

UNDERSTANDING RESIDENTS' KNOWLEDGE OF, ATTITUDES TOWARD, AND PARTICIPATION IN SEA TURTLE CONSERVATION IN TORTUGUERO, COSTA RICA AND NEAR THE ARCHIE CARR NATIONAL WILDLIFE REFUGE, FLORIDA, USA

by

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A Dissertation
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Doctor of Philosophy
Environmental Science and Public Policy

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Date: _____ Spring Semester 2015
George Mason University
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DEDICATION

This is dedicated to the residents of Tortuguero, Costa Rica and to those near the Archie Carr National Wildlife Refuge, USA.

ACKNOWLEDGEMENTS

Completion of this research would not have been possible without the tremendous support from my husband, Chris Cella. I would like to thank my primary advisor, Dr. Chris Parsons, and my committee members, Drs. Lee Talbot, Greg Guagnano, and Larry Rockwood, for their exceptional teaching, guidance, and support throughout my education at George Mason University. I am grateful to George Mason University's Department of Environmental Science and Policy for awarding me with a travel stipend to complete a portion of this research. I would like to thank all of the survey participants, including experts and residents, for their time and contribution to this research. I'm very thankful for the expertise that Dr. Ramón López-Rosado provided on the Spanish-translated questionnaire used in this research and on validating translations. I'm grateful to Dr. Jennifer Leeman, Dr. Colleen Sweet, Victor Armas Gonzalez, Evelyn Herencia Larsen, and two other anonymous reviewers, who all provided excellent technical expertise on the Spanish-translated questionnaire. I thank my father, Dr. Frank Lux, and my mother, Joan Hunter, for their travel companionship during several of the research site visits. I also thank my parents for being good role models and encouraging me to pursue higher education.

TABLE OF CONTENTS

	Page
List of Tables	vii
List of Figures	ix
Abstract	xi
Chapter One: Introduction	1
Introduction	1
Research Objectives	3
Research Sites and Literature Review	4
Tortuguero, Costa Rica	4
The Archie Carr National Wildlife Refuge (ACNWR)	9
Methods	13
Survey Methods	13
Statistical Methods	16
Qualitative Methods (Values toward Sea Turtles)	19
Chapter Two: Demographic Characteristics that Explain Residents' Knowledge of, Attitudes Toward, and Participation in Sea Turtle Conservation in Tortuguero, Costa Rica	21
Abstract	21
Introduction	22
Methods	24
Results	25
Interview Results	25
Quantitative Results	28
Discussion	66
Chapter Three: Understanding Residents' Knowledge of, Attitudes Toward, and Participation in Sea Turtle Conservation Near the Archie Carr National Wildlife Refuge, Florida, USA	77
Abstract	77

Introduction	78
Methods.....	79
Results	80
Interview Results	80
Quantitative Results.....	82
Discussion	128
Chapter Four: Understanding Residents’ Knowledge of, Attitudes Toward, and Participation in Sea Turtle Conservation Across Cultures: A Comparison Between Tortuguero, Costa Rica and the Archie Carr National Wildlife Refuge, USA.....	137
Abstract	137
Introduction	138
Methods.....	141
Survey Methods.....	141
Statistical Methods	141
Results	142
Discussion	158
Chapter Five: Discussion and Future Research	167
Discussion	167
Sea Turtle Poaching.....	167
Convenience Sampling Considerations	168
Recommendations	168
Future Research.....	170
Appendices.....	171
Appendix A: Questionnaires and Informed Consent	172
Appendix B: Detailed Models.....	194
Appendix C: Supplemental Methods and Analyses.....	196
Literature Cited.....	201

