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Actual and Potential Tourist Reaction to Adverse Changes in Recreational Coastal Beaches and Fisheries in Florida

by

Frederick W. Bell

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Frederick W. Bell

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EXECUTIVE SUMMARY

This report summarizes the results of a research project to determine the role of resource scarcity, if any, in influencing tourism to Florida. The project was designed to test the hypothesis that selected natural resources supply constraints (e.g., saltwater fisheries and beaches) in Florida's coastal zone, will moderate the projected growth in tourism. Two approaches were taken in the analysis. First, a time series on tourist air and auto arrivals was analyzed with and without natural resource constraints. Second, a field survey of tourists was conducted to determine tourist participation in saltwater recreational fisheries and saltwater beach use plus their response, if any, to the resource scarcity. As used in this report, the term resource scarcity refers to a generalized decline in the quantity and quality of a natural resource that is used for recreational activities. 1,271 tourists were contacted in this study as part of the field survey. The major findings can be summarized as follows:

Saltwater Recreational Beaches

* In 1990, there were 224 miles of critical saltwater beach erosion in Florida constituting 28.5 percent of the coastal shoreline. This represented a slight increase in critical erosion over any earlier study in 1973. Because of

an absence of an annual series on beach conditions such as erosion, it could not be established that resource scarcity, if any, had any impact on tourism over the last two decades.

* The tourist survey indicated that 57.4 percent of the air and auto visitors to Florida participated in saltwater beach activities in 1990. The main reason for nonparticipation in saltwater beach activities was not resource scarcity (e.g., crowding; lack of access; parking), but just no interest in this form of recreation;

* Saltwater beach participation rates were higher for males; whites; those arriving by air and more affluent tourists. However, beach use and age were inversely related. As the tourist population ages, there will be less pressure on beach resources;

* Saltwater tourist beach users were asked, "Given the present conditions on the beaches, how much would conditions have to change before you would quit vacationing in Florida?". The average beach user said crowding would have to increase form 31 to 50 percent above present levels before he or she would quit, indicating that resource scarcity is not presently a major factor. With respect to access points to beaches, the average beach user felt that the interval between access points would have to decrease to one-quarter of a mile above present intervals before he or she would quit. This implies that resource scarcity is not yet a factor in beach use;

* Because saltwater beaches are common property resources, the value of a beach day was established by survey and not by an organized market. The survey applied the contingent value method to beach users, finding an average willingness to pay of $2.00 per day with a range of $0 to $150 per day. 47 percent of the saltwater beach tourists were unwilling to pay anything for the use of the beach per day. This attitude was especially pronounced among those with years of visiting Florida beaches and males as opposed to females, but less pronounced by those arriving by air. Those refusing to pay anything were against fees as a matter of principle, based possibly upon the historical common property nature of beaches (i.e., no beach license). The variation in willingness to pay was poorly explained by socioeconomic and physical variables;

* In 1990, it is estimated that tourists 18 years and older that used saltwater beaches in Florida numbered over 20 million, constituting over 100 million beach days and spending over $6 billion;

* At present, the resource scarcity hypotheses for beaches is rejected as it relates to tourism, but with 28 percent of the shoreline under critical erosion, future demand may increase for beaches to a point where resource scarcity can only be mitigated by renourishment that will bring this portion of the shoreline "on line".

Saltwater Recreational Fisheries

* Over the period 1979-1990, the recreational saltwater fishery catch per trip dropped from 5.8 to 4.5 fish, with the East Coast of Florida accounting for all of the decline. This physical evidence of resource scarcity was introduced into each equation explaining air and auto tourist arrivals. The decline in catch per trip had no statistically significant impact on auto arrivals, but did have a statistically significant impact, as hypothesized, on air arrivals. This was deceiving since the downward trend in total catch (i.e., Atlantic plus Gulf Coast) per trip was totally due to the Atlantic side of Florida, but when introduced separately into the air tourist equation it had no statistical impact. Thus, this analysis established no relation between tourism and resource scarcity in recreational saltwater fisheries in the State of Florida over the 1979-90 period;

* The tourist survey indicated that 15.8 percent of the air and auto visitors to Florida participated in saltwater recreational fishing in 1990. The main reason for not participating in saltwater recreational fishing was not resource scarcity (i.e., declining catch rate, crowding, pollution), but a decided lack of interest in this form of recreation;

* Saltwater fishing participation rates were higher for males, but lower for higher income tourists. Participation

was parabolically related to age with the maximum tourist participation at the age of 50. If fishing is truly an "inferior good" (i.e., declines with increases in income), less pressure may be placed on the fishery resource as the tourist population becomes more affluent, but as the median age rises from 32.8 in 1988 to 41.0 in 2025, this may raise participation in saltwater fishing, thereby counteracting the income effect in terms of fishing pressure;

* Saltwater tourist anglers were asked, "What is the minimum number of fish (i.e., critical threshold) you would consider per day before you would quit fishing in Florida?" For anglers that targeted their species, existing catch rates were nearly 7 fish above the critical threshold using the mean, but only 3 fish using the median. For those not targeting species, existing catches were 4 and 2 above the critical threshold using the mean and median responses respectively from the tourist angler survey. These findings indicate that catch rates in the aggregate are not at a level where resource scarcity in the saltwater fisheries negatively impacts tourism;

* Because saltwater fisheries are common property resources, the value of a fishing day was established by the survey and not by an organized market. The survey applied the contingent value method to beach users, finding an average willingness to pay of $3.18 per day with a range of $0 to $50 per day. 53 percent of the saltwater tourist

anglers were unwilling to pay anything for the use of the fishery per day. This attitude was especially pronounced among those with years of visiting Florida fisheries and older individuals, but less pronounced by those arriving by air. Those refusing to pay anything were against fees, as a matter of principle, based possibly upon the historical common property nature of fisheries. The variation in willingness to pay was poorly explained by socioeconomic and physical variables;

* In 1990, it is estimated that tourists 18 years and older that used saltwater fisheries in Florida numbered over 5.5 million, constituting over 22 million fishing days and spending over $2.2 billion;

* At present, the resource scarcity hypothesis for saltwater fisheries is rejected as it relates to tourism, but with catch rates falling among a wide variety of species, future demand may increase and drive catch rates below the critical thresholds that would deter tourist anglers from visiting the State of Florida. Over the 1990-2005 period, the number of tourist saltwater anglers may increase by as much as 60 percent, forcing bag limits to drop further and also closer to critical thresholds established by anglers as a condition for fishing in Florida. Further research is needed on thresholds for each species for tourists to establish management objectives and their economic impact.

CHAPTER 1

INTRODUCTION AND TRENDS IN BEACH AND FISHERY RESOURCES

Over the 1976-1990 period, tourism in Florida increased from 16.5 million to 41.4 million visitors, an average annual rate of increase of 9.4 percent. In 1990, nearly 75 percent of the 41.4 million tourists had their primary destination as one of Florida's 35 coastal counties. Tourism is critical in two respects. First, along with Florida's own population growth, tourists place added demand pressure on coastal natural resources such as beaches and fisheries. Second, the economy of Florid is heavily dependent on continued growth in tourism. However, increasing tourism in the coastal zone may be incompatible with natural resource constraints. For example, beach use, fishing and various other water sports are among the top ten activities enjoyed in Florid by both auto and air visitors surveyed according to the Florida Visitors Study: 1990: Executive Summary.

Over 31 million tourists (i.e., 75 percent of 41.4 million visitors) used natural resources in Florida's coastal zone in 1990. In that year, nearly 66 percent or over 20 million visitors participated in saltwater beach activities. This participation rate was taken from Bell

(1991). The saltwater beaches of Florida are common property in nature. Two undesirable effects are in evidence with beach resource in the coastal zone. First, Florida's beaches as well as those of the nation are experiencing an erosion trend due to (1) natural causes (e.g., rise in sea water level; storms), and (2) human related causes. For example, observations conducted over a long period of time reveal a slow erosion caused by the rise in sea level. See Florida Department of Natural Resources (1986). In addition, the growth in population and tourism has caused significant modifications along the shoreline, including the building of houses, motels, roads, etc. and creating artificial inlets and river entrances. The later modification performed admirably for navigation; however, the jetties, which are frequently long, interrupted the longshore transport processes, causing sand to accumulate on one side of the inlet and to erode on the other side. According to the Florida Department of Natural Resources (1986), the annual erosion rate along Florida's east cost ranges from 3 ft/yr, with the long term extreme rate of 30 ft/yr. It is one of the great ironies that saltwater beaches attract tourism which, in part, is damaging to the resource itself. That is, the laissez-faire tourist market creates a need for shoreline alterations (i.e., manmade) that accelerates the erosion process. This may be termed a negative technological externality or a depletion of beach resources due to private market activity. This leads to resource scarcity which can be defined in physical terms of beach area to use ratios. Use may be measured in terms of beach days. A fall in the ratio of beach area to beach days or person-days is one crude indicator that resource scarcity is taking place. Tietenberg (1988) has suggested that such economic indicators as (1) resource price; (2) scarcity rent; (3) extraction cost and (4) marginal discovery cost might be used as a way of detecting resource scarcity. As pointed out above, beaches are common property; therefore, markets are not efficient. That is, the price for common property resources such as beaches, air or water is zero for all time periods. Traditional economic indicators of resource scarcity may be inadequate to detect such scarcity for the beach resource. Economists such as McConnell (1977) have developed alternative economic indicators to measure increasing resource scarcity for beach resources. This is known as the willingness to pay (WTP) or consumer surplus approach which will be discussed in some detail later in this report.

Second, beaches are finite (or dwindling) common property resources and the continued influx of tourists may create congestion diseconomies. Such diseconomies are an aspect of resource scarcity which reflects lower utility from the saltwater beach recreational activity.

Another important resource in the coastal zone is marine fishery resources. That is, boat and nonboat saltwater fishing also attracts a significant number of tourists to Florida. In 1990, tourists' participation rates were 12.7 and 11.7 percent for boat and nonboat saltwater fishing respectively according to Bell (1991). As in the case of beaches, saltwater fisheries are common property resources. Since entry to the fishery resource is not controlled by fees or limited entry programs, fisheries become rapidly depleted. Such depletion is a physical indicator of resource scarcity and is usually measured by a decline in catch per unit of fishing effort. Economic indicators are usually flawed for common property resources as discussed above. The preliminary discussion above leads to two hypothesis regarding the interaction of growing tourism and specific resources in the coastal zone of Florida:

1. It is hypothesized that the two identified technological diseconomies in production (i.e., manmade erosion) and consumption (i.e., congestion) will act to reduce tourism related to saltwater beach resources below a level expected in the absence of such diseconomies;
2. It is hypothesized that increases in resource scarcity as evidenced by declining catch per unit of fishing effort will deter saltwater fishery-

related tourism below a level expected in the absence of technological diseconomies produced by the common property nature of the fishery resource.

This report will focus on saltwater beach and fishery resources. There are other resources in the coastal zone (i.e., waterfront land, boating access points) that may also limit or reduce the rate of tourism expansion that will not be explored in this report.

The potential economic payoff of this inquiry is to enhance marine productivity by identifying the extent to which, if any, negative externalities in beaches and fisheries are operating as a consequence of laissez-faire tourism where an infinite supply of resources is usually assumed. Once this hypothesized identification has been made, the results can be an important input into policy options to mitigate against resource scarcity. The next section will look at some basic trends in saltwater beach and fishery resources in Florida.

<u>Trends in Resource Availability</u>

<u>Saltwater Beaches</u>: As discussed above, are Florida's saltwater beaches declining because of erosion? The answer is yes as discussed above, but there has been efforts at the Federal, State and local levels to mitigate a fall in beach area by beach renourishment. Beach renourishment restores the beach to an earlier stage of the natural erosion-

accretion process. Global figures on beach area in Florida are available from inventories published in Outdoor Recreation in Florida (1976, 1981, 1987, 1989) by the Florida Division of Recreation and Parks and shown in Table 1:1.

The global figures in Table 1.1 would seem to indicate that overall saltwater beach resources in Florida have actually increased over the 1975-1987 period for which figures are available. This is not to say that certain beaches have not been reduced in size. Also, since these are global figures, there is no indication of where demand is greatest. A discussion with those that inventories saltwater beach data indicated that a more intensive research was conducted of available beach resources in the later years thereby biasing the figures upward. Finally, such beach figure are subject to unknown measurement (i.e., survey procedures) errors from year to year. Outdoor Recreation in Florida - 1989 (DNR, 1989) states that with respect to the saltwater beaches, "The result has been that the availability of suitable beach resources has declined while demand has increased steadily" (p. 112). This same report does indicate some definite regional needs for saltwater beach resources, depending on which guideline was used for saltwater beach use. Using a guideline for saltwater beach-based outdoor recreation of 200 square feet

Table 1.1
Trend in Length (Miles) and Area (SQFT) of Florida Saltwater Beaches as Inventoried by the Florida Division of Recreation and Parks, 1975-1987

Year	Length (Miles)	(Mil SQFT)
1975	148.8	76.2
1979	275.3	118.0
1985	402.4	192.6
1987	459.0	215.9

Source: Florida Department of Natural Resources, Outdoor Recreation in Florida (1976, 1981, 1987, 1989).

