

Martin County, Florida



Socioeconomic Study of Reefs in Martin County, Florida

*Prepared by Hazen and Sawyer
for Martin County, Florida*

Final Report

July 21, 2004



40526c-01

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Kathy Fitzpatrick, P.E.
Coastal Engineer
MARTIN COUNTY
County Administrative Center
2401 S.E. Monterey Road
Stuart, Florida 34996

Socioeconomic Study of Reefs in Martin
County, Florida – Final Report

Dear Ms. Fitzpatrick:

We are pleased to submit 23 hard copies and 20 electronic copies of the final report titled, Socioeconomic Study of Reefs in Martin County, Florida. This report is the product of a significant survey research effort and analysis of the uses and values of the artificial and natural reefs in Martin County. This project's success was directly attributable to the assistance and support of many individuals involved in this 18-month long effort. The study provides estimates of the following values that represent the time period January 2003 through December 2003:

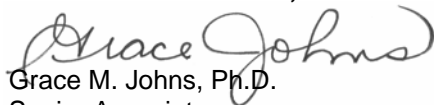
- Total reef use of residents and visitors in Martin County over a twelve-month period as measured in terms of person-days;
- Economic contribution of the artificial and natural reefs as residents and visitors spend money in Martin County to participate in reef-related recreation;
- Willingness of reef users to pay to maintain the artificial and natural reefs of Martin County, Florida in their existing conditions;
- Willingness of reef users to pay for additional artificial reefs in Martin County, Florida;
- Opinions of residents regarding "no take" zones on some natural reefs in the county; and,
- Socioeconomic characteristics of reef users.

Total sales, income, employment and tax revenues generated within Martin County measure economic contributions. Martin County, Florida and the Florida Fish and Wildlife Conservation Commission funded this study. This study followed the methodology used in the report titled, "Socioeconomic Study of Reefs in Southeast Florida", October 2001, prepared by Hazen and Sawyer in association with Florida State University and the National Oceanic and Atmospheric Administration for Broward County, Florida.

We enjoyed working with you on this interesting and important project.

Very truly yours,

HAZEN AND SAWYER, P.C.



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

Enclosure

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Acknowledgements

Socioeconomic Study of Reefs in Martin County, Florida, 2003

This project's success was directly attributable to the assistance and support of all those individuals involved in this 18-month long survey research effort.

Funding for this project was provided by Martin County and the Florida Fish and Wildlife Conservation Commission. The representatives of these agencies were key to the success of this project. They are Kathy Fitzpatrick, P.E., Coastal Engineer for Martin County and Jon Dodrill, Florida Fish and Wildlife Conservation Commission.

The principal investigators of this study were Grace Johns, Ph.D., economist at Hazen and Sawyer, who was project manager, and J. Walter Milon, Ph.D., economics professor at University of Central Florida, who conducted the statistical analysis of reef user values. Dave Sayers of Hazen and Sawyer led the data management effort.

We wish to thank Sandy Palmer of Rife Market Research for providing and supervising the survey researchers. These researchers worked with energy and in earnest, often in the hot sun, to conduct the visitor intercept interviews in Martin County. Without these individuals, the study of visitor reef users to Martin County would not have been possible. The survey researchers were Diana Sullivan, Helen Chabot, Billy James, Mike Sullivan, Bonnie Herrick, Darrell Leamy and Lydi Pallares. Diana Sullivan assisted Sandy in managing the visitor intercept surveys.

We also thank the business owners and managers who gave us permission to conduct the voluntary surveys of Martin County visitors on their properties and the residents and visitors who responded to the surveys. The participation of these businesses, residents and visitors was very important to the success of this study.

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Chapter 1: Introduction

This study estimated the net economic value of the natural and artificial reef resources of Martin County, Florida to the local economy and the reef users. 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 January 2003 to December 2003. 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 in glass-bottom boats.

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

- Total reef use of residents and visitors in Martin County over a twelve-month period as measured in terms of person-days;
- Economic contribution of the artificial and natural reefs as residents and visitors spend money in Martin County to participate in reef-related recreation;
- Willingness of reef users to pay to maintain the artificial and natural reefs of Martin County, Florida in their existing conditions;
- Willingness of reef users to pay for additional artificial reefs in Martin County, Florida;
- Opinions of residents regarding “no take” zones on some natural reefs in the county; and,
- Socioeconomic characteristics of reef users.

Total sales, income, employment and tax revenues generated within Martin County measure economic contributions. Martin County, Florida and the Florida Fish and Wildlife Conservation Commission funded this study. This study followed the methodology used in the report titled, “Socioeconomic Study of Reefs in Southeast Florida”, October 2001, prepared by Hazen and Sawyer in association with Florida State University and the National Oceanic and Atmospheric Administration for Broward County, Florida. That study was funded by Palm Beach, Broward, Miami-Dade and Monroe Counties, the Florida Fish and Wildlife Conservation Commission, and the National Oceanic and Atmospheric Administration.

1.1 Resident and Visitor Surveys

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 Martin County is considered a visitor to Martin County. Likewise, a person from New York visiting Martin County is considered a visitor. Residents are defined as persons living in Martin County who used the reefs on a private boat registered in Martin County. For example, a person who lives in Martin County and fishes for recreation on the reefs off the shores of Martin County using a private boat registered in Martin County is a resident of Martin County.

This study successfully conducted the following four surveys:

- Resident boater mail survey – was conducted in January 2004
- Visitor boater intercept survey – was conducted in the Winter of 2003 and the Summer of 2003
- General visitor intercept survey – was conducted in the Winter of 2003 and the Summer of 2003
- Recreation for-hire mail survey – was conducted in the Winter of 2003 and the Summer of 2003

The survey instruments are provided in Appendices A, B, C, and D.

Visitors are defined as nonresidents of the county that they are visiting. Residents are those who live within the county. The purpose of the resident boater survey and the visitor boater survey is to collect information to estimate the following characteristics:

- Percentage of boaters who fish, dive and / or snorkel on the reefs;
- Total and 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 Martin County reefs in their existing condition; and,
- Willingness-to-pay for additional reefs in Martin County.

The purpose of the general visitor survey is to obtain estimates of the total number of visitors to Martin County and the percentage of visitors who boat.

The recreation for-hire survey is a survey of for-hire charter and party boat operators that take out passengers for recreational fishing, snorkeling, and/or scuba diving in saltwater off the coast of Martin County. 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 versus no reefs in Martin County.

In addition, at the request of the county, the resident survey also included questions regarding “no-take” zones.

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

Definitions. Certain terminology was used in this report to represent units of recreational activity. These terms are person-trip and person-day. For visitors, a person-trip is defined as one person making one trip to a county. That trip may last one day to many days. On any given day, the number of visitor person-trips and the number of visitors are the same. For resident boaters,

a person-trip is one day's outing on a boat to participate in saltwater recreation activities. A person-day is defined as one person participating in an activity for a portion or all of a day.

Resident Boater Survey. The resident survey was a mail survey of registered boat owners in Martin County who own boats at least 16 feet in length. The size restriction was used to focus survey effort on owners of boats that were likely to be used for reef-related recreation. The boat length of 16 feet was also used in the Socioeconomic Study of Reefs in Southeast Florida prepared for Broward County, Florida dated October 2001. The resident survey instrument is provided in Appendix A of this report.

Boat owner information for Martin County was obtained from the Florida Department of Highway Safety and Motor Vehicles which provided information on registered boat owners in the county. Boater registration information includes owner's name and address and the length of the boat. The mailing list was created by selecting a random sample of boat owners with boats 16 feet or greater from the county's boater registration file.

During the period January 7, 2004 to January 9, 2004, the resident boater survey was mailed to 2,000 boat owners registered in Martin County. These boat owners were sampled from the 7,385 owners of boats at least 16 feet in length.¹ This length was chosen to better target those boat owners whose boats could reach the reefs and to exclude owners of small boats not likely to be used for reef-related recreation such as wave runners.

A total of 568 completed surveys were received for a response rate of 28 percent. Only 33 surveys were returned unopened because they were undeliverable (wrong address). Of the 568 completed surveys, 279 were completed by boaters who had used the Martin County reefs in the past 12 months (49 percent) and 289 were completed by boaters who had not used the reefs in the past 12 months (51 percent). Of the 279 completed surveys of Martin County reef users, 272 were filled out in a manner that could be used for the analysis. The responses to these surveys are the basis of the resident reef user activity, expenditures and use value estimates.

Visitor Boater Survey and General Visitor Survey. The visitor boater survey and the general visitor survey were intercept surveys where survey researchers canvas locations where visitors are likely to be. The researchers conducted voluntary in-person surveys at these locations. The general visitor survey targeted all visitors to Martin County. The visitor boater survey targeted visitors who participated in reef-related recreation in Martin County using a boat in the past twelve months. For visitor boaters, the intercept locations included marinas, charter/party boat operations, and hotels. For general visitors, the intercept locations were visitor attractions and hotels. The visitor must be leaving the county before noon the next day in order to participate in the survey. The surveys were conducted in the winter of 2003 and the summer of 2003 to adequately model the seasonality of visitation. The general visitor survey is presented in Appendix B of this report. The visitor boater survey is presented in Appendix C of this report.

¹ Names, addresses and boat length of registered boats are from the Florida Department of Motor Vehicle Registration Records, 2003.

A summary table of the number of completed general visitor and visitor boater surveys is provided in Table 1.1-1. A total of 479 general visitor surveys were completed and 522 visitor boater surveys were completed.

**Table 1.1-1
Summary of Completed Surveys (a)**

Survey Type	Winter 2003 (Feb. 15 to Apr. 18, 2003)	Summer 2003 (June 27 to Sept. 19, 2003)	Total
General Visitor	233	246	479
Visitor Boater	222	300	522
Total	455	546	1,001

(a) The number of completed surveys in Table 1 may be lower than indicated in the "Interviewed" column of Tables 2.1-1 and 2.1-2 (presented later in this memorandum) due to incomplete surveys that are counted in this table.

The summer general visitor survey tally by interview site is provided in Table 1.1-2. Of 951 persons intercepted, 246 were visitors who met the exit condition and agreed to be surveyed. The winter general visitor survey tally by interview site is provided in Table 1.1-3. Of 1,436 persons intercepted, 275 were visitors to Martin County who met the exit condition and agreed to be surveyed. The most likely places to find general visitors who met the survey conditions were Jensen Beach, Jonathan Dickinson State Park and Sand Sprit Park. Survey researchers were instructed not to conduct a general visitor survey after completing a visitor boater survey for the same person. This would defeat one of the purposes of the general visitor survey, which is to estimate the percent of general visitors who boat.

**Table 1.1-2
General Visitor Survey Tally by Interview Site - Summer 2003
Number of Persons**

Interview Site	Permanent Resident	Non-Exit Visitor	Refusal	Language Barrier	Interviewed	Total Contacted
Bathtub Reef	0	0	0	0	4	4
Boat US (Boat Sales)	6	1	0	0	6	13
Florida Oceanographic Center	81	24	3	0	20	128
Holiday Inn	14	13	6	1	30	64
Jensen Beach	51	14	2	2	67	136
Jonathan Dickinson State Park	49	11	9	3	82	154
Northside Marina	3	1	0	0	2	6
Pirates Cove	20	9	2	1	10	42
Sand Sprit Park	256	34	5	0	15	310
Stuart Causeway	67	17	0	0	10	94
Total	547	124	27	7	246	951

Table 1.1-3
General Visitor Survey Tally by Interview Site - Winter 2003
Number of Persons

Interview Site	Permanent Resident	Non-Exit Visitor	Refusal	Language Barrier	Interviewed	Total Contacted
Bathtub Reef	23	27	7	1	24	82
Causeway	0	0	1	0	0	1
Dela Bahia	0	0	0	0	1	1
Holiday Inn	3	8	0	1	2	14
Jensen Beach	222	225	11	9	100	567
Jonathan Dickinson State Park	16	17	5	1	26	65
Northside Marina	7	10	5	1	13	36
Old Town	31	17	0	2	4	54
Pirates Cove	51	67	7	0	27	152
Sand Sprit Park	100	117	5	0	57	279
Shepard's Park	6	4	0	0	0	10
Sundance & Jensen Beach	13	13	2	0	5	33
T.C. Mall	63	57	0	3	13	136
West Marine III	0	0	0	0	3	3
Unknown	1	2	0	0	0	3
Total	536	564	43	18	275	1,436

The summer visitor boater survey tally by interview site is provided in Table 1.1-4. Of 2,245 persons intercepted, 303 were visitors to Martin County who met the exit condition, used Martin County reefs sometime during the past 12 months and agreed to be surveyed. The winter visitor boater survey tally by interview site is provided in Table 1.1-5. Of 2,238 persons intercepted, 256 were visitors to Martin County who met the exit condition, used Martin County reefs sometime during the past 12 months and agreed to be surveyed. The most likely places to find visitor boaters who met the survey conditions were Sand Sprit Park, West Marine and Pirates Cove. After investigating all potential survey sites, Sand Sprit Park was, by far, the most popular location in Martin County for visitor boaters.

Table 1.1-4
Visitor Boater Survey Tally by Interview Site - Summer 2003
Number of Persons

Interview Site	Permanent Resident	Non Boating Ocean	Non Reef User	Non Exit Visitor	Refusal	Language Barrier	Interviewed	Total Contact
Bathtub Reef	3	2	0	0	1	0	2	8
Boat US (Boat Sales)	48	1	3	7	4	0	13	76
Chevron Gas Station	0	0	0	0	0	0	1	1
Deep Six	38	0	0	2	0	0	13	53
Jensen Beach	1	1	0	0	0	0	3	5
Jonathan Dickinson	2	3	0	9	2	0	1	17
Northside Marina	2	0	0	0	1	0	1	4
Pirates Cove	38	6	3	15	6	0	16	84
Sand Sprit Park	1,189	16	49	73	127	0	224	1,678
Stuart Causeway	10	0	0	0	1	0	1	12
West Marine	128	23	26	96	6	0	28	307
Total	1,459	52	81	202	148	0	303	2,245

Table 1.1-5
Visitor Boater Survey Tally by Interview Site - Winter 2003 – Number of Persons

Interview Site	Permanent Resident	Non Boating Ocean	Non Reef User	Non Exit Visitor	Refusal	Language Barrier	Interviewed	Total Contacted
DeLa Bahia	0	0	1	1	0	0	1	3
Jensen /Sundance	7	0	3	10	3	0	1	24
Jensen Causeway	115	0	1	59	1	3	16	195
Jonathan Dickinson State Park	3	16	6	12	3	1	1	42
Lady Stuart	11	0	0	8	0	1	1	21
North Shore Marina	28	0	0	16	2	1	6	53
Pirates Cove	84	55	39	96	10	0	32	316
Pirates Cove/Port Solerno	6	2	5	8	1	0	1	23
Sandsprit Park	578	6	61	6	3	0	106	760
Seven B	0	0	0	0	0	0	0	0
Shepherds Park	1	0	0	2	0	0	0	3
Snook Nook	2	0	0	2	0	0	0	4
Stuart Causeway	0	0	0	2	1	0	1	4
Sundance Beach	9	0	0	12	1	0	1	23
Sundance Marine	3	0	0	1	0	0	0	4
West Marine	271	73	85	228	17	0	89	763
Total	1,118	152	201	463	42	6	256	2,238

Recreational For-Hire Survey. In the winter and summer of 2003, a questionnaire was faxed or mailed to 14 charter/party boat operators who were believed to be operating in Martin County, Florida. Under a charter service, the boat owner / guide takes a group of six or fewer fishers (or divers/snorkelers) on a full- or half-day of fishing (or diving/snorkeling) trip for a fee. Under a party service, the boat owner/guide takes from seven to several dozen (or more) fishers (or divers/snorkelers) on a trip for a fee per person. The survey was conducted to fill in information gaps of survey respondents who do not know whether they have fished, dived or snorkeled on a reef, either artificial or natural. The questionnaire is provided in Appendix D. The results of the survey are provided in Table 1.1-6. Nine of the 14 operators surveyed completed and returned the survey. All were fishing charters or fishing party boat operators. One was also a dive/snorkel charter. As it turned out, this survey was not necessary because in most cases the survey researchers were able to ask the fishing captain of the respondent's charter where the respondent fished.

Table 1.1-6

**Percent of Recreational Fishing Passenger Days Spent on Reefs In Martin County - 2003
Recreational For-Hire Survey**

Item	Fishing	Dive/Snorkel
Sample Size – Number of Operators	9	1
Number of Boats	10	1
Total Passenger Days in Past 12 Months	1,103	100
Percent of Days Fished On -		
Artificial Reefs	31%	50%
Natural Reefs	30%	50%
No Reefs	39%	0%
Sum of Percentages	100%	100%

1.2 Summaries, Modeling, and Statistical Evaluation

The survey responses were used to estimate the economic and use values of the reefs. The types of reef-related recreation that were considered in the survey included the following saltwater recreational boating activities:

- fishing
- diving
- snorkeling

For visitors, each activity was tied to a boating mode. These boating modes were charter boats; party boats; rental boats; and own or private boat.

Three types of evaluations were conducted as follows.

Data Summaries. Summaries of the survey responses were used to describe the characteristics of reef users. These characteristics include median age, household income, length of boat and years boating; and whether or not the respondent is a member of a fishing or diving club.

Modeling. The survey responses and, for visitors, the Capacity Utilization Model (CAP) were used to calculate person-trips, person-days, and expenditures associated with reef-related activities in Martin County. The CAP is explained in more detail in Chapter 2.0.

For visitors, the number of person-trips to Martin County where the person participated in reef-related recreation was calculated. A person-trip is defined as one person making one trip to the county. That trip may last one day to many days. On any given day, the number of visitor person-trips and the number of visitors are the same. For resident boaters, a person-trip is one day's outing on a boat.

For both visitors and residents, the number of person-days was calculated by boating activity and boating mode (private boat, rental boat, charter boat, party boat). A person-day is defined as one person participating in an activity for a portion or all of a day.

For residents, the term "party-day" is used to convert the resident survey responses to person-days. A party-day is defined as one boat carrying one or more passengers for a day or partial day of reef-related recreation.

The total economic contribution of the reefs to Martin County is the contribution of reef-related expenditures to county sales, income and employment. "Sales" is defined as the value of the additional output produced in the county due to the reef-related expenditures. The total income contribution is defined as the sum of employee compensation, proprietor's income, interest, rents, and profits generated as a result of the reef-related expenditures. Income is the money that stays in the county's economy. The employment contribution is the number of full-time and part-time jobs created due to the reef-related expenditures. The indirect business tax contribution is the sum of the additional excise taxes, property taxes, fees, licenses, and sales taxes collected due to the reef-related expenditures. It excludes taxes on profit and income.

The average itemized expenditures per day while participating in each type of reef-related recreation activity were calculated from the resident boater and visitor boater survey responses. The type of expenditures included boat fuel, charter / party boat fees, lodging, food, gasoline, car rental, ramp and marina fees, bait, tackle, ice, equipment rental, and air refills. If the survey respondent participated in two reef-related boating recreation activities in one day, then the reported day's expenditures were halved for each activity. Total expenditures on reef-related recreation within the county was obtained by multiplying the average itemized expenditures per person-day for each activity and boat mode by the number of person-days associated with each activity and boat mode and summing over all the activities and boating modes.

The reef-related expenditures were always itemized in order to calculate the economic contribution of these expenditures. Economic contribution is the increase in sales, income,

employment and tax revenues generated within the county from reef-related expenditures. The magnitude of the economic contribution depends on the types of goods and services purchased.

Expenditures by visitors generate sales, income and jobs within the 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 sales, income and employment are created as the income earned by the reef-related industries and their employees is respent 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 county. Induced effects are created when the employees of the direct and indirect industries spend their money in the county.

For visitors, the direct, indirect and induced economic contribution of the reefs was estimated using the estimated reef-related expenditures and economic input-output models.

For residents, the expenditures were converted to sales, income and employment generated within the directly affected industries. The multiplier effect of reef-related spending by residents in the county was not estimated because this spending is also the result of multiplier effects from other economic activities within the county. The multiplier effect of resident spending on reef-related activities is attributed both to the reef system and to these other economic activities that generated the resident income used to purchase the reef-related goods and services. Thus, the economic importance of the reefs would be overstated if the multiplier effects were considered. To provide a conservative estimate of the economic contribution of resident use of the reef system, the multiplier effects were not included.

The economic contribution of reef-related expenditures was estimated using the IMPLAN Regional Economic Input-Output Model. This computer model simulates the supply of and demand for goods and services within a county or within groups of counties. It allows the user to estimate the extent to which new investments or increases in demand affect a region's economy in terms of sales, income and employment. IMPLAN stands for Impact Analysis for PLANning and was originally developed by the USDA Forest Service in cooperation with the Federal Emergency Management Agency and the USDI Bureau of Land Management to assist the Forest Service in land and resource management planning. The developers of this model formed the Minnesota IMPLAN Group in 1993 to privatize the development of IMPLAN data and software. The Martin County input-output data represents 2000 economic conditions. This was the most recent year available from the Minnesota IMPLAN Group.

Statistical Analysis. The user values of the natural and artificial reefs were estimated using the survey responses and statistical models. Three user values were defined as follows.

Existing Natural Reefs - The user value of natural reefs was defined in this study as the maximum amount of additional money a person would be willing to give up per trip to Martin County, Florida to use the natural reefs. This amount is over and above the respondent's

expenditures the last time he/she used the natural reefs in Martin County. This money would be used to ensure that Martin County's natural reef system was maintained in its existing condition.

Existing Artificial Reefs - The user value of existing artificial reefs was defined in this study as the maximum amount of money a person would be willing to give up per trip to Martin County, Florida to use the artificial reefs. This amount is over and above the respondent's expenditures the last time he/she used the artificial reefs in Martin County. This money would be used to ensure that Martin County's artificial reef system was maintained in its existing condition.

New Artificial Reefs with Maintenance - The user value of new artificial reefs was defined in this study as the maximum amount of additional money a person would be willing to give up per year to fund a construction and maintenance program for new artificial reefs in Martin County. Artificial reefs would be constructed and maintained using this fund.

Separate statistical evaluations were used to estimate resident values and visitor values. The estimated user values per trip were converted to user value per person-day and multiplied by the number of person-days associated with artificial and natural reefs.

1.3 Report Organization

This report begins with an Executive Summary and this Introduction, which is Chapter 1. Chapter 2 presents the methods and results of Martin County reef use and the contribution of the reefs to the economy of Martin County. Chapter 3.0 presents the use value of Martin County's reefs. Chapter 4.0 presents the project summary and conclusions. Chapter 5.0 is the bibliography. The appendices provide the survey instruments used in this study.

Chapter 2: Reef Use and Economic Contribution

This chapter describes the uses and economic contribution of artificial and natural reefs in Martin County, Florida to residents and visitors during 2003. This chapter discusses the following topics.

- Volume of user activity on both artificial and natural reefs off Martin County;
- Economic contribution of artificial and natural reefs to the county's economy; and,
- Demographic and boater profile of reef users in Martin County.

For residents, their opinions regarding the existence of “no-take” zones as a tool to protect existing artificial and natural reefs are provided.

2.1 Residents

This section presents the estimated socioeconomic values associated with resident boater use of the reefs off the coast of Martin County. Resident boaters are those individuals who live within Martin County and who use a boat that is owned by a resident of the county to visit the reef system. Resident boats used to visit the reef system are defined as those greater than 16 feet in length and registered with the Florida Department of Highway Safety and Motor Vehicles.

