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Survey Research on
Florida Boaters and Manatee Management

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Executive Summary

The Florida manatee (*Trichechus manatus latirostris*) was classified as endangered in 1973. Boats account for about 25% of manatee deaths each year (Ackerman et al. 1995; Wright et al. 1995), emphasizing the need to study the human dimensions context of manatee conservation. This study examines boaters’ knowledge, attitudes, and behavioral intentions regarding manatee protection and management in Florida. These data provide baseline information for comparing the efficacy of environmental regulations and educational interventions in the Tampa Bay area. This study also used socio-psychological theory to understand the relationship between the beliefs, attitudes and behavioral intentions of boaters. The results of this survey help identify target beliefs, and aid in developing communication material aimed at influencing problem behaviors.

From May to June 2000, a phone survey instrument measured knowledge, attitudes, beliefs, and behavioral intentions of boaters in Tampa Bay towards manatees and their conservation. The survey was administered to a random sample of 915 registered boat owners, whose boats were observed in the Tampa Bay area. Completed questionnaires were obtained from 504 primary boat users, with a response rate of 55.03%.

Demographic information revealed that respondents, the primary boat users, averaged 46.3 years in age, had 14.3 years of education, and 24.5 years of boating experience. A large proportion of the respondents were male (81.2%), and Caucasian (90.1%). Fifty-two percent were sport fishermen, and 24.8% engaged in pleasure boating. Two thirds (65%) of the respondents had seen a manatee at least once in Tampa Bay.

Respondents averaged 6.16 on a 10-point knowledge scale, and supported manatee conservation efforts, with a mean of 3.84 on a 5-point overall support scale. Boaters indicated more support for increased public education, than for stringent regulations such as setting speed and wake limits in sea grass areas, no-entry areas, or increased patrols. Thirty-nine percent of the respondents indicated a willingness to pay a license surcharge averaging $6.31 for increased patrols, and of $6.81 for increased public education, when asked in a hypothetical question. A majority of respondents believed that about a quarter of the boaters violated speed zones and entered closed areas, and perceived that almost none harassed manatees. Greater knowledge about manatees was positively related with support for their conservation. Greater knowledge and support were positively related to perception of speeding, no-entry or harassment violations.
An analysis of trends in the last ten years was based on comparisons with three previous public surveys. Our results indicated a decrease in knowledge about manatees and their protection. There was also a decrease in support for conservation efforts such as setting speed and wake limits in seagrass areas, no-entry areas, increased patrols and speed reduction.

Fishbein & Ajzen’s Theory of Reasoned Action was applied to the behavior of disregarding speed zones. Analysis demonstrated a heavy normative influence on the behavioral intention of following speed zones, with respondents having a high motivation to comply with law enforcers.

Based on the survey results, future communications objectives were identified as (1) filling gaps in knowledge about manatees and their conservation, (2) identifying and clarifying speed zone regulations and harassment behaviors (3) increasing support for manatee conservation efforts, (4) strengthening attitudes and intention towards following speed zone and no-entry regulations, and (5) using media more effectively to increase compliance with law enforcement. Communication strategies and tools are recommended in this report.

This study is part of a larger project to examine the impacts and effectiveness of persuasive communication and regulatory interventions on Tampa Bay boaters. The results of this study will be disseminated at The Florida Chapter of the Wildlife Society Spring Conference at Gainesville, in March. This final report is a draft manuscript, to be coauthored by the University of Florida and Florida Marine Research Institute project scientists (Susan K. Jacobson, Sampreethi Apanjiguly and Richard Flamm), for a professional journal.
Introduction

The status of the Florida manatee (*Trichechus manatus latirostris*) has been a cause of great concern since it was classified as endangered in 1973. Even though manatee numbers have been fluctuating, there is little confusion regarding causes of manatee mortality (Twiss & Reeves 1999). The combination of biological traits such as low reproductive potential, with factors such as degradation or elimination of habitat, and impacts of human activities, such as watercraft collisions, have proved disastrous to the manatee.

Boats account for about 25% of manatee deaths each year (Ackerman et al. 1995; Wright et al. 1995). This emphasizes the need to study the human dimensions aspect of manatee conservation. A few studies have attempted to understand people’s attitudes and beliefs towards manatees and their conservation. These studies have gathered opinions about various issues regarding manatees and their conservation. One of the primary reasons for studying human attitudes and beliefs towards manatees and their conservation is to understand human behavior and to identify potential interventions for changing negative behaviors. Studies conducted so far, however, have not explored the relationship between knowledge, beliefs, attitudes and behavior.

This study aims to describe the sociodemographic make-up of the target audience—boaters in Tampa Bay. We determine boaters’ sources of information, opinion about manatee conservation strategies, priorities regarding manatee conservation issues, willingness to make various compromises to better protect manatees, knowledge about manatees and their conservation, and reactions to new policy, regulation, or communications programs.

This study uses a socio-psychological theory to understand the relationship between the beliefs, attitudes and behavioral intentions of boaters. The results of this study help identify target beliefs, and aid in developing communication material aimed at influencing attitudes and beliefs. This study provides a useful trend analysis for comparison with the survey of Florida’s registered boat owners (Parker, 1989), the report on the Public Use of the Crystal River National Wildlife Refuge (Buckingham, 1989), and Parker and Wang’s 1996 report on a survey of the Florida Public and Manatee Protection. Our study also acts as a foundation to examine the impacts and effectiveness of environmental communication and regulatory interventions on Tampa Bay boaters in the future.
Demographics and other relevant information

Sociodemographic variables in the survey include years of boating experience, years of education, race or ethnic background, income, age, and sex. Other relevant information include boating frequency of the respondent in Tampa Bay in the last year, boater’s primary activity when boating, number of times boater has seen manatees in Tampa Bay in the previous year, season during which the respondent visits Tampa Bay, and membership in local boating, fishing and environmental clubs. These variables are correlated with knowledge, attitude, and belief measures. This study also describes the audience’s sources of information about boating regulations and manatees.

Attitudes and knowledge

Many studies on knowledge and attitude have found a positive and often significant relationship between the two variables. In a study of the effectiveness of a visitor education strategy in raising levels of knowledge and attitudes toward state nature preserves, Olson, Bowman and Ruth (1984) found a positive relationship between scores on the knowledge test and scores on the attitude test for all concepts measured. They were successful in both raising levels of knowledge and improving attitudes toward environmental management through the use of state park visitor education programs. Pettus (1976) contends that some basic knowledge of the environment is needed in order to promote development of desirable attitudes and to enable people to make sound environmental decisions.

The survey instrument in this study includes 10 knowledge items:

- The manatee is an endangered species.
- Touching a manatee without it first approaching is harassment.
- Swimming with a manatee will disturb it.
- Feeding a manatee will disturb it.
- Any human activity that changes a manatee’s behavior is harassment.
- Manatees feed only on plants.
- Manatees have to be fed because there may not be enough natural plants for them.
- Fishing lines are a threat to manatees.
- Wearing polarized sunglasses would help see manatees better.
- What proportion of manatee deaths are boat-related?

The statements were constructed based on a review of printed literature which is distributed to boaters in Tampa Bay, and consultation with FMRI staff.
This study includes information on audience support for manatee conservation efforts. Measures include boater support for:

- speed reduction on waterways
- no-entry areas
- setting speed or wake limits in seagrass areas
- increased public education
- increased patrols for law enforcement
- willingness to pay a license surcharge for increased patrols by law enforcement officers, and increased public education.

**A Theoretical Framework Based on the Theory of Reasoned Action**

One component of this study tested the suitability of Fishbein and Ajzen’s Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980), to understand boater behavior. This general theory of human behavior deals with the relationships among beliefs, attitudes, intentions and behavior. It has been used extensively to study and explain a wide variety of behaviors including public support for a controlled burn policy of the National Park Service (Bright et al., 1993), voting behavior on a ballot initiative for Colorado’s trapping amendment (Manfredo et al., 1997), Colorado’s social climate for wolf reintroduction (Pate et al., 1994), intentions of woodland owners to harvest timber (Young & Reichenbach, 1987), outdoor recreation behavior (Young & Kent, 1985), differences in the attitudes of farmers and conservationists and their implications (Carr & Tait, 1991), attitudes toward wildlife watching (Miller, 1995), identifying value orientations and attitudes influencing the decision to hunt and/or fish in Colorado (Fulton et al., 1996), and hunting interventions (Rossi & Armstrong, 1999).

The many studies that have used the Theory of Reasoned Action as a framework have reflect its robust nature to understand, explain and predict behaviors, and also to provide a useful guide for designing intervention strategies to replace, alter, or maintain behaviors. In conservation and natural-resource related literature, where the use of socio-psychological theories and persuasion techniques is still in its infancy, these studies become all the more important in laying down benchmarks and guidelines in operationalizing and applying the theory. The studies not only underline the importance of identifying target audiences and target behaviors, but also stress on the usefulness of identifying target beliefs in order to design interventions. Ham and Krumpe (1996), in their article on identifying audiences and messages for non-formal environmental education, argue that resource managers often make the mistake of designing...
messages that contain only important factual information concerning the behavior they desire people to change. The authors further state that what resource managers fail to do is consult the intended recipients of the message to identify which of their beliefs really influence how they behave in a particular situation.

The TRA views a person's intention to perform (or not perform) a behavior as the immediate determinant of the action. This behavioral intention, in turn, has two determinants. One is the attitude towards the behavior—a person who believes that performing a given behavior will lead to mostly positive outcomes will hold a favorable attitude toward performing the behavior. The other is the subjective norm—a person who believes that most referents with whom he is motivated to comply think he should perform the behavior will perceive the social pressure to do so. The beliefs that underlie a person's attitude toward the behavior are termed behavioral beliefs, and those that underlie the subjective norm are termed normative beliefs.

The first step in developing an instrument to measure boaters' attitudes toward manatee conservation was identifying the problem behaviors that threatened manatees. Behaviors identified were disregarding speed and no-wake zones set for manatee protection, entering areas closed for the protection of the manatee and its habitat, cutting across shallow water instead of staying in the marked channel, and direct human impacts on manatee behavior (swimming with the manatee, touching, feeding, giving the animal water to drink, chasing). A relative absence of beliefs made the behavioral and normative measures of the four target behaviors seem repetitive, and in the final instrument only one problem behavior—that of disregarding speed zones—was targeted.

As implied by the theory, if one wants to change or reinforce a given behavioral intention, one must add to, change or strengthen the attitude toward performing that behavior and/or change or strengthen the subjective norm with respect to that behavior. Whether one should change the attitude or the subjective norm depends upon the relative importance of these two components as determinants of a specific intention of the audience.

Trend Analysis

Several previous studies about Floridians and manatees provided data to analyze trends in public opinion about manatees over the past decade. In a survey of Florida’s registered boat owners, Parker (1989) interviewed 911 licensed boat owners to determine their attitudes about protecting the manatee, setting a maximum speed limit on the intracoastal waterway, setting speed or wake limits to protect natural resources, and improving boater safety. The study found
that 96% of boat owners sampled knew that the manatee is an endangered species, that 78% supported increased patrols by law enforcement officers to protect the manatee, 91% supported programs to protect the manatee if it meant reducing speed on waterways, 79% supported programs to protect the manatee if it meant designating no entry areas, and 91% supported setting speed or wake limits in areas where natural resources, such as sea grasses, need protection.

A report on the Public Use of the Crystal River National Wildlife Refuge (Buckingham, 1989), explored public knowledge of rules and regulations, knowledge of manatees, and public opinion regarding conservation efforts. The survey instrument recorded the opinions of nearly 300 people. Respondents included sport fishermen, commercial fishermen, divers, snorkelers, wildlife observers, pleasure boaters, and photographers, who visited Kings Bay. The study showed that knowledge of manatee rules was widespread. Eighty-seven percent of the respondents acknowledged that entry by any boat or person into a manatee sanctuary is prohibited; 84.1% knew that touching a manatee without it first approaching is considered harassment; 79.3% knew that approaching within 50 feet of a manatee with a motorboat would disturb it; and 89.3% agreed that manatees feed only on plants.