LIST OF TABLES

Table	Page
Table 1. Definitions of values toward sea turtles identified in this research.	20
Table 2. Tortuguero participants' responses to the knowledge questions.	35
Table 3. Multiple regression results explaining Tortuguero's knowledge index.....	37
Table 4. Tortuguero's responses to the attitude toward sea turtles items.	41
Table 5. Binary logistic regression results for the model explaining Tortuguero's attitudes toward sea turtles.	43
Table 6. Tortuguero's responses to the willingness to act items.	45
Table 7. Binary logistic regression results for the model explaining Tortuguero's willingness to donate money for sea turtle conservation.	47
Table 8. Ordinal logistic regression results for the model explaining Tortuguero's willingness to pay slightly higher taxes to help sea turtle conservation.	49
Table 9. Binary logistic regression results for the model explaining Tortuguero's willingness to donate their time to help sea turtle conservation.	51
Table 10. Binary logistic regression results for the model explaining Tortuguero's support of additional sea turtle preservation habitat.	53
Table 11. Summary of the regression analyses for the effects of the independent variables on Tortuguero's willingness to act items.	54
Table 12. Tortuguero's response to the adequacy of participation opportunities.	55
Table 13. Frequency of Tortuguero's participation in sea turtle-related activities.	58
Table 14. Binary logistic regression results for the model explaining Tortuguero's participation in sea turtle-related activities.	59
Table 15. Binary logistic regression results for the model explaining Tortuguero's participation in helping to protect sea turtles.	62
Table 16. Binary logistic regression results for the model explaining respondents' participation in helping sea turtles in danger.	64
Table 17. Demographics of the ACNWR survey sample compared to census data for the approximate research site (U.S. Census Bureau 2010).	84
Table 18. ACNWR participants' responses to the knowledge questions.	92
Table 19. Multiple regression results explaining the ACNWR's knowledge index.	95
Table 20. ACNWR's responses to the attitude toward sea turtles items.	99
Table 21. Binary logistic regression results for the model explaining the ACNWR's attitudes toward sea turtles.	101
Table 22. ACNWR's responses to the willingness to act items.	103
Table 23. Ordinal logistic regression results for the model explaining the ACNWR's willingness to donate money for sea turtle conservation.	106

Table 24. Ordinal logistic regression results for the model explaining the ACNWR’s willingness to pay slightly higher taxes to help sea turtle conservation.	109
Table 25. Ordinal logistic regression results for the model explaining ACNWR’s willingness to donate their time to help sea turtle conservation.	112
Table 26. Ordinal logistic regression results for the model explaining ACNWR’s support of additional sea turtle preservation habitat.	114
Table 27. Summary of the regression analyses for the effects of the independent variables on the ACNWR’s willingness to act items.	116
Table 28. ACNWR’s response to the adequacy of participation opportunities.	117
Table 29. Sea turtle-related activities that the ACNWR participants reported they would want offered.	118
Table 30. Frequency of the ACNWR’s participation in sea turtle-related activities.	119
Table 31. Binary logistic regression results for the model explaining the ACNWR’s participation in sea turtle-related activities.	121
Table 32. Binary logistic regression results for the model explaining the ACNWR’s participation in helping to protect sea turtles.	123
Table 33. Binary logistic regression results for the model explaining the ACNWR’s participation in helping sea turtles in danger.	124
Table 34. Binary logistic regression results for the model explaining the ACNWR respondents’ active donation of money to sea turtle conservation.	127
Table 35. Values toward sea turtles expressed by Tortuguero and ACNWR residents.	147
Table 36. Summary of the regression analyses for the effects of the independent variables on the Tortuguero and ACNWR residents’ willingness to act items.	154

LIST OF FIGURES

Figure	Page
Figure 1. Tortuguero location map (basemap data sources: Esri, HERE, DeLorme, OpenStreetMap contributors).....	5
Figure 2. Photograph of Tortuguero beach (taken by the author 2013).....	6
Figure 3. Location map of the Archie Carr National Wildlife Refuge (ACNWR) (USFWS 2008).	10
Figure 4. Enlarged map of the ACNWR (USFWS 2008).....	10
Figure 5. Photograph of the ACNWR (taken by the author 2013).	11
Figure 6. Hypothesized model explaining willingness to act for sea turtle conservation. 17	
Figure 7. Hypothesized model explaining participation in sea turtle-related activities....	17
Figure 8. Tortuguero participants’ main source of sea turtle information ($N = 130$).	33
Figure 9. Mean response from Tortuguero participants ($N = 99$) on the extent to which they agreed or disagreed with the statement: “I think that the amount of information provided to me by my primary source is adequate.”	34
Figure 10. Sea turtle-related activities that Tortuguero participants reported they would want offered ($n = 99$).	56
Figure 11. ACNWR participants’ main source of sea turtle information ($N = 127$).	89
Figure 12. Mean response from ACNWR participants ($N = 89$) on the extent to which they agreed or disagreed with the statement: “I think that the amount of information provided to me by my primary source is adequate.”	91
Figure 13. Photograph of the sign listing the ACNWR beach rules (taken by the author in 2013).	93
Figure 14. Percentage and statistical differences between Tortuguero and the ACNWR respondents’ main source of sea turtle information. Significance levels (χ^2) are indicated where n.s. = not significant, * = $p < 0.01$, ** = $p < 0.001$	144
Figure 15. Percentage and statistical differences between Tortuguero and the ACNWR residents’ expressed values toward sea turtles. Significance levels (χ^2) are indicated where n.s. = not significant, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$	148
Figure 16. Mean differences between Tortuguero and the ACNWR residents’ attitudes toward sea turtles, which includes four items: (a) “I feel that the preservation of sea turtle nesting beaches is...”; (b) “I feel that the future survival of sea turtle species is...”; (c) “I feel that sea turtle protection laws and policies are...”; (d) ‘How much do you like or dislike sea turtles?’	150
Figure 17. Mean and significant differences (χ^2 , $p < 0.001$) found between Tortuguero and the ACNWR residents’ willingness to act, which included four questions: (a) ‘How much would you favor or oppose the preservation of additional sea turtle nesting	