2.1.1 User Activity - Residents

There are two measures of recreational user activity associated with reefs: the party day and the person day. The number of boating trips that individuals take to spend part or a full day visiting the reef system is usually called “party-days” since each boat carries one or more individuals called a party. Party-days are measured in this analysis because the party is the principal spending unit. When the average number of party days is multiplied by the average number of individuals in a party, the number of “person-days” is obtained. This measure of boating activity is important because it reflects the number of people using the reefs and the intensity of reef use. Person-days are of particular significance when estimating the “use value” of the reef system. Both measures of user activity were estimated and are discussed below.

To measure user activity associated with the reef system, the number of party-days and person-days spent on artificial and natural reefs off the coast of Martin County were estimated. Most residents use their own boats to facilitate this recreational pursuit. The use of party boats and charter rentals by residents was not estimated. In 2003, there were 7,385 registered pleasure boats in Martin County at least 16 feet in length according to the Florida Department of Highway Safety and Motor Vehicles (October 2003). A random sample of the owners of these boats was selected and the owners were mailed a survey to be completed. Boats less than 16 feet were excluded to eliminate boats that are not used on reefs such as wave runners and boats too small to reach the reefs.

Not everyone with a relatively large boat used an artificial and/or natural reef in the past twelve months. In fact, the survey results indicated that 49 percent of these larger vessels used the Martin County reef system in the last 12 months or 3,619 pleasure craft. Finally, about four percent of registered boats in the target population had a residence somewhere outside of Martin County, which further reduced the target population of resident boats to 3,461 pleasure craft.

On average, the respondents to the mail survey indicated that over a 12-month period (2003) they and their party used the reef system 30.66 days. While using the reef system, respondents indicated they were involved with three main recreational activities - fishing, snorkeling, and scuba diving. Based upon this information, it was estimated that during this 12-month period (i.e., 2003) 106,116 “party-days” were spent on the reef system (30.66 party days times 3,461 pleasure craft). This calculation is provided in Table 2.1-1.

**Table 2.1-1 (Residents)
Resident Party Days Using Reefs in Martin County, 2003**

Row No.	Item	Value
(1)	Registered Boats in Martin County at least 16 feet in length (a)	7,385
(2)	Proportion of Martin Co. Registered Boat Owners who used Martin Co.'s Reefs in Past Year (b)	0.49
(3)	Proportion of Martin Co. Registered Boat Owners who Live in Martin County (a)	0.96
(4)	Total Number of Martin County Resident Registered Boat Owners Who Used Martin Co. Reefs in Past Year (4) = (1) x (2) x (3)	3,461
(5)	Number of Days Reefs Used for Recreation Per Resident Boat Owner in Past Year (Party Days) (c)	30.66
(6)	Resident Party Days - Total Days Spent By Resident Boat Owners Using the Reefs of Martin County (Party Days) (6) = (4) x (5)	106,116

(a) From Florida Department of Highway Safety and Motor Vehicles database of registered boats in Martin County.

(b) From responses to Resident Boater Survey, Question 2: While saltwater boating in Martin County over the past 12 months, did you use the artificial or natural reefs for any recreation activities such as fishing, diving or snorkeling. The number of yeses was 279. The number of no's was 289.

(c) From responses to Resident Boater Survey. Total days spent on reefs by respondents divided by number of respondents (8,340/272 = 30.66)

In conducting the mail survey of resident boaters, reef-users were asked to distribute their 30.66 reef using party-days among three activities, (1) fishing, (2) snorkeling and (3) scuba diving, and between artificial and natural reefs. The resident responses are summarized in Table 2.1-2. In 2003, the 272 respondents spent 6,789 days fishing, 805 days snorkeling and 746 days scuba diving on the reefs of Martin County. Thus, the average number of days fished on reefs per resident reef user was 24.96. The average number of days that residents went snorkeling on the

2.0 Reef Use and Economic Contribution

reefs was 2.96 per resident reef user. The average number of days that residents went scuba diving on the reefs was 2.74 per resident reef user.

For each of these three activities, the respondents indicated how many days they spent on artificial reefs only, natural reefs only, and both artificial and natural reefs on the same day. One half of the days spent on both artificial and natural reefs on the same day was added to the days spent on natural reefs and the other half was added to the days spent on artificial reefs. This was done because the survey responses indicated that the time split between artificial and natural reefs was about even. The results for the respondents are provided in Rows (5) and (6) of Table 2.1-2. Of the 6,789 days spent fishing on reefs, 44 percent of these days were spent on artificial reefs and 56 percent were spent on natural reefs. Of the 805 days spent snorkeling on the reefs, 14 percent were spent on artificial reefs and 86 percent were spent on natural reefs. Of the 746 days spent scuba diving on reefs, 32 percent were spent on artificial reefs and 68 percent were spent on natural reefs.

Table 2.1-2 (Residents)
Respondent Person Days Spent on Martin County Reefs in 2003 by Activity and Reef Type, Responses to Resident Boater Survey

Row No.	Item	Fishing	Snorkeling	Scuba Diving	Total
(1)	Total Days Spent on Reefs, All Respondents	6,789	805	746	8,340
(2)	Number of Respondents	272	272	272	272
(3)	Average Days Spent On Reefs, (3) = (1) / (2)	24.96	2.96	2.74	30.66
(4)	Percent of Total Days By Activity, (4) = (1:activity) / (1:total)	81%	10%	9%	100%
(5)	Days on Artificial Reefs	3,004	115	242	0
(6)	Days on Natural Reefs	3,785	691	505	0
(7)	Total	6,789	805	746	0
(8)	Percent Artificial Reefs	44%	14%	32%	
(9)	Percent Natural Reefs	56%	86%	68%	
(10)	Percent All Reefs	100%	100%	100%	

The resident responses were used to estimate the total party days residents spent using reefs in Martin County in 2003. The proportions of these days spent fishing, snorkeling and scuba diving are calculated in Row (4) of Table 2.1-2 and are repeated in Row (2) of Table 2.1-3. These proportions were applied to the 106,116 total party days residents spent using the reefs of Martin County. Thus, of the 106,116 total party days, 86,832 party days were spent fishing the reefs; 10,243 party days were spent snorkeling the reefs and 9,492 party days were spent scuba diving the reefs of Martin County. These days were further divided into days on artificial reefs and days on natural reefs using the proportions in Rows (8) and (9) of Table 2.1-2. These Rows are repeated in Rows (4) and (5) of Table 2.1-3. These proportions were applied to the numbers of party days spent fishing, snorkeling and scuba diving and the results are presented in Rows (6)

and (7) of Table 2.1-3. For all three activities, 42,752 party days were spent on artificial reefs and 63,364 party days were spent on natural reefs.

Table 2.1-3 (Residents)
Resident Party Days Using Martin County Reefs in 2003 By Activity and Reef Type

Row No.	Item	Fishing	Snorkeling	Scuba Diving	Total
(1)	Total Party Days, Martin Co. Residents:				106,116
(2)	Proportion of Party Days Spent:	0.81	0.10	0.09	1.00
(3)	Number of Party Days by Activity, (3) = (1) x (2)	86,382	10,243	9,492	106,116
	Proportion of Party Days Spent Using:				
(4)	Artificial Reefs	0.44	0.14	0.32	
(5)	Natural Reefs	0.56	0.86	0.68	
	Number of Party Days Spent Using:				
(6)	Artificial Reefs, (6) = (3) x (4)	38,222	1,457	3,073	42,752
(7)	Natural Reefs, (7) = (3) x (5)	48,160	8,786	6,419	63,364
(8)	Total, (8) = (6) + (7)	86,382	10,243	9,492	106,116

Table 2.1-4 shows the final distribution of party-days and the derivation of person-days. Of all party days spent on the reefs, fishing comprised 81 percent followed by snorkeling (10 percent) and scuba diving (9 percent). For all the recreational activities on reefs, 60 percent of the party-days were spent on natural reefs and 40 percent were spent on artificial reefs. The strongest intensity of natural reef use was found among those who snorkeled with 86 percent of the party-days spent at natural reefs.

Multiplying the average number of residents in the party by the number of party-days spent on the reef, as summarized in Table 2.1-4, resulted in the number of person-days. A person-day is one person participating in an activity for all or part of one day. The resident party size is 3.34 residents per party for fishing, 3.0 residents per party for snorkeling, and 3.58 residents per party for scuba diving. The total number of person-days spent on the reefs in Martin County was estimated to be about 353,270 in 2003 with 143,059 person-days spent on artificial reefs and 210,211 person-days spent on natural reefs. The number of person-days spent fishing on reefs was 288,601. The number of person-days spent snorkeling on reefs was 30,728 and the number of person-days spent scuba diving on reefs was 33,941.

Table 2.1-4 (Residents)
Estimated Resident User Activity As Measured by Party-Days and Person-Days on
Artificial and Natural Reefs off Martin County, Florida, 2003

Activity/ Type Of Reef	Number and Distribution of Party-Days by Activity and Reef Type (a)			Number and Distribution of Person-Days by Activity and Reef Type			
	Number of Party-Days	Percentage of Party-Days per Activity by Reef Type	Percentage of Total Party- Days per Activity	Resident Party-Size by Activity (b)	Number of Resident Person- Days by Activity by Reef Type (c)	Percentage of Person-Days per Activity by Reef Type	Percentage of Total Person-Days per Activity
Fishing			81.4%	3.34			81.7%
Artificial	38,222	44%			127,700	44%	
Natural	48,160	56%			160,901	56%	
Subtotal	86,382	100%			288,601	100%	
Snorkeling			9.7%	3.00			8.7%
Artificial	1,457	14%			4,371	14%	
Natural	8,786	86%			26,357	86%	
Subtotal	10,243	100%			30,728	100%	
Scuba Diving			8.9%	3.58			9.6%
Artificial	3,073	32%			10,988	32%	
Natural	6,419	68%			22,953	68%	
Subtotal	9,492	100%			33,941	100%	
All Activities							
Artificial	42,752	40%			143,059	40%	
Natural	63,364	60%			210,211	60%	
Total	106,116	100%	100.0%		353,270	100%	100.0%

(a) A party day is one boat carrying one or more passengers for a day or a partial day of reef-related recreation.

(b) Party size is number of persons in the boat. It was determined from the answers to Question 8 (plus 1) for each respondent who participated in activity divided by the number of respondents who participated in the activity. Question 8 asked "How many other people living in Martin County went with you on your last trip to go: saltwater fishing; snorkeling; scuba diving?"

(c) Resident person-days was calculated by multiplying the number of party-days by the average resident party size.

2.1.2 Economic Contribution - Residents

This section presents the economic contribution of Martin County's reefs as residents use the reefs for fishing, snorkeling and scuba diving. Economic contribution is measured in terms of the impact of reef-related expenditures on sales, income and employment in the county. The method of estimating economic contribution for residents is different than that used for visitors. The difference in methods depends on whether the money used to pay for reef-related expenditures is earned inside the county or outside the county. Sales, income and employment are generated within the county as goods and services are sold to those who live outside the county. These sales are called exports. Examples of export goods and services include agricultural commodities, seafood, computer goods, brokerage services, and automobiles. People who visit Martin County and spend money in the county will create sales, income and jobs in the county. Retirees who move to the county and bring their life savings with them to spend in the county will expand the county's economy.

When visitors spend money in Martin County for reef-related recreation, sales, income and employment within the county are created as they spend money on boat fuel, bait and tackle, equipment rentals, lodging and food. These industries are called direct industries. Because this money has entered the economy as visitors use the reefs, these expenditures create multiplier effects wherein additional sales, income and employment are created as the income earned by the reef-related industries and their employees 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 county. Induced effects are created when the employees of the direct and indirect industries spend their money in the county.

Local spending on reef-related recreation is somewhat different in that it is a result of the sales exports from many local industries, not just the reef industry. As money circulates through the local economy, local residents receive income from this flow and use it to purchase goods and services such as boats, supplies, food, and fuel. Although resident spending on reef-related boating does not create multiplier effects that can be directly tied to the reefs, the existence of the reefs does keep money in the local economy. If the reef system did not exist off the coast of a particular county, residents may go elsewhere and spend their income. Generally, the more money kept in the local economy, the greater will be the multiplier effect of many local exports. In effect, reef-related spending by residents keeps the sales, income and employment in the home economy rather than exiting the economy as residents go elsewhere to recreate.

The multiplier effect of resident spending on reef-related activities is attributed both to the reef system and to these other economic activities that generated the resident income used to purchase the reef-related goods and services. Thus, the economic importance of the reefs would be overstated if the multiplier effects were considered. To provide a conservative estimate of the economic contribution of resident use of the reef system, the multiplier effects were not included.

To estimate the economic contribution of reef-user spending on the Martin County economy, the respondents were asked to estimate party spending during their last boating trip to visit the reef system. The respondents were asked to enter the expenditures that were made in Martin County

only. It was assumed that each boating trip would involve only one day since the residents are in their own county.

The itemized average expenditures per party-day and per person-day by recreational activity are provided in Table 2.1-5. Resident fishers using the county's reefs spent the most per day while resident snorkelers spent the least per day. Expenditures for fuel, tackle and bait made fishing a more expensive recreational activity than snorkeling. Marina slip rental and dockage fees were also higher for fishing. Total expenditures per party day were \$164 for fishing, \$54 for snorkeling and \$85 for scuba diving. From one half to one third of the expenditures were for boat oil and gas, depending on the activity.

To obtain the total 2003 itemized resident reef-related expenditures in Martin County, the average itemized expenditures provided by the respondents were multiplied by the proportion of the party size comprised of residents. This proportion is 0.76 for fishing, 0.84 for snorkeling, and 0.83 for scuba diving. Then the result was multiplied by the number of party days spent using artificial reefs and the number of party days spent using natural reefs, by recreation activity.

Total 2003 itemized expenditures for each activity and in total are provided in Tables 2.1-6 through 2.1-9 for fishing, snorkeling, scuba diving and all activities, respectively. Within each table, the expenditures are provided separately for artificial reefs and natural reefs. Recreational fishing on Martin County reefs generated \$10,800,000 in expenditures within the county. About 40 percent of these expenditures were for boat oil and gas. Snorkeling on Martin County reefs generated about \$465,000 in expenditures within the county of which one-half was spent on boat oil and gas. Scuba diving on Martin County reefs generated about \$672,000 in expenditures within the county of which about one-half was spent on boat oil and gas. For all activities, as indicated in Table 2.1-9, the use of artificial reefs generated within county expenditures of \$5,071,000 while the use of natural reefs generated \$6,886,000 in expenditures within the county. Total 2003 reef-related expenditures were \$12,000,000.

Table 2.1-5 (Residents)
Resident Expenditures Per Party Day and Per Person Day on Most Recent Day Participating in Activity - 2003
Martin County, Florida

Item	Expenditures in County Per Party Day (a)			Expenditures in County Per Person Day (b)		
	Fishing	Snorkeling	Scuba Diving	Fishing	Snorkeling	Scuba Diving
Boat Oil and Gas	\$67.04	\$28.03	\$43.80	\$19.41	\$15.26	\$19.15
Bait	\$15.22	\$0.00	\$0.00	\$4.41	\$0.00	\$0.00
Tackle	\$14.46	\$0.65	\$3.33	\$4.19	\$0.36	\$1.46
Ice	\$4.47	\$2.76	\$3.09	\$1.29	\$1.50	\$1.35
Food and Beverages from Stores	\$16.96	\$10.13	\$12.03	\$4.91	\$5.51	\$5.26
Food and Beverages from Restaurant / Bars	\$10.05	\$5.63	\$6.12	\$2.91	\$3.06	\$2.68
Gas for Auto	\$3.86	\$2.36	\$2.97	\$1.12	\$1.28	\$1.30
Boat Ramp & Parking Fees	\$0.06	\$0.06	\$0.06	\$0.02	\$0.03	\$0.03
Marina Slip Rental & Dockage Fees	\$11.08	\$0.34	\$0.35	\$3.21	\$0.18	\$0.15
Equipment Rental	\$10.18	\$0.12	\$4.52	\$2.95	\$0.06	\$1.97
Sundries (sun screen, etc.)	\$3.39	\$2.45	\$2.64	\$0.98	\$1.33	\$1.15
Any other items not mentioned above	\$7.05	\$1.79	\$6.03	\$2.04	\$0.97	\$2.64
Total	\$163.83	\$54.29	\$84.94	\$47.43	\$29.56	\$37.13
Number of Respondents	261	104	66	261	104	66
Number of Respondents and Party Members	902	191	151	902	191	151

(a) Expenditures per party per day were estimated from the responses to question 10 of the Resident Boater Survey. For each activity, the day's expenditures for each item were summed over all the respondents who participated in the Activity. This sum was divided by the total number of respondents who participated in the activity. This provides the expenditures per party day.

(b) Expenditures per person per day were estimated from the responses to question 10 of the Resident Boater Survey. For each activity, the day's expenditures for each item were summed over all the respondents who participated in the Activity. This sum was divided by the total number of persons who benefited from the expenditures as indicated in question 10.

Table 2.1-6 (Residents)
Total Resident Expenditures In Martin County Associated with Reef Use
When Fishing (a)

Item	Artificial Reef	Natural Reef	All Reefs
Total Number of Party Days	38,222	48,160	86,382
Proportion of Party Members Who Live in County (b)	0.76	0.76	0.76
Boat Oil and Gas	\$1,959,286	\$2,468,674	\$4,427,960
Bait	\$444,908	\$560,578	\$1,005,486
Tackle	\$422,458	\$532,292	\$954,750
Ice	\$130,574	\$164,521	\$295,094
Food and Beverages from Stores	\$495,574	\$624,416	\$1,119,990
Food and Beverages from Restaurant / Bars	\$293,806	\$370,192	\$663,998
Gas for Auto	\$112,753	\$142,067	\$254,819
Boat Ramp & Parking Fees	\$1,680	\$2,116	\$3,796
Marina Slip Rental & Dockage Fees	\$323,823	\$408,012	\$731,835
Equipment Rental	\$297,613	\$374,988	\$672,602
Sundries (sun screen, etc.)	\$99,126	\$124,897	\$224,023
Any other items not mentioned above	\$206,135	\$259,727	\$465,861
Total	\$4,787,734	\$6,032,481	\$10,820,215

(a) Itemized Expenditures per Party Day times Number of Party Days in Activity.

(b) From responses to question 8 and question 9 of Resident Boater Survey.

**Table 2.1-7 (Residents)
Total Resident Expenditures In Martin County Associated with Reef Use
When Snorkeling (a)**

Item	Artificial Reef	Natural Reef	All Reefs
Total Number of Party Days	1,457	8,786	10,243
Proportion of Party Members Who Live in County (b)	0.84	0.84	0.84
Boat Oil and Gas	\$34,156	\$205,983	\$240,139
Bait	\$0	\$0	\$0
Tackle	\$797	\$4,805	\$5,602
Ice	\$3,366	\$20,301	\$23,667
Food and Beverages from Stores	\$12,339	\$74,408	\$86,747
Food and Beverages from Restaurant / Bars	\$6,855	\$41,338	\$48,193
Gas for Auto	\$2,871	\$17,312	\$20,183
Boat Ramp & Parking Fees	\$70	\$424	\$494
Marina Slip Rental & Dockage Fees	\$410	\$2,473	\$2,883
Equipment Rental	\$141	\$848	\$989
Sundries (sun screen, etc.)	\$2,980	\$17,970	\$20,949
Any other items not mentioned above	\$2,179	\$13,143	\$15,323
Total	\$66,164	\$399,005	\$465,169

(a) Itemized Expenditures per Party Day times Number of Party Days in Activity.

(b) From responses to question 8 and question 9 of Resident Boater Survey.

Table 2.1-8 (Residents)
Total Resident Expenditures In Martin County Associated with Reef Use
When Scuba Diving (a)

Item	Artificial Reef	Natural Reef	All Reefs
Total Number of Party Days	3,073	6,419	9,492
Proportion of Party Members Who Live in County (b)	0.83	0.83	0.83
Boat Oil and Gas	\$112,244	\$234,481	\$346,725
Bait	\$0	\$0	\$0
Tackle	\$8,542	\$17,844	\$26,385
Ice	\$7,920	\$16,546	\$24,466
Food and Beverages from Stores	\$30,827	\$64,399	\$95,226
Food and Beverages from Restaurant / Bars	\$15,685	\$32,767	\$48,453
Gas for Auto	\$7,610	\$15,897	\$23,507
Boat Ramp & Parking Fees	\$155	\$324	\$480
Marina Slip Rental & Dockage Fees	\$893	\$1,865	\$2,758
Equipment Rental	\$11,570	\$24,170	\$35,740
Sundries (sun screen, etc.)	\$6,756	\$14,113	\$20,868
Any other items not mentioned above	\$15,452	\$32,281	\$47,733
Total	\$217,655	\$454,687	\$672,342

(a) Itemized Expenditures per Party Day times Number of Party Days in Activity.

(b) From responses to question 8 and question 9 of Resident Boater Survey.

Table 2.1-9 (Residents)
Total Resident Expenditures In Martin County Associated with Reef Use
When Participating in All Reef-Related Activities

Item	Artificial Reef	Natural Reef	Total
Total Number of Person Days	42,752	63,364	106,116
Boat Oil and Gas	\$2,105,686	\$2,909,138	\$5,014,824
Bait	\$444,908	\$560,578	\$1,005,486
Tackle	\$431,797	\$554,940	\$986,737
Ice	\$141,860	\$201,368	\$343,228
Food and Beverages from Stores	\$538,740	\$763,224	\$1,301,963
Food and Beverages from Restaurant/Bar	\$316,346	\$444,297	\$760,643
Gas for Auto	\$123,233	\$175,276	\$298,509
Boat Ramp & Parking Fees	\$1,905	\$2,865	\$4,770
Marina Slip Rental & Dockage Fees	\$325,126	\$412,351	\$737,477
Equipment Rental	\$309,324	\$400,006	\$709,330
Sundries (sun screen, etc.)	\$108,861	\$156,980	\$265,841
Any other items not mentioned above	\$223,766	\$305,151	\$528,917
Total	\$5,071,553	\$6,886,173	\$11,957,726

The IMPLAN Model was used to convert these expenditures into estimates of direct sales, income and employment generated within Martin County. The itemized expenditures were matched to industries that are included in the model as summarized in Table 2.1-10. Then the IMPLAN model was used to convert these itemized expenditures into direct sales, income and employment generated in the county.

Table 2.1-10 (Residents)
Itemization of Resident Reef-Related Expenditures Applied to IMPLAN Model Sectors

Expenditure Item	Artificial Reef	Natural Reef	Total	IMPLAN Sector
Bait, Tackle, Ice, Ramp Fees, Marina Fees	\$1,345,596	\$1,732,102	\$3,077,697	436 Transportation - Water
Food and Beverages - Stores	538,740	763,224	\$1,301,963	450 Food Stores
Auto Gas, Boat Fuel	2,228,920	3,084,414	\$5,313,334	451 Auto Service Stations
Food and Beverages - Restaurants/Bars	316,346	444,297	\$760,643	454 Eating and Drinking
Shopping	332,628	462,130	\$794,758	455 Miscellaneous Retail
Charter/Party Boat Fee, Boat Rental, Air, Equip.	309,324	400,006	\$709,330	488 Amusement and Recreational Services
Total	\$5,071,553	\$6,886,173	\$11,957,726	

The economic contribution of Martin County reefs as residents spend money to use the reefs are provided in Table 2.1-11. The sales contribution is defined as the value of the additional output produced in the county due to the reef-related expenditures. The total income contribution is defined as the sum of employee compensation, proprietor's income, interest, rents, and profits generated as a result of the reef-related expenditures. Income is the money that stays in the county's economy. The employment contribution is the number of full-time and part-time jobs created due to the reef-related expenditures. The indirect business tax contribution is the sum of the additional excise taxes, property taxes, fees, licenses, and sales taxes collected due to the reef-related expenditures. It excludes taxes on profit and income.