Parker and Wang's 1996 report on a survey of the Florida Public on Manatee Protection gathered attitudes and opinions about the quality of Florida's environment, the importance of manatee protection, sources of danger to the manatee, approaches to save the manatee, endangered species protection and economic concerns, and issues such as boater access, and boater safety. The survey found that 71% of the responses to the open-ended question "What do you feel is the biggest threat to manatees?" were boat-related.

All the above measures were repeated in the present survey to study trends in attitudes toward and beliefs about manatees and their conservation.

Study Objectives

In summary, the objectives of this study were to:

- describe the socio-demographic make-up of the target audience
- determine boaters' sources of information
- determine opinion about manatee conservation strategies, and priorities regarding manatee conservation issues
- determine willingness to make various compromises to better protect manatees
- describe knowledge about manatees and their conservation
- determine reactions to a new policy, regulation, or communications program
• understand the relationship between the beliefs, attitudes and behavioral intentions of boaters.

• help identify target beliefs to aid in developing communication material aimed at influencing attitudes and beliefs

• provide a useful trend analysis for comparison with similar previous studies

Our study serves as a foundation to examine the impacts and effectiveness of environmental communication and regulatory interventions on Tampa Bay boaters in the future.
Methods

This study assessed the knowledge, attitudes, and beliefs of boaters at Tampa Bay about manatees and their conservation. Standard survey design techniques were applied in this project (Babbie 1998, Salant & Dillman 1994). The questionnaire was administered by phone.

Sample

The sample for this study was obtained through boat observations in Tampa Bay. Volunteers for the Florida Marine Research Institute recorded registration numbers of the boats in the area, and obtained corresponding phone numbers of the registered boat owners. A total of 2211 registered boat owners were identified. Contact information for 219 boat registration numbers was unavailable and these were deleted from the final survey.

Tele-researchers at the Bureau of Economic and Business Research at the University of Florida dialed all 1,992 numbers using computer-aided random digit dialing, until they achieved over 500 complete responses. Since registered boat owners may not necessarily be the primary boat users, interviewers administered the survey after specifically asking for the primary boat user.

Questionnaire design and pilot testing

The questionnaire design followed standard procedures to construct simple questions that would elicit accurate results. Knowledge statements were constructed based on a review of printed literature distributed to boaters in Tampa Bay and in consultation with FMRI.

In order to develop measures to test the Theory of Reasoned Action, face-to-face elicitation interviews with 18 boaters were conducted at the Gandy and Maximo boat ramps in Tampa Bay. These helped determine salient outcomes of the problem behaviors and salient social referents with respect to a person performing these behaviors. Measures were developed as outlined by Ajzen & Fishbein (1980).

This study also conducted a trend analysis. Statements to measure trends in knowledge and beliefs about manatees and their conservation were based on studies by Parker (1989), Buckingham (1989), and Parker & Wang (1996).

The survey instrument was pilot tested (N=20), during the first half of March 2000, and revisions were made based on the outcome of the pilot test. The survey was administered in May and June, 2000.
Data Analysis

Data was entered into an Excel spreadsheet and imported into an SPSS 10.0 software package for statistical analysis. Data was checked for outliers, and answers for questions with open-ended options were examined for coding. Preliminary univariate analysis included reports of frequency distributions, central tendency and dispersion.

The 5-point attitude and belief measures were treated as interval level data in order to use the more sophisticated methods available for quantitative data (Agresti & Finlay, 1997). Test statistics were used to identify significant differences in mean scores between various groupings (F-test). The Pearson correlation coefficient, $r$, was used to measure the strength of relationships between knowledge, support, and perception of violations. When analyzing trends and examining differences between nominal data, chi-squared tests were used to identify significant differences. Significant differences are reported at the alpha level of $p \leq 0.01$.

Factor analysis using a varimax rotation procedure was applied to thirteen 5-point scale attitude items in order to reduce them into several reportable factors. Use of the Cronbach’s alpha (inter-item correlation reliability) ensured scale reliability for factor scales.

Analysis of the Theory of Reasoned Action followed steps laid out by Fishbein and Ajzen (1980). The following equation represents the theoretical relationship between attitude and beliefs: $A = \sum (B_i E_i)$, where $A$ is the computed measure of attitude, $B$ is the measure of the belief’s strength, and $E$ is the measure of the belief outcome’s evaluation. The equation $SN = \sum (NB_i MC_i)$ expresses the relationship between subjective norm, normative beliefs, and motivation to comply with specific referents. $SN$ is the computed measure of the subjective norm, $NB$ is the measure of the normative belief, and $MC$ is the measure of the motivation to comply. Correlation coefficients served as tests of the relationship between the computed measures of attitude, subjective norm, and their respective direct measures. Correlation coefficients were also used to examine the relationship between attitude, norm, and behavioral intention. Standardized beta regression coefficients were used to estimate the relative importance of the attitudinal and normative components in their relationship with behavioral intention.
Results

Survey Response

A total of 2211 registered boat owners were identified through boat observations in Tampa Bay. Corresponding contact information for 219 boat registration numbers was unavailable and these were deleted for the final survey. The remaining 1,992 numbers were called, on an average of 3.3 attempts per number. About 10% (222 respondents) of the listed sample of boat owners said that they didn't own boats, and 80 phone numbers belonged to business or government organizations. Both these categories were considered ineligible for the survey.

The survey resulted in 504 completes, with 411 refusals. The 411 refusals included 107 strong refusals and 304 soft refusals. When soft refusals were converted to a complete, they were subtracted from the soft refusal total, and added to the completes. The response rate calculated as a percentage of (# of responses/(# of responses + # of refusals)), gives us a response rate based on people who actually answered the survey, or 55.03%.

Socio-Demographic Background

Demographic data are shown in Table 1. The mean age of all respondents was 46.3 years (S.D=13.5). Eighty-one percent of the respondents were male and 19% were female.

The average number of years of education was 14.3 years (S.D=2.5); 31.5% had a high school education, 23.6% had at least 2 years of college education, 30.4% were college graduates, and 14.5% had graduate school experience.

A majority of the respondents (19.2%) fell in the $41,000 to $60,000 income bracket, followed by 15.7% in the $61,000 to 80,000 bracket. Ninety percent of the respondents were Caucasian.

Boating Information

The respondents have extensive boating experience, averaging 24.5 years, with 83.7% having 10 years or more experience and 42.1% having 30 years or more.

Eighteen percent of the respondents reported boating in Tampa Bay up to 10 times in the last year, 41.1% reported boating 11 to 50 times, and 31.7% reported boating more than 50 times. Surprisingly, 8.7% reported that they did not boat in Tampa Bay in the last year, although respondent information was obtained from boat observations in the area.
Fifty-two percent of the respondents were sport fishermen, and 24.8% engaged in pleasure boating. A majority of 71% reported boating in Tampa Bay year round. A list of other primary activities of respondents in Tampa Bay is listed in Appendix B.

Other Relevant Information

Observations of Manatees

Sixty-five percent of the respondents reported having sighted a manatee at least once in Tampa Bay, with 32.5% having sighted a manatee between 1 and 5 times.

Source of information

Fifty-six percent reported having received printed informational material on manatees. Seventy-two percent said they carried nautical charts when boating.

Newspapers and magazines were reported as the primary source of information about boating regulations by 21%. 19.6% of the respondents said they got boating regulations information from brochures, and 12.5% said they got the information from the coastguard.

Thirty-one percent of the respondents said they got information about manatees from newspapers and magazines, and 18.7% said they got the information from brochures. A detailed frequency distribution of sources of information is shown in Table 2. A list of the other primary sources of information is shown in Appendix C.

Membership in Organizations

Twenty-five percent of the respondents were members of fishing, boating or environmental clubs. The list of clubs is shown in Appendix D.

Beliefs Toward Manatees and their Conservation

Factor analysis

At the design stage of the questionnaire, five items were included to measure support for manatee conservation efforts. Factor analysis was used to verify these groupings. An analysis of thirteen attitude and belief items demonstrated that the variables fell into four factors. For further analysis, of these four, two indices of opinion were used: (1) to measure support for manatee conservation efforts, and (2) to measure respondents' perception of violations. Based on the analysis, two additional items were added to the five-item support measure. Factor loading scores and the proportion of variance of each variable that can be explained by the common factors are shown in Appendix E.
Support for manatee conservation efforts

The index to measure support for manatee conservation efforts was constructed from 7 items that rated respondents' support for the following: (1) support for speed reduction in some waterways, (2) support for no-entry areas, (3) support for setting speed/wake limits in sea grass areas, (4) support for increased public education, (5) support for increased patrols, (6) belief that manatees are in need of protection, and (7) belief that manatees are worth saving, despite the need for regulations (Table 3a). Overall mean support for manatee conservation efforts, on a scale of 1 to 5, was 3.84 (S.D.=1.10). A post-hoc Tukey's test showed that support for speed reduction, public education, belief that manatees need protection and that they are worth saving were not significantly different from each other; however, these variables scored significantly greater than support for no-entry areas, for speed/wake limits in seagrass areas, and for increased patrols. Reliability analysis resulted in a Cronbach's alpha of 0.716, with an item means of 3.869.

Factors Correlated with Support for Manatee Conservation

To determine correlations with socio-demographic and other variables, scores for the seven support items were added for each respondent, resulting in a total score of 35 possible points. Significant correlations among support and other variables are shown in Table 4. Respondents with an income of less than $40,000 (25.44) scored significantly less on the support scale than those in the $61,000 to $80,000 (27.60), the $81,000 to 100,000 (28.55) and over $100,000 (28.02) income categories (F=5.029, p=0.001). Females scored higher (28.65) than males (26.74, F=13.27, p<0.001). Sport fishermen (27.12), and boaters whose primary activity was cruising (28.22) reported higher support scores than others (25.80, F=5.863, p=0.003).

Support for manatee conservation efforts was positively related to knowledge (r=0.263, p<0.001), and to perception of violations (r=0.185, p=0.001).

A list of significant relationships between demographic variables and individual support variables is shown in Table 5.

Perception of violations

The perception of violations index was constructed from three variables. This index measured respondents' opinions on the percentage of boaters who: (1) violated speed zones, (2) entered areas closed for manatee protection, and (3) harassed manatees (Figure 1a, 1b,1c).

Reliability analysis indicated a Cronbach's alpha of 0.621, with an inter-item means of 2.178. Scores for the three items were added to arrive at a 15-point scale.
Factors Correlated with Perception of Violations

Females perceived a larger proportion of violations (7.27), than males (6.38, F=8.62, p=0.004). Perception of violations was positively correlated to knowledge (r=0.147, p=0.009), and to support (r=0.185, p=0.001). Significant means comparison tables for perception of violations is shown in Table 6.

Knowledge about manatees and their conservation

At the design stage of the survey questionnaire, twelve items were to indicate knowledge. However, two items, (1) manatees need fresh water to drink, and (2) entry into a manatee sanctuary is prohibited, were removed from the final knowledge measure because of ambiguous wording and variability in public information.

Respondents averaged 6.16 points (S.D=2.08) on the 10-point knowledge score. The percentage of respondents that correctly answered each question is shown in Table 7.

Factors Correlated with Knowledge about Manatees

A number of variables were related to knowledge (Table 8). Respondents who had boated less than ten times in Tampa Bay in the last year, had lower mean knowledge scores than more frequent boaters (F=6.403, p=0.002). Those who were members of fishing, boating and environmental clubs had more knowledge (6.53), than those who were not (6.03, F=5.594, p=0.018). Knowledge was also related to income. Those with an income between $61,000 and $80,000 (6.67) had a higher mean knowledge score than those with an income less than $40,000 (5.66, F=2.958, p=0.020). Sport fishermen were more knowledgeable (6.51) than boaters whose primary activity was cruising (5.85, F=5.042, p=0.007).

