfish	5,485,580	37,587	5,523,167	99.32
Grunt	2,833,118	23,199	2,856,317	99.19
Drum	2,597,933	195,987	2,793,920	92.98
Snapper	3,782,417	942,283	4,724,700	80.05
Bluefish	5,117,897	1,335,623	6,453,520	79.30
Grouper	2,719,694	961,333	3,681,027	73.88
Mullet	2,931,908	2,353,292	5,285,200	55.47
King Mackerel	3,759,782	3,401,502	7,161,284	52.50
B. Primarily Commercial:				
King Whiting	315,641	680,373	996,014	31.69
Spanish Mackerel	2,004,821	5,510,538	7,515,357	26.67
Spot	111,206	993,860	1,105,066	10.06
Menhaden	0	13,034,474	0	0
Swordfish	0	536,293	0	0

Source: Sport Fishery: National Marine Fisheries Service, U.S.D.C., Marine Recreational Fishery Statistics Survey, Atlantic and Gulf 1980.

Commercial Fishery: National Marine Fisheries Service, U.S.D.C., Current Fisheries Statistics No. 7819, Florida Landings Annual Summary 1978.

anglers, or is it due to heavy fishing effort by commercial fishermen that lowers success rates for sport fisherman?

Table 5.4 shows the results on the Gulfside of Florida. Catfish, grunt, shark, jack and seatrout are predominately sport fish. However, grouper and bluefish are more equally shared by commercial and sports fishermen. Even King and Spanish mackerel plus snapper have a significant sport fish component on the Gulf side of Florida. These tables (Tables 5.2, 5.3 and 5.4) show the inevitable conflict for fixed or finite resources. Many of these species are fished at maximum sustainable yield; therefore, a rise in fishing effort which will certainly be dictated as the demand for fish for both food and recreation increases will make this an issue of critical state concern.

The Supply of Fishing Modes

The private market usually works fairly well in providing certain types of fishing modes such as charter, party and private boats. Almost 53 percent of all saltwater fishing effort is expended via pier/jetty bridge and surf and shore. The private market does not automatically insure a supply of these modes based upon demand. Beaches which are currently common property resources could be converted to private ownership if residential development continues, reducing surf and shore fishing. Piers, jetties and bridges are in most cases not built expressly for fishermen. These facilities will usually not be supplied by the private market. The deterioration or even elimination of a jetty or bridge may involve an adverse economic impact on the saltwater recreational fishing industry. One third of all fishing effort takes place on piers, jetties and bridges. This is another area of critical state concern. The Florida Department of Natural Resources is aware of these supply problems, but will have to work with other agencies to be effective. Further discussion of these problems is provided in Outdoor Recreation in Florida (1980).

Environmental Damage

The destruction of wetlands and general estuarine areas has had a detrimental impact on fishery productivity. See Lynne et. al. (1981). The user values generated in this paper can be used to evaluate U. S. Army Corps of Engineers projects in Florida especially if saltwater recreational activities are reduced. The Florida Department of Environmental Regulations

TABLE 5.4

A Comparison of Commercial and Sports Fishery Catch for the Gulf Coast of Florida

Species or Group	Sport Catch (Pounds)	Commercial Catch (Pounds)	Total Catch Pounds	Sport Catch As Percent of Total
A. Primarily Sport:				
Catfish	4,791,513	18,764	4,810,277	99.61
Grunt	2,930,160	140,245	3,070,405	95.43
Sharks	3,125,962	210,588	3,336,550	93.69
Jacks	16,823,889	1,774,108	18,597,997	90.46
Seatrout	5,583,842	2,232,428	7,816,270	71.44
Groupers	10,617,312	4,851,447	15,468,759	68.64
Bluefish	1,559,951	850,121	2,450,072	65.30
B. Primarily Commercial:				
Snappers	4,181,480	4,904,354	9,085,834	46.02
Spanish Mackerel	1,063,307	1,600,292	2,663,599	39.92
Ladyfish	759,383	2,282,137	3,041,520	24.97
King Whiting	323,946	1,745,191	2,069,137	15.66
Mullet	2,910,327	24,977,291	27,887,618	10.43
Sardines	0	2,352,281	0	0

Source: Sport Fishery: National Marine Fisheries Service, U.S.D.C., Marine Recreational Fishery Statistics Survey, Atlantic and Gulf 1980.