In 2003, resident spending for reef-related recreation generated \$6.3 million in sales, \$2.6 million in income and 85 jobs in Martin County. Artificial reef use generated 43 percent of this income and 42 percent of the employment while natural reef use generated 57 percent of the income and 58 percent of the employment. Resident reef use generated \$430,000 in indirect business taxes, of which 42 percent was provided from artificial reef use and 58 percent was provided from natural reef use.

Table 2.1-11 (Residents)

**Economic Contribution of Resident Reef-Related Expenditures to Martin County, Florida
January 2003 to December 2003 - Sales, Income, Employment and Indirect Business Taxes
In 2003 \$**

Reef Type / Economic Contribution Type	Artificial Reefs	Natural Reefs	Total
Person Days	143,059	210,211	353,270
Sales	\$2,709,053	\$3,602,677	\$6,311,729
Total Income (a)	\$1,120,305	\$1,509,372	\$2,629,677
Employment (b)	36	49	85
Indirect Business Taxes (c)	\$181,632	248,230	\$429,862

(a) Sales is the value of the additional output produced in the county due to the reef-related expenditures.

(b) Total income is sum of wages, salaries, proprietor's income, profits, rents, royalties & dividends.

(c) Employment includes full-time and part-time jobs.

(d) Indirect business taxes include excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses and excludes taxes on profit and income.

A breakdown of the expenditures, income, employment and indirect business taxes by industry type is provided in Table 2.1-12. Reef-related resident spending at amusement and recreation service establishments and in eating and drinking establishments created proportionately more employment and income than purchasing fuel at service stations. This is because eating and drinking establishments are more labor intensive and more of the sales remain within the county. For example, service stations must purchase the fuel from outside the county.

Table 2.1-12 (Residents)

**Income Generated in Martin County from Resident Reef-Related Expenditures By
Industry in 2003, 2003 Dollars**

Industry (IMPLAN)	Expenditures	Income	Employment	Indirect Business Taxes
Water Transportation (436)	\$3,077,697	\$753,836	12.79	\$67,031
Food Stores (450)	\$1,301,963	\$260,275	10.91	\$55,455
Automotive Dealers & Service Stations (451)	\$5,313,334	\$693,252	13.61	\$179,726
Eating & Drinking (454)	\$760,643	\$356,812	19.38	\$49,792
Miscellaneous Retail (455)	\$794,758	\$158,241	6.79	\$38,501
Amusement and Recreation Services (488) (a)	\$709,330	\$406,389	21.81	\$39,357
Other State and Local Govt Enterprises (512)	\$0	\$873	0.01	\$0
Total	\$11,957,726	\$2,629,677	85.30	\$429,862

2.1.3 Role of “No-Take” Zones

In this section, the opinions of residents regarding “no take” zones in the Florida Keys and in Martin County are summarized. A no-take zone is a designated area of the reef system in which nothing is to be taken from this area, including fish and shellfish. In theory, “no-take” zones would increase fish and coral populations to the carrying capacity of the specified area with benefits spilling over into areas used by recreational and commercial users. Some question these alleged benefits and oppose the imposition of such zones. Therefore, as part of this study, we were asked to obtain the opinion of resident artificial and natural reef-users regarding “no-take” zones as management tools. During the resident survey, reef-users were asked questions regarding “no-take” zones. The respondent results are summarized in Table 2.1-13.

Under the National Marine Sanctuary Act, 23 areas or zones were created where the taking of anything including fish and shellfish has been prohibited since 1997 in the Florida Keys. It is reasonable to assume that residents of neighboring counties may have formed an opinion about this management tool. Thus, residents were asked their support for the existing “no take” zones in the Florida Keys and their support for creating “no take” zones in Martin County. Those who supported “no take” zones in Martin County were also asked what percent of the Martin County natural reef system should be a “no take” zone.

“No take” zones in the Florida Keys are supported by 57 percent of respondents while “no take” zones in Martin County are supported by 45 percent of respondents. From the survey responses, the average percent of the natural reef system that should be a “no take” zone was 16 percent. The median response was 0 percent. These statistics include 0 percent for those respondents who do not support “no take” zones in Martin County. The distribution of responses to the percent of the natural reef system that should be a “no take” zone is provided in Table 2.1-14.

Table 2.1-13 (Residents)
Opinion of Martin County Resident Boat Owners Regarding "No Take" Zones For Natural Reefs, 2003

Survey Question	Percent of Respondents			Sample Size
	Answering "Yes"	Answering "No"	Answering "Don't Know"	
(1)	(2)	(3)	(4)	(5)
Support existing "NO TAKE" Zones in the Florida Keys	57%	29%	15%	267
Support "NO TAKE" Zones on some reefs off shore of Martin County	45%	45%	10%	269
	Average	Median		
What Percent of natural reefs in Martin County should be protected with "No Take" Zones (Of all respondents who said Yes or No to Support for zones in County.)	16%	0%		224

Note: Some of the 272 respondents did not answer these questions. For the question, percent of natural reefs to make "no take" zones, the 26 respondents who answered "don't know" to support for zones in County are not included. Two others said they didn't know what percent to make "no take" zones and 20 other respondents did not answer the question.

Table 2.1-14 (Residents)
Percent of Martin County Natural Reef System That Should Be No Take Zone Of 224 Resident Boaters Surveyed Who Used Reefs in Past 12 Months

Response Range	Number of Respondents	Percentage of Respondents
0%	122	54.46%
1% to 25%	56	25.00%
26% to 50%	30	13.39%
51% to 75%	9	4.02%
76% to 100%	7	3.13%
TOTAL	224	100.00%

2.1.4 Demographic Information - Residents

The mail survey administered to Martin County residents included questions regarding demographic characteristics. The reason for collecting such information was to determine what segment of the population will gain by protecting natural and artificial reefs off the Martin County coast. Respondents were asked to provide some background on both themselves and their boating experience. Thus, the survey was used to collect demographic information as well as develop a boater profile to better understand resident "reef-users". Table 2.1-15 presents the

2.0 Reef Use and Economic Contribution

results from the mail survey combined with comparable information on the entire Martin County population.

Resident boat owners who use the reefs are slightly older than the general population of Martin County. The median age of resident reef-users is 53 years compared to 48 years for the general population. Boating appears to be a male dominated activity with about 96 percent of the respondents indicating they were male compared to the general population of which 49 percent is male. Of course, there is no way to control who fills out the survey instrument once it reaches the boat owner's residence. However, the survey is directed at the person who owns the boat.

The household income of resident boat owners who use the reefs is double the household income of the county. The estimated median household income of respondents is \$87,500 compared to about \$43,083 for the general Martin County population. Of course, the purchase of a relatively large pleasure craft is also correlated with higher income as found by Bell and Leeworthy (1987) so this finding is not unusual.

Finally, a resident boater profile for Martin County was developed from the survey results. The typical reef-using boater has lived in Martin County for 14 years and has boated in south Florida for 22 years. The resident reef user's average boat length is 26 feet. Nearly 20 percent of the respondents were members of fishing and/or diving clubs. This indicator gives some idea of the intensity and degree of interest in recreational fishing, snorkeling and scuba diving off the coast of Martin County, Florida.

**Table 2.1-15 (Residents)
Demographic Characteristics and Boater Profile of Resident Reef-Users in Martin County, Florida 2003**

Demographic Characteristics of Respondents	Reef-Users	Martin County Population (a)
Median Age	53	48
Sex		
Male	96%	49%
Female	4%	51%
Median Household Income	\$87,500	\$43,083
Boater Profile		
Average Years of Residence in Martin County	14	N/A
Average Years of Boating in south Florida	22	N/A
Average Length of Boat Used for Saltwater Activities (feet)	26	N/A
Percentage of Respondents who belong to fishing and/or diving clubs	19%	N/A
Sample Size	272	

(a) From U.S. Bureau of the Census (1999 and 2000).

2.2 Visitors

The focus of this section is the socioeconomic value of the reefs associated with visitors to Martin County. As defined in Chapter 1, Introduction, visitors to a county are defined as nonresidents of the county that they are visiting. For example, a person from Palm Beach County visiting Martin County is considered to be a visitor to Martin County. Likewise, a person from New York visiting Martin County is considered to be a visitor to Martin County. This section provides the following values associated with visitors to Martin County: reef user activity, economic contribution of the reefs, and demographic information.

2.2.1 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 Martin 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 number of person-trips was then converted to the number of person-days spent by all visitors to Martin County using information from the General Visitor Survey.

The model uses the following information. The number of hotel/motel rooms in Martin County during the study period (January 2003 to December 2003) and the average hotel/motel occupancy rate during the summer and winter of the same study period was obtained from the Martin County Hotel/Motel Association. Summer is defined from June to November and winter is defined from December to May. 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.

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

The results for Martin County are provided in Table 2.2-1. In 2003, visitors to Martin County took 475,340 person trips in the summer and 720,661 person trips in the winter. The total number of visitor person trips in 2003 was 1.2 million.

Table 2.2-1 (Visitors)
Calculation of Number of Person Trips To Martin County By Season in 2003 Using
Capacity Utilization Model

Variable	Summer	Winter
Hotel/Motel Occupancy Rate (k) ^a	0.559	0.669
Average Number of Hotel/Motel Rooms in 2003 (R) ^a	1,700	1,700
Number of Days in Season (p)	183	183
Average Size of Party for those using hotels/motels (SP) ^b	2.62	2.20
Average Trip Length in Nights for those staying in hotels/motels (LS) ^c	4.70	2.94
Proportion of Visitors who stay at hotels/motels (g) ^d	0.20	0.22
Estimated Number of Person Trips by Visitors who used hotels/motels = k x R x p x SP / LS	96,614	155,315
Estimated Total Number of Person Trips by All Visitors to County = k x R x p x SP / LS / g	475,340	720,661

^a From Martin County Hotel/Motel Association, Calendar year 2003.

^b From General Visitor Survey responses to Question 25 for parties with four or fewer people.

^c General Visitor Survey responses to Questions 7 (On this trip, how many nights will you have spent in Martin County?).

^d From General Visitor Survey responses to Question 9 and Question 7. Denominator includes person trips by day trippers (no accommodation).

Next, the number of person-trips was converted to number of person-days. The number of person-trips, as presented on the last row of Tables 2.2-1, was distributed to the different types of accommodation modes and day-trippers. This distribution was based on the general survey responses to Question 9 (Where are you staying on this trip?). The number and proportions of respondents by accommodation are provided in Tables 2.2-2 and 2.2-3, respectively. Almost 50 percent of visitors to Martin County are day trippers, meaning that they spend the day but not the night in the county. This is because 45 percent of visitors are from St. Lucie County which is just north of Martin County and 23 percent are from Palm Beach County which is just south of Martin County. Visitors from these counties tend to make day trips to Martin County. A summary of visitor origin is presented in Table 2.2-4.

After the day trippers, an additional 21 percent spend the night in a hotel, motel, guest house or bed and breakfast inn; and another 21 percent stay at the home of family and friends. The distribution of person-trips by accommodation is provided in Table 2.2-5.

Table 2.2-2 (Visitors)
Number of General Visitor Respondents Surveyed by Accommodation -
Martin County, Florida, 2003

Accommodation	Summer	Winter	Total
Day Trippers	114	106	220
1. Hotel/Motel/Guest House/Bed & Breakfast	50	50	100
2. Home of Family and Friends	41	58	99
3. Campground	22	6	28
4. Condominium or Second Home (own)	8	10	18
5. Vacation Rental	2	1	3
6. Time Share	5	0	5
7. Boat	4	1	5
No answer or refused	0	0	0
Total	246	232	478

Source: Question 9 of General Visitor Survey (Where did you stay on this trip?)

Table 2.2-3 (Visitors)
Proportion of General Visitor Respondents Surveyed by Accommodation -
Martin County, Florida, 2003

Accommodation	Summer	Winter	Total
Day Trippers	0.46	0.46	0.46
1. Hotel/Motel/Guest House/Bed & Breakfast	0.20	0.22	0.21
2. Home of Family and Friends	0.17	0.25	0.21
3. Campground	0.09	0.03	0.06
4. Condominium or Second Home (own)	0.03	0.04	0.04
5. Vacation Rental	0.01	0.00	0.01
6. Time Share	0.02	0.00	0.01
7. Boat	0.02	0.00	0.01
No. of Respondents	246	232	478
Total	1.00	1.00	1.00

Source: Question 9 of General Visitor Survey (Where did you stay on this trip?)

Table 2.2-4 (Visitors)
Origin of Visitors to Martin County, Florida, 2003
From General Visitor Survey Responses

Origin	Number of Respondents	Percent of Respondents
Indian River County	10	2%
St. Lucie County	231	45%
Okeechobee County	11	2%
Highlands County	3	1%
Palm Beach County	116	23%
Broward County	12	2%
Miami-Dade County	6	1%
Other Florida Counties	47	9%
Other US States	68	13%
Canada	3	1%
Bahamas	1	0.20%
Mexico	1	0.20%
Ireland	1	0.20%
Total	510	100%

Table 2.2-5 (Visitors)
Number of Person Trips By Accommodation By Visitors in Martin County - 2003 -
From General Visitor Survey

Accommodation	Summer	Winter	Total
Day Trippers	220,280	329,268	549,547
1. Hotel/Motel/Guest House/Bed & Breakfast	96,614	155,315	251,929
2. Home of Family and Friends	79,223	180,165	259,389
All Other Accommodations (a)	79,223	55,913	135,137
Total	475,340	720,661	1,196,002

(a) All Other Accommodations include campground, condo or second home, vacation rental, time share and boat.

Source: Total visits distributed to visitor accommodation mode based on proportion of respondents who were day trippers and overnight trippers by accommodation mode.

For each accommodation mode and the day-trippers, the number of person-trips was multiplied by the average number of days per trip from Question 8. The average number of days per trip is provided in Table 2.2-6. The number of days per trip is a bit higher in the summer than in the winter. Then the number of person-trips by accommodation mode and day-trippers was summed over all accommodation modes and day-trippers. The number of person-days all visitors spent in Martin County is presented in Table 2.2-7.

Table 2.2-6 (Visitors)
Average Number of Days Per Trip by Accommodation By Visitors In
Martin County - 2003
From General Visitor Survey

Accommodation	Summer	Winter
Day Trippers	1.00	1.00
1. Hotel/Motel/Guest House/Bed & Breakfast	5.70	3.94
2. Home of Family and Friends	7.51	5.76
All Other Accommodations (a)	13.90	11.11

(a) All Other Accommodations include campground, condo or second home, vacation rental, time share and boat.

Source: General Visitor Survey responses to Question 8 (on this trip, how many nights have you spent in this county) plus 1.

Table 2.2-7 (Visitors)
Total Number of Person Days Spent by Visitors in Martin County - 2003
From General Visitor Survey

Accommodation	Summer	Winter	Total
Day Trippers	220,280	329,268	549,547
1. Hotel/Motel/Guest House/Bed & Breakfast	550,699	611,941	1,162,640
2. Home of Family and Friends	595,142	1,037,504	1,632,646
All Other Accommodations (a)	1,101,399	621,260	1,722,658
Total	2,467,519	2,599,972	5,067,491

(a) All Other Accommodations include campground, condo or second home, vacation rental, time share and boat.

Source: Person trips by accommodation mode times number of days per trip by accommodation mode.

In summary, the number of person-trips taken by all visitors to Martin County and the number of person-days these visitors spent in the county during the year 2003 is summarized in Table 2.2-8.

**Table 2.2-8 (Visitors)
Visitation in Martin County - Year 2003**

Item	Number		
	Summer	Winter	Total
Person Trips	475,340	720,661	1,196,002
Person Days	2,467,519	2,599,972	5,067,491
Item	Percent		
	Summer	Winter	Total
Person Trips	40%	60%	100%
Person Days	49%	51%	100%

Visitors took 1.2 million person-trips to Martin County in 2003 and spent 5.1 million person-days in the county. Visitation in the winter was slightly higher than visitation in the summer with 60 percent of the person trips taken in the winter and 51 percent of the person days spent in the winter.

The number of person-trips by all visitors was used as the basis for estimating the number of person-days visitors spent using the artificial and natural reefs in the county. For each season, the number of boating person-trips is equal to the total number of person-trips by all visitors multiplied by 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 12 (Which activities and boating modes did you participate in over the past 12 months in Martin 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 2.2-9.

Table 2.2-9 (Visitors)
Person Trips of Visitors Who Boat and Visitors Who Used the Reefs
In Martin County, Florida

Item	Summer	Winter	Total
(1) Total Person Trips to County - All Visitors	475,340	720,661	1,196,002
(2) Proportion of Person Trips Taken By Visitors Who Boated in County (a)	0.14	0.16	
(3) Boating Person Trips By Visitors in County (3) = (1) x (2)	67,630	114,933	182,563
(4) Proportion of Boating Person Trips When Visitor used the Reefs (b)	0.89	0.79	
(5) Person Trips to County When Visitor Used the Reefs (5) = (3) x (4)	60,167	90,919	151,085

(a) *Saltwater Boating Only. From General Visitor Survey Answer to Question 12 (Which activity did you participate in over the past 12 months in Martin County?) for one boating activity divided by total number of respondents.*

(b) *From the Visitor Boater Tally Sheets: = 1 - (Col. 6/(Col. 6 + Col. 7 + Col. 8 + Col. 10))*

Of the 1,196,002 person-trips visitors took to Martin County in 2003, 14 percent of the trips involved saltwater boating activities in the summer and 16 percent involved saltwater boating activities in the winter. Of the resulting 182,563 boating person-trips by visitors to Martin County, 89 percent of those trips involved recreational reef use in the summer and 79 percent involved recreational reef use in the winter. Thus, visitors who used the reefs for recreation in Martin County made about 151,100 person-trips to the county in 2003.

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 used the reefs. The average days per visit by boaters who used the reefs was obtained from the responses to Question 9 of the Visitor Boater Survey (How many nights are you spending on this trip?) where a 1 was added to each answer to obtain number of days. The average number of days and the total person days reef users spent in Martin County in 2003 are provided in Table 2.2-10.

Table 2.2-10 (Visitors)
Average Number of Days Visiting Martin County and Total Person Days
in Martin County by Visitor Boaters Who Used the Reefs in 2003

County	Average Days Visiting the County Per Trip	Total Person Days Spent Visiting the County
Martin County	2.90	437,891

Reef-using boaters who visited Martin County spent an average of 2.90 days in the county during their trip. As a result, these visitors spent 438,000 person-days in Martin County in 2003.

2.0 Reef Use and Economic Contribution

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 11 through 18 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 11 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 12 asked if the respondent participated in the activity and boating mode. Question 14 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 days spent on each reef/no reef was calculated from the Visitor Boater Survey responses. Question 15 asked the respondent how many days he/she spent on both the artificial reef and the natural reef. Question 16 asked the respondent how many days he/she spent on the artificial reef only. Question 17 asked the respondent how many days he/she spent on the natural reef only. Question 18 asked the respondent how many days he/she spent on no reef. From the responses to these questions, the proportions of days 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 survey responses because in most cases the survey researchers were able to ask the fishing captain of the respondent's charter where the respondent fished.

The proportion of visitor days that reef-using visitor boaters participated in fishing and diving/snorkeling and the percent of fishing days and scuba/snorkeling days that reef-using visitor boaters spent on the artificial, natural and no reefs in Martin County are presented in Table 2.2-11.

Table 2.2-11 (Visitors)
Percent of Visitor Person-Days That Reef-Using Boaters Participated in the
Activity and Percent of Days Spent on
Artificial, Natural and No Reefs from Visitor Boater Survey
Martin County

Activity ^a	Total Respondents	Percent of All Visitor Days ^b	Percent of Person Days On:			
			Artificial Reefs	Natural Reefs	No Reefs	Sum of Percentages
Fishing	510	42%	62%	29%	9%	100%
Snorkeling	510	2%	24%	70%	7%	100%
Scuba Diving	510	2%	38%	38%	25%	100%

^a Percent of days on each reef type is reported. For days on both artificial and natural reefs, one-half day was allocated to artificial reefs and one-half day was allocated to natural reefs.

^b This is the percent of all of the days that the visitor stayed in Martin County.

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

Visitor boaters who came to Martin County to use the reefs spent 42 percent of their visiting days participating in saltwater fishing from a charter, party, rental or private boat. About 97 percent of those visitor reef-users who fish in Martin County use private boats. Of these fishing days, 62 percent of days were spent fishing near artificial reefs, 29 percent of days were spent fishing near natural reefs and 9 percent of days were spent fishing near no reefs. Also, visitor boaters who came to the county to use the reefs spent 2 percent of their days snorkeling and 2 percent of their days scuba diving. Of the snorkeling days, 24 percent of days were spent on artificial reefs, 70 percent of days were spent on natural reefs, and 7 percent of days were spent on no reefs. Of the scuba diving days, 38 percent of days were spent on artificial reefs, 38 percent of days were spent on natural reefs, and 25 percent of days were spent on no reefs.

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 2003 (437,891 from Table 2.2-10) times the proportion of person-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 the proportion of days spent in that activity-boat mode on or near artificial versus natural reefs.

A summary of the total person-days visitors spent participating in reef-related recreation by type of activity and by type of reef in Martin County is provided in Table 2.2-12. The total person-days visitors spent participating in each saltwater activity and boat mode by type of reef is provided in Table 2.2-13.

Table 2.2-12 (Visitors)
Number of Visitor Person-Days Spent Using Artificial and Natural Reefs in 2003
By Recreation Activity – Martin County

Activity	Number of Person-Days		
	Artificial Reefs	Natural Reefs	All Reefs
Snorkeling	1,582	4,680	6,262
Scuba Diving	1,902	1,902	3,804
Fishing	113,454	52,754	166,208
Total	116,938	59,336	176,274

Visitors to Martin County spent about 176,000 person-days on the reef system in 2003. About 117,000 of these days were spent on artificial reefs and about 59,000 of these days were spent on natural reefs.

2.2.2 Economic Contribution – Visitors

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. The respondent was also asked how many people spent or benefited from those expenditures. The respondent was asked only to provide the amount of money spent in Martin County. From this information, a picture of the average itemized expenditures per person per fishing, snorkeling or scuba diving day and by boating mode was estimated.

The average itemized per person expenditures by those who participated in each activity and boat mode in Martin County are provided in Table 2.2-14. Martin County reef-using visitors who went saltwater fishing on their own boat, a friend's boat or a rental boat spent, on average, \$44 per person per day on the day that they went fishing. This amount is comprised of \$15 for boat fuel, \$10 for tackle, bait and ice, \$0.40 for marina fees, \$1.14 for lodging and camping, \$7 for food and beverages at stores and \$5 for food and beverages at restaurants and bars, among other items.

The average expenditure of persons who fished on charter boats was \$129 per person per day. About \$83 was the cost of the charter boat while \$12 was spent on lodging, \$7 was spent on food and beverages at stores, \$17 was spent on food and beverages at restaurants and bars, and \$5.20 was spent on auto rental, among other items.

Persons who fished on party boats spent an average of \$63 per person which included \$24 for the party boat fee, \$6.50 for lodging, \$8 for food and beverages at stores, \$15 for food and beverages at restaurants and bars, \$4 for auto rental and \$3.50 for shopping, among other items.