Respondents who had seen manatees in Tampa Bay had a higher knowledge score, than those who had never spotted manatees (F=8.944, p<0.001). Those who had received literature about manatees were more knowledgeable (6.43), than those who had not (5.88, F=8.495, p=0.004).

Knowledge was positively correlated to support (r=0.263, p<0.001) and to perception of violations (r=0.147, p=0.009).

Analysis based on the Theory of Reasoned Action

The Theory of Reasoned Action (TRA) argues that a person's attitude toward a behavior is determined by the set of salient beliefs he or she holds about the behavior (Ajzen & Fishbein, 1980). In this study, the behavior we aimed to understand was disregarding speed zones. The product of the perceived consequences and evaluation of these consequences (Table 9a) was
summed and correlated with respondents' overall attitude towards disregarding speed zones, resulting in an 'r' value of 0.087. The 'p' value (0.067) was not statistically significant.

Ajzen and Fishbein argue that a person's subjective norm is a function of normative beliefs. According to the TRA, a person's subjective norm can be predicted from the index obtained by multiplying normative beliefs by the corresponding motivations (Table 9b) to comply and then summed. The 'r' value, after, correlating normative beliefs with subjective norms was a moderate, and statistically significant 0.448 (p<0.001).

Attitude and behavioral intention correlated at (r=0.323, p<0.001); norm and behavioral intention correlated highly at 0.705 (p<0.001). A linear regression demonstrated a heavy normative influence on the behavioral intention (standardized beta=0.705). According to the analysis, attitude had lesser influence on the intention of following speed zones (standardized beta=0.323, Figure 2).

Significant relationships between intention, attitudes, norms, knowledge and support variables were further studied to aid in planning interventions.

Intention to follow speed zones was positively related to knowledge (r=0.238, p<0.001) and support (r=0.509, p<0.001). Positive attitude towards following speed zones was related to knowledge (r=0.147, p<0.001) and support (r=0.319, p<0.001). Motivation to comply with law enforcers was positively related to knowledge (r=0.172, p<0.001) and support (0.305, p<0.001).

Knowledge variables, attitude and intention to follow speed zones

Individual knowledge variables were compared against attitude and intention to follow speed zones, in order to help plan communication strategies.

Significant differences in attitude towards following speed zones existed between respondents who believed that: manatees are endangered (F=8.922, p=0.003), feeding a manatee disturbs it (F=11.161, p=0.001), touching a manatee without it first approaching is considered harassment (F=9.994, p=0.002), any human activity that changes a manatee's behavior is harassment (F=9.324, p=0.002), and fishing lines pose a threat to manatees (F=6.617, p=0.010).

Significant differences in intention to follow speed zones existed between respondents who believed that: manatees are endangered (F=34.631, p<0.001), feeding a manatee disturbs it (F=9.979, p=0.002), touching a manatee without it first approaching is considered harassment (F=13.490, p<0.001), any human activity that changes a manatee's behavior is harassment
(F=22.583, p<0.001), manatees feed only on plants (F=4.337, p=0.028), and fishing lines are a threat to manatees (F=16.022, p<0.001).

Significant relationships also were found between knowledge variables and motivation to comply with law enforcers. Differences in motivation to comply with enforcers existed between respondents with the belief that manatees are endangered (F=18.442, p<0.001), touching a manatee without it first approaching is considered harassment (F=8.307, p=0.004), any human activity that changes a manatee’s behavior is harassment (F=8.821, p=0.003), manatees feed only on plants (F=11.177, p=0.001), and wearing polarized sunglasses helps spot manatees better (F=5.948, p=0.015).

Analysis of trends

The trend analysis for 10 items showed a general decrease in knowledge and support in the last ten years (Table 10).

Parker’s 1989 study found that 91% supported setting speed or wake limits in sea grass areas. Results of this study show that only 53.8% supported setting speed or wake limits ($X^2=283.041$, $p<0.001$). Support for reducing speed on some waterways remained about the same, from 91% to 87.1% ($X^2=5.395$, $p=0.100$). Support for no-entry areas decreased from 79% to 59.1% ($X^2=71.807$, $p<0.001$), and support for increased patrols had decreased from 78% to 73.8% ($X^2=161.188$, $p<0.001$).

In 1989, 98% of respondents said yes, when asked, “Were you aware that the manatee is an endangered species?” In this study 80.6% of the respondents agreed with the statement “The manatee is an endangered species”. In the last four years, compared with Parker & Wang’s 1996 survey, the belief that boats constitute the biggest threat to manatees decreased by 8.3%, belief that pollution was the biggest threat had increased by 4.1%, and belief that habitat loss was the biggest threat had increased by 4.9% (other open-ended responses are shown in Appendix F).

Our study revealed that only 62.5% of the respondents agreed that entry into a manatee sanctuary is prohibited, less than the 86.8% in 1989; 60.1% agreed that touching a manatee without it first approaching is considered harassment, less than the 84.1% in 1989; 55.3% agreed that approaching within 50 feet of a manatee with a motorboat disturbs it, less than the 79.3% in 1989; and 85.5% agreed that manatees feed only on plants, 89.3% agreed in 1989.

Other Indicators of Support for Manatee Conservation

Other indicators of support for manatee conservation in this study show that 91.1% of the respondents supported an increase in public education, and 48% of these were willing to pay a
mean license surcharge of $6.81 (S.D.=3.36) towards educational efforts. Of the 73.8% who supported increased patrols by law enforcement officers, 39.1% were willing to pay a mean license surcharge of $6.31 (S.D.=3.03) towards increased patrols. The matrix of trends in Table 7 shows the trends in support and knowledge. A list of other threats to manatees is shown in Appendix E.

Additional Opinions about Manatee Conservation

Thirty-eight percent of the respondents agreed or strongly agreed that speed zones were not adequately signed. Fourteen percent of the respondents felt that they had been negatively affected by regulations for protecting the manatee. Twenty-four percent of the respondents agreed or strongly agreed or otherwise that manatees like being petted. Twenty-six percent of the respondents agreed that fishing is better in areas that are closed for manatee protection.
<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>S.D=13.5</th>
<th>n=409</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>46.3</td>
<td>13.5</td>
<td>409</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>81.2%</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>18.8%</td>
<td>53</td>
</tr>
<tr>
<td>Education</td>
<td>Mean</td>
<td>14.3</td>
<td>79</td>
</tr>
<tr>
<td>Income</td>
<td>$20,000</td>
<td>2.2%</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>21,000 - 40,000</td>
<td>10.5%</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>41,000 - 60,000</td>
<td>19.2%</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>61,000 - 80,000</td>
<td>15.7%</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>81,000 - 100,000</td>
<td>11.3%</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>100,000 - 150,000</td>
<td>10.5%</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>&gt;150,000</td>
<td>8.9%</td>
<td>11</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td>Caucasian</td>
<td>90.1%</td>
<td>454</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>1.2%</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Asian or Pacific Islander</td>
<td>0.2%</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Hispanic/Latino</td>
<td>1.8%</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1.0%</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Multi-racial</td>
<td>4.0%</td>
<td>20</td>
</tr>
<tr>
<td>Boating experience</td>
<td>Mean</td>
<td>24.5</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>Times boated in</td>
<td>none</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Tampa Bay</td>
<td>1 - 10</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>Last year</td>
<td>11 - 50</td>
<td>207</td>
</tr>
<tr>
<td></td>
<td>More than 50</td>
<td>31.7%</td>
<td>160</td>
</tr>
<tr>
<td>Primary activity when boasting</td>
<td>Sport fishing</td>
<td>52.0%</td>
<td>262</td>
</tr>
<tr>
<td></td>
<td>Commercial fishing</td>
<td>2.6%</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Cruising</td>
<td>24.8%</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>Water skiing</td>
<td>2.2%</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Commuting</td>
<td>0.8%</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Other work-related</td>
<td>0.8%</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>5.0%</td>
<td>25</td>
</tr>
<tr>
<td>Manatee sightings in Tampa Bay</td>
<td>none</td>
<td>24.8%</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>1 - 5 times</td>
<td>32.5%</td>
<td>164</td>
</tr>
<tr>
<td></td>
<td>5 - 10 times</td>
<td>11.3%</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>more than 10</td>
<td>21.6%</td>
<td>109</td>
</tr>
<tr>
<td>Season for visiting</td>
<td>Summer</td>
<td>9.5%</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Winter</td>
<td>5.0%</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>All-year round</td>
<td>71%</td>
<td>358</td>
</tr>
<tr>
<td>Club membership</td>
<td>Yes</td>
<td>25.4%</td>
<td>128</td>
</tr>
<tr>
<td>Receipt of printed material on manatees</td>
<td>Yes</td>
<td>56.2%</td>
<td>283</td>
</tr>
</tbody>
</table>
Table 2

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>Boating Regulations</th>
<th>Manatees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newspapers and magazines</td>
<td>21.0%</td>
<td>31.0%</td>
</tr>
<tr>
<td>Brochures</td>
<td>19.6%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Coast guard</td>
<td>12.5%</td>
<td>----</td>
</tr>
<tr>
<td>Boating / coast guard classes</td>
<td>8.7%</td>
<td>----</td>
</tr>
<tr>
<td>Personal experience</td>
<td>5.0%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Family and friends</td>
<td>4.2%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Boating / fishing clubs</td>
<td>4.2%</td>
<td>----</td>
</tr>
<tr>
<td>Local environmental organizations</td>
<td>----</td>
<td>6.3%</td>
</tr>
<tr>
<td>Marine patrol</td>
<td>3.8%</td>
<td>----</td>
</tr>
<tr>
<td>Other government offices</td>
<td>3.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Boat supply/ bait &amp; tackle stores</td>
<td>3.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Zoos / museums</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Signs posted on waterways</td>
<td>3.0%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Navigational charts</td>
<td>1.2%</td>
<td>18.7%</td>
</tr>
<tr>
<td>Radio</td>
<td>0.2%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Television</td>
<td>0.4%</td>
<td>----</td>
</tr>
<tr>
<td>Other</td>
<td>6.3%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Don't get info</td>
<td>----</td>
<td>----</td>
</tr>
</tbody>
</table>
Table 3
Index of Support for Manatee Conservation: Individual Variables based on Mean
Scale: 1 = strongly disagree to 5 = strongly agree

<table>
<thead>
<tr>
<th>Abbreviated statement</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support for speed reduction</td>
<td>4.05</td>
<td>1.02</td>
</tr>
<tr>
<td>Support for no-entry areas</td>
<td>3.42</td>
<td>1.24</td>
</tr>
<tr>
<td>Support for speed/wake limits in seagrass areas</td>
<td>3.15</td>
<td>1.32</td>
</tr>
<tr>
<td>Support for public education</td>
<td>4.17</td>
<td>0.76</td>
</tr>
<tr>
<td>Support for increased patrols</td>
<td>3.70</td>
<td>1.15</td>
</tr>
<tr>
<td>Manatees need protection</td>
<td>4.21</td>
<td>0.78</td>
</tr>
<tr>
<td>Manatees are worth saving despite need for regulations</td>
<td>4.21</td>
<td>0.72</td>
</tr>
<tr>
<td>Total mean support for manatee conservation</td>
<td>3.84</td>
<td>1.10</td>
</tr>
</tbody>
</table>

Results of Post-Hoc Test for Means Comparisons between Individual Support Variables

