

Socioeconomic Study of Reefs in Southeast Florida



Technical Appendix
to the Final Report
October 19, 2001 as
revised April 18, 2003 for

Broward County

Palm Beach County

Miami-Dade County

Monroe County

Florida Fish and Wildlife
Conservation Commission

National Oceanic and
Atmospheric Administration

Principal Investigators:

Grace M. Johns, Ph.D., Project Manager

Vernon R. Leeworthy, Ph.D.

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HAZEN AND SAWYER
Environmental Engineers & Scientists

In association with



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**Florida State
UNIVERSITY**



April 17, 2003

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Socioeconomic Study of Reefs
In Southeast Florida – Technical Appendix

Dear Ms. Fletcher

We are pleased to submit ten bound and one unbound copies of the Technical Appendix to the Final Report of the Socioeconomic Study of Reefs in Southeast Florida dated October 2001, as revised April 18, 2003. The Final Report was written with the intent to inform the reader of the methodology used while not overwhelming the reader with excessive detail. This appendix describes those methods used to estimate the economic contribution and use values of the reefs that were not described in the Final Report. Therefore, readers wishing to understand the complete methods used should first refer to Chapters 1 and 2 of the Final Report and then fill in any information gaps by reviewing this Technical Appendix.

This study provides estimates of the reef use, reef user values, and the economic contribution of reef-related expenditures during the time period June 2000 to May 2001. This technical appendix and report are the product of a significant survey research effort and analysis of the uses and values of the artificial and natural reefs in southeast Florida. This project's success was directly attributable to the assistance and support of many individuals involved in this 20-month long effort.

We thank you, Pamela Fletcher, for your consistent support and guidance during this project. We know you spent significant effort in making sure this project was a success. We have enjoyed working with the funding agencies and you and your staff at Broward County.

Very truly yours,

HAZEN AND SAWYER, P.C.

Grace M. Johns, Ph.D.
Senior Associate
Economist and Project Manager

Enclosures

C: File 40289

Socioeconomic Study of Reefs in Southeast Florida

Technical Appendix to the Final Report

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Introduction

This is the Technical Appendix to the Final Report titled, “Socioeconomic Study of Reefs in Southeast Florida”, dated October 2001. The Final Report was written with the intent to inform the reader of the methodology used while not overwhelming the reader with excessive detail. This appendix describes in more detail those methods used to estimate the economic contribution and use values of the reefs.

Project Purpose

This study estimated the net economic value of the natural and artificial reef resources of southeast Florida to the local economies and the reef users. Southeast Florida is defined as the counties of Palm Beach, Broward, Miami-Dade and Monroe. Monroe County includes the Florida Keys. This study employed extensive survey research to measure the economic contribution and the use values of artificial and natural reefs over the twelve-month period of June 2000 to May 2001. The reef users surveyed were boaters who are recreational fishers (commercial fishers were not included), reef divers, reef snorkelers, and/or visitors viewing the reefs on glass-bottom boats.

The primary goals of this study were to estimate the following values:

- Total reef use of residents and visitors in each of the four counties over a twelve-month period as measured in terms of person-days
- Economic contribution of the artificial reefs as residents and visitors spend money in each of the four counties to participate in reef-related recreation
- Economic contribution of the natural reefs as residents and visitors spend money in each of the four counties to participate in reef-related recreation
- Willingness of reef users to pay to maintain the natural reefs of southeast Florida in their existing conditions
- Willingness of reef users to pay to maintain the artificial reefs of southeast Florida in their existing conditions
- Willingness of reef users to pay for additional artificial reefs in southeast Florida
- Socioeconomic characteristics of reef users

Economic contribution is measured by total sales, income, employment and tax revenues generated within each county. In addition, the opinions of residents regarding the existence or establishment of “no-take” zones as a tool to protect existing artificial and natural reefs are presented.

This study was funded by each of the four counties – Palm Beach, Broward, Miami-Dade and Monroe; the Florida Fish and Wildlife Conservation Commission through the use of Federal Aid in Sport Fish Restoration funds; and the National Oceanic and Atmospheric Administration

(NOAA) through the Socioeconomic Monitoring Program for the Florida Keys National Marine Sanctuary.

Project Objectives

For each of the four counties, the population of reef users was divided into two groups – (1) visitors to the county and (2) residents of the county. Visitors are defined as nonresidents of the county that they are visiting. For example, a person from Broward County visiting the Florida Keys in Monroe County is considered a visitor to Monroe County. Likewise, a person from New York visiting the Florida Keys is considered a visitor. For each county, residents are defined as persons living in the county who used the county’s reefs on a private boat registered in that county. For example, a person who lives in Broward County and fishes for recreation on the reefs off the shores of Broward County using a private boat registered in Broward County is a resident of Broward County.

This study conducted four surveys as follows:

- Resident boater survey – conducted in the Fall of 2000
- General visitor survey – conducted in the Summer of 2000 and the Winter of 2001
- Visitor boater survey – conducted in the Summer of 2000 and the Winter of 2001
- Charter / Party boat survey – conducted in the Spring of 2001

The purpose of the resident boater survey and the visitor boater survey was to collect information to estimate the following characteristics:

- Percentage of boaters who fish, dive and / or snorkel on the reefs;
- Total of itemized expenditures related to using the reefs (lodging, food, gas, equipment, etc.);
- Number of person-visits and person-days of reef use by type of reef and activity;
- Willingness-to-pay to protect southeast Florida reefs in their existing condition; and,
- Willingness-to-pay for additional reefs in southeast Florida.

In addition, at the request of the counties, the resident survey also includes questions regarding “no-take” zones in their counties of residence.

The purpose of the general visitor survey was to obtain estimates of the total number of visitors to each county and the percentage of visitors who boat.

The charter/party boat survey was a survey of for-hire operations that take out passengers for recreational fishing, snorkeling, scuba diving and glass-bottom boat rides in saltwater off the

coasts of the four counties. The primary purpose of this survey was to estimate the proportion of charter / party service activity that takes place on the artificial versus the natural reefs in each county.

Report Organization

This Technical Appendix begins with the Introduction. Chapter 1 provides the methods used to estimate resident and visitor use of artificial and natural reefs. These methods were also described in the Final Report. Chapter 2 provides the methods used to estimate the economic contribution of the reefs as residents and visitors spend money using the reefs. Chapter 3 provides the methods used to estimate the use values of the reefs to residents and visitors. This Technical Appendix concludes with the Bibliography reprinted from the Final Report. The survey instruments are provided in the Final Report.

Chapter 1 – Methodology – User Activity

This chapter describes the methods and data used to estimate user activity of residents and visitors on artificial and natural reefs.

1.1 User Activity - Residents

There are two fundamental measures of natural resource user activity such as scuba diving the reef systems off southeast Florida. First, user activity can be measured by the number of boating days. This is usually called “party-days” since each boat carries one or more individuals depending, for the most part, on the size of the boat. Party-days gives us a “boating measure” of activity. This measure is important for several purposes. For instance, this measure can be used to estimate boat ramp use for planning purposes. In addition, this measure can be used to estimate the number of boats that are expected to arrive at artificial and/or natural reefs in a given day.

Finally, the term “party-days” is used in economic analysis because the party is the principal spending unit. When we multiply the number of party-days by the number in the party, we obtain “person-days”. This second measure of boating activity is important since it tells us how many people will be fishing and/or diving on a particular reef during a day. In the case of fishing, a person-day is the principal measure of fishing effort or pressure on a renewable resource (e.g., fishery biomass).

"Person-days" is of particular significance when estimating the “user value” of recreating while using a reef. The principal unit of both consumption and production of an activity involving the reefs is a “person-day”. If it were determined that recreational fishers valued a day of fishing at a reef at \$10 per person per day, then a party of four (i.e., the party-day) would receive \$40 in “use value” (four person days multiplied by the value per person per day from recreational fishing). Thus, while the party-day is boat oriented in terms of accommodating a boatload of fishers, a person-day measures both fishing effort on a resource and the unit of output of the resource available to the user. Thus, the first order of business in this project was to estimate the number of party-days and person-days by residents involved in reef-related activities off the southeastern coast of Florida.

Table 1.1-1 presents resident boater user activity on artificial and natural reefs for Palm Beach, Broward, Miami-Dade and Monroe counties as measured in party-days and person-days. These activity measures were estimated in a two-step procedure. First, a mail survey was sent to a sample of registered boat owners in the four counties in the study area during the Fall of 2000. A total of 12,500 surveys were mailed out to registered boat owners in the study area who owned boats at least 16 feet long. The boat size distinction was made because reef visitations are heavily concentrated among larger boats and we wished to target the segment of the boater population that are heavy reef users. This allowed us to obtain a larger sample of our targeted group with greater statistical reliability. Florida State University received 2,543 completed surveys from resident boaters. Of the surveys received, 65.2 percent of respondents reported using artificial and/or natural reefs in the last 12 months. Eliminating those not using reefs, we obtained 1,658 surveys from resident boaters who indicated they do use the reefs.

The distribution of resident reef users who responded to the survey is provided in the table below.

Boat Length Distributions of Resident Reef Users Who Responded to the 2000 Survey (Percent)

Boat Length Category	Palm Beach	Broward	Miami-Dade	Monroe	Total
16' to 25' 11"	66	65	79	73	71
26' to 39' 11"	29	30	18	23	25
40' to 64' 11"	5	5	3	4	4
65' to 109' 11"	0	0	0	0	0
110' and Greater	0	0	0	0	0
	100	100	100	100	100

The number of registered boats in the county at least 16 feet long, that are owned by a county resident, and that carried parties to the reef in the last 12 months was estimated using the inventory of boat registrations furnished by the Florida Department of Highway Safety and Motor Vehicles (2000). From this inventory, boats less than 16 feet and owners who live outside of the county were excluded. The remaining number of boats in each county was multiplied by the proportion of survey respondents who said they used their boats on the county's reefs in the last 12 months. The resulting target population of boats carrying parties that used the reefs at least once in the past 12 months is provided below.

Target Population of Resident Boats by County in Southeast Florida

County	Total Registered Boats in County	Target Population - Number of Boats Carrying Parties that Used the Reefs
Palm Beach	56,924	19,463
Broward	61,124	23,854
Miami-Dade	67,936	30,695
Monroe	26,564	14,477

The sample data obtained from the survey was then used in combination with the target population of boats to estimate the total number of party-days spent using artificial and natural reefs off the coast of each county. The results are provided in Table 1.1-1. Reef-using respondents were asked to estimate their total days spent on or about the reefs over the last 12 months. For example, we estimated that resident boaters of Palm Beach County spent a total of 779,000 party-days on reefs over the last 12 months. Total party-days was estimated as follows. Palm Beach County survey respondents stated that they spent, on average, 40 days over the 12-month period using their boat to visit the reef system. The "40-days" was multiplied by the target population of boaters for Palm Beach County (i.e., 19,463 times 40 days). All other estimates of party-days for each county in Table 1.1-1 were derived in the same manner.

Table 1.1-1 (Residents)
A Summary of Resident Boater User Activity on
Artificial and Natural Reefs in Southeast Florida, 2000

Total "Party-Days" on All Reefs		
County	Total Party-Days (Thousands)	Percentage for Each County
Palm Beach	779	20%
Broward	930	24%
Miami-Dade	1,105	29%
Monroe	1,013	26%
Total All Counties	3,827	100%
Total "Party-Days" on Artificial Reefs		
County	Total Party-Days	Percent Spent on Artificial Reefs in County
Palm Beach	281	36%
Broward	319	34%
Miami-Dade	376	34%
Monroe	345	34%
Total All Counties	1,321	35%
Total "Party-Days" on Natural Reefs		
County	Total Party-Days	Percent Spent on Natural Reefs in County
Palm Beach	497	64%
Broward	612	66%
Miami-Dade	729	66%
Monroe	669	66%
Total All Counties	2,507	65%
Total Person-Days on All Reefs (Thousands)		
County	Total Person-Days	Percentage for Each County
Palm Beach	2,978	20%
Broward	3,718	25%
Miami-Dade	4,506	31%
Monroe	3,379	23%
Total All Counties	14,581	100%
Total "Person-Days" on Artificial Reefs		
County	Total Person-Days	Percent Spent on Artificial Reefs in County
Palm Beach	1,075	36%
Broward	1,281	34%
Miami-Dade	1,540	34%
Monroe	1,102	33%
Total All Counties	4,998	34%
Total Person-Days on Natural Reefs		
County	Total Person-Days	Percent Spent on Natural Reefs in County
Palm Beach	1,903	64%
Broward	2,437	66%
Miami-Dade	2,965	66%
Monroe	2,277	67%
Total All Counties	9,582	66%

Note: A party-day is a one-day visit by a party of people. A person-day is a one-day visit by one individual.

Miami-Dade County had the most party-days while Palm Beach County had the least party-days among the four counties evaluated. This was primarily due to the fact that Miami-Dade County has the largest number of boats in the target population. Among all counties, resident boaters spent over 3.8 million party-days using the reef system.

Respondents were asked to distribute their reef activities by the type of reef used. Without much variation among counties, resident reef-users spent two-thirds of their party-days on natural as opposed to artificial reefs. Boater preference for natural reefs is hardly surprising, but it does show that artificial reefs are apparently substitutes for natural reefs. This is of interest to the artificial reef program managed by state and local officials.

The second half of Table 1.1-1 summarizes the estimated number of person-days for residents by county and reef type. For this estimate, we purposely netted out any nonresidents since they are, in fact, tourists. This is a significant factor in the Florida Keys, which attracts more friends and relatives from outside Monroe County than any other county in the study area. Using the results of the survey, the average resident party size was estimated to be 3.8 individuals. The total number of person-days per county is equal to the resident party size times the number of party-days per county. For all four counties, the number of person-days was estimated at 14.6 million. As expected, about two-thirds of these person-days were spent on natural as opposed to artificial reefs.

Respondents were then asked to breakdown their time on reefs by recreational activity. These activities were (1) fishing, (2) snorkeling and (3) scuba diving. Table 1.1-2 summarizes the breakdown of party-days by activity for all the counties. Alternatively, Table 1.1-3 shows the number of party-days and person-days broken down by this classification for each county separately.

**Table 1.1-2 (Residents)
Party-Days by Activity for All Counties**

Activity	Number of Party-Days Spent on Reef System by Activity	Percentage of Total Party-Days by Activity
Fishing	2,040,159	53%
Snorkeling	911,293	24%
Scuba Diving	875,758	23%
Total	3,827,209	100%

Resident fishing constitutes about 53 percent of all resident party-days in the four county study area. Snorkeling and Scuba diving are almost evenly split in terms of the number of party-days, with snorkeling at 911 thousand and scuba diving at 876 thousand party days. Thus, reefs accommodate three rather important recreational activities as indicated in these two tables. These percentages remain similar for both artificial and natural reefs. That is, about two-thirds of fishing, snorkeling and scuba diving are spent on natural as opposed to artificial reefs using party-days as a measure of user activity. Person-days follow the same pattern as discussed for party-days. The activity tables will come into greater play as in other sections of this summary

chapter. For now, the party-day is being used as a spending unit in conjunction with the information on party spending per day obtained from our sample survey of reef users.

Table 1.1-3 (Residents)
Summary of the Kinds of Recreational Activities on Reefs in Southeastern Florida, 2000
(A) Party-Days (Thousands)

Kind of Activity	All Reefs		Artificial Reefs		Natural Reefs	
	Total Party-Days	Each County's Percentage of Total Party-Days	Total Party-Days	Each County's Percentage of Total Party-Days	Total Party-Days	Each County's Percentage of Total Party-Days
Fishing						
Palm Beach	405	20%	146	20%	259	20%
Broward	512	25%	205	28%	307	24%
Miami-Dade	597	29%	227	31%	370	28%
Monroe	527	26%	158	21%	369	28%
Total	2,040	100%	735	100%	1,305	100%
Snorkeling						
Palm Beach	163	18%	77	29%	87	14%
Broward	177	19%	39	15%	138	21%
Miami-Dade	287	32%	80	30%	207	32%
Monroe	284	31%	71	27%	213	33%
Total	911	100%	267	100%	644	100%
Scuba Diving						
Palm Beach	210	24%	59	19%	151	28%
Broward	242	28%	75	24%	167	30%
Miami-Dade	221	25%	69	22%	152	27%
Monroe	203	23%	116	36%	87	16%
Total	876	100%	318	100%	558	100%

(B) Person-Days (Thousands)

Kind of Activity	Total Person-Days	Each County's Percentage of Total Person-Days	Total Person-Days	Each County's Percentage of Total Person-Days	Total Person-Days	Each County's Percentage of Total Person-Days
Fishing						
Palm Beach	1,551	19%	558	19%	992	19%
Broward	2,154	27%	862	29%	1,292	25%
Miami-Dade	2,578	32%	980	34%	1,598	31%
Monroe	1,744	22%	523	18%	1,221	24%
Total	8,027	100%	2,923	100%	5,103	100%
Snorkeling						
Palm Beach	616	17%	290	27%	327	13%
Broward	732	20%	161	15%	571	22%
Miami-Dade	1,230	33%	344	32%	885	34%
Monroe	1,104	30%	276	26%	828	32%
Total	3,682	100%	1,071	100%	2,611	100%
Scuba Diving						
Palm Beach	811	28%	227	23%	584	31%
Broward	832	29%	258	26%	574	31%
Miami-Dade	698	24%	216	22%	482	26%
Monroe	531	18%	303	30%	228	12%
Total	2,872	100%	1,004	100%	1,868	100%

1.2 User Activity - Visitors

The activity of reef users is summarized in person-days of reef use. For visitors, the number of person-trips to use the reefs is also of interest. In order to measure person-days and person-trips associated with reef use, the total number of person-trips by all visitors to each county must be estimated. Total visitation includes visits to a county by non-residents of that county to participate in any activity be it recreation, business or family matters. The total number of person-trips by all visitors to the county was estimated using the Capacity Utilization Model. This model uses a variety of information obtained from the counties and the responses to the General Visitor Survey.

The model uses the following information for each county. The number of hotel/motel rooms in each county during the study period (June 2000 to May 2001) and the average hotel/motel occupancy rate during the summer and winter of the same study period was obtained from the counties. Summer is defined from June 2000 to November 2000 and winter is defined from December 2000 to May 2001. The model also requires estimates of average party size for those using hotel and motel accommodations, the average trip length in nights for those staying in hotels/motels, and the proportion of visitors who stay in hotels/motels. This information was obtained from the general visitor survey responses.

The equation for the Capacity Utilization Model is as follows.

$$\begin{aligned}
 &\text{Total Number of Person-Trips by All Visitors to the County During a Season} = \\
 &\quad (\text{Hotel/Motel Occupancy Rate} \times \text{Number of Hotel/Motel Rooms} \times \\
 &\quad 183 \text{ Days in the Season} \times \text{Average Party Size for those Using Hotels/Motels}) \\
 &\quad \text{divided by} \\
 &\quad \text{Average Trip Length in Nights for those staying in Hotels/Motels} \\
 &\quad \text{divided by} \\
 &\quad \text{Proportion of Visitors who stay at Hotels/Motels}
 \end{aligned}$$

The results for each of the four counties are provided in Table 1.2-1 and Table 1.2-2, for the summer and winter seasons, respectively.

Table 1.2-1 (Visitors)
Results of Capacity Utilization Model
Calculation of Number of Person-Trips to County
Summer Season (June 2000 to November 2000)

Variable	Summer			
	Palm Beach	Broward	Miami-Dade	Monroe
Hotel/Motel Occupancy Rate (k) ^a	0.629	0.662	0.660	0.673
Average Number of Hotel/Motel Rooms During the Year (R) ^b	16,076	28,600	48,000	8,916
Number of Days in Season (p)	183	183	183	183
Average Size of Party for those using hotels/motels (SP) ^c	1.80	2.55	2.86	2.65
Average Trip Length in Nights for those staying in hotels/motels (LS) ^d	3.99	6.26	5.94	4.03
Proportion of Visitors who stay at hotels/motels (g) ^e	0.43	0.42	0.42	0.56
Estimated Number of Person Trips by Visitors who used hotels/motels = $k \times R \times p \times SP / LS$	832,110	1,404,824	2,782,827	720,322
Estimated Total Number of Person Trips by All Visitors to County = $k \times R \times p \times SP / LS / g$	1,938,327	3,314,292	6,574,428	1,288,464

^a Palm Beach County - For year ending September 30, 2000; Broward, Miami-Dade and Monroe Counties - For calendar year 2000. Sources: Palm Beach County Tourist Development Council, Greater Fort Lauderdale Convention and Visitors Bureau, Greater Miami Convention and Visitors Bureau; Monroe County Tourist Development Council. All rates are from Smith Travel Research.

^b Data represent 1999. Source: Florida Department of Professional Regulation, Division of Hotels and Restaurants.

^c From General Visitor Survey responses to Question 25 for parties who stayed in hotels/motels and party size was five or fewer people.

^d From General Visitor Survey responses to Questions 8 (On this trip, how many nights will you have spent in county?) for those respondents who stayed at hotels/motels on this trip.

^e From General Visitor Survey responses to Question 10 (Where are you staying on this trip?). Proportion equal to number of respondents staying at hotel or motel divided by all respondents. All respondents include all accommodation modes and day-trippers (no accommodation) and exclude cruise ship passengers who disembark at Key West for a day trip.

**Table 1.2-2 (Visitors)
Results of Capacity Utilization Model
Calculation of Number of Person-Trips to County
Winter Season (December 2000 to May 2001)**

Variable	Winter			
	Palm Beach	Broward	Miami-Dade	Monroe
Hotel/Motel Occupancy Rate (k) ^a	0.744	0.763	0.738	0.730
Average Number of Hotel/Motel Rooms During the Year (R) ^b	16,076	28,600	48,000	8,916
Number of Days in Season (p)	183	183	183	183
Average Size of Party for those using hotels/motels (SP) ^c	1.92	2.35	2.24	2.46
Average Trip Length in Nights for those staying in hotels/motels (LS) ^d	8.28	5.00	6.27	5.08
Proportion of Visitors who stay at hotels/motels (g) ^e	0.22	0.31	0.38	0.46
Estimated Number of Person Trips by Visitors who used hotels/motels = $k \times R \times p \times SP / LS$	506,882	1,873,450	2,306,184	575,605
Estimated Total Number of Person Trips by All Visitors to County = $k \times R \times p \times SP / LS / g$	2,313,013	6,088,714	6,039,217	1,263,466

Note: See Table 2.2.1-1 for footnotes.

The number of person-trips for the year 2000-2001 is summarized in Table 1.2-3 for each county. The number of cruise ship passengers who disembarked at Key West during the study period was added to the number of person-trips for Monroe County. The number of cruise ship passengers docking at Key West by month was obtained from the Monroe County Tourist Development Council. These numbers were multiplied by an estimate of the proportion of passengers who actually disembark to visit Key West for a half-day (0.9883 for summer and 0.9547 for winter). This proportion was obtained from Leeworthy, 1996 and is based on a NOAA study of cruise ship passengers in Key West.

Table 1.2-3 (Visitors)
Number of Person-Trips to Each County
All Visitors
June 2000 to May 2001

County	Number of Person-Trips (millions)		
	Summer - 00	Winter - 01	Total
Palm Beach	1.94	2.31	4.25
Broward	3.31	6.09	9.40
Miami-Dade	6.57	6.04	12.61
Monroe ^a	1.51	1.60	3.11
Total	13.33	16.04	29.37

^a Includes cruise ship passengers who disembark at Key West for day trip.

Next, the number of person-trips was converted to number of person-days. For each county, the number of person-trips, as presented on the last rows of Tables 1.2-1 and 1.2-2 (net of cruise ship passengers), was distributed to the different types of accommodation modes and day-trippers. This distribution was based on the general survey responses to Question 10 (Where are you staying on this trip?) and Question 8 (On this trip, how many nights will you have spent?). The proportions of respondents by accommodation are provided in Table 1.2-4.

Table 1.2-4 (Visitors)
Proportion of General Visitor Respondents Surveyed by Accommodation

Accommodation	County							
	Palm Beach		Broward		Miami-Dade		Monroe	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Day Trippers	0.12	0.20	0.13	0.21	0.25	0.34	0.15	0.09
Hotel/Motel/Guest House/Bed & Breakfast	0.43	0.22	0.42	0.31	0.42	0.38	0.56	0.46
Home of Family and Friends	0.36	0.40	0.32	0.24	0.27	0.18	0.07	0.07
Campground	0.00	0.07	0.03	0.11	0.01	0.04	0.16	0.32
Condominium or Second Home (own)	0.08	0.09	0.04	0.04	0.03	0.03	0.04	0.03
Vacation Rental	0.00	0.02	0.02	0.04	0.01	0.01	0.02	0.03
Time Share	0.01	0.01	0.03	0.05	0.01	0.01	0.00	0.01
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
No. of Respondents	396	397	486	260	378	364	635	529

Then, for each accommodation mode and the day-trippers, the number of person-trips was multiplied by average number of days per trip from Question 8. The average number of days per

trip is provided in Table 1.2-5. Then the number of person-trips by accommodation mode and day-trippers was summed over all accommodation modes and day-trippers. The numbers of cruise ship passengers who disembark at Key West for the day were added to the Monroe County results. The numbers of person-days all visitors spent in each county are presented in Table 1.2-6.

**Table 1.2-5 (Visitors)
Average Number of Days Per Trip by Accommodation
General Visitor Survey**

Accommodation	County – Summer				County – Winter			
	Palm Beach	Broward	Miami-Dade	Monroe	Palm Beach	Broward	Miami-Dade	Monroe
Day Trippers	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hotel/Motel/Guest House/Bed & Breakfast	4.99	7.26	6.94	5.03	9.28	6.00	7.27	6.08
Home of Family and Friends	8.46	10.79	10.31	5.36	11.66	10.24	12.44	6.26
All Other Accommodations ^a	17.83	9.02	12.39	5.03	40.85	21.06	16.03	11.54

^a All Other Accommodations include campground, condo or second home, vacation rental and time-share.
Source: General Visitor Survey responses to Question 8 (on this trip, how many nights have you spent in this county) plus 1.

**Table 1.2-6 (Visitors)
Number of Person-Days Spent in Each County
All Visitors
June 2000 to May 2001**

County	Number of Person-Days (Millions)		
	Summer - 00	Winter - 01	Total
Palm Beach	13.41	33.44	46.85
Broward	25.94	58.69	84.63
Miami-Dade	44.19	56.43	100.62
Monroe ^a	5.54	6.60	12.13
Total	89.08	155.16	244.23

^a Includes cruise ship passengers who disembark at Key West for day trip.

The number of person-trips by all visitors is used as the basis for estimating the number of person-days visitors spent using the artificial and natural reefs in each county. For each season, the number of boating person-trips is equal to the total number of person-trips by all visitors times the proportion of person-trips taken by visitors who participated in saltwater boating in the county in the past twelve months. This proportion was taken from the General Visitor Survey answer to Question 13 (Which activities and boating modes did you participate in over the past

12 months in this county?) for one boating activity per respondent divided by the total number of respondents.

To get the number of boating person-trips when the person used the reefs, the number of boating person-trips is multiplied by the proportion of boating person-trips when the respondent used the reefs. This proportion was obtained from the Visitor Boater Screening Tally sheets. These sheets indicated the proportion of boaters intercepted who used the reefs at least once in the past 12 months. The results for the summer, winter and the year are summarized in Tables 1.2-7 to 1.2-9.

**Table 1.2-7 (Visitors)
Person-Trips of Visitors Who Boated
And Visitors Who Used the Reefs Over the Past 12 Months
Summer 2000**

County	Summer – June 2000 to November 2000				
	Total Person Trips to County - All Visitors	Proportion of Person Trips Taken By Visitors Who Boated ^a	Boating Person Trips	Proportion of Boating Person Trips When the Reef was Used for Recreation ^b	Boating Person Trips When the Reef was Used for Recreation
Palm Beach	1,938,327	0.16	306,304	0.98	299,522
Broward	3,314,292	0.20	668,204	0.99	663,312
Miami- Dade	6,574,428	0.28	1,843,418	0.91	1,682,421
Monroe	1,513,099	0.33	502,031	0.90	450,077
Total	13,340,147		3,319,957		3,095,332

^a Saltwater Boating Only. From General Visitor Survey Answer to Question 13 (Which activities_modes did you participate in over the past 12 months in this county) for one boating activity divided by total number of respondents.

^b From the Visitor Boater Tally Sheets: $= 1 - (Q6/(Q6+Q7+Q8+Q10))$

**Table 1.2-8 (Visitors)
Person-Trips of Visitors Who Boated
And Visitors Who Used the Reefs Over the Past 12 Months
Winter 2001**

County	Winter - December 2000 to May 2001				
	Total Person Trips to County - All Visitors	Proportion of Person Trips Taken By Visitors Who Boated ^a	Boating Person Trips	Proportion of Boating Person Trips When the Reef was Used for Recreation ^b	Boating Person Trips When the Reef was Used for Recreation
Palm Beach	2,313,013	0.14	330,430	0.98	323,115
Broward	6,088,714	0.19	1,145,612	0.99	1,137,225
Miami- Dade	6,039,217	0.13	768,919	0.91	701,764
Monroe	1,596,298	0.26	413,226	0.90	370,462
Total	16,037,242		2,658,187		2,532,566

Note: See Table 2.2.1-7 for an explanation of the footnotes.

**Table 1.2-9 (Visitors)
Person-Trips of Visitors Who Boated
And Visitors Who Used the Reefs Over the Past 12 Months
June 2000 to May 2001**

County	Year Round - June 2000 to May 2001		
	Total Person Trips – All Visitors	Boating Person Trips	Boating Person Trips When the Reefs Were Used for Recreation
Palm Beach	4,251,341	636,734	622,637
Broward	9,403,006	1,813,816	1,800,537
Miami-Dade	12,613,645	2,612,337	2,384,185
Monroe	3,109,397	915,257	820,539
Total	29,377,389	5,978,144	5,627,898

Next, the total number of person-days that visitor boaters who used the reefs spent visiting the county was estimated. This estimate is the total boating person-trips when reefs were used times the average days per visit by boaters who use the reefs. The average days per visit by boaters who used the reefs was obtained from the answers to Question 10 of the Visitor Boater Survey (How many nights are you spending on this trip?) where a 1 was added to each answer to represent number of days. The average number of days and the total person days reef users spent in the county in 2000-2001 are provided in Table 1.2-10 for each county.

**Table 1.2-10 (Visitors)
Average Number of Days Visiting County
And Total Person-Days in County
By Visitor Boaters Who Used the Reefs**

County	Average Days Visiting the County Per Trip	Total Person-Days Spent Visiting the County
Palm Beach	5.36	3,336,923
Broward	8.47	15,252,053
Miami-Dade	7.58	18,068,870
Monroe	8.39	6,887,497
Total		43,545,343

To allocate the total person-days spent visiting the county to actual days using the artificial and natural reefs, the daily participation rates of the different boating activities were calculated using the responses to Questions 12, 15, 16 and 17 of the Visitor Boater Survey. Participation rate is the proportion of total days that respondents spent in the county in the last 12 months when the respondent actually participated in a saltwater activity and boat mode. It represents the probability that a visitor boater who uses the reefs will participate in a particular saltwater boating activity and boating mode on any given day.

Question 12 asked the respondent to examine a list of saltwater boating activities and boat modes and read the number corresponding to the activity-boat mode that he/she or someone in his/her party participated in over the past 12 months. The saltwater activity-boat mode list is provided in Appendix B with the Visitor Boater Survey. Question 13 asked if the respondent participated in the activity and boating mode. Question 15 asked how many days in the past 12 months that the respondent participated in the activity-boat mode. From the responses to these questions, the proportions of total visiting days respondents actually spent participating in the activity-boat mode were obtained.

To allocate the total number of days in an activity-boat mode to the use of artificial reefs versus natural reefs versus no reefs, the proportion of fishing days and the proportion of dives spent on each reef/no reef was calculated from the Visitor Boater Survey responses. Question 16 asked the respondent how many days he/she spent on the artificial reef and Question 17 asked the respondent how many days he/she spent on the natural reef. For scuba divers and snorkelers, Question 18 asked for the total number of dives and Questions 19 and 20 asked for the number of dives on artificial versus natural reefs. A dive is defined as exiting and reentering the boat and applies to both divers and snorkelers. From the responses to these questions, the proportions of fishing days spent on the artificial and natural reefs and the proportions of dives spent on the artificial and natural reefs were obtained. For fishing charter and party boats, the proportion of days spent on artificial versus natural versus no reefs was taken from the fishing-related responses to the charter/party boat operator survey.

The proportions of visitor days that visitor boaters who use the reefs participated in fishing and diving/snorkeling are presented in Tables 1.2-11 and 1.2-12. These tables also provide the proportion of fishing days and scuba/snorkeling dives that visitor boaters spent on the artificial, natural and no reefs. For example, visitor boaters who came to Broward County to use the reefs spent 27 percent of their visiting days participating in saltwater fishing from a charter, party, rental or private boat. Of these fishing days, 47 percent of days were spent fishing near artificial reefs, 52 percent of days were spent fishing near natural reefs and 1 percent of days were spent fishing near no reefs. In Palm Beach County, visitor boaters who came to the county to use the reefs spent 32 percent of their visiting days scuba diving or snorkeling. Of these diving/snorkeling days, 25 percent of days were spent on artificial reefs, 74 percent of days were spent on natural reefs, and 1 percent of days were spent on no reefs.

**Table 1.2-11 (Visitors)
Percent of Visitor Person-Days That Reef-Using Boaters Went Saltwater Fishing
And Percent of Fishing Days Spent on Artificial, Natural and No Reefs
From Visitor Boater Survey**

County	Total Respondents	Percent of Visitor Days	Percent of Fishing Days on:			Sum of Proportions
			Artificial Reefs	Natural Reefs	No Reefs	
Palm Beach	490	10%	21%	45%	34%	100%
Broward	252	27%	47%	52%	1%	100%
Miami-Dade	339	22%	24%	61%	15%	100%
Monroe	1,392	26%	20%	40%	40%	100%

Note: Boating Modes are Charter, Party, Rental, and Private (Own or Friend's) Boat.

Table 1.2-12 (Visitors)
Percent of Visitor Person-Days That Reef-Using Boaters Went Scuba Diving or Snorkeling
And Percent of Diving/Snorkeling Dives Spent on Artificial, Natural and No Reefs
From Visitor Boater Survey

County	Total Respondents	Percent of Visitor Days	Percent of Dives on:			Sum of Proportions
			Artificial Reefs	Natural Reefs	No Reefs	
Palm Beach	490	32%	25%	74%	1%	100%
Broward	252	22%	51%	48%	1%	100%
Miami-Dade	339	8%	32%	65%	3%	100%
Monroe	1,392	17%	16%	80%	4%	100%

Note: Boating Modes are Charter, Party, Rental, and Private (Own or Friend's) Boat.

The number of person-days spent in each saltwater boating activity-boat mode was estimated as the total person days reef-using boaters spent visiting the county in year 2000-2001 (from Table 1.2-10) times the proportion of visitor days that these visitors spent participating in each activity-boat mode. Then the number of person-days spent in each saltwater boating activity-boat mode was allocated to artificial and natural reefs based on either the proportion of days or the proportion of dives spent in that activity-boat mode on or near artificial versus natural reefs. Proportion of days was used for all activities except scuba diving and snorkeling where the proportion of dives was used to provide a more accurate indicator of reef use.

A summary of the total person-days that visitors spent participating in all activity-boat modes by type of reef is provided in Table 1.2-13. A summary of total person days visitors spent participating in each activity for each county is provided in Tables 1.2-14 through Tables 1.2-17. The total person-days visitors spent participating in all saltwater activities and boat modes by type of reef is provided in Tables 1.2-18 to 1.2-21 for each county.

Table 1.2-13 (Visitors)
Total Person-Days Visitors Spent on Artificial and Natural Reefs by County
June 2000 to May 2001 (Millions)

County	Number of Visitor Person Days on:		
	Artificial Reefs	Natural Reefs	All Reefs
Palm Beach	0.33	0.93	1.26
Broward	2.69	3.03	5.72
Miami-Dade	1.41	3.25	4.66
Monroe	0.48	1.60	2.08
All Counties	4.91	8.81	13.72

Visitors to the four counties spent about 14 million person-days on the reef systems of southeast Florida from June 2000 to May 2001. About 5 million of these days were spent on artificial reefs and about 9 million of these days were spent on natural reefs.