Martin County reef-using visitors who went scuba diving or snorkeling on their own boat, a friend's boat or a rental boat spent, on average, \$50 per person per day on the day they went diving or snorkeling. This amount is comprised of \$11 for boat fuel, \$5.50 for air refills, \$7 for lodging, \$8 for food and beverages at stores and \$15 for food and beverages at restaurants and bars, among other items.

Table 2.2-13 (Visitors)
Number of Person-Days All Visitors Spent Participating in Saltwater Boating Activities
by Boating Modes and Type of Reef Used - 2003
Martin County, Florida

Activity	Boat Mode	Number of Person Days	Number of Person-Days On:		
			Artificial Reefs	Natural Reefs	No Reefs
Snorkeling	Charter/Party	101	50	50	0
	Rental	404	0	404	0
	Private	3,569	1,448	2,121	0
	Without Boat	2,660	84	2,104	471
Scuba Diving	Charter/Party	168	101	34	34
	Rental	0	0	0	0
	Private	4,747	1,734	1,801	1,212
	Without Boat	135	67	67	0
Fishing – Offshore / Trolling	Charter	640	471	135	34
	Party	2,390	1,565	791	34
	Rental	808	236	471	101
	Private	108,673	56,979	43,681	8,012
Fishing Bottom	Charter	303	135	135	34
	Party	976	539	337	101
	Rental	168	67	101	0
	Private	67,971	53,461	7,103	7,406
Viewing Nature and Wildlife	Glass Bottom Boat	0	0	0	0
	Rental	168	0	0	168
	Private	4,478	0	0	4,478
Personal Watercraft (jet skis, wave runners, etc.)	Rental	101	0	0	101
	Private	875	0	0	875
Sailing	Charter/Party	0	0	0	0
	Rental	0	0	0	0
	Private	1,044	0	0	1,044
Other Boating Activities	Charter/Party	0	0	0	0
	Rental	0	0	0	0
	Private	808	0	0	808
Total Person-Days		201,187	116,938	59,336	24,913

Table 2.2-14 (Visitors)

Amount of Money Spent in Martin County Per Person During Most Recent Day Participating in Each Reef-Related Activity and Boating Mode - From Visitor Boater Survey Responses - 2003 Dollars

Item	Amount Spent Per Person-Day (a)					
	Fishing on:			Snorkeling or Scuba Diving on:		
	Own, Friend's or Rental Boat ^b	Charter Boat	Party Boat	Own, Friend's or Rental Boat	No Boat	Charter / Party Boat
Charter / Party Boat Fee		\$82.96	\$24.12			\$43.57
Boat Rental				\$0.00		
Boat Fuel	\$14.94			\$11.42		
Air Refills				\$5.53	\$1.14	\$1.14
Tackle	\$2.30					
Bait	\$5.22					
Ice	\$2.33			\$1.40	\$3.00	\$0.00
Ramp Fees	\$0.00			\$1.59		
Marina Fees	\$0.40			\$2.07		
Lodging	\$1.12	\$12.14	\$6.54	\$7.10	\$19.05	\$14.29
Camping Fees	\$0.02	\$0.00	\$0.32	\$0.23	\$0.00	\$0.00
Food and Beverages - Stores	\$6.69	\$6.91	\$8.30	\$7.20	\$7.62	\$6.43
Food and Beverages - Restaurants/Bars	\$5.28	\$17.31	\$15.21	\$9.55	\$17.22	\$8.57
Auto Gas	\$3.83	\$2.35	\$3.81	\$3.16	\$4.29	\$0.00
Auto Rental	\$0.43	\$5.20	\$1.37	\$0.05	\$0.00	\$0.00
Equipment Rental (includes boat rental)	\$0.27	\$0.15	\$0.13	\$0.00	\$0.00	\$0.00
Shopping	\$0.98	\$1.87	\$3.55	\$0.86	\$3.17	\$7.14
Total	\$43.78	\$128.90	\$63.35	\$50.17	\$55.49	\$81.14
Number of Respondents	375	21	49	41	7	4
Number of Respondents and Party Members	876	49	117	111	7	14

(a) Expenditures per person per day were estimated from the responses to the Visitor Boater Survey. For each Activity Boat Mode, the expenditures for each item were summed over all the respondents and party members who participated in the Activity_ Boat Mode. This sum was divided by the total number of respondents and party members who participated in the Activity_ Boat Mode.

2.0 Reef Use and Economic Contribution

Visitors who did not use a boat to go diving or snorkeling spent, on average, \$55 per person per day on the day they went diving or snorkeling. This amount is comprised of \$4 for air refills and ice, \$19 for lodging, \$7.60 for food and beverages at stores, \$17 for food and beverages at restaurants and bars, and \$4 for automobile gasoline, among other items.

Visitors who went diving or snorkeling on charter or party boats spent \$81 per person per day. This expenditure was comprised of \$44 per day for the dive charter or party boat, \$14 per day for lodging; \$6.40 per day for food and beverages at stores, \$8.50 per day for food and beverages in restaurants and bars and \$7.00 per day for shopping.

The lodging expenditure item includes lodging costs for hotels, motels and campgrounds. The expenditures per person per day for lodging may seem lower than the actual per person rate of a hotel or motel. Bear in mind that only a portion of visitors stay at a hotel or motel. Visitor accommodations also include campgrounds, family or friends, second homes and time shares. Also, many visitors spend only one day in the county and therefore do not incur the cost of a room. The cost of the second home or time share is not included in the lodging cost because this is a monthly or up front cost that can, at best, only be partially due to the existence of the reefs.

The expenditures per person per day were multiplied by the number of person-days by boating mode and reef type to obtain an estimate of the total expenditures associated with reef related activities in Martin County. The itemized total expenditures associated with reef use in 2003 are provided in Table 2.2-15. Visitors who used the reefs in Martin County spent \$7.9 million on reef-related expenditures. Of this amount \$5.2 million was associated with artificial reef-related expenditures and \$2.7 million was associated with natural reef-related expenditures.

The reef-related visitor expenditures were then used to estimate the economic contribution of artificial and natural reefs to Martin County. As discussed in the Introduction of the Report, expenditures by visitors generate sales, income and jobs within the 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 sales, income and employment are created as the income earned by the reef-related industries and their employees 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 county. Induced effects are created when the employees of the direct and indirect industries spend their money in the county.

Table 2.2-15 (Visitors)
Total Visitor Expenditures In Martin County Associated with Reef Use in 2003
All Reef-Related Activities and Boating Modes
In 2003 dollars

Item	Artificial Reef	Natural Reef	Total
Total Number of Person Days	116,938	59,336	176,274
Charter / Party Boat Fee	\$107,632	\$53,217	\$160,850
Boat Rental	\$0	\$0	\$0
Boat Fuel	\$1,690,626	\$816,589	\$2,507,215
Air Refills	\$17,944	\$26,508	\$44,452
Tackle	\$254,218	\$117,893	\$372,111
Bait	\$578,369	\$268,218	\$846,586
Ice	\$262,390	\$131,980	\$394,370
Ramp Fees	\$5,073	\$6,898	\$11,971
Marina Fees	\$50,582	\$29,364	\$79,946
Lodging	\$172,682	\$141,391	\$314,073
Camping Fees	\$3,615	\$2,368	\$5,983
Food and Beverages - Stores	\$787,046	\$402,790	\$1,189,835
Food and Beverages - Restaurants/Bars	\$660,949	\$372,152	\$1,033,101
Auto Gas	\$443,776	\$224,372	\$668,148
Auto Rental	\$53,577	\$25,147	\$78,724
Equipment Rental	\$29,894	\$13,881	\$43,775
Shopping	\$121,232	\$65,949	\$187,181
Total	\$5,239,604	\$2,698,718	\$7,938,322

The direct, indirect and induced increase in sales, total income, employment and indirect business taxes generated by the reef-related expenditures were estimated for Martin County using the IMPLAN Regional Input-Output Model. This model uses detailed data on the economy of the county to estimate economic multipliers and to model the impact of reef-related expenditures on the economy. The IMPLAN Model was used to convert these expenditures into estimates of direct income and employment generated within Martin County. The itemized expenditures were matched to industries that are included in the model as summarized in Table 2.2-16. Then the IMPLAN model was used to convert these itemized expenditures into direct income and employment generated in the county.

The economic contribution of the reefs to Martin County is provided in Table 2.2-17. The sales contribution is defined as the value of the additional output produced in the county due to the reef-related expenditures. The total income contribution is defined as the sum of employee compensation, proprietor's income, interest, rents, and profits generated as a result of the reef-related expenditures. Income is the money that stays in the county's economy. The employment contribution is the number of full-time and part-time jobs created due to the reef-related expenditures. The indirect business tax contribution is the sum of the additional excise taxes, property taxes, fees, licenses, and sales taxes collected due to the reef-related expenditures. It excludes taxes on profit and income.

2.0 Reef Use and Economic Contribution

Reef-related expenditures by visitors to Martin County during 2003 resulted in \$6.8 million in sales to county businesses. These sales generated \$3.2 million in income and 97 jobs. About \$426,000 in indirect business taxes were collected as a result. About 65 percent of these values were the result of artificial reef-related expenditures and 35 percent of these values were the result of natural reef-related expenditures.

Table 2.2-16 (Visitors)
Itemization of Visitor Reef-Related Expenditures By IMPLAN Model Sectors

Expenditure Item	Artificial Reef	Natural Reef	All Reefs	IMPLAN Sector
Bait, Tackle, Ice, Ramp Fees, Marina Fees	\$1,150,632	\$554,353	\$1,704,985	436 Transportation - Water
Food and Beverages - Stores	787,046	402,790	\$1,189,835	450 Food Stores
Auto Gas, Boat Fuel	2,134,402	1,040,961	\$3,175,363	451 Auto Service Stations
Food and Beverages - Restaurants/Bars	660,949	372,152	\$1,033,101	454 Eating and Drinking
Shopping	121,232	65,949	\$187,181	455 Miscellaneous Retail
Lodging, Camping Fees	176,297	143,759	\$320,056	463 Hotels and Lodging
Auto Rental	53,577	25,147	\$78,724	477 Auto Rental and Leasing
Charter/Party Boat Fee, Boat Rental, Air, Equip.	155,471	93,606	\$249,077	488 Amusement and Recreational Services
Total	\$5,239,604	\$2,698,718	\$7,938,322	

Table 2.2-17 (Visitors)
Economic Contribution of Reef-Related Expenditures by Visitors to Martin County in 2003 – In 2003 dollars

Reef Type/Economic Contribution	Direct	Indirect	Induced	Total
Artificial Reefs				
Sales	\$2,913,084	\$903,940	\$645,789	\$4,462,814
Total Income	\$1,262,955	\$446,636	\$381,492	\$2,091,084
Employment	43	11	8	63
Indirect Business Taxes	\$204,414	\$30,008	\$43,660	\$278,082
Natural Reefs				
Sales	\$1,545,520	\$470,439	\$345,870	\$2,361,829
Total Income	\$682,043	\$234,925	\$204,318	\$1,121,286
Employment	24	6	4	35
Indirect Business Taxes	108,665	15,983	23,383	148,031
Natural and Artificial Reefs				
Sales	\$4,458,604	\$1,374,380	\$991,659	\$6,824,643
Total Income	\$1,944,998	\$681,561	\$585,810	\$3,212,370
Employment	68	17	13	97
Indirect Business Taxes	\$313,079	\$45,991	\$67,043	\$426,113

2.2.3 Demographic Information - Visitors

The Visitor Boater Survey asked the respondent questions regarding his/her socioeconomic characteristics so that a picture of the typical reef user could be developed. The results for Martin County are summarized in Table 2.2-18. The median visitor reef user in Martin County is a 45 year old male with annual household income of \$45,000. He has boated in south Florida for the past five years. He owns a boat but he is not likely to be a member of a fishing or diving club.

Table 2.2-18 (Visitors)
Demographic Characteristics of Visitor Reef-Users in Martin County, 2003

Characteristic	Value
Median Age of Respondent – Years (506 respondents)	45
Sex of Respondent (495 respondents)	
Male	92%
Female	8%
Median Household Income – 2003 dollars (406 respondents)	\$45,000
Average Years Boating in Southeast Florida (511 respondents)	5
Percent of Respondents who Own Boat (500 respondents)	82%
Percent of Respondents Who Belong to Fishing and/or Diving Clubs (500 respondents)	10%

2.3 Total – Residents and Visitors

This section summarizes the user activities, economic contribution and use values associated with the artificial and natural reefs for both residents and visitors of Martin County, Florida. Demographic information of both resident and visitor reef users is also provided.

2.3.1 User Activity

The numbers of person-days spent using the reefs in Martin County by reef type and population (residents and visitors) are summarized in Table 2.3-1. Visitors and residents spent 529,000 person-days using artificial and natural reefs in Martin County in 2003. Residents spent 353,000 person-days and visitors spent 176,000 person-days. Reef users spent 260,000 person-days using artificial reefs and 269,000 person-days using natural reefs.

A summary of reef use by type of activity is provided in Table 2.3-2. Fishing on the reefs is by far the most prevalent reef-related activity in Martin County comprising 86 percent of reef using person-days. Fishing comprises 454,000 person-days while snorkeling and scuba diving comprise 37,000 person-days and 38,000 person-days, respectively. Residents spend significantly more days fishing and more days snorkeling and scuba diving than do visitors.

Table 2.3-1
Number of Person-Days Spent on Artificial and
Natural Reefs in Martin County in 2003
Residents and Visitors

Population	Artificial Reefs	Natural Reefs	All Reefs	Percent
Residents	143,000	210,000	353,000	67%
Visitors	117,000	59,000	176,000	33%
Total	260,000	269,000	529,000	100%
Percent	49%	51%	100%	

Table 2.3-2
Number of Person-Days Spent Using Reefs in Martin County
By Recreational Activity in 2003
Residents and Visitors

Activity	Residents	Visitors	All Persons	Percent
Snorkeling	31,000	6,000	37,000	7%
Scuba Diving	34,000	4,000	38,000	7%
Fishing	288,000	166,000	454,000	86%
Total	353,000	176,000	529,000	100%

2.3.2 Economic Contribution

The total economic contribution of the reefs to Martin County includes the contribution of reef expenditures to sales, income and employment. Expenditures by visitors generate income and jobs within the 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, the visitor expenditures create multiplier effects wherein additional income and employment is created as the income earned by the reef-related industries and their employees 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 county. Induced effects are created when the employees of the direct and indirect industries spend their money in the county.

For visitors, the direct, indirect and induced economic contribution of the reefs was estimated using the estimated reef-related expenditures and the IMPLAN economic input-output model.

For residents, the expenditures were converted to sales, income and employment generated within the directly affected industries using the IMPLAN model. The multiplier effect of reef-related spending by residents in the county was not estimated because this spending is also the result of multiplier effects from other economic activities within the county. The multiplier effect of resident spending on reef-related activities is attributed both to the reef system and to these other economic activities that generated the resident income used to purchase the reef-related goods and services. Thus, the economic importance of the reefs would be overstated if

2.0 Reef Use and Economic Contribution

the multiplier effects were considered. To provide a conservative estimate of the economic contribution of resident use of the reef system, the multiplier effects were not included.

The economic contributions of the artificial, natural and all reefs to Martin County are provided in Tables 2.3-3, 2.3-4, and 2.3-5, respectively. The sales contribution is defined as the value of the additional output produced in the county due to the reef-related expenditures. The total income contribution is defined as the sum of employee compensation, proprietor's income, interest, rents, and profits generated as a result of the reef-related expenditures. The employment contribution is the number of full-time and part-time jobs created due to the reef-related expenditures. The indirect business tax contribution is the sum of the additional excise taxes, property taxes, fees, licenses, and sales taxes collected due to the reef-related expenditures. It excludes taxes on profit and income.

All reef-related expenditures in Martin County generated \$13.1 million in sales during 2003. These sales resulted in \$5.8 million in income to Martin County residents and provided 182 jobs in the county. Reefs generated indirect business taxes of \$856,000. Artificial reef-related expenditures accounted for 55 percent of the economic contribution of all reefs and natural reef-related expenditures accounted for 45 percent of the economic contribution.

**Table 2.3-3
Economic Contribution of Artificial Reef-Related Expenditures in 2003 to Martin County, in 2003 dollars**

Round of Spending	Contribution to:			
	Sales ^a	Income ^b	Indirect Business Taxes ^c	Employment ^d
Direct				
Resident	\$2,709,000	\$1,120,000	\$182,000	36
Visitor	\$2,913,000	\$1,263,000	\$204,000	43
Total	\$5,622,000	\$2,383,000	\$386,000	80
Indirect	\$904,000	\$447,000	\$30,000	11
Induced	\$646,000	\$381,000	\$44,000	8
Total	\$7,172,000	\$3,211,000	\$460,000	99

^a The sales contribution is defined as the value of the additional output produced in the county due to the reef-related expenditures.

^b Total income is the sum of wages, salaries, proprietor's income, profits, rents, royalties and dividends.

^c The indirect business tax contribution is the sum of the additional excise taxes, property taxes, fees, licenses, and sales taxes collected due to the reef-related expenditures. It excludes taxes on profit and income.

^d Employment includes the number of full-time and part-time jobs.

Table 2.3-4
Economic Contribution of Natural Reef-Related Expenditures in 2003 to Martin County, in 2003 dollars

Round of Spending	Contribution to:			
	Sales ^a	Income ^b	Indirect Business Taxes ^c	Employment ^d
Direct ^a				
Resident	\$3,603,000	\$1,509,000	\$248,000	49
Visitor	\$1,546,000	\$682,000	\$109,000	24
Total	\$5,149,000	\$2,191,000	\$357,000	73
Indirect	\$470,000	\$235,000	\$16,000	6
Induced	\$346,000	\$204,000	\$23,000	4
Total	\$5,965,000	\$2,630,000	\$396,000	84

^a The sales contribution is defined as the value of the additional output produced in the county due to the reef-related expenditures.

^b Total income is the sum of wages, salaries, proprietor's income, profits, rents, royalties and dividends.

^c The indirect business tax contribution is the sum of the additional excise taxes, property taxes, fees, licenses, and sales taxes collected due to the reef-related expenditures. It excludes taxes on profit and income.

^d Employment includes the number of full-time and part-time jobs.

Table 2.3-5
Economic Contribution of All Reef-Related Expenditures in 2003 to Martin County, in 2003 dollars

Round of Spending	Contribution to:			
	Sales ^a	Income ^b	Indirect Business Taxes ^c	Employment ^d
Direct ^a				
Resident	\$6,312,000	\$2,629,000	\$430,000	85
Visitor	\$4,459,000	\$1,945,000	\$313,000	68
Total	\$10,771,000	\$4,574,000	\$743,000	153
Indirect	\$1,374,000	\$682,000	\$46,000	17
Induced	\$992,000	\$585,000	\$67,000	13
Total	\$13,137,000	\$5,841,000	\$856,000	182

^a The sales contribution is defined as the value of the additional output produced in the county due to the reef-related expenditures.

^b Total income is the sum of wages, salaries, proprietor's income, profits, rents, royalties and dividends.

^c The indirect business tax contribution is the sum of the additional excise taxes, property taxes, fees, licenses, and sales taxes collected due to the reef-related expenditures. It excludes taxes on profit and income.

^d Employment includes the number of full-time and part-time jobs.

The relative contribution of Martin County’s reefs to the overall Martin County economy is provided in Table 2.3-6. Martin County’s reefs contribute 0.11 percent to the total income of county residents and 0.24 percent of all jobs within the county.

**Table 2.3-6
Contribution of Artificial and Natural Reef-Related Expenditures to Martin County Economy (Residents and Visitors)**

Economic Contribution Type	From Reef-Related Expenditures – 2003	Total in County - 2001 (a)	Percent of County that is Reef-Related
Annual Income	\$5,841,000	\$5,492,350,000	0.11%
Employment	182	75,541	0.24%

(a) From U.S. Department of Commerce, Bureau of Economic Analysis, *Regional Economic Accounts*.

2.3.3 Demographic Information

This section summarizes and compares the demographic characteristics of resident and visitor reef users. These characteristics were obtained from the resident boater survey and the visitor boater survey. They are summarized in Table 2.3-7. The only similarities between residents and visitors are that they are likely to be male and are unlikely to belong to a fishing or diving club. Residents tend to be older and have much higher income than visitors. They have boated in south Florida for much longer than visitors – 22 years versus 5 years.

**Table 2.3-7
Demographic Characteristics of Resident and Visitor Reef-Users in Martin County, Florida, 2003**

Characteristic	Residents	Visitors
Median Age of Respondent, years	53	45
Number of Respondents	272	506
Sex of Respondent		
Number of Respondents	272	495
Male, percent	96%	92%
Female, percent	4%	8%
Median Household Income - 2003 \$	\$87,500	\$45,000
Average Years Boating in south Florida	22	5
Number of Respondents	272	511
Respondents Who Belong to Fishing and/or Diving Clubs		
Number of Respondents	272	500
Yes, percent	19%	10%
No, percent	81%	90%

Chapter 3: Use Value of the Martin County Reef System

Natural and artificial reefs contribute to the recreational experience of residents and visitors as they fish, snorkel and scuba dive. Traveling to and enjoying a reef system involves economic costs including the cost of fuel, bait and tackle, among other items. However, the market does not measure the total economic value of reef systems. The value of reefs to reef users is at least as high as what they paid to visit the reefs, or else they would not be reef users. For many reef users, the value of the reefs is even higher than what they paid to visit them. Since reef-users are attracted to reefs for recreational pursuits, we call this unmeasured value “use value”. While one could engage in fishing, snorkeling or scuba diving without the benefit of a natural or artificial reef, the addition of a reef presumably adds some “value” to the recreational experience. This section of the report evaluates the incremental use value of having a reef system off the shore of Martin County, Florida.

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

The resident survey included contingent valuation (CV) questions that ask users about their willingness to pay for a reef system contingent on specified conditions (e.g., use of funds for various reef related improvements). This CV method has been employed in numerous studies to estimate use values from deep-sea fishing to deer hunting. The reef-using respondents were asked a series of CV questions dealing with their willingness to pay for the reef program. The respondents were asked to consider the total cost for their last boating day in Martin County including fuel, sundries, rentals and other boating expenses. Then, the respondent was asked:

“If your total cost for this day would have been \$_____ higher, would you have been willing to pay this amount to maintain the (insert kind of reef – artificial, natural or both) in their existing condition?”

Payment amounts (or cost increases) of \$2, \$5, \$10, \$25, and \$50 were inserted into the survey instrument (where the blank is in the question above). The payment amounts were rotated from respondent to respondent. Thus, some respondents received questions asking about a \$2 increase

3.0 Use Value of the Martin County Reef System

while others were asked about a \$5, \$10, \$25 or even \$50 increase in boating cost that day. The purpose of these questions was to establish the user value per day for artificial and natural reefs.

The above willingness to pay question was asked of each respondent in three forms: (1) natural reefs separately; (2) artificial reefs separately and (3) a combination of natural and artificial reefs. For the combined program, the randomly assigned cost increases presented in the previous paragraph were doubled. Because the primary spending unit is the “party”, the willingness to pay response referred to an increase in trip cost to the entire party traveling on the boat.

The resident survey also included a question to solicit resident reef users’ willingness-to-pay for new artificial reefs. The question is as follows:

“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 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 a 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 Martin County, Florida.

14. Would you be willing to pay \$ _____ per year when you renew your boat registration to fund this program? (Non-boat owners would pay higher fees to a charter/party boat or rental boat operation to fund this program.)”