Table 1.2
Trend in Critical Saltwater Beach Erosion
by County in State of Florida, 1973-1990

Percentage	Shoreline Length (Miles)		Miles of Critical Erosion		Percent Critical Erosion		Point Change
	1973	1990	1973	1990	1973	1990	1990-1973
Nassau	13.3	12.7	2.5	6.2	18.8	48.8	+30.0
Duval	16.0	15.0	10.0	10.0	62.5	66.7	+42.0
St. Johns	41.3	41.1	5.0	4.6	12.1	11.2	-.9
Flagler	18.0	18.1	3.0	2.9	16.6	16.0	-.6
Volusia	49	48.8	.5	8.2	1	16.8	+15.8
Brevard	72	71.6	23	15.2	31.9	21.2	-10.7
Indian River	22	22.4	6	6.6	27.3	29.5	+2.2
St. Lucie	22	21.5	1.3	1.1	5.9	5.1	-.8
Martin	21	21.4	6.0	10.3	28.6	48.1	+19.5
Palm Beach	44.9	45.3	28.4	21.8	63.3	48.1	-15.2
Broward	24.0	24.0	8.9	18.2	37.1	75.8	+38.7
Dade	34.8	20.8	19.5	16.9	56.0	81.3	+25.3
Monroe*	6	26.4	1.0	4.8	16.7	18.2	N/A
Collier	35	34.1	4.0	10.8	11.4	31.7	+20.3
Lee	44.0	47.3	12.4	16.9	28.2	35.7	+7.5
Charlotte	14.0	12.2	5	4.4	35.7	36.1	+.4
Sarasota	35.0	34.7	4.4	19.1	12.6	55.0	+42.4
Manatee	14.0	12.3	6.7	7.0	47.9	56.9	+9
Hillsborough	No figs	2.1	No figs	0.0	No figs	0.0	N/A
Pinellas	35.4	37.2	13.0	20.9	36.7	56.2	+19.5
Franklin	54.6	54.6	18.3	2.0	33.5	3.7	-29.8
Gulf	26.4	28.8	6.4	0.1	24.2	0.4	-23.8
Bay	44.6	41.2	21.5	11.6	48.2	28.2	-20
Walton	25.2	25.6	N/A	0.0	N/A	0.0	N/A
Okaloosa	24.5	23.9	N/A	0.0	N/A	0.0	N/A
Santa Rosa	3.1	5.0	N/A	0.0	N/A	0.0	N/A
Escambia	40.8	38.9	3.0	4.9	7.3	12.6	5.3
Total	780.9	787.0	209.8	224.5	26.9	28.5	+1.6

* Reflects only Monroe County Atlantic Ocean beaches. Erosion information for Gulf of Mexico beaches was not available.

Source: 1973: U.S. Army Corps of Engineers, National Shoreline Study, Regional Inventory Report, South Atlantic, Gulf Region, Puerto Rico and Virgin Islands (1973).

1990: Division of Beaches and Shores, Florida Department of Natural Resources, (1991) per person.[1] It was further assumed that this same area of beach would be used twice during the same day. Therefore, the use guideline was established as 100 square feet per person per day. Using this criterion, a comparison of peak demand per day to supply of saltwater per day indicated "sufficient" saltwater beach resources in all eleven Florida planning regions. An alternative guideline of 5 linear feet per person with a daily turnover rate of 2 yields 2.5 linear feet of person per day. When this guideline was used, the East Central (i.e., Volusia County, etc.) and Tampa Bay planning region showed saltwater beach "shortages" in 1987. By 1990, it was projected that the Southeast Florida planning region would experience similar saltwater beach shortages. Thus, planning document such as those reviewed above do not shed much light on the resource scarcity hypothesis. If anything, signals are mixed with respect to saltwater beach resources.

Data from the U.S. Army Corps of Engineers (1973) and Division of Beaches and Shores (1991) were assembled in Table 1.2. These data reflect two points in time on shoreline (i.e., beach) length and miles of critical erosion. Unfortunately, such data are not available each year. The data do indicate that the percent of shoreline

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[1] It was assumed that 200 square feet was enough to provide a "worthwhile recreational experience". Such explicit valuations will be discussed later in this report. See McConnell (1977).

that is classified as critically eroded rose from 26.9 to 28.5 percent over the 1973-1990 period. Globally, this 17 years represents little change in critical erosion among Florida's saltwater beaches. Many counties in Table 1.2 show substantial increases in critical erosion such as Nassau, Dade, Broward, Monroe, Sarasota and Pinellas. It would appear that Florida as a state has been holding its own against critical erosion of saltwater beaches. Certainly, critical erosion is a good physical indicator of resource scarcity.

Saltwater Fisheries. Historically, Florida has had an ample supply and diversity of recreational saltwater fisheries. The rise in tourism and migration of population to Florida has placed increasing pressure on a renewable, but finite resource, the fisheries. One physical indicator of resource scarcity in fisheries is catch per unit of fishing effort. Recreational fishing data has been collected on a regional basis (i.e., state) only since 1979. Table 1.3 shows the trends in the number of fish caught; fishing trips and number of fish caught per fishing trip for the East and West Coast of Florida over the 1979-1990 period. The number of fish caught is a very rough indicator since there is no adjustment for species mix. Over the last eleven years, there does not seem to be a trend in the number of recreational fish caught on the Gulf of Mexico side of Florida with an average of 76,899 million fish

Table 1.3
Trends in Recreational Saltwater Fish Catch, Trips and Catch Per Trip: East and West Coast of Florida, 1979-1990

	Gulf Sub-Region			Atlantic Sub-Region			Florida		
Year	Number Fish Caught (Mil)	Number Trips (Mil)	Fish per Trip	Number Fish Caught (Mil)	Number Trips (Mil)	Fish per Trip	Number Fish Caught (Mil)	Number Trips (Mil)	Fish per Trip
1979	60916	10750	5.6666046	61518	10215	6.0223201	122434	20965	5.8399236
1980	52819	11904	4.4370799	43228	10460	4.1326959	96047	22364	4.2947147
1981	56675	9217	6.1489638	26111	7636	3.4194604	82786	16853	4.9122411
1982	92290	12103	7.6253821	34809	9005	3.8655191	127099	21108	6.0213663
1983	60658	10224	5.9329029	29872	7793	3.8331836	90530	18017	5.0246988
1984	84298	11451	7.3616278	32643	9891	3.3002729	116941	21342	5.4793833
1985	87710	13372	6.5592282	35067	12493	2.8069318	122777	25865	4.7468393
1986	68630	13436	5.1079190	32444	10298	3.1505146	101074	23734	4.2586163
1987	60567	12217	4.9576000	25783	12210	2.1116298	86350	24427	3.5350227
1988	80932	13822	5.8553031	23605	12540	1.8823763	104537	26362	3.9654426
1989	71920	10556	6.8131868	21221	10611	1.9999057	93141	21167	4.4002929
1990	68476	9492	7.2140700	18524	9830	1.8844000	87000	19322	4.5026390

Source: U.S. Department of Commerce, NOAA, NMFS, Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1979-1990 (published through 1989; unpublished from the NMFS, 1990) caught per year. This measure of fishing effort or the number of recreational fishing trips exhibits no trend for the Gulf of Mexico side of Florida, averaging a little under 12 million trips. After 1985, there was a statistical adjustment downward for trip by reducing fishing trips to the 95th percentile that reported trips beyond that percentile. The MRFSS (1991) states,

> "Further caution should be applied when analyzing trend data because adjustment of outliers started in 1987 reduced estimates an average of 15-20 percent" (p. 9).

Despite these statistical problems, the Gulf of Mexico side of Florida exhibits a rather static recreational fishery <u>in the aggregate</u>. Thirty-nine percent of the total marine recreational catch by number in Gulf of Mexico in 1987 consisted of drum, seatrouts, and croakers. This percentage dropped to 27 in 1989. Red drum catches in 1989 were lower than any other year since 1980 and red snapper catches showed a declining trend since 1981 according to the MRFSS (1991). Thus, species composition in the Gulf of Mexico is an ever changing phenomenon.

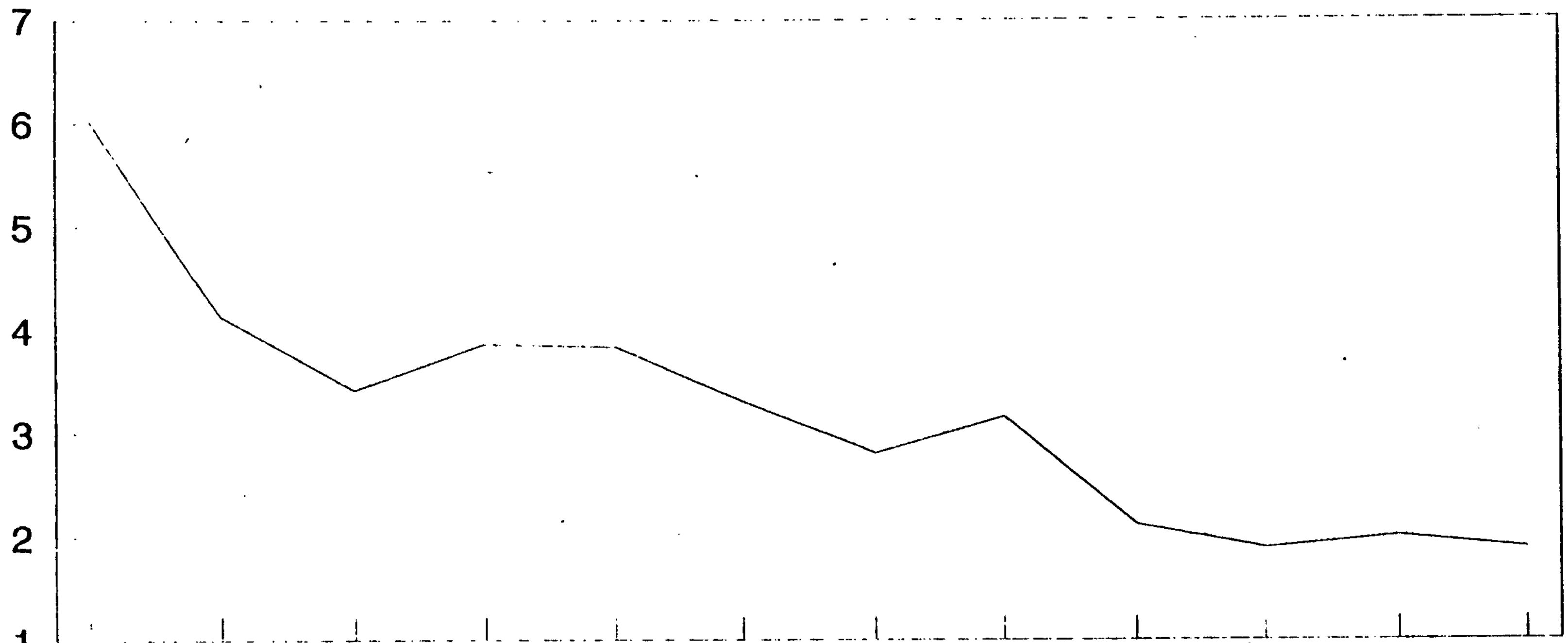
The Atlantic Ocean side of Florida exhibits some definite aggregate trends as shown in Table 1.3. The most notable change is the decline in catch per trip from 6 fish in 1979 to under 2 fish per trip in 1990. This is certainly a physical indicator of resource scarcity. This ratio shows a downward trend because of a declining number of fish caught coupled with a rather static number of trips for the

East Coast of Florida over the 1979-90 period. On a species basis, bluefish and king mackerel catches showed a continual decline since the early 1980's in the Southeast United States.

It would appear that little can be concluded from Table 1.3 since the aggregate data may obscure the trends for particular species. With growing number of residents and tourists in Florida, it is odd that the total number of fishing trips for both the East and West coasts of Florida showed no growth over the 1979-1990 period. In part, this may be due to the downward statistical adjustment of fishing trips starting in 1986 as discussed above. Figures 2.1, 2.2 and 2.3 show the plots of the time trend in catch per trip by saltwater anglers in Florida.

The review of physical measures of beach and fishing resources provided only marginal insight into resource scarcity. The aggregate level of these measures combined with changing statistical methodologies probably accounts for some of this ambiguity. Thus, such trends must be viewed with caution in measuring the impact, if any, of resource scarcity on tourism to Florida. If anything, this review points out the need for basic data. Chapter 2 will review the limited literature pertaining on the beach and fisheries hypotheses stipulated above.