Commercial Fishery: National Marine Fisheries Service, U.S.D.C., Current Fisheries Statistics No. 7819, Florida Landings Annual Summary 1978.

and the Department of Natural Resources will have direct valuation of Florida's sport fishery resources. This will be of substantial help since projects involving water resources require adherence to the U. S. Principles and Standards.

Coordination With Other Projects

Two other major pieces of research are directly related to our work here. The U. S. Fish and Wildlife Service (USFWLS) is making state estimates of the number of saltwater anglers for both residents and nonresidents. Their estimates are considerably below ones reported in this study. They estimate only 2.6 million anglers as compared to our 5.2 million. However, we are in agreement in terms of days fished per resident and nonresident. Their preliminary report indicates 19 days per resident and five days per nonresident (as compared with 19.36 and 5.39 for residents and tourists, respectively, in our study). At this writing, the authors do not know why their estimates of the number of anglers differ from ours. In fairness, their report is so preliminary that we must await final results before determining sources of differences.

The second study was completed by the National Marine Fisheries Service in 1980. This study showed 2.3 million resident anglers of all ages in Florida compared to our estimated 2.1 million resident anglers 18 years of age or older. These estimates are in fairly good agreement. But the NMFS shows only 1.65 million nonresident anglers in 1979 while our estimate is about three million. We do not know why such a great difference should exist. In fact, the NMFS reported nonresident saltwater anglers in Florida to be 2.8 million in 1974, and the number should surely be higher today. See NMFS (1975) (1977). In the 1979 study, the NMFS survey shows only 6.11 fishing days (i.e., trips) per resident, where their "trip" is equivalent to a day. For nonresidents, the NMFS survey shows only 2.85 fishing "trips" or days. We are at a loss to explain these low figures which greatly disagree with our study and other independent studies. For example, in 1975 the USFWS reported a usage rate of about 26 days per resident angler. In 1955, Ellis, Rosen and Moffett (1958) estimated resident anglers fished 11.4 days per year. We have been working closely with both NMFS and USFWS and hope to resolve some of these apparent data differences.

A Footnote on Commerical Fisheries

Bell (1979) has estimated the relative economic impact of recreational versus commercial fisheries. He estimated that in 1975 the Florida commercial fishing industry (i.e., Florida landings only) generated about $60 million of retail sales within the State. Sales (i. e., not at retail, but at wholesale) to other states of Florida caught fish were estimated at approximately $100 million. Thus, Bell concluded that Florida's commercial harvest of fish and shellfish may have generated $160 million in final sales in 1975. It is erroneously assumed that the analysis of commercial and recreational fisheries by Bell is comparing "apples and oranges". The charge is made that "The multiplier is used on sport values at retail, while on commercial at wholesale (dockside)".[24] The estimated value of $160 million in 1975 for Florida's commercial fisheries is only the first round (i. e., primary impact) sales at retail within the state and naturally at wholesales/processing outside the state. In Bell (1979), the regional multiplier is applied to wages to obtain indirect employment created. The multiplier is applied to export wages at all stages of production that are applicable for commercial fishing (i. e., production, processing, wholesaling). There are no export "retail wages" for commercial fishing since the product is sold to other states by processors or wholesalers in Florida. This is the source of some of the confusion. Using data from the USFWS (1977) and other sources, Bell estimated that saltwater recreational fishermen (i. e., residents and tourists) spent $851 million in Florida at retail in 1975 (exclusive of multiplier effects). Thus, Bell concluded that recreational saltwater fishermen spend 5.3 times the amount generated by commercial fishermen for their catch (i. e., $851 million divided by $160 million). Cato and Prochaska (1980) have taken issue with this conclusion by indicating that other estimates of the impact of commercial fishing differ from that computed by Bell. Morris (1977) indicates Florida landings of fish and shellfish valued at $73.7 million in 1975 generated a primary (i. e., without a multiplier) economic impact of $184.1 million excluding the value added by retailing within the State (See Table 5 in Cato and Prochaska, 1980). Thus, the Bell and Morris primary impacts differ somewhat. Cato and Prochaska argue that Bell gives no consideration to the