Payment amounts of \$5, \$10, \$20, \$50 and \$100 were assigned randomly.

To estimate values per party per trip (a day and a trip are equal for residents), the survey responses were statistically evaluated. A logit equation was used to estimate the average value “per party per trip”. Separate logit equations were estimated for each of the four reef programs (e.g., natural reefs, existing artificial reefs, both natural and artificial reefs and new artificial reefs).

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). 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. In other words, the survey responses were used to estimate the proportion of people who would be willing to pay for the program as a function of the payment amount. This provides us with information regarding respondents’ maximum willingness-to-pay, which is the measure of value that we are trying to estimate.

3.0 Use Value of the Martin County Reef System

The expected value (average or mean) of 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 this document.

The survey responses were used to estimate the values of four logit equations: one for the natural reef program, one for the artificial reef program, one for the combined natural and existing artificial reef programs and one for the new artificial reef program. The dependent variable is 0 for no and 1 for yes. The logarithm of the WTP bid is the independent variable. The estimated equations and average resident WTP values for each program are provided in Table 3-1.

**Table 3-1 (Residents)
Estimated WTP Equation Parameters and Average Willingness-to-Pay for Each Program
Using the Log Transformed Value of WTP Bid, Residents**

Reef Program	WTP Equation (a)		Average WTP Per Party Per Boating Day (Trip) or Per Year (for new artificial reefs)
	Intercept Value	Coefficient of WTP Bid	
Maintaining Natural Reefs in Existing Condition	1.479	-0.5964	\$11.94
Maintaining Artificial Reefs in Existing Condition	1.2084	-0.5867	\$7.84
Maintaining All Reefs in Existing Condition	1.221	-0.5617	\$8.79
New Artificial Reefs	2.0891	-0.6414	\$25.97

(a) The intercept and WTP bid coefficient were statistically significant at the 95 percent confidence level for all equations.

The coefficients of the WTP bids are negative as would be expected (as the bid increases the probability that a person would be willing to pay the bid decreases) and the estimated coefficients are statistically significant at the 95 percent confidence level.

The estimated per party per trip (day) values were \$11.94 for the natural reefs, \$7.84 for the artificial reefs, and \$8.79 for the combined program. For the new artificial reef program the average willingness to pay per party per year is \$25.97.

The question combining the natural and artificial reef programs yielded estimates of use value lower than that derived by adding-up the values of the natural and artificial reef programs separately. This result is consistent with past research. Some respondents are not willing to pay the sum of the values of the individual programs to finance the combined programs. This is largely due to the income constraints as higher bid values are provided to the respondents under the combined programs. The value of the combined programs would provide a conservative or lower bound estimate of the total use value per party of natural and artificial reefs.

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When the respondent answered “NO” to a valuation question, he/she was asked for the reason for saying “NO”. The response “A” (a contribution of that amount is more than the reefs are worth to me) is the expected economic response. 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 problem with eliminating the protests is that over 78 percent of the no responses are protests so all responses, including the protests, were included in the statistical analysis. Depending on the scenario being valued, 16 to 31 percent of the respondents who would not be willing to pay anything to maintain the reefs or add new artificial reefs under a government program are concerned that inland land and water management has harmed the reef system. For example, many believe that the management of water releases from Lake Okeechobee through the St. Lucie Inlet and into the coastal waters has a negative impact on the reef system and that the State should take responsibility for maintaining and improving the reef system. It is likely that these persons value the reef system but do not believe they should be the ones financing its management under these circumstances. Thus, it is likely that the estimates of resident use value reported in this document are underestimated.

For those respondents who said no to a contingent valuation question, the reasons why they said no are summarized in Tables 3-2 through 3-6 for each reef program. For brevity, only the written comments from the natural reef WTP question is provided. Written comments to the other WTP questions are similar.

**Table 3-2 (Residents)
Reasons for Saying No to Natural Reef Maintenance Willingness to Pay Question,
Residents**

Letter	Reason	Number of Responses	% of No Answers
A	A contribution of that amount is more than natural reefs are worth to me.	14	10%
B	I really don't know how much natural reefs are worth to me.	2	1%
C	There are no problems with water quality or the natural reefs.	2	1%
D	There is not enough information to form a decision.	19	14%
E	I don't understand or like the question.	2	1%
F	I already pay too much to government.	18	13%
G	Government waste should be reduced to pay for water quality protection and management of the natural reefs.	29	22%
H	Other (please explain):	42	31%
BLANK		6	4%
Total		134	100%

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Table 3-3 (Residents)
Reasons for Saying No to Artificial Reef Maintenance Willingness to Pay Question, Residents

Letter	Reason	Number of Responses	% of No Answers
A	A contribution of that amount is more than artificial reefs are worth to me.	33	22%
B	I don't really know how much artificial reefs are worth to me.	5	3%
C	There are no problems with water quality or the artificial reefs.	3	2%
D	There is not enough information to form a decision.	27	18%
E	I don't understand or like the question.	2	1%
F	I already pay too much to government.	19	13%
G	Government waste should be reduced to pay for water quality protection and management of the artificial reefs.	30	20%
H	Other (please explain)	24	16%
BLANK		6	4%
Total		149	100%

Table 3-4 (Residents)
Reasons for Saying No to Natural and Artificial Reef Maintenance Willingness to Pay Question, Residents

Letter	Reason	Number of Responses	% of No Answers
A	A contribution of that amount is more than natural reefs are worth to me.	34	20%
B	I really don't know how much reefs are worth to me.	4	2%
C	There are no problems with water quality or the reefs.	2	1%
D	There is not enough information to form a decision.	29	17%
E	I don't understand or like the question.	4	2%
F	I already pay too much to government.	23	14%
G	Government waste should be reduced to pay for water quality protection and management of the natural reefs.	36	21%
H	Other (please explain):	29	17%
BLANK		7	4%
Total		168	100%

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Table 3-5 (Residents)
Reasons for Saying No to New Artificial Reefs Willingness to Pay Question, Residents

Letter	Reason	Number of Responses	% of No Answers
A	A contribution of that amount is more than new artificial reefs are worth to me.	22	17%
B	I really don't know how much new artificial reefs are worth to me.	3	2%
C	There are enough artificial reefs already.	1	1%
D	There is not enough information to form a decision.	12	9%
E	I don't understand or like the question.	1	1%
F	The government should fund the artificial reef program out of general revenue and not a specific tax or fee.	23	18%
G	I already pay too much to the government.	14	11%
H	Government waste should be reduced to fund the artificial reef program.	17	13%
I	Other (please explain):	29	22%
BLANK		8	6%
Total		130	100%

Table 3-6 (Residents)
Reasons for Saying No to Natural Reef Maintenance Willingness to Pay Question - H. Other Reason, Please Explain, Residents

Comment Number	Comment
1	All Expenses To Protect Reefs Should Be Born By All Residents Of Fla, As It Benefits Everyone Like Fresh Air. Also Tourists Should Also Pay.
2	All Tax Payers Are Responsible For Public Areas.
3	All The Money In The World Will Not Fix The Problem. People And The Reefs Do Not Mix Get Rid Of The People.
4	Clean Up St. Lucie N. Fork For Okeechobee Outfall & Our Nat. Reefs Will Take Care Of Themselves.
5	This Topic Is Of Minor Importance Compared To The Atrocious Conditions Of The Estuaries.
6	Everyone Should Pay Just Like School Tax.
7	Fix The Water Flow To The South And Charge Out Of County Boaters To Use The Ramps.
8	Fuel Road Tax Money Collected From Fuel Used In Boats Should Be Spent On The Marine Environment.
9	Funding Could Easily Be Diverted To Other Programs. Big Sugar Is Mainly Responsible For Poor Water Quality. Tax Them For Cleanup.
10	Get Rid Of Sugar Products In S. Florida.
11	I Already Pay 3x That Amount.
12	I Don't Think It Would Make A Difference.

3.0 Use Value of the Martin County Reef System

Table 3-6 (Residents)
Reasons for Saying No to Natural Reef Maintenance Willingness to Pay Question - H. Other Reason, Please Explain, Residents

Comment Number	Comment
13	I Paid A Tax To Buy Back Land For Water Quality And What Did Government Do With The Money. Purchased The Land And Then Leased It Back. You Will Not Get A Penny Out Of Me Until You Live Up To Your Obligation.
14	If \$2 Today, What Will Cost In Future?
15	If You Really Want To Improve The Reefs: (1) Stop Pumping Sand On The Millionaires' Beaches! (2) Stop Dumping Lake Okeechobee Into The St. Lucie!
16	Martin County Taxes Are Out Of Control Cut Other Areas For Reef Protection.
17	Most Damage Is Caused By Pollution From Agriculture I.E Sugar Tax The Source Not The General Public
18	Natural Reefs In M.C. Are Largely Being Damaged By Poor Water Quality. Boat Owners Should Not Have To Pay For Damage Caused By Others.
19	Not A Government Responsibility
20	Other Licensing Fees Should Be Used And Not Diverted To General Fund.
21	Our Natural Resources Have Been Ruined By Government. Therefore I Would Oppose Any Funding To Such An Organization.
22	Real Polluters Are Agriculture & Sugar. They Should Pay. Runoff From Yards Are A Big Problem. Hence All Fla. Tax Payers Should Share Bill To Improve Reefs.
23	Redirect Taxes From Boat Goes To This As Well As Ramp Maintenance.
24	Reefs Are Worth A Lot More Than \$25 Per Trip. This Sounds Like A New Tax The Way Its Worded.
25	Stop Dumping Fresh Water Into The River.
26	Stop Releasing Water From Lake Okeechobee.
27	Stop The Pollution Charge The Polluters.
28	Stop The Pumping Of Contaminated Water From Lake O & Leave The Rest To Nature.
29	The C.O.E. Is Responsible For The Demise Of Our Reefs & Should Be Responsible For Restoring Them.
30	The Entire Area And Businesses Benefit Economically From The Boating Industry. Any Tax Or Additional Fees Should Be Supported On A Government Level.
31	The Money Should Be There. Get The Big Shots
32	The Money Would Be Spent On Another Survey.
33	The Reefs Don't Need To Be Maintained They Need To Be Left Alone. Stop Dumping Pollutants On Them And Place Restrictions On The Number Of Fish That Are Caught Both Things Are In Process Nature Is Capable Of Maintaining It Self Better Than Man Is
34	The Water Quality Of M.C. Is Being Destroyed By The Dumping Of Lake O.
35	Until The Army Core Of Engineers & South Water Mgmt. Stop Destroying Our Environment, Wasting Out Natural Assets, What's The Point. The Indian River Estuary Is Dead Reefs Nest.
36	Would Everyone In The County Pay Because People Who Visit Should Also Pay.
37	It Seems Excessive Based On # Of Boaters. Should Not Be Limited To Martin County. Southeast Florida Boaters Travel To Our Reefs From Palm Beach.
38	Must Be In Better Condition (Due To Runoff From Okeechobee). The Government Is Responsible For The Problems We Have Now. Fix Them Immediately. Stop The Drain. Take Back Sugar Land! Restore The Everglades! Allow Natural Flow.
39	The Reefs Are In Bad Shape & Need Improvements.

3.2 Use Value - Visitors

The visitor boater survey included contingent valuation (CV) questions that ask users about their willingness to pay for a reef system contingent on specified conditions (e.g., use of funds for various reef related improvements). The methods used to estimate average willingness to pay are identical to those used for residents as discussed in the previous subsection. The difference is in the wording of the CV questions between residents and visitors.

The respondent was asked to state yes, no, don't know or refused to a specified payment that would be used to maintain the artificial reefs, the natural reefs and all reefs in their existing conditions. The scenario provided to the respondent was as follows:

“Local and state government agencies are considering different approaches to maintaining the health and condition of natural and artificial reefs of Martin County. One plan focuses on providing greater protection for *natural reefs* by maintaining water quality, limiting damage to natural reefs from anchoring, and preventing overuse of the natural reefs. A second plan focuses on protecting the *artificial reefs* by maintaining water quality, limiting damage to artificial reefs from anchoring, and preventing overuse of the artificial reefs.

Both of these plans will involve increased costs to local businesses that will ultimately be passed on to both residents and visitors in Martin County. We are doing this survey because local government agencies want to know whether you support one, both, or none of these plans and if you would be willing to incur higher costs to pay for these plans. Please keep in mind that whether you support these plans or not would not have any effect on your ability to participate in any boating activity or other recreation in Martin County.”

Then the respondent was asked a yes or no question regarding the natural reef plan, the artificial reef plan and both plans. For example, the question regarding both plans read:

“Suppose that both of the above plans to maintain the natural and artificial reefs in Martin County, Florida were put together in a combined program. Consider once again your total trip cost for your last trip to use the reefs in Martin County including travel expenses, lodging, and all boating expenses. If your total costs for this trip would have been \$_____ higher, would you be willing to pay this amount to maintain the artificial and natural reefs?”

The amounts (bid values) of \$20, \$100, \$200, \$400, and \$1,000 were rotated from respondent to respondent. For the individual programs (just natural or artificial reef protection), the amounts were one-half of the above amounts: \$10, \$50, \$100, \$200 and \$500.

Values for all reefs were taken from statistical analysis of responses to Question 42 of the Visitor Boater Survey¹:

¹ For a complete description of the contingent valuation questions, please refer to the Visitor Boater Survey and the Blue Card (which is white in this report but labeled “Blue Card” in Appendix B).

3.0 Use Value of the Martin County Reef System

“Suppose that both of the above plans to maintain the natural and artificial reefs in Martin County, Florida were put together into a combined program...If your total costs for this trip would have been \$___ higher, would you have been willing to pay this amount to maintain the artificial and natural reefs.”

Values for natural reefs were taken from statistical analysis of responses to Question 38 pertaining only to a program to maintain the natural reefs in their current condition. Values for artificial reefs were taken from statistical analysis of responses to Question 40 pertaining only to a program to maintain the existing artificial reefs in their current condition.

For visitors, the statistical analysis of WTP responses using the logit equation was identical to that used to analyze the resident WTP responses. The expected value (average or mean) of 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 this document.

The survey responses were used to estimate the values of four logit equations: one for the natural reef program, one for the artificial reef program, one for the combined natural and existing artificial reef programs and one for the new artificial reef program. The dependent variable is 0 for no and 1 for yes. The logarithm of the WTP bid is the independent variable. The estimated equations and average visitor WTP values for each program are provided in Table 3-7.

Table 3-7 (Visitors)
Estimated WTP Equation Parameters and Average Willingness-to-Pay for Each Program Using the Log Transformed Value of WTP Bid, Visitors

Reef Program	WTP Equation (a)		Average WTP Per Party Per Trip to County to Use Reefs or Per Year (for new artificial reefs)
	Intercept Value	Coefficient of WTP Bid	
Maintaining Natural Reefs in Existing Condition	2.3783	-0.8234	\$17.96
Maintaining Artificial Reefs in Existing Condition	2.5566	-0.8769	\$18.46
Maintaining All Reefs in Existing Condition	3.1426	-0.9439	\$27.92
New Artificial Reefs	3.17	-1.1896	\$14.36

(a) The WTP bid coefficient was statistically significant at the 95 percent confidence level for all equations.

The coefficients of the WTP bids are negative as would be expected (as the bid increases the probability that a person would be willing to pay the bid decreases) and the estimated coefficients are statistically significant at the 95 percent confidence level.

3.0 Use Value of the Martin County Reef System

For the maintenance programs, the use value is per party per trip to Martin County to use the reefs. The estimated per party per trip values were \$17.96 for the natural reefs, \$18.46 for the artificial reefs, and \$27.92 for the combined program. For the new artificial reef program, the average willingness to pay per party each year that they visit Martin County to use the reefs is \$14.36.

The question combining the natural and artificial reef programs yielded estimates of use value lower than that derived by adding-up the values of the natural and artificial reef programs separately. This result is consistent with past research. Some respondents are not willing to pay the sum of the values of the individual programs to finance the combined programs. This is largely due to the income constraints as higher bid values are provided to the respondents under the combined programs. The value of the combined programs would provide a conservative or lower bound estimate of the total use value per party of natural and artificial reefs.

For all visitor contingent valuation questions, the number of protest votes was much smaller than that of the resident survey. About 60 percent of respondents who answered “no” did so because the WTP bid amount was more than they were willing to pay. Most of the remaining 40 percent said they already pay too much to the government or that government waste should be reduced to pay for water quality protection and management of the reefs.

3.3 Results for Resident and Visitor Reef Use Values

To estimate total annual use values for the existing Martin County reefs, the number of party-trips was multiplied by the estimated use values per party per trip. The value per person-day was 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. These calculations were conducted separately for residents and visitors.

For the new artificial reef program, the annual use value per party was divided by the average number of days per year that reefs were used per party. This information was obtained from the survey responses. This provided the use value per person per day. This value was then multiplied by the person-days of artificial reef use to obtain the annual use value of new artificial reefs. These calculations were conducted separately for residents and visitors.

For all programs, the capitalized value of the reef user values was calculated using a three percent discount rate. This value is analogous to land values and is the present value of the annual reef user values. It represents the “stock” value of the reefs. For example, the \$200,000 market value of a house is the stock value of that house and represents the present value of the annual values of the services provided by that house. Bear in mind that this value only includes the value that reef users place on the reefs and does not include the values that non-reef-users place on the reefs or the economic contribution of the reefs. The estimation of the value of the reefs to non-reef users was not part of this study.

The reef user values associated with maintaining Martin County’s reefs in their existing conditions are provided in Table 3-8. Use value per person-day means the value reef users place, above and beyond their reef-related expenditures, on maintaining the reefs in their existing

3.0 Use Value of the Martin County Reef System

conditions. Per person-day values for artificial, natural and all reef use are provided in the table. The use values were estimated via a statistical analysis of the survey responses to the contingent valuation questions of the resident and visitor surveys as discussed in the previous sub-sections.

Visitor and resident reef users in Martin County are willing to pay \$5.2 million per year to maintain both the artificial reefs and the natural reefs in their current condition by maintaining water quality, limiting damage to reefs from anchoring, and preventing overuse of the reefs. When the projects to protect the artificial and natural reefs are considered separately, visitor and resident reef users are willing to pay \$3.6 million per year to protect the artificial reefs and \$4.0 million per year to protect the natural 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 it is reasonable to conclude that the 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 capitalized reef user value for Martin County reefs is \$172 million. This value only includes the value that reef users place on the reefs and does not include the values that non-reef-users place on the reefs or the economic contribution of the reefs. Thus, for example, if the reefs were destroyed, then the minimum compensation needed would be \$172 million.

Visitor and resident reef users' willingness to pay to invest in and maintain "new" artificial reefs is provided in Table 3-9. Martin County reef users are willing to pay \$1.1 million annually for this program in Martin County. This value is appropriate to use in a benefit-cost analysis of providing new artificial reefs.

3.0 Use Value of the Martin County Reef System

Table 3-8
Annual Use Value in 2003 and Capitalized Value associated With Reef Use
Martin County, Florida – Residents and Visitors

No.	Item	Residents	Visitors	Residents and Visitors
(1)	Number of Trips to Use Reef (a)	106,116	151,085	257,202
(2)	All Reefs - Artificial and Natural			
(3)	Use Value Per Trip (b)	\$8.79	\$27.92	\$20.03
(4)	Person-Days of Reef Use	353,270	176,000	529,270
(5)	Use Value Per Person-Day (5) = (6)/(4)	\$2.64	\$23.97	\$9.73
(6)	Annual Use Value (6) = (1) x (3)	\$933,000	\$4,218,000	\$5,151,000
(7)	Capitalized Value @ 3 percent Discount Rate (7) = (6) / 0.03	\$31,100,000	\$140,600,000	\$171,700,000
(8)	Artificial Reefs			
(9)	Use Value Per Trip (b)	\$7.84	\$18.46	\$14.08
(10)	Person-Days of Reef Use	143,059	117,000	260,059
(11)	Use Value Per Person-Day (11) = (12)/(10)	\$5.82	\$23.84	\$13.92
(12)	Annual Use Value (12) = (1) x (9)	\$832,000	\$2,789,000	\$3,621,000
(13)	Capitalized Value @ 3 percent Discount Rate (13) = (12) / 0.03	\$27,733,000	\$92,967,000	\$120,700,000
(14)	Natural Reefs			
(15)	Use Value Per Trip (b)	\$11.94	\$17.96	\$15.48
(16)	Person-Days of Reef Use	210,211	59,000	269,211
(17)	Use Value Per Person-Day (17) = (18) / (16)	\$6.03	\$46.00	\$14.79
(18)	Annual Use Value (18) = (1) x (15)	\$1,267,000	\$2,714,000	\$3,981,000
(19)	Capitalized Value @ 3 percent Discount Rate (19) = (18) / 0.03	\$42,233,000	\$90,467,000	\$132,700,000

(a) For residents, the number of trips is the number of days that the boat owner took his boat and his party to use the reefs. For visitors, the number of trips is the number of parties that visited Martin County to use the reefs.

(b) From average of survey responses using a log transformation logit analysis.

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Table 3-9
Estimated Use Value of Investing in and Maintaining "New" Artificial Reefs
Martin County, Florida – Residents and Visitors

Row No.	Item	Residents	Visitors	Residents and Visitors
(1)	Person-Days of Artificial Reef Use (a)	143,059	117,000	260,059
(2)	Annual Value of New Artificial Reefs Per Party (b)	\$25.97	\$14.36	
(3)	Average Number of Days Per Year Reefs Used Per Party (c)	4.18	7.16	
(4)	Use Value Per Person-Day for "New" Artificial Reefs (4) = (2) / (3)	\$6.22	\$2.01	\$4.33
(5)	Annual Use Values for "New" Artificial Reefs (5) = (4) x (1)	\$890,000	\$235,000	\$1,125,000
(6)	Capitalized Value @ 3 percent Discount Rate (6) = (5) / 0.03	\$29,667,000	\$7,833,000	\$37,500,000

(a) From Section 2.0.

(b) From average of survey responses using a log transformation logit analysis.

(c) From survey responses.

4.0 Summary and Conclusions

Investment in and maintenance of public resources is a prime function of government. Artificial and natural reefs are public resources that provide recreational benefits to reef users and income to local economies. This study determined, in a comprehensive manner, the net economic value of Martin County, Florida's natural and artificial reef resources to the local economy and the reef users.

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 January 2003 through December 2003. 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. This study estimated the following values:

- Total reef use of residents and visitors in Martin County over a twelve-month period as measured in terms of person-days;
- Economic contribution of the artificial and natural reefs as residents and visitors spend money in Martin County to participate in reef-related recreation;
- Willingness of reef users to pay to maintain the artificial and natural reefs of Martin County, Florida in their existing conditions;
- Willingness of reef users to pay for additional artificial reefs in Martin County, Florida;
- Opinions of residents regarding "no take" zones on some natural reefs in the county; and,
- Socioeconomic characteristics of reef users.

Total sales, income, employment and tax revenues generated within Martin County measure economic contributions. Martin County, Florida and the Florida Fish and Wildlife Conservation Commission funded this study. This study followed the methodology used in the report titled, "Socioeconomic Study of Reefs in Southeast Florida", October 2001, prepared by Hazen and Sawyer in association with Florida State University and the National Oceanic and Atmospheric Administration for Broward County, Florida.