Table 1.2-14 (Visitors)
Number of Person-Days Spent Using Artificial and Natural Reefs
By Recreation Activity – Palm Beach County

Activity	Number of Person-Days		
	Artificial Reefs	Natural Reefs	All Reefs
Snorkeling	36,940	90,544	127,484
Scuba Diving	237,921	681,802	919,723
Fishing	55,252	158,329	213,580
Glass Bottom Boat Sightseeing	0	0	0
Total	330,112	930,675	1,260,787

Table 1.2-15 (Visitors)
Number of Person-Days Spent Using Artificial and Natural Reefs
By Recreation Activity – Broward County

Activity	Number of Person-Days		
	Artificial Reefs	Natural Reefs	All Reefs
Snorkeling	87,669	266,717	354,386
Scuba Diving	1,587,123	1,433,074	3,020,197
Fishing	1,003,641	1,289,745	2,293,386
Glass Bottom Boat Sightseeing	16,483	37,675	54,157
Total	2,694,915	3,027,210	5,722,125

Table 1.2-16 (Visitors)
Number of Person-Days Spent Using Artificial and Natural Reefs
By Recreation Activity – Miami-Dade County

Activity	Number of Person-Days		
	Artificial Reefs	Natural Reefs	All Reefs
Snorkeling	281,347	599,359	880,706
Scuba Diving	168,664	270,813	439,477
Fishing	959,302	2,363,723	3,323,024
Glass Bottom Boat Sightseeing	3,124	14,060	17,184
Total	1,412,438	3,247,954	4,660,392

Table 1.2-17 (Visitors)
Number of Person-Days Spent Using Artificial and Natural Reefs
By Recreation Activity – Monroe County

Activity	Number of Person-Days		
	Artificial Reefs	Natural Reefs	All Reefs
Snorkeling	121,778	641,218	762,996
Scuba Diving	75,632	282,336	357,967
Fishing	277,349	603,549	880,899
Glass Bottom Boat Sightseeing	3,636	71,363	74,999
Total	478,395	1,598,467	2,076,862

Table 1.2-18 (Visitors)
Number of Person-Days Visitors Spent Participating in Saltwater Boating Activities and Reef Use - June 2000 to May 2001
Palm Beach County

Activity	Boat Mode	Number of Person Days	Number of Person-Days on:		
			Artificial Reefs	Natural Reefs	No Reefs
Snorkeling	Charter/Party	34,171	6,276	27,895	0
	Rental	9,528	5,558	3,970	0
	Private	83,785	25,105	58,679	0
Scuba Diving	Charter/Party	795,460	179,124	607,859	8,477
	Rental	5,257	1,643	3,614	0
	Private	127,484	57,155	70,329	0
Fishing – Offshore / Trolling	Charter	39,428	5,399	18,221	15,808
	Party	73,270	10,032	33,861	29,377
	Rental	16,428	0	986	15,443
	Private	115,655	32,937	64,004	18,714
Fishing – Flats or Back Country	Charter/Party	329	0	0	329
	Rental	329	0	0	329
	Private	657	0	657	0
Fishing Bottom	Charter	18,071	2,474	8,351	7,245
	Party	32,200	4,409	14,881	12,910
	Rental	0	0	0	0
	Private	39,428	0	17,367	22,061
Viewing Nature and Wildlife	Glass Bottom Boat	0	0	0	0
	Back Country Excursion	986	0	0	986
	Rental	5,914	0	0	5,914
	Private	23	0	0	23
Personal Watercraft (jet skis, wave runners, etc.)	Rental	2,629	0	0	2,629
	Private	42,714	0	0	42,714
Sailing	Charter/Party	657	0	0	657
	Rental	1,314	0	0	1,314
	Private	34,171	0	0	34,171
Other Boating Activities	Charter/Party	4,929	0	0	4,929
	Rental	0	0	0	0
	Private	33,185	0	0	33,185
Total Person-Days		1,540,978	330,112	930,675	280,190

Table 1.2-19 (Visitors)
Number of Person-Days Visitors Spent Participating in Saltwater Boating Activities and Reef Use - June 2000 to May 2001
Broward County

Activity	Boat Mode	Number of Person Days	Number of Person-Days on:		
			Artificial Reefs	Natural Reefs	No Reefs
Snorkeling	Charter/Party	233,553	52,880	176,267	4,407
	Rental	0	0	0	0
	Private	125,239	34,789	90,450	0
Scuba Diving	Charter/Party	2,613,090	1,370,373	1,233,489	9,228
	Rental	176,011	88,006	88,006	0
	Private	240,323	128,745	111,579	0
Fishing – Offshore / Trolling	Charter	338,483	48,895	52,970	236,619
	Party	2,034,284	293,859	318,347	1,422,078
	Rental	0	0	0	0
	Private	1,133,919	471,151	637,970	24,797
Fishing – Flats or Back Country	Charter/Party	0	0	0	0
	Rental	0	0	0	0
	Private	88,006	29,335	44,298	0
Fishing Bottom	Charter	6,770	978	1,059	4,732
	Party	169,242	24,447	68,826	118,309
	Rental	0	0	0	0
	Private	301,250	134,976	166,274	0
Viewing Nature and Wildlife	Glass Bottom Boat	54,157	16,483	37,675	0
	Back Country Excursion	20,309	0	0	20,309
	Rental	10,154	0	0	10,154
	Private	74,466	0	0	74,466
Personal Watercraft (jet skis, wave runners, etc.)	Rental	13,539	0	0	13,539
	Private	176,011	0	0	176,011
Sailing	Charter/Party	0	0	0	0
	Rental	0	0	0	0
	Private	44,003	0	0	44,003
Other Boating Activities	Charter/Party	60,927	0	0	60,927
	Rental	3,385	0	0	3,385
	Private	10,154	0	0	10,154
Total Person-Days		7,927,276	2,694,915	3,027,210	2,233,120

Table 1.2-20 (Visitors)
Number of Person-Days Visitors Spent Participating in Saltwater Boating Activities and Reef Use - June 2000 to May 2001
Miami-Dade County

Activity	Boat Mode	Number of Person Days	Number of Person-Days on:		
			Artificial Reefs	Natural Reefs	No Reefs
Snorkeling	Charter/Party	144,205	51,231	79,692	13,282
	Rental	0	0	0	0
	Private	751,307	230,116	519,667	1,524
Scuba Diving	Charter/Party	142,763	25,318	102,677	14,769
	Rental	0	0	0	0
	Private	311,483	143,347	168,136	0
Fishing – Offshore / Trolling	Charter	288,410	93,657	114,974	79,778
	Party	501,833	162,964	200,056	138,814
	Rental	347,534	139,013	208,520	0
	Private	1,455,027	318,640	817,748	318,640
Fishing – Flats or Back Country	Charter/Party	1,442	0	0	1,442
	Rental	0	0	0	0
	Private	637,386	59,393	538,880	39,112
Fishing Bottom	Charter	18,747	6,088	7,473	5,186
	Party	233,612	75,862	93,129	64,620
	Rental	0	0	0	0
	Private	501,833	103,684	382,941	15,207
Viewing Nature and Wildlife	Glass Bottom Boat	18,747	3,124	14,060	1,562
	Back Country Excursion	0	0	0	0
	Rental	2,884	0	0	2,884
	Private	341,766	0	0	341,766
Personal Watercraft (jet skis, wave runners, etc.)	Rental	30,283	0	0	30,283
	Private	73,544	0	0	73,544
Sailing	Charter/Party	23,073	0	0	23,073
	Rental	7,210	0	0	7,210
	Private	235,054	0	0	235,054
Other Boating Activities	Charter/Party	46,146	0	0	46,146
	Rental	2,884	0	0	2,884
	Private	194,677	0	0	194,677
Total Person-Days		6,311,847	1,412,438	3,247,954	1,651,455

Table 1.2-21 (Visitors)
Number of Person-Days Visitors Spent Participating in Saltwater Boating Activities and Reef Use - June 2000 to May 2001
Monroe County (Florida Keys)

Activity	Boat Mode	Number of Person Days	Number of Person-Days on:		
			Artificial Reefs	Natural Reefs	No Reefs
Snorkeling	Charter/Party	269,479	13,413	250,701	5,365
	Rental	65,315	8,476	56,590	249
	Private	465,424	99,889	333,928	31,607
Scuba Diving	Charter/Party	119,816	17,678	99,738	2,401
	Rental	18,600	1,898	16,702	0
	Private	222,331	56,056	165,896	379
Fishing – Offshore / Trolling	Charter	93,863	4,779	41,190	47,894
	Party	110,300	5,616	48,403	56,281
	Rental	35,902	10,097	21,317	4,488
	Private	618,547	119,763	215,028	283,756
Fishing – Flats or Back Country	Charter/Party	18,167	0	0	18,167
	Rental	9,084	0	0	9,084
	Private	305,380	62,694	95,052	147,634
Fishing Bottom	Charter	21,195	1,079	9,301	10,815
	Party	24,223	1,233	10,630	12,360
	Rental	15,572	4,152	7,786	3,633
	Private	467,587	67,935	154,842	244,810
Viewing Nature and Wildlife	Glass Bottom Boat	80,454	3,636	71,363	5,455
	Back Country Excursion	15,572	0	0	15,572
	Rental	50,608	0	0	50,608
	Private	309,273	0	0	309,273
Personal Watercraft (jet skis, wave runners, etc.)	Rental	31,576	0	0	31,576
	Private	154,420	0	0	154,420
Sailing	Charter/Party	12,111	0	0	12,111
	Rental	3,028	0	0	3,028
	Private	18,167	0	0	18,167
Other Boating Activities	Charter/Party	17,735	0	0	17,735
	Rental	2,595	0	0	2,595
	Private	134,091	0	0	134,091
Total Person-Days		3,710,416	478,395	1,598,467	1,633,554

Chapter 2: Methodology – Economic Contribution of Resident and Visitor Reef Use

This chapter describes the methods used to estimate the economic contribution of the reef-related expenditures that were not presented in the Final Report in the interest of brevity.

2.1 Economic Contribution of Resident Reef Use

Recreational boating activities that use artificial and natural reefs are only possible by spending money to get to the reef (e.g., gas and oil) and payment of fees (e.g., marina storage costs) for various aspects of boating. The primary spending unit for this reef-related recreation is the boating party. While recreating on the reefs, a boating party may spend money on food and beverages from stores and/or restaurants. Because the primary objective of the boating party is to recreate on or about a reef, reef-related expenditures are those that were incurred during reef-related recreation activity. Thus, the first objective in calculating the economic contribution was to estimate total expenditures by reef users over a twelve-month period. Such expenditures support the payment of wages to workers who serve the reef-users. Thus, the economic contribution is embodied in spending that creates income and employment.

Recreational fishing from shore or from boats away from reefs would not be included in the economic contribution. Such economic contribution must be reef-related to facilitate statements regarding the importance of artificial and natural reefs in generating economic activity within the county under consideration. Without a reef system, residents and visitors would spend money in other counties with reef systems.

For residents, reefs are usually reached by private pleasure craft. Such pleasure craft are usually registered in the resident's county. Also, residents may reach the reef system by hiring private boats such as charter and party craft. In a study by Bell et al,¹ residents of Northwest Florida overwhelmingly used their own boats to reach the reef system while visitors used a mix of their own pleasure boats and rental craft such as charter and party boats. A direct survey of the charter and party boat industry in Northwest Florida revealed that this segment relies on visitors for 90-95 percent of their business.

To estimate the economic contribution of resident reef users, all registered pleasure boats in the county reported as of July 2000 by the Florida Department of Highway Safety and Motor Vehicles, hereinafter referred to as DHSMV,² were identified and assigned the name ALLREGB. A Glossary of ALL the abbreviated terms used in these tables and in the following model, is

¹ Bell, Frederick W., Mark A. Bonn and Vernon R. Leeworthy, "Economic Impact and Importance of Artificial Reefs in Northwest Florida," Office of Fisheries Management and Assistance Service, Florida Department of Environmental Protection, Tallahassee, Florida, December 1998.

² Florida Department of Highway Safety and Motor Vehicles, "Revenue Report." July 1, 1999 to June 2000, Tallahassee, Florida. 2001.

2.0 Methodology – Economic Contribution of Resident and Visitor Reef Use

provided in Table A.2.1-1, at the end of Section 2.1. The Tables A.2.1-2 through Table A.2.1-13, located at the end of Section 2.1, present the results of the model for each county.

Not all registered boats in the county use the reef system so the following equation was used to obtain the number of registered boats in the county used for reef-related recreation:

(1) $REGBTR = ALLREGB * \%16ft+ * \%REEFU$ where,

$REGBTR$ = number of registered boats in the county used for recreation on reefs in the past twelve months;

$ALLREGB$ = all registered boats reported by the Florida Department of Highway Safety and Motor Vehicles (DHSMV) in the county;

$\%16ft+$ = percent of all registered boats 16 feet and greater (as reported by DHSMV);

$\%REEFU$ = percent of owners of boats 16 feet and over who used the reefs for recreation in the county where they reside (from survey responses);

Equation (1) provides an estimate of the number of pleasure craft in the county that were used at least once during the last 12 months to reach an artificial and/or natural reef for the purpose of some kind of recreation such as fishing; snorkeling and scuba diving. Of the three terms on the right hand side of equation (1), two are obtained directly from the DHSMV ($ALLREGB$ and $\%16ft+$). When these two terms are multiplied together, the resulting calculation is the number of boats from the county under study that potentially could use the reef system. This yields a group of local pleasure craft that may or may not have used the reef system. This was the targeted sample from which the mail survey sample was taken. For Palm Beach, Broward and Miami-Dade Counties, 3,000 survey instruments were sent to this segment of $ALLREGB$. Due to questions added to the Monroe County survey, 3,500 mail surveys were sent to this county. The survey results were used to estimate $\%REEFU$.

Equation (2) provides an estimate of the number of boats registered in the county that are used by reef-using residents of the county.

(2) $RREGBT = REGBTR * \%RES$ where,

$RREGBT$ = number of registered boats in county used by county residents for recreation on reefs during the past 12 months.

$\%RES$ = percent of all registered boats owned by residents of the county.

The term $\%RES$ was obtained from DHSMV then applied to $REGBTR$. This information provided an estimate of $RREGBT$, which is the number of resident boat owners who used their

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pleasure craft to recreate on the reefs in their county at least once during the last 12 months (i.e., Winter of 1999 to Fall of 2000).

The sample survey also yielded the number of party days per RREGBT. Each respondent using the reef system was asked how many days they had recreated on an artificial and/or natural reef over the last 12 months. Thus, the following equation yielded the total number of party days spent by residents on the county's reef system (PARTDA).

$$(3) \text{ PARTDA} = \text{RREGBT} * \text{RDAYS/BT}$$

where,

PARTDA = total number of party days spent by residents on the county's reef system;

RREGBT = the number of resident boat owners who used their pleasure craft to recreate on the reefs in their county at least once during the last 12 months (From Equation (2));

RDAYS/BT = average reef party days per boat over the last 12 months (from survey responses).

Equation (3) translates a stock of pleasure craft into the number of "party" days spent per year on the reef system. For example, if 1,000 pleasure craft were used to recreate on the reef system in the last 12 months and, if on average, the craft was used on the County's reef system 20 party days per year, then 20,000 is the estimate for PARTDA in equation (3).

Of the 20 party days that the individual craft was used on the reef system in the discussion above, the respondents or reef-users were asked to break these days down into the following recreational categories:

$$(4) \text{ PARTDAF} = \% \text{SALTF} * \text{PARTDA} \quad (\text{FISHING})$$

$$(5) \text{ PARTDAS} = \% \text{SALTS} * \text{PARTDA} \quad (\text{SNORKELING})$$

$$(6) \text{ PARTDAD} = \% \text{SALTD} * \text{PARTDA} \quad (\text{SCUBA DIVING})$$

where,

PARTDAF = Estimated number of party days engaged in saltwater fishing on reefs;

PARTDAS = Estimated number of party days engaged in saltwater snorkeling on reefs;

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PARTDAD	= Estimated number of party days engaged in saltwater scuba diving on reefs.
%SALTF	= Percent of total reef days devoted to saltwater fishing (from survey responses).
%SALTS	= Percent of total reef days devoted to saltwater snorkeling (from survey responses).
%SALTD	= Percent of total reef days devoted to saltwater scuba diving (from survey responses).

where the last three terms above add to 100%.

Equations (4)-(6) provide a breakdown of the total party days spent on the reef system over the last 12 months by type of recreational activity: fishing, snorkeling and scuba diving. The reason for this was two fold. First, it was important to better define the kinds of recreation while using the reef system. Second, it was believed that the spending per party might vary with the kind of recreation pursued on the reef system. This would give an idea of just how the economic contribution might vary depending upon the particular recreational use of the reef system. That is, an artificial reef might be constructed primarily for fishers who may spend more per party day in the local economy than those engaged in snorkeling.

The next important element in estimating the economic contribution is the primary spending unit, which is the recreational party. In Bell et al (1998), it was recognized that spending by residents was complicated in that residents of interior or other coastal counties may be a part of the primary spending unit. Such expenditures would be by visitors to the individual county and not by residents. A party in the Florida Keys might consist of the resident boat owner and her uncle Harry and aunt Laura from Michigan. Some areas attract relatives more than others, but some downward adjustment must be made to “net-out” visitor spending from resident spending. For each of the recreational activities on reefs discussed above, the total party size and the number in the total party that are residents of the county under study were analyzed. This information was requested from the respondents to the mail survey. In addition, they were asked to give the total party spending per day whether resident or visitor. Then, the following three equations were used to estimate total spending by recreational activity for residents only:

$$(7) \$EXPENF = \$EPPDF * \% \text{ IN COUNTF} * PARTDAF \quad (\text{FISHING})$$

$$(8) \$EXPENS = \$EPPDS * \% \text{ IN COUNTS} * PARTDAS \quad (\text{SNORKELING})$$

$$(9) \$EXPEND = \$EPPDD * \% \text{ IN COUNTD} * PARTDAD \quad (\text{SCUBA DIVING})$$

where,

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\$EXPENF	= Total reef-related expenditures on fishing (\$ million);
\$EXPENS	= Total reef-related expenditures on snorkeling (\$ million);
\$EXPEND	= Total reef-related expenditures on scuba diving (\$ million);
\$EPPDF	= Expenditures per party per day on reef-related fishing;
\$EPPDS	= Expenditures per party per day on reef-related snorkeling;
\$EPPDD	= Expenditures per party per day on reef-related scuba diving
%IN COUNTF	= Percent of fishing party that represents residents of the county under study;
%IN COUNTS	= Percent of snorkeling party that represents residents of the county under study;
%IN COUNTD	= Percent of scuba diving party that represents residents of the county under study;

PARTDAF; PARTDAS and PARTDAD = from equations (4) through (6) above.

It is possible that visitors may pay less than their share of the total party spending since there are a lot of fixed costs such as marina fees, which the local resident would probably pay. However, uncle Harry from Michigan, as discussed above, may pick up the entire restaurant check. It was well beyond the scope of this study to pursue individual expenditures by first residents and then visitors. These estimates are believed to be conservative and err on the side of understating resident spending on reef-related activities.

Survey respondents were also asked to breakdown their recreational days by reef type. Thus, based upon the percent of days spent on artificial and natural reefs respectively, the spending on each kind of reef can be estimated by dividing equations (7) through (9) into artificial and natural reef use. It was assumed that the expenditures per party day would be the same whether one were fishing on an artificial reef or a natural reef. This was obvious from the expenditure categories where marina storage; gas and oil and spending on food and beverages consumed about 75 percent of total party day spending. That is, costs such as marina storage will be the same whether you are reef fishing or not. It certainly should not vary with the kind of reef one chooses. Any difference in expenditures per party between reef types would come from very small samples since reef users must first be divided into the kind of recreation first (e.g., fishing).

The survey respondents were asked to break down their total party spending per day into 12 spending categories. Each type of expenditure may create a different impact on income and employment. For example, restaurants are very labor intensive (i.e., require a lot of labor per

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dollar of sales) while gasoline stations are very capital intensive (i.e., require little labor per dollar of sales). Thus, residents who spend proportionately more money on food and drink as opposed to gas and oil will create more local jobs than if the opposite situation existed. This is why a breakdown of the reef-users expenditure pattern is important.

From the U.S. Census of Business, 12 spending categories were matched to the appropriate industrial categories called NAICS – North American Industrial Classification System – to obtain the percent of sales paid as wages and the sales-to-employment ratios for each industry. This external data set was a useful resource in the estimation of the wage and employment impact of reef user spending in each county. The following equations were used:

$$(10) \text{ EMPLOYF} = (\$EXPENF) / \$S/E \quad (\text{FISHING})$$

$$(11) \text{ EMPLOY S} = (\$EXPENS) / \$S/E \quad (\text{SNORKELING})$$

$$(12) \text{ EMPLOYD} = (\$EXPEND) / \$S/E \quad (\text{SCUBA DIVING})$$

where,

EMPLOYF = Employment generated in county under study by reef-using fishers;

EMPLOY S = Employment generated in county under study by reef-using snorkelers;

EMPLOYD = Employment generated in county under study by reef-using scuba divers;

\$EXPENF; \$EXPENS; and \$EXPEND. From Equations (7) through (9)

\$S/E = Sales-to-employment ratios, by NAICS Industry categories matched to spending categories for each activity.

The first term on the right hand side of equation (10) was taken from equation (7), which is the estimated total spending by residents who fish on or near the reefs in the county under study. For each of the 12 categories of spending under \$EXPENF, employment generated in that category was estimated by dividing the amount spent for that category by the category's ratio of sales to employment adjusted to 2000 dollars. When summed over all spending categories, this yielded the aggregate employment generated from reef-related spending. This was done for fishing, snorkeling and scuba diving as provided in equations (10), (11) and (12). Readers interested in expenditures on individual items, may review the Final Report or the tables at the end of this chapter.

The wages generated from the hiring of the employees estimated in equations (10) through (12) were obtained using the U.S. Census of Business (1997) data that correspond to the 12 individual spending categories for each recreational activity as follows:

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$$(13) \$WAGEF = \%WAGE * \$EXPENF \quad (\text{FISHING})$$

$$(14) \$WAGES = \%WAGE * \$EXPENS \quad (\text{SNORKELING})$$

$$(15) \$WAGED = \%WAGE * \$EXPEND \quad (\text{SCUBA DIVING})$$

Where,

$\$WAGEF$ = Wages generated by expenditures of reef-using fishers;

$\$WAGES$ = Wages generated by expenditures of reef-using snorkelers;

$\$WAGED$ = Wages generated by expenditure of reef-using scuba divers;

$\%WAGE$ = Wages as a percent of sales, by NAICS Industry categories matched to spending categories.

$\$EXPENF$; $\$EXPENS$ and $\$EXPEND$. From Equations (7) through (9)

Finally, the total economic contribution of resident recreational activities on all reefs was obtained by addition of the above equations as follows:

TOTAL SPENDING BY RESIDENT REEF USERS:

$$(16) SPEND = \$EXPENF + \$EXPENS + \$EXPEND$$

TOTAL EMPLOYMENT GENERATED BY RESIDENT REEF USERS:

$$(17) EMPLOY = EMPLOYF + EMPLOY S + EMPLOYD$$

TOTAL WAGES GENERATED BY RESIDENT REEF USERS:

$$(18) WAGE = \$WAGEF + \$WAGES + \$WAGED$$

Equations (16) through (18) show aggregate spending by reef users and the wages and employment they generate for the county under analysis. These totals and components are contained in each chapter of the Final Report.

The survey respondents were asked to break down all of their recreational activities discussed above by whether they took place on artificial reefs or natural reefs. They did this by breaking their total days fishing, for example, into how many days were spent on artificial versus natural reefs versus no reefs. Thus, the economic model was actually more elaborate than presented above because there was a partitioning of the spending by reef type. For example, this led to the

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assignment of total spending, wages and employment in equations (16) through (18) into the two types of reefs. In general, about two-thirds of the economic contribution was due to natural reef use while one-third was due to artificial reef use among the four counties under study in Southeast Florida.

Table A.2.1-1
Glossary of Abbreviated Terms Used in This Section, Resident Reef-User Economic Contribution

\$EPPDD	expenditures per party per day on reef-related scuba diving.
\$EPPDF	expenditures per party per day on reef-related fishing.
\$EPPDS	expenditures per party per day on reef-related snorkeling.
\$EXPEND	total reef-related expenditures on scuba diving (\$ Million).
\$EXPENF	total reef-related expenditures on fishing (\$ Million).
\$EXPENS	total reef-related expenditures on snorkeling (\$ Million).
\$S/E	sales-to-employment ratios by NAICS Industry categories matched to spending categories
% 16ft+	percent of all registered boats 16 feet and greater.
% ARTRED	percent of total diving days on artificial reefs.
% ARTREF	percent of total fishing days on artificial reefs.
% ARTRES	percent of total snorkeling days on artificial reefs.
% IN COUNTD	percent of scuba diving party that represents residents from the county under study.
% IN COUNTF	percent of fishing party that represents residents from the county under study.
% IN COUNTS	percent of snorkeling party that represents residents from the county under study.
% NATRED	percent of total diving days on natural reefs.
% NATREF	percent of total fishing days on natural reefs.
% NATRES	percent of total snorkeling days on natural reefs.
% REEFU	percent of owners of boats 16 feet and over who used the reefs for recreation in the county where they reside.
% RES	percent of all registered boats owned by residents of the county.
% SALTD	percent of total reef days devoted to saltwater scuba diving.
% SALTF	percent of total reef days devoted to saltwater fishing.
% SALTS	percent of total reef days devoted to saltwater snorkeling.
% WAGE	wages as a percent of sales by NAICS Industry categories matched to spending categories.
ALLREGB	all registered boats reported by the Florida DHSMV in the county.
DAYARTD	party days spent diving on artificial reefs.
DAYARTF	party days spent fishing on artificial reefs.
DAYARTS	party days spent snorkeling on artificial reefs.
DAYNATD	party days spent diving on natural reefs.

Table A.2.1-1
Glossary of Abbreviated Terms Used in This Section, Resident Reef-User Economic Contribution

DAYNATF	party days spent fishing on natural reefs.
DAYNATS	party days spent snorkeling on natural reefs.
EMPLOY	aggregate employment generated by resident reef users – for All activities.
EMPLOYD	employment generated in county under study by reef-using scuba divers (number of full and part-time jobs).
EMPLOYF	employment generated in county under study by reef-using fishers (number of full and part-time jobs).
EMPLOYS	employment generated in county under study by reef-using snorkelers (number of full and part-time jobs).
NAICS	North American Industrial Classification System – used to obtain the percent of sales paid as wages and the sales-to-employment ratios for each industry.
PARTDA	total number of party days spent by residents on the County’s reef system.
PARTDAD	estimated number of party days engaged in saltwater scuba diving on reefs.
PARTDAF	estimated number of party days engaged in saltwater fishing on reefs.
PARTDAS	estimated number of party days engaged in saltwater snorkeling on reefs.
RDAY5/BT	average reef party days per boat over the last 12 months.
REGBTR	number of registered boats in county used for recreation on the reef system in the past twelve months.
RREGBT	number of registered boats in county used by county residents for recreation on the reefs during the past twelve months.
SPEND	aggregate spending derived from resident reef users – for All activities (\$ Million).
WAGE	aggregate wages generated by resident reef users – for All activities.
WAGED	wages generated by expenditures of reef-using scuba divers (\$ Million).
WAGEF	wages generated by expenditures of reef-using fishers (\$ Million).
WAGES	wages generated by expenditures of reef-using snorkelers (\$ Million).

2.2 Economic Contribution of Visitor Reef Use

The methods used to estimate reef use and reef-related expenditures by visitors to each county are provided in the Final Report. This Section describes how the visitor reef-related expenditures were used to estimate the countywide sales, income, and employment, generated by reef use for each county. Total economic contribution is defined for purposes of this study as the direct, indirect and induced sales, total income³, employment⁴ and indirect business taxes generated from reef use⁵. Hazen and Sawyer utilized the IMPLAN Model⁶ to estimate the economic contribution for Palm Beach, Broward and Miami-Dade Counties as described in Section 2.2.1 of this Technical Appendix. An alternative method was used to estimate the economic contribution of reef-related activities by visitors to Monroe County and is described in Section 2.2.2 of this Technical Appendix.

2.2.1 Method for Estimating Economic Contribution – Palm Beach, Broward and Miami-Dade Counties

The economic contributions of reef-related recreation by visitors to Palm Beach, Broward and Miami-Dade counties were estimated using the IMPLAN Model as follows. The Visitor Boater Survey asked respondents how much money they and members of their party spent on their last day that they participated in fishing, scuba diving and snorkeling in the county by expenditure category. The respondent was also asked how many people spent or benefited from those expenditures. This information was used to estimate the average expenditure per person per fishing day, snorkeling day and scuba diving day and by boating mode. The average expenditures per person per day were then multiplied by the number of person-days by boating mode and reef type to obtain an estimate of the total itemized expenditures associated with reef related activities during the 12-month period 2000-2001. Per person and total itemized expenditures for each county are summarized in Tables 2.2.2-1 through 2.2.2-8 in the Final Report.

The reef-related visitor expenditures were then used to estimate the economic contribution of artificial and natural reefs to each of the counties. Expenditures by visitors generate income and jobs within industries that supply reef-related goods and services, such as charter/ party boat operations, restaurants and hotels. These industries are called direct industries. In addition, these expenditures create multiplier effects wherein additional income and employment is created, as the income earned by the reef-related industries is re-spent within the county. These additional effects of reef-related expenditures are called indirect and induced. Indirect effects are generated as the reef-related industries purchase goods and services from other industries in the

³ Total income includes wages, salaries and benefits paid to employees and payments received by self-employed individuals as labor. In addition, income includes “other property income” that consists of rents, royalties and dividends.

⁴ Includes full and part-time employment.

⁵ Indirect business taxes include excise taxes, property taxes, fees, licenses and sales taxes paid by businesses.

⁶ IMPLAN Pro Model, Version 2.0, Minnesota IMPLAN Group, Inc., Stillwater, Minnesota. Data represent 1998 economic conditions.

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county. Induced effects are created when employees of the direct and indirect industries spend their money in the county.

The IMPLAN Model for Broward, Palm Beach and Miami-Dade counties was used to estimate the total economic contribution of reef-related expenditures. IMPLAN uses an input/output approach to evaluate the relationships within an economy. This includes the relationship between businesses and final consumers as well as among businesses. The model captures all monetary market transactions from consumption in a given period of time. With input/output analysis, mathematical formulas are used to predict how changes in spending within a county will impact the entire county economy.

There are two aspects of the IMPLAN Model that are important to evaluate economic contributions. First, IMPLAN provides a *descriptive model* that includes information on countywide economic transactions. This information is organized in *regional economic accounts*. The descriptive model also describes the movement of goods and services within and outside the county or region (*called regional trade flows*). Finally, the descriptive model includes a series of *social accounts* that describe non-industrial transactions within a region such as taxes paid by businesses and households, and government payments to these entities.

A second important aspect of the IMPLAN Model is the *predictive model*. The predictive model is used to estimate economic multipliers that describe the response in the economy to a stimulus (e.g. direct expenditures by reef visitors). The multipliers are mathematically derived by IMPLAN using a Leontief Inverse and are used to estimate indirect and induced affects.

To use the IMPLAN Model to estimate the economic contribution of reef-related activities required a series of steps. First, the itemized expenditures estimated for each county were matched to industries included in the IMPLAN Model as summarized in Table A.2.2-1

**Table A.2.2-1
Expenditures Categories as Applied to IMPLAN Model Sectors**

IMPLAN Sector Number	IMPLAN Sector	Reef Expenditure Categories Applied to Each Sector
436	Transportation - Water	Bait, Tackle, Ice, Ramp Fees, Marina Fees
450	Food Stores	Food and Beverages – Stores
451	Auto Service Stations	Auto Gas, Boat Fuel
454	Eating and Drinking	Food and Beverages - Restaurants/Bars
455	Miscellaneous Retail	Shopping
463	Hotels and Lodging	Lodging, Camping Fees

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477	Auto Rental and Leasing	Auto Rental
488	Amusement and Recreational Services	Charter/Party Boat Fee, Boat Rental, Air Refills, Equipment Rentals, Glass Bottom Boat Rides

Next, the direct expenditures were converted to dollar values that represent the year of the data used by the IMPLAN Model to generate the multipliers. In this case, all direct sales made in 2000 were converted to 1998 dollars. The estimated economic contributions were then converted back to 2000 dollars.

In addition, a series of margins were applied to the expenditures for retail items to convert purchaser prices to producer prices because multipliers are based on producer prices. For example when a household buys a retail item, only a portion of the total expenditure will go directly to the retailer. The rest will go to the industries that produced the good. For retail industries only, purchaser prices are greater than producer prices. Therefore the expenditures on retail items were adjusted to represent producer prices.

Economic contributions for each county were estimated by multiplying the direct expenditures that contribute to the economies of each county by the appropriate I-O multipliers. The resulting values for sales, income and indirect business taxes were then converted to represent year 2000 dollars. The economic contribution for Palm Beach, Broward and Miami-Dade Counties are summarized in Tables 2.2.2-9 through 2.2.2-11 in the Final Report.

2.2.2 Economic Contribution of Visitors to Monroe County

The economic contribution to Monroe County from reef related expenditures by visitors was estimated as follows using a different approach than was used for the other counties. The IMPLAN model was not used for Monroe County because the research team has had problems calibrating the IMPLAN Model for Monroe County during previous projects.

The Monroe County approach utilized several ratios on economic measures derived from data published by the U.S. Census (1997 Economic Census) and the Bureau of Economic Analysis. The first two ratios used in this analysis were the direct wage-to-direct sales and direct wages-to-direct employment for Monroe County as derived in Table A.2.2.2-1⁷. Total annual sales, payroll and employment by industry were taken from the 1997 Economic Census for Monroe County for industries providing the reef-related goods and services and are summarized in columns 1 through 5. Column 6 summarizes the direct wage-to-direct sales ratio for each industry and was calculated by dividing total payroll (wages and salaries) per industry by total annual sales. Column 7 provides the direct wages-to-direct employment ratio, which was calculated by dividing total payroll by total employment for each industry.

⁷ For this analysis, the term wages is defined as wages and salaries and does not include proprietors' income.

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In addition, two other ratios calculated in Table A.2.2.2-2 were important to this analysis. This included the countywide total income-to-wage and salaries ratio and the countywide proprietor's income-to-proprietor's employment ratio. Both of these ratios were calculated for Monroe County using data from the U.S. Bureau of Economic Analysis for 1997.

These ratios were used to estimate the total income and employment contributions to Monroe County from visitor expenditures as follows.

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Table A.2.2.2-1
Derivation of Direct Wages-to-Direct Sales and Direct Wages-to-Direct Employment Ratios for Monroe County, 1997¹

NAICS Code	Industry	Sales (\$1,000)	Annual Payroll (\$1,000) ²	Paid Employees	Wages-to-Sales-Ratio	Wages-to-Employment Ratio
(1)	(2)	(3)	(4)	(5)	(6) = (4) / (3)	(7) = (4) / (5) * 10 ³
721	Hotels and Motels	\$569,086	\$151,297	10,939	0.2659	\$13,831
N/A	Automotive Rental ³	N/A	N/A	N/A	0.1524	\$19,577
445	Food Stores	\$233,474	\$21,961	1,561	0.0941	\$14,069
447	Gasoline Stations	\$83,127	\$5,829	384	0.0701	\$15,180
722	Eating and Drinking Places	\$233,198	\$62,955	5,831	0.2700	\$10,797
453	Miscellaneous Retail	\$49,242	\$9,355	650	0.1900	\$14,392
713	Amusement and Recreational Services	\$46,243	\$11,177	667	0.2417	\$16,757

¹ Data by industry was taken from the 1997 Economic Census: Monroe County, Florida, U.S. Census Bureau. The data in this table reflect total sales, payroll and employees for businesses with employees. Non-employee businesses are not included in this table.

² Annual payroll includes wages and salaries but does not include proprietors' income.

³ The breakdown of industries provided in the 1997 Economic Census did not include a category for Auto Rentals and Leasing. Therefore the wage-to-sales and wages-to-employment ratios were taken from a previous study by Leeworthy, December 1996 that estimated these ratios for Monroe County.

Table A.2.2.2-2
Derivation of Direct Income-to-Wages and Salaries Ratio for Monroe County

(1)	Employment by Place of Work (1) = (2) + (3)	51,305
(2)	Wages and Salary Employment	40,104
(3)	Proprietor's Employment	11,201
(4)	Wage & Salaries and Other Labor Income (\$1,000)	\$1,046,181
(5)	Proprietor's Income (\$1,000)	\$170,154
(6)	Total Income by Place of Work (\$1,000) (6) = (4) + (5)	\$1,216,335
(7)	Direct Income-to-Wages & Salaries Ratio (7) = (6)/(4)	1.163
(8)	Proprietor's Income-to-Proprietor's Employment Ratio (8) = (5)/(3)	\$15,191

Bureau of Economic Analysis, 1997

Direct Wages & Salaries and Direct Employment. The direct wages and salaries associated with visitor spending were estimated by multiplying the direct wage-to-direct sales ratio for each industry by the itemized expenditures by visitors as shown in Table A.2.2.2-3 for artificial reefs and Table A.2.2.2-4 for natural reefs. The direct employment due to visitor spending is also estimated in these tables by dividing direct wages and salaries (column 4) by the direct wages-to-direct employment ratio (column 5).