<table>
<thead>
<tr>
<th></th>
<th>Support for speed reduction</th>
<th>Support for no-entry areas</th>
<th>Support for speed/wake limits</th>
<th>Support for public education</th>
<th>Support for increased patrols</th>
<th>Manatees need protection</th>
<th>Manatees are worth saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support for speed reduction</td>
<td>0.63*</td>
<td>0.90*</td>
<td>-0.12</td>
<td>0.35*</td>
<td>-0.16</td>
<td>-0.16</td>
<td></td>
</tr>
<tr>
<td>Support for no-entry areas</td>
<td>-0.63*</td>
<td>0.27*</td>
<td>-0.76*</td>
<td>-0.28*</td>
<td>-0.79*</td>
<td>-0.79*</td>
<td></td>
</tr>
<tr>
<td>Support for speed/wake limits</td>
<td>-0.90*</td>
<td>-0.27*</td>
<td>-1.02*</td>
<td>-0.55*</td>
<td>-1.06*</td>
<td>-1.06*</td>
<td></td>
</tr>
<tr>
<td>Support for public education</td>
<td>0.12</td>
<td>0.76*</td>
<td>1.02*</td>
<td>0.47*</td>
<td>-0.04</td>
<td>-0.03</td>
<td></td>
</tr>
<tr>
<td>Support for increased patrols</td>
<td>-0.35*</td>
<td>0.28*</td>
<td>0.55*</td>
<td>-0.47*</td>
<td>-0.51*</td>
<td>-0.51*</td>
<td></td>
</tr>
<tr>
<td>Manatees need protection</td>
<td>0.16</td>
<td>0.79*</td>
<td>1.06*</td>
<td>0.04</td>
<td>0.51*</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>Manatees are worth saving</td>
<td>0.16</td>
<td>0.79*</td>
<td>1.06*</td>
<td>0.03</td>
<td>0.51*</td>
<td>0.003</td>
<td></td>
</tr>
</tbody>
</table>

* Significant mean difference values per Tukey's test. Values significant at p≤0.05
Table 4

Significant means comparisons of total support for manatee conservation efforts

1. Support

<table>
<thead>
<tr>
<th>income</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 40,000</td>
<td>25.44&lt;sup&gt;a&lt;/sup&gt;</td>
<td>57</td>
<td>4.38</td>
</tr>
<tr>
<td>41,000 to 60,000</td>
<td>26.70&lt;sup&gt;b&lt;/sup&gt;</td>
<td>90</td>
<td>3.93</td>
</tr>
<tr>
<td>61,000 to 80,000</td>
<td>27.60&lt;sup&gt;b&lt;/sup&gt;</td>
<td>70</td>
<td>4.97</td>
</tr>
<tr>
<td>81,000 to 100,000</td>
<td>28.55&lt;sup&gt;b&lt;/sup&gt;</td>
<td>53</td>
<td>3.54</td>
</tr>
<tr>
<td>over 100,000</td>
<td>28.02&lt;sup&gt;b&lt;/sup&gt;</td>
<td>86</td>
<td>4.24</td>
</tr>
<tr>
<td>Total</td>
<td>27.27</td>
<td>356</td>
<td>4.35</td>
</tr>
</tbody>
</table>

$F=5.029, p=0.001$ (a and b connote statistical differences using Tukey's test at $p \leq 0.05$)

2. Support

<table>
<thead>
<tr>
<th>sex</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>26.74</td>
<td>372</td>
<td>4.24</td>
</tr>
<tr>
<td>Female</td>
<td>28.65</td>
<td>81</td>
<td>4.49</td>
</tr>
<tr>
<td>Total</td>
<td>27.08</td>
<td>453</td>
<td>4.35</td>
</tr>
</tbody>
</table>

$F=13.27, p<0.001$

3. Support

<table>
<thead>
<tr>
<th>Primary Activity</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sport fishing</td>
<td>27.12&lt;sup&gt;a&lt;/sup&gt;</td>
<td>242</td>
<td>4.12</td>
</tr>
<tr>
<td>Cruising</td>
<td>28.22&lt;sup&gt;a&lt;/sup&gt;</td>
<td>109</td>
<td>4.45</td>
</tr>
<tr>
<td>Others</td>
<td>25.80&lt;sup&gt;b&lt;/sup&gt;</td>
<td>51</td>
<td>4.54</td>
</tr>
<tr>
<td>Total</td>
<td>27.25</td>
<td>402</td>
<td>4.31</td>
</tr>
</tbody>
</table>

$F=5.863, p=0.003$ (a and b connote statistical differences using Tukey's test at $p \leq 0.05$)
Table 5
Significant relationships for individual demographic and support variables

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Sex</th>
<th>Education</th>
<th>Income</th>
<th>Boating Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manatees need protection</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manatees are worth saving</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Support for speed reduction</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support for speed/wake limits in seagrass areas</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Support for public education</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Means comparisons for demographic and individual support variables

1. Sex x Manatees need protection

<table>
<thead>
<tr>
<th>Sex</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>4.16</td>
<td>399</td>
<td>.79</td>
</tr>
<tr>
<td>Female</td>
<td>4.45</td>
<td>94</td>
<td>.70</td>
</tr>
<tr>
<td>Total</td>
<td>4.21</td>
<td>493</td>
<td>.78</td>
</tr>
</tbody>
</table>

F=10.879, p=0.001

2. Education x Manatees are worth saving

<table>
<thead>
<tr>
<th>Education</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school</td>
<td>4.04(^a)</td>
<td>152</td>
<td>.77</td>
</tr>
<tr>
<td>Some college</td>
<td>4.26(^b)</td>
<td>114</td>
<td>.72</td>
</tr>
<tr>
<td>College graduate</td>
<td>4.29(^b)</td>
<td>146</td>
<td>.67</td>
</tr>
<tr>
<td>Grad school/prof degree</td>
<td>4.31(^b)</td>
<td>71</td>
<td>.65</td>
</tr>
<tr>
<td>Total</td>
<td>4.21</td>
<td>483</td>
<td>.72</td>
</tr>
</tbody>
</table>

F=4.158, p=0.006 (\(a\) and \(b\) connote statistical differences using Tukey's test at \(p \leq 0.05\))

3. Income x Manatees are worth saving

<table>
<thead>
<tr>
<th>Income</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40,000</td>
<td>3.95(^a)</td>
<td>60</td>
<td>.95</td>
</tr>
<tr>
<td>41,000 to 60,000</td>
<td>4.10(^b)</td>
<td>94</td>
<td>.84</td>
</tr>
<tr>
<td>61,000 to 80,000</td>
<td>4.35(^b)</td>
<td>78</td>
<td>.60</td>
</tr>
<tr>
<td>81,000 to 100,000</td>
<td>4.39(^b)</td>
<td>56</td>
<td>.49</td>
</tr>
<tr>
<td>over 100,000</td>
<td>4.30(^b)</td>
<td>90</td>
<td>.57</td>
</tr>
<tr>
<td>Total</td>
<td>4.22</td>
<td>378</td>
<td>.73</td>
</tr>
</tbody>
</table>

F=4.597, p=0.001 (\(a\) and \(b\) connote statistical differences using Tukey's test at \(p \leq 0.05\))
4. Sex x Support for speed reduction

<table>
<thead>
<tr>
<th>Sex</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>3.97</td>
<td>408</td>
<td>1.03</td>
</tr>
<tr>
<td>Female</td>
<td>4.40</td>
<td>95</td>
<td>.90</td>
</tr>
<tr>
<td>Total</td>
<td>4.05</td>
<td>503</td>
<td>1.02</td>
</tr>
</tbody>
</table>

\[ F=14.112, p<0.001 \]

5. Income x Support for speed/wake limits in sea grass areas

<table>
<thead>
<tr>
<th>Income</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40,000</td>
<td>2.80\textsuperscript{a}</td>
<td>64</td>
<td>1.27</td>
</tr>
<tr>
<td>41,000 to 60,000</td>
<td>2.94\textsuperscript{ab}</td>
<td>96</td>
<td>1.30</td>
</tr>
<tr>
<td>61,000 to 80,000</td>
<td>3.16\textsuperscript{ab}</td>
<td>79</td>
<td>1.38</td>
</tr>
<tr>
<td>81,000 to 100,000</td>
<td>3.37\textsuperscript{ab}</td>
<td>57</td>
<td>1.36</td>
</tr>
<tr>
<td>over 100,000</td>
<td>3.47\textsuperscript{b}</td>
<td>97</td>
<td>1.25</td>
</tr>
<tr>
<td>Total</td>
<td>3.16</td>
<td>393</td>
<td>1.33</td>
</tr>
</tbody>
</table>

\[ F=3.685, p=0.006 \text{ (a and b connote statistical differences using Tukey's test at } p \leq 0.05) \]

6. Boating frequency x Support for public education

<table>
<thead>
<tr>
<th>Boating freq</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>3.97\textsuperscript{a}</td>
<td>129</td>
<td>.86</td>
</tr>
<tr>
<td>11 to 50</td>
<td>4.28\textsuperscript{b}</td>
<td>205</td>
<td>.74</td>
</tr>
<tr>
<td>more than 50</td>
<td>4.22\textsuperscript{b}</td>
<td>157</td>
<td>.66</td>
</tr>
<tr>
<td>Total</td>
<td>4.18</td>
<td>491</td>
<td>.76</td>
</tr>
</tbody>
</table>

\[ F=7.011, p=0.001 \text{ (a and b connote statistical differences using Tukey's test at } p \leq 0.05) \]

7. Income x Support for public education

<table>
<thead>
<tr>
<th>Income</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40,000</td>
<td>3.88\textsuperscript{a}</td>
<td>64</td>
<td>.97</td>
</tr>
<tr>
<td>41,000 to 60,000</td>
<td>4.15\textsuperscript{b}</td>
<td>94</td>
<td>.64</td>
</tr>
<tr>
<td>61,000 to 80,000</td>
<td>4.22\textsuperscript{b}</td>
<td>78</td>
<td>.80</td>
</tr>
<tr>
<td>81,000 to 100,000</td>
<td>4.43\textsuperscript{b}</td>
<td>56</td>
<td>.50</td>
</tr>
<tr>
<td>over 100,000</td>
<td>4.24\textsuperscript{b}</td>
<td>95</td>
<td>.73</td>
</tr>
<tr>
<td>Total</td>
<td>4.18</td>
<td>387</td>
<td>.75</td>
</tr>
</tbody>
</table>

\[ F=4.554, p=0.001 \text{ (a and b connote statistical differences using Tukey's test at } p \leq 0.05) \]
8. Sex x Support for public education

<table>
<thead>
<tr>
<th>Sex</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>4.13</td>
<td>102</td>
<td>.74</td>
</tr>
<tr>
<td>Female</td>
<td>4.34</td>
<td>93</td>
<td>.81</td>
</tr>
<tr>
<td>Total</td>
<td>4.17</td>
<td>495</td>
<td>.76</td>
</tr>
</tbody>
</table>

$F=5.815, p=0.016$
Table 6

Significant means comparisons for perception of violations

1. Proportion of violations

<table>
<thead>
<tr>
<th>Sex</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6.38</td>
<td>267</td>
<td>2.04</td>
</tr>
<tr>
<td>Female</td>
<td>7.27</td>
<td>56</td>
<td>2.12</td>
</tr>
<tr>
<td>Total</td>
<td>6.54</td>
<td>323</td>
<td>2.08</td>
</tr>
</tbody>
</table>