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[24]A reviewer of this manuscript.

economic impact of the processing of fish purchased outside the state. They argue that fish imports into the state are induced by the existence of the domestic or state harvesting sector; therefore, both sectors (i.e., domestic plus imports) should be counted. One might argue that the import and domestic sectors are not complementary but substitutes. If the domestic sector declined, increased imports would be expected subject to locational factors. That is, processors are dependent upon both domestic and imported shrimp, for example. It is not clear whether the absence of domestically caught fish would drive the processor out of business or he would merely step up his orders for imported fish. Experience throughout the country indicates that numerous processors handle only imported fish. We feel that the point raised by Cato and Prochaska needs further research.

Table 5.5 shows a 1980-81 (12 months) update of the earlier study made by Bell (1979). Unadjusted for inflation, saltwater anglers increased their expenditure in Florida from $851 million in 1975 to $1,871 million in 1980-81. This was a substantial increase; however, the reader should be aware that the methodologies were quite different in the two studies.

In 1975, Bell estimated that the total primary impact of the Florida commercial fishing harvesting sector was 2.17 times the ex vessel value of landlings. Morris (discussed above) indicated a 2.5 ratio of the primary impact to the ex vessel value of landings. In 1980, Florida landings were valued at approximately $133 million. Using 2.17 ratio of primary impact of the value of landings, we estimate $288 million in primary impact for 1980. The Morris rates yeilds $332 million in primary impact. Therefore, we estimate that for 1980-1 saltwater recreational fishing generated from 5.6 to 6.5 times the primary sales of commercially harvested fishery products in the State of Florida. This, of course, is subject to the qualifications discussed above (i.e., imported fish should be included).

In summary, the saltwater sport fisheries of Florida are among its most valuable and unique resources. The asset value of these fisheries exceeds $27 billion. Approximately $5 billion were directly or indirectly generated by saltwater anglers (i.e., tourist plus residents). This in turn produced almost $1.4 billion annually in wages within the State of Florida, creating about 124,000 jobs. Tourist and resident saltwater anglers generate almost $150 million in state taxes for Florida.

Table 5.5

A Comparison of the Estimated Primary Economic Impact of Saltwater Recreational Fishing with Saltwater Commercial Fishing in Florida, 1975, 1980-81

	1975[1] (millions)	1980-81[2] (millions)
Saltwater Anglers	$851[3]	1,871[3]
Saltwater Commercial Fishing	$160[4]	$288[5]-$332[6]
Saltwater Angler $ Divided by Saltwater Commercial Fishery $	5.3	6.5-5.6

[1]Bell (1977)
[2]FSU-SRFS; NMFS
[3]Resident plus tourist expenditures (retail)
[4]In 1975 Florida ex vessel landings were valued at $73.732 million or 46.1 percent of the total estimated primary impact (i.e., $160 million)
[5]In 1980,Florida ex vessel landings were valued at $132.928 million. In 1975, the total primary impact was 2.17 times the value of landings. Using this ratio in 1980, we estimate the total primary impact of $288 million.
[6]Value of 1980 landings times 2.5. See Morris (1977).

The most critical public policy question relating to these fisheries involves the present and future decline of fishery stocks. Measures must soon be adopted which will allocate these limited stocks among competing uses. Habitat destruction and water pollution will have to be controlled in the framework of the economic values that are at stake (i.e., a benefit-cost framework). The data and analysis presented here should provide a beginning point for some of the needed policy decisions.

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The State University System of Florida Sea Grant College is supported by award of the Office of Sea Grant, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, grant number NA80AA-D-00038, under provisions of the National Sea Grant College and Programs Act of 1966. This information is published by the Marine Advisory Program which functions as a component of the Florida Cooperative Extension Service, John T. Woeste, dean, in conducting Cooperative Extension work in Agriculture, Home Economics, and Marine Sciences, State of Florida, U.S. Department of Agriculture, U.S. Department of Commerce, and Boards of County Commissioners, cooperating. Printed and distributed in furtherance of the Acts of Congress of May 8 and June 14, 1914. The Florida Sea Grant College is an Equal Employment Opportunity-Affirmative Action employer authorized to provide research, educational information and other services only to individuals and institutions that function without regard to race, color, sex, or national origin.

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