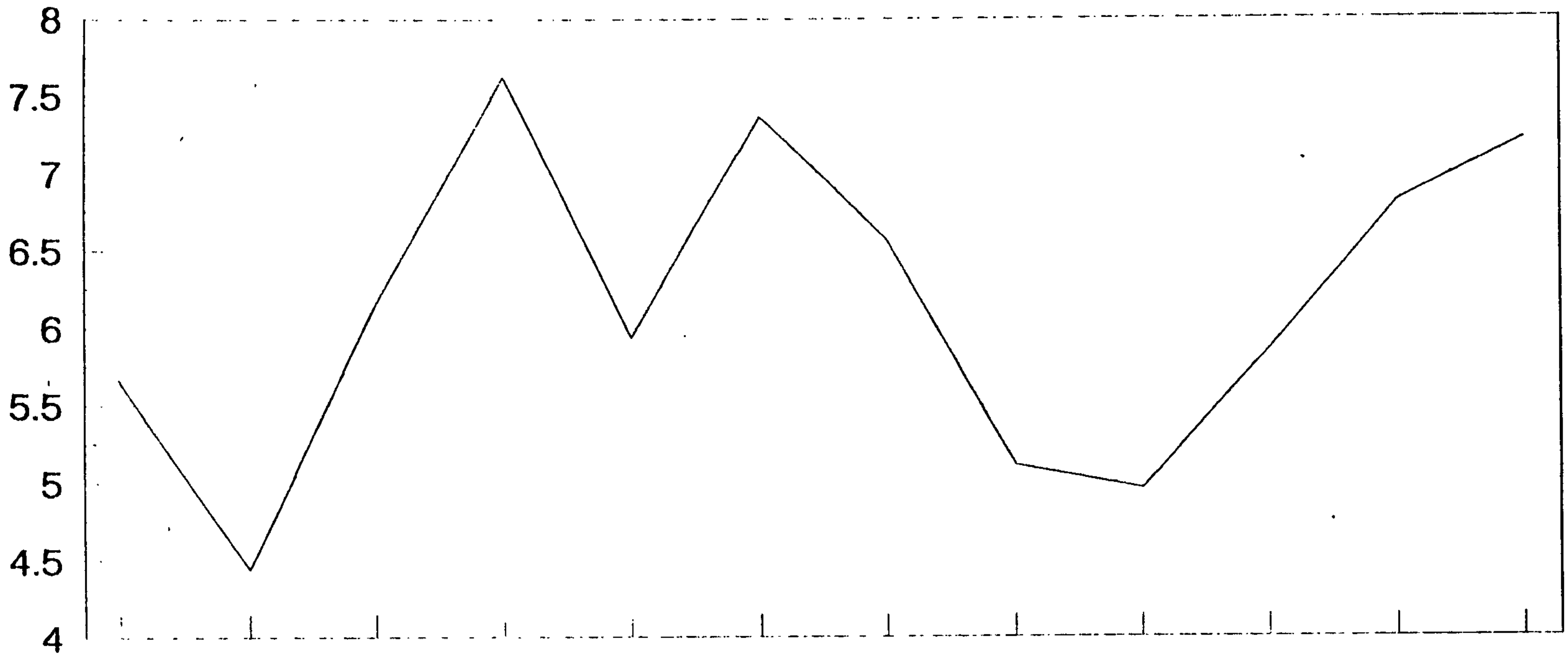
Figure 2.1. Fish Caught Per Trip
Florida Atlantic Coast 1979-90



1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
6.02232	4.13270	3.41946	3.86552	3.83318	3.30027	2.80693	3.15051	2.11163	1.88238	1.99991	1.88440

Source: U.S. Dept. Commerce, NOAA, NMFS, Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1979-1990.

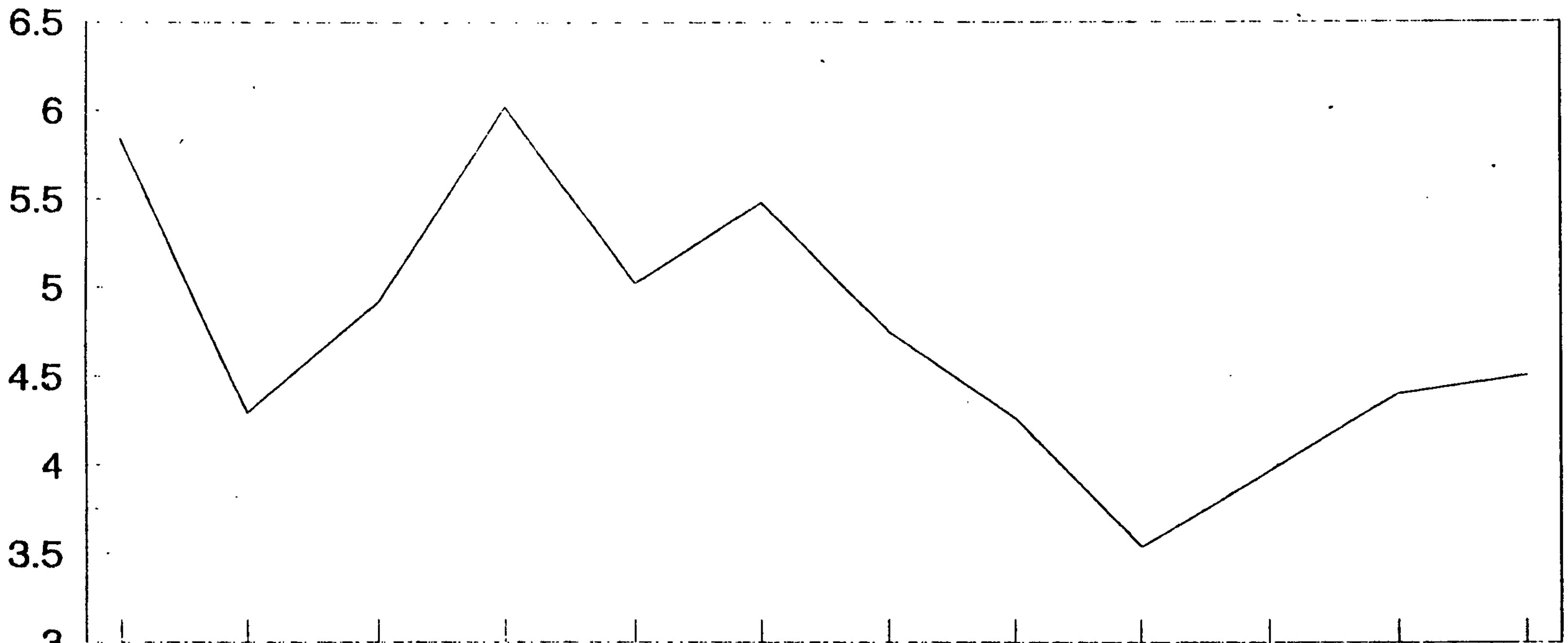
Figure 2.2. Fish Caught Per Trip
Florida Gulf Coast 1979-90



1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
5.66660	4.43708	6.14896	7.62538	5.93290	7.36163	6.55923	5.10792	4.95760	5.85530	6.81319	7.21407

Source: U.S. Dept. Commerce, NOAA, NMFS, Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1979-1990.

Figure 2.3. Fish Caught Per Trip
Florida Coast 1979-90



1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
5.83992	4.29471	4.91224	6.02137	5.02470	5.47938	4.74684	4.25862	3.53502	3.96544	4.40029	4.50264

Source: U.S. Dept. Commerce, NOAA, NMFS, Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1979-1990.

CHAPTER 2

LITERATURE REVIEW

Beach Use and Resource Scarcity

As discussed in Chapter 1, the behavior of price of a commodity or service can be used to test for resource scarcity. However, no prices are charged for public beaches. Like fisheries and public grazing land, beaches are finite in supply and demand pressures create as Hardin (1968) would say, "a tragedy of the commons." However, demand for recreation (e.g., beaches, fisheries) in the absence of an efficient or organized market has been estimated by economists in two basic ways: the direct and indirect methods. In the direct method, the recreationist is asked how much he would be willing to pay for a specified amount of recreation, usually expressed in terms of days as a measure of consumption. The most prominent indirect method is known as the travel cost approach which utilizes travel cost as a price proxy in estimation of demand relationships or values. See Clawson (1959) and Clawson and Knetch (1966).

McConnell (1977) used the direct approach in measuring beach values in Rhode Island. The willingness-to-pay question attempted to measure the respondent's willingness to pay for the particular day of the interview only. Once this value is known for a given beach, a change in the conditions at the beach may reflect resource scarcity. Assume that the ratio of beach resources (i.e., square feet, linear feet) falls per user. This may happen because of erosion and/or an increase in people using a finite resource. As congestion increases, it is generally hypothesized that the willingness to pay for the beach resource will decline (i.e., evidence of resource scarcity). McConnell related consumer surplus (i.e., willingness to pay) per beach visit to family income, attendance per acre (i.e., congestion); air temperature and the number of visits per season for a sample of saltwater beaches in Rhode Island. He states, "..the coefficient on congestion suggests that an extra 100 people per acre on the average beach reduces the average individual's surplus per day by abut 25 percent" (p. 191).

Using about the same approach as McConnell, Bell and Leeworthy (1986) found that Florida resident were sensitive to square feet of saltwater beach available per person as consumer surplus increased with an increase in this resource supply variable. By contrast, tourists were not influenced by beach availability (i.e., SQFT/Person) in terms of consumer surplus in the Bell and Leeworthy (1986) study of Florida saltwater beaches. In this same study, Bell and Leeworthy found that nearly 23 percent of the residents found Florida Saltwater beaches to be severely crowded compared to only 7 percent of visiting tourists. For tourists from relatively small northeastern states such as Massachusetts or Rhode Island, "crowding" (i.e., congestion) may be a very relative phenomenon. This earlier literature should be compared with the findings presented in later chapters.

Silberman and Klock (1988) argue that the incremental benefits (i.e., consumer's surplus) through a reduction in congestion from existing beach users is too restrictive because it holds visitations constant after beach renourishment, and does not recognize any factor other than a reduction in congestion as a source of incremental benefits. Those beach resource scarcity as measured by erosion (i.e., a need for beach renourishment) can result in a reduction in the maximum amount that individuals are willing to pay to use the beach and a decreased visitation, or both. In this study, it is hypothesized that beach resource scarcity will negatively impact tourism to a particular beach. For New Jersey beaches, Silberman and Klock found that an increase in beach renourishment was associated with a relatively small rise in consumer surplus compared to a relative large rise in visitation. The authors believe that substitution of beaches within the state is the main reason for the large changes in visitation.

Curtis and Shows (1982, 1984) have done two site-specific studies on beach nourishment in Florida. These two studies are for Delray and Jacksonville beaches. As in the studies discussed above, the contingent values method (CVM) was used to estimate willingness to pay (WTP) for a beach recreational experience. The following mean willingness to pay were found in Florida;

Beach	Tourists (WTP/DAY)	Residents (WTP/DAY)	Year
Delray[1]	$2.15	1.88	1982
Jacksonville[2]	4.88	4.44	1984
All Florida[2]	1.45	1.31	1984

1. Curtis and Shows (1982,1984)
2. Bell and Leeworthy (1986)

As one can see from the above results, daily WTP never exceeded $5. One consistent factor is that tourists were willing to pay more per day for beach use when compared to residents. Curtis and Shows (1982) state "...When asked this question, residents would reply that they pay taxes and should not be expected to pay for Florida beaches". This concludes a brief review of previous studies dealing with resource scarcity or decline in the quality of the beach resource (e.g., congestion via erosion). In one study, it was found that erosion reduces participation (i.e., attendance) while renourishment or mitigating resource scarcity will increase participation. Since a state such as

Florida has many substitute beaches, it is not clear that erosion at several beaches will deter aggregate tourism to the state. This will be discussed in later chapters.

Fishery Use and Resource Scarcity

One of the basic measures of resource scarcity in the fisheries is catch per fishing trip. Green (1984) focused particularly on a sample of tourists visiting Florida over the 1980-81 period. Thus, Green's study is highly relevant to the thrust of this report. For tourists, Green found that saltwater days fished per trip would increase by 1 percent if the success rate (i.e., catch per day) increased by 10 percent. If anything, tourist saltwater fishing behavior was inelastically related to the success rate and therefore resource scarcity. Green states, "This study gives evidence that short-run economic repercussions on the tourist industry from any reasonable change in commercial/sport fishing effort may not be large" (p. 133). Also, Green did not find any statistically significant relationship between WTP for recreational saltwater fishing by tourist and the physical measure of resource scarcity, catch per day.

In a study of Florida residents, Glasure (1987) states that the statistical results are not strong enough to assert with confidence that a resident fisherman's decision to fish longer at a site is influenced by the success rate (i.e., catch per day). Thus, Green (1984) and Glasure (1987) find little support for the hypothesized negative effect on tourism or even resident angling in Florida of physical measures of resource scarcity.

Then again, at the individual species level, Green (1989) found that the red drum catch is an important variable in the decision to fish for the species in the Gulf of Mexico. The success rate elasticity is slightly above one, implying that a ten percent increase in expected catch by target anglers would be expected to raise red drum effort (i.e., demand) more than ten percent. Leeworthy (1990) states "The most important finding in this study is the number of recreational king mackerel trips in the Gulf of Mexico region responds to king mackerel catch rates in a highly elastic manner" (p. 63). The success elasticity for king mackerel was estimated at 1.96 by Leeworthy. The variety of species in Florida may allow for a high degree of substitution which would mitigate against "aggregate resource scarcity" as found by Green (1984) and Glasure (1987) for an aggregation of many periods. For classic discussion of resource scarcity, see Barnett and Morse (1963).

CHAPTER 3

THE PRESENT DETERMINANTS OF FLORIDA TOURISM: IS RESOURCE SCARCITY A FACTOR?

To test the hypothesis that there has been and will be a natural resource constraint on Florida tourism, the available data on tourism must be examined. Such data are shown in Table 3.1. The Florida tourist series is broken down into air and auto arrivals. The historical series is over the 1976-1990 period. The average annual growth rate by air was 14.2 percent while the corresponding rate for auto arrivals was 8.3 percent per year. For both auto and air arrivals, these growth rates are very high and have sustained a rapid growth rate in the Florida economy.