Table A.2.2.2-3

Derivation of Direct Wages, Salaries and Direct Employment From Visitor Expenditures in Monroe County – Artificial Reefs

Expenditure Category	Total Visitor Expenditures	Wage-to-Sales Ratio (Direct)	Direct Wages and Salaries	Wages-to-Employment Ratio (Direct)	Direct Employment
(1)	(2)	(3)	(4) = (2) * (3)	(5)	(6) = (4) / (5)
Transportation - Water	\$7,626,791	0.2417	\$1,843,407	\$16,757	110
Food Stores	\$9,326,234	0.0941	\$877,243	\$14,069	62
Auto Service Stations	\$12,966,536	0.0701	\$909,234	\$15,180	60
Eating and Drinking	\$11,142,883	0.2700	\$3,008,174	\$10,797	279
Miscellaneous Retail	\$7,228,354	0.1900	\$1,373,243	\$14,392	95
Hotels and Lodging	\$18,552,984	0.2659	\$4,932,490	\$13,831	357
Auto Rental and Leasing	\$1,875,831	0.1524	\$285,877	\$19,577	15
Amusement and Recreational Services	\$4,636,973	0.2417	\$1,120,763	\$16,757	67
Total	\$73,356,586		\$14,350,431		1,044

Table A.2.2.2-4
Derivation of Direct Wages, Salaries and Direct Employment From Visitor Expenditures in Monroe County – Natural Reefs

Expenditure Category	Total Expenditures	Wage-to-Sales Ratio (Direct)	Direct Wages and Salaries	Wages-to-Employment Ratio (Direct)	Direct Employment
Transportation - Water	\$16,854,888	0.2417	\$4,073,851	\$16,757	243
Food Stores	\$27,085,778	0.0941	\$2,547,739	\$14,069	181
Auto Service Stations	\$31,189,681	0.0701	\$2,187,071	\$15,180	144
Eating and Drinking	\$39,515,821	0.2700	\$10,667,838	\$10,797	988
Miscellaneous Retail	\$24,573,805	0.1900	\$4,668,534	\$14,392	324
Hotels and Lodging	\$65,463,748	0.2659	\$17,404,169	\$13,831	1,258
Auto Rental and Leasing	\$7,959,339	0.1524	\$1,213,003	\$19,577	62
Amusement and Recreational Services	\$32,518,977	0.2417	\$7,859,884	\$16,757	469
Total	\$245,162,036		\$50,622,088		3,669

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Total Sales, Income and Employment. To estimate total sales required two steps. First, total expenditures for all industries (\$73 million for artificial reefs and \$245 million for natural reefs) were multiplied by the percentage of inputs that are purchased locally in Monroe County (.70).⁸ An output multiplier⁹ of 1.6 was then multiplied by the in-county sales to derive total direct, indirect and induced sales from reef-related visitor expenditures as summarized in Table A.2.2.2-5 for artificial reefs and Table A.2.2.2-6 for natural reefs.

Table A.2.2.2-5
Derivation of Total Sales Generated by Reef-Related Activities in Monroe County - Artificial Reefs

1	Total Visitor Expenditures	\$73,356,586
2	Percent of Inputs Purchased Locally	0.7
3	Direct Sales (3) = (1) x (2)	\$51,349,610
4	Output Multiplier	1.6
5	Total Sales (5) = (3) x (4)	\$82,159,376

Table A.2.2.2-6
Derivation of Total Sales Generated by Reef-Related Activities in Monroe County - Natural Reefs

1	Total Visitor Expenditures	\$245,162,036
2	Percent of Inputs Purchased Locally	0.7
3	Direct Sales (3) = (1) x (2)	\$171,613,426
4	Output Multiplier	1.6
5	Total Sales (5) = (3) x (4)	\$274,581,481

Estimating total income also required two steps. First, the direct wages and salaries calculated in Tables A.2.2.2-3 and A.2.2.2-4 for artificial and natural reefs were multiplied by the direct income-to-wages and salaries ratio (1.163) from Table A.2.2.2-2. This yields an estimate of total direct income to workers and proprietors. Next, total direct income was multiplied by the income multiplier (1.6)¹⁰, to obtain total direct, indirect and induced income from visitor reef-related expenditures in Monroe County. Total income associated with artificial and natural reefs is summarized in Tables A.2.2.2-7 and A.2.2.2-8, respectively.

⁸ This percentage was taken from the study by Leeworthy (December 1996).

⁹ The output multiplier was taken from Leeworthy, (December 1996).

¹⁰ The income multiplier was taken from Leeworthy, (December 1996).

**Table A.2.2.2-7
Derivation of Total Income Generated by Reef-Related Activities in
Monroe County - Artificial Reefs**

Direct Wages & Salary Income	\$14,350,431
Direct Income-to-Wages & Salaries Ratio	1.1626
Total Direct Income (wages, salaries and proprietors' income)	\$16,684,428
Income Multiplier	1.6
Total Income	\$26,695,085

**Table A.2.2.2-8
Derivation of Total Income Generated by Reef-Related Activities in
Monroe County - Natural Reefs**

Direct Wages & Salaries Income	\$50,622,088
Direct Income-to-Wages & Salaries Ratio	1.1626
Total Direct Income (wages, salaries and proprietors' income)	\$58,855,416
Income Multiplier	1.6
Total Income	\$94,168,665

Finally, several steps were taken to estimate the total employment contribution from visitor expenditures in Monroe County as follows. First, direct wage and salary employment, estimated in Tables A.2.2.2-3 and A.2.2.2-4, was multiplied by the employment multiplier, to get total wage and salary employment. (1.6).¹¹ Next, proprietor employment was estimated by dividing proprietors' income by the proprietor's income-to-employment ratio from Table A.2.2.2-2. Then direct proprietor employment was multiplied by the employment multiplier to get total proprietor employment. Total wage and salary employment was then added to total proprietor employment to get an estimate of the total direct, indirect and induced employment generated by reef-related activities. This derivation is summarized in Tables A.2.2.2-9 and A.2.2.2-10 for artificial and natural reefs.

¹¹ The employment multiplier was taken from Leeworthy (December 1996).

2.0 Methodology – Economic Contribution of Resident and Visitor Reef Use

Table A.2.2.2-9
Derivation of Total Employment Generated by Reef-Related Activities in
Monroe County - Artificial Reefs

Direct Wage & Salary Employment	1,044
Employment Multiplier	1.6
Total Wage and Salary Employment ¹²	1,670
Proprietor's Employment	
Proprietor's Income (Direct Income minus wages & salaries)	\$2,333,997
Proprietor's Income-to-Employment Ratio	\$15,191
Proprietor's Employment (Direct)	154
Employment Multiplier	1.6
Proprietor's Employment (Total) ¹⁰	246
Total Employment (Direct, Indirect and Induced)	
Wage & Salary	1,670
Proprietor	246
Total Employment Generated	1,916

Table A.2.2.2-10
Derivation of Total Employment Generated by Reef-Related Activities
in Monroe County - Natural Reefs

Direct Wage & Salary Employment	3,669
Employment Multiplier	1.6
Total Wage and Salary Employment ¹³	5,870
Proprietor's Employment	
Proprietor's Income (Direct Income minus wages & salaries)	\$8,233,328
Proprietor's Income-to-Employment Ratio	\$15,191
Proprietor's Employment (Direct)	542
Employment Multiplier	1.6
Proprietor's Employment (Total) ¹¹	867
Total Employment (Direct, Indirect and Induced)	
Wages & Salary	5,870
Proprietor	867
Total Employment Generated	6,737

¹² This includes Direct, Indirect and Induced Wage and Salary Employment.

¹³ This includes Direct, Indirect and Induced Wage and Salary Employment.

TABLE A.2.1-2 (Residents)										
ESTIMATION OF THE NUMBER OF PARTY-DAYS AND PERSON-DAYS SPENT USING REEFS, BY "RESIDENTS" IN PALM BEACH COUNTY, FLORIDA - 2000										
DISTRIBUTION OF BOATING PARTY DAYS BY ACTIVITY: FISHING, SNORKELING & DIVING										
REGBTR	%RES=	RREGBT	RDAY/BT	TOTAL PARTY DAYS (PARTDA)	%SALTF	PARTDAF	%SALTS	PARTDAS	%SALTD	PARTDAD
19,561	0.995	19,463	40.00	778,532	0.52	404,837	0.21	163,492	0.27	210,204
				START HERE:	ALLREGB	%16FT+	%REEFU	REGBTR		
					56,924	0.64	0.54	19,561		
DISTRIBUTION OF PARTY DAYS BY ACTIVITY AND REEF TYPE										
ESTIMATED PARTY DAYS FISHING ON REEFS:										
%ARTREF	%NATREF	DAYARTF	DAYNATF	TOTAL PARTY DAYS (PARTDAF)						
0.36	0.64	145,741	259,095	404,837						
% OF TIME QUESTION										
0.33	0.62		CONSISTENT							
ESTIMATED PARTY DAYS SNORKELING ON REEFS:										
%ARTRES	%NATRES	DAYARTS	DAYNATS	TOTAL PARTY DAYS (PARTDAS)						
0.47	0.53	76,841	86,651	163,492						
ESTIMATED PARTY DAYS DIVING ON REEFS:										
%ARTRED	%NATRED	DAYARTD	DAYNATD	TOTAL PARTY DAYS (PARTDAD)						
0.28	0.72	58,857	151,347	210,204						
ESTIMATION OF RESIDENT PERSON DAYS BY ACTIVITY AND REEF TYPE										
ACTIVITY OR REEF TYPE	TOTAL PARTY DAYS	RESIDENT PARTY SIZE	TOTAL RESIDENT PERSON DAYS							
FISHING	404,837	3.83	1,550,524							
Artificial Reef	145,741	3.83	558,189							
Natural Reef	259,095	3.83	992,336							
SNORKELING	163,492	3.77	616,364							
Artificial Reef	76,841	3.77	289,691							
Natural Reef	86,651	3.77	326,673							
DIVING	210,204	3.86	811,386							
Artificial Reef	58,857	3.86	227,188							
Natural Reef	151,347	3.86	584,198							
Grand Total Resident Person-Days:			2,978,274							

TABLE A.2.1-3 (Residents)							
PALM BEACH COUNTY RESIDENT BOATER SPENDING PER PARTY-DAY; WAGES AND EMPLOYMENT BY ACTIVITY AND EXPENDITURE CATEGORY							
FISHING PARTY DAYS (PARTDAF):				404,837			
FISHING ACTIVITY SCENARIO (F)				%INCOUNTF=	0.79		
CATEGORY	\$EPPDF (Dollars)	\$EXPENF (\$Million)	\$S/E	EMPLOYF (Persons)	%WAGE	\$WAGEF (\$Million)	NAICS NUMBER
B.FUEL	93.98	30.06	0.31	96	0.05	1.43	447
BAIT	26.98	8.63	0.14	62	0.13	1.10	4511102
TACKLE	26.45	8.46	0.14	61	0.13	1.08	4511102
ICE	8.23	2.63	0.31	8	0.05	0.13	447
FOD/STO	25.89	8.28	0.14	60	0.11	0.87	445
FOD/RES	26.77	8.56	0.04	228	0.27	2.35	722
GAS AUT	14.76	4.72	0.32	15	0.05	0.23	447
BT.RAMP	10.00	3.20	0.11	29	0.17	0.55	71393
MAR FEE	75.00	23.99	0.11	214	0.17	4.09	71393
EQ.RENT	0.00	0.00	0.15	0	0.14	0.00	532292
SUNDR	9.36	2.99	0.15	19	0.09	0.28	452
OTHER	60.02	19.20	0.15	124	0.10	1.85	452
TOTAL	377.44	120.71	0.13	917	0.12	13.96	
SNORKELING PARTY DAYS (PARTDAS):				163,492			
SNORKELING ACTIVITY SCENARIO (S)				%INCOUNTS=	0.80		
CATEGORY	\$EPPDS (Dollars)	\$EXPENS (\$Million)	EMPLOY S (Persons)	\$WAGES (\$Million)			
B.FUEL	46.42	6.07	19	0.29			
BAIT	0.43	0.06	0	0.01			
TACKLE	1.60	0.21	2	0.03			
ICE	8.44	1.10	4	0.05			
FOD/STO	24.46	3.20	23	0.34			
FOD/RES	24.90	3.26	87	0.89			
GAS AUT	19.13	2.50	8	0.12			
BT.RAMP	1.74	0.23	2	0.04			
MAR FEE	41.08	5.37	48	0.92			
EQ.RENT	2.12	0.28	2	0.04			
SUNDR	8.92	1.17	8	0.11			
OTHER	19.18	2.51	16	0.24			
TOTAL	198.42	25.95	218	3.07			
SCUBA DIVING PARTY DAYS (PARTDAD):				210,204			
SCUBA DIVING ACTIVITY SCENARIOS (D)				%INCOUNTD=	0.85		
CATEGORY	\$EPPDD (Dollars)	\$EXPEND (\$Million)	EMPLOYD (Persons)	\$WAGED (\$Million)			
B.FUEL	75.49	13.49	43	0.64			
BAIT	2.67	0.48	3	0.06			
TACKLE	10.74	1.92	14	0.25			
ICE	6.03	1.08	3	0.05			
FOD/STO	19.35	3.46	25	0.36			
FOD/RES	23.74	4.24	113	1.16			
GAS AUT	9.96	1.78	6	0.08			
BT.RAMP	2.36	0.42	4	0.07			
MAR FEE	31.64	5.65	51	0.96			
EQ.RENT	24.66	4.41	29	0.62			
SUNDR	6.94	1.24	8	0.12			
OTHER	59.82	10.69	69	1.03			
TOTAL	273.40	48.85	368	5.42			

TABLE A.2.1-4 (Residents)

PALM BEACH COUNTY SUMMARY OF RESIDENT BOATER SPENDING, WAGES AND EMPLOYMENT GENERATED - BY ACTIVITY AND REEF TYPE

SUMMARY-ARTIFICIAL REEF				SUMMARY-NATURAL REEF				SUMMARY-ALL ACTIVITIES			
ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)	ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)	ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)
FISH	43.5	5.0	330	FISH	77.3	8.9	587	FISH	120.7	14.0	917
SNORKEL	12.2	1.4	103	SNORKEL	13.8	1.6	116	SNORKEL	26.0	3.1	218
S.DIVING	13.7	1.5	103	S.DIVING	35.2	3.9	265	S.DIVING	48.8	5.4	368
TOTAL	69.3	8.0	536	TOTAL	126.2	14.5	968	TOTAL	195.5	22.5	1,503

SUMMARY OF TOTAL SPENDING, EMPLOYMENT, AND WAGES - BY EXPENDITURE CATEGORY

Category	SPEND (\$Million)	%	Employment (Persons)	%	Wages Generated (\$ Million)	%
B.FUEL	49.62	0.25	159	0.11	2.37	0.11
BAIT	9.16	0.05	66	0.04	1.17	0.05
TACKLE	10.59	0.05	76	0.05	1.35	0.06
ICE	4.81	0.02	15	0.01	0.23	0.01
FOD/STO	14.94	0.08	109	0.07	1.57	0.07
FOD/RES	16.06	0.08	428	0.28	4.40	0.20
GAS AUT	9.00	0.05	28	0.02	0.43	0.02
BT RAMP	3.85	0.02	34	0.02	0.66	0.03
MAR FEE	35.01	0.18	313	0.21	5.98	0.27
EQ RENT	4.68	0.02	31	0.02	0.66	0.03
SUND	5.40	0.03	35	0.02	0.51	0.02
OTHER	32.39	0.17	209	0.14	3.12	0.14
TOTAL	195.51	1.00	1,503	1.00	22.45	1.00

TABLE A.2.1-5 (Residents)										
ESTIMATION OF THE NUMBER OF PARTY-DAYS AND PERSON-DAYS SPENT USING REEFS, BY "RESIDENTS" IN BROWARD COUNTY, FLORIDA - 2000										
DISTRIBUTION OF BOATING PARTY DAYS BY ACTIVITY: FISHING, SNORKELING & DIVING										
REGBTR	%RES=	RREGBT	RDAY/BT	TOTAL PARTY DAYS (PARTDA)	%SALTF	PARTDAF	%SALTS	PARTDAS	%SALTD	PARTDAD
23,974	0.995	23,854	39	930,317	0.55	511,674	0.19	176,760	0.26	241,882
				START HERE:	ALLREGB	%16FT+	%REEFU	REGBTR		
					61,124	0.65	0.61	23,974		
DISTRIBUTION OF PARTY DAYS BY ACTIVITY AND REEF TYPE										
ESTIMATED PARTY DAYS FISHING ON REEFS:										
%ARTREF	%NATREF	DAYARTF	DAYNATF	TOTAL PARTY DAYS (PARTDAF)						
0.40	0.60	204,670	307,005	511,674						
% OF TIME QUESTION										
0.32	0.57		CONSISTENT							
ESTIMATED PARTY DAYS SNORKELING ON REEFS:										
%ARTRES	%NATRES	DAYARTS	DAYNATS	TOTAL PARTY DAYS (PARTDAS)						
0.22	0.78	38,887	137,873	176,760						
ESTIMATED PARTY DAYS DIVING ON REEFS:										
%ARTRED	%NATRED	DAYARTD	DAYNATD	TOTAL PARTY DAYS (PARTDAD)						
0.31	0.69	74,984	166,899	241,882						
ESTIMATION OF RESIDENT PERSON DAYS BY ACTIVITY AND REEF TYPE										
ACTIVITY OR REEF TYPE	TOTAL PARTY DAYS	RESIDENT PARTY SIZE	TOTAL RESIDENT PERSON DAYS							
FISHING	511,674	4.21	2,154,148							
Artificial Reef	204,670	4.21	861,659							
Natural Reef	307,005	4.21	1,292,489							
SNORKELING	176,760	4.14	731,787							
Artificial Reef	38,887	4.14	160,993							
Natural Reef	137,873	4.14	570,794							
DIVING	241,882	3.44	832,075							
Artificial Reef	74,984	3.44	257,943							
Natural Reef	166,899	3.44	574,132							
Grand Total Resident Person-Days			3,718,011							

TABLE A.2.1-6 (Residents)							
BROWARD COUNTY RESIDENT BOATER SPENDING PER PARTY-DAY; WAGES AND EMPLOYMENT BY ACTIVITY AND EXPENDITURE CATEGORY							
FISHING PARTY DAYS (PARTDAF):				511,674			
FISHING ACTIVITY SCENARIO (F)				%INCOUNTF=	0.79		
CATEGORY	\$EPPDF (Dollars)	\$EXPENF (\$Million)	\$S/E	EMPLOYF (Persons)	%WAGE	\$WAGEF (\$Million)	NAICS NUMBER
B.FUEL	88.07	35.60	0.33	107.45	0.05	1.62	447
BAIT	29.39	11.88	0.15	79.28	0.12	1.46	4511102
TACKLE	35.92	14.52	0.15	96.89	0.12	1.79	4511102
ICE	9.05	3.66	0.33	11.04	0.05	0.17	447
FOOD/STO	27.59	11.15	0.13	85.01	0.11	1.20	445
FOOD/RES	32.35	13.08	0.04	345.45	0.26	3.41	722
GAS AUTO	16.00	6.47	0.33	19.52	0.05	0.29	447
BT.RAMP	7.11	2.87	0.09	31.62	0.24	0.70	71393
MAR FEE	49.28	19.92	0.10	201.42	0.24	4.85	71393
EQ. RENT	0.21	0.08	0.10	0.86	0.25	0.02	532292
SUNDRIES	7.65	3.09	0.08	39.38	0.10	0.30	452
OTHER	27.79	11.23	0.15	75.51	0.10	1.09	452
TOTAL	330.41	133.56	0.12	1,093	0.13	16.91	
SNORKELING PARTY DAYS (PARTDAS):				176,760			
SNORKELING ACTIVITY SCENARIO (S)				%INCOUNTS=	0.79		
CATEGORY	\$EPPDF (Dollars)	\$EXPENF (\$Million)	EMPLOYF (Persons)	\$WAGES (\$Million)			
B.FUEL	87.30	12.19	37	0.55			
BAIT	1.47	0.21	1	0.03			
TACKLE	4.45	0.62	4	0.08			
ICE	5.74	0.80	2	0.04			
FOOD/STO	29.46	4.11	31	0.44			
FOOD/RES	85.90	12.00	317	3.13			
GAS AUTO	10.44	1.46	4	0.07			
BT.RAMP	4.19	0.59	6	0.14			
MAR FEE	91.57	12.79	129	3.11			
EQ. RENT	10.84	1.51	15	0.38			
SUNDRIES	10.71	1.50	19	0.15			
OTHER	33.11	4.62	31	0.45			
TOTAL	375.18	52.39	599	8.56			
SCUBA DIVING PARTY DAYS (PARTDAD):				241,882			
SCUBA DIVING ACTIVITY SCENARIOS (D)				%INCOUNTD=	0.85		
CATEGORY	\$EPPDD (Dollars)	\$EXPEND (\$Million)	EMPLOYD (Persons)	\$WAGED (\$Million)			
B.FUEL	94.78	19.49	59	0.89			
BAIT	1.30	0.27	2	0.03			
TACKLE	46.39	9.54	64	1.18			
ICE	8.07	1.66	5	0.08			
FOOD/STO	35.05	7.21	55	0.77			
FOOD/RES	53.15	10.93	289	2.85			
GAS AUTO	12.37	2.54	8	0.12			
BT.RAMP	5.62	1.16	13	0.28			
MAR FEE	70.36	14.47	146	3.52			
EQ. RENT	25.21	5.18	52	1.30			
SUNDRIES	9.59	1.97	25	0.19			
OTHER	45.96	9.45	64	0.92			
TOTAL	407.85	83.85	781	12.13			

TABLE A.2.1-7 (Residents)

BROWARD COUNTY SUMMARY OF RESIDENT BOATER SPENDING AND WAGES AND EMPLOYMENT GENERATED - BY ACTIVITY AND REEF TYPE

SUMMARY-ARTIFICIAL REEF				SUMMARY-NATURAL REEF				SUMMARY-ALL ACTIVITIES			
ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)	ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)	ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)
FISH	53.4	6.8	437	FISH	80.1	10.1	656	FISH	133.6	16.9	1,093
SNORKEL	11.5	1.9	132	SNORKEL	40.9	6.7	467	SNORKEL	52.4	8.6	599
S.DIVING	26.0	3.8	242	S.DIVING	57.9	8.4	539	S.DIVING	83.9	12.1	781
TOTAL	90.9	12.4	811	TOTAL	178.9	25.2	1,662	TOTAL	269.8	37.6	2,473

SUMMARY OF TOTAL SPENDING, EMPLOYMENT, AND WAGES - BY EXPENDITURE CATEGORY

Category	SPEND (\$Million)	%	Employment (Persons)	%	Wages Generated (\$ Million)	%
B.FUEL	67.28	0.25	203	0.08	3.06	0.08
BAIT	12.35	0.05	82	0.03	1.52	0.04
TACKLE	24.68	0.09	165	0.07	3.04	0.08
ICE	6.12	0.02	18	0.01	0.28	0.01
FOOD/STO	22.47	0.08	171	0.07	2.41	0.06
FOOD/RES	36.00	0.13	951	0.38	9.39	0.25
GAS AUTO	10.47	0.04	32	0.01	0.48	0.01
BT RAMP	4.61	0.02	51	0.02	1.12	0.03
MAR FEE	47.17	0.17	477	0.19	11.49	0.31
EQ. RENT	6.78	0.03	69	0.03	1.70	0.05
SUNDRIES	6.56	0.02	84	0.03	0.64	0.02
OTHER	25.31	0.09	170	0.07	2.46	0.07
TOTAL	269.8	1.00	2,473	1.00	37.6	1.00

TABLE A.2.1-8 (Residents)										
ESTIMATION OF THE NUMBER OF PARTY-DAYS AND PERSON-DAYS SPENT USING REEFS, BY "RESIDENTS" IN MIAMI-DADE COUNTY, FLORIDA - 2000										
DISTRIBUTION OF BOATING PARTY DAYS BY ACTIVITY: FISHING, SNORKELING & DIVING										
REGBTR	%RES=	RREGBT	RDAYS/BT	TOTAL PARTY DAYS (PARTDA)	%SALTF	PARTDAF	%SALTS	PARTDAS	%SALTD	PARTDAD
30,849	0.995	30,695	36	1,105,005	0.54	596,703	0.26	287,301	0.20	221,001
				START HERE:	ALLREGB	%16FT+	%REEFU	REGBTR		
					67,936	0.66	0.69	30,849		
DISTRIBUTION OF PARTY DAYS BY ACTIVITY AND REEF TYPE										
ESTIMATED PARTY DAYS FISHING ON REEFS:										
%ARTREF	%NATREF	DAYARTF	DAYNATF	TOTAL PARTY DAYS (PARTDAF)						
0.38	0.62	226,747	369,956	596,703						
% OF TIME QUESTION										
0.31	0.64	CONSISTENT								
ESTIMATED PARTY DAYS SNORKELING ON REEFS:										
%ARTRES	%NATRES	DAYARTS	DAYNATS	TOTAL PARTY DAYS (PARTDAS)						
0.28	0.72	80,444	206,857	287,301						
ESTIMATED PARTY DAYS DIVING ON REEFS:										
%ARTRED	%NATRED	DAYARTD	DAYNATD	TOTAL PARTY DAYS (PARTDAD)						
0.31	0.69	68,510	152,491	221,001						
ESTIMATION OF RESIDENT PERSON DAYS BY ACTIVITY AND REEF TYPE										
ACTIVITY OR REEF TYPE	TOTAL PARTY DAYS	RESIDENT PARTY SIZE	TOTAL RESIDENT PERSON DAYS							
FISHING	596,703	4.32	2,577,755							
Artificial Reef	226,747	4.32	979,547							
Natural Reef	369,956	4.32	1,598,208							
SNORKELING	287,301	4.28	1,229,649							
Artificial Reef	80,444	4.28	344,302							
Natural Reef	206,857	4.28	885,347							
DIVING	221,001	3.16	698,363							
Artificial Reef	68,510	3.16	216,493							
Natural Reef	152,491	3.16	481,870							
Grand Total Resident Person-Days:			4,505,767							

TABLE A.2.1-9 (Residents)							
MIAMI-DADE COUNTY RESIDENT BOATER SPENDING PER PARTY-DAY; WAGES AND EMPLOYMENT BY ACTIVITY AND EXPENDITURE CATEGORY							
FISHING PARTY DAYS (PARTDAF):					596,703		
FISHING ACTIVITY SCENARIO (F)				%INCOUNTF=	0.80		
CATEGORY	\$EPPDF (Dollars)	\$EXPENF (\$Million)	\$S/E	EMPLOYF (Persons)	%WAGE	\$WAGEF (\$Million)	NAICS NUMBER
B.FUEL	84.99	40.57	0.33	124.54	0.04	1.82	447
BAIT	28.65	13.68	0.18	74.55	0.11	1.54	4511102
TACKLE	25.80	12.32	0.18	67.13	0.11	1.38	4511102
ICE	8.34	3.98	0.33	12.23	0.04	0.18	447
FOOD/STO	30.25	14.44	0.13	109.31	0.10	1.47	445
FOOD/RES	17.61	8.41	0.04	203.39	0.27	2.25	722
GAS AUTO	20.25	9.67	0.33	29.69	0.04	0.43	447
BT.RAMP	34.26	16.35	0.09	178.06	0.26	4.25	71393
MAR FEE	55.13	26.32	0.09	286.53	0.26	6.85	71393
EQ.RENT	4.21	2.01	0.08	25.60	0.32	0.64	532292
SUNDRIES	7.49	3.58	0.17	20.72	0.10	0.35	452
OTHER	28.52	13.61	0.17	78.89	0.10	1.33	452
TOTAL	345.50	164.93	0.14	1,211	0.14	22.49	
SNORKELING PARTY DAYS (PARTDAS):					287,301		
SNORKELING ACTIVITY SCENARIO (S)				%INCOUNTS=	0.82		
CATEGORY	\$EPPDS (Dollars)	\$EXPENS (\$Million)	EMPLOYS (Persons)	\$WAGES (\$Million)			
B.FUEL	59.82	14.09	43	0.63			
BAIT	2.73	0.64	4	0.07			
TACKLE	15.44	3.64	20	0.41			
ICE	8.88	2.09	6	0.09			
FOOD/STO	27.61	6.50	49	0.66			
FOOD/RES	16.20	3.82	92	1.02			
GAS AUTO	11.14	2.62	8	0.12			
BT.RAMP	8.40	1.98	22	0.51			
MAR FEE	74.16	17.47	190	4.54			
EQ.RENT	3.53	0.83	11	0.26			
SUNDRIES	6.82	1.61	9	0.16			
OTHER	15.35	3.62	21	0.35			
TOTAL	250.08	58.92	475	8.84			
SCUBA DIVING PARTY DAYS (PARTDAD):					221,001		
SCUBA DIVING ACTIVITY SCENARIOS (D)				%INCOUNTD=	0.87		
CATEGORY	\$EPPDD (Dollars)	\$EXPEND (\$Million)	EMPLOYD (Persons)	\$WAGED (\$Million)			
B.FUEL	65.13	12.52	38	0.56			
BAIT	25.91	4.98	27	0.56			
TACKLE	1.32	0.25	1	0.03			
ICE	6.70	1.29	4	0.06			
FOOD/STO	27.09	5.21	39	0.53			
FOOD/RES	22.74	4.37	106	1.17			
GAS AUTO	19.08	3.67	11	0.16			
BT.RAMP	10.07	1.94	21	0.50			
MAR FEE	47.08	9.05	99	2.35			
EQ.RENT	20.27	3.90	50	1.23			
SUNDRIES	7.31	1.41	8	0.14			
OTHER	16.18	3.11	18	0.30			
TOTAL	268.88	51.70	423	7.60			

TABLE A.2.1-10 (Residents)

MIAMI-DADE COUNTY SUMMARY OF RESIDENT BOATER SPENDING AND WAGES AND EMPLOYMENT GENERATED - BY ACTIVITY AND REEF TYPE

SUMMARY-ARTIFICIAL REEF			SUMMARY-NATURAL REEF			SUMMARY-ALL ACTIVITIES					
ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)	ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)	ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)
FISH	62.67	8.54	460	FISH	102.26	13.94	751	FISH	164.93	22.49	1,211
SNORKEL	16.50	2.48	133	SNORKEL	42.42	6.36	342	SNORKEL	58.92	8.84	475
S.DIVING	16.03	2.36	131	S.DIVING	35.67	5.25	292	S.DIVING	51.70	7.60	423
TOTAL	95.2	13.4	724	TOTAL	180.3	25.6	1,385	TOTAL	275.5	38.9	2,109

SUMMARY OF TOTAL SPENDING, EMPLOYMENT, AND WAGES - BY EXPENDITURE CATEGORY

Category	SPEND (\$Million)	%	Employment (Persons)	%	Wages Generated (\$ Million)	%
B.FUEL	67.19	0.24	206	0.10	3.02	0.08
BAIT	19.30	0.07	105	0.05	2.17	0.06
TACKLE	16.21	0.06	88	0.04	1.82	0.05
ICE	7.36	0.03	23	0.01	0.33	0.01
FOOD/STO	26.15	0.09	198	0.09	2.66	0.07
FOOD/RES	16.60	0.06	402	0.19	4.43	0.11
GAS AUTO	15.96	0.06	49	0.02	0.72	0.02
BT RAMP	20.27	0.07	221	0.10	5.27	0.14
MAR FEE	52.84	0.19	575	0.27	13.74	0.35
EQ. RENT	6.74	0.02	86	0.04	2.13	0.05
SUNDRIES	6.59	0.02	38	0.02	0.64	0.02
OTHER	20.34	0.07	118	0.06	1.98	0.05
TOTAL	275.5	1.00	2,109	1.00	38.9	1.00

TABLE A.2.1-11 (Residents)

ESTIMATION OF THE NUMBER OF PARTY-DAYS AND PERSON-DAYS SPENT USING REEFS, BY "RESIDENTS" IN MONROE COUNTY, FLORIDA - 2000

DISTRIBUTION OF BOATING PARTY DAYS BY ACTIVITY: FISHING, SNORKELING & DIVING

REGBTR	%RES=	RREGBT	RDAY/BT	TOTAL PARTY DAYS (PARTDA)	%SALTF	PARTDAF	%SALTS	PARTDAS	%SALTD	PARTDAD
14,549	0.995	14,477	70	1,013,355	0.52	526,945	0.28	283,740	0.20	202,671
				START HERE:	ALLREGB	%16FT+	%REEFU	REGBTR		
					26,564	0.726	0.754	14,549		

DISTRIBUTION OF PARTY DAYS BY ACTIVITY AND REEF TYPE

ESTIMATED PARTY DAYS FISHING ON REEFS:				
%ARTREF	%NATREF	DAYARTF	DAYNATF	TOTAL PARTY DAYS (PARTDAF)
0.30	0.70	158,083	368,861	526,945
% OF TIME QUESTION				
0.20	0.68		CONSISTENT	
ESTIMATED PARTY DAYS SNORKELING ON REEFS:				
%ARTRES	%NATRES	DAYARTS	DAYNATS	TOTAL PARTY DAYS (PARTDAS)
0.25	0.75	70,935	212,805	283,740
ESTIMATED PARTY DAYS SCUBA DIVING ON REEFS:				
%ARTRED	%NATRED	DAYARTD	DAYNATD	TOTAL PARTY DAYS (PARTDAD)
0.57	0.43	115,523	87,149	202,671

ESTIMATION OF RESIDENT PERSON DAYS BY ACTIVITY AND REEF TYPE

ACTIVITY OR REEF TYPE	TOTAL PARTY DAYS	RESIDENT PARTY SIZE	TOTAL RESIDENT PERSON DAYS
FISHING	526,945	3.31	1,744,187
Artificial Reef	158,083	3.31	523,256
Natural Reef	368,861	3.31	1,220,931
SNORKELING	283,740	3.89	1,103,747
Artificial Reef	70,935	3.89	275,937
Natural Reef	212,805	3.89	827,810
DIVING	202,671	2.62	530,998
Artificial Reef	115,523	2.62	302,669
Natural Reef	87,149	2.62	228,329
Grand Total Resident Person-Days:			3,378,932

1,101,861.83	1.86	3.37
2,277,070.32	0.89	2.075
3,378,932.15	2.62	5.445
		0.618348624

TABLE A.2.1-12 (Residents)

MONROE COUNTY RESIDENT BOATER SPENDING PER PARTY-DAY; WAGES AND EMPLOYMENT BY ACTIVITY AND EXPENDITURE CATEGORY

FISHING PARTY DAYS (PARTDAF):					526,945		
FISHING ACTIVITY SCENARIO (F)				%INCOUNTF=	0.68		
CATEGORY	\$EPPDF (Dollars)	\$EXPENF (\$Million)	\$S/E	EMPLOYF (Persons)	%WAGE	\$WAGEF (\$Million)	NAICS NUMBER
B.FUEL	77.47	27.76	0.23	122.13	0.07	1.95	447
BAIT	22.87	8.19	0.12	68.19	0.15	1.25	4511102
TACKLE	24.81	8.89	0.12	73.98	0.15	1.35	4511102
ICE	12.33	4.42	0.23	19.44	0.07	0.31	447
FOOD/STO	27.58	9.88	0.16	62.93	0.09	0.93	445
FOOD/RES	33.07	11.85	0.04	282.19	0.27	3.20	722
GAS AUTO	7.63	2.73	0.23	12.03	0.07	0.19	447
BT.RAMP	2.23	0.80	0.12	6.53	0.17	0.14	71393
MAR FEE	18.68	6.69	0.12	54.71	0.17	1.14	71393
EQ.RENT	0.74	0.27	0.05	4.89	0.23	0.06	532292
SUNDRIES	5.88	2.11	0.12	17.03	0.10	0.22	452
OTHER	16.45	5.89	0.12	47.65	0.10	0.61	452
TOTAL	249.74	89.49	0.12	772	0.13	11.34	

SNORKELING PARTY DAYS (PARTDAS):				283,740
SNORKELING ACTIVITY SCENARIO (S)				%INCOUNTS= 0.64
CATEGORY	\$EPPDS (Dollars)	\$EXPENS (\$Million)	EMPLOY S (Persons)	\$WAGES (\$Million)
BT.FUEL	37.30	6.77	30	0.47
BAIT	2.07	0.38	3	0.06
TACKLE	11.62	2.11	18	0.32
ICE	4.65	0.84	4	0.06
FOOD/STO	22.44	4.07	26	0.38
FOOD/RES	28.15	5.11	122	1.38
GAS AUTO	5.65	1.03	5	0.07
BT.RAMP	6.29	1.14	9	0.19
MAR FEE	21.31	3.87	32	0.66
EQ.RENT	3.22	0.58	11	0.14
SUNDRIES	10.20	1.85	15	0.19
OTHER	28.96	5.26	43	0.54
TOTAL	181.86	33.02	316	4.47

SCUBA DIVING PARTY DAYS (PARTDAD):				202,671
SCUBA DIVING ACTIVITY SCENARIOS (D)				%INCOUNTD= 0.72
CATEGORY	\$EPPDD (Dollars)	\$EXPEND (\$Million)	EMPLOYD (Persons)	\$WAGED (\$Million)
B.FUEL	40.41	5.90	26	0.41
BAIT	2.10	0.31	3	0.05
TACKLE	5.74	0.84	7	0.13
ICE	5.75	0.84	4	0.06
FOOD/STO	20.76	3.03	19	0.28
FOOD/RES	15.34	2.24	53	0.60
GAS AUTO	11.11	1.62	7	0.11
BT.RAMP	2.29	0.33	3	0.06
MAR FEE	9.47	1.38	11	0.23
EQ.RENT	27.67	4.04	74	0.94
SUNDRIES	6.12	0.89	7	0.09
OTHER	24.47	3.57	29	0.37
TOTAL	171.23	24.99	243	3.34

TABLE A.2.1-13 (RESIDENTS)

MONROE COUNTY SUMMARY OF RESIDENT BOATER SPENDING AND WAGES AND EMPLOYMENT GENERATED - BY ACTIVITY AND REEF TYPE

SUMMARY-ARTIFICIAL REEF				SUMMARY-NATURAL REEF				SUMMARY-ALL ACTIVITIES			
ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)	ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)	ACTIVITY	SPEND (\$Million)	WAGES (\$Million)	EMPLOY (Persons)
FISH	26.85	3.40	232	FISH	62.64	7.94	540	FISH	89.49	11.34	772
SNORKEL	8.26	1.12	79	SNORKEL	24.77	3.35	237	SNORKEL	33.02	4.47	316
S.DIVING	14.24	1.90	139	S.DIVING	10.74	1.44	105	S.DIVING	24.99	3.34	243
TOTAL	49.3	6.4	449	TOTAL	98.2	12.7	882	TOTAL	147.5	19.15	1,331

SUMMARY OF TOTAL SPENDING, EMPLOYMENT, AND WAGES - BY EXPENDITURE CATEGORY

Category	SPEND (\$Million)	%	Employment (Persons)	%	Wages Generated (\$ Million)	%
BT.FUEL	40.43	0.27	178	0.13	2.83	0.15
BAIT	8.88	0.06	74	0.06	1.35	0.07
TACKLE	11.84	0.08	99	0.07	1.80	0.09
ICE	6.10	0.04	27	0.02	0.43	0.02
FOOD/STO	16.99	0.12	108	0.08	1.60	0.08
FOOD/RES	19.20	0.13	457	0.34	5.18	0.27
GAS AUTO	5.38	0.04	24	0.02	0.38	0.02
BT. RAMP	2.28	0.02	19	0.01	0.39	0.02
MAR FEE	11.95	0.08	98	0.07	2.03	0.11
EQ. RENT	4.89	0.03	90	0.07	1.13	0.06
SUNDRIES	4.85	0.03	39	0.03	0.50	0.03
OTHER	14.72	0.10	119	0.09	1.52	0.08
TOTAL	147.5	1.00	1,331	1.00	19.1	1.00

Chapter 3: Methodology - Use Values of the Reefs to Residents and Visitors

This chapter describes the methods used to estimate the use values of the reefs that were not presented in the Final Report in the interest of brevity. The use values solicited during both the resident and visitor surveys pertain to use of the reefs in all four south Florida counties - Palm Beach, Broward, Miami-Dade and Monroe.