$F=8.624, p=0.004$
Table 7
Knowledge index scores- percent correct

<table>
<thead>
<tr>
<th>Summary of knowledge statements</th>
<th>Percent correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Manatees are endangered.</td>
<td>80.6%</td>
</tr>
<tr>
<td>2. Swimming with a manatee disturbs it.</td>
<td>40.3%</td>
</tr>
<tr>
<td>3. Feeding a manatee disturbs it.</td>
<td>56.2%</td>
</tr>
<tr>
<td>4. Touching a manatee without it first approaching is harassment.</td>
<td>60.1%</td>
</tr>
<tr>
<td>5. Any human activity that changes a manatee's behavior is harassment.</td>
<td>53.6%</td>
</tr>
<tr>
<td>6. Manatees feed only on plants.</td>
<td>85.5%</td>
</tr>
<tr>
<td>7. Manatees have to be fed because there may not be enough natural plants for them.</td>
<td>74.0%</td>
</tr>
<tr>
<td>8. Fishing lines are a threat to manatees.</td>
<td>68.1%</td>
</tr>
<tr>
<td>9. Wearing polarized sunglasses would help see manatees better.</td>
<td>78.2%</td>
</tr>
<tr>
<td>10. Proportion of boat-related manatee deaths</td>
<td>16.5%</td>
</tr>
<tr>
<td>(2.8%: none, 16.5%: one quarter, 21.4%: half, 30.4%: three-quarters, 14.3%: all, 14.7%: don't know)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 8

**Significant means comparisons for knowledge index**

1. **Boating frequency x Knowledge**

<table>
<thead>
<tr>
<th>Boating freq</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>5.63(^a)</td>
<td>130</td>
<td>2.04</td>
</tr>
<tr>
<td>11 to 50</td>
<td>6.29(^b)</td>
<td>205</td>
<td>2.01</td>
</tr>
<tr>
<td>more than 50</td>
<td>6.46(^b)</td>
<td>158</td>
<td>2.11</td>
</tr>
<tr>
<td>Total</td>
<td>6.17</td>
<td>493</td>
<td>2.07</td>
</tr>
</tbody>
</table>

\(F=6.403, p=0.002\) (a and b connote statistical differences using Tukey's test at \(p \leq 0.05\))

2. **Club membership x Knowledge**

<table>
<thead>
<tr>
<th>Club Membership</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6.53</td>
<td>128</td>
<td>2.08</td>
</tr>
<tr>
<td>No</td>
<td>6.03</td>
<td>365</td>
<td>2.07</td>
</tr>
<tr>
<td>Total</td>
<td>6.16</td>
<td>493</td>
<td>2.08</td>
</tr>
</tbody>
</table>

\(F=5.594, p=0.018\)

3. **Income x Knowledge**

<table>
<thead>
<tr>
<th>Income</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40,000</td>
<td>5.66(^a)</td>
<td>64</td>
<td>2.26</td>
</tr>
<tr>
<td>41,000 to 60,000</td>
<td>6.33(^{ab})</td>
<td>95</td>
<td>2.03</td>
</tr>
<tr>
<td>61,000 to 80,000</td>
<td>6.67(^b)</td>
<td>79</td>
<td>1.97</td>
</tr>
<tr>
<td>81,000 to 100,000</td>
<td>6.50(^{ab})</td>
<td>56</td>
<td>1.98</td>
</tr>
<tr>
<td>over 100,000</td>
<td>5.95(^{ab})</td>
<td>96</td>
<td>1.96</td>
</tr>
<tr>
<td>Total</td>
<td>6.22</td>
<td>390</td>
<td>2.05</td>
</tr>
</tbody>
</table>

\(F=2.958, p=0.020\) (a and b connote statistical differences using Tukey's test at \(p \leq 0.05\))

4. **Manatee sightings x Knowledge**

<table>
<thead>
<tr>
<th>Manatee Sightings</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>never</td>
<td>5.60(^a)</td>
<td>124</td>
<td>2.19</td>
</tr>
<tr>
<td>1 to 5 times</td>
<td>6.29(^b)</td>
<td>163</td>
<td>1.98</td>
</tr>
<tr>
<td>more than 5 times</td>
<td>6.63(^b)</td>
<td>163</td>
<td>1.99</td>
</tr>
<tr>
<td>Total</td>
<td>6.22</td>
<td>450</td>
<td>2.08</td>
</tr>
</tbody>
</table>

\(F=8.944, p<0.001\) (a and b connote statistical differences using Tukey's test at \(p \leq 0.05\))
5. Receipt of literature x Knowledge

<table>
<thead>
<tr>
<th>Receipt of literature</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6.43</td>
<td>279</td>
<td>2.03</td>
</tr>
<tr>
<td>No</td>
<td>5.88</td>
<td>205</td>
<td>2.06</td>
</tr>
<tr>
<td>Total</td>
<td>6.20</td>
<td>484</td>
<td>2.06</td>
</tr>
</tbody>
</table>

\[ F=8.495, \ p=0.004 \]

6. Primary activity x Knowledge

<table>
<thead>
<tr>
<th>Primary Activity</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sport fishing</td>
<td>6.51\textsuperscript{a}</td>
<td>261</td>
<td>2.03</td>
</tr>
<tr>
<td>Cruising</td>
<td>5.85\textsuperscript{b}</td>
<td>122</td>
<td>2.12</td>
</tr>
<tr>
<td>Others</td>
<td>5.96\textsuperscript{ab}</td>
<td>56</td>
<td>1.91</td>
</tr>
<tr>
<td>Total</td>
<td>6.26</td>
<td>439</td>
<td>2.06</td>
</tr>
</tbody>
</table>

\[ F=5.042, \ p=0.007 \ (a \ and \ b \ connote \ statistical \ differences \ using \ Tukey's \ test \ at \ p \leq 0.05) \]
### Table 9a

**Measures for Testing the Theory of Reasoned Action**

*Scale: 1=low to 5=high*

<table>
<thead>
<tr>
<th>Abbreviated statement</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likelihood of getting somewhere quickly by disregarding manatee speed zones. Evaluation of belief</td>
<td>2.92 3.28</td>
</tr>
<tr>
<td>Likelihood of being fined for disregarding manatee speed zones. Evaluation of belief</td>
<td>3.48 3.14</td>
</tr>
</tbody>
</table>

*Behavioral beliefs construct calculated as $A_B = \sum B_i E_i$*

### Table 9b

**Referent groups and motivation to comply**

*Scale: 1=strongly disagree to 5=strongly agree*

<table>
<thead>
<tr>
<th>Summary wording</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family &amp; friends think I should follow manatee speed zones.</td>
<td>4.18</td>
</tr>
<tr>
<td>Motivation to comply with family and friends</td>
<td>2.91</td>
</tr>
<tr>
<td>Co-boaters think I should follow manatee zones.</td>
<td>4.12</td>
</tr>
<tr>
<td>Motivation to comply with co-boaters</td>
<td>2.58</td>
</tr>
<tr>
<td>Law enforcers think I should follow manatee zones.</td>
<td>4.33</td>
</tr>
<tr>
<td>Motivation to comply with law enforcers</td>
<td>4.07</td>
</tr>
</tbody>
</table>

*Subjective norm construct calculated as $SN_B = \sum NB_i MC_i$*
<table>
<thead>
<tr>
<th>Statement</th>
<th>Previous study</th>
<th>Current study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you support setting speed or wake limits in areas where natural</td>
<td>Survey of Florida’s registered boat owners.</td>
<td>53.8% supported setting speed or wake limits in areas where natural resources,</td>
</tr>
<tr>
<td>resources, such as sea grasses, need protection?</td>
<td>Parker, 1989.</td>
<td>such as sea grasses, need protection.</td>
</tr>
<tr>
<td>Would you support programs to protect the manatee if it meant reducing</td>
<td>Survey of Florida’s registered boat owners.</td>
<td>87.1% supported programs to protect the manatee if it meant reducing speed on</td>
</tr>
<tr>
<td>the speed allowed on some waterways?</td>
<td>Parker, 1989.</td>
<td>waterways.</td>
</tr>
<tr>
<td>Would you support no entry areas in selected waterbodies during some</td>
<td>Survey of Florida’s registered boat owners.</td>
<td>59.1% supported programs to protect the manatee if it meant designating no-entry</td>
</tr>
<tr>
<td>months to protect the manatee?</td>
<td>Parker, 1989.</td>
<td>areas.</td>
</tr>
<tr>
<td>Would you support or oppose increased patrols by law enforcement</td>
<td>Survey of Florida’s registered boat owners.</td>
<td>22.2% strongly supported, 51.6% supported, 15.3% opposed and 5.8% strongly</td>
</tr>
<tr>
<td>officers to protect the manatee?</td>
<td>Parker, 1989.</td>
<td>opposed increased patrols. Of those who supported increased patrols, 39.1%</td>
</tr>
<tr>
<td></td>
<td>53% of the respondents strongly supported, 25% supported, 8% opposed, and 8%</td>
<td>(N=197) were willing to pay a license surcharge. 191 respondents were willing</td>
</tr>
<tr>
<td></td>
<td>strongly opposed increased patrols.</td>
<td>to pay a mean license surcharge of $6.31.</td>
</tr>
<tr>
<td>I support increased public education to protect the manatee.</td>
<td>NA</td>
<td>91.1% supported increased public education to protect the manatee. Of these, 48%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(N=242) were willing to pay a license surcharge. 235 respondents were willing to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pay a mean license surcharge of $5.81.</td>
</tr>
<tr>
<td>Were you aware that the manatee is an endangered species?</td>
<td>Survey of Florida’s registered boat owners.</td>
<td>80.6% agreed that the manatee is an endangered species.</td>
</tr>
<tr>
<td>Question</td>
<td>Method</td>
<td>Results</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>What do you feel is the biggest threat to manatees?</td>
<td>Survey of Florida public on manatee protection.</td>
<td>62.7% said boats were the biggest threat to manatees, 11.1% suggested pollution, 6.9% mentioned habitat loss, and 0.2% mentioned fishing activities.</td>
</tr>
<tr>
<td></td>
<td>Parker &amp; Wang, 1996</td>
<td></td>
</tr>
<tr>
<td></td>
<td>71% felt that boats were the biggest threat to manatees, 7% mentioned water pollution, 4% mentioned commercial fishing activities, and 2% mentioned habitat loss.</td>
<td></td>
</tr>
<tr>
<td>Entry by any boat or person into a manatee sanctuary is prohibited.</td>
<td>Crystal River public use survey.</td>
<td>62.5% agreed that entry into a manatee sanctuary is prohibited.</td>
</tr>
<tr>
<td></td>
<td>Cheryl Buckingham, 1989</td>
<td></td>
</tr>
<tr>
<td></td>
<td>86.8% of the respondents agreed, either strongly or otherwise.</td>
<td></td>
</tr>
<tr>
<td>Touching a manatee which does not first approach you is considered harassment</td>
<td>Crystal River public use survey.</td>
<td>60.1% agreed either strongly or otherwise, that touching a manatee which does not first approach you is considered harassment.</td>
</tr>
<tr>
<td></td>
<td>Cheryl Buckingham, 1989</td>
<td></td>
</tr>
<tr>
<td></td>
<td>84.1% of the respondents agreed, either strongly or otherwise.</td>
<td></td>
</tr>
<tr>
<td>Do you think approaching within 50 feet of a manatee with a motorboat disturbs it?</td>
<td>Crystal River public use survey.</td>
<td>55.3% agreed that approaching within 50 feet of a manatee with a motorboat disturbs it.</td>
</tr>
<tr>
<td></td>
<td>Cheryl Buckingham, 1989</td>
<td></td>
</tr>
<tr>
<td></td>
<td>79.3% of the respondents answered in the affirmative.</td>
<td></td>
</tr>
<tr>
<td>In your opinion, do manatees feed only on plants?</td>
<td>Crystal River public use survey.</td>
<td>85.5% agreed that manatees feed only on plants.</td>
</tr>
<tr>
<td></td>
<td>Cheryl Buckingham, 1989</td>
<td></td>
</tr>
<tr>
<td></td>
<td>89.3% agreed that manatees feed only on plants.</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1c

Perception of boater manatee harassment

- 1: almost none
- 2: about a quarter
- 3: about half
- 4: about three-quarters
- 5: almost all

Perceived percent of harassment
Figure 2
Relations among beliefs, attitudes, norms and intention

Behavioral beliefs towards disregarding speed zones $r=0.087$

Attitude towards disregarding speed zones $r=-0.323^{**}$, $w_1=-0.088^*$

Intention to follow speed zones

Normative beliefs towards following speed zones $r=0.448^{**}$

Subjective norm towards following speed zones $r=0.705^{**}$, $w_2=0.67^{**}$
Discussion

The Florida Manatee, classified as an endangered species in 1973, suffers losses from both natural causes and human-related factors. Research from the Florida Marine Research Institute (FMRI) has shown that human-related activities accounted for 44 percent of all manatee mortalities from 1976 though 1999. The Federal Manatee Recovery Plan identifies the reduction of watercraft-caused manatee deaths as a critical component to recovering this endangered species. In 1999, the number of watercraft-caused deaths in Florida was 82, compared to 66 the previous year. A press release by the Florida Fish and Wildlife Conservation Commission (April, 2000) reports that while 1999 witnessed a record number of boat-related deaths, the first three months of 2000 have been even worse. The 32 deaths attributed to watercraft this year is a 41% percent increase over the same time period in 1999.