Of particular interest, the projected growth rates in tourism over the 1991-2005 period are about one third for air (4.3 percent) and about the same for auto (4.7 percent) than those observed over the 1976-1990 historical period. These projections were prepared by the Florid Joint Legislative Management Committee. The projection equations are as follows:

$$\text{Air Arrivals} = f(\overset{+}{\text{PYPC}};\ \overset{-}{\text{EXR}};\ \overset{-}{\text{TCAIR}};\ \overset{-}{\text{TCCAR}};\ \overset{+}{\text{U.S.POP}}) \qquad (1)$$

$$\text{Auto Arrivals} = f(\overset{+}{\text{PYPC}};\ \overset{-}{\text{TCCAR}};\ \overset{+}{\text{TCAIR}}) \qquad (2)$$

Table 3.1
Florida Tourist Arrivals: History and Forecast (August 1991)

	Air Arrivals			Auto Arrivals			Total Arrivals	
	(000s)	% Chg	% Total	(000s)	% Chg	% Total	(000s)	% Chg
1976	6,990	NA	42.3%	9,528	NA	57.7%	16.517	NA
1977	7,484	7.1%	44.4%	9,373	-1.6%	55.6%	16,856	2.1%
1978	9,068	21.2%	47.2%	10,143	8.2%	52.8%	19,210	14.0%
1979	10,563	16.5%	50.6%	10,326	1.8%	49.4%	20,889	8.7%
1980	9,312	-11.8%	46.6%	10,671	3.3%	53.4%	19,982	-4.3%
1981	10,407	11.8%	49.1%	10,794	1.2%	50.9%	21,201	6.1%
1982	11,049	6.2%	48.0%	11,979	11.0%	52.0%	23,028	8.6%
1983	10,329	-6.5%	43.5%	13,442	12.2%	56.5%	23,772	3.2%
1984	12,714	23.1%	46.6%	14,596	8.6%	53.4%	27,310	14.9%
1985	13,064	2.8%	45.4%	15,739	7.8%	54.6%	28,803	5.5%
1986	14,770	13.1%	46.7%	16,842	7.0%	53.3%	31,612	9.8%
1987	16,597	12.4%	48.5%	17,646	4.8%	51.5%	34,243	8.3%
1988	18,080	8.9%	49.2%	18,705	6.0%	50.8%	36,785	7.4%
1989	18,161	0.4%	46.8%	20,674	10.5%	53.2%	38,835	5.6%
1990	20,867	14.9%	50.4%	20,556	-0.6%	49.6%	41,423	6.7%
Begins forecast period.								
1991	19,738	-5.4%	48.9%	20,643	0.4%	51.1%	40,381	-2.5%
1992	20,646	4.6%	49.0%	21,494	4.1%	51.0%	42,140	4.4%
1993	21,651	4.9%	49.0%	22,564	5.0%	51.0%	44,214	4.9%
1994	22,672	4.7%	48.9%	23,671	4.9%	51.1%	46,342	4.8%
1995	23,570	4.0%	48.9%	24,659	4.2%	51.1%	48,228	4.1%
1996	24,395	3.5%	48.8%	25,574	3.7%	51.2%	49,970	3.6%
1997	25,245	3.5%	48.8%	26,498	3.6%	51.2%	51,743	3.5%
1998	26,101	3.4%	48.8%	27,426	3.5%	51.2%	53,527	3.4%
1999	26,963	3.3%	48.7%	28,368	3.4%	51.3%	55,331	3.4%
2000	27,833	3.2%	48.7%	29,304	3.3%	51.3%	57,137	3.3%
2001	28,682	3.1%	48.7	30,265	3.3%	51.3%	58,947	3.2%
2002	29,460	2.7%	48.5%	31,252	3.3%	51.5%	60,712	3.0%
2003	30,219	2.6%	48.4%	32,263	3.2%	51.6%	62,482	2.9%
2004	30,968	2.5%	48.2%	33,296	3.2%	51.8%	64,264	2.9%
2005	31,714	2.4%	48.0%	34,352	3.2%	52.0%	66,066	2.8%

Source: Florida Economic Consensus Estimating Conference (September 1991).

where

PYPC =	U.S. real personal income per capita;
EXR =	Exchange rate (i.e., value of the U.S. dollar relative to other currencies);
TCAIR =	Travel cost by air;
TCCAR =	Travel cost by car;
U.S.POP =	U.S. population.

The hypothesized signs of the variables are given above the variable designation. Some signs are fairly obvious, but selected ones need some explanation. For example, as the value of the U.S. dollar (EXR) appreciates relative to other major currencies, air travelers would tend to visit overseas rather than Florida. A rise in personal income per capita in the U.S. (PYPC), as expected, is a positive influence on both air and auto arrivals to Florida. In the air arrival equation, the travel cost by air and auto are hypothesized to both have an inverse relation to the number of tourists arriving by air. The former cost (TCAIR) is viewed as travel cost from home to a site in Florida (e.g., Disney World) where TCCAR is viewed as a form of on-site cost. Since gasoline is the major cost of travel by auto, it is viewed as travel rather than on-site cost although much of the driving may take place in a very large state such as Florida. Finally, it is hypothesized that air travel is a close substitute for auto travel; therefore, the sign on TCAIR is positive in the auto arrival function. That is, if air fares decline, tourists switch from time consuming auto visits to air visits. But, the relationship is not symmetrical since air travelers do not perceive a visit to Florida by auto to be a close substitute, especially in light of the distances encountered (e.g., nearly 5 percent of all tourists come all the way from Michigan). Finally, certain dummy variables such as the Eastern Airline Strike or Gulf War were omitted from the theoretical discussion even though the statistical equation presented in the tables in this chapter were adjusted for these irregular events.

Of particular significance, the projected growth in Florida tourism shown in Table 3.1 will be slower than the historical period because of the projection in the independent variables, especially real personal income per capita, which is projected to grow at a slower rate than the historical period. The same is true for U.S. population over the projection period. Notice that there are no supply constraints or resource scarcity effects built into the forecasting equations. Thus, state forecasters are assuming an infinite supply (i.e., qualitatively and quantitatively) of natural resources (e.g., fish, beaches, etc.) to accommodate growth over the projection period.

Table 3.2 shows the results of the statistical analysis of equation (1) dealing with air arrivals only. The period of analysis was 1979-90 on both a quarterly and annual basis. The reason for the selection of this period was the availability of resource data on the recreation fisheries as

Table 3.2
Linear Least-Squares Estimates
of Air Arrival Tourists
Equations for Florida
1979-1990: NO Resource Constraint
(Dependent Variable: Air Arrivals)

Variable	Quarterly[1]	Annual[1]
Constant	-21,216.8***	-11,528.3**
	(5.2544)	(-2.892)
PYPC(T-1)	.3166	.6490
	(1.526)	(.3099)
EXR	-5.7831***	-19.0559
	(3.1470)	(-1.0852)
TCAIR	-1638.1**	-11,084.40
	(-2.0259)	(-1.3638)
TCCAR	-1237.9	14,275.3
	(-.3384)	(.3845)
USPOP	.0994***	.5644
	(3.8325)	(2.2090)**
N	48	12
Adj R^2	96.6	96.5
F	193.4	51.3
DW	1.557	3.04

1. t-values in parentheses.

*, **, *** indicate significant at .1, .05 and .01 level, respectively

discussed in Chapter 2. Unfortunately, there was no similar data for beach resources available to the author except for 1973 and 1990 which was discussed in Chapter 2. With respect to the individual variables in Table 3.1, the quarterly model performed much better than the annual model on statistical significance grounds.

From Chapter 2, a data series are available on recreational saltwater fisheries catch per trip. This series is available over the 1979-90 period and represents a very rough measure of resource scarcity in the fisheries experienced by both residents and tourists on the East and West Coasts of Florida as well as for all Florida. There is no reason to believe that the trend in catch per trip is that much different for residents as opposed to tourists. Although one may think that catch rates are confined to the fisheries in terms of resource scarcity, they do have implications for saltwater beaches in that fishing is an attribute of the beach recreational experience. According to NMFS (1987-1989), 53 percent of all fishing trips along the Atlantic Coast of Florida were conducted via the shore fishing mode. On Gulf Coast of Florida, nearly 42 percent of recreational fishing was conducted from shore.

Table 3.3 shows the results of introducing the recreational catch per trip into the quarterly tourist air arrivals equation in Table 3.2. The variable catch per trip (CPT) was added to the equation to measure a resource

Table 3.3
Linear Least-Squares Estimates of the Quarterly Air Arrival Tourist Equation, 1979-1990: With a Resource Constraint

(Dependent Variable: Air Arrivals)

Variable	East Coast[1] (Catch Rates)	West Coast[1] (Catch Rates)	All Florida[1] (Catch Rates)
Constant	-21,412.1*** (-4.5)	-13,889.2*** (-3.487)	-18,875.0*** (-5.073)
PYPC(T-1)	.3222 (1.4552)	.5108*** (2.741)	.5386*** (2.692)
EXR	-5.83*** (-2.942)	-10.315*** (-5.202)	-9.5906 (-4.682)
TCAIR	-1584.62 (-1.5017)	-413.49 (-.537)	-274.22 (-.323)
TCCAR	-1051.4 (.2401)	-5301.26 (-1.589)	-1377.4 (.416)
USPOP	.0996*** (3.771)	.0551** (2.183)	.0727*** (2.919)
CPT	6.977 (.0804)	119.04*** (3.817)	162.09*** (3.17)
N	48	48	48
Adj. R^2	96.5	97.5	97.3
F	165.07	228.52	208.85
DW	1.55	2.02	1.849

1. t-values in parentheses.

*, **, *** indicate significant at .1, .05 and .01 level, respectively.

constraint on tourism. It is hypothesized that the sign of CPT should be positive. That is, higher catch rates will encourage tourism while lower catch rates will deter tourism. Statistically, the East Coast of Florida's CPT has no impact on the air arrival regression. Thus, the estimated parameters in Table 3.3 (resource constrained) are a little different from the estimated parameters in Table 3.2 (quarterly). On a priori grounds, this series (i.e., Atlantic Coast) on CPT would be expected to have the most pronounced effect on tourism, if any, because of its downward time trend as shown in Figure 2.1 (Chapter 2). The time trend is as follows (t-value in parentheses):

$$CPT_{ECF} = \underset{}{15.187} - \underset{(-6.833)}{2.71T} \qquad (3)$$

$N = 12 \qquad \bar{R}^2 = .82$

where, CPT_{ECF} = recreational catch per trip on the East Coast of Florida.

Over the 1978-1990 period, the statistical trend has been decidedly downward for CPT_{ECF} where the numbers of fish caught per trip declined each year by nearly 3. As will be revealed in Chapter 4, only 16 percent of all tourists (auto and air) participate in recreational saltwater fishing. Other data revealed in Chapter 4 would be consistent with the findings in Table 3.3 -- that aggregate catch rates have had no aggregate effect on tourism. This does not, of course, preclude species substitution mitigating resource scarcity.

The CPT on the West Coast of Florida was positively related to air arrivals and statistically significant at the 1 percent level. The meaning of the coefficient in Table 3.3 is that a one fish increase per trip will increase tourism by 119,040 people to the State of Florida. These statistical findings may be questioned on three grounds. First, the magnitude of tourist arrivals because of a 1 fish change in the CPT is hardly credible. Second, there has been no secular decline in CPT on the West Coast of Florida as opposed to the East Coast as the following time trend reveals:

$$CPT_{WCF} = 1.08 - \underset{(.804)}{.8816T} \qquad (4)$$

$$N = 12 \qquad \bar{R}^2 = .061$$

where, CPT_{WCF} = recreational catch per trip on the West Coast of Florida.

Third, the CPT_{WCF} is cyclical in nature. See Figure 2.2 (Chapter 2). When introduced into the regression, CPT_{WCF} improves the DW statistic so that autocorrelation is reduced. One conclusion is that this effect makes CPT_{WCF} statistically significant, but still a statistical artifact. In sum, the author views the statistical results worth a high degree of skepticism.

As yet, the auto side of tourism has not been explored The theoretical equation is estimated using quarterly and annual data. The results are shown in Table 3.4. In contrast to air arrivals, the annual model performed better

Table 3.4
Linear Least-Squares Estimates
of Auto Arrival Tourists
Equations for Florida, 1979-1990:
No Resource Constraint

(Dependent Variable: Auto Arrivals)

Variable	Quarterly[1]	Annual[1]
Constant	-8,496.0***	-25,364.2***
	(-4.819)	(-3.882)
PYPC	1.0229***	3.3918***
	(7.449)	(6.596)
TCCAR	-1302.22	-25,870.5*
	(-.276)	(-1.486)
TCAIR	1613.01***	6,444.2***
	(4.141)	(4.846)
N	48	12
Adj R^2	94.6	99.1
F	164.52	301.9
DW	1.69	2.17

1. t-values in parentheses.