Study Methods. This study conducted four surveys as follows:

- Resident boater mail survey – was conducted in January 2004
- Visitor boater intercept survey – was conducted in the Winter of 2003 and the Summer of 2003
- General visitor intercept survey – was conducted in the Winter of 2003 and the Summer of 2003
- Recreation for-hire mail survey – was conducted in the Winter of 2003 and the Summer of 2003

Visitors are defined as nonresidents of the county that they are visiting. Residents are those who live within the county. The purpose of the resident boater survey and the visitor boater survey is to collect information to estimate the following characteristics:

- Percentage of boaters who fish, dive and / or snorkel on the reefs;
- Total and 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 Martin County reefs in their existing condition; and,
- Willingness-to-pay for additional reefs in Martin County.

The purpose of the general visitor survey is to obtain estimates of the total number of visitors to Martin County and the percentage of visitors who boat. In addition, at the request of the county, the resident survey also included questions regarding “no-take” zones.

The results of this study are based on the responses to these surveys. The resident mail survey resulted in 568 completed surveys of which 278 of these respondents (49 percent) participated in reef-related recreation in Martin County during the past 12 months. The general visitor intercept survey resulted in 479 completed surveys. The visitor boater intercept survey resulted in 522 completed surveys. These completed surveys provided sufficient information to estimate the economic value of the reefs to Martin County reef users and the local economy.

The survey responses were inferred to the population of Martin County residents and visitors. The results reported below are the total values for these populations.

Definitions. Certain terminology was used in this report to represent units of recreational activity. These terms are person-trip and person-day. For visitors, a person-trip is defined as one person making one trip to a county. That trip may last one day to many days. On any given day, the number of visitor person-trips and the number of visitors are the same. For resident boaters, a person-trip is one day’s outing on a boat to participate in saltwater recreation activities. A person-day is defined as one person participating in an activity for a portion or all of a day.

Number of Days People Participated in Recreational Use of the Reefs. The numbers of person-days spent using the reefs in Martin County by reef type and population (residents and visitors) are summarized in Table 4-1. Visitors and residents spent 529,000 person-days using artificial and natural reefs in Martin County in 2003. Residents spent 353,000 person-days and visitors spent 176,000 person-days. Reef users spent 260,000 person-days using artificial reefs and 269,000 person-days using natural reefs.

A summary of reef use by type of activity is provided in Table 4-2. Fishing on the reefs is by far the most prevalent reef-related activity in Martin County comprising 86 percent of reef using person-days. Fishing comprises 454,000 person-days while snorkeling and scuba diving

comprise 37,000 person-days and 38,000 person-days, respectively. Residents spend significantly more days fishing and more days snorkeling and scuba diving than do visitors.

Table 4-1
Number of Person-Days Spent on Artificial and
Natural Reefs in Martin County in 2003
Residents and Visitors

Population	Artificial Reefs	Natural Reefs	All Reefs	Percent
Residents	143,000	210,000	353,000	67%
Visitors	117,000	59,000	176,000	33%
Total	260,000	269,000	529,000	100%
Percent	49%	51%	100%	

Table 4-2
Number of Person-Days Spent Using Reefs in Martin County
By Recreational Activity in 2003
Residents and Visitors

Activity	Residents	Visitors	All Persons	Percent
Snorkeling	31,000	6,000	37,000	7%
Scuba Diving	34,000	4,000	38,000	7%
Fishing	288,000	166,000	454,000	86%
Total	353,000	176,000	529,000	100%

Contribution of Reef-Related Spending to the County Economies. The total economic contribution of the reefs to Martin County is the contribution of reef-related expenditures to county sales, income and employment. “Sales” is defined as the value of the additional output produced in the county due to the reef-related expenditures. The total income contribution is defined as the sum of employee compensation, proprietor’s income, interest, rents, and profits generated as a result of the reef-related expenditures. Income is the money that stays in the county’s economy. The employment contribution is the number of full-time and part-time jobs created due to the reef-related expenditures. The indirect business tax contribution is the sum of the additional excise taxes, property taxes, fees, licenses, and sales taxes collected due to the reef-related expenditures. It excludes taxes on profit and income.

Expenditures by visitors generate sales, income and jobs within the 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 sales, income and employment are created as the income earned by the reef-related industries and their employees is respent 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 county. Induced

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

For visitors, the direct, indirect and induced economic contribution of the reefs was estimated using the estimated reef-related expenditures and economic input-output models.

For residents, the expenditures were converted to sales, income and employment generated within the directly affected industries. The multiplier effect of reef-related spending by residents in the county was not estimated because this spending is also the result of multiplier effects from other economic activities within the county. The multiplier effect of resident spending on reef-related activities is attributed both to the reef system and to these other economic activities that generated the resident income used to purchase the reef-related goods and services. Thus, the economic importance of the reefs would be overstated if the multiplier effects were considered. To provide a conservative estimate of the economic contribution of resident use of the reef system, the multiplier effects were not included.

The economic contribution of reef-related expenditures was estimated using the IMPLAN Regional Economic Input-Output Model. This computer model simulates the supply of and demand for goods and services within a county or within groups of counties. It allows the user to estimate the extent to which new investments or increases in demand affect a region's economy in terms of sales, income and employment. IMPLAN stands for IMPact Analysis for PLANning and was originally developed by the USDA Forest Service in cooperation with the Federal Emergency Management Agency and the USDI Bureau of Land Management to assist the Forest Service in land and resource management planning. The developers of this model formed the Minnesota IMPLAN Group in 1993 to privatize the development of IMPLAN data and software. The Martin County input-output data represents 2000 economic conditions. This was the most recent year available from the Minnesota IMPLAN Group.

The economic contributions of the artificial, natural and all reefs to Martin County are provided in Table 4-3. In 2003, residents and visitors spent \$20 million in reef-related expenditures in Martin County. As summarized in Table 4-3, these expenditures generated \$13.1 million in sales in Martin County during 2003. "Sales" is the value of the additional output produced in Martin County due to the reef-related expenditures. These sales resulted in \$5.8 million in income to Martin County residents and provided 182 jobs in the county. Reef expenditures generated indirect business taxes of \$856,000. Artificial reef-related expenditures accounted for 55 percent of the economic contribution of all reefs and natural reef-related expenditures accounted for 45 percent of the economic contribution.

Table 4-3
Economic Contribution of Reef-Related Expenditures to Martin County, Florida, 2003-Residents and Visitors

Type of Economic Contribution	Artificial Reefs	Natural Reefs	All Reefs
Sales - in 2003 dollars (a)	\$7,172,000	\$5,965,000	\$13,137,000
Income - in 2003 dollars (b)	\$3,211,000	\$2,630,000	\$5,841,000
Indirect Business Taxes - in 2003 dollars (c)	\$460,000	\$396,000	\$856,000
Employment (d)	99	84	182

^a The sales contribution is defined as the value of the additional output produced in the county due to the reef-related expenditures.

^b Total income is the sum of wages, salaries, proprietor's income, profits, rents, royalties and dividends.

^c The indirect business tax contribution is the sum of the additional excise taxes, property taxes, fees, licenses, and sales taxes collected due to the reef-related expenditures. It excludes taxes on profit and income.

^d Employment includes the number of full-time and part-time jobs.

Value that Reef Users Place on the Reefs. 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 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.

The reef user values associated with maintaining Martin County's reefs in their existing conditions are provided in Table 4-4. Use value per person-day means the value reef users place, above and beyond their reef-related expenditures, on maintaining the reefs in their existing conditions. Per person-day values for artificial, natural or all reef use are provided in the table. The use values were estimated via a statistical analysis of the survey responses to the contingent valuation questions of the resident and visitor surveys.

Depending on the scenario being valued, 16 to 31 percent of the respondents who would not be willing to pay anything to maintain the reefs or add new artificial reefs under a government program are concerned that inland land and water management has harmed the reef system. They believe the State should take responsibility for maintaining and improving the reef system. It is likely that these persons do value the reef system but do not believe they should be the ones financing its management under these circumstances. Thus, it is likely that the estimates of resident use value reported in this document are underestimated.

Table 4-4
Annual Use Value in 2003 and Capitalized Value associated With Reef Use
Martin County, Florida – Residents and Visitors

Row No.	Item	Residents	Visitors	Residents and Visitors
(1)	(2)	(3)	(4)	(5)
(1)	Number of Trips to Use Reef (a)	106,116	151,085	257,202
(2)	All Reefs - Artificial and Natural			
(3)	Use Value Per Trip (b)	\$8.79	\$27.92	\$20.03
(4)	Person-Days of Reef Use	353,270	176,000	529,270
(5)	Use Value Per Person-Day (5) = (6)/(4)	\$2.64	\$23.97	\$9.73
(6)	Annual Use Value (6) = (1) x (3)	\$933,000	\$4,218,000	\$5,151,000
(7)	Capitalized Value @ 3 percent Discount Rate (7) = (6) / 0.03	\$31,100,000	\$140,600,000	\$171,700,000
(8)	Artificial Reefs			
(9)	Use Value Per Trip (b)	\$7.84	\$18.46	\$14.08
(10)	Person-Days of Reef Use	143,059	117,000	260,059
(11)	Use Value Per Person-Day (11) = (12)/(10)	\$5.82	\$23.84	\$13.92
(12)	Annual Use Value (12) = (1) x (9)	\$832,000	\$2,789,000	\$3,621,000
(13)	Capitalized Value @ 3 percent Discount Rate (13) = (12) / 0.03	\$27,733,000	\$92,967,000	\$120,700,000
(14)	Natural Reefs			
(15)	Use Value Per Trip (b)	\$11.94	\$17.96	\$15.48
(16)	Person-Days of Reef Use	210,211	59,000	269,211
(17)	Use Value Per Person-Day (17) = (18) / (16)	\$6.03	\$46.00	\$14.79
(18)	Annual Use Value (18) = (1) x (15)	\$1,267,000	\$2,714,000	\$3,981,000
(19)	Capitalized Value @ 3 percent Discount Rate (19) = (18) / 0.03	\$42,233,000	\$90,467,000	\$132,700,000

(a) For residents, the number of trips is the number of days that the boat owner took his boat and his party to use the reefs. For visitors, the number of trips is the number of parties that visited Martin County to use the reefs.

(b) From average of survey responses using a log transformation logit analysis.

Visitor and resident reef users in Martin County are willing to pay \$5.2 million per year to maintain both the artificial reefs and the natural reefs in their current condition by maintaining water quality, limiting damage to reefs from anchoring, and preventing overuse of the reefs (Column 5, row 6 of Table 4-4). When the projects to protect the artificial and natural reefs are considered separately, visitor and resident reef users are willing to pay \$3.6 million per year to protect the artificial reefs and \$4.0 million per year to protect the natural reefs (Column 5, rows 12 and 18 of Table 4-4).

4.0 Summary and Conclusions

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 it is reasonable to conclude that the 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 capitalized value of the reef user values is equal to the present value of the annual values calculated at three percent discount rate. It represents the “stock” value analogous to land market values. For example, the \$200,000 market value of a house is the stock value of that house and represents present value of the annual value of the services provided by that house. The capitalized reef user value for Martin County reefs is \$172 million. Bear in mind that this value only includes the value that reef users place on the reefs and does not include the values that non-reef-users place on the reefs or the economic contribution of the reefs. The estimation of the value of the reefs to non-reef users was not part of this study. Thus, for example, if the reefs were destroyed, then the minimum compensation needed would be \$172 million.

Visitor and resident reef users’ willingness to pay to invest in and maintain “new” artificial reefs is provided in Table 4-5. Martin County reef users are willing to pay \$1.1 million annually for this program in Martin County. This value is appropriate to use in a benefit-cost analysis of providing new artificial reefs.

Table 4-5
Estimated Use Value of Investing in and Maintaining "New" Artificial Reefs in 2003 Dollars
Martin County, Florida – Residents and Visitors

Row No.	Item	Residents	Visitors	Residents and Visitors
(1)	Person-Days of Artificial Reef Use (a)	143,059	117,000	260,059
(2)	Annual Value of New Artificial Reefs Per Party (b)	\$25.97	\$14.36	
(3)	Average Number of Days Per Year Reefs Used Per Party (c)	4.18	7.16	
(4)	Use Value Per Person-Day for "New" Artificial Reefs (4) = (2) / (3)	\$6.22	\$2.01	\$4.33
(5)	Annual Use Values for "New" Artificial Reefs (5) = (4) x (1)	\$890,000	\$235,000	\$1,125,000
(6)	Capitalized Value @ 3 percent Discount Rate (6) = (5) / 0.03	\$29,667,000	\$7,833,000	\$37,500,000

(a) From Section 2.0.

(b) From average of survey responses using a log transformation logit analysis.

(c) From survey responses.

Resident Opinions of “No Take” Zones. Both the economic contribution and the use value of the reef system are based upon its management or lack thereof. Resident reef-users were asked questions regarding “no take” zones. A “no take” zone is a designated area of the reef system in which nothing is to be taken from this area including fish and shellfish.

These opinions are summarized in Table 4-6. “No take” zones in the Florida Keys are supported by 57 percent of respondents while “no take” zones in Martin County are supported by 45 percent of respondents. From the survey responses, the average percent of the natural reef system that should be a “no take” zone was 16 percent. The median response was 0 percent. These statistics include 0 percent for those respondents who do not support “no take” zones in Martin County. The distribution of responses to the percent of the natural reef system that should be a “no take” zone is provided in Table 4-7.

Table 4-6
Opinion of Martin County Residents Regarding "No Take" Zones For Natural Reefs, 2003

Survey Question	Percent of Respondents			Sample Size
	Answering "Yes"	Answering "No"	Answering "Don't Know"	
(1)	(2)	(3)	(4)	(5)
Support existing "NO TAKE" Zones in the Florida Keys	57%	29%	15%	267
Support "NO TAKE" Zones on some reefs off shore of Martin County	45%	45%	10%	269
	Average	Median		
What Percent of natural reefs in Martin County should be protected with "No Take" Zones (Of all respondents who said Yes or No to Support for zones in County.)	16%	0%		224

Note: Some of the 272 respondents did not answer these questions. For the question, percent of natural reefs to make "no take" zones, the 26 respondents who answered "don't know" to support for zones in County are not included. Two others said they didn't know what percent to make "no take" zones and 20 other respondents did not answer the question.

Table 4-7
Percent of Martin County Natural Reef System That Should Be No Take Zone Of 224 Resident Boaters Surveyed Who Used Reefs in Past 12 Months

Response Range	Number of Respondents	Percentage of Respondents
0%	122	54.46%
1% to 25%	56	25.00%
26% to 50%	30	13.39%
51% to 75%	9	4.02%
76% to 100%	7	3.13%
TOTAL	224	100.00%

Demographic Characteristics of Reef Users. Respondents were asked to provide some background on both themselves and their boating experience. The reason for collecting such information was to determine what segment of the population will gain by protecting natural and artificial reefs off the Martin County coast.

The demographics of resident boat owners is provided in Table 4-8. Resident boat owners who use the reefs are slightly older than the general population of Martin County. The median age of resident reef-users is 53 years compared to 48 years for the general population. Boating appears to be a male dominated activity with about 96 percent of the respondents indicating they were male compared to the general population of which 49 percent is male. Of course, there is no way to control who fills out the survey instrument once it reaches the boat owner's residence. However, the survey is directed at the person who owns the boat. The household income of resident boat owners who use the reefs is double the household income of the county. The estimated median household income of respondents is \$87,500 compared to about \$43,083 for the general Martin County population.

A resident boater profile for Martin County was developed from the survey results. The typical reef-using boater has lived in Martin County for 14 years and has boated in south Florida for 22 years. The resident reef user's average boat length is 26 feet. Nearly 20 percent of the respondents were members of fishing and/or diving clubs.

**Table 4-8 (Residents)
Demographic Characteristics and Boater Profile of Resident Reef-Users
In Martin County, Florida 2003**

Characteristics	Reef-Users	Martin County Population (a)
Median Age	53	48
Sex		
Male	96%	49%
Female	4%	51%
Median Household Income	\$87,500	\$43,083
Boater Profile		
Average Years of Residence in Martin County	14	N/A
Average Years of Boating in south Florida	22	N/A
Average Length of Boat Used for Saltwater Activities (feet)	26	N/A
Percentage of Respondents who belong to fishing and/or diving clubs	19%	N/A
Sample Size	272	

(a) From U.S. Bureau of the Census (1999 and 2000).

The demographics of Martin County visitors are summarized in Table 4-9. The median visitor reef user in Martin County is a 45 year old male with annual household income of \$45,000. He has boated in south Florida for the past five years. He owns a boat but he is not likely to be a member of a fishing or diving club.

**Table 4-9 (Visitors)
Demographic Characteristics of Visitor Reef-Users in Martin County, 2003**

Characteristic	Value
Median Age of Respondent – Years (506 respondents)	45
Sex of Respondent (495 respondents)	
Male	92%
Female	8%
Median Household Income – 2003 dollars (406 respondents)	\$45,000
Average Years Boating in Southeast Florida (511 respondents)	5
Percent of Respondents who Own Boat (500 respondents)	82%
Percent of Respondents Who Belong to Fishing and/or Diving Clubs (500 respondents)	10%

The only similarities between residents and visitors are that they are likely to be male and are unlikely to belong to a fishing or diving club. Residents tend to be older and have much higher income than visitors. They have boated in south Florida for much longer than visitors – 22 years versus 5 years.

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Appendix A

Resident Boater Survey

Socioeconomic Study of Reefs In Martin County Florida

HAZEN AND SAWYER
Environmental Engineers & Scientists

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Hollywood, FL 33021
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Winter 2003

Dear Martin County Boat Owner:

Please find enclosed a boater's survey to be completed. You have been randomly selected from a list of Martin County boat owners to participate in this study. Please place the completed survey in the enclosed postage-paid business reply envelope and return it at your earliest convenience.

This study is very important to evaluate the socio-economic impact of artificial and natural reefs in Martin County. Your completing and returning this survey is vital to this study. Your responses are strictly confidential and will be combined with over 1,000 other responses. Upon completion of the survey, all mailing lists will be destroyed.

This project is called the Socioeconomic Study of Reefs in Martin County Florida being sponsored by Martin County and the Florida Fish and Wildlife Conservation Commission. This study will determine, in a comprehensive manner, the net economic value of the natural and artificial reef resources of Martin County to the users of these reefs and the local economies. This study is expected to demonstrate the importance of additional funding at the federal, State and local levels to protect our resources while promoting reef use.

Your help is vital to this study. Should you have any questions or concerns, please contact me or Kathy Fitzpatrick, P.E., Martin County Public Services Department at (772) 288-5429.

Thank you very much for your participation.

Very truly yours,

HAZEN AND SAWYER



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

Enclosures

**Socioeconomic Study of Reefs in Martin County, Florida
Resident Boater Survey**

Survey ID#: _____

SECTION 1: Screening

1. Over the past 12 months, how many **days** have you used your boat for saltwater activities in Martin County? _____ (days) (Note: You boated in Martin County if you launched your boat from a site in Martin County.)

2. While saltwater boating in Martin County over the past 12 months, did you use the artificial or natural reefs for any recreational activities such as fishing, diving or snorkeling?

YES _____ (If yes, please continue with the survey.)
NO _____ (If no, please return this uncompleted survey. It is very important that you return this survey.)

SECTION 2: Activity Profile and Use of Reefs

3. Of the days spent saltwater **boating** in Martin County over the past 12 months, how many of these **days** were spent:

Saltwater fishing? _____ Snorkeling? _____ Scuba diving? _____

4. Of the days spent **saltwater fishing** in Martin County over the past 12 months, how many of these **days** were spent fishing on:

Artificial reefs (no natural reefs that day)? _____ Natural reefs (no artificial reefs that day)? _____
Both Artificial and Natural Reefs? _____ No Reefs? _____

5. If you fished on both artificial and natural reefs in the same day, what **percent** of your time on reefs do you usually spend on:
Artificial reefs? _____% Natural reefs? _____%

6. Of the days you spent **snorkeling** in Martin County over the past 12 months, how many of these **days** were spent on:

Artificial reefs (no natural reefs that day)? _____ Natural reefs (no artificial reefs that day)? _____
Both Artificial and Natural Reefs? _____ No Reefs? _____

7. Of the days you spent **scuba diving** in Martin County over the past 12 months, how many of these **days** were spent on:

Artificial reefs (no natural reefs that day)? _____ Natural reefs (no artificial reefs that day)? _____
Both Artificial and Natural Reefs? _____ No Reefs? _____

8. How many other people living in Martin County went with you on your last trip to go:

Saltwater fishing? _____ Snorkeling? _____ Scuba diving? _____

9. How many other people who are **not** residents of Martin County went with you on your last trip to go:

Saltwater fishing? _____ Snorkeling? _____ Scuba diving? _____

**Socioeconomic Study of Reefs in Martin County, Florida
Resident Boater Survey**

SECTION 3: Expenditures

10. On your most recent saltwater fishing day, snorkeling day, and scuba diving day in Martin County, would you please indicate your best estimate of how much money you and your party spent in Martin County?

Expenditures in Martin County on most recent day

Expense Item	Fishing	Snorkeling	Scuba Diving
Boat Oil and Gas	\$	\$	\$
Bait	\$	\$	\$
Tackle	\$	\$	\$
Ice	\$	\$	\$
Food & Beverages from stores	\$	\$	\$
Food & Beverages from Restaurants/Bars	\$	\$	\$
Gas for Auto	\$	\$	\$
Boat ramp fees & parking fees	\$	\$	\$
Marina slip rental & dockage fees	\$	\$	\$
Equipment rentals	\$	\$	\$
Sundries (sun screen, etc.)	\$	\$	\$
Any other items not mentioned above	\$	\$	\$
Number of people who spent or benefited from these expenditures			

SECTION 4: Value of Reefs

11. Suppose there was a plan to maintain the health and condition of *natural reefs* in Martin County. First, consider your total costs for your last boating day in Martin County including beverages, sundries, rentals, and all boating expenses. If your total costs for this day would have been **\$5** higher, would you have been willing to pay this amount to maintain the *natural reefs* in their existing condition?

___ YES ___ NO

If you answered NO to the above question or you don't know or you refuse to answer the question, please circle the **one** letter that best explains your reason for saying no or don't know; or refusing to answer?

- A. A contribution of that amount is more than natural reefs are worth to me.
- B. I really don't know how much natural reefs are worth to me.
- C. There are no problems with water quality or the natural reefs.
- D. There is not enough information to form a decision.
- E. I don't understand or like the question.
- F. I already pay too much to government.
- G. Government waste should be reduced to pay for water quality protection and management of the natural reefs.
- H. Other (please explain): _____

**Socioeconomic Study of Reefs in Martin County, Florida
Resident Boater Survey**

12. Now suppose there was a plan to maintain the health and condition of **artificial reefs** in Martin County and that this was the only plan you were asked to consider. Think about your total costs for your last boating day in Martin County again including beverages, sundries, rentals, and all boating expenses. If your total costs for this day would have been **\$5** higher, would you have been willing to pay this amount to maintain the **artificial reefs** in their existing condition?

_____ YES _____ NO

If you answered NO to the above question or you don't know or you refuse to answer the question, please circle the **one** letter that best explains your reason for saying no or don't know; or refusing to answer?

- A. A contribution of that amount is more than artificial reefs are worth to me.
- B. I don't really know how much artificial reefs are worth to me.
- C. There are no problems with water quality or the artificial reefs.
- D. There is not enough information to form a decision.
- E. I don't understand or like the question.
- F. I already pay too much to government.
- G. Government waste should be reduced to pay for water quality protection and management of the artificial reefs.
- H. Other (please explain): _____

13. Finally, suppose that both of these plans to maintain the existing condition of **natural and artificial reefs** in Martin County were put together into a combined program. Consider once again your total costs for your last boating day in Martin County including beverages, sundries, rentals, and all boating expenses. If your total costs for this day would have been **\$10** higher, would you have been willing to pay this amount to maintain the **natural and artificial reefs** in their existing condition?