habitat?'; (b) 'How willing or not willing would you be to donating a little of your time to help sea turtle conservation?'; (c) 'How willing or not willing would you be to donating a little money to help sea turtle conservation?'; (d) 'How willing or not willing would you be to paying slightly higher taxes to help sea turtle conservation?' 152

Figure 18. Percentage and statistical differences between Tortuguero and the ACNWR residents' participation in sea turtle stewardship, which included two yes/no questions: (a) 'Have you ever helped to protect nesting sea turtles or hatchlings?' and (b) 'Have you ever helped a sea turtle that was in danger or was injured?' Significance levels (χ^2) are indicated where n.s. = not significant, * = $p < 0.05$ 157

ABSTRACT

UNDERSTANDING RESIDENTS' KNOWLEDGE OF, ATTITUDES TOWARD, AND PARTICIPATION IN SEA TURTLE CONSERVATION IN TORTUGUERO, COSTA RICA AND NEAR THE ARCHIE CARR NATIONAL WILDLIFE REFUGE, FLORIDA, USA

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George Mason University, 2015

Dissertation Director: Dr. E.C.M. Parsons

Tortuguero, Costa Rica and the Archie Carr National Wildlife Refuge (ACNWR), Florida, USA represent two critically important sea turtle nesting sites where habitat preservation has been established for many years. In 2014, questionnaires were completed by residents living adjacent to the ACNWR ($N = 131$) and by Tortuguero residents ($N = 132$) in order to: (1) analyze which demographic characteristics explain the Tortuguero and the ACNWR residents' knowledge of, attitudes toward, willingness to act for, and participation in sea turtle conservation; and (2) investigate the differences between the two locations regarding these facets of sea turtle conservation. Overall, survey responses for both Tortuguero and the ACNWR reflected strong positive attitudes toward sea turtles. The analyses for Tortuguero concluded that although facets of ecotourism play a large role in cultivating sea turtle knowledge and participation in sea turtle conservation, other demographics in the broader community significantly matter as

well, and that the role of peer-to-peer communication is important in promoting positive attitudes toward sea turtles. The analyses for the ACNWR concluded that residents' main source of sea turtle information (being a NGO or government agency) frequently played a significant role in shaping residents' knowledge of, attitude toward, willingness to volunteer for, and participation in sea turtle conservation. Compared to the ACNWR residents, this study revealed that Tortuguero residents had significantly higher knowledge of, willingness to act for, and participation in sea turtle conservation; however, similarities were found with regard to their general attitudes toward sea turtles. The reasons why Tortuguero had greater outcomes were attributed to demographic, cultural, and economic factors. Specifically, this study demonstrated that ecotourism in Tortuguero predominantly accounted for residents' higher sea turtle-related knowledge; willingness to donate money to help sea turtle conservation; participation in sea turtle-related activities; and participation in helping to protect sea turtles (on their own, non-agency sponsored time). On a broader level, these results illustrate that community-based ecotourism can lead to higher pro-species conservation behaviors and participation in species conservation among the local community than non-ecotourism based conservation strategies.

CHAPTER ONE: INTRODUCTION

Introduction

Modern sea turtles first appeared on Earth about 110 million years ago. When dinosaurs and many other organisms underwent a mass extinction around 65 million years ago, sea turtles seemed unharmed and increased in diversity. Today, two of the four families of these anciently-descended sea turtles still exist. As late as the 18th century, scientists estimate that hundreds of millions of sea turtles filled the oceans (Spotila 2004). However, in the 21st century, sea turtles face numerous anthropogenic threats. Current threats are so significant that the majority of the seven sea turtle species that exist today are now globally declining in population, and all six sea turtle species found in U.S. waters are listed under the U.S. Endangered Species Act (IUCN 2015; NOAA 2015).