*, **, and *** indicate significant at .1, .05, and .01 level, respectively.

from a statistical point of view than the quarterly specification for auto arrivals over the 1979-1990 period. As in the discussion above, this is the period over which resource scarcity data are available to this project. For auto arrivals, the CPT variable was added to the no resource constraint annual model shown in Table 3.4. Because of the contradictory evidence revealed by the air arrival results (i.e., resource scarcity discovered to impact tourism if it occurs on the West as opposed to the East Coast of Florida), it is especially important that the research include the auto component of tourism. The results are shown in Table 3.5 using the same format employed in Table 3.3 for air arrivals.

The signs in most of the variables are as expected; however, the CPT or the resource variable is not statistically significant at the normal levels of significance at the bottom of Table 3.5. CPT is not a significant variable impacting auto arrivals. Thus, there is no empirical support for the hypothesis that resource scarcity as measured by catch per trip had an impact on tourist auto arrivals to the State of Florida. The results from the auto sector of tourism lend further skepticism regarding the influence of CPT_{WCF} on air arrivals as discussed above. To further pursue the matter of resource scarcity, this study will explore the results of a direct survey of tourists who engaged in both saltwater fishing and

Table 3.5
Linear Least-Squares Estimates
of the Annual Auto Arrival
Tourist Equation, 1979-1990:
With a Resource Constraint

(Dependent Variable: Auto Arrivals)

Variable	East Coast[1] (Catch Rates)	West Coast[1] (Catch Rates)	All Florida[1] (Catch Rates)
Constant	-32,212.4** (-2.667)	-25,403.70*** (-3.620)	-26,377.5*** (-3.356)
PYPC	3.751*** (5.011)	3.395*** (6.147)	3.453*** (5.832)
TCCAR	-17,131 (-.774)	-26,452 (-1.406)	-25,030.5 (-1.324)
TCAIR	8,191.08** (2.827)	6,279.25*** (4.029)	6,483.47** (4.523)
CPT	242.04 (.686)	34.07 (.265)	58.55 (.285)
N	12	12	12
Adj R^2	99.0	98.9	98.6
F	223.33	209.42	209.81
DW	2.510	2.335	2.364

1. t-values in parentheses.

*, **, *** indicate significant at .1, .05 and .01 level, respectively.

beach use in Florida. That will be the subject matter of the next two chapters.

CHAPTER 4

THE TOURIST SURVEY APPROACH TO RESOURCE SCARCITY

The major thrust of this survey is to obtain direct information on tourists using two important coastal resources: beaches and fisheries. More specifically, this survey is intended to shed light on the two resource scarcity hypotheses articulated in Chapter 1 and explained in Chapter 3 using time series. Such questions as why people visiting Florida and use or do use beach and fish resources in the coastal zone is of fundamental importance to the tourist industry. Hopefully, some of these challenging questions will be answered in this key chapter.

The Resource Scarcity Survey: Participation Versus Non-Participation

Using Rife Market Research, Inc. of Miami, Florida, a subcontract was let by Florida State University to collect data on tourists using saltwater beaches and fisheries in Florida. The survey contacts were structured to meet targets or quotas at airports and arteries from which tourists leave the State of Florida. Targets were based upon total tourist population flow provided by the Florida Division of Tourism. In total, 1,271 tourists were contacted on a random basis within the context of the airport and arteries quotas. A survey instrument was used to ascertain tourist use of saltwater beaches and fisheries in Florida. The survey was conducted from September, 1989 to April 1990 (8 months) to reflect the seasonal pattern of tourism throughout the state. The survey instrument can be found in Appendix A to this report.

Of particular importance, it is necessary that participation rates be calculated from the random tourist contacts. These were as follows:

Activity	Participation Rate (i.e., percent of total contacts
Saltwater Beaches	57.4
Saltwater Fisheries	15.8

According to Outdoor Recreation in Florida (1985, 1987), saltwater beach participation rates for tourists were 57.8 and 50 percent respectively. Bell (1990) estimated a tourist saltwater participation rate of 65.9 percent in 1990. Given sample variability, the participation rate found in this study certainly falls in the mid-range of other reported studies. The participation rate applies to that segment of the tourist population 18 years and older.

In 1990, Bell (1990) found that saltwater recreational fishing participation rates for boat and nonboat fishing were 12.7 and 11.7 respectively for Florida tourists. The participation rate found in this study is somewhat higher, but does not seem unreasonable given other studies.

Since this study was intended to establish the role, if any, of resource scarcity in attracting or not attracting tourists to Florida, those nonparticipants in recreational saltwater beach and fishery uses were asked the principal reason they did not participate. The following results were obtained:

Nonparticipants: Saltwater Beaches
(42.6% of Tourists)

Reason Not Used Beach	Percent Responding
No Interest	37.5
Too Crowded	3.7
No Access	1.1
No Parking	.7
Miscellaneous	57.0

Most beach nonparticipants were just not interested in this recreational activity. Such resource scarcity factors such as crowding, lack of access and parking were only 5.5 percent of all the reasons given for nonparticipation.

To further pursue the question of resource scarcity with respect to saltwater beaches, all contacts were asked whether they have friends or relatives who do not come to Florida or stopped coming to Florida because of a "decline in the quality of the saltwater beach experience" (i.e., resource scarcity). Only 3.5 percent of the 1271 contacts answered affirmatively.

Fishery nonparticipants gave similar answers as beach nonparticipants as shown below:

Nonparticipants: Saltwater Fisheries
(84.2% of Tourists)

Reasons Not Used Fishery	Percent Responding
No Interest	66.2
Low Catch Rate	.4
Too Crowded	.1
Pollution	.1
Miscellaneous	33.3

The answer "no interest" was much more prominent in saltwater recreational fisheries than for saltwater beaches. Less than 1 percent of the nonparticipants in saltwater fisheries mentioned resource scarcity factors such as catch rates, crowding or pollution. Of all the contacts, only 2 percent said their friends or relatives quit coming to Florida to engage in saltwater fishing because of a "decline in the quality of the recreational experience" indicating a relatively small role for resource scarcity in deterring tourism in the aggregate.

According to the Sport Fishing Institute (SFI) (November/December, 1990) several recent studies have begun to shed some light on the factors that influence an angler's decision to fish. Several interesting findings about anglers 18 years and older who recently quit fishing or reduced their fishing activity surfaced:

(1) two-thirds fished with family members;

(2) over half rated themselves as having below average fishing skills;

(3) most fished for relaxation (45 percent);

(4) many disliked contact with fish, cleaning fish and baiting hooks

Family plays a central role in fishing participation according to the SFI. Having fishing partners (i.e., family, friends) is important in increasing or decreasing (i.e., lack of partners) participation.

For both saltwater beaches and fisheries, one approach to analyzing participation rates is to estimate a participation function where one attempts to see how participants differ from nonparticipants based upon socioeconomic characteristics. The following participation equation was hypothesized for both beach and fishing recreational activities:

$$(1) \quad PrP = f(AGE, AGE^2, SEX, WHITE, VISIT, INC)$$

where

PrP	=	probability of participating, 1 = participated, 0 = not participated
AGE	=	age of respondent (years)
SEX	=	1 = male; 0 = female of respondent
WHITE	=	1 = white; 0 = nonwhite
VISIT	=	1 = air traveler; 0 = auto traveler
INC	=	annual income.

The participation function for saltwater beaches in Florida is shown in Table 4.1 using linear OLS and logit forms of the equation. It is hypothesized that age has a parabolic relation to many outdoor recreational activities in terms of participation (i.e., people do not fish intensively earlier

Table 4.1
Estimated Saltwater Beach Participation Function for Florida Tourists Using a Linear OLS and Logit Functions, 1990
(Participation = Dependent Variable)

Variable	Linear OLS[1]	Logit[2]
Constant	.4127*** (6.11)	-.2704 (.24)
AGE	-.00455*** (-5.30)	-.0251* (-1.16)
AGE^2	(3)	(3)
SEX	.0725*** (2.65)	.3152*** (7.02)
WHITE	.2900*** (5.82)	1.2362*** (30.45)
VISIT	.0704** (2.40)	.3091** (5.84)
INC	.0100* (1.57)	.0447* (2.36)
N	1271	1271
Adj R^2	.054	N/A
F	15.52	N/A
X^2	N/A	74.98

1. t-values in parentheses; 2. Wald values in parentheses; 3. Not statistically significant at 20 percent level and omitted from the equation. *, **, *** indicate significant at .1, .05, and .01 level, respectively.

in their lives and later in their lives, but have maximum participation in the "middle" of their lives). AGE^2 was not statistically significant and was omitted from the beach participation equations. It would appear from the results that saltwater beach participation declines with an increase in age. Murdock <u>et al</u> (1990) have projected demographic changes in the U.S. population from which most of the tourists visiting Florida come. In 1988, this population had a median age of 32.3 years, but by 2025, the median age is projected to be 41 years. This projection combined with the participation function would indicate less pressure on the saltwater resources of Florida. Males are more likely to participate in beach activities than females according to the results shown in Table 4.1. Of particular significance, WHITE shows a highly positive relation with beach participation. This has important implications for demand pressures on the beach resources. Nonwhites (i.e., blacks, hispanics, etc.) or minorities have a lower participation rate with respect to saltwater beach use. Murdock <u>et al</u> (1990) forecast in the years 1980 to 2025 that 78 percent of the net change in the populations of the U.S. will be due to minorities. To the degree that tourists visiting Florida reflect the rising percent of minorities in the general population, this may signal less demand pressures on beach resources. This may tend to mitigate against resource scarcity. Visitors arriving by air have a higher participation rate than those arriving by autos. According to Burrett and Williams (1990), "Rest/relation is the main goal of auto tourists today, whereas in 1983 it was beaches. For air tourists, enjoying the beaches has overtaken rest/relaxation" (p. 256). The participation function is consistent with this statement. Although there is a positive association between saltwater beach participation and income, it is very weak. Thus, growing affluence among tourists may have but a marginal influence on beach participation. The net result of this analysis is to indicate that the demand for saltwater beaches in Florida will probably grow less rapidly than the overall tourist market. Walt Disney's Magic Kingdom and EPCOT Center attract the most out-of-state visitors, along with Sea World, Busch Gardens and Spaceport USA in the top five. Apparently, saltwater beaches will no longer be the major reason to visit Florida.

Table 4.2 shows the participation function for saltwater recreational fisheries estimated from the sample of 1,271. Participation in recreational fishing is parabolically related to AGE. AGE and AGE^2 are statistically significant at the 1 percent level in both the linear OLS and the logit equations. In both equations, participation reaches its maximum at approximately age 50 for tourists engaged in saltwater recreational fishing in Florida. Murdock et al (1990) estimate the following median

Table 4.2
Estimated Saltwater Fisheries Participation Function for Florida Tourists Using a Linear OLS and Logit Functions, 1990
(Participation = Dependent Variable)

Variable	Linear OLS[1]	Logit[2]
Constant	-.2731*** (2.97)	-5.9451*** (45.169)
AGE	.0142*** (3.68)	.1302*** (13.20)
AGE^2	-.000141*** (-3.55)	-.0013*** (12.35)
SEX	.2018*** (10.13)	1.849*** (79.46)
WHITE	.4091 (1.13)	.3726 (1.38)
VISIT	.0096 (.45)	.082 (.21)
INC	-.0085* (-1.76)	-.0768* (3.49)
N	1271	1271
Adj R^2	.082	N/A
F	19.83	N/A
X^2	N/A	121.02

1. t-values in parentheses; 2. Wald values in parentheses; 3. Not statistically significant at 20 percent level and omitted from the equation. *, **, *** indicate significant at .1, .05, and .01 level, respectively.

age in the U.S. along with a projection for 2025

Year	Median Age
1980	30.0
1988	32.3
2025	41.0

If tourists to Florida reflect this aging trend, this will increase participation in saltwater fisheries. This may place an added burden on fishery stocks that are already depleted. There is great physical evidence of resource scarcity in the fisheries. As the participation function indicates, recreational fishing is dominated by male (i.e. SEX variable) tourists visiting Florida. Saltwater recreational fishing does not appear to be related to race (WHITE) or mode of arrival into Florida (VISIT). However, this recreational activity appears to be an inferior good for increasingly affluent tourists that visit Florida. Green (1984) found that income elasticities for tourists engaging in saltwater fisheries were either zero of negative. This would be consistent with the results shown in Table 4.2 and would mean, if true, that rising affluence should mitigate against resource scarcity.

Quality of the Recreational Experience for Participants

The first part of this chapter has focused upon the contrast between participants and nonparticipants in recreational saltwater beach and fishery activities. In this section, the results from the survey on the quality of the recreational experience will be discussed. One dimension of resource scarcity in these two forms of outdoor recreation is the "quality of the recreational experience". Let us consider saltwater beaches first.

Two aspects that measure the quality of the saltwater beach are crowding and public access including parking. To those individuals who were tourist beach users, the following question was asked: "Given the present conditions on the beaches, how much would conditions have to change before you would quit vacationing in Florida?" This is an important question since it gets at the root of potential tourist deterrence to visiting Florida because of the unsatisfactory nature of aspects of the resource. Let us consider crowding first.