In this study, four types of use values were estimated: (1) the value to reef users of maintaining the natural reefs in their existing condition; (2) the value to reef users of maintaining the artificial reefs in their existing condition; (3) the value to reef users of maintaining both the artificial and natural reefs in their existing condition and (4) the value to reef users of adding and maintaining additional artificial reefs.

In general, use value is the maximum amount of money that reef users are willing to pay to maintain the reefs in their existing condition and to add more artificial reefs to the system. Use value was measured in terms of per party per trip for existing natural and artificial reefs and per party per year for new artificial reefs. For presentation, values were normalized to values per person-day of reef-related activity so that the use values can be compared to use values estimated in other studies. Use value is also presented in aggregate for all users of the reef system.

3.1 Use Value - Residents

For the survey section on reef use value, the resident sample was split with half getting questions about their values for natural reefs, artificial reefs and a combined program for natural and artificial reefs. The other half of the resident boater sample received a version of the questionnaire that only asked for their values for new artificial reefs.

For the natural reefs, artificial reefs, and the combined natural and artificial reef programs, the questionnaire included the following:

“Suppose there was a plan to maintain the health and condition of natural reefs in southeast Florida. First, consider your total costs for your last boating trip in southeast Florida including travel expenses, lodging, and all boating expenses. If your costs for this trip would have been \$___ higher, would you have been willing to pay this amount to maintain the natural reefs in their current condition?”

The respondent was simply asked to respond “YES” or “NO” to the given dollar amount. Dollar amounts of \$10, \$50, \$100, \$200 and \$500 were randomly assigned. If the respondent said “NO”, then a follow-up question was asked regarding why they said “NO”. This will be discussed below under Protests/Scenario Rejection.

Next the respondent was asked the following:

3.0 Methodology – Use Values of the Reefs to Residents and Visitors

“Now suppose there was a plan to maintain the health and condition of the artificial reefs in southeast Florida and that this was the only plan you were asked to consider. Think about your total costs for your last boating trip in southeast Florida again including travel expenses, lodging, and all boating expenses. If your total costs for this trip would have been \$___ higher, would you have been willing to pay this amount to maintain the artificial reefs in their existing condition?”

Again the respondent was asked for a ‘YES’ or ‘NO’ response, and if ‘NO’, then a question asking for the reason for saying ‘NO’. The randomly assigned dollar amounts were the same as used for the natural reefs.

Next the respondent was asked the following:

“Finally, suppose that both of these plans to maintain the existing condition of natural and artificial reefs in southeast Florida were put together into a combined program. Consider once again your total costs for your last boating trip in southeast Florida including travel expenses, lodging, and all boating expenses. If your total costs for this trip would have been \$___ higher, would you have been willing to pay this amount to maintain the natural and artificial reefs in their existing condition?”

Again the respondent was asked for a ‘YES’ or ‘NO’ response. The dollar amounts were doubled from the previous amounts for the separate natural reef and artificial reef programs (e.g., \$20, \$100, \$200, \$400 and \$1,000). If respondent answered ‘NO’, then again they were asked the reason for saying ‘NO’.

Preceding these questions were questions about reef trip costs on the respondent’s recent reef-using day on a per party basis. For all residents, a trip is equal to a day. Therefore, the respondent was fully aware of his/her costs on the last trip.

The data can be analyzed either using a dichotomous choice model or the Turnbull Method. Use values reported in the main report were estimated using the logit form of the dichotomous choice model approach. Here, also, the results using the Turnbull Method are presented.

Logit Model. Use of the logit equation in this study can be considered as a cumulative probability distribution function where the underlying probability density function provides the probability of an event occurring given values for the parameters of the event. For the natural reef example, the estimated logit equation provides the probability that a respondent will say yes to paying a certain value to maintain the natural reefs in their existing condition (called WTP bid) given the respondent’s household income, age, boating experience and other characteristics. The underlying probability density function (the first derivative of the cumulative distribution function with respect to the WTP bid) tells us the extent to which respondents change their answer from yes to no as the willingness-to-pay bid increases. This provides us with information

3.0 Methodology – Use Values of the Reefs to Residents and Visitors

regarding respondents’ maximum willingness-to-pay, which is the measure of value that we are trying to estimate.

The expected value (or mean) of the willingness-to-pay (WTP) among all reef users is the mathematical integral over the range of possible willingness-to-pay values of each willingness to pay value times the value of the probability density function at that WTP value. This expected value of willingness-to-pay is the measure of reef user values reported in the Final Report and Technical Appendix.

The survey responses were used to estimate the values of three logit equations: one for the natural reef program, one for the artificial reef program and one for the combined programs. The dependent variable is 0 for no and 1 for yes. The independent variables (or explanatory variables) are described in this section.

To estimate values per party per day, the data were pooled for all counties. A logit model was used to estimate per party per day values. The logit model tested for differences in WTP by County, activity, household income, age of respondent, years of boating experience in South Florida, race/ethnicity, sex, length of boat owned, and whether a member of a fishing or diving club. The definitions for all the variables used are included in Table A.3.1-1.

**Table A.3.1-1
Definitions of Variables Used in Dichotomous Choice Models**

Variable	Definition
WTPNR	Willingness to Pay for Natural Reef Program (1=Yes, 0=No)
WTPAR	Willingness to Pay for Artificial Reef Program (1=Yes, 0=No)
WTPNAR	Willingness to Pay for Combined Natural and Artificial Reef Programs (1=Yes, 0=No)
WTPARNP	Willingness to Pay for New Artificial Reefs Program (1=Yes, 0=No)
BIDNR	Randomly Assigned Dollar Amount for Natural Reef Program. Dollars Per Party Per Trip (\$10, \$50, \$100, \$200, \$500 and \$1,000).
LBIDNR	Natural Logarithm of BIDNR.
BIDAR	Randomly Assigned Dollar Amount for Artificial Reef Program. Dollars Per Party Per Trip (\$10, \$50, \$100, \$200, \$500 and \$1,000).
LBIDAR	Natural Logarithm of BIDAR.
BIDNAR	Randomly Assigned Dollar Amount for Combined Natural and Artificial Reef Programs. Dollars Per Party Per Trip (\$20, \$100, \$200, \$400, \$1,000 and \$2,000). Double amount for natural or artificial reef programs.
LBIDNAR	Natural Logarithm of BIDNAR.
BIDARNP	Randomly Assigned Dollar Amount for New Artificial Reef Program. Dollars Per Party Per Year (\$5, \$10, \$20, \$30, \$50 and \$100).
LBIDARNP	Natural Logarithm of BIDARNP.
DADE	Dummy Variable for County where Interviewed (1=Miami-Dade, 0=Other). Miami-Dade is the reference County in model estimation.
BROWARD	Dummy Variable for County where Interviewed (1=Broward, 0=Other).

3.0 Methodology – Use Values of the Reefs to Residents and Visitors

Table A.3.1-1
Definitions of Variables Used in Dichotomous Choice Models

Variable	Definition
PALMB	Dummy Variable for County where Interviewed (1=Palm Beach, 0=Other).
MONROE	Dummy Variable for County where Interviewed (1=Monroe, 0=Other).
INC25K	Dummy Variable for Household Income (1=less than \$25,000, 0=Other). This was the reference Household Income in model estimation.
INC50K	Dummy Variable for Household Income (1=\$25,000 to \$49,999, 0=Other).
INC100K	Dummy Variable for Household Income (1=\$50,000 to \$99,999, 0=Other).
INC150K	Dummy Variable for Household Income (1=\$100,000 and Greater, 0=Other).
INCMISS	Dummy Variable for Household Income (1=Income Missing, 0=Other).
AGEH	Age of Respondent in Years divided by 10.
LAGEH	Natural Logarithm of AGEH.
EXPER	Number of Years of Boating Experience in South Florida.
LEXPER	Natural Logarithm of EXPER.
HISPANIC	Dummy Variable for Ethnic Background (1=Hispanic or Latino, 0=Other).
WHITE	Dummy Variable for Race (1=White, 0=Non White).
MALE	Sex of Respondent (1=Male, 0=Female).
BLENGTH	Length of Boat (in feet).
LBLENGTH	Natural Logarithm of BLENGTH.
CLUB	Dummy Variable for Membership in fishing or diving club (1=Yes, 0=No).
SNORKNR	Dummy Variable for Activity/Reef Type (1=Snorkeling on Natural Reefs, 0=Other).
SNORKAR	Dummy Variable for Activity/Reef Type (1=Snorkeling on Artificial Reefs, 0=Other).
SCUBANR	Dummy Variable for Activity/Reef Type (1=Scuba Diving on Natural Reefs, 0=Other).
SCUBAAR	Dummy Variable for Activity/Reef Type (1=Scuba Diving on Artificial Reefs, 0=Other).
FISHNR	Dummy Variable for Activity/Reef Type (1=Fishing on Natural Reefs, 0=Other).
FISHAR	Dummy Variable for Activity/Reef Type (1=Fishing on Artificial Reefs, 0=Other).

Separate models were estimated for each of the four reef programs (e.g., natural reefs, existing artificial reefs, natural & artificial reefs combined and new artificial reefs). For the natural reef, existing artificial reefs and the combined programs, the only significant difference in user values were found for those with income greater than \$100,000. This group had a higher willingness to pay to maintain the reefs in their existing condition than other reef users. There were no other differences found. The logit model did not produce different per party per day values by county, and because party sizes were not significantly different by county the estimated values per person-day were also the same across counties for each of the reef valuation programs. The estimated per party per day values were \$32.55 for the natural reefs, \$11.31 for the artificial reefs and \$12.94 for the combined program. The final models used for estimating values are included in Table 2.1.3-1 and 2.1.3-3 of the Final Report. Appendix tables are included with the full set of modeled variables: Table A.3.1-2 (Natural Reefs), Table A.3.1-3 (Artificial Reefs) and Table A.3.1-4 (Natural & Artificial Reefs combined) at the end of this Chapter.

3.0 Methodology – Use Values of the Reefs to Residents and Visitors

To estimate total annual use values for each county, the number of party-days are multiplied by the estimated values per party per day. The value per person-day is then estimated by dividing the total annual use value by the total number of person-days. This normalized value per person-day can be compared with results from other studies. The calculations are shown in the following appendix tables: Table A.3.1-5 (Natural Reefs), Table A.3.1-6 (Artificial Reefs) and Table A.3.1-7 (Natural & Artificial Reefs Combined) at the end of this Chapter.

The results are consistent with the idea that natural reefs are preferred to artificial reefs. Across all counties, the average per person-day value of the natural reefs was \$8.49 versus \$2.97 for artificial reefs. Total use is also higher for natural versus artificial reefs. Across all counties, natural reef use was over 9.3 million person-days versus about 4.9 million person-days for artificial reefs. This translated into an estimate of total annual use value of over \$79 million for natural reefs and \$14.5 million for artificial reefs. Capitalizing the annual use values, using a three percent interest rate, yields asset values of over \$2.6 billion for the natural reefs and \$484 million for the artificial reefs.

The sum of the values for the individual reef programs can be different from the value for the combined programs. This result is not inconsistent with the literature on embedded values. Randall and Hoehn (1992) have shown that this type of result is consistent with economic theory. The combined programs have exceeded the income constraints of many respondents and/or many respondents had value for only one of the programs. So we conclude that our estimated values for the natural and artificial reefs valued separately and together are valid estimates. Bear in mind that willingness to pay for the combined programs is a different scenario from willingness to pay for the individual programs.

The second half of the resident sample was asked about their willingness to pay for new artificial reefs. The following was presented to this sample:

“Local and state government agencies are being asked to evaluate how users of artificial reefs value new artificial reefs. Artificial reef programs cost money. Suppose that the government proposed that all users of the artificial reefs would pay for all the newly constructed reefs. Fishermen and divers with their own boats would pay for a decal as part of their boat registration and/or, if they used a charter/party boat or rental boat (pay operation), they would pay for the costs through higher fees charged by the pay operation. The money would go into a trust fund that could only be used for the construction and maintenance of artificial reefs in southeast Florida.”

Would you be willing to pay \$___ per year when you renew your boat registration and/or the amount in higher fees to a charter/party boat or rental operation to fund this program?

3.0 Methodology – Use Values of the Reefs to Residents and Visitors

The respondent was asked to respond either “YES” or “NO” to the following randomly assigned dollar amounts: \$5, \$10, \$20, \$30, \$50 and \$100. If “NO”, then they were asked their reason for saying “NO”.

As with the three reef programs above, a logit model was estimated. The logit model estimated for the new artificial reef program found some statistically significant differences. Those from Palm Beach and Broward counties had higher willingness to pay than those from Miami-Dade and Monroe counties. Snorkelers and scuba divers had higher values than those who participated in fishing activities. The only other statistically significant variable was household income. As household income levels increased, so did willingness to pay for new artificial reefs. On a per party per day basis, the estimated values ranged from a high of \$3.60 for snorkelers and scuba divers from Palm Beach and Broward counties to a low of \$0.63 for those who participated in fishing activities off Miami-Dade and Monroe counties. The results for the final model used for estimating the use values for new artificial reef are included in Table 2.1.3-3 of the Final Report. For the model that includes the full compliment of explanatory variables, see appendix Table A.3.1-8.

As with the other three programs, the estimated per party per day values were multiplied by the total party-days spent on artificial reefs by artificial reefs users in each county to get total annual use value for each county. The total annual use values were then divided by the total annual person-days of artificial reef use in each county to get an estimate of the value per person-day. Again, this normalized value per person-day can be compared with results from other studies. These calculations are included in appendix Table A.3.1-9.

On a per person-day basis, the estimated values ranged from a low of 28 cents in Miami-Dade County to a high of 72 cents in Palm Beach County. Across all four counties, the average was 49 cents per person-day. These values may seem low, but one should recall that these normalized values are obtained by dividing total annual use value for new artificial reefs by all use on existing artificial reefs. Total use across all counties was almost 4.9 million person-days with an annual use value of almost \$2.4 million.

Turnbull Method. The Turnbull Method has been advocated as producing a lower bound or conservative estimate of value (Carson et. al., 1994). The method is simple to implement, since it only requires a cross-tabulation of the randomly assigned dollar amounts with the yes/no responses. The method was implemented including all reef users and by limiting the sample to users of each type of reef (i.e., only natural reef users for valuing natural reefs and only artificial reef users for valuing artificial reefs). For the combined natural and artificial reef programs all reef users were included.

For the sample of users only, the Turnbull Method calculations are included in **Table A.3.1-10** (Natural Reefs), **Table A.3.1-11** (Artificial Reefs), **Table A.3.1-12** (Natural & Artificial Reefs combined), and **Table A.3.1-13** (New Artificial Reefs). The Turnbull Method does not allow for

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estimating different values for different counties or for other socioeconomic factors because of limits in sample size available. So for each type of reef program only one estimate of use value per party day is generated using this method. For natural reefs, this method yielded an estimate of \$126.87 per party per day. For artificial reefs, the estimate is \$105.08. For the natural & artificial reefs combined, the estimate is \$115.00. For new artificial reefs, this method yielded an estimate of \$59.00 per party per year. Using an estimate of the sample average number of artificial reef use days for artificial reef users (14.82), the use value per party per day for new artificial reefs is estimated at \$3.98.

For the sample of all reef users regardless of reef type, the Turnbull Method calculations are included in Table A.3.1-14 (Natural Reefs), Table A.3.1-15 (Artificial Reefs), Table A.3.1-16 (Natural & Artificial Reefs combined), and Table A.3.1-17 (New Artificial Reefs). For natural reefs, this method yielded an estimate of \$124.97 per party per day. For artificial reefs, the estimate is \$77.88. For the natural & artificial reefs combined, the estimate is \$115.00 (same as above). For new artificial reefs, this method yielded an estimate of \$51.50 per party per year. Using an estimate of the sample average number of artificial reef use days for artificial reef users (11.1), the use value per party per day for new artificial reefs is estimate at \$4.64.

Estimates of use value per party per day were extrapolated from sample to population using the estimates of party days of reef use for each type of reef in each county. Multiplying party days times use value per party per day yields an estimate of total annual use value. This total annual use value is then divided by the estimate of the total annual person-days of activity on each type of reef to yield an estimate of the use value per person-day. This is a normalized value that can be compared with other studies. Asset value is calculated as total annual value divided by .03 or three percent.

For the sample of users only, these calculations are included in Table A.3.1-18 (Natural Reefs), Table A.3.1-19 (Artificial Reefs), Table A.3.2-20 (Natural & Artificial Reefs combined) and Table A.3.1-21 (New Artificial Reefs). For the sample of all reef users, the calculations are included in Table A.3.1-22 (Natural Reefs), Table A.3.1-23 (Artificial Reefs), Table A.3.1-24 (Natural & Artificial Reefs combined) and Table A.3.1-25 (New Artificial Reefs).

Comparison of Logit Model and Turnbull Method Results. Comparing the results from the logit model with the results derived using the Turnbull Method (sample of users only), it was observed that the Turnbull Method yields estimates on a per party per day basis 3.9 times higher for natural reef use, 9.3 times higher for artificial reef use, 9.9 times higher for natural and artificial reefs combined, and 2.1 times higher for new artificial reefs. So in this application, the Turnbull Method did not yield a lower bound conservative estimate as past research had indicated.

In this application of the Turnbull Method, a large proportion of the value is attributed to the upper interval (\$500 to infinity for the separate natural reef and artificial reef programs, \$1,000

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to infinity for the combined programs, and \$500 to infinity for the new artificial reef program). For natural reefs 99.87% of the value is attributed to the upper interval. For artificial reefs 99.11% of value is attributed to the upper interval. It was 82.52% for the natural and artificial reef combined and 42.37% for new artificial reefs. This would appear to indicate a problem with too high a percent indicating a “YES” response to the top dollar amount used. More research is needed to test how this might affect the logit model results.

Protests/Scenario Rejection. As mentioned above, when the respondent answered “NO” to a valuation question, he/she was asked for their reasons for saying “NO”. Table A.3.1-26 summarizes the responses for each valuation question. The response “A” (a contribution of that amount is more than the reefs are worth to me) is the expected economic response. Other responses (included in the Other Reason category) include responses that are also expected economic responses such as he/she would go elsewhere or would do something else (substitution). All of the other responses are interpreted either as protests to the questions and/or they indicated the person rejected the scenario for the valuation exercise. Protests and scenario rejections might usually be eliminated from the sample in estimating values because they might have been willing to pay the assigned dollar amount, they just did not like something about the question or scenario.

The relationship between the randomly assigned dollar amounts and those responses that indicate a protest and/or scenario rejection was reviewed. There was a high correlation between the randomly assigned dollar amounts and the person giving a protest and/or scenario rejection reason for saying “NO”. As the dollar amounts increased, so did the proportion of protest and/or scenario rejection responses. This finding affirmed that no one should be eliminated as true protestors and/or for scenario rejection. There appears to be a simple reaction to the high dollar amounts and this is the expected result. Table A.3.1-27 summarizes the relationship between protestors/scenario rejection and dollar amounts.

3.2 Use Value - Visitors

The information obtained on visitor use values for the reefs in Southeast Florida can be evaluated using either the Turnbull Method or the Dichotomous Choice Model Method. A disadvantage of the Turnbull Method is that it requires extremely large sample sizes to allow for separate estimates of use value for different user groups. Available sample sizes would not allow for providing separate estimates for each county or activity-boating mode (e.g., snorkeling from private/rental boat, scuba diving from charter/party boat, bottom fishing from a private/rental boat, etc.) using the Turnbull Method. For the Final Report, only the results from the Dichotomous Choice Model Method employing a logit model were presented. In this Technical Appendix, the results from logit and probit models, plus the results using the Turnbull Method are presented. For the Turnbull Method, estimates were provided based on samples of all reef users and users of each type of reef.

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Logit Model. A logit model was used on all the visitor data pooled across all four counties and the two seasons (e.g., summer and winter). The logit model was used to test for differences by county, season, activity-boat mode, type of reef used (e.g., natural or artificial), and various user characteristics such as, household income, age of respondent, race/ethnicity, sex, boat ownership, years of boating experience in South Florida and whether the respondent was a member of a fishing or diving club. The definitions of all the variables used in estimation are provided in Table A.3.2-1.

**Table A.3.2-1
Definitions of Variables Used in Dichotomous Choice Models**

Variable	Definition
WTPNR	Willingness to Pay for Natural Reef Program (1=Yes, 0=No)
WTPAR	Willingness to Pay for Artificial Reef Program (1=Yes, 0=No)
WTPNAR	Willingness to Pay for Combined Natural and Artificial Reef Programs (1=Yes, 0=No)
WTPARNP	Willingness to Pay for New Artificial Reefs Program (1=Yes, 0=No)
Q34a	Randomly Assigned Dollar Amount for Natural Reef Program. Dollars Per Party Per Trip (\$10, \$50, \$100, \$200, \$500 and \$1,000).
LQ34a	Natural Logarithm of Q34a.
Q36a	Randomly Assigned Dollar Amount for Artificial Reef Program. Dollars Per Party Per Trip (\$10, \$50, \$100, \$200, \$500 and \$1,000).
LQ36a	Natural Logarithm of Q36a.
Q38a	Randomly Assigned Dollar Amount for Combined Natural and Artificial Reef Programs. Dollars Per Party Per Trip (\$20, \$100, \$200, \$400, \$1,000 and \$2,000). Double amount for natural or artificial reef programs.
LQ38a	Natural Logarithm of Q38a.
Q40a	Randomly Assigned Dollar Amount for New Artificial Reef Program. Dollars Party Per Year (\$5, \$10, \$20, \$30, \$50 and \$100).
LQ40a	Natural Logarithm of LQ40a.
SUMMER	Dummy Variable for Season Visitors Sampled (1=Summer, 0=Winter).
DADE	Dummy Variable for County where Interviewed (1=Miami-Dade, 0=Other). Miami-Dade is the reference County in model estimation.
BROWARD	Dummy Variable for County where Interviewed (1=Broward, 0=Other).
PALMB	Dummy Variable for County where Interviewed (1=Palm Beach, 0=Other).
MONROE	Dummy Variable for County where Interviewed (1=Monroe, 0=Other).
INC25K	Dummy Variable for Household Income (1=less than \$25,000, 0=Other). This was the reference Household Income in model estimation.
INC50K	Dummy Variable for Household Income (1=\$25,000 to \$49,999, 0=Other).
INC100K	Dummy Variable for Household Income (1=\$50,000 to \$99,999, 0=Other).
INC150K	Dummy Variable for Household Income (1=\$100,000 and Greater, 0=Other).
INCMISS	Dummy Variable for Household Income (1=Income Missing, 0=Other).
AGEH	Age of Respondent in Years divided by 10.
LAGEH	Natural Logarithm of AGEH.

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**Table A.3.2-1
Definitions of Variables Used in Dichotomous Choice Models**

Variable	Definition
EXPER	Number of Years of Boating Experience in South Florida.
LEXPER	Natural Logarithm of EXPER.
HISPANIC	Dummy Variable for Ethnic Background (1=Hispanic or Latino, 0=Other).
WHITE	Dummy Variable for Race (1=White, 0=Non White).
MALE	Sex of Respondent (1=Male, 0=Female).
OWNBOAT	Dummy Variable for Boat Ownership (1=Yes, 0=No).
CLUB	Dummy Variable for Membership in fishing or diving club (1=Yes, 0=No).
NREEF	Dummy Variable for type of reef used (1=Natural Reef, 0=Artificial Reef Only).
AREEF	Dummy Variable for type of reef used (1=Artificial Reef, 0=Natural Reef Only).
NAREEF	Dummy Variable for type of reef use (1=Both Natural and Artificial Reef, 0=Only one type of reef used).
SNORKC	Dummy Variable for Activity/Boat Mode (1=Snorkeling from Charter/Party Boat, 0=Other).
SNORKPR	Dummy Variable for Activity/Boat Mode (1=Snorkeling from Private/Rental Boat, 0=Other).
SCUBAC	Dummy Variable for Activity/Boat Mode (1=Scuba Diving from Charter/Party Boat, 0=Other).
SCUBAPR	Dummy Variable for Activity/Boat Mode (1=Scuba Diving from Private/Rental Boat, 0=Other).
FSHBOTC	Dummy Variable for Activity/Boat Mode (1=Bottom Fishing from Charter Boat, Boat, 0=Other).
FSHBOTPY	Dummy Variable for Activity/Boat Mode (1=Bottom Fishing from Party Boat, Boat, 0=Other).
FSHBOTPR	Dummy Variable for Activity/Boat Mode (1=Bottom Fishing from Private/Rental Boat, 0=Other).
FSHOTH	Dummy Variable for Activity/Boat Mode (1=All Fishing Other than Bottom Fishing, 0=Other).
GLASSBOT	Dummy Variable for Activity/Boat Mode (1=Glass-bottom Boat Ride, 0=Other).
VIEW	Dummy Variable for Activity/Boat Mode (1=View from Private/Rental Boat, Boat, 0=Other).
OTHBOAT	Dummy Variable for Activity/Boat Mode (1=Other Boating Activities, Boat, 0=Other).

Separate models were estimated for each of the four reef programs (e.g., natural reefs, existing artificial reefs, natural & artificial reefs combined, and new artificial reefs). For all four reef programs, significant differences were found by county. On a per party per trip and per person-trip basis, Miami-Dade County had the lowest values for all four reef programs. In order from lowest to highest values: Miami-Dade, Palm Beach, Broward, and Monroe.

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Significant differences were also found by activity-boat modes, but these differences were dependent on reef type and county. For natural reefs, there were no differences that could be identified for Miami-Dade County. For Palm Beach and Broward counties, scuba divers from charter/party boats had significantly higher values than users from all other activity-boat modes. For Monroe County, snorkelers from private/rental boats and scuba divers from charter/party boats had higher values than users from all other activity-boat modes.

For existing artificial reefs, there were no differences found by activity-boat modes for Miami-Dade, Palm Beach and Broward counties. For Monroe County, differences were found for snorkelers from private/rental boats and for those who did bottom fishing from private/rental boats. These latter user groups were, holding all other factors constant, willing to pay more than those who used other activity-boat modes.

For the combined natural and artificial reef program, there were no differences found by activity-boat modes in Miami-Dade County. For Palm Beach and Broward counties, scuba divers from charter/party boats were willing to pay more than those who used other activity-boat modes. For Monroe County, snorkelers from private/rental boats, scuba divers from charter/party boats, and those who did bottom fishing from private/rental boats had higher willingness to pay than those who used other activity-boat modes.

For the new artificial reefs, there were no differences found by activity-boat mode in Miami-Dade County. For Palm Beach, Broward and Monroe counties, scuba divers from charter/party boats had a higher willingness to pay than those who used all other activity-boat modes.

Season was a significant factor in all estimated models. Summer season visitors had significantly lower willingness to pay than winter season visitors. This influenced the decision on how to calculate total annual value. Separate values were calculated for the summer and winter seasons and then added together to get annual values.

Household income was a significant factor in all of the estimated logit models. The higher the household income, the higher the willingness to pay. Race/ethnicity was mixed. There were no significant differences for Hispanic visitors. Whites (95 percent of the visitors) had higher willingness to pay for natural reefs, existing artificial reefs and the combination of natural and artificial reefs, but being white was not significant for new artificial reefs.

Sex was only significant for existing artificial reefs. Males (74 percent of the sample reef users) had higher willingness to pay than female reef users. Boat ownership was significant for existing artificial reefs and for the combined natural and artificial reef programs. Boat owners had higher willingness to pay than non-boat owners, holding all other factors constant, for these two programs.

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All other factors tested were not significant for any of the four programs. These factors included age, years of experience in South Florida boating and membership in a fishing or diving club.

The user values calculated using the estimated logit model are included in the Final Report Table 2.2.3-1 (Natural Reefs) and Table 2.2.3-2. The parameter estimates of the logit model used to estimate these values are provided in Tables A.3.2-2 through A.3.2-5.

Appendix tables that include first-run logit models with all variables tested for significance are Table A.3.2-6 (Natural Reefs), Table A.3.2-7 (Artificial Reefs), Table A.3.2-8 (Natural and Artificial Reefs—The Combined Programs), and Table A.3.2-9 (New Artificial Reefs). The probit models rejected because they resulted in negative values are included in Table A.3.2-10 (Natural Reefs), Table A.3.2-11 (Artificial Reefs), Table A.3.2-12 (Natural and Artificial Reefs—The Combined Programs), and Table A.3.2-13 (New Artificial Reefs).

The logit model was used to estimate values per party per trip for each of the sampled users for each reef program. For new artificial reefs, this required an additional calculation since the question asked for a yearly amount instead of an amount per trip. For new artificial reefs, the per party per year estimates were divided by the number of trips that the person made to South Florida on which they used artificial reefs over the past 12 months. Separate sample averages were then estimated for each County, Season and Activity-boat mode for which there were significant differences. These per party per trip values were then divided by the average party size (number of people for which the respondent was paying for trip expenses) by county and activity-boat mode to get estimates of willingness to pay per person-trip. Mean values per party per trip are included in Table A.3.2-14 (Natural Reefs), Table A.3.2-15 (Artificial Reefs), Table A.3.2-16 (Natural and Artificial Reefs—The Combined Programs), and Table A.3.2-17 (New Artificial Reefs). Mean values for party size by county and activity type are included in Table A.3.2-18.

Estimation of Annual User Value and User Value Per Person-day. To estimate annual user values, the per person-trip values were multiplied by estimates of the number of person-trips. This was done by County, Season and Activity-boat mode.

The use values per person-day were derived by dividing the total annual user value by the relevant number of total annual person-days. Again, the value per person-day is a standardized measure that can be compared with results from other studies. These calculations are shown in Appendix Tables with one table for each county and type of reef. Tables A.3.2-19 to -22 (Natural Reefs), Tables A.3.2-23 to -26 (Artificial Reefs), Tables A.3.2-27 to -30 (Natural and Artificial Reefs—The Combined Programs), and Tables A.3.2-31 to -34 (New Artificial Reefs). Annual User Values by type of Reef and County are summarized in Table A.3.2-35.

Asset Value of the Reefs. Annual user value shows the flow of value for a given period of time or how much people are willing to pay per year for their reef use. Asset value is the amount

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someone would be willing to pay for the reefs if they could own the reefs and charge a price to those using the reefs. Calculation of asset values requires information about the expected life of the asset (reefs). A simplifying assumption was used, inferring that the reefs will exist into perpetuity (indefinite future). It was also assumed that the real annual user value (value net of inflation) remains constant each year. This means that the amount of use remains constant and the value per unit of use remains constant.

These assumptions are not likely to be true. It might be expected that both the amount of use and the value per unit of use will rise in the future as the reefs become scarce goods i.e., short in supply relative to demand. A real interest rate (discount rate net of inflation) of three percent was also used to translate future dollars into present day dollars. Given the above assumptions, estimates of the asset value are considered lower bound or conservative. The asset values are summarized in Table A.3.2-35.

User Value by Type of Reef. As discussed above, user values were estimated for four different reef programs. For those asked about existing natural and artificial reefs, they were first asked about their willingness to pay for natural reefs, then about their willingness to pay for artificial reefs. In a third step, they were then asked about their willingness to pay for a combined natural and artificial reef program.

For the separate natural and artificial reef programs, the same randomly assigned dollar amounts were used (\$10, \$50, \$100, \$200, \$500 and \$1,000). For the combined program, these amounts were doubled (\$20, \$100, \$200, \$400, \$1,000, and \$2,000). The possibility exists that a respondent might say “yes” to \$500 for the natural reef program and \$500 for the artificial reef program, but say “no” to \$1,000 for the combined program. This would result in an inconsistency for the values of all the natural and artificial reefs because the value of the combined program would be less than the sum of the two separate programs.

Almost all of the results had the above referenced inconsistency i.e., that the willingness to pay for the combined natural and artificial reef programs was less than adding-up the values of the two programs valued individually. This result is not inconsistent with the literature on embedded values. Randall and Hoehn (1995) have shown that this type of result is consistent with economic theory. The combined programs have exceeded the income constraints of many respondents and/or many respondents had value for only one of the programs. So it was concluded that estimated values for the natural and artificial reefs valued separately were valid estimates.

Turnbull Method. The Turnbull Method has been advocated as producing a lower bound or conservative estimate of value (Carson et. al., 1994). The method is simple to implement, since it only requires a cross-tabulation of the randomly assigned dollar amounts with the yes/no responses.

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Values were estimated using the Turnbull Method for summer and winter season visitors separately for each of the four reef valuation programs. The Turnbull Method was also used to estimate values using two types of samples: a sample that included all reef users and a sample that included only users of the reef type targeted in the program.

Two of the results did not have well-behaved distributions (i.e., the percent of respondents saying “Yes” to the randomly assigned dollar amount did not decline monotonically with the rise in dollar amounts). This indicates that the sample size is not sufficient to use the Turnbull Method. The two results were for the Natural Reef Program (Natural Reef Users Only during the summer season) and the Natural & Artificial Reef Program Combined during the summer season. This leads to negative values using the Turnbull Method. For the summer sample of visitors valuing natural reefs, a higher percent of visitors were willing to pay \$1,000 than \$500. For the summer sample of visitors valuing the natural & artificial reefs combined, a higher percent of visitors were willing to pay \$2,000 than \$1,000.

The calculations for users only are shown in Table A.3.2-36 (Natural Reefs-Summer), Table A.3.2-37 (Natural Reefs-Winter), Table A.3.2-38 (Artificial Reefs-Summer), Table A.3.2-39 (Artificial Reefs-Winter), Table A.3.2-40 (New Artificial reefs-Summer), and Table A.3.2-41 (New Artificial Reefs-Winter). For the Natural & Artificial Reefs Combined, all reef users are used. The calculations for this program are included in Table A.3.2-42 (summer) and Table A.3.2-43 (winter).

The calculations using the responses of all reef users are included in appendix Table A.3.2-44 (Natural Reef-Summer), Table A.3.2-45 (Natural Reef-Winter), Table A.3.2-46 (Artificial Reefs-Summer), Table A.3.2-47 (Artificial Reefs-Winter), Table A.3.2-48 (New Artificial Reefs-Summer) and Table A.3.2-49 (New Artificial Reefs-Winter).

Table A.3.2-50 summarizes the results for all the estimates derived using the Turnbull Method. For each type of reef, winter values were always higher than summer values, which agrees with the logit model results. However, the Turnbull Method results are generally higher than those obtained using the logit model. So in this application of the Turnbull Method it did not yield lower bound estimates. Limiting the samples to users only generally resulted in higher values, except for natural reefs-winter sample and artificial reefs-summer sample.