This study provides an in-depth examination of boaters in the Tampa Bay area, where manatees live year-round and are highly susceptible to boat accidents. The survey results identify the characteristics of boaters in Tampa Bay, their attitudes, knowledge, and beliefs.

Support for manatee conservation

The total mean support for manatee conservation was 3.84, on a 5-point scale, revealing moderate support for a variety of interventions. Support was related to the respondent’s income, sex, knowledge and perception of violations. Respondents with incomes less than $40,000 showed the least scores on the support index. Other studies have found that gender influences attitudes toward animals. Kellert and Berry (1984) reported that male-female differences in attitudes toward animals were among the most dramatic in a national survey of adult Americans. Females had significantly higher humanistic and moralistic attitudes. In this study, females showed higher support for manatee conservation efforts, but only 18.8% of the boaters were female.

Greater support was reported for public education than for more stringent regulations such as setting speed/wake limits in seagrass areas or no-entry areas. Support for public education was not significantly different from support for speed reduction, belief that manatees need protection and that they are worth saving, which also had high mean values. Support for no-entry areas, for speed/wake limits in seagrass areas and for increased patrols were significantly different from the other support variables, as reflected in their lower mean scores.
Past research has shown that attitudes about specific measures of environmental control are affected by the way people relate those measures to their own self-interests. Having information about environmental conditions may not be as important a factor in how people will feel about restrictive measures as where they live and work (Tichenor, et al., 1971). Our study found that respondents whose primary boat-related activity in Tampa Bay was cruising and sport fishing reported higher support for manatee conservation efforts than others.

Of the 73.8% of boaters who supported increased patrols by law enforcement officers, 39.1% indicated a willingness to pay a hypothetical license surcharge averaging $6.31. Of the 91.1% who supported increased public education, 48% indicated a willingness to pay a license surcharge averaging $6.81 for education.

Perception of violations

According to a recent press release by the Florida Fish and Wildlife Conservation Commission (April 2000), independent studies of boater compliance with manatee protection speed zones show that compliance varies significantly from zone to zone, but in many areas only 50-60 percent of the boaters are obeying the posted regulations. A frequency distribution of the three items used to measure perception of violations in this study showed that about a quarter of the boaters were believed to violate speed zones and no-entry areas, indicating that boaters underestimate the proportion of violations.

Most boaters believed that almost none of the boaters harassed manatees. However, current informational literature is not specific about what constitutes manatee harassment. Images of people swimming with manatees, depicted in the mass media, may influence inappropriate behavior. Respondents’ views about the definition of manatee harassment differ, and this may be reflected in their perception that boaters do not harass manatees. Support for manatee protection also was related to the perception of increased violations.

Knowledge about manatees and their conservation

Respondents scored an average of 6.16 on a 10-point knowledge score. Frequency distributions of the knowledge index scores revealed low knowledge among respondents. Twenty percent of the respondents could not answer correctly if manatees were endangered. Only 40% reported that swimming with a manatee disturbed it, 56% knew that feeding a manatee disturbs it, 53% knew that human activity that changes a manatee’s behavior is harassment, 60% knew that touching a manatee without it first approaching is harassment, and 68% knew that fishing lines are a threat to manatees.
Knowledge was significantly related to boating frequency. Respondents reported boating over 10 times in Tampa Bay in the last year had the highest mean knowledge score. This may be due to the educational efforts that are already in place in the area, or increased interest in the marine environment because of exposure. Past research has found local ecological knowledge to be influenced by experience (Schoolmaster et al. 1985, Kellert 1984, Appelson 1999).

Respondents who were members of boating, fishing or environmental clubs were more knowledgeable about manatees. This suggests that clubs may be acting as sources of information, or attracting more knowledgeable individuals. Past research also has found that members of environmental clubs have more awareness of environmental issues. Olson et al. (1984) found that there was a positive relationship between membership in a conservation group and knowledge about nature preserves.

Those who had seen manatees in Tampa Bay in the last year had a higher mean knowledge score. However, the number of times the respondents sighted manatees was also related to their boating frequency (F=113.097, p<0.001), and thus their potential exposure to ongoing educational efforts. It is also probable that the more people watch manatees, the more they would seek out information about them.

The study revealed that respondents who reported that they had received literature about manatees had a higher mean knowledge score than those who had not. Although self-reports of receipt of literature may be inaccurate, they provide information where direct data is not available. Respondents who are interested in manatees and their conservation may be more likely to remember receiving literature, and this interest also may be reflected in their knowledge about manatees.

When individual knowledge questions were cross-tabulated against receipt of literature, only 5 of the 10 items were statistically significant—(1) manatees do not have to be fed because there are enough natural plants for them, (2) swimming with a manatee disturbs it, (4) touching a manatee which does not first approach you is considered harassment (5) manatees feed only on plants, and (4) wearing polarized glasses helps spot manatees. Important items, such as: (1) the manatee is endangered, (2) any human activity that changes a manatee’s behavior is harassment, (3) feeding a manatee disturbs it, (4) fishing lines are a threat to manatees, and (5) proportion of boat-related manatee deaths, did not associate significantly with receipt of literature. This helps identify gaps in existing educational material, and suggests content for future materials.
This study found that knowledge levels were significantly correlated to attitude scores in support of manatees. Reiling et al. (1988) found that an information program could significantly alter the attitudes of users of outdoor recreational facilities, and increase their willingness to accept higher fees. Pettus (1976) suggests that some basic knowledge of the environment is needed in order to promote development of desirable attitudes and to enable people to make sound environmental decisions.

**Analysis based on the Theory of Reasoned Action**

Based on the TRA, behavioral beliefs should be significant determinants of attitudes. In this study, a low correlation of 0.087 suggests that not all the beliefs towards disregarding manatee speed zones were captured. The questionnaire measured one positive and one negative perceived consequence of the behavior. According to Fishbein and Ajzen’s (1975) theory, a person should perceive more positive than negative consequences, in order to perform the related behavior. The questionnaire for this study may have ignored other positive consequences associated with the behavior of disregarding speed zones, and these consequences may have had more to do with the positive consequences associated with speeding in general, such as feelings of thrill and fun.

Another reason for the low behavioral beliefs—attitude correlation coefficient could be that boaters may not have given the topic of disregarding speed zones conscious thought, and there could be an absence of beliefs about disregarding manatee speed zones. As the name implies, the theory of reasoned action pre-supposes that the behavior is a rational and conscious one.

However, the study clearly shows that the normative component has a great influence on the intention to follow speed zones. The strong correlation between norms and intention ($r=0.705$), and the higher relative weight of the norm (standardized beta=0.671), shows that the behavioral intention of following speed zones falls under normative control.

According to the theory of reasoned action, actual behavior should be predictable based on attitudes and intentions. Bright et al. (1993) mention that the framework of the TRA as a model which explains attitude and behavior change was supported in their study of public perceptions of the National Park Service’s controlled burn policy. Pate et al. (1994), found that attitudes toward wolf reintroduction in Colorado were predictive of how an individual would vote on this issue. Young and Reichenbach (1987), reported that differences in beliefs and in the influence of social groups were observed between woodland owners who intended to harvest
timber and those who did not. Young and Kent (1985), found a significant correlation between camping intentions and reported camping behavior. In this study, however, the behavior of disregarding speed zones was not observed due to logistical reasons, and only the attitude and intention relationship of the model were tested.

For application purposes, findings that the intention to follow speed zones falls under normative influences is of practical significance. Analyses demonstrating the relationships between intention and knowledge, intention and support, knowledge and attitude towards disregarding speed zones, knowledge and motivation to comply with law enforcers, support and attitude towards disregarding speed zones, and support and motivation to comply with law enforcers, are all of statistical as well as practical significance. These findings have implications for developing a communication program. As proposed by the theory of reasoned action, salient beliefs can be targeted in a persuasive communication to effectively change or strengthen attitudes and intentions. Messages can be structured so that the arguments presented are based on the elicited beliefs, and supported by factual evidence.

Trend analysis

The trend analysis for 10 items showed a general decrease in knowledge and support in the last ten years. However, sampling techniques differed among the studies compared.

Parker (1989) used a random sample of licensed boaters in Florida, who were registered as the owner on the license. In the same year, Buckingham's study surveyed the public visiting Crystal River National Wildlife Refuge. In her sample, over half of the people interviewed had come to the area primarily to dive or snorkel (56.7%); other primary activities included wildlife observation (15.4%), sport fishing (12.1%), pleasure boating (6%), and commercial fishing (1.3%). Twice as many people rented boats as owned them (62.1% to 29%), and 4.8% had a guide with the boat.

Parker and Wang (1996) surveyed a sample population of Florida residents who were 18 years or older on manatee protection and other topics related to Florida's environment.

The sample population of the current study was limited to users of Tampa Bay. Only those who said they were primary boat users were interviewed. Fifty-two percent of the respondents said their primary activity in Tampa Bay was sport fishing, 24.8% pleasure boated, 2.6% fished commercially, and 2.2% water skied.

Results of the trend analysis, therefore, have to be interpreted cautiously. However, this trend analysis helps track changes in support toward and knowledge about manatees and their
conservation. It documents the change in attitudes over the last 10 years. In their discussion of the evolution of North American attitudes toward marine mammals, Lavigne et al. (1999) mention that the Florida manatee gets more attention than might be expected for a single species and reflects the special concern that Americans have for “native” endangered species. The apparent decrease in both support and knowledge about manatees revealed by this study needs to be monitored.

Differences in the various survey results may also have arisen from the way questions were framed. Parker used “Were you aware that the manatee is endangered species?” Whereas this study asked for agreement or disagreement to the statement “The manatee is endangered,” to remove the bias that could be introduced by the wording, and to make the statement clear and easy to understand.

Parker’s study also employed support questions such as: “Would you support or oppose increased patrols by law enforcement officers to protect the manatee?” Our survey used “I support increased patrols by law enforcement officers to protect the manatee.” Parker’s question “Would you support no-entry areas in selected waterbodies during some months to protect the manatee?” was reworded in this study as, “I oppose programs to protect the manatee if it means boats would not be allowed to enter some areas,” to make some of the statements negative to reduce rote responses.

The target audience, methods and context of each survey, and the differences in wording may have affected responses. However, questions compared between boat owners in Parker’s 1989 study and this study were probably similar enough to point out the need for educational interventions.
Recommendations

This study described the socio-demographic make-up of Tampa Bay boaters, their sources of information, opinion about manatee conservation strategies, priorities regarding manatee conservation issues, willingness to make various compromises to better protect manatees, knowledge about manatees and their conservation, and reactions to a new policy, regulation, or communications program.