Would Quit Vacating in Florida
If Saltwater Beach Crowding
Increase by a Given Percent

Scarcity Measure: Percent Increase in Beach Crowding	Percent of Participants	Cumulative Percent
1 to 10%	8.5	8.5
11 to 30%	22.0	30.5
31 to 50%	28.3	58.8
More than 50%	41.2	100.0

The findings indicate an inelastic response of tourists quitting Florida as a vacation spot with even fairly substantial increases in crowding. It must be remembered that these responses are from beach users or participants. A more than 50 percent increase in crowding over "present conditions" would cause 41.2 percent of saltwater beach users to quit vacating in Florida. The average beach user said crowding would have to increase from 31-50 percent above present levels before he or she would quit. An erosion of a beach that results in crowding might produce an attrition of tourists from Florida. Crowding would appear to be a negative externality from these responses.

One aspect of the quality of the recreational beach experience is the degree of public access to common property beaches. To measure the degree of access, the distance between access points was used. Beach users were asked how difficult access would have to get before they would quit vacationing in Florida.

Would Quit Vacationing in Florida
Under Decreased Access to Public Beaches

One Access Point For Every	Percent of Participants	Cumulative Percent
200 feet of beach	15.3	15.3
500 feet of beach	24.0	39.3
1/4 mile of beach	33.3	72.6
1 mile of beach	16.7	89.3
5 miles of beach	8.9	98.2
DK (Don't Know)	1.8	100.0

It would appear that beach users are fairly sensitive to distance between access points in that ninety percent might quit vacationing in Florida if the distance between access points were as much as a mile. The average beach user felt that the interval between access points would have to decrease to one-quarter of a mile above present intervals before he or she would quit. Apparently, the distance between access points to the beach is critical aspect of the recreational experience.

With regard to saltwater recreational fisheries, it is important that we know some aspects of angling such as the percent of tourists that target their species. Targeting is an aspect of avidity toward recreational fishing. A working hypothesis is that targeting a fish makes the angler more sensitive to physical measures of resource scarcity such as catch per unit of fishing effort. From the sample of tourist saltwater anglers, only 28 percent had a principal target species. McConnell et al (1990, unpublished) state "Florida is similar to Georgia in the large proportion of saltwater anglers who do not target a species. For the decade, Florida had the largest percentage of anglers not targeting (62%). Like Georgia, this percentage grew during the decade, from 55 percent in the first half to 66 percent in the latter half. The rise came at the expense of the big game and bottomfish targets" (p. 6). In contrast to popular belief, the survey in this study revealed that tourist saltwater angler targeted small game and bottomfish (e.g., snapper, groupers, black drum) and such species as dolphin and sailfish were seldom mentioned. For the anglers in the sample, they reported mean and median catch of targeted species per day of 8.2 and 4 respectively with latter more in agreement with overall catch rates in Florida of 4.5

shown in Table 2.2 (See Chapter 2). For those that target species, (i.e., 28 percent), they catch a mean and median per day of 8.4 and 6 respectively of nontargeted species. Even those that may not achieve their targets do, on average, land fish.

Nearly three quarters of the tourist anglers do not target any particular species. This is consistent with the hypothesis that tourists in particular are bent on rest and relaxation in outdoor recreation such as fishing, but have no great preference for the species caught. Bell (1991) found that 65 percent of all tourists visiting Florida said that outdoor recreation was very important to them. If all this is true, resource scarcity among some species may have little effect on tourism because of the apparent ease of species substitution. Those tourists that have no target species have a mean and median catch per day of 8.8 and 6 fish respectively. Nontarget species are primarily bottom fish such as snapper and grouper.

To examine resource scarcity once again, a question was asked as to the minimum number of fish you would consider per day before you would quit fishing in Florida. For the two groups of tourist anglers, the following answers were given:

Kind of Angler	Catch Per Day	Minimum Acceptable	Surplus or Deficit
Target Species	(1)	(2)	(1) - (2)
(a) Mean	8.2	1.23	+6.97
(b) Median	4.0	1.00	+3.00
Nontarget Species			
(a) Mean	8.8	5.00	+3.8
(b) Median	6.0	4.00	+2.0

It is quite clear that minimum acceptable or threshold catch per day is well below the actual catch using the mean and median measure of central tendency. The evidence above would appear to indicate that physical indicators of resource scarcity in saltwater recreational fishing in Florida by tourists has not declined to a point where catch rates are unacceptably low. At the very aggregate level, it would appear that catch rates are not yet a factor in deterring tourist anglers from Florida waters. The impact on residents may be entirely different, but this subject is not within the purview of this study of only tourist. The next chapter will consider the user value of beach and fishery resources; the determinants of user value and the economic impact by tourists using saltwater beaches and fishing in Florida's coastal zone.

CHAPTER 5

USER VALUE AND THE ECONOMIC IMPACT OF SALTWATER BEACH AND FISHERY RESOURCES IN FLORIDA'S COASTAL ZONE

User Day Value or Willingness to Pay

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 or the use of a beach because the "product" is not directly marketed in the U.S. In most cases, no one person(s) owns the resources; therefore, a charge cannot be levied upon the use of this resource. To approximate the unit day value of a resource (i.e., fish, beaches), economists use a direct survey approach called the contingent valuation method (CVM). See Mitchell and Carson (1989) for an extended discussion of this technique.

The actual question in the case of recreational fishing is in section B of the questionnaire in Appendix A which concludes by asking, "What is the maximum amount you would pay per fishing day in addition to the fishing license and still fish ___ days per year (from Question 3) in Florida? of the 201 tourist saltwater anglers interviewed, nearly 53 percent indicated they would be willing to pay nothing in answer to this question. The range of responses was from $0 to $50 per day with a mean of $3.18. People who answer zero are sometimes regarded as "protestors". A further analysis of the saltwater angling protestors was made using the dichotomous variable, PFWP (protestor of fishing willingness to pay) or

PFWP	1 =	Willing to pay something
	0 =	Not willing to pay anything.

The explanatory variables were as follows:

AGE	=	age;	
INC	=	income;	
SEX	=	1	Male
	=	0	Female;
WHITE	=	1	White
		0	Nonwhite;
VISIT	=	1	Air
		0	Auto;
FISHYRS	=	years fishing in Florida.	

Table 5.1 shows estimates of the participation function (i.e. willing to pay; not willing to pay) for linear OLS and logit specifications. It appears that there are some socioeconomic variables that explain the tendency for over one-half of the saltwater tourist saltwater anglers refusal to pay anything for the recreational experience. AGE and FISHYR were inversely related to willingness to pay as shown

in Table 5.1. Older persons who have been fishing in Florida for a relatively long time refused to pay anything for the recreational experience or its attributes. It is always difficult to phrase a contingent value question. This question was asked during a period where the State of Florida instituted a saltwater fishing license for tourists and residents for the first time ever. Nonresidents are now required to pay $15 plus fees (i.e., $2) for a 7 day license. Other options are available such as a $5, 3-day license or $30, 1-year license for tourists. Also, there are generally fewer exemptions for tourists compared to residents (e.g., any Florida resident is exempt if fishing from land or a structure fixed to land). Thus the respondents might have perceived the question as an attempt to increase the licensee fee even further. Only those arriving by air as opposed to auto (i.e., VISIT) show an inclination to pay more than the "protestors." Both the linear OLS and logit show somewhat similar results as indicated in Table 4.1. If the respondents feel that the license is an attempt to displace their consumers' surplus, then they may psychologically subtract the license fee from their true willingness to pay. Assuming that most tourists would purchase the 7-day license, then one might infer that the true willingness to pay is $15 plus the mean response of $3.18 or $18.18 per day. In 1980-81, Bell <u>et al</u> (1982) found a willingness to pay per day of $28.64 by tourist

Table 5.1

Estimated Relation Between Those Saltwater Fishermen Who Would Be Willing To Pay Versus Not Willing to Pay for a Day of Angling With Socioeconomic Variables

(Dependent Variable: 1 = Willing; 0 = Not Willing)

Variable	Linear OLS[1]	Logit[2]
Constant	.7462 (3.652)***	1.1802 (.992)
AGE	-.0046 (-1.851)*	-.0513 (.526)
INC	-.0053 (-.288)	-.0109 (.0163)
SEX	.0785 (.0560)	.3440 (.6080)
WHITE	-.0693 (-.499)	-.3674 (.3500)
VISIT	.1807 (2.297)**	.7594 (4.975)**
FISHYRS	-.00730 (-1.994)**	-.0330 (3.5971)**
N	201	201
Adj R^2	.074	N/A
F	3.58	N/A
X^2	N/A	21.099

1. T-values in parentheses; 2. Wald values in parentheses

I, II, III indicate significant at .1, .05 and .01 level, repectively.

anglers in Florida. Even a decade ago, there was substantial opposition to a saltwater fishing license as nearly half the tourists would not pay $10.50 (i.e., a suggested figure by state officials) for such a license. Finally, the willingness to pay for recreational saltwater fishing may be lowered by a secular decline in catch per trip which is very pronounced on the East Coast of Florida. See Table 1.3 (Chapter 1).

To further examine the discussion above, the survey did ask "protestors" why they were unwilling to pay anything for the saltwater recreational fishing experience. The following reasons were given:

Reasons for a Zero Willingness to Pay for Saltwater Recreational Fishing in Florida by Tourists

Reason	Percent of Protestors
1. Do Not Like Fees	77.1
2. Would Go to Another State	14.7
3. Would Do Something Else in Florida	7.3
4. Do Not Understand Question	0.9

Once individuals have been conditioned to common property resource (i.e., no fees charged), one might expect "protestors". The statistical results in Table 4.1 indicating that those that have used the fishery resource for a relatively long time (i.e., FISHYRS) are more likely to be "protestors."

With respect to tourist saltwater beach users, a similar contingent value question was asked or "What is the maximum amount you would pay per beach day in addition to any present beach fees and still visit the beach ___ days"? Of the 729 saltwater beach users interviewed, 46.9 percent indicated they would be willing to pay nothing in answer to this question. The range of responses was from $0 to $150 per day with a mean of $2.00. Although not as relatively numerous as the saltwater recreational fishermen, "protestors" are still very prominent among saltwater beach users visiting Florida. A similar statistical analysis was conducted and is shown in Table 5.2. The same socioeconomic variables were used to explain the dichotomous variable, PBWP (protestor of beach willingness to pay) or

PBWP	1 =	Willing to pay something
	0 =	Not willing to pay anything.

As with saltwater fishing, those tourists using Florida's beaches the longest (BCHYRS) tended to have a higher percentage of protestors. Males (SEX) were more likely to be protestors than females; however, those arriving by air (VISIT) were less likely to be protestors. The linear OLS and logit specifications were in reasonable agreement. Of particular interest, the average willingness to pay was higher than that found by Bell and Leeworthy (1986) in 1984 for saltwater beaches in Florida.

Table 5.2

Estimated Relation Between Those Saltwater Recreational Beach Users Who Would Be Willing to Pay Versus Not Willing to Pay for a Beach Day with Socioeconomic Variables

(Dependent Variable: 1 = Willing; 0 = Not Willing)

Variable	Linear OLS[1]	Logit[2]
Constant	.7194 (4.033)***	.9589 (1.538)
AGE	-.0054 (-.724)	-.0242 (.564)
INC	.0017 (.185)	.0072 (.0345)
SEX	-.0561 (-1.525)*	-.2422 (2.362)*
WHITE	.0409 (.469)	.1838 (.243)
VISIT	.1450 (3.738)***	.6155 (13.692)*
BCHYRS	-.0059 (-3.145)***	-.0258 (9.564)*
N	729	729
Adj R^2	.06	N/A
F	7.52	N/A
X^2	N/A	51.058

1. T-values in parentheses; Wald values in parentheses

*, **, *** indicate significant at .1, .05 and .01 level, respectively.

Tourist Willingness to Pay for
Saltwater Beaches
(All Florida)

Year	Value Per Day (Tourists)	Base Year
1984[1]	1.45	100
1990[2]	2.00	138

1. Bell and Leeworthy (1986)
2. FSU Survey

It is of interest that willingness to pay for saltwater Florida beaches increased by 38 percent over the 1984-1990 period while inflation increased by 26 percent as measured by the consumer price index. In contrast to the findings for recreational fisheries, the willingness to pay found in the sample analyzed in this study seem more consistent with the earlier study by Bell and Leeworthy. No statewide beach fees were imposed in 1990 as was the case for saltwater recreational fisheries.

One similarity between the fishery and beach results was the significant number of protestors in each sample. For saltwater beach users, the reasons given for protesting were as follows:

Reasons for a Zero Willingness to Pay for
Saltwater Recreational Beach Use
in Florida by Tourists

Reason	Percent of Protestors
1. Do Not Like Fees	86.0
2. Would Do Something Else in Florida	7.3
3. Would Go to Another State	4.4
4. Do Not Understand Question	2.4

Saltwater beach users were more vehement in their dislike of fees than saltwater anglers among the visitor population to Florida. Many states have saltwater fishing licenses, but none, to the author's knowledge, have imposed a similar statewide fee on beaches. In contrast to saltwater fishermen, saltwater beach users would rather pay zero, but "do something else in the state" rather than go to another state. Both groups apparently interpret an unwillingness to pay anything as precluding them for the use of the resource.