The above results yield estimates on a per party per trip basis. To extrapolate from sample to population, these estimates were converted to value per person-trip. Table A.3.2-51 includes estimates of the mean party sizes by season and type of reef use and Table A.3.2-52 includes estimates of the mean number of annual trips of artificial reef use used in estimating the value of new artificial reefs on a per person-trip basis. For natural reefs, artificial reefs and natural & artificial reefs combined, per party per trip values were divided by the average party size to get value per person-trip. For the new artificial reefs, the per party per trip values were first divided

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by the average number of trips to get value per party per trip. The result was then divided by the average party size to get value per person-trip.

Estimation of Annual Use Value, Use Value Per Person-day and Asset Value. In estimating annual use values, use values per person-day and asset values, separate values was calculated by county. Thus, for extrapolating value from sample to population, the estimates of reef use in each county were used for each season. Tables A.3.2-53 to -56 show the calculations for the four counties. Again, the use value per person-trip for the summer and winter seasons is the same across counties using the Turnbull Method. It is the varying amount of use in each county that determines total annual value, value per person-day and asset value. Asset value is calculated in the same way as was done for the logit application discussed above (i.e., annual user value divided by three percent).

Table A.3.1-2 (Residents)				
Logit Model for Natural Reef Valuation-Test for Significant Variables				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	0.660905	0.466	0.6412	1.000000
LBIDNR	-0.605814	-9.070	0.0000	4.444262
LBLENGTH	0.160752	0.441	0.6590	3.149844
MALE	0.012271	0.041	0.9674	0.903955
WHITE	0.101949	0.220	0.8260	0.960452
INC50k	1.016754	1.925	0.0543	0.172316
INC100k	1.098464	2.175	0.0296	0.384181
INC150k	1.586238	3.105	0.0019	0.341808
INCMISS	0.462573	0.716	0.4737	0.053672
LAGEH	-0.349782	-0.872	0.3830	1.578540
LEXPER	-0.118520	-1.026	0.3051	2.880361
BROWARD	0.115687	0.438	0.6616	0.214689
PALMB	0.341156	1.279	0.2008	0.201977
MONROE	0.059618	0.239	0.8110	0.353107
SNORKNR	0.451071	2.259	0.0239	0.637007
SCUBANR	-0.097005	-0.511	0.6094	0.389831
FISHNR	0.011178	0.056	0.9556	0.750000
CLUB	0.306648	1.430	0.1528	0.204802
Notes:				
<i>Dependent Variable is WTPNR Mean=.3559</i>				
<i>N=708</i>				
<i>Log likelihood function -399.6129</i>				
<i>Restricted log likelihood -460.9376</i>				
<i>Chi-squared 122.6494</i>				
<i>Degrees of freedom 17</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 73.02</i>				

Table A.3.1-3 (Residents)				
Logit Model for Artificial Reef Valuation-Test for Significant Variables				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	0.956849	0.468	0.6400	1.000000
LBIDAR	-0.632915	-6.694	0.0000	4.447416
LBLENGTH	-0.154140	-0.294	0.7689	3.162925
MALE	-0.142783	-0.297	0.7665	0.920673
WHITE	0.491448	0.727	0.4671	0.954327
INC50k	0.616560	0.908	0.3639	0.151442
INC100k	0.299036	0.467	0.6403	0.375000
INC150k	1.102554	1.713	0.0868	0.355769
INCMISS	-0.882467	-0.904	0.3662	0.060096
LAGEH	-0.156299	-0.272	0.7855	1.545619
LEXPER	0.075413	0.434	0.6640	2.916021
BROWARD	-0.146179	-0.379	0.7050	0.213942
PALMB	-0.106439	-0.281	0.7787	0.206731
MONROE	-0.097813	-0.274	0.7842	0.355769
SNORKAR	0.377407	1.315	0.1886	0.259615
SCUBAAR	0.546012	1.899	0.0575	0.290865
CLUB	0.192181	0.658	0.5104	0.228365
Notes:				
<i>Dependent Variable is WTPAR Mean=.2620</i>				
<i>N=416</i>				
<i>Log likelihood function -202.8965</i>				
<i>Restricted log likelihood -239.2659</i>				
<i>Chi-squared 72.7388</i>				
<i>Degrees of freedom 16</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 71.87</i>				

Table A.3.1-4 (Residents)				
Logit Model for Natural & Artificial Reef Valuation-Test for Significant Variables				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	0.044821	0.026	0.9796	1.000000
LBIDNAR	-0.561395	-6.724	0.0000	5.206274
LBLENGTH	0.456506	1.008	0.3133	3.146351
MALE	0.105684	0.263	0.7929	0.911576
WHITE	-0.067188	-0.116	0.9079	0.959807
INC50k	0.366128	0.611	0.5411	0.167203
INC100k	0.293937	0.527	0.5984	0.385852
INC150k	1.038580	1.845	0.0651	0.337621
INCMISS	-0.757943	-0.829	0.4070	0.059486
LAGEH	-0.845380	-1.642	0.1007	1.572714
LEXPER	0.021268	0.137	0.8908	2.907507
BROWARD	-0.020026	-0.058	0.9538	0.213826
PALMB	0.069913	0.202	0.8402	0.204180
MONROE	0.242664	0.758	0.4485	0.355305
SNORKNR	0.318587	1.213	0.2253	0.654341
SCUBANR	0.354362	1.490	0.1361	0.401929
FISHNR	0.095363	0.365	0.7151	0.755627
CLUB	-0.111135	-0.404	0.6866	0.207396
Notes:				
<i>Dependent Variable is WTPNAR Mean=, 1913</i>				
<i>N=622</i>				
<i>Log likelihood function -266.2286</i>				
<i>Restricted log likelihood -303.6162</i>				
<i>Chi-squared 74.77</i>				
<i>Degrees of freedom 17</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 81.83</i>				

Table A.3.1-5 (Residents)						
Estimated Use Values for Natural Reefs Using the Logit Model, 2000						
County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value Natural Reefs
Palm Beach						
Snorkeling	86,651	32.55	\$2,820,490	326,674	\$8.63	\$94,016,335
Scuba Diving	151,347	32.55	\$4,926,345	584,199	\$8.43	\$164,211,495
Fishing	259,095	32.55	\$8,433,542	992,334	\$8.50	\$281,118,075
Total	497,093	32.55	\$16,180,377	1,903,207	\$8.50	\$539,345,905
Broward						
Snorkeling	137,873	32.55	\$4,487,766	570,794	\$7.86	\$149,592,205
Scuba Diving	166,899	32.55	\$5,432,562	574,133	\$9.46	\$181,085,415
Fishing	307,005	32.55	\$9,993,013	1,292,491	\$7.73	\$333,100,425
Total	611,777	32.55	\$19,913,341	2,437,418	\$8.17	\$663,778,045
Miami-Dade						
Snorkeling	206,857	32.55	\$6,733,195	885,348	\$7.61	\$224,439,845
Scuba Diving	152,491	32.55	\$4,963,582	481,872	\$10.30	\$165,452,735
Fishing	369,956	32.55	\$12,042,068	1,598,210	\$7.53	\$401,402,260
Total	729,304	32.55	\$23,738,845	2,965,430	\$8.01	\$791,294,840
Monroe						
Snorkeling	212,805	32.55	\$6,926,803	827,810	\$8.37	\$230,893,425
Scuba Diving	87,149	32.55	\$2,836,700	228,329	\$12.42	\$94,556,665
Fishing	368,861	32.55	\$12,006,426	1,220,931	\$9.83	\$400,214,185
Total	668,815	32.55	\$21,769,928	2,277,070	\$9.56	\$725,664,275
All Counties						
Snorkeling	644,186	32.55	\$20,968,254	2,610,626	\$8.03	\$698,941,810
Scuba Diving	557,886	32.55	\$18,159,189	1,868,533	\$9.72	\$605,306,310
Fishing	1,304,917	32.55	\$42,475,048	5,103,966	\$8.32	\$1,415,834,945
Total	2,506,989	32.55	\$81,602,492	9,583,125	\$8.52	\$2,720,083,065

Table A.3.1-6 (Residents)						
Estimated Use Values for Artificial Reefs Using the Logit Model, 2000						
County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value Artificial Reefs
Palm Beach						
Snorkeling	76,841	11.31	\$869,072	289,691	\$3.00	\$28,969,057
Scuba Diving	58,857	11.31	\$665,673	227,188	\$2.93	\$22,189,089
Fishing	145,741	11.31	\$1,648,331	558,188	\$2.95	\$54,944,357
Total	281,439	11.31	\$3,183,075	1,075,067	\$2.96	\$106,102,503
Broward						
Snorkeling	38,887	11.31	\$439,812	160,992	\$2.73	\$14,660,399
Scuba Diving	74,985	11.31	\$848,080	257,948	\$3.29	\$28,269,345
Fishing	204,670	11.31	\$2,314,818	861,661	\$2.69	\$77,160,590
Total	318,542	11.31	\$3,602,710	1,280,601	\$2.81	\$120,090,334
Miami-Dade						
Snorkeling	80,445	11.31	\$909,833	344,305	\$2.64	\$30,327,765
Scuba Diving	68,510	11.31	\$774,848	216,492	\$3.58	\$25,828,270
Fishing	226,747	11.31	\$2,564,509	979,547	\$2.62	\$85,483,619
Total	375,702	11.31	\$4,249,190	1,540,343	\$2.76	\$141,639,654
Monroe						
Snorkeling	70,935	\$11.31	\$802,275	275,937	\$2.91	\$26,742,495
Scuba Diving	115,523	\$11.31	\$1,306,565	302,669	\$4.32	\$43,552,171
Fishing	158,083	\$11.31	\$1,787,919	523,256	\$3.42	\$59,597,291
Total	344,541	\$11.31	\$3,896,759	1,101,862	\$3.54	\$129,891,957
All Counties						
Snorkeling	267,108	\$11.31	\$3,020,991	1,070,925	\$2.82	\$100,699,716
Scuba Diving	317,875	\$11.31	\$3,595,166	1,004,297	\$3.58	\$119,838,875
Fishing	735,241	\$11.31	\$8,315,576	2,922,652	\$2.85	\$277,185,857
Total	1,320,224	\$11.31	\$14,931,733	4,997,873	\$2.99	\$497,724,448

Table A.3.1-7 (Residents)						
Estimated Use Values for Natural & Artificial Reefs Using the Logit Model, 2000						
County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value Natural & Artificial Reefs
Palm Beach						
Snorkeling	163,492	\$12.94	\$2,115,586	616,365	\$3.43	\$70,519,549
Scuba Diving	210,204	\$12.94	\$2,720,040	811,387	\$3.35	\$90,667,992
Fishing	404,836	\$12.94	\$5,238,578	1,550,522	\$3.38	\$174,619,261
Total	778,532	\$12.94	\$10,074,204	2,978,274	\$3.38	\$335,806,803
Broward						
Snorkeling	176,760	\$12.94	\$2,287,274	731,786	\$3.13	\$76,242,480
Scuba Diving	241,884	\$12.94	\$3,129,979	832,081	\$3.76	\$104,332,632
Fishing	511,675	\$12.94	\$6,621,075	2,154,152	\$3.07	\$220,702,483
Total	930,319	\$12.94	\$12,038,328	3,718,019	\$3.24	\$401,277,595
Miami-Dade						
Snorkeling	287,302	\$12.94	\$3,717,688	1,229,653	\$3.02	\$123,922,929
Scuba Diving	221,001	\$12.94	\$2,859,753	698,363	\$4.09	\$95,325,098
Fishing	596,703	\$12.94	\$7,721,337	2,577,757	\$3.00	\$257,377,894
Total	1,105,006	\$12.94	\$14,298,778	4,505,773	\$3.17	\$476,625,921
Monroe						
Snorkeling	283,740	\$12.94	\$3,671,596	1,103,747	\$3.33	\$122,386,520
Scuba Diving	202,671	\$12.94	\$2,622,563	530,998	\$4.94	\$87,418,758
Fishing	526,945	\$12.94	\$6,818,668	1,744,187	\$3.91	\$227,288,943
Total	1,013,356	\$12.94	\$13,112,827	3,378,932	\$3.88	\$437,094,221
All Counties						
Snorkeling	911,294	\$12.94	\$11,792,144	3,681,551	\$3.20	\$393,071,479
Scuba Diving	875,760	\$12.94	\$11,332,334	2,872,829	\$3.94	\$377,744,480
Fishing	2,040,159	\$12.94	\$26,399,657	8,026,618	\$3.29	\$879,988,582
Total	3,827,213	\$12.94	\$49,524,136	14,580,998	\$3.40	\$1,650,804,541

Table A.3.1-8 (Residents)				
Logit Model for New Artificial Reef Valuation-Test for Significant Variables				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	-4.025321	-1.644	0.1002	1.000000
LBIDARNP	-0.772778	-7.422	0.0000	4.289538
LBLENGTH	0.551279	0.891	0.3727	3.153064
MALE	0.755397	1.201	0.2298	0.932314
WHITE	-0.920007	-1.341	0.1800	0.960699
INC50k	2.433865	2.210	0.0271	0.174672
INC100k	3.220915	3.027	0.0025	0.399563
INC150k	2.912186	2.748	0.0060	0.336245
LAGEH	0.556689	0.931	0.3520	1.535251
LEXPER	-0.061690	-0.360	0.7189	2.871033
BROWARD	0.736215	1.957	0.0503	0.268559
PALMB	0.715743	1.742	0.0815	0.189956
MONROE	0.063543	0.156	0.8761	0.320961
SNORKAR	0.544170	1.866	0.0621	0.283843
SCUBAAR	0.568898	2.038	0.0415	0.340611
CLUB	0.113295	0.331	0.7403	0.179039
Notes:				
<i>Dependent Variable is WTPARNP Mean=.2293</i>				
<i>N=458</i>				
<i>Log likelihood function -193.354</i>				
<i>Restricted log likelihood -246.577</i>				
<i>Chi-squared 106.446</i>				
<i>Degrees of freedom 15</i>				
<i>Significance level .00000</i>				
<i>Percent Correct Predictions 80.79</i>				

Table A.3.1-9 (Residents)

Estimated Use Values for New Artificial Reefs Using the Logit Model, 2000

County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-Days	Use Value Per Person-day	Asset Value New Artificial Reefs
Palm Beach						
Snorkeling	76,841	\$3.60	\$276,628	289,691	\$0.95	\$9,220,920
Scuba Diving	58,857	\$3.60	\$211,885	227,188	\$0.93	\$7,062,840
Fishing	145,741	\$1.98	\$288,567	558,188	\$0.52	\$9,618,906
Total	281,439		\$777,080	1,075,067	\$0.72	\$25,902,666
Broward						
Snorkeling	38,887	\$3.60	\$139,993	160,992	\$0.87	\$4,666,440
Scuba Diving	74,985	\$3.60	\$269,946	257,948	\$1.05	\$8,998,200
Fishing	204,670	\$1.72	\$352,032	861,661	\$0.41	\$11,734,413
Total	318,542		\$761,972	1,280,601	\$0.60	\$25,399,053
Miami-Dade						
Snorkeling	80,445	\$1.97	\$158,477	344,305	\$0.46	\$5,282,555
Scuba Diving	68,510	\$1.97	\$134,965	216,492	\$0.62	\$4,498,823
Fishing	226,747	\$0.63	\$142,851	979,547	\$0.15	\$4,761,687
Total	375,702		\$436,292	1,540,343	\$0.28	\$14,543,065
Monroe						
Snorkeling	70,935	\$1.97	\$139,742	275,937	\$0.51	\$4,658,065
Scuba Diving	115,523	\$1.97	\$227,580	302,669	\$0.75	\$7,586,010
Fishing	158,083	\$0.63	\$99,592	523,256	\$0.19	\$3,319,743
Total	344,541		\$466,915	1,101,862	\$0.42	\$15,563,818
All Counties						
Snorkeling	267,108		\$714,839	1,070,925	\$0.67	\$23,827,980
Scuba Diving	317,875		\$844,376	1,004,297	\$0.84	\$28,145,874
Fishing	735,241		\$883,042	2,922,652	\$0.30	\$29,434,749
Total	1,320,224		\$2,442,258	4,997,873	\$0.49	\$81,408,603

Table A.3.1-10 (Residents)					
Willingness to Pay for Natural Reefs in Southeast Florida: Natural Reef Users, 2000 - Turnbull Method (\$ Per Party-Day)					
(1)	(2)	(3)	(4)	(5)	(6)
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$); (5) = (1) * (4)	Sample Size
\$0	\$10	0.7163	0.2837	\$0	141
\$10	\$50	0.3182	0.3909	\$3.91	132
\$50	\$100	0.22741	0.09079	\$4.54	135
\$100	\$200	0.1966	0.03081	\$3.08	117
\$200	\$500	0.2534	-0.0568	-\$11.36	146
\$500	INFINITY	0	0.2534	\$126.70	N/A
Total Use Value (Sum column 5)				\$126.87	
Note:					
<i>Turnbull not well behaved because frequencies of yes do not decline with increase in dollar amounts.</i>					
SOURCE: FLORIDA STATE UNIVERSITY					

Table A.3.1-11 (Residents)					
Willingness to Pay for Artificial Reefs in Southeast Florida: Artificial Reef Users, 2000 - Turnbull Method (\$ Per Party-Day)					
(1)	(2)	(3)	(4)	(5)	(6)
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$); (5) = (1) * (4)	Sample Size
\$0	\$10	0.5571	0.4429	\$0.00	70
\$10	\$50	0.2941	0.2565	\$2.57	68
\$50	\$100	0.1905	0.1036	\$5.18	63
\$100	\$200	0.1579	0.0326	\$3.26	57
\$200	\$500	0.2083	-0.0504	-\$10.08	72
\$500	INFINITY	0	0.2083	\$104.15	N/A
Total Use Value (Sum Column 5)				\$105.08	
Note:					
<i>Turnbull not well behaved because frequencies of yes do not decline with increase in dollar amounts.</i>					
SOURCE: FLORIDA STATE UNIVERSITY					

Table A.3.1-12 (Residents)					
Willingness to Pay for Natural & Artificial Reefs in Southeast Florida: All Reef Users, 2000 - Turnbull Method (\$ Per Party-Day)					
(1)	(2)	(3)	(4)	(5)	(6)
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$); (5) = (1) * (4)	Sample Size
\$0	\$20	0.4625	0.5375	\$0.00	160
\$20	\$100	0.1497	0.3128	\$6.26	147
\$100	\$200	0.1545	-0.0048	-\$0.48	123
\$200	\$400	0.1069	0.0476	\$9.52	131
\$400	\$1,000	0.0949	0.012	\$4.80	158
\$1,000	INFINITY	0	0.0949	\$94.90	N/A
Total Use Value (Sum column 5)				\$115.00	
Note:					
<i>Turnbull not well behaved because frequencies of yes do not decline with increase in dollar amounts.</i>					
SOURCE: FLORIDA STATE UNIVERSITY					

Table A.3.1-13 (Residents)					
Willingness to Pay for New Artificial Reefs in Southeast Florida: Artificial Reef Users, 2000 - Turnbull Method (\$ Per Party-Day)					
(1)	(2)	(3)	(4)	(5)	(6)
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$); (5) = (1) * (4)	Sample Size
0	10	0.5059	0.4941	0	85
10	50	0.2192	0.289	\$2.89	73
50	100	0.25	-0.0308	-\$1.54	72
100	200	0.1765	0.0735	\$7.35	68
200	500	0.05	0.1265	\$25.30	60
500	INFINITY	0	0.05	\$25.00	N/A
Total Use Value (Sum column 5)			[A]	\$59.00	
Mean Number of Days Per Year			[B]	14.82	
Use Value Per Party Per Day			[C] = [A] / [B]	\$3.98	
SOURCE: FLORIDA STATE UNIVERSITY					

Table A.3.1-14 (Residents)					
Willingness to Pay for Natural Reefs in Southeast Florida: All Reef Users, 2000 - Turnbull Method (\$ Per Party-Day)					
(1)	(2)	(3)	(4)	(5)	(6)
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$); (5) = (1) * (4)	Sample Size
\$0	\$10	0.7091	0.2909	\$0	165
\$10	\$50	0.32	0.3891	\$3.89	150
\$50	\$100	0.2676	0.0524	\$2.62	142
\$100	\$200	0.1955	0.0721	\$7.21	133
\$200	\$500	0.2405	-0.045	-\$9.00	158
\$500	INFINITY	0	0.2405	\$120.25	N/A
Total Use Value (Sum column 5)				\$124.97	
Note:					
<i>Turnbull not well behaved because frequencies of yes do not decline with increase in dollar amounts.</i>					
SOURCE: FLORIDA STATE UNIVERSITY					

Table A.3.1-15 (Residents)					
Willingness to Pay for Artificial Reefs in Southeast Florida: All Reef Users, 2000 - Turnbull Method (\$ Per Party-Day)					
(1)	(2)	(3)	(4)	(5)	(6)
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$); (5) = (1) * (4)	Sample Size
\$0	\$10	0.5506	0.4494	\$0.00	158
\$10	\$50	0.2207	0.3299	\$3.30	145
\$50	\$100	0.15	0.0707	\$3.54	140
\$100	\$200	0.1318	0.0182	\$1.82	129
\$200	\$500	0.1429	-0.0111	-\$2.22	155
\$500	INFINITY	0	0.1429	\$71.45	N/A
Total Use Value (Sum Column 5)				\$77.88	
Note:					
<i>Turnbull not well behaved because frequencies of yes do not decline with increase in dollar amounts.</i>					
SOURCE: FLORIDA STATE UNIVERSITY					

Table A.3.1-16 (Residents)					
Willingness to Pay for Natural & Artificial Reefs in Southeast Florida: All Reef Users, 2000 - Turnbull Method (\$ Per Party-Day)					
(1)	(2)	(3)	(4)	(5)	(6)
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$); (5) = (1) * (4)	Sample Size
\$0	\$20	0.4625	0.5375	\$0.00	160
\$20	\$100	0.1497	0.3128	\$6.26	147
\$100	\$200	0.1545	-0.0048	-\$0.48	123
\$200	\$400	0.1069	0.0476	\$9.52	131
\$400	\$1,000	0.0949	0.012	\$4.80	158
\$1,000	INFINITY	0	0.0949	\$94.90	N/A
Total Use Value (Sum Column 5)				\$115.00	
Note:					
<i>Turnbull not well behaved because frequencies of yes do not decline with increase in dollar amounts.</i>					
SOURCE: FLORIDA STATE UNIVERSITY					

Table A.3.1-17 (Residents)					
Willingness to Pay for New Artificial Reefs in Southeast Florida: All Reef Users, 2000 - Turnbull Method (\$ Per Party-Day)					
(1)	(2)	(3)	(4)	(5)	(6)
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$); (5) = (1) * (4)	Sample Size
0	10	0.5082	0.4918	0	183
10	50	0.2139	0.2943	\$2.94	173
50	100	0.1878	0.0261	\$1.31	181
100	200	0.1014	0.0864	\$8.64	148
200	500	0.0611	0.0403	\$8.06	131
500	INFINITY	0	0.0611	\$30.55	N/A
Total Use Value (Sum column 5)			[A]	\$51.50	
Mean Number of Days Per Year			[B]	11.1	
Use Value Per Party Per Day			[C] = [A] / [B]	\$4.64	
SOURCE: FLORIDA STATE UNIVERSITY					

Table A.3.1-18 (Residents)

Calculation of Use Values for Natural Reefs Using the Turnbull Method, Natural Reef Users Only - 2000						
County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value Natural Reefs
Palm Beach						
Snorkeling	86,651	126.87	\$10,993,412	326,674	\$33.65	\$366,447,079
Scuba Diving	151,347	126.87	\$19,201,394	584,199	\$32.87	\$640,046,463
Fishing	259,095	126.87	\$32,871,383	992,334	\$33.13	\$1,095,712,755
Total	497,093	126.87	\$63,066,189	1,903,207	\$33.14	\$2,102,206,297
Broward						
Snorkeling	137,873	126.87	\$17,491,948	570,794	\$30.64	\$583,064,917
Scuba Diving	166,899	126.87	\$21,174,476	574,133	\$36.88	\$705,815,871
Fishing	307,005	126.87	\$38,949,724	1,292,491	\$30.14	\$1,298,324,145
Total	611,777	126.87	\$77,616,148	2,437,418	\$31.84	\$2,587,204,933
Miami-Dade						
Snorkeling	206,857	126.87	\$26,243,948	885,348	\$29.64	\$874,798,253
Scuba Diving	152,491	126.87	\$19,346,533	481,872	\$40.15	\$644,884,439
Fishing	369,956	126.87	\$46,936,318	1,598,210	\$29.37	\$1,564,543,924
Total	729,304	126.87	\$92,526,798	2,965,430	\$31.20	\$3,084,226,616
Monroe						
Snorkeling	212,805	126.87	\$26,998,570	827,810	\$32.61	\$899,952,345
Scuba Diving	87,149	126.87	\$11,056,594	228,329	\$48.42	\$368,553,121
Fishing	368,861	126.87	\$46,797,395	1,220,931	\$38.33	\$1,559,913,169
Total	668,815	126.87	\$84,852,559	2,277,070	\$37.26	\$2,828,418,635
All Counties						
Snorkeling	644,186	126.87	\$81,727,878	2,610,626	\$31.31	\$2,724,262,594
Scuba Diving	557,886	126.87	\$70,778,997	1,868,533	\$37.88	\$2,359,299,894
Fishing	1,304,917	126.87	\$165,554,820	5,103,966	\$32.44	\$5,518,493,993
Total	2,506,989	126.87	\$318,061,694	9,583,125	\$33.19	\$10,602,056,481

Table A.3.1-19 (Residents)

Calculation of Use Values for Artificial Reefs Using the Turnbull Method, Artificial Reef Users Only - 2000

County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value Artificial Reefs
Palm Beach						
Snorkeling	76,841	\$105.08	\$8,074,452	289,691	\$27.87	\$269,148,409
Scuba Diving	58,857	\$105.08	\$6,184,694	227,188	\$27.22	\$206,156,452
Fishing	145,741	\$105.08	\$15,314,464	558,188	\$27.44	\$510,482,143
Total	281,439	\$105.08	\$29,573,610	1,075,067	\$27.51	\$985,787,004
Broward						
Snorkeling	38,887	\$105.08	\$4,086,246	160,992	\$25.38	\$136,208,199
Scuba Diving	74,985	\$105.08	\$7,879,424	257,948	\$30.55	\$262,647,460
Fishing	204,670	\$105.08	\$21,506,724	861,661	\$24.96	\$716,890,787
Total	318,542	\$105.08	\$33,472,393	1,280,601	\$26.14	\$1,115,746,445
Miami-Dade						
Snorkeling	80,445	\$105.08	\$8,453,161	344,305	\$24.55	\$281,772,020
Scuba Diving	68,510	\$105.08	\$7,199,031	216,492	\$33.25	\$239,967,693
Fishing	226,747	\$105.08	\$23,826,575	979,547	\$24.32	\$794,219,159
Total	375,702	\$105.08	\$39,478,766	1,540,343	\$25.63	\$1,315,958,872
Monroe						
Snorkeling	70,935	\$105.08	\$7,453,850	275,937	\$27.01	\$248,461,660
Scuba Diving	115,523	\$105.08	\$12,139,157	302,669	\$40.11	\$404,638,561
Fishing	158,083	\$105.08	\$16,611,362	523,256	\$31.75	\$553,712,055
Total	344,541	\$105.08	\$36,204,368	1,101,862	\$32.86	\$1,206,812,276
All Counties						
Snorkeling	267,108	\$105.08	\$28,067,709	1,070,925	\$26.21	\$935,590,288
Scuba Diving	317,875	\$105.08	\$33,402,305	1,004,297	\$33.26	\$1,113,410,167
Fishing	735,241	\$105.08	\$77,259,124	2,922,652	\$26.43	\$2,575,304,143
Total	1,320,224	\$105.08	\$138,729,138	4,997,873	\$27.76	\$4,624,304,597

Table A.3.1-20 (Residents)

Calculation of Use Values for Natural & Artificial Reefs Using the Turnbull Method, All Reef Users - 2000						
County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value Natural & Artificial Reefs
Palm Beach						
Snorkeling	163,492	\$115.00	\$18,801,580	616,365	\$30.50	\$626,719,333
Scuba Diving	210,204	\$115.00	\$24,173,460	811,387	\$29.79	\$805,782,000
Fishing	404,836	\$115.00	\$46,556,140	1,550,522	\$30.03	\$1,551,871,333
Total	778,532	\$115.00	\$89,531,180	2,978,274	\$30.06	\$2,984,372,667
Broward						
Snorkeling	176,760	\$115.00	\$20,327,400	731,786	\$27.78	\$677,580,000
Scuba Diving	241,884	\$115.00	\$27,816,660	832,081	\$33.43	\$927,222,000
Fishing	511,675	\$115.00	\$58,842,625	2,154,152	\$27.32	\$1,961,420,833
Total	930,319	\$115.00	\$106,986,685	3,718,019	\$28.78	\$3,566,222,833
Miami-Dade						
Snorkeling	287,302	\$115.00	\$33,039,730	1,229,653	\$26.87	\$1,101,324,333
Scuba Diving	221,001	\$115.00	\$25,415,115	698,363	\$36.39	\$847,170,500
Fishing	596,703	\$115.00	\$68,620,845	2,577,757	\$26.62	\$2,287,361,500
Total	1,105,006	\$115.00	\$127,075,690	4,505,773	\$28.20	\$4,235,856,333
Monroe						
Snorkeling	283,740	\$115.00	\$32,630,100	1,103,747	\$29.56	\$1,087,670,000
Scuba Diving	202,671	\$115.00	\$23,307,165	530,998	\$43.89	\$776,905,500
Fishing	526,945	\$115.00	\$60,598,675	1,744,187	\$34.74	\$2,019,955,833
Total	1,013,356	\$115.00	\$116,535,940	3,378,932	\$34.49	\$3,884,531,333
All Counties						
Snorkeling	911,294	\$115.00	\$104,798,810	3,681,551	\$28.47	\$3,493,293,667
Scuba Diving	875,760	\$115.00	\$100,712,400	2,872,829	\$35.06	\$3,357,080,000
Fishing	2,040,159	\$115.00	\$234,618,285	8,026,618	\$29.23	\$7,820,609,500
Total	3,827,213	\$115.00	\$440,129,495	14,580,998	\$30.19	\$14,670,983,167

Table A.3.1-21 (Residents)						
Calculation of Use Values for New Artificial Reefs Using the Turnbull Method, Artificial Reef Users Only - 2000						
County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value New Artificial Reefs
Palm Beach						
Snorkeling	76,841	\$3.98	\$305,827	289,691	\$1.06	\$10,194,239
Scuba Diving	58,857	\$3.98	\$234,251	227,188	\$1.03	\$7,808,362
Fishing	145,741	\$3.98	\$580,049	558,188	\$1.04	\$19,334,973
Total	281,439	\$3.98	\$1,120,127	1,075,067	\$1.04	\$37,337,574
Broward						
Snorkeling	38,887	\$3.98	\$154,770	160,992	\$0.96	\$5,159,009
Scuba Diving	74,985	\$3.98	\$298,440	257,948	\$1.16	\$9,948,010
Fishing	204,670	\$3.98	\$814,587	861,661	\$0.95	\$27,152,887
Total	318,542	\$3.98	\$1,267,797	1,280,601	\$0.99	\$42,259,905
Miami-Dade						
Snorkeling	80,445	\$3.98	\$320,171	344,305	\$0.93	\$10,672,370
Scuba Diving	68,510	\$3.98	\$272,670	216,492	\$1.26	\$9,088,993
Fishing	226,747	\$3.98	\$902,453	979,547	\$0.92	\$30,081,769
Total	375,702	\$3.98	\$1,495,294	1,540,343	\$0.97	\$49,843,132
Monroe						
Snorkeling	70,935	\$3.98	\$282,321	275,937	\$1.02	\$9,410,710
Scuba Diving	115,523	\$3.98	\$459,782	302,669	\$1.52	\$15,326,051
Fishing	158,083	\$3.98	\$629,170	523,256	\$1.20	\$20,972,345
Total	344,541	\$3.98	\$1,371,273	1,101,862	\$1.24	\$45,709,106
All Counties						
Snorkeling	267,108	\$3.98	\$1,063,090	1,070,925	\$0.99	\$35,436,328
Scuba Diving	317,875	\$3.98	\$1,265,143	1,004,297	\$1.26	\$42,171,417
Fishing	735,241	\$3.98	\$2,926,259	2,922,652	\$1.00	\$97,541,973
Total	1,320,224	\$3.98	\$5,254,492	4,997,873	\$1.05	\$175,149,717

Table A.3.1-22 (Residents)

Calculation of Use Values for Natural Reefs Using the Turnbull Method, All Reef Users - 2000

County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value Natural Reefs
Palm Beach						
Snorkeling	163,492	\$124.97	\$20,431,595	616,365	\$33.15	\$681,053,175
Scuba Diving	210,204	\$124.97	\$26,269,194	811,387	\$32.38	\$875,639,796
Fishing	404,836	\$124.97	\$50,592,355	1,550,522	\$32.63	\$1,686,411,831
Total	778,532	\$124.97	\$97,293,144	2,978,274	\$32.67	\$3,243,104,801
Broward						
Snorkeling	176,760	\$124.97	\$22,089,697	731,786	\$30.19	\$736,323,240
Scuba Diving	241,884	\$124.97	\$30,228,243	832,081	\$36.33	\$1,007,608,116
Fishing	511,675	\$124.97	\$63,944,025	2,154,152	\$29.68	\$2,131,467,492
Total	930,319	\$124.97	\$116,261,965	3,718,019	\$31.27	\$3,875,398,848
Miami-Dade						
Snorkeling	287,302	\$124.97	\$35,904,131	1,229,653	\$29.20	\$1,196,804,365
Scuba Diving	221,001	\$124.97	\$27,618,495	698,363	\$39.55	\$920,616,499
Fishing	596,703	\$124.97	\$74,569,974	2,577,757	\$28.93	\$2,485,665,797
Total	1,105,006	\$124.97	\$138,092,600	4,505,773	\$30.65	\$4,603,086,661
Monroe						
Snorkeling	283,740	124.97	\$35,458,988	1,103,747	\$32.13	\$1,181,966,260
Scuba Diving	202,671	124.97	\$25,327,795	530,998	\$47.70	\$844,259,829
Fishing	526,945	124.97	\$65,852,317	1,744,187	\$37.76	\$2,195,077,222
Total	1,013,356	124.97	\$126,639,099	3,378,932	\$37.48	\$4,221,303,311
All Counties						
Snorkeling	911,294	124.97	\$113,884,411	3,681,551	\$30.93	\$3,796,147,039
Scuba Diving	875,760	124.97	\$109,443,727	2,872,829	\$38.10	\$3,648,124,240
Fishing	2,040,159	124.97	\$254,958,670	8,026,618	\$31.76	\$8,498,622,341
Total	3,827,213	124.97	\$478,286,809	14,580,998	\$32.80	\$15,942,893,620

Table A.3.1-23 (Residents)						
Calculation of Use Values for Artificial Reefs Using the Turnbull Method, All Reef Users - 2000						
County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value Artificial Reefs
Palm Beach						
Snorkeling	163,492	\$77.88	\$12,732,757	616,365	\$20.66	\$424,425,232
Scuba Diving	210,204	\$77.88	\$16,370,688	811,387	\$20.18	\$545,689,584
Fishing	404,836	\$77.88	\$31,528,628	1,550,522	\$20.33	\$1,050,954,256
Total	778,532	\$77.88	\$60,632,072	2,978,274	\$20.36	\$2,021,069,072
Broward						
Snorkeling	176,760	\$77.88	\$13,766,069	731,786	\$18.81	\$458,868,960
Scuba Diving	241,884	\$77.88	\$18,837,926	832,081	\$22.64	\$627,930,864
Fishing	511,675	\$77.88	\$39,849,249	2,154,152	\$18.50	\$1,328,308,300
Total	930,319	\$77.88	\$72,453,244	3,718,019	\$19.49	\$2,415,108,124
Miami-Dade						
Snorkeling	287,302	\$77.88	\$22,375,080	1,229,653	\$18.20	\$745,835,992
Scuba Diving	221,001	\$77.88	\$17,211,558	698,363	\$24.65	\$573,718,596
Fishing	596,703	\$77.88	\$46,471,230	2,577,757	\$18.03	\$1,549,040,988
Total	1,105,006	\$77.88	\$86,057,867	4,505,773	\$19.10	\$2,868,595,576
Monroe						
Snorkeling	283,740	\$77.88	\$22,097,671	1,103,747	\$20.02	\$736,589,040
Scuba Diving	202,671	\$77.88	\$15,784,017	530,998	\$29.73	\$526,133,916
Fishing	526,945	\$77.88	\$41,038,477	1,744,187	\$23.53	\$1,367,949,220
Total	1,013,356	\$77.88	\$78,920,165	3,378,932	\$23.36	\$2,630,672,176
All Counties						
Snorkeling	911,294	\$77.88	\$70,971,577	3,681,551	\$19.28	\$2,365,719,224
Scuba Diving	875,760	\$77.88	\$68,204,189	2,872,829	\$23.74	\$2,273,472,960
Fishing	2,040,159	\$77.88	\$158,887,583	8,026,618	\$19.80	\$5,296,252,764
Total	3,827,213	\$77.88	\$298,063,348	14,580,998	\$20.44	\$9,935,444,948