_____ YES _____ NO

If you answered NO to the above question or you don't know or you refuse to answer the question, please circle the **one** letter that best explains your reason for saying no or don't know; or refusing to answer?

- A. A contribution of that amount is more than reefs are worth to me.
- B. I don't really know how much reefs are worth to me.
- C. There are no problems with water quality or the reefs.
- D. There is not enough information to form a decision.
- E. I don't understand or like the question.
- F. I already pay too much to government.
- G. Government waste should be reduced to pay for water quality protection and management of reefs.
- H. Other (please explain): _____

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 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 a 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 Martin County, Florida.

14. Would you be willing to pay **\$10** per year when you renew your boat registration to fund this program? (Non-boat owners would pay higher fees to a charter/party boat or rental boat operation to fund this program.)

_____ YES _____ NO

**Socioeconomic Study of Reefs in Martin County, Florida
Resident Boater Survey**

If you answered NO to the above question or you don't know or you refuse to answer the question, please circle the **one** letter that best explains your reason for saying no or don't know; or refusing to answer?

- A. A contribution of that amount is more than new artificial reefs are worth to me.
- B. I really don't know how much new artificial reefs are worth to me.
- C. There are enough artificial reefs already.
- D. There is not enough information to form a decision.
- E. I don't understand or like the question.
- F. The government should fund the artificial reef program out of general revenue and not a specific tax or fee.
- G. I already pay too much to the government.
- H. Government waste should be reduced to fund the artificial reef program.
- I. Other (please explain): _____

SECTION 5: No Take Area Opinions

In July 1997, the Florida Keys National Marine Sanctuary created 23 areas or zones in which the taking of anything is prohibited. The total area of this no take zone is 13.37 square miles. A no take zone is a designated area of the reef system in which nothing is to be taken from this area including fish and shellfish.

- 15. Do you support the currently designated "NO TAKE" zones in the Florida Keys?
____ YES ____ NO ____ Don't Know ____ Refuse to Answer
- 16. Would you support the creation of "NO TAKE" zones on some of the reefs in Martin County?
____ YES ____ NO ____ Don't Know ____ Refuse to Answer
- 17. What percentage of the coral or natural reefs in Martin County do you think would be a reasonable proportion to protect by giving them NO TAKE designation? _____(%)

SECTION 6: Demographics

- 18. How long have you been boating in south Florida? _____ (# years)
- 19. What is the length of your boat that you use for your saltwater activities? _____ (feet)
- 20. Are you a member of fishing or diving club? ____ YES ____ NO
- 21. In what year were you born? 19 ____
- 22. What is your zip code? _____ (five digits)
- 23. How long have you lived in Martin County? _____ (# years)
- 24. Are you: Male? ____ Female? ____
- 25. Please circle the letter that corresponds to your estimated annual household income before taxes?

(a) less than \$5,000	(f) \$30,000 to 34,999	(k) \$75,000 to \$99,999
(b) \$5,000 to \$9,999	(g) \$35,000 to \$39,999	(l) \$100,000 to \$149,000
(c) \$10,000 to \$14,999	(h) \$40,000 to \$49,999	(m) \$150,000 or more
(d) \$15,000 to \$24,999	(i) \$50,000 to \$59,000	
(e) \$25,000 to \$29,999	(j) \$60,000 to \$74,999	

Appendix B

General Visitor Survey

Socioeconomic Study of Reefs In Martin County Florida

YELLOW CARD

PRIVACY STATEMENT

Your participation is voluntary. Since each interviewed person will represent many others not interviewed, your cooperation is extremely important. Hazen & Sawyer and Rife Market Research are conducting this study for Martin County, Florida and the Florida Fish and Wildlife Conservation Commission. Uses of the information include evaluation of present recreation uses and planning for future recreation visitation. This survey does not ask for any information that identifies you. All information from this survey will be available for distribution. The interview should take 5 to 15 minutes with an average of 10 minutes.

Section 1. Modes of Transportation

- | | | | |
|---|----------------------------------|---|---|
| A | Automobile – private | G | Air – Orlando |
| B | Automobile – rental | H | Air – other Florida city, Specify _____ |
| C | Air – Miami | I | Cruise ship |
| D | Air – Ft. Lauderdale / Hollywood | J | Own boat |
| E | Air – West Palm Beach | K | Other, Specify _____ |
| F | Air – Tampa | | |

Section 2. Overnight Accommodations

- 1 = Hotel / Motel / Guest House / Bed & Breakfast
- 2 = Home of family/friends
- 3 = Campground
- 4 = Condominium or second home (own), excluding time shares
- 5 = Vacation rental
- 6 = Time Share

Section 3. Primary Purpose of Trip

- A = Recreation or Vacation
- B = Visit family or friends
- C = Business trip
- D = Business and Pleasure
- E = Other, Specify _____

Section 4. Annual Household Income before Taxes

Please give only the letter of your income category.

- | | | | |
|---|----------------------|---|------------------------|
| A | Less than \$5,000 | J | \$45,000 to \$49,999 |
| B | \$5,000 to \$9,999 | K | \$50,000 to \$59,999 |
| C | \$10,000 to \$14,999 | L | \$60,000 to \$74,999 |
| D | \$15,000 to \$19,999 | M | \$75,000 to \$99,999 |
| E | \$20,000 to \$24,999 | N | \$100,000 to \$149,999 |
| F | \$25,000 to \$29,999 | O | \$150,000 or more |
| G | \$30,000 to \$34,999 | | |
| H | \$35,000 to \$39,999 | | |
| I | \$40,000 to \$44,999 | | |

WHITE CARD – OCEAN ACTIVITIES LIST

<u>Number</u>	<u>Activities in Ocean</u>
	Snorkeling
100	Snorkeling from charter/party boat (pay operation)
101	Snorkeling from rental boat
102	Snorkeling from private boat (own boat/friend's boat)
103	Snorkeling without boat (close to shore)
	Scuba Diving
200	Scuba diving from charter/party boat (pay operation)
201	Scuba diving from rental boat
202	Scuba diving from private boat (own boat/friend's boat)
203	Scuba Diving without boat (close to shore)
	Special Activities while Snorkeling or Scuba Diving
300	Diving for lobsters
301	Underwater photography
302	Wreck diving
303	Spear fishing
304	Collecting tropical fish or shellfish
305	Current/drift diving
	Fishing - Offshore/Trolling
400	Fishing from charter boat (pay operation six persons or less) - offshore
401	Fishing from party or head boat (charge per person) - off shore
402	Fishing from rental boat - offshore
403	Fishing from private boat (own boat/friend's boat) - offshore
	Fishing - Bottom
407	Bottom fishing from charter boat (pay operation six persons or less)
408	Bottom fishing from party or head boat (charge per person)
409	Bottom fishing from rental boat
410	Bottom fishing from private boat (own boat/friend's boat)
	<hr/>
	Viewing Nature and Wildlife
500	Glass bottom boat rides (pay operation)
501	Viewing nature and wildlife from rental boat
502	Viewing nature and wildlife from private boat (own boat/friend's boat)
	Personal Watercraft (jet skis, wave runners, etc.)
600	Personal watercraft – rental
601	Personal watercraft - private (own boat/friend's boat)
	Sailing
700	Sailing charter/party boat (pay operation)
701	Sailing rental boat
702	Sailing private boat (own boat/friend's boat)
	Other Activities NOT MENTIONED ABOVE (parasailing, hang gliding, sunset cruises, water-skiing)
800	Other activities from charter/party (pay operation)
801	Other activities from rental boat
802	Other activities from private boat (own boat/friend's boat)

General Visitors Survey

Screening Criteria: 1) NOT a resident of Martin County.
2) Meets exit condition

Interview site: _____

Onsite survey number: _____

Date/time of interview: _____
Month Day Time

HAND RESPONDENT YELLOW CARD AND ASK THEM TO READ PRIVACY STATEMENT

1. a) How many people are here with you on your visit to Martin County (do not include respondent)?
_____ # people

1. b) How many of these people are not permanent residents of Martin County (do not include respondent)?
_____ # people

2. How many of these people are 16 or older (do not include respondent)?
_____ # people

3. Where is your primary residence?

City or nearest city County State Zip Code

Country: _____

- USA
- Canada
- Mexico
- Central/South America
- Australia/Oceania
- Japan
- Other Far East
- United Kingdom
- Other Europe
- Middle East
- Africa
- Other (Specify):

4. a) On this trip to Martin County, when did you first arrive?
_____ Month Day Time

4. b) When do you plan to leave?
_____ Month Day Time

5. Including this trip, how many times have you visited Martin County in the last 12 months - that is, since (date last year)?
_____ # times

General Visitors Survey

6. Including this trip, how many days have you spent in Martin County in the last 12 months?

_____ # days

7. On this trip, how many nights will you have spent in Martin County?

_____ # nights

8. Look at Section 1 of the **YELLOW CARD**. How did you and those in your group who are not permanent residents of Martin County get to Martin County? Please give the letters of all that apply. (*Circle all that apply*)

A Automobile - private

B Automobile - rental

C Air - Miami

D Air - Ft Lauderdale/ Hollywood

E Air - West Palm Beach

F Air - Tampa

G Air - Orlando

H Air - Other Florida city, Specify _____

I Cruise Ship

J Own boat

K Other, Specify _____

9. Where are you staying or did you stay on this trip to Martin County? Please read me the number from Section 2 of the Yellow card.

1 = Hotel/Motel/Guest House/Bed
& Breakfast

2 = Home of family/friends

3 = Campground

4 = Condominium, or second home (own),
excluding time shares

5 = Vacation Rental

6 = Time Share

Please refer to the WHITE CARD with the Ocean Activities List.

10. Over the last 12 months, did you or someone in your current group who is not a resident of Martin County engage in any of these activities when visiting Martin County?

YES, Go to Q11.

NO, Go to Q15.

General Visitors Survey

**HAND RESPONDENT WHITE CARD WITH OCEAN
ACTIVITIES LIST**

I would now like to ask you about some of the activities in which you, or someone in your group, participated in while on your visits to Martin County.

- Q11. In which of these activities did you or someone in your group participate during the last 12 months?
- Q12. As I read each activity in which you said you or someone in your group participated, could you tell me which activity YOU participated in during the past 12 months? *If the person is alone, skip to Q14.*
- Q13. Now as I read each activity would you tell me how many others in your group who are not residents of Martin County participated in the activity in Martin County during the past 12 months?
- Q14. As I read each activity in which YOU participated, how many days in the past 12 months did you participate in that activity on an artificial or natural reef?

Last 12 Months			
Activity	Respondent	# Others	Respondent Days on Reefs
____ _	0	____ _	____ _
____ _	0	____ _	____ _
____ _	0	____ _	____ _
____ _	0	____ _	____ _
____ _	0	____ _	____ _
____ _	0	____ _	____ _
____ _	0	____ _	____ _

- Q15. Please refer to Section 3 on your YELLOW CARD and tell me which reason best describes the primary purpose of your trip to Martin County. *Please read the letter from the YELLOW CARD.*
- A Recreation or vacation
 - B Visit family or friends
 - C Business trip
 - D Business and pleasure
 - E Other (specific) _____

General Visitors Survey

Now I would like to ask you about your trip expenses. Please provide your best estimate of the total for each category for your party for this trip. Include only the amounts spent in Martin County.

Total Spent During Trip in Martin County

- Q16. \$ _____ Lodging accommodations
- Q17. \$ _____ Food & beverage at restaurants/bars
- Q18. \$ _____ Food & beverage at grocery/convenient stores
- Q19. \$ _____ Sport activities including charter/party/guide fees, boat ramp/marine fees, tackle and bait fees
- Q20. \$ _____ Admission to events and attractions
- Q21. \$ _____ Evening entertainment
- Q22. \$ _____ Rental car, taxi, bus fares
- Q23. \$ _____ Shopping (clothing, gifts, souvenirs)
- Q24. \$ _____ All other
- Q25. How many people in your party spent or benefited from these expenditures? _____
of People

Finally, for statistical purposes, we need to know a few things about you.

Q26. In what year were you born? 19 ____ ____

Q27. Sex: Male Female *(Observed, not asked)*

Q28. Please refer to Section 5 of the Yellow card and tell me which income category best describes your annual household income last year before taxes. Please give me the letter on the card corresponding to the amount that is the closest to your annual household income.

A B C D E F G H I J K L M N O

Refused

Don't know

That's it. Thank you very much for participating in this survey. I hope you enjoyed your stay.

Appendix C

Visitor Boater / Reef User Survey

Socioeconomic Study of Reefs In Martin County Florida

**BOATING VISITORS SURVEY
SCREENER/TALLY SHEET**

1. Are you a permanent resident of Martin County?

YES. Thank you. We are only interviewing nonresidents of Martin County. *(place tic mark in column 4)*

NO. Hand respondent **WHITE CARD** (Ocean Activities List).

2. Over the past 12 months, did you do any of the activities on the list in Martin County?

NO. Thank you. We are only interviewing those who did boating activities in the ocean. *(place tic mark in column 5)*

YES. 3. Did you do any of these activities on the artificial or natural reefs in Martin County?

NO. Thank you. We are only interviewing reef users. *(place tic mark in column 6)*

YES. 4. Are you ending your visit to Martin County before noon tomorrow?

NO. Thank you. We are only interviewing people at the end of their visit. *(place tic mark in column 7)*

YES. 5. Will you participate in a 5-15 minute interview about your visit to Martin County ?

NO. Thank you. *(place tic mark in column 8)*

If language Barrier, *(place tic mark in column 9)*

YES. Go to Questionnaire. *(place tic mark in column 10)*

YELLOW CARD

PRIVACY STATEMENT

Your participation is voluntary. Since each interviewed person will represent many others not interviewed, your cooperation is extremely important. Hazen & Sawyer and Rife Market Research are conducting this study for Martin County, Florida and the Florida Fish and Wildlife Conservation Commission. Uses of the information include evaluation of present recreation uses and planning for future recreation visitation. This survey does not ask for any information that identifies you. All information from this survey will be available for distribution. The interview should take 5 to 15 minutes with an average of 10 minutes.

Section 1. Modes of Transportation

- | | | | |
|---|----------------------------------|---|---|
| A | Automobile – private | G | Air – Orlando |
| B | Automobile – rental | H | Air – other Florida city, Specify _____ |
| C | Air – Miami | I | Cruise ship |
| D | Air – Ft. Lauderdale / Hollywood | J | Own boat |
| E | Air – West Palm Beach | K | Other, Specify _____ |
| F | Air – Tampa | | |

Section 2. Overnight Accommodations

- 1 = Hotel / Motel / Guest House / Bed & Breakfast
- 2 = Home of family/friends
- 3 = Campground
- 4 = Condominium or second home (own), excluding time shares
- 5 = Vacation rental
- 6 = Time Share

Section 3. Primary Purpose of Trip

- A = Recreation or Vacation
- B = Visit family or friends
- C = Business trip
- D = Business and Pleasure
- E = Other, Specify _____

Section 4. Annual Household Income before Taxes

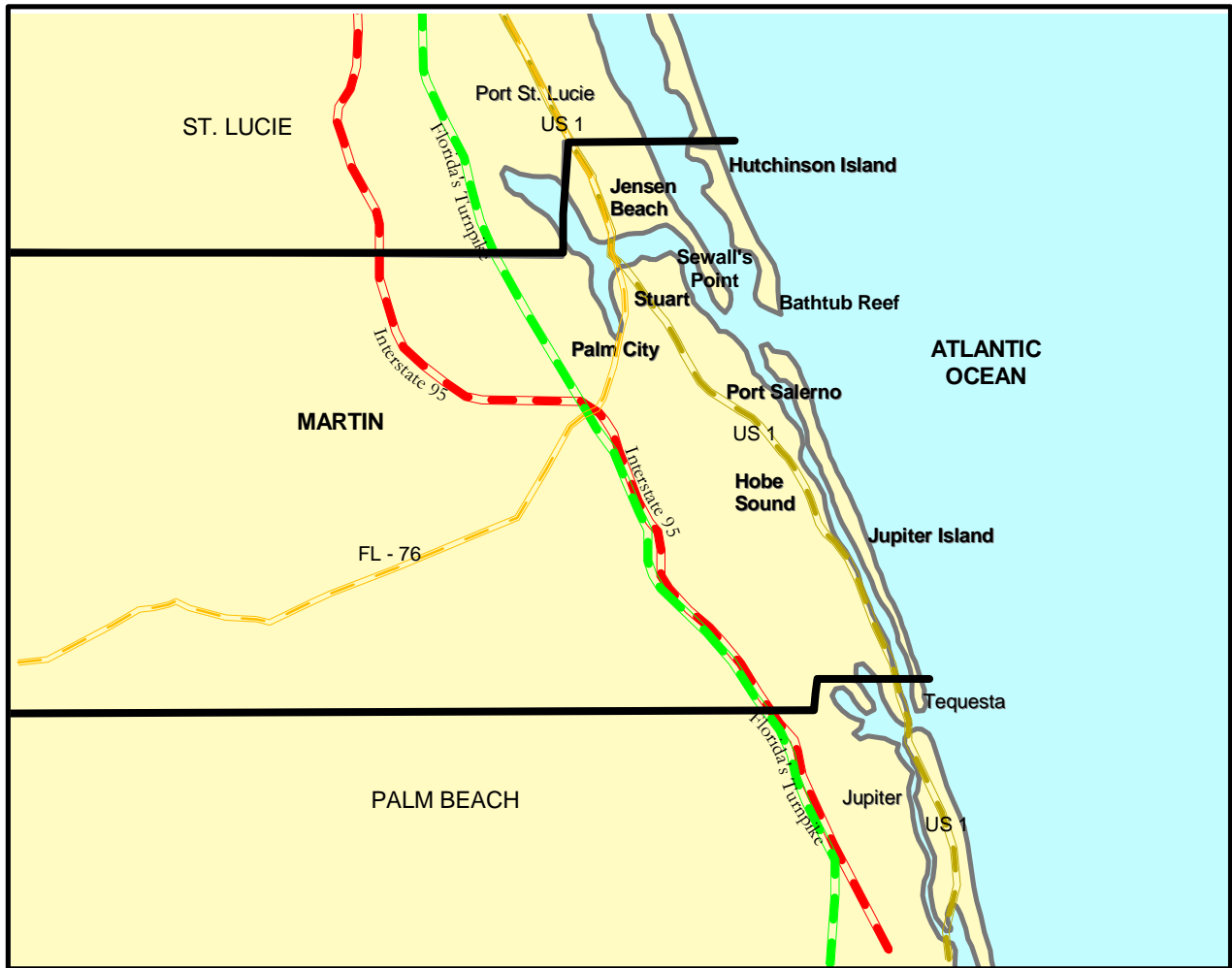
Please give only the letter of your income category.

- | | | | |
|---|----------------------|---|------------------------|
| A | Less than \$5,000 | J | \$45,000 to \$49,999 |
| B | \$5,000 to \$9,999 | K | \$50,000 to \$59,999 |
| C | \$10,000 to \$14,999 | L | \$60,000 to \$74,999 |
| D | \$15,000 to \$19,999 | M | \$75,000 to \$99,999 |
| E | \$20,000 to \$24,999 | N | \$100,000 to \$149,999 |
| F | \$25,000 to \$29,999 | O | \$150,000 or more |
| G | \$30,000 to \$34,999 | | |
| H | \$35,000 to \$39,999 | | |
| I | \$40,000 to \$44,999 | | |



WHITE CARD – OCEAN ACTIVITIES LIST

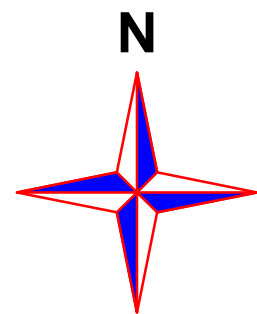
<u>Number</u>	<u>Activities in Ocean</u>
	Snorkeling
100	Snorkeling from charter/party boat (pay operation)
101	Snorkeling from rental boat
102	Snorkeling from private boat (own boat/friend's boat)
103	Snorkeling without boat (close to shore)
	Scuba Diving
200	Scuba diving from charter/party boat (pay operation)
201	Scuba diving from rental boat
202	Scuba diving from private boat (own boat/friend's boat)
203	Scuba Diving without boat (close to shore)
	Special Activities while Snorkeling or Scuba Diving
300	Diving for lobsters
301	Underwater photography
302	Wreck diving
303	Spear fishing
304	Collecting tropical fish or shellfish
305	Current/drift diving
	Fishing - Offshore/Trolling
400	Fishing from charter boat (pay operation six persons or less) - offshore
401	Fishing from party or head boat (charge per person) - off shore
402	Fishing from rental boat - offshore
403	Fishing from private boat (own boat/friend's boat) - offshore
	Fishing - Bottom
407	Bottom fishing from charter boat (pay operation six persons or less)
408	Bottom fishing from party or head boat (charge per person)
409	Bottom fishing from rental boat
410	Bottom fishing from private boat (own boat/friend's boat)
	<hr/>
	Viewing Nature and Wildlife
500	Glass bottom boat rides (pay operation)
501	Viewing nature and wildlife from rental boat
502	Viewing nature and wildlife from private boat (own boat/friend's boat)
	Personal Watercraft (jet skis, wave runners, etc.)
600	Personal watercraft – rental
601	Personal watercraft - private (own boat/friend's boat)
	Sailing
700	Sailing charter/party boat (pay operation)
701	Sailing rental boat
702	Sailing private boat (own boat/friend's boat)
	Other Activities NOT MENTIONED ABOVE (parasailing, hang gliding, sunset cruises, water-skiing)
800	Other activities from charter/party (pay operation)
801	Other activities from rental boat
802	Other activities from private boat (own boat/friend's boat)

Martin County, Florida Socioeconomic Study of Reefs - Study Area



LEGEND

-  County Boundaries
-  Land Area w/ Major Roads
-  Waterways & Atlantic Ocean



BLUE CARD

SECTION 1. REEF PLANS

Local and state government agencies are considering different approaches to maintaining the health and condition of natural and artificial reefs of Martin County. One plan focuses on providing greater protection for *natural reefs* by maintaining water quality, limiting damage to natural reefs from anchoring, and preventing overuse of the natural reefs. A second plan focuses on protecting the *artificial reefs* by maintaining water quality, limiting damage to artificial reefs from anchoring, and preventing overuse of the artificial reefs.

Both of these plans will involve increased costs to local businesses that will ultimately be passed on to both residents and visitors in Martin County. We are doing this survey because local government agencies want to know whether you support one, both, or none of these plans and if you would be willing to incur higher costs to pay for these plans. Please keep in mind that whether you support these plans or not would not have any effect on your ability to participate in any boating activity or other recreation in Martin County.

SECTION 2. REASONS FOR SAYING NO, DON'T KNOW OR REFUSAL

Please give the letter corresponding to the answer that best describes your reason.

- A A contribution of that amount is more than natural reefs are worth to me.
- B I don't really know how much an natural reefs are worth to me.
- C There are no problems with water quality or the natural reefs.
- D Not enough information to form a decision.
- E I don't understand or like the question.
- F Already pay too much to the government.
- G Government waste should be reduced to pay for water quality protection and management of the natural reefs.
- H Other Reason (Please Specify)_____

SECTION 3. REASONS FOR SAYING NO, DON'T KNOW OR REFUSAL

Please read the letter of the answer that best describes your reason.