The Determinants of the Willingness to Pay

Hammack and Brown (1974) were among the first to explain the variation in consumer's surplus or willingness to pay (WTP) among those engaged in the use of a natural resource for outdoor recreation. In essence, they stated that WTP would be a function of socioeconomic and conditions of the resource (e.g., low catch rates per day were hypothesized to lower WTP per day). For this study, WTP per day for saltwater recreational fisheries were hypothesized to depend on the following independent variables:

INC	=	income;
FISHDAYS	=	fishing days per year;
BCHDAYS	=	beach days per year;
OTHDAYS	=	other recreational days per year;
FISHYRS	=	years fishing in Florida;
FTRACOST	=	travel cost from home to fishing site in Florida;
FISHE	=	on-site fishing expenditures per day;

VISIT = 1 = Air arrival; 0 = auto arrival;
TARGET = 1 = Yes; 0 = No
CATCH = number of fish caught per day.

Some explanation of the hypothesized sign for these independent variables is needed here. As Y increases, the demand curve for saltwater fishery services should shift up and to the right, increasing WTP. An increase in FISHDAYS will move the consumer down the demand curve thereby increasing consumer surplus or WTP. BCHDAYS and OTHDAYS are recreational substitutes for FISHDAYS. As these variables increase, the WTP for FISHDAYS should decline as the saltwater angler travels up the demand curve. The longer an angler fishes (FISHYRS) he may experience diminishing annual utility or it may be an indicator of avidity. Thus, the sign on FISHYRS could be plus or minus. One may make larger expenditures to travel to the fishing site (FTRACOST) and spend more while there (FISHE). Thus, the angler may perceive that he is purchasing a richer set of characteristics (i.e., tastes) and therefore value the beach characteristics more. A positive influence might be hypothesized. Air arrivals are hypothesized to have a higher WTP than auto arrivals (VISIT) since air visitors are less inclined to be protestors. See Table 5.1. Those that target their fish are more likely to express a greater avidity and thereby WTP for fishing (TARGET). The key variable in the WTP equation is the catch rate. Higher catch rates for those that target their fish or do not is hypothesized to increase the quality of the recreational experience. However, the survey conducted in this study indicated tat current catch rates are still well above minimum acceptable catch rates for the tourist saltwater angler. Table 5.3 shows the results of the linear OLS regression analysis[2] The results of the analysis are certainly unimpressive. Most of the variables except BCHDAYS; OTHDAYS; FTRACOST and CATCH had the hypothesized signs but only FISHYRS was statistically significant at an acceptable level. See the footnote to Table 5.3 for acceptable levels. The sign on the variable, CATCH, was one of all things, negative but not statistically significant at even the 10 percent level. However, the CATCH results are not inconsistent with the hypothesis that threshold levels of catch rates have not been reached to reduce the WTP by tourist saltwater anglers. Also, the introduction of the saltwater fishing license cannot be overlooked as a

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[2]Previous statistical analysis revealed some socioeconomic differences between protestors (i.e., not willing to pay anything) and those willing to pay something as revealed in Tables 5.1 and 5.2 dealing with saltwater anglers and beach users respectively. Those willing to pay nothing may not be revealing what they might be willing to pay if user charges were imposed on coastal natural resources. Also, zero responses cannot be used in logarithmic form. For these reasons, all protestors were eliminated from both the saltwater tourist angler and beach user samples respectively and the equations were rerun including a logarithmic specification. Unfortunately, no improvement in statistical results was noted over that presented in Tables 5.3 and 5.4 so in the interest of brevity these results were not presented.

Table 5.3

Statistical Analysis of the Determinants of the Willingness to Pay Per Day for the Recreational Experience by Tourist Saltwater Anglers, 1990

(Dependent Variable: Willingness to pay per day)

Independent Variables[1]	
Constant	2.966 (1.832)*
INC	.1332 (.482)
FISHDAYS	.0495 (1.260)
BCHDAYS	.0262 (1.398)
OTHDAYS	-.0052 (-.352)
FISHYRS	-.0986 (-2.079)**
FTRACOS	-.00112 (-.825)
FISHE	.0015 (.335)
VISIT	.5691 (.569)
TARGET	1.387 (1.319)
CATCH	-.0259 (.562)
N	201
Adj R^2	.002
F	1.04

1. t-values in parentheses.

*, **, *** indicate significant at .1, .05, and .01 level, respectively.

confounding factor in interpreting the WTP for an angling day.

With respect to the WTP for beach days, all of the related independent variables used for saltwater angling were used for saltwater beach use except TARGET and CATCH that only applied to the fisheries. For beaches, an anticipation variable, CROWD, was used to reflect a deterioration in the quality of the recreational experience. If the beach user anticipated increased crowding, would he lower his WTP? The results are shown in Table 5.4. Again, the results are not particularly enlightening. Only two variables were statistically significant. These variables, BCHDAYS and FISHDAYS, where the latter variable does not exhibit the hypothesized sign. The equation in Table 5.4 does not seem very helpful in the understanding of why WTP might vary among individuals. The contingent value method may generate responses that are not well linked to the variables specified in Table 5.4.

A Brief Look at the Gross Economic Impact of Tourism in the Fishing and Beach Sectors

Table 5.5 outlines some of the estimated dimensions of tourist participation in the use of fishery and beach resources in the coastal zone of Florida. Remember that individuals 18 years and older were interviewed in deriving the participation rate. Thus, the participation rate was only applied to those 18 years or older in the total 1990 tourist population of 41,421,200 (i.e., 84.6 percent 18 or

Table 5.4

Statistical Analysis of the Determinants of the Willingness to Pay Per Day for the Recreational Experience by Tourist Beach Users, 1990

(Dependent Variable: Willingness to pay per day)

Independent Variables[1]	
Constant	3.5756 (2.326)**
INC	-.0884 (-.612)
BCHDAYS	.0246 (1.978)**
FISHDAYS	.0877 (1.977)**
OTHDAYS	.0176 (1.665)
BCHYRS	-.0465 (-1.541)
BTRACOS	-.00039 (-.442)
BCHE	.00275 (.664)
VISIT	-.0853 (-.124)
CROWD	-.3377 (-1.090)
N	729
Adj R^2	.0157
F	1.921

1. t-values in parentheses.

*, **, *** indicate significant at .1, .05, and .01 level, respectively.

Table 5.5

Estimated Number of Participants, Recreational Days and Gross Expenditures by Tourists on Saltwater Recreational Fishing and Beach Use in Florida, 1990

Recreational Saltwater Fisheries

Total Tourist Population Over 18	X	Participation Rate	=	Total Tourist Fishermen
35,074,925		.158	=	5,547,838
Median Days Fished Per Year	X	Tourist Fishermen	=	Total Angler Days
4.0	X	5,541,838	=	22,167,353
Daily Expenditures in Florida (Median)	X	Total Angler Days	=	Total Expenditures
$100.00 Billion	X	22,167,353	=	$2.217

Recreational Saltwater Beaches

Total Tourist Population Over 18	X	Participation Rate	=	Total Beach Users
35,042,335	X	.574	=	20,133,007
Median Days Used Beach Per Year	X	Tourist Beach Users	=	Total Beach Days
5.00		20,133,007		100,665,005
Daily Expenditures in in Florida (Median)		Total Beach Days	=	Total Expenditures
$60.00 Billion	X	100,665,005	=	$6.040

over). It is estimated that over 5.5 tourists participated in saltwater recreational fishing during 1990. This figure would not include children accompanying adults and is therefore probably biased downward. Of those adults participating in saltwater recreational fishing in 1990, they were asked how many days each participated in that year. In answering, the respondent could count any fraction of a day as one day. Obviously, one could engage in several activities in one day and a tourist desiring to do all there is to be done on a short, once a year (or even a lifetime) opportunity is likely to do so. Therefore, double counting a day is a likely prospect. This will bias days spent in any form of recreation upward. After looking at the distribution of days spent per year by tourist in saltwater fishing, it was also apparent that the mean of 7.8 days was biased upward due to outliers (e.g., 70 days fished per year). The median was selected to counteract double counting and outlier effects. An estimated 22.1 saltwater angler days were spent by tourists while in Florida in 1990. After correcting the Bell et al work for the upward biased tourist series, it is estimated that 9,35 million days were spent on saltwater angling by tourists in 1981. These figures would indicate a doubling of fishing effort by tourists in about a decade. Such fishing pressure would certainly produce a decline in catch per unit of effort among many species such as swordfish, red snapper, red drum and king mackerel to mention but a few stressed species. Yet, in the aggregate, tourist saltwater anglers claim according to the survey upon which this study is based that a threshold of catch rates has not been reached (i.e., extreme physical resource scarcity) that would deter saltwater anglers from visiting Florida. Finally, the median daily expenditure while fishing was selected to minimize outliers and when multiplied by saltwater angler days yields gross expenditures of $2.215 billion. Leventhal and Company estimate that Disney World and Orange/Osceola Counties generated $3.15 billion in gross expenditure in 1987 which includes mainly tourists, but also residents. Although distributed throughout Florida, recreational fishing is a significant component of tourism.

Turning now to saltwater beaches in Table 5.5, the starting point is with the tourist population 18 years and older as discussed above. Of the over 35 million tourists (i.e., adults) visiting Florida in 1990, 57.4 percent used the saltwater beaches or over 20 million tourists as shown in Table 5.5. The median days per year was used because of outliers and double counting a day as discussed in some detail above. Five days a year was spent by each adult tourist (i.e., 18 years and older) visiting Florida. When multiplied by total beach users, over 100 million saltwater beach days were expended in 1990 by tourists. In 1984, Bell and Leeworthy (1986) estimated over 69 million beach days were spent by tourists in Florida's coastal zone. In the last six years, the pressure on Florida's finite saltwater beaches has expanded by over 45 percent. Finally, the estimated beach day was multiplied by the beach-related expenditures per day of $60 (median) to derive gross expenditures of over $6 billion. These expenditures support numerous jobs. Since this report deals exclusively with tourists, the study focuses upon an export industry (i.e., part of the economic base). This export industry has a multiplier effect on the Florida economy which increases the impact of the direct gross expenditures estimated in this study. However, such quantification of the total impact (i.e., direct and indirect) is beyond the scope of this report.

CHAPTER 6

POLICY IMPLICATIONS AND CONCLUSIONS

Policy Implications

Burrett and Williams (1990) state that "The outlook for tourism in Florida through the year 2000 is excellent" (p. 263). They assume that Florida's natural resource will still be in place over the course of the next ten years. Also, the diversification of tourism may also be a factor in preventing undue pressure on natural resources of the coastal zone. The hypothesis pursued in this report is that resource scarcity may be a deterrence or obstacle to the growth in tourism in Florida. Although the conclusions from earlier chapters tend to reject this hypothesis, this does not mean that there are no important policy issues surrounding saltwater fishery and beach resources. The "wolf of resource scarcity" is always at the door! Because of projected economic trends, tourism in Florida is not expected to grow as fast over the 1991-2005 period <u>even assuming no resource constraint</u>! However, policies must be in place to mitigate against the prospect of resource scarcity. Physical resource scarcity is inevitable with increasing demand for what are largely common property resources without offsetting policies.

The problem of physical resource scarcity or declining catch per unit of fishing effort in saltwater recreational fisheries in Florida has been recognized over the last two decades. Jurisdiction for these resources is split between the State of Florida (Marine Fisheries Commission) and the Federal government (Gulf and Atlantic Fishery Management Councils). Such agencies must balance recreational and commercial interests in the use of the marine fishery resources. With respect to recreational fisheries, the main policy tool is the imposition of daily bag limits per angler. Such an imposition is a recognition of resource scarcity. According to the Gulf of Mexico Fishery Management Council, for example, the species below are regulated in the following manner:

	Species	Daily Bag Limit
1.	Cobia	21/person
2.	Spiny Lobster	6/person
3.	King Mackerel	2/person
4.	Spanish Mackerel	5/person
5.	Red Drum	0/person
6.	Bluefin Tuna	1/person/year
7.	Billfish	none
8.	Marlin	none
9.	Red Snapper	7/person
10.	Other Snapper	none
11.	Groupers	5/person
12.	Black Seabass	none
13.	Greater Amberjack	3/person
14.	Jewfish	0/person

Red drum and jewfish have become severely depleted resources and all recreational catch in Federal waters is prohibited. In Chapter 4, the survey asked tourists about their minimum acceptable catch per day which was as follows (mean values):

Target species: 1.23/person

Nontarget species: 5.00/person

Although these thresholds are not specific to any one species, they do indicate in a general way that current bag limits are somewhat above these critical points as indicated by the survey. Leeworthy (1990) and Green (1989) already have identified king mackerel (2/day/person) and red drum (0/day/person) respectively as species where anglers are extremely sensitive in terms of fishing demand to catch rates. By 2005, it is estimated there will be 8,831,000 tourist saltwater anglers (66.066 million X .846 X .158) 18 years and older compared to an estimated 5,536,689 in 1990 (Table 5.5), a nearly 60 percent increase. With a finite fishery resource, bag limits will have to be lowered by about 60 percent to spread the resource over more tourists and residents. This is assuming that the present bag limits are protecting the presently stressed populations. These are some of the parameters that policymakers must consider when adopting a bag limit strategy. Other strategies to consider are designation of such species as king mackerel a sports fish only or placing higher license fees on species short in supply. A further discussion of this issue is well beyond the scope of this study except to say that more survey work at the species level is needed to establish angler threshold of response to catch rates and bag limits.