Table A.3.1-24 (Residents)

Calculation of Use Values for Natural & Artificial Reefs Using the Turnbull Method, All Reef Users - 2000

County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value Natural & Artificial Reefs
Palm Beach						
Snorkeling	163,492	\$115.00	\$18,801,580	616,365	\$30.50	\$626,719,333
Scuba Diving	210,204	\$115.00	\$24,173,460	811,387	\$29.79	\$805,782,000
Fishing	404,836	\$115.00	\$46,556,140	1,550,522	\$30.03	\$1,551,871,333
Total	778,532	\$115.00	\$89,531,180	2,978,274	\$30.06	\$2,984,372,667
Broward						
Snorkeling	176,760	\$115.00	\$20,327,400	731,786	\$27.78	\$677,580,000
Scuba Diving	241,884	\$115.00	\$27,816,660	832,081	\$33.43	\$927,222,000
Fishing	511,675	\$115.00	\$58,842,625	2,154,152	\$27.32	\$1,961,420,833
Total	930,319	\$115.00	\$106,986,685	3,718,019	\$28.78	\$3,566,222,833
Miami-Dade						
Snorkeling	287,302	\$115.00	\$33,039,730	1,229,653	\$26.87	\$1,101,324,333
Scuba Diving	221,001	\$115.00	\$25,415,115	698,363	\$36.39	\$847,170,500
Fishing	596,703	\$115.00	\$68,620,845	2,577,757	\$26.62	\$2,287,361,500
Total	1,105,006	\$115.00	\$127,075,690	4,505,773	\$28.20	\$4,235,856,333
Monroe						
Snorkeling	283,740	\$115.00	\$32,630,100	1,103,747	\$29.56	\$1,087,670,000
Scuba Diving	202,671	\$115.00	\$23,307,165	530,998	\$43.89	\$776,905,500
Fishing	526,945	\$115.00	\$60,598,675	1,744,187	\$34.74	\$2,019,955,833
Total	1,013,356	\$115.00	\$116,535,940	3,378,932	\$34.49	\$3,884,531,333
All Counties						
Snorkeling	911,294	\$115.00	\$104,798,810	3,681,551	\$28.47	\$3,493,293,667
Scuba Diving	875,760	\$115.00	\$100,712,400	2,872,829	\$35.06	\$3,357,080,000
Fishing	2,040,159	\$115.00	\$234,618,285	8,026,618	\$29.23	\$7,820,609,500
Total	3,827,213	\$115.00	\$440,129,495	14,580,998	\$30.19	\$14,670,983,167

Table A.3.1-25 (Residents)

Calculation of Use Values for New Artificial Reefs Using the Turnbull Method, All Reef Users - 2000

County/Activity	Party-days	Use Value Per Party-day	Annual Use Value	Person-days	Use Value Per Person-day	Asset Value New Artificial Reefs
Palm Beach						
Snorkeling	163,492	\$4.64	\$758,603	616,365	\$1.23	\$25,286,763
Scuba Diving	210,204	\$4.64	\$975,347	811,387	\$1.20	\$32,511,552
Fishing	404,836	\$4.64	\$1,878,439	1,550,522	\$1.21	\$62,614,635
Total	778,532	\$4.64	\$3,612,388	2,978,274	\$1.21	\$120,412,949
Broward						
Snorkeling	176,760	\$4.64	\$820,166	731,786	\$1.12	\$27,338,880
Scuba Diving	241,884	\$4.64	\$1,122,342	832,081	\$1.35	\$37,411,392
Fishing	511,675	\$4.64	\$2,374,172	2,154,152	\$1.10	\$79,139,067
Total	930,319	\$4.64	\$4,316,680	3,718,019	\$1.16	\$143,889,339
Miami-Dade						
Snorkeling	287,302	\$4.64	\$1,333,081	1,229,653	\$1.08	\$44,436,043
Scuba Diving	221,001	\$4.64	\$1,025,445	698,363	\$1.47	\$34,181,488
Fishing	596,703	\$4.64	\$2,768,702	2,577,757	\$1.07	\$92,290,064
Total	1,105,006	\$4.64	\$5,127,228	4,505,773	\$1.14	\$170,907,595
Monroe						
Snorkeling	283,740	\$4.64	\$1,316,554	1,103,747	\$1.19	\$43,885,120
Scuba Diving	202,671	\$4.64	\$940,393	530,998	\$1.77	\$31,346,448
Fishing	526,945	\$4.64	\$2,445,025	1,744,187	\$1.40	\$81,500,827
Total	1,013,356	\$4.64	\$4,701,972	3,378,932	\$1.39	\$156,732,395
All Counties						
Snorkeling	911,294	\$4.64	\$4,228,404	3,681,551	\$1.15	\$140,946,805
Scuba Diving	875,760	\$4.64	\$4,063,526	2,872,829	\$1.41	\$135,450,880
Fishing	2,040,159	\$4.64	\$9,466,338	8,026,618	\$1.18	\$315,544,592
Total	3,827,213	\$4.64	\$17,758,268	14,580,998	\$1.22	\$591,942,277

Table A.3.1.26 (Residents)	
Reasons for Saying "NO" to Reef Valuation Questions	
Reef Type/Reason for Saying "NO" to Randomly Assigned Dollar Amount	Percent
Natural Reefs	
A. A contribution of that amount is more than natural reefs are worth to me.	4.3
B. I really don't know how much a natural reefs are worth to me.	3.7
C. There are no problems with water quality or the natural reefs.	2.1
D. Not enough information to form a decision.	16.8
E. I don't understand of like the question.	4.5
F. I already pay too much to the government.	14.7
G. Government waste should be reduced to pay for water quality protection and management of the natural reefs.	27.1
H. Other Reason	26.9
Artificial Reefs	
A. A contribution of that amount is more than artificial reefs are worth to me.	12.0
B. I don't really know how much artificial reefs are worth to me.	6.8
C. There are no problems with water quality or the artificial reefs.	1.7
D. Not enough information to form a decision.	15.0
E. I don't understand of like the question.	3.0
F. I already pay too much to the government.	11.8
G. Government waste should be reduced to pay for water quality protection and management of the artificial reefs.	23.5
H. Other Reason	26.2
Natural & Artificial Reefs	
A. A contribution of that amount is more than the reefs are worth to me.	8.8
B. I don't really know how much the reefs are worth to me.	3.7
C. There are no problems with water quality or the reefs.	1.0
D. Not enough information to form a decision.	14.3
E. I don't understand of like the question.	4.0
F. I already pay too much to the government.	15.1
G. Government waste should be reduced to pay for water quality protection and management of reefs.	24.8
H. Other Reason	28.4
New Artificial Reefs	
A. A contribution of that amount is more than a new artificial reef is worth to me.	14.1
B. I don't really know how much an artificial reef is worth to me.	5.5
C. There are enough artificial reefs already.	2.1
D. Not enough information to form a decision.	8.5
E. I don't understand of like the question.	1.5
F. The government should fund the artificial reef program out of general revenue and not a specific tax or fee.	20.8
G. I already pay too much to the government.	11.1
H. Government waste should be reduced to fund the artificial reef program.	17.8
I. Other reason.	18.7

Table A.3.1-27 (Residents)		
Relationship Between Protestors/Scenario Rejection and Dollar Amounts		
Reef Type/Dollar Amount	Percent "NO"	Sample Size
Natural Reefs		
\$10	24.40	168
\$50	46.20	158
\$100	52.03	148
\$200	52.45	143
\$500	49.39	164
Artificial Reefs		
\$10	28.31	166
\$50	46.15	156
\$100	50.00	150
\$200	51.75	143
\$500	50.00	164
Natural & Artificial Reefs		
\$20	32.74	168
\$100	50.00	164
\$200	51.15	131
\$400	55.24	143
\$1,000	50.30	165
New Artificial Reefs		
\$10	37.37	190
\$50	47.22	180
\$100	51.10	182
\$200	61.69	154
\$500	59.29	140

Table A.3.2-2 (Visitors)				
Logit Model for Natural Reef Valuation				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	1.671546	4.352	0.0000	1.000000
LQ34a	-0.886884	-22.055	0.0000	4.739014
WHITE	0.795697	3.111	0.0019	0.956431
INC50k	0.725614	3.325	0.0009	0.219522
INC100k	0.835698	3.949	0.0001	0.324675
INC150k	1.015397	4.583	0.0000	0.208630
INCMISS	0.295581	1.304	0.1923	0.177210
BROWARD	0.978211	4.688	0.0000	0.111437
PALMB	0.594799	3.034	0.0024	0.211144
MONROE	1.264684	7.633	0.0000	0.543779
SNORKPR	0.536275	3.853	0.0001	0.170088
SCUBAC	0.256741	1.836	0.0664	0.232509
SUMMER	-0.406214	-3.817	0.0001	0.432761
NREEF	0.330605	2.169	0.0301	0.872643
Notes:				
<i>Dependent Variable is WTPNR Mean=.5149</i>				
<i>N=2387</i>				
<i>Log likelihood function - 1239.238</i>				
<i>Restricted log likelihood - 1653.486</i>				
<i>Chi-squared 828.4958</i>				
<i>Degrees of freedom 13</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 73.94</i>				

Table A.3.2-3 (Visitors)				
Logit Model for Artificial Reef Valuation				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	1.271774	3.370	0.0008	1.000000
LQ36a	-0.809115	-20.988	0.0000	4.741342
OWNBOAT	-0.200918	-1.757	0.0789	0.334345
MALE	0.235360	2.059	0.0395	0.737207
WHITE	0.811411	3.095	0.0020	0.954467
INC50k	0.508736	2.286	0.0223	0.219428
INC100k	0.736976	3.424	0.0006	0.323938
INC150k	0.772915	3.423	0.0006	0.204683
INCMISS	0.059831	0.259	0.7956	0.182134
BROWARD	1.031595	4.878	0.0000	0.111448
PALMB	0.474533	2.372	0.0177	0.199913
MONROE	1.047387	6.089	0.0000	0.553339
SNORKPR	0.453183	3.147	0.0016	0.175629
SCUBAC	0.219997	1.574	0.1154	0.228101
FSHBOTPR	0.401029	2.104	0.0354	0.078925
SUMMER	-0.389201	-3.586	0.0003	0.440156
AREEF	0.182874	1.581	0.1139	0.405898
Notes:				
<i>Dependent Variable is WTPAR Mean=.4555</i>				
<i>N=2306</i>				
<i>Log likelihood function -1228.137</i>				
<i>Restricted log likelihood -1582.08</i>				
<i>Chi-squared 707.8878</i>				
<i>Degrees of freedom 16</i>				
<i>Significance level .000000</i>				
<i>Percent correct predictions 72.59</i>				

Table A.3.2-4 (Visitors)				
Logit Model for Natural & Artificial Reef Combined Valuation				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	1.927517	4.739	0.0000	1.000000
LQ38a	-0.866794	-21.422	0.0000	5.437317
OWNBOAT	-0.246832	-2.070	0.0385	0.333767
WHITE	0.649675	2.342	0.0192	0.955353
INC50k	0.789407	3.255	0.0011	0.218899
INC100k	1.035656	4.404	0.0000	0.324664
INC150k	1.151358	4.699	0.0000	0.206329
INCMISS	0.209708	0.831	0.4061	0.181188
BROWARD	0.764753	3.450	0.0006	0.110533
PALMB	0.069818	0.329	0.7425	0.205028
MONROE	1.122830	6.185	0.0000	0.551799
SNORKPR	0.367008	2.473	0.0134	0.175119
SCUBAC	0.268370	1.816	0.0694	0.231036
FSHBOTPR	0.382516	1.939	0.0524	0.078023
SUMMER	-0.359219	-3.191	0.0014	0.434330
NREEF	0.184181	1.476	0.1401	0.345904
Notes:				
<i>Dependent Variable is WTPNAR Mean=.3801</i>				
<i>N=2307</i>				
<i>Log likelihood function -1149.282</i>				
<i>Restricted log likelihood -1532.162</i>				
<i>Chi-squared 765.7608</i>				
<i>Degrees of freedom 15</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 75.90</i>				

Table A.3.2-5 (Visitors)				
Logit Model for New Artificial Reefs Valuation				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	2.032626	9.384	0.0000	1.000000
LQ40a	-0.781056	-15.846	0.0000	3.052129
INC50k	0.360464	1.929	0.0538	0.218923
INC100k	0.576840	3.188	0.0014	0.320665
INC150k	0.651699	3.402	0.0007	0.206255
INCMISS	-0.225349	-1.174	0.2405	0.180523
BROWARD	0.545200	2.967	0.0030	0.118765
PALMB	0.464738	2.693	0.0071	0.207047
MONROE	0.344255	2.515	0.0119	0.537213
SCUBAC	0.877731	6.482	0.0000	0.227237
SUMMER	-0.303493	-3.180	0.0015	0.427949
Notes:				
<i>Dependent Variable is WTPARNP Mean=.6397</i>				
<i>N=2526</i>				
<i>Log likelihood function -1438.168</i>				
<i>Restricted log likelihood -1650.902</i>				
<i>Chi-squared 425.4676</i>				
<i>Degrees of freedom 10</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 70.66</i>				

Table A.3.2-6 (Visitors)				
Logit Model for Natural Reefs -Test for Significant Variables				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
LQ34A	-0.860526	-20.253	0.0000	4.731232
OWNBOAT	-0.222303	-1.795	0.0727	0.350725
MALE	0.069467	0.567	0.5708	0.740580
WHITE	0.913638	3.193	0.0014	0.957971
HISPANIC	-0.197337	-1.065	0.2869	0.111111
INC100K	0.274009	1.999	0.0456	0.330435
INC150K	0.349447	2.211	0.0270	0.207246
INCMISS	-0.203809	-1.242	0.2141	0.174879
LAGEH	0.231927	1.411	0.1583	1.383612
LEXPER	-0.023777	-1.934	0.0531	-0.324445
BROWARD	0.915381	3.828	0.0001	0.118841
PALMB	0.536668	2.279	0.0226	0.206280
MONROE	1.247620	5.890	0.0000	0.563768
SNORKC	0.104613	0.690	0.4902	0.240580
SNORKPR	0.691527	4.098	0.0000	0.180193
SCUBAC	0.449556	2.662	0.0078	0.239130
SCUBAPR	0.023111	0.115	0.9086	0.086957
FSHBOTC	0.042550	0.077	0.9388	0.010145
FSHBOTPR	0.252238	1.206	0.2279	0.085024
FSHOTH	0.059065	0.464	0.6429	0.428019
GLASSBOT	0.131429	0.572	0.5673	0.064734
VIEW	0.044704	0.228	0.8197	0.095652
SUMMER	-0.338992	-2.861	0.0042	0.450725
NREEF	0.306882	1.808	0.0706	0.872947
CLUB	0.045044	0.277	0.7819	0.134300
Notes:				
<i>Dependent Variable is WTPNR Mean=.5227</i>				
<i>N=2070</i>				
<i>Log likelihood function -1081.283</i>				
<i>Restricted log likelihood -1432.680</i>				
<i>Chi-squared 702.7941</i>				
<i>Degrees of freedom 25</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 73.96</i>				

Table A.3.2-7 (Visitors)				
Logit Model for Artificial Reefs -Test for Significant Variables				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	0.946100	2.149	0.0317	
LQ36A	-0.789935	-19.658	0.0000	4.73081
OWNBOAT	-0.284935	-2.331	0.0197	0.35099
MALE	0.275251	2.275	0.0229	0.74049
WHITE	1.117582	3.697	0.0002	0.95763
HISPANIC	-0.188494	-1.032	0.3019	0.11170
INC100K	0.338845	2.524	0.0116	0.32980
INC150K	0.253735	1.637	0.1016	0.20703
INCMISS	-0.330990	-2.020	0.0434	0.17525
LAGEH	0.210955	1.294	0.1958	1.38393
LEXPER	-0.021541	-1.787	0.0739	-0.32505
BROWARD	1.039286	4.396	0.0000	0.11940
PALMB	0.419343	1.802	0.0715	0.20558
MONROE	0.972043	4.660	0.0000	0.56428
SNORKC	-0.001775	-0.012	0.9901	0.24121
SNORKPR	0.485746	2.973	0.0029	0.18151
SCUBAC	0.412537	2.561	0.0104	0.23832
SCUBAPR	0.307243	1.576	0.1151	0.08763
FSHBOTC	0.027228	0.050	0.9598	0.01011
FSHBOTPR	0.445249	2.200	0.0278	0.08522
FSHOTH	0.175591	1.408	0.1592	0.42898
GLASSBOT	0.296422	1.345	0.1785	0.06596
VIEW	-0.051975	-0.274	0.7838	0.09581
SUMMER	-0.331230	-2.840	0.0045	0.45354
AREEF	0.000885	2.270	0.0232	0.42703
CLUB	0.122466	0.773	0.4396	0.13385
Notes:				
<i>Dependent Variable is WTPAR Mean=.4458</i>				
<i>N=2077</i>				
<i>Log likelihood function -1112.970</i>				
<i>Restricted log likelihood -1427.456</i>				
<i>Chi-squared 628.9712</i>				
<i>Degrees of freedom 25</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 72.32</i>				

Table A.3.2-8 (Visitors)				
Logit Model for Natural & Artificial Reefs Combined: Test for Significant Variables				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	1.558707	3.292	0.0010	
LQ38A	-0.843096	-19.755	0.0000	5.43416
OWNBOAT	-0.323589	-2.492	0.0127	0.35355
MALE	0.137996	1.088	0.2766	0.73964
WHITE	0.908657	2.867	0.0041	0.95710
HISPANIC	-0.518899	-2.617	0.0089	0.11193
INC100K	0.347767	2.451	0.0143	0.33037
INC150K	0.355789	2.172	0.0299	0.20513
INCMISS	-0.396033	-2.252	0.0243	0.17801
LAGEH	0.302943	1.761	0.0782	1.38490
LEXPER	-0.030706	-2.399	0.0164	-0.32270
BROWARD	0.749685	2.997	0.0027	0.11736
PALMB	-0.033308	-0.133	0.8944	0.20217
MONROE	1.122602	4.921	0.0000	0.56903
SNORKC	0.058546	0.392	0.6950	0.24112
SNORKPR	0.367953	2.162	0.0306	0.18393
SCUBAC	0.406732	2.325	0.0201	0.23817
SCUBAPR	0.341995	1.682	0.0925	0.08876
FSHBOTC	-0.474856	-0.848	0.3965	0.01036
FSHBOTPR	0.449447	2.126	0.0335	0.08580
FSHOTH	0.106004	0.805	0.4207	0.42751
GLASSBOT	0.226328	0.999	0.3178	0.06706
VIEW	-0.018595	-0.095	0.9247	0.09665
SUMMER	-0.313960	-2.525	0.0116	0.44970
NAREEF	0.264706	1.949	0.0513	0.36144
CLUB	0.222027	1.335	0.1818	0.13314
Notes:				
<i>Dependent Variable is WTPNAR Mean=.3826</i>				
<i>N=2028</i>				
<i>Log likelihood function -1013.577</i>				
<i>Restricted log likelihood -1349.316</i>				
<i>Chi-squared 671.4775</i>				
<i>Degrees of freedom 25</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 76.53</i>				

Table A.3.2-9 (Visitors)				
Logit Model for New Artificial Reefs - Test for Significant Variables				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	2.832109	6.881	0.0000	
LQ40A	-0.776148	-13.953	0.0000	3.055226
OWNBOAT	-0.201302	-1.691	0.0908	0.354791
MALE	-0.106210	-0.892	0.3725	0.741523
WHITE	0.275118	1.130	0.2585	0.955774
HISPANIC	-0.075905	-0.442	0.6586	0.111548
INC100K	0.368615	2.772	0.0056	0.329238
INC150K	0.362053	2.360	0.0183	0.206388
INCMISS	-0.452144	-2.968	0.0030	0.177887
LAGEH	-0.069782	-0.443	0.6579	1.384113
LEXP	0.001324	0.111	0.9114	-0.287944
BROWARD	0.475909	2.133	0.0329	0.120393
PALMB	0.233690	1.076	0.2818	0.204423
MONROE	0.145232	0.752	0.4521	0.562654
SNORKC	-0.170943	-1.187	0.2351	0.237838
SNORKPR	0.037167	0.235	0.8142	0.181327
SCUBAC	0.888880	5.254	0.0000	0.239803
SCUBAPR	0.316435	1.625	0.1042	0.088452
FSHBOTC	0.509762	0.940	0.3472	0.009828
FSHBOTPR	0.390997	1.961	0.0499	0.085012
FSHOTH	-0.176328	-1.440	0.1498	0.427518
GLASSBOT	0.145700	0.669	0.5036	0.067322
VIEW	-0.103682	-0.556	0.5780	0.096806
SUMMER	-0.366460	-3.177	0.0015	0.446683
AREEF	-0.181252	-1.478	0.1395	0.427027
CLUB	0.166381	0.999	0.3176	0.134644
Notes:				
<i>Dependent Variable is WTPARNP Mean=.6437</i>				
<i>N=2035</i>				
<i>Log likelihood function -1144.617</i>				
<i>Restricted log likelihood -1325.272</i>				
<i>Chi-squared 361.3098</i>				
<i>Degrees of freedom 25</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 71.60</i>				

Table A.3.2-10 (Visitors)				
Probit Model for Natural Reef Valuation				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	-0.862772	-4.336	0.0000	1.00000
Q34a	-0.002017	-20.545	0.0000	281.01382
WHITE	0.421067	2.965	0.0030	0.95643
INC50k	0.386044	3.141	0.0017	0.21952
INC100k	0.469663	3.944	0.0001	0.32468
INC150k	0.582044	4.663	0.0000	0.20863
INCMISS	0.187725	1.474	0.1405	0.17721
BROWARD	0.465227	3.984	0.0001	0.11144
PALMB	0.258635	2.380	0.0173	0.21114
MONROE	0.613517	6.737	0.0000	0.54378
SNORKPR	0.326229	4.114	0.0000	0.17009
SCUBAC	0.136909	1.732	0.0833	0.23251
SUMMER	-0.190764	-3.155	0.0016	0.43276
NREEF	0.224160	2.581	0.0098	0.87264

Dependent Variable is WTPNR Mean=.5149
N=2387
Log likelihood function -1332.957
Restricted log likelihood -1653.486
Chi-squared 641.0575
Degrees of freedom 13
Significance level .00000
Percent correct predictions 72.64

Table A.3.2-11 (Visitors)				
Probit Model for Artificial Reef Valuation				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	-0.865959	-4.340	0.0000	1.000000
Q36a	-0.002063	-18.849	0.0000	281.053770
OWNBOAT	-0.105393	-1.600	0.1095	0.334345
MALE	0.135079	2.056	0.0398	0.737207
WHITE	0.430445	2.915	0.0036	0.954467
INC50k	0.265000	2.085	0.0371	0.219428
INC100k	0.425318	3.460	0.0005	0.323938
INC150k	0.454674	3.523	0.0004	0.204683
INCMISS	0.049181	0.374	0.7081	0.182134
BROWARD	0.517563	4.292	0.0000	0.111448
PALMB	0.201786	1.778	0.0755	0.199913
MONROE	0.519536	5.368	0.0000	0.553339
SNORKPR	0.293807	3.530	0.0004	0.175629
SCUBAC	0.128982	1.595	0.1107	0.228101
FSHBOTPR	0.202591	1.829	0.0674	0.078925
SUMMER	-0.193447	-3.095	0.0020	0.440156
AREEF	0.103841	1.556	0.1197	0.405898
Notes:				
<i>Dependent Variable is WTPAR Mean=.4406</i>				
<i>N=2306</i>				
<i>Log likelihood function -1298.049</i>				
<i>Restricted log likelihood -1582.080</i>				
<i>Chi-squared 568.0624</i>				
<i>Degrees of freedom 16</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 70.42</i>				

Table A.3.2-12 (Visitors)				
Probit Model for Natural & Artificial Reefs Combined Valuation				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	-0.982005	-4.779	0.0000	1.000000
Q38a	-0.001047	-17.960	0.0000	564.672740
OWNBOAT	-0.116586	-1.747	0.0806	0.333767
WHITE	0.355358	2.306	0.0211	0.955353
INC50k	0.429889	3.194	0.0014	0.218899
INC100k	0.598599	4.596	0.0000	0.324664
INC150k	0.678229	4.992	0.0000	0.206329
INCMISS	0.162640	1.167	0.2433	0.181188
BROWARD	0.334809	2.710	0.0067	0.110533
PALMB	-0.023155	-0.197	0.8435	0.205028
MONROE	0.536744	5.388	0.0000	0.551799
SNORKPR	0.237128	2.823	0.0048	0.175119
SCUBAC	0.143570	1.728	0.0841	0.231036
FSHBOTPR	0.157816	1.401	0.1613	0.078023
SUMMER	-0.165743	-2.620	0.0088	0.434330
NREEF	0.124126	1.769	0.0769	0.345904
Notes:				
<i>Dependent Variable is WTPNAR Mean=.3801</i>				
<i>N=2307</i>				
<i>Log likelihood function -1254.553</i>				
<i>Restricted log likelihood -1532.162</i>				
<i>Chi-squared 555.2192</i>				
<i>Degrees of freedom 15</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 73.04</i>				

Table A.3.2-13 (Visitors)				
Probit Model for New Artificial Reef Valuation				
Independent Variable	Coefficient (b)	b/standard error (t-value)	Probability (t-value)	Mean of Independent Variable
Constant	0.389036	3.210	0.0013	1.000000
Q40a	-0.013163	-15.237	0.0000	33.357086
INC50k	0.203680	1.809	0.0705	0.218923
INC100k	0.342205	3.149	0.0016	0.320665
INC150k	0.393663	3.431	0.0006	0.206255
INCMISS	-0.117898	-1.017	0.3091	0.180523
BROWARD	0.321182	2.927	0.0034	0.118765
PALMB	0.255921	2.505	0.0122	0.207047
MONROE	0.185167	2.253	0.0242	0.537213
SCUBAC	0.505319	6.487	0.0000	0.227237
SUMMER	-0.170146	-2.998	0.0027	0.427949
Notes:				
<i>Dependent Variable is WTPARNP Mean=.6397</i>				
<i>N=2526</i>				
<i>Log likelihood function -1460.790</i>				
<i>Restricted log likelihood -1650.902</i>				
<i>Chi-squared 380.2247</i>				
<i>Degrees of freedom 10</i>				
<i>Significance level .00000</i>				
<i>Percent correct predictions 70.74</i>				

Table A.3.2-14						
Estimated Mean Values Using Logit Equations: Visitors to Natural Reefs, 2000-2001						
County/Activity-Boat Mode	Summer			Winter		
	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size
Miami-Dade (All Users)	\$34.70	1.13	193	\$55.26	2.34	93
Snorkelers - Private/Rental Boats	\$55.76	3.81	28	\$13.10	7.86	4
Scuba Divers - Charter/Party Boats	\$41.60	4.31	11	\$60.26	6.06	17
All Others	\$30.38	0.89	154	\$50.87	2.02	72
Palm Beach (All Users)	\$92.14	2.99	146	\$133.20	2.77	290
Snorkelers - Private/Rental Boats	\$154.41	9.30	18	\$287.67	0.00	5
Scuba Divers - Charter/Party Boats	\$95.71	3.43	94	\$144.37	3.38	202
All Others	\$65.94	3.67	38	\$107.56	3.60	88
Broward (All Users)	\$115.67	3.81	146	\$198.96	8.27	101
Snorkelers - Private/Rental Boats	\$191.93	16.84	13	\$417.71	51.42	6
Scuba Divers - Charter/Party Boats	\$142.74	9.22	39	\$239.47	13.19	52
All Others	\$100.68	3.02	100	\$158.20	6.77	54
Monroe (All Users)	\$179.42	3.85	446	\$274.82	4.19	687
Snorkelers - Private/Rental Boats	\$248.48	5.94	166	\$423.03	11.46	122
Scuba Divers - Charter/Party Boats	\$211.12	12.38	37	\$315.84	11.21	92
All Others	\$129.88	2.80	245	\$231.96	3.04	477
Notes.						
<i>NREEF=1 Used Natural Reefs</i>						
<i>Numbers in bold were used for estimating values of reef.</i>						
<i>All Others values were used for Activity-Boat Modes with sample sizes less than 30, except Miami-Dade where the All Users values were used for all Activity-Boat Modes.</i>						

Table A.3.2-15						
Estimated Mean Values Using Logit Equations: Visitors to Artificial Reefs, 2000-2001						
County/Activity-Boat Mode	Summer			Winter		
	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size
Miami-Dade (All Users)	\$23.63	0.82	217	\$31.82	1.53	100
Snorkelers - Private/Rental Boats	\$34.77	3.03	29	\$56.83	7.92	4
Bottom fishing from Private/Rental Boats	\$49.37	5.09	10			0
All Others	\$21.48	0.72	184	\$30.78	1.47	96
Palm Beach (All Users)	\$50.90	1.80	180	\$78.74	2.06	286
Snorkelers - Private/Rental Boats	\$80.78	7.96	20	\$144.88	14.74	6
Bottom fishing from Private/Rental Boats	\$104.40	20.57	6	\$98.62	45.95	4
All Others	\$46.84	1.52	157	\$77.02	1.94	276
Broward (All Users)	\$99.98	4.29	143	\$164.49	6.99	120
Snorkelers - Private/Rental Boats	\$154.66	19.08	15	\$331.45	36.94	6
Bottom Fishing from Private/Rental Boats	\$227.20	0.03	4	\$200.22	47.61	5
All Others	\$91.40	3.58	125	\$153.66	6.01	109
Monroe (All Users)	\$96.41	2.55	483	\$146.16	2.59	802
Snorkelers - Private/Rental Boats	\$133.61	4.66	184	\$229.17	8.25	143
Bottom Fishing from Private/Rental Boats	\$165.43	8.72	69	\$241.00	12.14	85
All Others	\$70.88	2.00	279	\$124.21	1.93	611
Notes.						
<i>AREEF=1 Artificial Reef Users was not significant in logit model.</i>						
<i>Numbers in bold were used for estimating values of reef.</i>						
<i>Dollar amounts are Per Party Per Trip.</i>						

Table A.3.2-16						
Estimated Mean Values Using Logit Equations: Visitors to Natural & Artificial Reefs, 2000-2001						
County/Activity-Boat Mode	Summer			Winter		
	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size
Miami-Dade (All Users)	\$37.05	1.23	216	\$50.12	2.50	98
Snorkelers - Private/Rental Boats	\$47.23	3.98	29	\$77.28	10.16	4
Scuba Divers - Charter/Party Boats	\$46.16	7.08	11	\$62.45	8.80	16
Bottom Fishing - Private/Rental Boats	\$66.74	8.04	10			0
All Others	\$34.21	1.19	172	\$46.19	2.34	78
Palm Beach (All Users)	\$49.13	1.75	181	\$75.44	2.01	300
Snorkelers - Private/Rental Boats	\$69.82	6.47	20	\$130.19	16.00	7
Scuba Divers - Charter/Party Boats	\$59.72	2.46	91	\$84.32	2.50	200
Bottom Fishing - Private/Rental Boats	\$90.48	16.21	6	\$88.86	39.51	4
All Others	\$33.57	1.68	72	\$57.68	2.55	96
Broward (All Users)	\$109.15	4.39	142	\$175.45	6.88	120
Snorkelers - Private/Rental Boats	\$147.85	18.26	15	\$295.24	37.19	6
Scuba Divers - Charter/Party Boats	\$140.62	11.32	36	\$215.68	10.25	54
Bottom Fishing - Private/Rental Boats	\$227.27	59.44	4	\$183.78	43.08	5
All Others	\$95.45	3.88	96	\$137.78	6.77	60
Monroe (All Users)	\$146.49	3.59	483	\$221.81	3.62	805
Snorkelers - Private/Rental Boats	\$185.52	6.58	184	\$307.88	11.17	143
Scuba Divers - Charter/Party Boats	\$204.24	12.88	37	\$271.79	10.71	94
Bottom Fishing - Private/Rental Boats	\$224.63	12.24	69	\$329.17	16.19	84
All Others	\$109.36	3.12	244	\$187.33	3.04	525
Notes.						
<i>Dollar amounts are Per Party Per Trip.</i>						

Table A.3.2-17						
Estimated Mean Values Using Logit Equations: Visitors, New Artificial Reefs, 2000-2001						
County/Activity-Boat Mode	Summer			Winter		
	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size
Miami-Dade (All Users)	\$9.79	0.56	218	\$29.27	2.17	89
Scuba Divers - Charter/Party Boats	\$24.50	4.68	11	\$43.63	9.05	16
All Others	\$9.01	0.49	207	\$26.13	1.59	73
Palm Beach (All Users)	\$26.75	2.17	186	\$66.36	3.91	280
Scuba Divers - Charter/Party Boats	\$34.56	3.74	94	\$78.44	5.14	199
All Others	\$18.78	1.85	92	\$36.68	2.86	81
Broward (All Users)	\$26.07	1.70	146	\$51.66	4.48	109
Scuba Divers - Charter/Party Boats	\$25.85	5.14	37	\$65.68	8.16	53
All Others	\$26.14	1.49	109	\$38.40	3.24	56
Monroe (All Users)	\$27.93	1.13	474	\$54.46	1.49	722
Scuba Divers - Charter/Party Boats	\$83.96	6.51	37	\$119.45	6.98	94
All Others	\$23.18	0.74	437	\$44.73	0.84	628
Notes.						
<i>Dollar amounts are Per Party Per Trip.</i>						
<i>Original question yielded dollar amounts of per party per year. The logit model was used to estimate the willingness to pay per party per year for each sampled individual. This amount was then divided by the number of trips that the reefs in South Florida were used over the past 12 month (number of trips artificial reefs). This yielded an estimate of the willingness to pay per party per trip.</i>						

Table A.3.2-18					
Average Visitor Party Sizes					
County	Average Persons Per Party				
	Fishing On:			Scuba Diving or Snorkeling On:	
	Own, Friend's or Rental Boat	Charter Boat	Party Boat	Own, Friend's or Rental Boat	Charter or Party Boat
	Palm Beach	3.23	2.68	2.26	3.26
Broward	3.16	2.77	2.00	3.05	2.00
Miami-Dade	3.25	3.21	2.70	3.13	1.75
Monroe	3.99	3.13	2.83	4.28	4.08

Table A.3.2-19									
Calculation of Use Values for Natural Reefs - Palm Beach County Visitors - 2000-2001									
Activity-Boat Mode	Summer Value Per Person-Trip (NREEF=1)	Winter Value Per Person-Trip (NREEF=1)	Natural Reefs Annual Person-days	Summer Person-Trips Natural Reefs	Winter Person-Trips Natural Reefs	Summer Value Natural Reefs	Winter Value Natural Reefs	Annual Value Natural Reefs	User Value Per Person-Day Natural Reefs
Snorkeling									
Charter/Party	\$39.49	\$64.41	27,895	6,279	6,774	\$247,941	\$436,293	\$684,233	\$24.53
Rental	\$20.23	\$32.99	3,970	1,770	1,910	\$35,810	\$63,014	\$98,825	\$24.89
Private	\$20.23	\$32.99	58,679	10,047	10,838	\$203,220	\$357,599	\$560,819	\$9.56
Total			90,544	18,097	19,522	\$486,971	\$856,906	\$1,343,878	\$14.84
Scuba Diving									
Charter/Party	\$57.31	\$86.45	607,859	142,053	153,242	\$8,141,259	\$13,247,661	\$21,388,921	\$35.19
Rental	\$20.23	\$32.99	3,614	767	828	\$15,524	\$27,317	\$42,840	\$11.85
Private	\$20.23	\$32.99	70,329	16,954	18,290	\$342,934	\$603,449	\$946,383	\$13.46
Total			681,802	159,775	172,360	\$8,499,717	\$13,878,427	\$22,378,144	\$32.82
Fishing - Offshore/Trolling									
Charter	\$24.60	\$40.13	18,221	2,930	3,161	\$72,100	\$126,872	\$198,972	\$10.92
Party	\$29.18	\$47.59	33,861	8,931	9,634	\$260,569	\$458,515	\$719,084	\$21.24
Rental	\$20.41	\$33.30	986	209	226	\$4,273	\$7,519	\$11,792	\$11.96
Private	\$20.41	\$33.30	64,004	11,931	12,871	\$243,565	\$428,593	\$672,159	\$10.50
Total			117,072	24,001	25,892	\$580,508	\$1,021,499	\$1,602,007	\$13.68
Fishing - Flats or Back Country									
Charter/Party	\$24.60	\$40.13	0	0	0	\$0	\$0	\$0	
Rental	\$20.41	\$33.30	0	0	0	\$0	\$0	\$0	
Private	\$20.41	\$33.30	657	140	151	\$2,849	\$5,013	\$7,862	\$11.96
Total			657	140	151	\$2,849	\$5,013	\$7,862	\$11.96
Fishing - Bottom									
Charter	\$24.60	\$40.13	8,351	2,299	2,480	\$56,562	\$99,530	\$156,092	\$18.69
Party	\$29.18	\$47.59	14,881	3,558	3,839	\$103,821	\$182,689	\$286,510	\$19.25
Rental	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Private	\$20.41	\$33.30	17,367	2,582	2,785	\$52,701	\$92,737	\$145,438	\$8.37
Total			40,599	8,439	9,103	\$213,084	\$374,956	\$588,040	\$14.48
Viewing									
Glass Bottom Boat	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Total			0						
All Activities - Boat Modes			930,675	210,451	227,028	9,783,129	16,136,801	\$25,919,931	\$27.85
All Fishing			158,329	32,579	35,146	\$796,441	\$1,401,468	\$2,197,909	\$13.88