- A A contribution of that amount is more than the artificial reefs are worth to me.
- B I don't really know how much artificial reefs are worth to me.
- C Water quality is not a problem and artificial reefs don't need any management.
- D Not enough information to form a decision.
- E I don't understand or like the question.
- F Already pay too much to the government.
- G Government waste should be reduced to fund water quality protection and management of the artificial reefs.
- H Other Reason (Please Specify)_____

(MORE ON OTHER SIDE)

SECTION 4. REASONS FOR SAYING NO, DON'T KNOW OR REFUSAL

Please read the letter of the answer that best describes your reason.

- A** A contribution of that amount is more than the reefs are worth to me.
- B** I don't really know how much reefs are worth to me.
- C** Water quality is not a problem and the reefs don't need any management.
- D** Not enough information to form a decision.
- E** I don't understand or like the question.
- F** Already pay too much to the government.
- G** Government waste should be reduced to fund water quality protection and management of the reefs.
- H** Other Reason (Please Specify)_____

SECTION 5. ARTIFICIAL REEF PROGRAM - NEW REEFS

Artificial reef programs cost money. Suppose that the government proposed that all newly constructed reefs would be paid for by all users of the artificial 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 (pay operation) or a rental boat, they would pay for the costs through higher fees charged by the pay operation.

How would the money be used ?

The money would go into a trust fund that could only be used for the construction and maintenance of artificial reefs in Martin County.

SECTION 6. REASONS FOR SAYING NO, DON'T KNOW OR REFUSAL

- A** A contribution of that amount is more than a new artificial reef is worth to me.
- B** I don't really know how much an artificial reef is worth to me.
- C** There are enough artificial reefs already.
- D** Not enough information to form a decision.
- E** I don't understand or like the question.
- F** The government should fund the artificial reef program out of general revenue and not a specific tax or fee.
- G** Already pay too much to the government.
- H** Government waste should be reduced to fund the artificial reef program.
- I** Other Reason (Please Specify)_____

Boating Visitors Survey - Martin County

Screening Criteria: 1) NOT a resident of Martin County.
2) Engaged in reef-related ocean activities in Martin County in past 12 months.

Survey number: _____

Date/time of interview:

3) Meets Exit Condition

Month Day Time

Interview Site: _____

Interviewer Name: _____

HAND RESPONDENT YELLOW CARD AND ASK THEM TO READ PRIVACY ACT STATEMENT

Q1. a) How many people are with you on your visit to Martin County (do not count the respondent)?

people

Q1. b) How many of these people are not permanent residents of Martin County?

people

Q2. How many of these people are 16 or older (do not include respondent)?

people

Q3. Where is your primary residence?

City or nearest city County State Zip Code

Country: _____

- USA
- Canada
- Mexico
- Central/South America
- Australia/Oceania
- Japan
- Other Far East
- United Kingdom
- Other Europe
- Middle East
- Africa
- Other:

Q4. a) On this trip, is Martin County the only destination?

- YES, Go to Q5.
- NO, Go to Q4b.

Q4. b) Is Martin County your primary destination for this trip?

- YES, Go to Q5.
- NO, Go to Q4c.

Q4. c) Where did you last visit before coming to Martin County?

City or nearest city County State Zip Code

Boating Visitors Survey - Martin County

Q5. Look at Section 1 of the YELLOW CARD. How did you and those in your group who are not residents of Martin County, get to Martin County? Please give the letters of ALL that apply. (Circle ALL that apply)

- | | |
|----------------------------------|--|
| A Automobile – private | G Air – Orlando |
| B Automobile – rental | H Air - Other Florida city,
Specify _____ |
| C Air - Miami | I Cruise Ship |
| D Air - Ft Lauderdale/ Hollywood | J Own boat |
| E Air - West Palm Beach | K Other, Specify _____ |
| F Air – Tampa | |

Q6. a) On this trip to Martin County, when did you first arrive in Martin County?

_____	_____	_____
Month	Day	Time

Q6. b) When do you plan to leave Martin County?

_____	_____	_____
Month	Day	Time

Q7. Including this trip, how many times have you visited Martin County in the last 12 months, that is since (date last year)?

_____ # of times

Q8. Including this trip, how many days have you spent in Martin County in the last 12 months?

_____ # of days

Q9. How many nights are you spending in Martin County on this trip?

_____ # of nights

If Question 9 is zero, then go to Question 11.

Q10. Please refer to the Section 2 of the YELLOW CARD and tell me the number corresponding to where you stayed on this trip to Martin County? (circle ALL numbers that apply)

- | | |
|---|--|
| 1 = Hotel/Motel/Guest House/Bed & Breakfast | 4 = Condominium, or second home (own), excluding time shares |
| 2 = Home of family/friends | 5 = Vacation Rental |
| 3 = Campground | 6 = Time Share |

Boating Visitors Survey - Martin County

I would now like to ask you about some of the activities in which you or someone in your group who is not a permanent resident of Martin County, participated while on your visits to Martin County.

HAND RESPONDENT WHITE CARD WITH OCEAN ACTIVITIES LIST

- Q11. In which of these activities did you or someone in your group participate during the last 12 months in Martin County? Please read me the number corresponding to each activity on the card.
- Q12. As I read you each activity in which you said you or someone in your group participated, please tell me which activity you participated in during the past 12 months in Martin County.

If person by themselves, skip to Q14.

- Q13. As I read each activity, please tell me how many others in your group who are not permanent residents of Martin County participated in the activity in Martin County during the last 12 months.
- Q14. As I read each activity, would you tell me how many days you participated in the activity in Martin County over the past 12 months?
- Q15. How many days of the (activity) were spent on both natural and artificial reefs?
- Q16. How many days of the (activity) were spent on artificial reefs only?
- Q17. How many days of the (activity) were spent on natural reefs only?
- Q18. How many days of the (activity) were on no reefs?

OCEAN ACTIVITIES IN MARTIN COUNTY

Q11 Activity	Q12 Respondent	Q13 # of Others	Q14 Respondent # of days	Q15 # days art. & nat. reefs	Q16 # days art. reef only	Q17 # days nat. reef only	Q18 # days no reefs
____ _	O	____	____	____	____	____	____
____ _	O	____	____	____	____	____	____
____ _	O	____	____	____	____	____	____
____ _	O	____	____	____	____	____	____
____ _	O	____	____	____	____	____	____
____ _	O	____	____	____	____	____	____
____ _	O	____	____	____	____	____	____
____ _	O	____	____	____	____	____	____
____ _	O	____	____	____	____	____	____

Boating Visitors Survey - Martin County

Q19. Please refer to Section 3 on your YELLOW CARD and tell me which reason best describes the primary purpose of your trip to Martin County. Please read the corresponding letter from the YELLOW CARD.

- A Recreation or vacation
- B Visit family or friends
- C Business trip
- D Business and pleasure
- E Other, Specify _____

FISHING EXPENDITURES

Ask Q20 if they participated in fishing from own boat or a friend's boat (activities 403 or 410)

Q20. On the most recent saltwater fishing day using your own or a friend's boat, approximately how much money did your party spend on the following items in Martin County:

Ask Q21 if they participated in fishing from a rental boat (activities 402 or 409)

Q21. On the most recent saltwater fishing day using a rental boat, approximately how much did your party spend on the following items in Martin County:

Expenditure Item	Expenditures on Most Recent Saltwater Fishing Day in Martin County	
	Q20 Own/Friend's Boat	Q21 Rental Boat
Boat fuel	\$ _____	\$ _____
Tackle	\$ _____	\$ _____
Bait	\$ _____	\$ _____
Ice	\$ _____	\$ _____
Ramp fees	\$ _____	\$ _____
Marina fees	\$ _____	\$ _____
Lodging	\$ _____	\$ _____
Camping fees	\$ _____	\$ _____
Food and beverages - stores	\$ _____	\$ _____
Food and beverages - restaurants/bars	\$ _____	\$ _____
Auto gas	\$ _____	\$ _____
Auto rental	\$ _____	\$ _____
Equipment rental	\$ _____	\$ _____
Shopping (clothing, gifts, souvenirs)	\$ _____	\$ _____
Number of People in party who spent or benefited from this money (overall)	# _____	# _____

Q22. Are these expenditures for one day or for many days? ____ 1 day; ____ many days. If many, how many days? _____

FISHING EXPENDITURES, continued

Ask Q23 if they participated in fishing from a charter boat (activities 400 or 407)

Q23. On the most recent saltwater fishing day using a charter boat, approximately how much did your party spend on the following items in Martin County:

Ask Q24 if they participated in fishing from a party boat (activities 401 or 408)

Q24. On the most recent saltwater fishing day using a party boat (charge per person), approximately how much did your party spend on the following items in Martin County:

Expenditures on Most Recent Saltwater Fishing Day in Martin County		
Expenditure Item	Q23 Charter Boat	Q24 Party Boat
Charter fee	\$ _____	\$ _____
Lodging	\$ _____	\$ _____
Camping fees	\$ _____	\$ _____
Food and beverages - stores	\$ _____	\$ _____
Food and beverages - restaurants/bars	\$ _____	\$ _____
Auto gas	\$ _____	\$ _____
Auto rental	\$ _____	\$ _____
Equipment rental	\$ _____	\$ _____
Shopping (clothing, gifts, souvenirs)	\$ _____	\$ _____
Number of People in party who spent or benefited from this money (overall)	# _____	# _____

Q25. Are these expenditures for one day or for many days? ____ 1 day; ____ many days. If many, how many days? _____

SNORKELING OR SCUBA DIVING EXPENDITURES

Ask Q26 if they participated in snorkeling or scuba diving from their own or a friend's boat (activities 102 or 202).

Q26. On the most recent saltwater snorkeling or scuba diving day using your own or a friend's boat, approximately how much did your party spend on the following items in Martin County:

Ask Q27 if they participated in snorkeling or scuba diving from a rental boat (activities 101 or 201).

Q27. On the most recent saltwater snorkeling or scuba diving day using a rental boat, approximately how much did your party spend on the following items in Martin County:

Ask Q28 if they participated in snorkeling or scuba diving without a boat (activities 103 or 203).

Q28. On the most recent saltwater snorkeling or scuba diving day without a boat, approximately how much did your party spend on the following items in Martin County:

Expenditures on Most Recent
Saltwater Snorkeling or Scuba Diving Day in Martin County

Expenditure Item	Q26 Own/Friend's Boat	Q27 Rental Boat	Q28 No Boat
Boat rental	\$ <u>XXXXXXXXXXXX</u>	\$ _____	\$ <u>XXXXXXXXXXXX</u>
Boat fuel	\$ _____	\$ _____	\$ <u>XXXXXXXXXXXX</u>
Air refills	\$ _____	\$ _____	\$ _____
Ice	\$ _____	\$ _____	\$ _____
Ramp fees	\$ _____	\$ _____	\$ <u>XXXXXXXXXXXX</u>
Marina fees	\$ _____	\$ _____	\$ <u>XXXXXXXXXXXX</u>
Other equipment rentals	\$ _____	\$ _____	\$ _____
Lodging	\$ _____	\$ _____	\$ _____
Camping fees	\$ _____	\$ _____	\$ _____
Food and beverages - stores	\$ _____	\$ _____	\$ _____
Food and beverages - restaurants/bars	\$ _____	\$ _____	\$ _____
Auto gas	\$ _____	\$ _____	\$ _____
Auto rental	\$ _____	\$ _____	\$ _____
Equipment rental	\$ _____	\$ _____	\$ _____
Shopping (clothing, gifts, souvenirs)	\$ _____	\$ _____	\$ _____
Number of People in party who spent or benefited from this money (overall)	# _____	# _____	# _____

Q29. Are these expenditures for one day or for many days? _____ 1 day; _____ many days. If many, how many days? _____

SNORKELING OR SCUBA DIVING EXPENDITURES, continued

Ask Q30 if they participated in snorkeling or scuba diving from a charter/party boat (**activities 100 or 200**).

Q30. On the most recent saltwater snorkeling or scuba diving day using a charter/party boat, approximately how much did your party spend on the following items in Martin County:

	Expenditures on Most Recent Saltwater Snorkeling or Scuba Diving Day in Martin County
Expenditure Item	Q30 Charter/Party Boat
Charter/party boat fee	\$ _____
Equipment rental	\$ _____
Air refills	\$ _____
Ice	\$ _____
Ramp fees	\$ _____
Marina fees	\$ _____
Lodging	\$ _____
Camping fees	\$ _____
Food and beverages - stores	\$ _____
Food and beverages - restaurants/bars	\$ _____
Auto gas	\$ _____
Auto rental	\$ _____
Shopping (clothing, gifts, souvenirs)	\$ _____
Number of People in party who spent or benefited from this money (overall)	# _____

Q31. Are these expenditures for one day or for many days? ____ 1 day; ____ many days. If many, how many days? _____

Boating Visitors Survey - Martin County

Now I would like to ask you a few questions about how you value both the artificial and natural reefs in Martin County.

**CONTINGENT VALUATION QUESTIONS
MARTIN COUNTY, FLORIDA
(Show Respondent(s) the Martin County Florida map)**

- Q32. Over the past 12 months, how many trips have you made to Martin County, Florida in which you used the natural reefs? _____ (# trips)
- Q33. On these trips, how many days did you stay in Martin County? _____ (# days)
- Q34. Over the past 12 months, how many trips have you made to Martin County, Florida in which you used the artificial reefs? _____ (# trips)
- Q35. On these trips, how many days did you stay in Martin County? _____ (# days)
- Q36. Over the past 12 months, how many trips have you made to Martin County, Florida in which you used both the artificial or natural reefs? _____ (# trips)
- Q37. On these trips, how many days did you stay in Martin County? _____ (# days)

Hand respondent BLUE CARD.

Please take a minute and read the information in Section 1 on the BLUE CARD about the plans.

Now I would like to ask you only about a plan to maintain the health and condition of the natural reefs in Martin County.

38. First, consider your total trip costs for your last trip to use the natural reefs of Martin County, including travel expenses, hotel and campsites fees, food and drink, and all other 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 reefs?**

Please keep in mind that the added costs would have been used to make sure the water quality and health of the natural reefs would have been maintained in their current condition. Also, keep in mind that instead of using the natural reefs in Martin County, you could have used the artificial reefs, gone to places other than Martin County or spent this money on other things.

- YES (Go to Question 40) Don't Know (Go to Question 39)
 NO (Go to Question 39) Refused (Go to Question 39)

38a. *If yes and if party size associated with expenditure info greater than 1, ask:* Was your answer based on the costs for all the people you were paying for on this trip or just yourself?

- Included all the people Included just myself

Boating Visitors Survey - Martin County

39. Please refer to Section 2 on the BLUE CARD and indicate the letter that best describes your reason for saying no, don't know or refusing. *Write-in any other reason.*

(circle): A B C D E F G H Other, _____

Now we would like to evaluate the artificial reef plan.

40. Considering your total trip costs for your last trip to use the artificial reefs in Martin County, including travel expenses, hotel and campsites fees, food and drink, and all other 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?**

Please keep in mind that the added costs would have been used to make sure the water quality and health of the fish and sea life on the artificial reefs would have been maintained in their current condition. Also, keep in mind that instead of using the artificial reefs of Martin County, you could have used the natural reefs, gone to places other than Martin County or spent this money on other things.

- YES (Go to Question 42)
- Don't Know (Go to Question 41)
- NO (Go to Question 41)
- Refused (Go to Question 41)

40a. *If yes and if party size associated with expenditure info greater than 1, ask: Was your answer based on the costs for all the people you were paying for on this trip or just yourself?*

- Included all the people
- Included just myself

41. Please refer to Section 3 on the BLUE CARD and indicate the letter that best describes your reason for saying no, don't know or refusing. *Write-in any other reason.*

(circle): A B C D E F G H Other, _____

42. Suppose that both of the above plans to maintain the natural and artificial reefs in Martin County were put together in a combined program. Consider once again your total trip costs for your last trip to use the reefs in Martin County 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 and NATURAL reefs?**

- YES (Go to Question 44)
- Don't Know (Go to Question 43)
- NO (Go to Question 43)
- Refused (Go to Question 43)

42a. *If yes and if party size associated with expenditure info greater than 1, ask: Was your answer based on the costs for all the people you were paying for on this trip or just yourself?*

- Included all the people
- Included just myself

43. Please refer to Section 4 on the BLUE CARD and indicate the letter that best describes your reason for saying no, don't know or refusing. *Write-in any other reason.*

(circle): A B C D E F G H Other, _____

Boating Visitors Survey - Martin County

Please take a minute and read Section 5 of the Blue Card on the **Artificial Reef Program for NEW Reefs.**

44. **Would you be willing to pay \$ ____ per year when you renew your boat registration and/or that amount in higher fees to charter/party boat or rental boat operations to fund this program?** The amount paid would go to fund **NEW ARTIFICIAL REEFS** in Martin County.

Please keep in mind that this amount would be in addition to the costs above for maintaining the current artificial reefs and protecting the water quality. Also, keep in mind that instead of using the artificial reefs in Martin County, you could have used the natural reefs, gone to places other than Martin County or spent this money on other things.

- YES (*Go to Question 46*) Don't Know (*Go to Question 45*)
 NO (*Go to Question 45*) Refused (*Go to Question 45*)

44a. *If yes and if party size associated with expenditure info greater than 1, ask:* Was your answer based on the costs for all the people you pay for on a typical trip or just yourself?

- Included all the people Included just myself

Q45. Please refer to Section 6 on the BLUE CARD and read me the letter that best describes your reason for saying no, don't know or refusing. *Write-in any other reason.*

(circle): A B C D E F G H Other, _____

Q46. How long have you been boating in Martin County?

_____ (# years)

Q47. Do you own your own boat? Yes No

Q48. Are you a member of a fishing or diving club?

- YES NO

Q49. In what year were you born? 19 ____ ____

Q50. Sex: Male Female (Observed, not asked)

Q51. Please refer to Section 4 of the YELLOW CARD and tell me which income category best describes your annual household income last year, before taxes. Please give me the letter on the card that corresponds to the category.

A B C D E F G H I J K L M N O

- Refused
 Don't know

Boating Visitors Survey - Martin County

Q52. a) During this trip to Martin County, were you giving up any income earning activities?

YES

NO



→ Q53. b) How much income, before taxes, do you estimate you lost during this trip to Martin County? \$_____

This concludes your interview. Thank you for your time.

Appendix D

Recreational For-Hire Survey

**Socioeconomic Study of Reefs
In Martin County Florida**

March 28, 2003

Person's Name
BUSINESS NAME
Address
City, State Zip

Socioeconomic Study of Reefs in Martin County Florida

Dear :

Please find enclosed a charter / party boat survey to be completed. Your business has been identified as one that provides charter or party boat fishing or diving services in Martin County. We have been retained by Martin County to estimate the economic contribution and use values of the natural and artificial reefs in Martin County. For people who use charter or party boat services, we have found that they do not always know whether they have fished (and sometimes whether they have dived) on artificial or natural reefs. To help us with this information, please complete this survey, place it in the enclosed postage-paid business reply envelope, and return it.

If you do not provide charter or party boat fishing or diving services in Martin County, please enter a 0 for question 1 of the survey and mail it back to us. If you do not use the reefs, please fill out the survey, as it will help us with our estimates of reef use.

Your responses and those of others will be used in a study called Socioeconomic Study of Reefs in Martin County, Florida being sponsored by Martin County and the Florida Fish and Wildlife Conservation Commission. This study will determine, in a comprehensive manner, the net economic value of the natural and artificial reef resources of Martin County to the users of these reefs and the local economy. This study is expected to demonstrate the importance of additional funding at the Federal, State and local levels to protect our reef resources while promoting reef use.

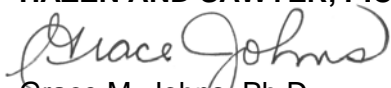
Your completed survey is very important to evaluate the economic contribution and use-values of artificial and natural reefs in Martin County. Your responses are strictly confidential and will be combined with other responses. Upon completion of the survey, all mailing lists will be destroyed.

Should you have any questions or concerns, please feel free to contact me at the address or phone number on the letterhead or call Ms. Kathy Fitzpatrick, Coastal Engineer, Martin County Public Services Department at (772) 288-5429.

Thank you very much for your participation.

Very truly yours,

HAZEN AND SAWYER, P.C.



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

Enclosure

Hwd:40526L009

**MARTIN COUNTY FLORIDA
CHARTER/PARTY BOAT SURVEY
ARTIFICIAL AND NATURAL REEF USE**

We are conducting a study of the economic value of both artificial and natural reef use in the saltwater areas off Martin County. The Florida Fish and Wildlife Conservation Commission and Martin County are funding this study.

Separate surveys of residents and non-residents of each county are being conducted. However, for those people who use charter/party/guide boat services, we have found that they do not know whether they have fished (and sometimes whether they have dived) on artificial or natural reefs.

As an experienced captain or guide that takes people out for fishing, diving or glass-bottom boat rides, we would like your assistance in more accurately estimating the proportion of use on artificial and natural reefs.

SECTION 1: CAPACITY AND USE OF VESSEL/BOAT

1. How many vessels/boats do you own or operate to take out paying passengers in Martin County? _____# boats

2. Of these boats, how many passengers is each boat licensed to carry?

	Number of Passengers		Number of Passengers
Boat 1	_____	Boat 3	_____
Boat 2	_____	Boat 4	_____

3. How would you classify your activity? Check the category that best describes your operation. Charter = 6 or less passengers; Party = more than six passengers. Dive/Snorkel means diving and/or snorkeling.

- | | |
|--|--|
| <input type="checkbox"/> Charter – Fish Only | <input type="checkbox"/> Party – Fish Only |
| <input type="checkbox"/> Charter – Dive/Snorkel Only | <input type="checkbox"/> Party – Dive/Snorkel Only |
| <input type="checkbox"/> Charter – Fish & Dive/Snorkel | <input type="checkbox"/> Party – Fish & Dive/Snorkel |
| <input type="checkbox"/> Glass-bottom boat | <input type="checkbox"/> Other (specify) _____ |

4. About what percentage of your business in Martin County is from residents in Martin County? _____ (%) Please provide your best estimate.

SECTION 2: ARTIFICIAL AND NATURAL REEF USE

5. Here we need your best estimates of passenger-days and the proportion of your passenger days that were spent on artificial reefs versus natural reefs versus no reefs in Martin County for the latest year. We ask for the information by activity type (e.g., fishing, scuba diving, snorkeling, or glass-bottom boat rides). We need your best estimate of the number of **passenger-days**. A passenger-day is defined as one passenger for any part of a day (half day or whole day).

For each activity, we need to know the percent of passenger-days spent on artificial reefs versus natural reefs versus not on reefs. The three percentages should sum to 100%.

Activity	Check if none	Total Passenger-Days	Percent of Passenger-Days			
			On Artificial Reefs	On Natural Reefs	Not on Reefs	Total
Fishing						100%
Scuba Diving						100%
Snorkeling						100%
Glass Bottom Boat Rides						100%

THANK YOU VERY MUCH FOR YOUR PARTICIPATION

Please **fax** the completed 2-page survey to Grace Johns, Hazen and Sawyer at
(954) 987-2949
(a cover page is not needed)

If this survey was mailed to you, you may fax the survey or place your completed survey in the self-addressed envelope and mail.

If you do not have a self-addressed envelope and cannot fax the survey, please mail to:

**Grace Johns
Hazen and Sawyer
4000 Hollywood Boulevard, Ste. 750 N
Hollywood, Florida 33021**

If you have any questions, please call Grace Johns at (954) 987-0066 or e-mail her at gjohns@hazenandsawyer.com