Over the 1973-1990 period, there has been no appreciable change in the percent of Florida saltwater beaches that have been designated as those experiencing critical erosion (i.e., about 28 percent. See Table 1.2 (Chapter 2). Critical erosion is a physical indicator of resource scarcity where there is a steady loss in the resource itself. According to the Florida Division of Beaches and Shores (September 1991), a Beach Erosion Control Program was started in 1965. Since the program's inception over 127 million <u>state</u> dollars have been spent for the preservation, protection and restoration of Florida's beach resources. In nominal dollars, annual appropriations averaged $2.5 million over the 1965- FY 1985-86, but increased to $12.4 million yearly from FY 1986-87 to date. Over the 1965-1990 period, inflation increased by 250 percent as measured by the producer price index. Thus, the increase in real dollars is much less than it appears in nominal dollars. The Division of Beaches and Shores argues that restoration of beach resources has been more effective after the establishment of beach restoration management planning in 1985. They point to the following data. Prior to management, 36.3 miles of beach were restored over a 21-year period, an average per year of 1.7 miles. The post management period saw construction or preparation for construction of 28.1 miles over a six-year period or 4.7 miles per year. The total number of beaches restored since the inception of the overall program in 1965 has been 64.4 miles. In contrast to the fisheries, beaches may be a somewhat simpler policy issue. That is, there are no recreational-commercial conflicts; no Federal-State jurisdictional boundaries to be reconciled and one is not dealing with a biological resource. This is not to say that the policy issues with respect to beaches are not complex. The distribution of beach renourishment money is a complex issue and according to the DBS (1991), "...a more equitable distribution of funds for critical beach erosion problems on a statewide basis occurred after beach restoration management planning began in FY 1986-87" (p. 26). It still may be unacceptable to have 28.5 percent of Florida saltwater beaches designated as critically eroded today in light of expected tourist demands. By 2005, it is estimated there will be 32,081,900 tourists using saltwater beaches (66.066 million X .846 X .574) 18 years and older compared to 20,114,300 in 1990. Those saltwater beaches that are critically eroded may be needed to accommodate the projected expansion in demand even though the rate of growth in overall tourism is expected to ease. More research is needed on the relation between projected regional demand and supply of saltwater beach resources.

Conclusions

The purpose of this inquiry was to examine the hypothesis that resource scarcity has and will act to reduce tourism to Florida. Since tourism is heavily concentrated in the coastal zone, two resources were researched to determine the impact on tourists of changes in saltwater recreational beaches and fisheries. The following basic conclusions were reached:

1. An examination of tourist air and auto arrivals to Florida over the 1979-1990 period revealed no evidence that <u>overall</u> increasing resource scarcity in the saltwater fisheries of which nearly 16 percent of all tourists participated had any impact on tourism. Time series on the status of saltwater beach resources were not available;
2. Of the 35 million tourists (18 years or older), 57.4 and 15.8 percent participated in saltwater beach and fishing recreation respectively while in Florida in 1990;
3. Participation (tourist) in saltwater beach recreation was greater for white males arriving by air and having a higher income than the general tourist population. However, saltwater beach participation declined with age;
4. Participation (tourists) in saltwater recreational fisheries was greater among white males having lower incomes than the general tourist population. Such participation reached its maximum at 50 years of age;

5. When asked about potential beach crowding, tourists were not very sensitive to potential increases in saltwater crowding above existing level. Tourists were more sensitive to the frequency of beach access points;

6. Saltwater anglers exhibited success rates (i.e., catch per day) significantly above a threshold where they would quit fishing in Florida;

7. Since both saltwater beaches and fisheries are common property recreational resources, tourists were asked their willingness to pay using the CVM-contingent valuation method. This is needed since there are no organized markets for these recreational activities. Nearly 53 percent of the tourist saltwater anglers refused to pay anything for the recreational experience while nearly 47 percent of the saltwater beach users also refused to pay anything. Tourist anglers, as a group, were willing to pay $3.18 per day while beach users were willing to pay $2.00 per day as a measure of their consumer surpluses;

8. The variation in willingness to pay among users for both the fishery and beach resources was not well explained by socioeconomic variables, tastes or natural resource scarcity;

9. It was estimated that tourist saltwater angler spent $2.2 billion while tourist beach users spent $6 billion while in Florida in 1990;

10. The two resource scarcity hypotheses were rejected. This study found that aggregate catch rates were not a factor related to that segment of tourists that are saltwater anglers. Species substitution probably mitigates against a negative effect of resource scarcity on tourism. With 28 percent of Florida's saltwater beaches classified as under critical erosion over the 1973-1991 period, there is no significant evidence that this condition has been a significant deterrent to tourism in the aggregate. As with fisheries, beach substitution is most likely to have mitigated against resource scarcity within regions of Florida for visiting tourist;

11. The rejection of the two resource scarcity hypotheses should not produce a feeling of complacence. With catch rates falling and introduction of bag limits, tourist saltwater anglers may be deterred from Florida in the future especially with a 50 percent increase in anglers expected by the year 2005. The saltwater beaches with 28 percent still critically eroded will also experience increased growth and with it the potential for resource scarcity negatively impacting Florida tourism.

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Appendix A

Interviewer (initials):___
Area:_________________________ (47)
Date:_________________________ (48)

SURVEY QUESTIONNAIRE
Florida Sea Grant Tourist - Resource
Scarcity Study
Saltwater Beach and Recreational
Fishing Participants

CODE

A. Screening Questions

Good AM/afternoon. We are talking to Florida visitors today, that is folks who are in Florida for over 24 hours and have their principal home in another state.

1. Over the last 12 months, did you participate in any of the following coastal activities while visiting Florida?

	Activities	1 Yes	0 No	Nearest City or Town to Activity	County	CODE
(a)	Saltwater Recreational Fishing	☐	☐	________	______	1-2
(b)	Saltwater Beach Activities/Use	☐	☐	________	______	3-4

2. If NO to either or both of the two activities, answer the following questions:

(a) What was the principal reason you did not participate?

Saltwater Fishing (Check only one if you did not participate) 5

(1) Have No Interest in this Form of of Recreation ☐

(2) Too Crowded ☐

(3) Low Catch Rate (Poor Fishing) ☐

(4) Waters Polluted ☐

(5) Other (specify)________ ☐
____
____

CODE

Saltwater Beach Use (Check only one if you did not participate) 6

(1) Have No Interest in this Form of Recreation ☐

(2) Too Crowded ☐

(3) Lack of Parking ☐

(4) Lack of Easy Public Access other than Parking (e.g., no roads, etc.) ☐

(5) Other (specify)———— ☐

____

____

(b) Do you have friends and/or relatives who have not been attracted to Florida or have stopped coming to Florida because they have told you there is

(1) ☐ decline in the quality of the recreational fishing experience (e.g., poor fishing, pollution, etc.) 7-0,1

(2) ☐ decline in the quality of the saltwater beach experience (e.g., too crowded, poor public access, etc.) 8-0,1

(3) ☐ none of the above (check here if answer to (1) and (2) is no). 9

INTERVIEWER: IF RESPONDENT ANSWERS "NO" TO BOTH SALTWATER FISHING AND BEACH USE IN QUESTION ONE, SKIP THE FOLLOWING QUESTIONS AND PROCEED TO SECTION F QUESTIONS ON LAST PAGE OF QUESTIONNAIRE.

3. If YES to either or both of the activities in Question 1, answer the following questions:

(a) Over the last 12 months, how many trips to Fla. have you made including this one: How many days on all trips did you engage in the following recreational activities? Definition: Any part of a day please count as a whole day.

(1) _____ Number of Trips over the last 12 months. 10

(2) _____ Number of days saltwater recreational fishing (last 12 months) (count any fraction of a day as one day) 11

(3) _____ Number of days used saltwater beach (last 12 months) (count any fraction of a day as one day) 12

(4) _____ Total days spent in Florida on all other recreation (last 12 months). Definition: recreation includes horse track, sea world, Disney, etc. 13

CODE

(5) ______ Total days spent in Florida (last 12 months) (number 5 should be the same as number 4 if all days on recreation/vacation) 14

(b) Thinking of all your trips to Florida, how many years have you

(1) saltwater fished in Florida ______ yrs 15

(2) used saltwater beaches in Florida ______ yrs 16

(c) On average, how many relatives or friends from out of state accompanied you on these trips and engaged in

(1) saltwater fishing in Florida with you ______ # 17

(2) the use of saltwater beaches in Florida with you ______ # 18

B. Expenditures

1. Travel to Florida by Auto (skip if always by air)

(a) Number of round trip miles from your home to saltwater fishing site in FL (if more than one site, pick your principal site or the one you spent the most time at) ______ miles 19

(b) Number of round trip miles from your home to saltwater beach site in FL (if more than one site, pick your principal site) ______ miles 20

2. Travel to Florida by Air (skip if always by auto)

(a) cost of round trip air fare for you from home to near or at saltwater fishing site in FL (pick principal site) $______ 21

(b) cost of round trip air fare for you from home to near or at saltwater beach site in FL (pick principal site) $______ 22

3. Expenditures while in Florida

(a) On average, what are your daily expenditures while saltwater recreational fishing in Florida, including lodging, food and drink, travel, bait, guides, fees, licenses and rentals $______/day 23

(b) On average, what are your daily expenditures while using saltwater beaches in Florida including lodging, food and drink, travel and beach access fees $______/day 24

CODE

C. Principal Sites

1. What is the name of the principal saltwater fishing site used while in Florida? ________________ site. (Note: If there is no specific name, then indicate coastal city or town nearest site). County of principal site ______________________ 25

2. What is the name of the principal saltwater beach used while in Florida? ______________________ beach. County of principle site ________________________________ 26

D. Willingness to Pay

1. Beginning in 1990, the State of Florida will require a saltwater fishing license - $15 for a 7-day and $30 for an annual license. The revenues from these fees will be used for fishery management. Suppose that, because of pollution, overfishing and other saltwater fishing-related problems, it became necessary to charge additional fees to cover the costs of fish hatcheries, pollution control and other fishery management activities. The goal of these activities would be to maintain catch rates and water quality at their present levels. What is the maximum amount you would pay per fishing day in addition to the fishing license and still fish ______ days per year (from Question 3) in Florida? 27

$____________/day If zero then 28

Reason for saying zero (circle one) 29

(1) Would do something else in Florida.
(2) Would go to some other state.
(3) Do not understand the question.
(4) Do not like the idea of charging fees.

2. Because of beach erosion, trash wash-ups and water pollution, suppose it became necessary for beach users to agree to pay a daily fee to cover the costs of maintaining the beach and water at its current level of quality. What is the maximum amount you would pay per beach day in addition to any present beach fees and still visit the beach ______ days (from Question 3)? 30

$____________/day If zero then 31

Reason for saying zero (circle one) 32

(1) Would do something else in Florida.
(2) Would go to some other state.
(3) Do not understand the question.
(4) Do not like the idea of charging fees.

CODE

E. Quality of the Recreational Experience

1. One aspect of the quality of saltwater recreational fishing is the number of fish caught per day. Do you have a principal target species? 33

(0) No ☐ If No, go to (c)

(1) Yes ☐ If Yes

(1) Principal target species is ______________ 34

(2) How many of target species do you usually catch per day______________ 35 NTARD

(3) How many of all other fish than the target do you usually catch per day ______________ 36 NOTARD

[go to (e)]

(c) How many of all fish do you usually catch per day ___________ 37 FCPP

(d) What is the principal species caught ___________ 38

(e) What is the minimum number of fish per day you would consider acceptable before you would quit fishing in Florida?

___________ minimum number of target species per day 39
if answer to 1(a) is NO.

___________ minimum number of all fish per day 40

2. Two aspects that measure the quality of a saltwater beach are crowding on the beach and public access including parking. Given the present conditions on the beaches, how much would conditions have to change before you would quit vacationing in Florida?

Increased Crowding 41

(1) 1 - 10%

(2) 11 - 30%

(3) 31 - 50%

(4) more than 51%

Decreased Public Access 42

(1) one access point for every 200 ft. of beach

(2) one access point for every 500 ft. of beach

(3) one access point for every 1/4 mile

(4) one access point every mile

(5) one access point every 5 miles

CODE

F. Background Information on Respondent

1. What group includes your age (show card)? 43

2. Which category includes your total annual income before taxes (show card)? 44

   1. Less than $10,000
   2. $10,000 - under $20,000
   3. $20,000 - under $30,000
   4. $30,000 - under $40,000
   5. $40,000 - under $50,000
   6. $50,000 - under $60,000
   7. $60,000 - under $70,000
   8. $70,000 - under $80,000
   9. $80,000 or above

3. Sex M [ ] 1 F [ ] 0 45

4. Are you: (1). White (2). Black (3). Hispanic or (4). Other (circle one) 46

5. Did you visit Florida by [ ] air or [ ] auto this trip? 49

<u>Thank you very much for participating in this important survey.</u>

Appendix B
Socioeconomic Characteristics of Tourist Sample, 1990

Characteristics	All Contacts N=127/	Saltwater Beach Users N=729	Saltwater Anglers N=201
Average Age	47.33	45.33	49.47
Average Total Annual Income	$36,200	$37,500	$36,000
Sex (Percent)			
Male	53	55	85
Female	47	45	15
Ethnicity/Race (Percent)			
White	91.8	95.2	95.2
Black	5.4	3.2	3.2
Hispanic	2.0	1.2	1.2
Other	.8	.4	.4

Source: Florida State University, Department of Economics