Table A.3.2-20									
Calculation of Use Values for Natural Reefs - Broward County Visitors - 2000-2001									
Activity-Boat Mode	Summer Value Per Person-Trip (NREEF=1)	Winter Value Per Person-Trip (NREEF=1)	Natural Reefs Annual Person-days	Summer Person-Trips Natural Reefs	Winter Person-Trips Natural Reefs	Summer Value Natural Reefs	Winter Value Natural Reefs	Annual Value Natural Reefs	User Value Per Person-Day Natural Reefs
Snorkeling									
Charter/Party	\$50.34	\$79.10	176,267	10,476	17,961	\$527,367	\$1,420,708	\$1,948,076	\$11.05
Rental	\$33.01	\$51.87	0	0	0	\$0	\$0	\$0	
Private	\$33.01	\$51.87	90,450	5,928	6,395	\$195,679	\$331,692	\$527,371	\$5.83
Total			266,717	16,404	24,356	\$723,046	\$1,752,400	\$2,475,446	\$9.28
Scuba Diving									
Charter/Party	\$71.37	\$119.74	1,233,489	141,813	152,984	\$10,121,222	\$18,317,507	\$28,438,730	\$23.06
Rental	\$33.01	\$51.87	88,006	11,856	12,790	\$391,357	\$663,384	\$1,054,741	\$11.98
Private	\$33.01	\$51.87	111,579	20,976	22,628	\$692,402	\$1,173,679	\$1,866,081	\$16.72
Total			1,433,074	174,645	188,401	\$11,204,981	\$20,154,570	\$31,359,551	\$21.88
Fishing - Offshore/Trolling									
Charter	\$36.35	\$57.11	52,970	17,100	18,447	\$621,515	\$1,053,520	\$1,675,035	\$31.62
Party	\$50.34	\$79.10	318,347	136,797	147,573	\$6,886,386	\$11,673,003	\$18,559,389	\$58.30
Rental	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Private	\$31.86	\$50.06	637,970	64,523	69,605	\$2,055,746	\$3,484,662	\$5,540,408	\$8.68
Total			1,009,287	218,420	235,624	\$9,563,647	\$16,211,186	\$25,774,832	\$25.54
Fishing - Flats or Back Country									
Charter/Party	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Rental	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Private	\$31.86	\$50.06	44,298	3,952	4,263	\$125,911	\$213,430	\$339,342	\$7.66
Total			44,298	3,952	4,263	\$125,911	\$213,430	\$339,342	\$7.66
Fishing - Bottom									
Charter	\$36.35	\$57.11	1,059	456	492	\$16,574	\$28,094	\$44,668	\$42.16
Party	\$50.34	\$79.10	68,826	11,400	12,298	\$573,865	\$972,750	\$1,546,616	\$22.47
Rental	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Private	\$31.86	\$50.06	166,274	19,380	20,906	\$617,450	\$1,046,630	\$1,664,080	\$10.01
Total			236,160	31,235	33,696	\$1,207,889	\$2,047,474	\$3,255,364	\$13.78
Viewing									
Glass Bottom Boat	\$50.34	\$79.10	37,675	3,648	3,935	\$183,637	\$311,280	\$494,917	\$13.14
Total			37,675	3,648	3,935	\$183,637	\$311,280	\$494,917	\$13.14
All Activities - Boat Modes			3,027,210	448,304	490,275	23,009,112	40,690,340	\$63,699,452	\$21.04
All Fishing			1,289,745					\$29,369,538	\$22.77

Table A.3.2-21

Calculation of Use Values for Natural Reefs - Miami-Dade County Visitors - 2000-2001

Activity-Boat Mode	Summer Value Per Person-Trip (NREEF=1)	Winter Value Per Person-Trip (NREEF=1)	Natural Reefs Annual Person-days	Summer Person-Trips Natural Reefs	Winter Person-Trips Natural Reefs	Summer Value Natural Reefs	Winter Value Natural Reefs	Annual Value Natural Reefs	User Value Per Person-Day Natural Reefs
Snorkeling									
Charter/Party	\$19.83	\$31.58	79,692	45,568	19,007	\$903,542	\$600,187	\$1,503,729	\$18.87
Rental	\$11.09	\$17.65	0	0	0	\$0	\$0	\$0	
Private	\$11.09	\$17.65	519,667	154,111	64,282	\$1,708,515	\$1,134,898	\$2,843,413	\$5.47
Total			599,359	199,679	83,289	\$2,612,057	\$1,735,085	\$4,347,142	\$7.25
Scuba Diving									
Charter/Party	\$19.83	\$31.58	102,677	43,008	17,939	\$852,782	\$566,469	\$1,419,250	\$13.82
Rental	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Private	\$11.09	\$17.65	168,136	67,072	27,977	\$743,573	\$493,926	\$1,237,499	\$7.36
Total			270,813	110,079	45,916	\$1,596,354	\$1,060,394	\$2,656,749	\$9.81
Fishing - Offshore/Trolling									
Charter	\$10.81	\$17.21	114,974	54,272	22,638	\$586,675	\$389,705	\$976,379	\$8.49
Party	\$12.85	\$20.47	200,056	68,608	28,617	\$881,734	\$585,701	\$1,467,435	\$7.34
Rental	\$10.68	\$17.00	208,520	74,035	30,881	\$790,463	\$525,073	\$1,315,536	\$6.31
Private	\$10.68	\$17.00	817,748	296,958	123,866	\$3,170,598	\$2,106,101	\$5,276,699	\$6.45
Total			1,341,298	493,872	206,002	\$5,429,470	\$3,606,579	\$9,036,049	\$6.74
Fishing - Flats or Back Country									
Charter/Party	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Rental	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Private	\$10.68	\$17.00	538,880	190,463	79,445	\$2,033,556	\$1,350,810	\$3,384,366	\$6.28
Total			538,880	190,463	79,445	\$2,033,556	\$1,350,810	\$3,384,366	\$6.28
Fishing - Bottom									
Charter	\$10.81	\$17.21	7,473	4,096	1,708	\$44,277	\$29,412	\$73,689	\$9.86
Party	\$12.85	\$20.47	93,129	41,984	17,512	\$539,569	\$358,414	\$897,982	\$9.64
Rental	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Private	\$10.68	\$17.00	382,941	141,823	59,157	\$1,514,234	\$1,005,845	\$2,520,079	\$6.58
Total			483,544	187,903	78,377	\$2,098,080	\$1,393,670	\$3,491,750	\$7.22
Viewing									
Glass Bottom Boat	\$12.85	\$20.47	14,060	4,608	1,922	\$59,221	\$39,338	\$98,559	\$7.01
Total			14,060	4,608	1,922	\$59,221	\$39,338	\$98,559	\$7.01
All Activities-Boat Modes			3,247,954	1,186,603	494,951	13,828,739	9,185,876	\$23,014,615	\$7.09
All Fishing			2,363,723	872,237	363,824	\$9,561,106	\$6,351,059	\$15,912,165	\$6.73

Table A.3.2-22									
Calculation of Use Values for Natural Reefs - Monroe County Visitors - 2000-2001									
Activity-Boat Mode	Summer Value Per Person-Trip (NREEF=1)	Winter Value Per Person-Trip (NREEF=1)	Natural Reefs Annual Person-days	Summer Person-Trips Natural Reefs	Winter Person-Trips Natural Reefs	Summer Value Natural Reefs	Winter Value Natural Reefs	Annual Value Natural Reefs	User Value Per Person-Day Natural Reefs
Snorkeling									
Charter/Party	\$31.83	\$56.85	250,701	62,891	51,766	\$2,002,027	\$2,943,051	\$4,945,078	\$19.73
Rental	\$62.28	\$98.84	56,590	13,139	10,815	\$818,235	\$1,068,917	\$1,887,153	\$33.35
Private	\$62.28	\$98.84	333,928	73,776	60,726	\$4,594,442	\$6,002,037	\$10,596,480	\$31.73
Total			641,218	149,806	123,306	\$7,414,704	\$10,014,005	\$17,428,710	\$27.18
Scuba Diving									
Charter/Party	\$51.75	\$77.41	99,738	26,938	22,173	\$1,393,885	\$1,716,413	\$3,110,298	\$31.18
Rental	\$30.35	\$54.20	16,702	4,398	3,620	\$133,460	\$196,191	\$329,650	\$19.74
Private	\$30.35	\$54.20	165,896	32,215	26,517	\$977,593	\$1,437,096	\$2,414,688	\$14.56
Total			282,336	63,551	52,309	\$2,504,938	\$3,349,700	\$5,854,637	\$20.74
Fishing - Offshore/Trolling									
Charter	\$41.50	\$74.11	41,190	8,026	6,607	\$333,052	\$489,599	\$822,651	\$19.97
Party	\$45.89	\$81.96	48,403	23,969	19,729	\$1,100,029	\$1,617,082	\$2,717,110	\$56.13
Rental	\$32.55	\$58.14	21,317	4,178	3,439	\$136,002	\$199,928	\$335,929	\$15.76
Private	\$32.55	\$58.14	215,028	34,744	28,598	\$1,130,963	\$1,662,555	\$2,793,518	\$12.99
Total			325,938	70,917	58,373	\$2,700,046	\$3,969,163	\$6,669,209	\$20.46
Fishing - Flats or Back Country									
Charter/Party	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Rental	\$0.00	\$0.00	0	0	0	\$0	\$0	\$0	
Private	\$32.55	\$58.14	95,052	15,503	12,761	\$504,638	\$741,836	\$1,246,475	\$13.11
Total			95,052	15,503	12,761	\$504,638	\$741,836	\$1,246,475	\$13.11
Fishing - Bottom									
Charter	\$41.50	\$74.11	9,301	440	362	\$18,249	\$26,827	\$45,077	\$4.85
Party	\$45.89	\$81.96	10,630	1,319	1,086	\$60,552	\$89,014	\$149,566	\$14.07
Rental	\$32.55	\$58.14	7,786	1,649	1,358	\$53,685	\$78,919	\$132,604	\$17.03
Private	\$32.55	\$58.14	154,842	27,817	22,897	\$905,486	\$1,331,096	\$2,236,582	\$14.44
Total			182,559	31,226	25,702	\$1,037,972	\$1,525,856	\$2,563,828	\$14.04
Viewing									
Glass Bottom Boat	\$45.89	\$81.96	71,363	17,262	14,209	\$792,223	\$1,164,595	\$1,956,818	\$27.42
Total			71,363	17,262	14,209	\$792,223	\$1,164,595	\$1,956,818	\$27.42
All Activities - Boat Modes			1,598,467	348,264	286,659	14,954,521	20,765,156	\$35,719,677	\$22.35
All Fishing			603,549	117,646	96,835	4,242,656	6,236,856	\$10,479,512	\$17.36

Table A.3.2-23: Calculation of Use Value of Artificial Reefs - Palm Beach County Visitors, 2000-2001

Activity-Boat Mode	Summer Value Per Person Trip	Winter Value Per Person Trip	Annual Person-Days; Artificial Reefs	Summer Person-Trips; Artificial Reefs	Winter Person-Trips; Artificial Reefs	Summer Value; Artificial Reefs	Winter Value; Artificial Reefs	Annual Value; Artificial Reefs	User Value Per Person-day (Artificial Reefs)
Snorkeling									
Charter/Party	\$30.48	\$47.15	6,276	1,395	1,505	\$42,531	\$70,976	\$113,507	\$18.08
Rental	\$15.61	\$24.15	5,558	253	273	\$3,949	\$6,590	\$10,539	\$1.90
Private	\$15.61	\$24.15	25,105	5,721	6,172	\$89,328	\$149,071	\$238,399	\$9.50
Total			36,940	7,370	7,950	\$135,808	\$226,637	\$362,444	\$9.81
Scuba Diving									
Charter/Party	\$30.48	\$47.15	179,124	50,654	54,643	\$1,543,871	\$2,576,419	\$4,120,290	\$23.00
Rental	\$15.61	\$24.15	1,643	349	376	\$5,447	\$9,090	\$14,537	\$8.85
Private	\$15.61	\$24.15	57,155	16,257	17,537	\$253,822	\$423,579	\$677,401	\$11.85
Total			237,921	67,259	72,557	\$1,803,139	\$3,009,088	\$4,812,227	\$20.23
Fishing - Offshore/Trolling									
Charter	\$18.99	\$29.38	5,399	2,721	2,935	\$51,680	\$86,243	\$137,923	\$25.55
Party	\$22.52	\$34.84	10,032	4,326	4,667	\$97,426	\$162,585	\$260,010	\$25.92
Rental	\$15.76	\$24.38	0	0	0	\$0	\$0	\$0	\$0
Private	\$15.76	\$24.38	32,937	6,140	6,623	\$96,754	\$161,464	\$258,219	\$7.84
Total			48,368	13,187	14,225	\$245,860	\$410,292	\$656,152	\$13.57
Fishing - Flats or Back Country									
Charter/Party	\$18.99	\$29.38	0	0	0	\$0	\$0	\$0	\$0.00
Rental	\$15.76	\$24.38	0	0	0	\$0	\$0	\$0	\$0
Private	\$15.76	\$24.38	0	0	0	\$0	\$0	\$0	\$0
Total			0	0	0	\$0	\$0	\$0	\$0
Fishing - Bottom									
Charter	\$18.99	\$29.38	2,474	0	0	\$0	\$0	\$0	\$0.00
Party	\$22.52	\$34.84	4,409	1,256	1,355	\$28,285	\$47,202	\$75,487	\$17.12
Rental	\$15.76	\$24.38	0	0	0	\$0	\$0	\$0	\$0
Private	\$15.76	\$24.38	0	0	0	\$0	\$0	\$0	\$0
Total			6,883	1,256	1,355	\$28,285	\$47,202	\$75,487	\$10.97
Viewing									
Glass Bottom Boat	\$22.52	\$34.84	0	0	0	\$0	\$0	\$0	\$0
Total			0	0	0	\$0	\$0	\$0	\$0
All Activities - Boat Modes			330,112	89,071	96,087	2,213,092	3,693,219	\$5,906,311	\$17.89
All Fishing			55,252					\$731,639	\$13.24

Table A.3.2-24: Calculation of Use Value of Artificial Reefs - Broward County Visitors, 2000-2001

Activity-Boat Mode	Summer Value Per Person Trip	Winter Value Per Person Trip	Annual Person-Days; Artificial Reefs	Summer Person-Trips; Artificial Reefs	Winter Person-Trips; Artificial Reefs	Summer Value; Artificial Reefs	Winter Value; Artificial Reefs	Annual Value; Artificial Reefs	User Value Per Person-day (Artificial Reefs)
Snorkeling									
Charter/Party	\$49.99	\$82.25	52,880	3,492	5,987	\$174,567	\$492,398	\$666,965	\$12.61
Rental	\$32.78	\$53.93	0	0	0	\$0	\$0	\$0	
Private	\$32.78	\$53.93	34,789	1,368	1,476	\$44,843	\$79,588	\$124,430	\$3.58
Total			87,669	4,860	7,463	\$219,410	\$571,986	\$791,396	\$9.03
Scuba Diving									
Charter/Party	\$49.99	\$82.25	1,370,373	152,301	164,298	\$7,613,537	\$13,512,660	\$21,126,197	\$15.42
Rental	\$32.78	\$53.93	88,006	11,400	12,298	\$373,689	\$663,231	\$1,036,919	\$11.78
Private	\$32.78	\$53.93	128,745	14,364	15,495	\$470,848	\$835,671	\$1,306,519	\$10.15
Total			1,587,123	178,065	192,091	\$8,458,074	\$15,011,561	\$23,469,635	\$14.79
Fishing - Offshore/Trolling									
Charter	\$36.09	\$59.38	48,895	17,328	18,693	\$625,423	\$1,110,013	\$1,735,436	\$35.49
Party	\$49.99	\$82.25	293,859	134,974	145,605	\$6,747,327	\$11,975,291	\$18,722,618	\$63.71
Rental	\$31.64	\$52.05	0	0	0	\$0	\$0	\$0	
Private	\$31.64	\$52.05	471,151	47,651	51,405	\$1,507,645	\$2,675,800	\$4,183,445	\$8.88
Total			813,905	199,952	215,702	\$8,880,395	\$15,761,104	\$24,641,499	\$30.28
Fishing - Flats or Back Country									
Charter/Party	\$36.09	\$59.38	0	0	0	\$0	\$0	\$0	
Rental	\$31.64	\$52.05	0	0	0	\$0	\$0	\$0	
Private	\$31.64	\$52.05	29,335	1,976	2,132	\$62,518	\$110,958	\$173,476	\$5.91
Total			29,335	1,976	2,132	\$62,518	\$110,958	\$173,476	\$5.91
Fishing - Bottom									
Charter	\$36.09	\$59.38	978	0	0	\$0	\$0	\$0	\$0.00
Party	\$49.99	\$82.25	24,447	11,400	12,298	\$569,876	\$1,011,427	\$1,581,302	\$64.68
Rental	\$31.64	\$52.05	0	0	0	\$0	\$0	\$0	
Private	\$31.64	\$52.05	134,976	15,732	16,971	\$497,739	\$883,398	\$1,381,137	\$10.23
Total			160,401	27,132	29,269	\$1,067,615	\$1,894,825	\$2,962,440	\$18.47
Viewing									
Glass Bottom Boat	\$49.99	\$82.25	16,483	1,596	1,722	\$79,783	\$141,600	\$221,382	\$13.43
Total			16,483	1,596	1,722	\$79,783	\$141,600	\$221,382	\$13.43
All Activities - Boat Modes			2,694,915	413,581	448,378	18,767,795	33,492,033	\$52,259,828	\$19.39
All Fishing			1,003,641					\$27,777,415	\$27.68

Table A.3.2-25: Calculation of Use Value of Artificial Reefs - Miami-Dade County Visitors, 2000-2001

Activity-Boat Mode	Summer Value Per Person Trip	Winter Value Per Person Trip	Annual Person-Days; Artificial Reefs	Summer Person-Trips; Artificial Reefs	Winter Person-Trips; Artificial Reefs	Summer Value; Artificial Reefs	Winter Value; Artificial Reefs	Annual Value; Artificial Reefs	User Value Per Person-day (Artificial Reefs)
Snorkeling									
Charter/Party	\$13.50	\$18.18	51,231	11,776	4,912	\$159,009	\$89,313	\$248,321	\$4.85
Rental	\$7.55	\$10.17	0	0	0	\$0	\$0	\$0	
Private	\$7.55	\$10.17	230,116	65,536	27,336	\$494,762	\$277,901	\$772,663	\$3.36
Total			281,347	77,311	32,248	\$653,771	\$367,213	\$1,020,984	\$3.63
Scuba Diving									
Charter/Party	\$13.50	\$18.18	25,318	7,168	2,990	\$96,788	\$54,364	\$151,152	\$5.97
Rental	\$7.55	\$10.17	0	0	0	\$0	\$0	\$0	
Private	\$7.55	\$10.17	143,347	49,664	20,716	\$374,937	\$210,597	\$585,534	\$4.08
Total			168,664	56,832	23,705	\$471,725	\$264,961	\$736,686	\$4.37
Fishing - Offshore/Trolling									
Charter	\$7.36	\$9.91	93,657	44,032	18,366	\$324,134	\$182,061	\$506,195	\$5.40
Party	\$8.75	\$11.79	162,964	69,632	29,044	\$609,405	\$342,294	\$951,699	\$5.84
Rental	\$7.27	\$9.79	139,013	49,356	20,587	\$358,860	\$201,566	\$560,426	\$4.03
Private	\$7.27	\$9.79	318,640	115,711	48,265	\$841,310	\$472,551	\$1,313,861	\$4.12
Total			714,274	278,731	116,263	\$2,133,708	\$1,198,472	\$3,332,180	\$4.67
Fishing - Flats or Back Country									
Charter/Party	\$7.36	\$9.91	0	0	0	\$0	\$0	\$0	
Rental	\$7.27	\$9.79	0	0	0	\$0	\$0	\$0	
Private	\$7.27	\$9.79	59,393	20,992	8,756	\$152,627	\$85,728	\$238,355	\$4.01
Total			59,393	20,992	8,756	\$152,627	\$85,728	\$238,355	\$4.01
Fishing - Bottom									
Charter	\$7.36	\$9.91	6,088	1,024	427	\$7,538	\$4,234	\$11,772	\$1.93
Party	\$8.75	\$11.79	75,862	21,504	8,970	\$188,199	\$105,708	\$293,907	\$3.87
Rental	\$7.27	\$9.79	0	0	0	\$0	\$0	\$0	
Private	\$7.27	\$9.79	103,684	38,400	16,017	\$279,196	\$156,820	\$436,016	\$4.21
Total			185,635	60,928	25,414	\$474,932	\$266,762	\$741,695	\$4.00
Viewing									
Glass Bottom Boat	\$8.75	\$11.79	3,124	1,024	427	\$8,962	\$5,034	\$13,996	\$4.48
Total			3,124	1,024	427	\$8,962	\$5,034	\$13,996	\$4.48
All Activities - Boat Modes			1,412,438	495,818	206,813	3,895,725	2,188,172	\$6,083,896	\$4.31
All Fishing			959,302					\$4,312,230	\$4.50

Table A.3.2-26: Calculation of Use Value of Artificial Reefs - Monroe County Visitors, 2000-2001

Activity-Boat Mode	Summer Value Per Person Trip	Winter Value Per Person Trip	Annual Person-Days; Artificial Reefs	Summer Person-Trips; Artificial Reefs	Winter Person-Trips; Artificial Reefs	Summer Value; Artificial Reefs	Winter Value; Artificial Reefs	Annual Value; Artificial Reefs	User Value Per Person-day (Artificial Reefs)
Snorkeling									
Charter/Party	\$17.37	\$30.44	13,413	4,398	3,620	\$76,404	\$110,206	\$186,610	\$13.91
Rental	\$31.22	\$53.54	8,476	2,034	1,674	\$63,498	\$89,647	\$153,145	\$18.07
Private	\$31.22	\$53.54	99,889	18,801	15,476	\$586,926	\$828,627	\$1,415,552	\$14.17
Total			121,778	25,233	20,770	\$726,827	\$1,028,479	\$1,755,307	\$14.41
Scuba Diving									
Charter/Party	\$17.37	\$30.44	17,678	5,497	4,525	\$95,505	\$137,757	\$233,262	\$13.20
Rental	\$16.56	\$29.02	1,898	1,045	860	\$17,298	\$24,951	\$42,249	\$22.26
Private	\$16.56	\$29.02	56,056	11,765	9,684	\$194,830	\$281,025	\$475,855	\$8.49
Total			75,632	18,307	15,068	\$307,633	\$443,734	\$751,366	\$9.93
Fishing - Offshore/Trolling									
Charter	\$22.65	\$39.68	4,779	5,278	4,344	\$119,512	\$172,386	\$291,898	\$61.08
Party	\$25.05	\$43.89	5,616	2,419	1,991	\$60,583	\$87,386	\$147,969	\$26.35
Rental	\$17.76	\$31.13	10,097	1,979	1,629	\$35,157	\$50,711	\$85,869	\$8.50
Private	\$17.76	\$31.13	119,763	19,351	15,928	\$343,760	\$495,844	\$839,604	\$7.01
Total			140,256	29,027	23,892	\$559,013	\$806,327	\$1,365,340	\$9.73
Fishing - Flats or Back Country									
Charter/Party	\$22.65	\$39.68	0	0	0	\$0	\$0	\$0	
Rental	\$17.76	\$31.13	0	0	0	\$0	\$0	\$0	
Private	\$17.76	\$31.13	62,694	10,225	8,417	\$181,646	\$262,009	\$443,654	\$7.08
Total			62,694	10,225	8,417	\$181,646	\$262,009	\$443,654	\$7.08
Fishing - Bottom									
Charter	\$22.65	\$39.68	1,079	3,518	2,896	\$79,675	\$114,924	\$194,599	\$180.32
Party	\$25.05	\$43.89	1,233	1,539	1,267	\$38,553	\$55,609	\$94,162	\$76.34
Rental	\$41.46	\$60.40	4,152	880	724	\$36,469	\$43,730	\$80,199	\$19.31
Private	\$41.46	\$60.40	67,935	12,204	10,046	\$506,007	\$606,759	\$1,112,765	\$16.38
Total			74,400	18,142	14,933	\$660,703	\$821,022	\$1,481,725	\$19.92
Viewing									
Glass Bottom Boat	\$25.05	\$43.89	3,636	880	724	\$22,030	\$31,777	\$53,807	\$14.80
Total			3,636	880	724	\$22,030	\$31,777	\$53,807	\$14.80
All Activities - Boat Modes			478,395	101,813	83,803	2,457,851	3,393,348	\$5,851,199	\$12.23
All Fishing			277,349					\$3,290,720	\$11.86

Table A.3.2-27: Calculation of Use Value of Natural & Artificial Reefs - Palm Beach County Visitors, 2000-2001									
Activity-Boat Mode	Summer Person-Trips on Reefs	Winter Person-Trips on Reefs	Summer Value Per Person-Trip	Summer Total Value	Winter Value Per Person-Trip	Winter Total Value	Annual Value	Annual Person-Days	Value Per Person-day
Snorkeling									
Charter/Party	7,675	8,279	\$20.10	\$154,277	\$34.54	\$285,958	\$440,235	34,171	\$12.88
Rental	2,023	2,183	\$10.30	\$20,836	\$17.69	\$38,619	\$59,455	9,528	\$6.24
Private	15,768	17,010	\$10.30	\$162,374	\$17.69	\$300,966	\$463,339	83,785	\$5.53
Total							\$963,029	127,484	\$7.55
Scuba Diving									
Charter/Party	192,707	207,886	\$35.76	\$6,891,281	\$50.49	\$10,496,361	\$17,387,642	786,983	\$22.09
Rental	1,116	1,204	\$10.30	\$11,495	\$17.69	\$21,307	\$32,803	5,257	\$6.24
Private	33,211	35,827	\$10.30	\$341,990	\$17.69	\$633,892	\$975,883	127,484	\$7.65
Total							\$18,396,328	919,723	\$20.00
Fishing - Offshore/Trolling									
Charter	5,651	6,097	\$12.53	\$70,790	\$21.52	\$131,213	\$202,003	23,620	\$8.55
Party	13,256	14,301	\$14.85	\$196,911	\$25.52	\$364,982	\$561,893	43,894	\$12.80
Rental	209	226	\$10.39	\$2,175	\$17.86	\$4,032	\$6,208	986	\$6.30
Private	18,071	19,494	\$10.39	\$187,811	\$17.86	\$348,116	\$535,927	96,941	\$5.53
Total							\$1,306,030	165,440	\$7.89
Fishing - Flats or Back Country									
Charter/Party	0	0	\$12.53	\$0	\$21.52	\$0	\$0	0	
Rental	0	0	\$10.39	\$0	\$17.86	\$0	\$0	0	
Private	140	151	\$10.39	\$1,450	\$17.86	\$2,688	\$4,138	657	\$6.30
Total							\$4,138	657	\$6.30
Fishing - Bottom									
Charter	2,299	2,480	\$12.53	\$28,796	\$21.52	\$53,374	\$82,169	10,826	\$7.59
Party	4,814	5,193	\$14.85	\$71,510	\$25.52	\$132,546	\$204,056	19,290	\$10.58
Rental	0	0	\$10.39	\$0	\$17.86	\$0	\$0	0	
Private	2,582	2,785	\$10.39	\$26,830	\$17.86	\$49,731	\$76,561	17,367	\$4.41
Total							\$362,786	47,483	\$7.64
Viewing									
Glass Bottom Boat	0	0	\$14.85	\$0	\$25.52	\$0	\$0	0	
Total							\$0	0	
All Activities - Boat Modes	299,522	323,115					21,032,312	1,260,787	\$16.68
All Fishing							\$1,672,955	213,580	\$7.83

Table A.3.2-28: Calculation of Use Value of Natural & Artificial Reefs - Broward County Visitors, 2000-2001									
Activity-Boat Mode	Summer Person-Trips on Reefs	Winter Person-Trips on Reefs	Summer Value Per Person-Trip	Summer Total Value	Winter Value Per Person-Trip	Winter Total Value	Annual Value	Annual Person-Days	Value Per Person-day
Snorkeling									
Charter/Party	13,968	23,948	\$47.73	\$666,630	\$68.89	\$1,649,770	\$2,316,399	229,147	\$10.11
Rental	0	0	\$31.30	\$0	\$45.17	\$0	\$0	0	
Private	7,296	7,871	\$31.30	\$228,325	\$45.17	\$355,542	\$583,867	125,239	\$4.66
Total							\$2,900,266	354,386	\$8.18
Scuba Diving									
Charter/Party	294,115	317,281	\$70.31	\$20,679,198	\$107.84	\$34,215,623	\$54,894,822	2,603,862	\$21.08
Rental	23,256	25,087	\$31.30	\$727,785	\$45.17	\$1,133,291	\$1,861,076	176,011	\$10.57
Private	35,339	38,123	\$31.30	\$1,105,948	\$45.17	\$1,722,158	\$2,828,106	240,323	\$11.77
Total							\$59,584,003	3,020,197	\$19.73
Fishing - Offshore/Trolling									
Charter	34,427	37,139	\$34.46	\$1,186,315	\$49.74	\$1,847,303	\$3,033,618	101,865	\$29.78
Party	271,771	293,178	\$47.73	\$12,970,272	\$68.89	\$20,197,021	\$33,167,292	612,206	\$54.18
Rental	0	0	\$30.21	\$0	\$43.60	\$0	\$0	0	
Private	112,174	121,010	\$30.21	\$3,388,292	\$43.60	\$5,276,174	\$8,664,466	1,109,121	\$7.81
Total							\$44,865,376	1,823,192	\$24.61
Fishing - Flats or Back Country									
Charter/Party	0	0	\$34.46	\$0	\$49.74	\$0	\$0	0	
Rental	0	0	\$30.21	\$0	\$43.60	\$0	\$0	0	
Private	5,928	6,395	\$30.21	\$179,056	\$43.60	\$278,822	\$457,878	73,633	\$6.22
Total							\$457,878	73,633	\$6.22
Fishing - Bottom									
Charter	456	492	\$34.46	\$15,713	\$49.74	\$24,468	\$40,180	2,037	\$19.72
Party	22,800	24,595	\$47.73	\$1,088,110	\$68.89	\$1,694,381	\$2,782,491	93,273	\$29.83
Rental	0	0	\$30.21	\$0	\$43.60	\$0	\$0	0	
Private	35,111	37,877	\$30.21	\$1,060,563	\$43.60	\$1,651,485	\$2,712,048	301,250	\$9.00
Total							\$5,534,720	396,561	\$13.96
Viewing									
Glass Bottom Boat	5,244	5,657	\$47.73	\$250,265	\$68.89	\$389,708	\$639,973	54,157	\$11.82
Total							\$639,973	54,157	\$11.82
All Activities - Boat Modes	861,885	938,653					113,982,216	5,722,125	\$19.92
All Fishing							\$50,857,974	2,293,386	\$22.18

Table A.3.2-29: Calculation of Use Value of Natural & Artificial Reefs - Miami-Dade County Visitors, 2000-2001

Activity-Boat Mode	Summer Person Trips on Reefs	Winter Person-Trips on Reefs	Summer Value Per Person-Trip	Summer Total Value	Winter Value Per Person-Trip	Winter Total Value	Annual Value	Annual Person-Days	Value Per Person-day
Snorkeling									
Charter/Party	57,344	23,919	\$21.17	\$1,214,046	\$28.64	\$685,038	\$1,899,085	130,923	\$14.51
Rental	0	0	\$11.84	\$0	\$16.01	\$0	\$0	0	
Private	219,647	91,618	\$11.84	\$2,599,970	\$16.01	\$1,467,060	\$4,067,029	749,783	\$5.42
Total							\$5,966,114	880,706	\$6.77
Scuba Diving									
Charter/Party	50,176	20,929	\$21.17	\$1,062,291	\$28.64	\$599,408	\$1,661,699	127,994	\$12.98
Rental	0	0	\$11.84	\$0	\$16.01	\$0	\$0	0	
Private	116,735	48,692	\$11.84	\$1,381,802	\$16.01	\$779,696	\$2,161,498	311,483	\$6.94
Total							\$3,823,197	439,477	\$8.70
Fishing - Offshore/Trolling									
Charter	98,303	41,004	\$11.54	\$1,134,623	\$15.61	\$640,223	\$1,774,845	208,632	\$8.51
Party	138,239	57,662	\$13.72	\$1,896,948	\$18.56	\$1,070,372	\$2,967,320	363,019	\$8.17
Rental	123,391	51,468	\$11.40	\$1,406,660	\$15.42	\$793,722	\$2,200,382	347,534	\$6.33
Private	412,669	172,131	\$11.40	\$4,704,430	\$15.42	\$2,654,523	\$7,358,953	1,136,387	\$6.48
Total							\$14,301,499	2,055,572	\$6.96
Fishing - Flats or Back Country									
Charter/Party	0	0	\$11.54	\$0	\$15.61	\$0	\$0	0	
Rental	0	0	\$11.40	\$0	\$15.42	\$0	\$0	0	
Private	211,455	88,201	\$11.40	\$2,410,583	\$15.42	\$1,360,196	\$3,770,779	598,273	\$6.30
Total							\$3,770,779	598,273	\$6.30
Fishing - Bottom									
Charter	5,120	2,136	\$11.54	\$59,095	\$15.61	\$33,345	\$92,440	13,561	\$6.82
Party	63,488	26,482	\$13.72	\$871,191	\$18.56	\$491,578	\$1,362,769	168,992	\$8.06
Rental	0	0	\$11.40	\$0	\$15.42	\$0	\$0	0	
Private	180,223	75,174	\$11.40	\$2,054,540	\$15.42	\$1,159,295	\$3,213,835	486,626	\$6.60
Total							\$4,669,044	669,179	\$6.98
Viewing									
Glass Bottom Boat	5,632	2,349	\$13.72	\$77,283	\$18.56	\$43,608	\$120,891	17,184	\$7.03
Total							\$120,891	17,184	\$7.03
All Activities - Boat Modes	1,682,421	701,764					\$32,651,524	4,660,392	\$7.01
All Fishing							\$22,741,322	3,323,024	\$6.84

Table A.3.2-30 Calculation of Use Value of Natural & Artificial Reefs - Monroe County Visitors, 2000-2001									
Activity-Boat Mode	Summer Person-Trips on Reefs	Winter Person-Trips on Reefs	Summer Value Per Person-Trip	Summer Total Value	Winter Value Per Person-Trip	Winter Total Value	Annual Value	Annual Person-Days	Value Per Person-day
Snorkeling									
Charter/Party	67,289	55,386	\$26.80	\$1,803,605	\$45.91	\$2,543,006	\$4,346,611	264,114	\$16.46
Rental	15,173	12,489	\$43.35	\$657,685	\$71.93	\$898,391	\$1,556,076	65,066	\$23.92
Private	92,577	76,201	\$43.35	\$4,012,830	\$71.93	\$5,481,489	\$9,494,320	433,817	\$21.89
Total							\$15,397,007	762,996	\$20.18
Scuba Diving									
Charter/Party	32,435	26,698	\$50.06	\$1,623,657	\$66.62	\$1,778,460	\$3,402,117	117,416	\$28.97
Rental	5,442	4,480	\$25.55	\$139,063	\$43.77	\$196,073	\$335,136	18,600	\$18.02
Private	43,980	36,200	\$25.55	\$1,123,742	\$43.77	\$1,584,427	\$2,708,169	221,952	\$12.20
Total							\$6,445,422	357,967	\$18.01
Fishing - Offshore/Trolling									
Charter	13,304	10,951	\$34.94	\$464,827	\$59.85	\$655,386	\$1,120,213	45,970	\$24.37
Party	26,388	21,720	\$38.64	\$1,019,706	\$66.19	\$1,437,742	\$2,457,448	54,019	\$45.49
Rental	6,157	5,068	\$27.41	\$168,758	\$46.95	\$237,942	\$406,700	31,414	\$12.95
Private	54,095	44,526	\$27.41	\$1,482,663	\$46.95	\$2,090,491	\$3,573,154	334,791	\$10.67
Total							\$7,557,516	466,194	\$16.21
Fishing - Flats or Back Country									
Charter/Party	0	0	\$34.94	\$0	\$59.85	\$0	\$0	0	
Rental	0	0	\$27.41	\$0	\$46.95	\$0	\$0	0	
Private	25,728	21,177	\$27.41	\$705,169	\$46.95	\$994,258	\$1,699,427	157,746	\$10.77
Total							\$1,699,427	157,746	\$10.77
Fishing - Bottom									
Charter	3,958	3,258	\$34.94	\$138,296	\$59.85	\$194,991	\$333,286	10,380	\$32.11
Party	2,859	2,353	\$38.64	\$110,468	\$66.19	\$155,755	\$266,224	11,863	\$22.44
Rental	2,529	2,082	\$56.30	\$142,369	\$82.50	\$171,721	\$314,090	11,938	\$26.31
Private	40,021	32,942	\$56.30	\$2,253,139	\$82.50	\$2,717,675	\$4,970,814	222,777	\$22.31
Total							\$5,884,414	256,959	\$22.90
Viewing									
Glass Bottom Boat	18,142	14,933	\$38.64	701,048	\$66.19	\$988,448	\$1,689,496	75,000	\$22.53
Total							\$1,689,496	75,000	\$22.53
All Activities - Boat Modes	450,077	370,462					38,673,282	2,076,862	\$18.62
All Fishing							\$15,141,356	880,899	\$17.19