This study used a socio-psychological theory to understand the relationship between the beliefs, attitudes and behavioral intentions of boaters. The results of this study identify sociodemographic backgrounds and target beliefs to aid in developing communications aimed at influencing boater attitudes and beliefs. This study serves as a foundation to further examine the impacts and effectiveness of environmental communication and regulatory interventions on Tampa Bay boaters.

Based on the findings of the study and a review of relevant literature, recommendations have been identified for the development of communications programs in the Tampa Bay area.

Recommendation 1: Filling gaps in knowledge about manatees and their conservation.

Frequency distributions of the knowledge scores reveal the lack of knowledge about manatees. Only 16% knew that about a quarter of manatee deaths are boat-related. There also may be widespread belief that manatee numbers are increasing.

Printed literature should focus on filling the identified gaps in knowledge. The number and proportion of manatee deaths over the last decade could be displayed graphically near boat ramps. Visual displays could keep boaters updated on the number of boat-related manatee deaths so far this year.

Positive messages thanking boaters for following regulations and attributing the increase in the number of manatees to their compliance with regulations could help reinforce positive attitudes towards compliance. These messages can further stress the need to continue compliance to maintain manatee numbers.

Recommendation 2: Identifying and clarifying speed zone regulations and harassment behaviors

Thirty-eight percent of the respondents felt that speed zones were not adequately marked. A review of the current literature shows that penalties for violating regulations have not been clearly conveyed. Hendee, Stankey, and Lucas (1978) found that a lack of knowledge of a regulation can lead to "unskilled" or "uninformed actions". Seventy-two percent of the respondents mentioned that they carry nautical charts when boating. Navigational charts with
regulation areas marked on them can help boaters follow speed zones or no-entry zones. These charts can also have information about penalties for breaking the law. Hoots (1976) found that behavioral controls are more likely to be successful if recreationists are informed of reasonable alternatives to performing undesired behaviors. Navigational charts could carry information about alternative routes to take to avoid regulation areas.

Public education material about manatees does not clearly convey information about manatee harassment. Ambiguity and variability in the literature about what constitutes manatee harassment is reflected in the survey. Only 60% of the respondents believed that touching a manatee without it first approaching is considered harassment, and 53% knew that any human activity that changes a manatee behavior is harassment. Forty percent believed that swimming with a manatee disturbs it, and 56% that feeding a manatee disturbs it.

Education of media representatives, such as through a press conference or repeated press releases about manatee harassment will not only educate the public but also the communicators.

Photograph by John Moran, The Gainesville Sun, September 2, 2000

Recommendation 3: Increasing support for manatee conservation efforts

Increasing knowledge about manatees and their conservation should increase support for manatee conservation efforts. Ham and Krumpe (1996) assert that off-site and site-based environmental interpretation represents an important intervention strategy for reaching key audiences such as resource users and public living in close proximity to the managed resources. These groups are generally most impacted by resource management policies and also have the greatest impact on those resources.

Our findings demonstrate that knowledge about manatees and their conservation are related to support for manatee conservation efforts. Thus, an increase in support for manatee conservation should follow an increase in knowledge. The frequencies of individual knowledge
scores show that there are obvious gaps in knowledge regarding threats to manatees. Thematic based communications should be geared towards filling this lack of knowledge. Jacobson (1999) states that effective interpretation presents a unifying theme or concept, rather than fragmented topics and ideas. Tools for communication could include concise articles in newsletters of boating and fishing clubs and in local newspapers and magazines.

Recommendation 4: *Strengthening attitudes and intention towards following speed zone and no-entry regulations, and increasing and using media more effectively to increase compliance with law enforcement.*

According to the TRA, messages should target negative consequences of a behavior to change the audience's intention to perform the behavior. Messages could target boaters in Tampa Bay and inform them about the negative consequences of violating speed zones or no-entry areas. Messages could warn boaters about the risk of penalty and arrest that boaters could face, the higher risk of accidents, risk of boat damage, and risk of hitting a manatee. Reports of recent incidents of enforcement could be carried in local newspapers and radio.

To be effective, educators also should use media that serve as sources of information for boaters. Twenty-one percent of the respondents reported that their primary source of information for boating regulations are newspapers and magazines. About twenty percent said they got their information from brochures.

Thirty-one percent of boaters said that their primary source of information about manatees was newspapers and magazines. Nineteen percent got their information from television, and about 11% from brochures. Communication planners could use these channels more frequently for information dissemination. Other channels could include signs at boat ramps, posters at boating and fishing supply stores, local newspapers, and newsletters of boating, fishing, and environmental clubs.
References


47. SPSS Base 10.0 Applications Guide


Appendix A
Survey Questionnaire

Hello, my name is _______________. I'm calling from the University of Florida. We are conducting a study about boating in Tampa Bay. This is not a sales call in any way. This research is being conducted by the university and we would only like your opinion. (As necessary: We started an interview a few days ago and I'm calling back to complete that interview. May we begin?)

My questions are for the primary boat user in your household. May I please speak to him or her?

(When phone is passed) Hello. We are conducting a study involving boaters' opinions. We are conducting a study about boating in Tampa Bay. This is not a sales call in any way. This research is being conducted by the university and we would only like your opinion. According to our selection procedures, I need to interview you as the primary boat user in the household.

Your phone number was selected at random, from a list of boater owners in Florida. Your answers will be completely confidential. You do not have to answer any questions you don't wish to.

May I begin with your name?

Record sex of respondent (not informant)
1 Male
2 Female

And what is your age?

Q 1: First, I would like your opinion on some issues. Please tell me if you strongly agree, agree, neither agree nor disagree, disagree or strongly disagree with the following statements. There is no right or wrong answer, and we are interested only in your personal opinion. If you do not have an opinion on an issue, you may answer "don't know".

I support programs to protect the manatee even though it means reducing the speed allowed on some waterways.
1 strongly disagree
2 disagree
3 neither agree nor disagree
4 agree
5 strongly disagree
8 don't know
9 unavailable

Q 2: I oppose programs to protect the manatee if it means boats would not be allowed to enter some areas.
1 strongly disagree
2 disagree
3 neither agree nor disagree
4 agree
5 strongly disagree
-8 don't know
-9 unavailable

Q 3: I oppose setting speed or wake limits in areas where natural resources, such as sea grasses, need protection.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 4a: I support increased public education to protect the manatee.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 4b: If agree or strongly agree, go to: Would you be willing to pay a license surcharge for increased public education to protect the manatee?
   1 Yes
   2 No

Q4c: If yes, go to: On a scale from 0 to 10 dollars, how much would you be willing to pay?
   0—10

Q 5a: I support increased patrols by law enforcement officers to protect the manatee.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 5b: If agree or strongly agree, go to: Would you be willing to pay a license surcharge for increased patrols by law enforcement officers to protect the manatee?
   1 Yes
   2 No

Q 5c: If yes, go to: On a scale from 0 to 10 dollars, how much would you be willing to pay?
   0—10

Q 6: What do you feel is the biggest threat to manatees?
   1 Water pollution
2 Boats
3 Fishing activities
4 Loss of habitat from development
5 other
-8 Don’t know
-9 Unavailable

Please tell me if you feel that the following events are highly likely, likely, neither likely nor unlikely, unlikely, or highly unlikely. Again, there is no wrong or right answer. If you do not have an opinion on a statement, you may answer “don’t know”.

Q 7: I would get where I want more quickly on my boat, if I disregarded manatee speed zones.
   1 highly unlikely
   2 unlikely
   3 neither likely nor unlikely
   4 likely
   5 highly likely
   -8 don’t know
   -9 unavailable

Q 8: I would be fined if I disregarded manatee speed zones.
   1 highly unlikely
   2 unlikely
   3 neither likely nor unlikely
   4 likely
   5 highly likely
   -8 don’t know
   -9 unavailable

Please tell me if you strongly agree, agree, neither agree nor disagree, disagree, strongly disagree with the following statements. Again, there is no wrong or right answer. If you do not have an opinion on a statement, you may answer “don’t know”.

Q 9: Speed zones are adequately signed.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 10: Manatees are in need of protection.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable
Q 11: The manatee is an endangered species.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 12: I have been negatively affected by regulations for protecting the manatee.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 13: The manatee is worth saving despite the need for current regulations.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 14: Swimming with a manatee will disturb it.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 15: Feeding a manatee will disturb it.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 16: Approaching within 50 feet of a manatee with a motorboat disturbs it.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
Q 17: Touching a manatee which does not first approach you is considered harassment.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don't know
   -9 unavailable

Q 18: Any human activity that changes a manatee's behavior is harassment.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don't know
   -9 unavailable

Q 19: Manatees like being petted.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don't know
   -9 unavailable

Q 20: Manatees need fresh water to drink.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don't know
   -9 unavailable

Q 21: Manatees feed only on plants.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don't know
   -9 unavailable

Q 22: Manatees have to be fed because there may not be enough natural plants for them.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
5 strongly disagree
-8 don’t know
-9 unavailable

Q 23: Entry by any boat or person into a manatee sanctuary is prohibited.
1 strongly disagree
2 disagree
3 neither agree nor disagree
4 agree
5 strongly disagree
-8 don’t know
-9 unavailable

Q 24: Fishing lines are a threat to manatees.
1 strongly disagree
2 disagree
3 neither agree nor disagree
4 agree
5 strongly disagree
-8 don’t know
-9 unavailable

Q 25: Fishing is better in areas that are closed for manatee protection.
1 strongly disagree
2 disagree
3 neither agree nor disagree
4 agree
5 strongly disagree
-8 don’t know
-9 unavailable

Q 26: Wearing polarized sunglasses would help me see manatees better.
1 strongly disagree
2 disagree
3 neither agree nor disagree
4 agree
5 strongly disagree
-8 don’t know
-9 unavailable

The next set of questions may sound similar to each other. So, please listen carefully before responding. Please evaluate the following statements and tell me if you feel they are very good, good, neither good nor bad, bad, very bad.

Q 27: Getting where I want quickly when boating, is (READ CHOICES)
1 very bad
2 bad
3 neither good nor bad
4 good
5 very good
-8 don’t know
-9 unavailable
Q 28: Getting fined for a boating violation is (READ CHOICES)
1 very bad
2 bad
3 neither good nor bad
4 good
5 very good
-8 don’t know
-9 unavailable

Q 29: Disregarding manatee speed zones is (READ CHOICES)
1 very bad
2 bad
3 neither good nor bad
4 good
5 very good
-8 don’t know
-9 unavailable

Please tell me if you strongly agree, agree, neither agree nor disagree, disagree, strongly disagree, with the following statements.