Table A.3.2-31: Calculation of Use Value of New Artificial Reefs - Palm Beach County Visitors, 2000-2001

Activity-Boat Mode	Summer Value Per Person-Trip	Winter Value Per Person-Trip	Artificial Reefs - Annual Person-Days	Summer Trips Artificial Reefs	Winter Trips - Artificial Reefs	Summer Value - Artificial Reef Users	Winter Value - Artificial Reef Users	Annual Value - Artificial Reef Users	Value Per Person-day
Snorkeling									
Charter/Party	\$11.25	\$21.96	6,276	1,395	1,505	\$15,692	\$33,063	\$48,755	\$7.77
Rental	\$5.76	\$11.25	5,558	253	273	\$1,457	\$3,070	\$4,527	\$0.81
Private	\$5.76	\$11.25	25,105	5,721	6,172	\$32,958	\$69,443	\$102,401	\$4.08
Total			36,940	7,370	7,950	\$50,107	\$105,576	\$155,683	\$4.21
Scuba Diving									
Charter/Party	\$20.69	\$39.33	179,124	50,654	54,643	\$1,048,255	\$2,149,088	\$3,197,343	\$17.85
Rental	\$5.76	\$11.25	1,643	349	376	\$2,010	\$4,234	\$6,244	\$3.80
Private	\$5.76	\$11.25	57,155	16,257	17,537	\$93,650	\$197,319	\$290,969	\$5.09
Total			237,921	67,259	72,557	\$1,143,914	\$2,350,641	\$3,494,556	\$14.69
Fishing - Offshore/Trolling									
Charter	\$7.01	\$13.69	5,399	2,721	2,935	\$19,068	\$40,175	\$59,243	\$10.97
Party	\$8.30	\$16.23	10,032	4,326	4,667	\$35,908	\$75,738	\$111,646	\$11.13
Rental	\$5.81	\$11.36	0	0	0	\$0	\$0	\$0	
Private	\$5.81	\$11.36	32,937	6,140	6,623	\$35,698	\$75,216	\$110,914	\$3.37
Total			48,368	13,187	14,225	\$90,674	\$191,129	\$281,803	\$5.83
Fishing - Flats or Back Country									
Charter/Party	\$7.01	\$13.69	0	0	0	\$0	\$0	\$0	
Rental	\$5.81	\$11.36	0	0	0	\$0	\$0	\$0	
Private	\$5.81	\$11.36	0	0	0	\$0	\$0	\$0	
Total			0	0	0	\$0	\$0	\$0	
Fishing - Bottom									
Charter	\$7.01	\$13.69	2,474	0	0	\$0	\$0	\$0	\$0.00
Party	\$8.31	\$16.23	4,409	1,256	1,355	\$10,436	\$21,988	\$32,424	\$7.35
Rental	\$5.81	\$11.36	0	0	0	\$0	\$0	\$0	
Private	\$5.81	\$11.36	0	0	0	\$0	\$0	\$0	
Total			6,883	1,256	1,355	\$10,436	\$21,988	\$32,424	\$4.71
Viewing									
Glass Bottom Boat	\$8.31	\$16.23	0	0	0	\$0	\$0	\$0	
Total			0	0	0	\$0	\$0	\$0	
All Activities - Boat Modes			330,112	89,071	96,087	1,295,132	2,669,335	\$3,964,467	\$12.01
All Fishing			55,252					314227.698	\$5.69

Table A.3.2-32: Calculation of Use Value of New Artificial Reefs - Broward County Visitors, 2000-2001

Activity-Boat Mode	Summer Value Per Person-Trip	Winter Value Per Person-Trip	Artificial Reefs - Annual Person-Days	Summer Trips Artificial Reefs	Winter Trips - Artificial Reefs	Summer Value - Artificial Reef Users	Winter Value - Artificial Reef Users	Annual Value - Artificial Reef Users	Value Per Person-day
Snorkeling									
Charter/Party	\$13.07	\$19.20	52,880	3,492	5,987	\$45,641	\$114,950	\$160,591	\$3.04
Rental	\$8.57	\$12.59	0	0	0	\$0	\$0	\$0	
Private	\$8.57	\$12.59	34,789	1,368	1,476	\$11,724	\$18,580	\$30,304	\$0.87
Total			87,669	4,860	7,463	\$57,365	\$133,529	\$190,895	\$2.18
Scuba Diving									
Charter/Party	\$12.93	\$32.84	1,370,373	152,301	164,298	\$1,968,493	\$5,395,535	\$7,364,028	\$5.37
Rental	\$8.57	\$12.59	88,006	11,400	12,298	\$97,702	\$154,830	\$252,532	\$2.87
Private	\$8.57	\$12.59	128,745	14,364	15,495	\$123,104	\$195,086	\$318,191	\$2.47
Total			1,587,123	178,065	192,091	\$2,189,299	\$5,745,451	\$7,934,751	\$5.00
Fishing - Offshore/Trolling									
Charter	\$9.44	\$13.86	48,895	17,328	18,693	\$163,518	\$259,131	\$422,650	\$8.64
Party	\$13.07	\$19.20	293,859	134,974	145,605	\$1,764,104	\$2,795,618	\$4,559,722	\$15.52
Rental	\$8.27	\$12.15	0	0	0	\$0	\$0	\$0	
Private	\$8.27	\$12.15	471,151	47,651	51,405	\$394,177	\$624,662	\$1,018,840	\$2.16
Total			813,905	199,952	215,702	\$2,321,800	\$3,679,411	\$6,001,211	\$7.37
Fishing - Flats or Back Country									
Charter/Party	\$9.44	\$13.86	0	0	0	\$0	\$0	\$0	
Rental	\$8.27	\$12.15	0	0	0	\$0	\$0	\$0	
Private	\$8.27	\$12.15	29,335	1,976	2,132	\$16,345	\$25,903	\$42,249	\$1.44
Total			29,335	1,976	2,132	\$16,345	\$25,903	\$42,249	\$1.44
Fishing - Bottom									
Charter	\$9.44	\$13.86	978	0	0	\$0	\$0	\$0	\$0.00
Party	\$13.07	\$19.20	24,447	11,400	12,298	\$148,995	\$236,116	\$385,112	\$15.75
Rental	\$8.27	\$12.15	0	0	0	\$0	\$0	\$0	
Private	\$8.27	\$12.15	134,976	15,732	16,971	\$130,135	\$206,228	\$336,363	\$2.49
Total			160,401	27,132	29,269	\$279,130	\$442,345	\$721,475	\$4.50
Viewing									
Glass Bottom Boat	\$13.07	\$19.20	16,483	1,596	1,722	\$20,859	\$33,056	\$53,916	\$3.27
Total			16,483	1,596	1,722	\$20,859	\$33,056	\$53,916	\$3.27
All Activities - Boat Modes			2,694,915	413,581	448,378	4,884,799	10,059,696	\$14,944,495	\$5.55
All Fishing			1,003,641					6764934.583	\$6.74

Table A.3.2-33: Calculation of Use Value of New Artificial Reefs - Miami-Dade County Visitors, 2000-2001

Activity-Boat Mode	Summer Value Per Person-Trip	Winter Value Per Person-Trip	Artificial Reefs Annual Person-Days	Summer Trips Artificial Reefs	Winter Trips - Artificial Reefs	Summer Value - Artificial Reef Users	Winter Value - Artificial Reef Users	Annual Value - Artificial Reef Users	Value Per Person-day
Snorkeling									
Charter/Party	\$5.59	\$16.73	51,231	11,776	4,912	\$65,878	\$82,155	\$148,033	\$2.89
Rental	\$3.13	\$9.35	0	0	0	\$0	\$0	\$0	
Private	\$3.13	\$9.35	230,116	65,536	27,336	\$204,982	\$255,630	\$460,612	\$2.00
Total			281,347	77,311	32,248	\$270,860	\$337,786	\$608,645	\$2.16
Scuba Diving									
Charter/Party	\$5.59	\$16.73	25,318	7,168	2,990	\$40,100	\$50,008	\$90,107	\$3.56
Rental	\$3.13	\$9.35	0	0	0	\$0	\$0	\$0	
Private	\$3.13	\$9.35	143,347	49,664	20,716	\$155,338	\$193,720	\$349,058	\$2.44
Total			168,664	56,832	23,705	\$195,437	\$243,727	\$439,165	\$2.60
Fishing - Offshore/Trolling									
Charter	\$3.05	\$9.12	93,657	44,032	18,366	\$134,290	\$167,471	\$301,761	\$3.22
Party	\$3.63	\$10.84	162,964	69,632	29,044	\$252,479	\$314,863	\$567,342	\$3.48
Rental	\$3.01	\$9.01	139,013	49,356	20,587	\$148,677	\$185,413	\$334,090	\$2.40
Private	\$3.01	\$9.01	318,640	115,711	48,265	\$348,558	\$434,682	\$783,240	\$2.46
Total			714,274	278,731	116,263	\$884,003	\$1,102,429	\$1,986,432	\$2.78
Fishing - Flats or Back Country									
Charter/Party	\$3.05	\$9.12	0	0	0	\$0	\$0	\$0	
Rental	\$3.01	\$9.01	0	0	0	\$0	\$0	\$0	
Private	\$3.01	\$9.01	59,393	20,992	8,756	\$63,234	\$78,858	\$142,092	\$2.39
Total			59,393	20,992	8,756	\$63,234	\$78,858	\$142,092	\$2.39
Fishing - Bottom									
Charter	\$3.05	\$9.12	6,088	1,024	427	\$3,123	\$3,895	\$7,018	\$1.15
Party	\$3.63	\$10.84	75,862	21,504	8,970	\$77,971	\$97,237	\$175,208	\$2.31
Rental	\$3.01	\$9.01	0	0	0	\$0	\$0	\$0	
Private	\$3.01	\$9.01	103,684	38,400	16,017	\$115,672	\$144,253	\$259,925	\$2.51
Total			185,635	60,928	25,414	\$196,766	\$245,385	\$442,151	\$2.38
Viewing									
Glass Bottom Boat	\$3.63	\$10.84	3,124	1,024	427	\$3,713	\$4,630	\$8,343	\$2.67
Total			3,124	1,024	427	\$3,713	\$4,630	\$8,343	\$2.67
All Activities - Boat Modes			1,412,438	495,818	206,813	1,614,014	2,012,815	\$3,626,829	\$2.57
All Fishing			959,302			\$0	\$0	2570675.386	\$2.68

Table A.3.2-34: Calculation of Use Value of New Artificial Reefs - Monroe County Visitors, 2000-2001

Activity-Boat Mode	Summer Value Per Person-Trip	Winter Value Per Person-Trip	Artificial Reefs Annual Person- Days	Summer Trips Artificial Reefs	Winter Trips - Artificial Reefs	Summer Value - Artificial Reef Users	Winter Value - Artificial Reef Users	Annual Value - Artificial Reef Users	Value Per Person-day
Snorkeling									
Charter/Party	\$5.68	\$10.96	13,413	4,398	3,620	\$24,986	\$39,687	\$64,673	\$4.82
Rental	\$5.42	\$10.45	8,476	2,034	1,674	\$11,016	\$17,497	\$28,514	\$3.36
Private	\$5.42	\$10.45	99,889	18,801	15,476	\$101,826	\$161,734	\$263,559	\$2.64
Total			121,778	25,233	20,770	\$137,828	\$218,918	\$356,746	\$2.93
Scuba Diving									
Charter/Party	\$20.58	\$29.28	17,678	5,497	4,525	\$113,129	\$132,478	\$245,607	\$13.89
Rental	\$5.42	\$10.45	1,898	1,045	860	\$5,657	\$8,985	\$14,642	\$7.71
Private	\$5.42	\$10.45	56,056	11,765	9,684	\$63,716	\$101,202	\$164,917	\$2.94
Total			75,632	18,307	15,068	\$182,502	\$242,665	\$425,167	\$5.62
Fishing - Offshore/Trolling									
Charter	\$7.41	\$14.29	4,779	5,278	4,344	\$39,084	\$62,079	\$101,163	\$21.17
Party	\$8.19	\$15.81	5,616	2,419	1,991	\$19,813	\$31,469	\$51,282	\$9.13
Rental	\$5.81	\$11.21	10,097	1,979	1,629	\$11,498	\$18,262	\$29,759	\$2.95
Private	\$5.81	\$11.21	119,763	19,351	15,928	\$112,420	\$178,561	\$290,982	\$2.43
Total			140,256	29,027	23,892	\$182,815	\$290,371	\$473,186	\$3.37
Fishing - Flats or Back Country									
Charter/Party	\$7.41	\$14.29	0	0	0	\$0	\$0	\$0	
Rental	\$5.81	\$11.21	0	0	0	\$0	\$0	\$0	
Private	\$5.81	\$11.21	62,694	10,225	8,417	\$59,404	\$94,353	\$153,757	\$2.45
Total			62,694	10,225	8,417	\$59,404	\$94,353	\$153,757	\$2.45
Fishing - Bottom									
Charter	\$7.41	\$14.29	1,079	3,518	2,896	\$26,056	\$41,386	\$67,442	\$62.49
Party	\$8.19	\$15.81	1,233	1,539	1,267	\$12,608	\$20,026	\$32,634	\$26.46
Rental	\$5.81	\$11.21	4,152	880	724	\$5,110	\$8,116	\$13,226	\$3.19
Private	\$5.81	\$11.21	67,935	12,204	10,046	\$70,901	\$112,615	\$183,517	\$2.70
Total			74,400	18,142	14,933	\$114,676	\$182,144	\$296,819	\$3.99
Viewing									
Glass Bottom Boat	\$8.19	\$15.81	3,636	880	724	\$7,205	\$11,443	\$18,648	\$5.13
Total			3,636	880	724	\$7,205	\$11,443	\$18,648	\$5.13
All Activities - Boat Modes			478,395	101,813	83,803	684,429	1,039,894	\$1,724,324	\$3.60
All Fishing			277,349					923762.7668	\$3.33

Table A.3.2-35		
Annual User Value and Asset Value of the Reefs by Visitors to Southeast Florida, 2000-2001¹		
Reef Type/County	Annual User Value (millions \$)	Asset Value² (billions \$)
Natural Reefs	\$148.354	\$4.945
Palm Beach	\$25.920	\$0.864
Broward	\$63.699	\$2.123
Miami-Dade	\$23.015	\$0.767
Monroe	\$35.720	\$1.191
Artificial Reefs	\$70.101	\$2.337
Palm Beach	\$5.906	\$0.197
Broward	\$52.260	\$1.742
Miami-Dade	\$6.084	\$0.203
Monroe	\$5.851	\$0.195
Natural & Artificial Reefs	\$206.339	\$6.878
Palm Beach	\$21.032	\$0.701
Broward	\$113.982	\$3.799
Miami-Dade	\$32.652	\$1.088
Monroe	\$38.673	\$1.289
New Artificial Reefs	\$24.260	\$0.809
Palm Beach	\$3.964	\$0.132
Broward	\$14.944	\$0.498
Miami-Dade	\$3.627	\$0.121
Monroe	\$1.724	\$0.057
<p>1. Values based on estimated values from logit model.</p> <p>2. Asset Value is equal to the net present value of the flow of annual user value into perpetuity (indefinite future). Future dollars are converted to 2001 dollars using an interest (discount) rate of three (3) percent. This calculation assumes that the annual user value remains constant in the future (i.e, the amount of use remains constant and/or the value per unit of use remains constant in real terms-net of inflation). Thus, the asset values are considered "conservative" estimates.</p>		

Table A.3.2-36 (Visitors)					
Willingness to Pay for Natural Reefs in Southeast Florida: Natural Reef Users, Summer 2001 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$10	0.8366	0.1634	\$0	202
\$10	\$50	0.6441	0.1925	\$2	177
\$50	\$100	0.5068	0.1373	\$7	148
\$100	\$200	0.403	0.1038	\$10	134
\$200	\$500	0.1806	0.2224	\$44	144
\$500	\$1,000	0.1917	-0.0111	(\$6)	120
\$1,000	Infinity	0	0.1917	\$192	N/A
Total Use Value (Sum Column 5):				\$249.80	925

Table A.3.2-37 (Visitors)					
Willingness to Pay for Natural Reefs in Southeast Florida: Natural Reef Users, Winter 2001 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$10	0.9423	0.0577	\$0	208
\$10	\$50	0.6942	0.2481	\$2	206
\$50	\$100	0.6139	0.0803	\$4	202
\$100	\$200	0.5153	0.0986	\$10	196
\$200	\$500	0.2895	0.2258	\$45	190
\$500	\$1,000	0.1618	0.1277	\$64	173
\$1,000	Infinity	0	0.1618	\$162	N/A
Total Use Value (Sum Column 5):				\$287.17	1,175

Table A.3.2-38 (Visitors)					
Willingness to Pay for Artificial Reefs in Southeast Florida: Artificial Reef Users, Summer 2000 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$10	0.7355	0.2645	\$0	121
\$10	\$50	0.581	0.1545	\$2	105
\$50	\$100	0.3444	0.2366	\$12	90
\$100	\$200	0.2674	0.077	\$8	86
\$200	\$500	0.1047	0.1627	\$33	86
\$500	\$1,000	0.087	0.0177	\$9	69
\$1,000	Infinity	0	0.087	\$87	N/A
	Total Use Value (Sum Column 5):			\$149.47	557

Table A.3.2-39 (Visitors)					
Willingness to Pay for Artificial Reefs in Southeast Florida: Artificial Reef Users, Winter 2001 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$10	0.9079	0.0921	\$0	76
\$10	\$50	0.625	0.2829	\$3	64
\$50	\$100	0.5652	0.0598	\$3	69
\$100	\$200	0.3919	0.1733	\$17	74
\$200	\$500	0.3472	0.0447	\$9	72
\$500	\$1,000	0.1765	0.1707	\$85	51
\$1,000	Infinity	0	0.1765	\$177	N/A
Total Use Value (Sum Column 5):				\$293.94	406

Table A.3.2-40 (Visitors)					
Willingness to Pay for New Artificial Reefs in Southeast Florida: Artificial Reef Users, Summer 2000 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$5	0.735	0.265	\$0	117
\$5	\$10	0.7677	-0.0327	(\$0)	99
\$10	\$20	0.6923	0.0754	\$1	91
\$20	\$30	0.4578	0.2345	\$5	83
\$30	\$50	0.4118	0.046	\$1	85
\$50	\$100	0.33333	0.07847	\$4	72
\$100	Infinity	0	0.33333	\$33	N/A
Total Use Value (Sum Column 5):				\$43.92	547

Table A.3.2-41 (Visitors)					
Willingness to Pay for New Artificial Reefs in Southeast Florida: Artificial Reef Users, Winter 2001 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$5	0.9605	0.0395	\$0	76
\$5	\$10	0.7941	0.1664	\$1	68
\$10	\$20	0.7794	0.0147	\$0	68
\$20	\$30	0.5974	0.182	\$4	77
\$30	\$50	0.662	-0.0646	(\$2)	71
\$50	\$100	0.5472	0.1148	\$6	53
\$100	Infinity	0	0.5472	\$55	N/A
Total Use Value (Sum Column 5):				\$63.14	413

Table A.3.2-42 (Visitors)					
Willingness to Pay for Natural & Artificial Reefs in Southeast Florida: All Reef Users, Summer 2000 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$20	0.7155	0.2845	\$0	232
\$20	\$100	0.4483	0.2672	\$5	203
\$100	\$200	0.2928	0.1555	\$16	181
\$200	\$400	0.2264	0.0664	\$13	159
\$400	\$1,000	0.071	0.1554	\$62	169
\$1,000	\$2,000	0.1049	-0.0339	(\$34)	143
\$2,000	Infinity	0	0.1049	\$210	N/A
Total Use Value (Sum Column 5):				\$272.23	1,087

Table A.3.2-43 (Visitors)					
Willingness to Pay for Natural & Artificial Reefs in Southeast Florida: All Reef Users, Winter 2001 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$10	0.8254	0.1746	\$0	252
\$20	\$50	0.5081	0.3173	\$6	248
\$100	\$100	0.3852	0.1229	\$12	244
\$200	\$200	0.3333	0.0519	\$10	240
\$400	\$500	0.1525	0.1808	\$72	236
\$1,000	\$1,000	0.1147	0.0378	\$38	218
\$2,000	Infinity	0	0.1147	\$229	N/A
	Total Use Value (Sum Column 5):			\$368.54	1,438

Table A.3.2-44 (Visitors)					
Willingness to Pay for Natural Reefs in Southeast Florida: All Reef Users, Summer 2000 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$10	0.8333	0.1667	\$0	234
\$10	\$50	0.6089	0.2244	\$2	202
\$50	\$100	0.45	0.1589	\$8	180
\$100	\$200	0.354	0.096	\$10	161
\$200	\$500	0.1754	0.1786	\$36	171
\$500	\$1,000	0.1678	0.0076	\$4	143
\$1,000	Infinity	0	0.1678	\$168	N/A
	Total Use Value (Sum Column 5):			\$227.11	1,091

Table A.3.2-45 (Visitors)					
Willingness to Pay for Natural Reefs in Southeast Florida: All Reef Users, Winter 2001 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$10	0.9289	0.0711	\$0	253
\$10	\$50	0.6948	0.2341	\$2	249
\$50	\$100	0.6016	0.0932	\$5	246
\$100	\$200	0.5021	0.0995	\$10	241
\$200	\$500	0.2827	0.2194	\$44	237
\$500	\$1,000	0.1751	0.1076	\$54	217
\$1,000	Infinity	0	0.1751	\$175	N/A
	Total Use Value (Sum Column 5):			\$289.73	1,443

Table A.3.2-46 (Visitors)					
Willingness to Pay for Artificial Reefs in Southeast Florida: All Reef Users, Summer 2000 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$10	0.7393	0.2607	\$0	234
\$10	\$50	0.5268	0.2125	\$2	205
\$50	\$100	0.4066	0.1202	\$6	182
\$100	\$200	0.2883	0.1183	\$12	163
\$200	\$500	0.1337	0.1546	\$31	172
\$500	\$1,000	0.1042	0.0295	\$15	144
\$1,000	Infinity	0	0.1042	\$104	N/A
Total Use Value (Sum Column 5):				\$169.84	1,100

Table A.3.2-47 (Visitors)					
Willingness to Pay for Artificial Reefs in Southeast Florida: All Reef Users, Winter 2001 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$10	0.8617	0.1383	\$0	253
\$10	\$50	0.5645	0.2972	\$3	248
\$50	\$100	0.4756	0.0889	\$4	246
\$100	\$200	0.4274	0.0482	\$5	241
\$200	\$500	0.2383	0.1891	\$38	235
\$500	\$1,000	0.133	0.1053	\$53	218
\$1,000	Infinity	0	0.133	\$133	N/A
Total Use Value (Sum Column 5):				\$235.71	1,441

Table A.3.2-48 (Visitors)					
Willingness to Pay for New Artificial Reefs in Southeast Florida: All Reef Users, Summer 2000 Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$5	0.7665	0.2335	\$0	227
\$5	\$10	0.7551	0.0114	\$0	196
\$10	\$20	0.6614	0.0937	\$1	189
\$20	\$30	0.4872	0.1742	\$3	156
\$30	\$50	0.439	0.0482	\$1	164
\$50	\$100	0.3154	0.1236	\$6	149
\$100	Infinity	0	0.3154	\$32	N/A
	Total Use Value (Sum Column 5):			\$43.64	1,081

Table A.3.2-49 (Visitors)					
Willingness to Pay for New Artificial Reefs in Southeast Florida: All Reef Users, Winter 2001 - Turnbull Method (\$ Per Party Per Trip)					
Lower Bound for Interval	Upper Bound for Interval	Probability of Payment at Upper Bound	Change in Density of Distribution	Willingness to Pay (Use Value \$)	Sample Size
[1]	[2]	[3]	[4]	[5] = [1] * [4]	[6]
\$0	\$5	0.8972	0.1028	\$0	253
\$5	\$10	0.7826	0.1146	\$1	253
\$10	\$20	0.6872	0.0954	\$1	243
\$20	\$30	0.6286	0.0586	\$1	245
\$30	\$50	0.5783	0.0503	\$2	230
\$50	\$100	0.4299	0.1484	\$7	221
\$100	Infinity	0	0.4299	\$43	N/A
Total Use Value (Sum Column 5):				\$54.62	1,445

Table A.3.2-50 (Visitors)				
Summary of Willingness to Pay for Natural and Artificial Reefs in Southeast Florida: 2000-2001 - Turnbull Method (\$ Per Party Per Trip)				
Reef Type	Summer - All Reef Users	Winter - All Reef Users	Summer - Users Only¹	Winter - Users Only¹
1. Natural Reefs	\$227.11	\$289.73	\$249.80	\$287.17
2. Artificial Reefs	\$169.84	\$235.71	\$149.47	\$293.94
3. Natural & Artificial Reefs	\$272.23	\$368.54	\$272.23	\$368.54
4. New Artificial Reefs	\$43.64	\$54.62	\$43.92	\$63.14
Notes:				
1. "Users Only" means that the Natural Reef Valuation estimate was only based on the survey responses of the Natural Reef Users. For Artificial Reefs and New Artificial Reefs the values only include the survey responses of the Artificial Reef Users.				

Table A.3.2-51 (Visitors)			
Party Sizes by Type of Reef Use and Season			
Reef Type/Users/Season	N	Mean	Standard Error
All Reef Types - All Reef Users			
Summer	1,106	3.44	0.08
Winter	1,385	3.27	0.11
Natural Reefs - Users Only			
Summer	935	3.48	0.09
Winter	1,138	3.27	0.12
Artificial Reefs - Users Only			
Summer	557	3.22	0.11
Winter	386	3.33	0.23

Table A.3.2-52 (Visitors)			
Average Number of Annual Trips to Southeast Florida to Use the Reefs			
Reef Type/Users/Season	N	Mean	Standard Error
Summer - All Reef Users¹	1,044	5.91	0.65
Winter - All Reef Users¹	1,354	3.09	0.32
Summer - Users Only			
Artificial Reefs	562	7.69	1.15
Winter - Users Only			
Artificial Reefs	413	6.54	1.01
Notes			
1. For artificial reef users, the number of trips is equal to the number of trips to Southeast Florida to use the artificial reefs. For non artificial reef users, the number of trips is equal to their total trips.			

Table A.3.2-53

Calculation of Visitor Use Value for Reefs in Palm Beach County, 2000 - 2001: Turnbull Method

Activity-Boat Mode	Summer Person-Trips on Reefs	Winter Person-Trips on Reefs	Summer Value Per Person-Trip	Summer Total Value	Winter Value Per Person-Trip	Winter Total Value	Annual Value	Annual Person-Days	Value Per Person-day	Asset Value
Natural Reefs										
All Reef Users	299,522	323,115	\$66.02	\$19,774,547	\$88.60	\$28,628,779	\$48,403,326	1,260,787	\$38.39	\$1,613,444,214
Users Only	210,451	227,028	\$71.78	\$15,106,511	\$82.52	\$18,734,377	\$33,840,888	930,675	\$36.36	\$1,128,029,603
Artificial Reefs										
All Reef Users	299,522	323,115	\$49.37	\$14,788,028	\$72.08	\$23,290,959	\$38,078,987	1,260,787	\$30.20	\$1,269,299,576
Users Only	89,071	96,087	\$46.42	\$4,134,609	\$88.27	\$8,481,625	\$12,616,235	330,112	\$38.22	\$420,541,163
Nat & Art Reefs	299,522	323,115	\$79.14	\$23,703,161	\$112.70	\$36,416,147	\$60,119,308	1,260,787	\$47.68	\$2,003,976,950
New Artificial Reefs										
All Reef Users	299,522	323,115	\$2.15	\$642,936	\$5.41	\$1,746,637	\$2,389,572	1,260,787	\$1.90	\$79,652,414
Users Only	89,071	96,087	\$1.77	\$157,985	\$2.90	\$278,578	\$436,563	330,112	\$1.32	\$14,552,116

Table A.3.2-54

Calculation of Visitor Use Value for Reefs in Broward County, 2000 - 2001: Turnbull Method

Activity-Boat Mode	Summer Person-Trips on Reefs	Winter Person-Trips on Reefs	Summer Value Per Person-Trip	Summer Total Value	Winter Value Per Person-Trip	Winter Total Value	Annual Value	Annual Person-Days	Value Per Person-day	Asset Value
Natural Reefs										
All Reef Users	861,885	938,653	\$66.02	\$56,901,948	\$88.60	\$83,166,952	\$140,068,901	5,722,125	\$24.48	\$4,668,963,352
Users Only	448,304	490,275	\$71.78	\$32,179,983	\$82.52	\$40,457,549	\$72,637,532	3,027,210	\$23.99	\$2,421,251,063
Artificial Reefs										
All Reef Users	861,885	938,653	\$49.37	\$42,553,066	\$72.08	\$67,660,519	\$110,213,586	5,722,125	\$19.26	\$3,673,786,195
Users Only	413,581	448,378	\$46.42	\$19,198,122	\$88.27	\$39,578,447	\$58,776,569	2,694,915	\$21.81	\$1,959,218,967
Nat & Art Reefs	861,885	938,653	\$79.14	\$68,206,673	\$112.70	\$105,789,351	\$173,996,023	5,722,125	\$30.41	\$5,799,867,440
New Artificial Reefs										
All Reef Users	861,885	938,653	\$2.15	\$1,850,070	\$5.41	\$5,074,001	\$6,924,071	5,722,125	\$1.21	\$230,802,359
Users Only	413,581	448,378	\$1.77	\$733,569	\$2.90	\$1,299,951	\$2,033,519	2,694,915	\$0.75	\$67,783,976

Table A.3.2-55

Calculation of Visitor Use Value for Reefs in Miami-Dade County, 2000 - 2001: Turnbull Method

Activity-Boat Mode	Summer Person-Trips on Reefs	Winter Person-Trips on Reefs	Summer Value Per Person-Trip	Summer Total Value	Winter Value Per Person-Trip	Winter Total Value	Annual Value	Annual Person-Days	Value Per Person-day	Asset Value
Natural Reefs										
All Reef Users	1,682,421	701,764	\$66.02	\$111,074,021	\$88.60	\$62,178,007	\$173,252,029	4,660,392	\$37.18	\$5,775,067,619
Users Only	1,186,603	494,951	\$71.78	\$85,176,273	\$82.52	\$40,843,413	\$126,019,686	3,247,954	\$38.80	\$4,200,656,208
Artificial Reefs										
All Reef Users	1,682,421	701,764	\$49.37	\$83,064,646	\$72.08	\$50,584,952	\$133,649,598	4,660,392	\$28.68	\$4,454,986,598
Users Only	495,818	206,813	\$46.42	\$23,015,502	\$88.27	\$18,255,439	\$41,270,941	1,412,438	\$29.22	\$1,375,698,047
Nat & Art Reefs	1,682,421	701,764	\$79.14	\$133,141,125	\$112.70	\$79,091,163	\$212,232,288	4,660,392	\$45.54	\$7,074,409,604
New Artificial Reefs										
All Reef Users	1,682,421	701,764	\$2.15	\$3,611,383	\$5.41	\$3,793,469	\$7,404,852	4,660,392	\$1.59	\$246,828,389
Users Only	495,818	206,813	\$1.77	\$879,432	\$2.90	\$599,598	\$1,479,031	1,412,438	\$1.05	\$49,301,021

Table A.3.2-56

Calculation of Visitor Use Value for Reefs in Monroe County, 2000 - 2001: Turnbull Method

Activity-Boat Mode	Summer Person-Trips on Reefs	Winter Person-Trips on Reefs	Summer Value Per Person-Trip	Summer Total Value	Winter Value Per Person-Trip	Winter Total Value	Annual Value	Annual Person-Days	Value Per Person-day	Asset Value
Natural Reefs										
All Reef Users	450,077	370,462	\$66.02	\$29,714,241	\$88.60	\$32,823,840	\$62,538,080	2,076,862	\$30.11	\$2,084,602,669
Users Only	348,264	286,659	\$71.78	\$24,998,950	\$82.52	\$23,655,134	\$48,654,084	1,598,467	\$30.44	\$1,621,802,799
Artificial Reefs										
All Reef Users	450,077	370,462	\$49.37	\$22,221,244	\$72.08	\$26,703,853	\$48,925,096	2,076,862	\$23.56	\$1,630,836,537
Users Only	101,813	83,803	\$46.42	\$4,726,084	\$88.27	\$7,397,313	\$12,123,397	478,395	\$25.34	\$404,113,234
Nat & Art Reefs	450,077	370,462	\$79.14	\$35,617,576	\$112.70	\$41,752,314	\$77,369,890	2,076,862	\$37.25	\$2,578,996,323
New Artificial Reefs										
All Reef Users	450,077	370,462	\$2.15	\$966,108	\$5.41	\$2,002,577	\$2,968,684	2,076,862	\$1.43	\$98,956,149
Users Only	101,813	83,803	\$1.77	\$180,586	\$2.90	\$242,964	\$423,550	478,395	\$0.89	\$14,118,328

Table A.3.2-57 (Visitors)	
Reasons for Saying "NO" to Reef Valuation Questions	
Reef Type/Reason for Saying "NO" to Randomly Assigned Dollar Amount	Percent
Natural Reefs	
A. A contribution of that amount is more than natural reefs are worth to me.	36.6
B. I don't really know how much a natural reefs are worth to me.	10.9
C. There are no problems with water quality or the natural reefs.	1.2
D. Not enough information to form a decision.	19.5
E. I don't understand of like the question.	1.4
F. Already pay too much to the government.	14.0
G. Government waste should be reduced to pay for water quality protection and management of the natural reefs.	10.8
H. Other Reason	5.7
Artificial Reefs	
A. A contribution of that amount is more than artificial reefs are worth to me.	36.0
B. I don't really know how much a artificial reefs are worth to me.	11.4
C. Water quality is not a problem and artificial reefs don't need any management.	1.5
D. Not enough information to form a decision.	19.9
E. I don't understand of like the question.	1.4
F. Already pay too much to the government.	12.2
G. Government waste should be reduced to pay for water quality protection and management of the artificial reefs.	9.6
H. Other Reason	7.9
Natural & Artificial Reefs	
A. A contribution of that amount is more than the reefs are worth to me.	36.8
B. I don't really know how much the reefs are worth to me.	9.4
C. Water quality is not a problem and the reefs don't need any management.	1.3
D. Not enough information to form a decision.	19.6
E. I don't understand of like the question.	1.3
F. Already pay too much to the government.	13.9
G. Government waste should be reduced to pay for water quality protection and management of reefs.	9.7
H. Other Reason	8.0
New Artificial Reefs	
A. A contribution of that amount is more than a new artificial reef is worth to me.	23.9
B. I don't really know how much an artificial reef is worth to me.	9.4
C. There are enough artificial reefs already.	1.2
D. Not enough information to form a decision.	18.1
E. I don't understand of like the question.	1.6
F. The government should fund the artificial reef program out of general revenue and not a specific tax or fee.	17.1
G. Already pay too much to the government.	10.2
H. Government waste should be reduced to fund the artificial reef program.	10.7
I. Other reason.	7.9

Table A.3.2-58 (Visitors)		
Relationship Between Protestors/Scenario Rejection and Dollar Amounts		
	Percent	Sample
Reef Type/Dollar Amount	NO	Size
Natural Reefs		
\$10	9.57	491
\$50	23.46	456
\$100	32.48	431
\$200	34.96	409
\$500	45.74	411
\$1,000	45.36	366
Artificial Reefs		
\$10	16.29	491
\$50	31.36	456
\$100	38.75	431
\$200	39.36	409
\$500	48.42	411
\$1,000	48.09	366
Natural & Artificial Reefs		
\$20	18.33	491
\$100	35.53	456
\$200	43.85	431
\$400	43.28	409
\$1,000	50.61	411
\$2,000	47.54	366
New Artificial Reefs		
\$5	15.02	486
\$10	20.09	453
\$20	27.19	445
\$30	31.39	411
\$50	32.33	399
\$100	39.79	377

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