Q 30: My family and friends think that I should follow manatee speed zones.
1 strongly disagree
2 disagree
3 neither agree nor disagree
4 agree
5 strongly disagree
-8 don’t know
-9 unavailable

Q 31: People who are with me on my boat think that I should follow manatee speed zones.
1 strongly disagree
2 disagree
3 neither agree nor disagree
4 agree
5 strongly disagree
-8 don’t know
-9 unavailable

Q 32: Law enforcement officers think that I should follow manatee speed zones.
1 strongly disagree
2 disagree
3 neither agree nor disagree
4 agree
5 strongly disagree
-8 don’t know
-9 unavailable

Q 33: Most people who are important to me think that I should follow manatee speed zones.
1 strongly disagree
2 disagree
Q 34: I intend to follow speed zones set for manatee protection.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 35: When boating, I want to do what my family and friends think I should do.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 36: When boating, I want to do what the people who are with me on my boat think I should do.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 37: When boating, I want to do what the law enforcement officers think I should do.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable

Q 38: I carry nautical charts with me when boating.
   1 strongly disagree
   2 disagree
   3 neither agree nor disagree
   4 agree
   5 strongly disagree
   -8 don’t know
   -9 unavailable
Q 39: In your opinion, what proportion of manatee deaths are boat-related? (READ CHOICES)
   1 almost none
   2 about a quarter
   3 about half
   4 about three-quarters
   5 almost all
   -8 don’t know
   -9 Not available

Q 40: Why do you think there are boat-related manatee deaths? (Please don’t read choices.)
   1 Manatees get in the way of boats
   2 Boaters are careless
   3 Lack of propeller guards
   4 Lack of boating regulations
   5 Lack of law enforcement
   6 Other
   -8 Don’t know
   -9 Not available

Q 41: In your opinion, what proportion of boaters violate speed zones? (READ CHOICES)
   1 almost none
   2 about a quarter
   3 about half
   4 about three-quarters
   5 almost all
   -8 don’t know
   -9 unavailable

Q 42: In your opinion, what proportion of boaters enter areas closed for manatee protection? (READ CHOICES)
   1 almost none
   2 about a quarter
   3 about half
   4 about three-quarters
   5 almost all
   -8 don’t know
   -9 unavailable

Q 43: In your opinion, what proportion of boaters harass manatees? (READ CHOICES)
   1 almost none
   2 about a quarter
   3 about half
   4 about three-quarters
   5 almost all
   -8 don’t know
   -9 unavailable

Q 44: Manatees are in Tampa Bay during the (READ CHOICES)
   1 summer
   2 winter
   3 all-year round
   4 seldom
-8 don’t know
-9 Not available

Where do you get MOST of your information about boating regulations?
1 family & friends
2 boating clubs
3 fishing clubs
4 boat supply stores
5 bait & tackle stores
6 printed material such as brochures
7 newspapers or magazines
8 radio
9 television
10 Signs posted on waterways
11 navigational charts
12 Other
-8 Don’t know
-9 Not available

Where do you get MOST of your information about manatees?
1 family & friends
2 local environmental organizations
3 printed material such as brochures
4 boat supply stores
5 bait & tackle stores
6 newspaper or magazines
7 radio
8 television
9 other
10 don’t get information on manatees
-8 Don’t know
-9 Not available

Have you ever received any printed material (such as brochures) about manatees?
1 Yes
2 No
-8 Don’t know
-9 Unavailable

e almost finished. The next set of questions I have will help us analyze your answers along with the
rs of others.

About how many times have you boated in Tampa Bay in the last year?
1 less than 10
2 11 to 50
3 more than 50
4 haven’t boated in Tampa Bay
-8 don’t know
-9 not available
Q 49: What is your primary activity when you are boating in Tampa Bay? (READ CHOICES)
   1 Sport fishing
   2 Commercial fishing
   3 Cruising
   4 Water skiing
   5 Commuting
   6 Other work-related
   7 Other
   -8 don’t know
   -9 Not available

Q 50: About how many times have you seen manatees in Tampa Bay in the last year?
   1 never
   2 one to five times
   3 five to ten times
   4 more than 10 times
   -8 don’t know
   -9 unavailable

Q 51: During which season do you usually visit Tampa Bay: summer, winter or year-round?
   1 Summer
   2 Winter
   3 All-year round
   -8 Don’t know
   -9 Unavailable

Q 52: Are you a member of any local wildlife or sportsmen’s club or organization?
   1 Yes
   2 No
   -8 don’t know
   -9 unavailable

If yes, which one(s)?

Q 53: How many years of boating experience do you have?
   0—100
   -8 don’t know
   -9 unavailable

Q 54: What is the highest grade of school or year in college you have completed? (not necessary to read choices)

0 None........11 High School
1 Elementary 12 High School
2 Elementary 13 College
3 Elementary 14 College
4 Elementary 15 College
5 Elementary 16 College
6 Elementary 17 Some Graduate School
7 Elementary 18 Graduate/Prof. Degree
8 Elementary -8 Don't know
9 High School -9 Not available
10 High School
Q 55: How would you describe your race or ethnic background? (If necessary, read choices.)
   1 Caucasian
   2 African American
   3 Asian or Pacific Islander
   4 American Indian
   5 Hispanic / Latino
   6 Other (specify)
   7 Multi-racial or mixed race
   -8 Don’t know
   -9 unavailable

Q 56: Now consider your family’s household income from all members sources before taxes. As I read a list, please stop me when I get to the income level that best describes your household income in 1999.
   1 less than 20,000
   2 21,000 to 40,000
   3 41,000 to 60,000
   4 61,000 to 80,000
   5 81,000 to 100,000
   6 100,000 to 150,000
   7 Over 150,000
   -8 Don’t know
   -9 Not available

Q 57: If we were to repeat the survey next year, would you be willing to participate in it?
   1 Yes
   2 No
   -8 Don’t know
   -9 Unavailable

This completes the survey. Thank you very much. If you have any questions regarding the survey, you may contact Dr. Susan Jacobson, Professor at the Department of Wildlife Ecology and Conservation, University of Florida, Gainesville. Her phone number is 352-846-0562.

Any questions or concerns you may have about your rights can be directed to theUFIRB office, Box 112250, University of Florida, Gainesville, FL 32611-2250.
Primary activities listed in the "other" category

kayak
fishing and cruising (3)
sight seeing (2)
snorkeling
fishing and water sports
fishing(sport) or skiing (2)
swimming, looking for shells
diving (3)
going to restaurants
sailing (2)
diving, fishing, and pleasure
swimming
"f---ing around"
pleasure, riding, sport fishing
sail-boat racing
weight boarding
"palmetto"
riding a wave runner
Appendix C

Primary source of information about boating regulations reported in the “other” category

there are none (3)
the internet and a bait and tackle shop
boater registration
power squadron, coast guard
fish and game commission and the florida marine patrol
power squadron
internet and publications
Boat US(boat owner’s association of the US)
on line / internet (3)
phone
festivals
boat registry, life experience
“ I know it”
all of the above (3)
books, public library, school
Coastal Conservation Association (2)
Sierra club member, justice member
Game and Fresh Water Commission
NACBC
Boating auxiliary, water safety training
books from the Florida power squadron
state with registration
“ from husband”
internet and school (2)

Primary source of information about manatees reported in the “other” category

combination of tv and printed media
Department of Natural Resources (2)
public education and academic journals
“ anywhere”
signs on waterways
school
boater registration
The coast guard (5)
Boat US
University of Florida
“ tico”
tax office (4)
marine patrol (7)
marine patrol office
high school education
“ electric company provides information about manatees”
school (2)
internet and local knowledge
state of Florida
Florida Marine Research
both tv and newspaper
courses (2)
power plant
navigational charts
posted signs
"here and there, couldn't pin a specific source"
signs on waterways
boating registration, vehicle registration
internet
Department of Environment
college
USF
"from marine patrol charts"
lectures
Appendix D

List of clubs that respondents are members of

Boating clubs:

Charlotte Harbor
Boat U.S. (14)
U.S. Boating
Florida Sea Kayak Association
U.S. Power Squadron (5)
Coast Guard Auxiliary
International Jets Sports Boating Association
National Charter Boat Association
Hernando County Boat Club

Fishing Clubs:

Suncoast tarpon round up
Sportman Angler
BASS (2)
Bass Club
Bass Association.
Bassmaster
Inshore Fishing Association
Florida Fresh Water Game and Fish
Fish and Game
Fresh Water Fishing Association
Old Salts Fishing Club (10)
Bass Angler Sportsman Society (2)
Southern King Fish Association (3)
Tampa Pro Bass Association
Florida Fisherman’s Coalition
Florida Fishermen
Spear Fishing
Recreational Hook and Line of Florida
Suncoast Fly Fishers
National Fishing Alliance
Florida Sportsman (2)
North American Fishing Club (2)
North American Fisherman’s Club
Florida Anglers
Golden Triangle Fishing Club (2)
Meko-Onis Fishing Club
US Fishing Club
Trout Unlimited
Golf Coast Bass Masters
Environmental Clubs:

National Wildlife (4)
Coastal Conservation Association (24)
Coastal Conservation Club
Coastal Conservation Fishing Association
Florida Conservation Association (2)
Florida Conservation Society
Protect the Manatee
Tampa Bay Watch (2)
Florida Wildlife Federation (2)
Sierra Club (5)
Suncoast Sierra Club
Audobon Society (2)
Save the Manatee (3)
Save our Seabirds
Gulf Coast Conservation Organisation
Tampa Bay Wildlife
Manatee Stranding Network
Florida Environmental Prof Org.
Indian River Lagoon Snook Preservation Society
Pelican Fund
World Wildlife Fund
Organization for Artificial Reefs
Ducks Unlimited

Other:

St. Pete Underwater Club (3)
SKA (2)
National Rifle Association (6)
Shooting Club
Florida Polk Bad Man Smith Club
FCCA
Florida Guides Association
Florida Outdoor Writers Association
National Estroy (?)
Director Florida Park (?)
Parrothead Club
Turkey Federation
National Wild Turkey Club
Buckmasters
North American Hunting
Florida Salt Water Flats Association

don't remember (3)
## Appendix E

### Factor analysis of survey data for 13 attitude questions

<table>
<thead>
<tr>
<th>Abbreviated statement</th>
<th>Factor loadings</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>Manatees need protection</td>
<td>0.841</td>
<td></td>
</tr>
<tr>
<td>Support for speed reduction</td>
<td>0.799</td>
<td>0.137</td>
</tr>
<tr>
<td>Support for public education</td>
<td>0.779</td>
<td>0.112</td>
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<tr>
<td>Manatees worth saving</td>
<td>0.768</td>
<td>0.229</td>
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<tr>
<td>Support for increased patrols</td>
<td>0.720</td>
<td></td>
</tr>
<tr>
<td>Proportion of no-entry zone violaters</td>
<td></td>
<td>0.843</td>
</tr>
<tr>
<td>Proportion of speed zone violaters</td>
<td></td>
<td>0.755</td>
</tr>
<tr>
<td>Proportion of manatee harassers</td>
<td>0.207</td>
<td>0.524</td>
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<tr>
<td>Support for no-entry areas</td>
<td>0.206</td>
<td>-0.140</td>
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<tr>
<td>Support for speed/wake limits</td>
<td>0.120</td>
<td></td>
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<tr>
<td>Fishing is not better in closed areas</td>
<td></td>
<td>0.154</td>
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<tr>
<td>Speed zones adequately signed</td>
<td>-0.125</td>
<td>-0.277</td>
</tr>
<tr>
<td>Manatees do not like being petted</td>
<td>0.114</td>
<td>-0.102</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent variance accounted for by each factor and total</th>
<th>24.424</th>
<th>13.177</th>
<th>12.344</th>
<th>9.929</th>
<th>59.874</th>
</tr>
</thead>
</table>

| Eigenvalues                                            | 3.175 | 1.713 | 1.605 | 1.291 |
Appendix F

List of biggest threat to manatees reported in the “other” category

uneducated people (2)
humans / man / mankind / people (11)
ignorance
power boats, water pollution
overpopulation of people
“gator fans”
ignorance
“too docile, in the way of harm”
lack of education (3)
cold snaps and virus and bacteria
“Cubans”
cold
people population
power plants
the public
power plant gates and locks crush manatees
all the reasons listed (6)
“them being at the wrong place at the wrong time”
“heard that manatees were dying of some unknown cause, disease”
“uncaring people”
boating and loss of habitat
progress
cold weather
awareness of people
“ boaters’ ignorance”
“manatees themselves” (2)
“people’s uneducation about what to do when you run into a pack of them”
indifference
Desalination plant
primarily boats and pollution
speed zones
“over population” (2)
changing environment
“life too many people”
“feeding them things”
red tide
interactions with humans
boats and habitat quality
pollution and habitat loss
“manatees that have hardware that researchers put on them in order to do research”