The unique life history traits of sea turtles pose conservation challenges and make them particularly vulnerable to human overexploitation, bycatch in fisheries, and other anthropogenic threats. These traits include their long lifespan, extensive geographic range, slow growth, late sexual maturity, and slow reproductive rates (Davenport 1997; Lewison et al. 2004; Senko et al. 2011). The wide geographic range of sea turtles poses conservation challenges because policies and cooperation are needed locally, nationally, and internationally across a variety of habitats (Davenport 1997; Gonzalez-Carman et al.

2012). Sea turtles may travel hundreds or thousands of miles to reach foraging grounds; however, they have more restrictive and preferred beach nesting areas (Carr et al. 1978). Since sea turtles spend most of maturity in various national jurisdictions along coastal waters, local regulations and conservation actions require more attention (Davenport 1997; Gonzalez-Carman et al. 2012).

Human knowledge, attitudes, and values toward wildlife are vital components of conservation since they drive human action or behavior, which in turn may impact wildlife (Jacobson & Marynowski 1997; Rockwood et al. 2008). Research has found that the general public's attitudes toward and knowledge about wildlife in the U.S. and other countries have specific tendencies related to demographics such as age, gender, race, educational attainment, and cultural differences (Kellert et al. 1996). Understanding human knowledge, attitudes, and values toward wildlife, along with the demographic drivers behind them, can inform conservation strategies (Rockwood et al. 2008; Jacobson & Marynowski 1997).

Substantial research has been conducted analyzing how demographic characteristics influence the public's attitudes toward wildlife; however, less research of this type has been conducted in developing countries and in locations where long-standing species conservation efforts have been established. With global sea turtle populations in peril, it is crucial that the impact of current sea turtle conservation strategies on local residents' knowledge, attitudes, values, and behavior toward sea turtles be evaluated. The two research sites in this study, Tortuguero, Costa Rica and the Archie

Carr National Wildlife Refuge (ACNWR), Florida, USA, represent such locations where sea turtle conservation and preservation efforts have been established for many years.

Research Objectives

The main goal of this research is to provide conservation managers with information to inform conservation strategies. This research also provides stakeholders with demographic information that may assist them with marketing strategies for species conservation initiatives. In order to accomplish the main research goal, this research consisted of four primary objectives. The main research objectives were as follows:

(1) The first objective was to identify and establish a baseline of residents' knowledge of, attitudes toward, willingness to act, and participation in sea turtle conservation at Tortuguero and near the ACNWR.

(2) The second objective was to identify what demographic characteristics and other factors explain a residents' knowledge of, attitudes toward, willingness to act for, and participation in sea turtle conservation at Tortuguero.

(3) The third objective was to identify what demographic characteristics and other factors explain a residents' knowledge of, attitudes toward, willingness to act for, and participation in sea turtle conservation near the ACNWR.

(4) Lastly, the fourth objective was to compare the survey results between Tortuguero and the ACNWR in order to better understand how economic (mainly ecotourism) and cultural differences explain residents' knowledge of, attitudes toward, willingness to act for, and participation in sea turtle conservation.

Research Sites and Literature Review

For purposes of this research, a ‘research site’ is defined as the immediately-adjacent community to the protected area. A ‘resident’ is defined as an individual that lives within the research site either part-time or full-time and without regard to the legality of their residency. Although infrequent, individuals that worked within the research site, but lived outside of the site, were included in the sample.

Tortuguero, Costa Rica

The village of Tortuguero is located in northern Costa Rica on the Caribbean Sea coast in the province of Limón (Carr et al. 1978; INEC 2011) (Figure 1). Tortuguero is located within Tortuguero National Park (TNP) and is home to the largest green turtle (*Chelonia mydas*) rookery in the Atlantic (Bjorndal et. al 1999; Place 1995; Troëng & Rankin 2005). The green turtle is listed as an endangered species by the International Union for Conservation of Nature and Natural Resources (IUCN) (Seminoff 2004). The sea turtle nesting beach at Tortuguero lies on a barrier island that is separated from the mainland by a continuous series of lagoons and swamps (Carr et al. 1978; Place 1995). Based on personal communication with INEC, Tortuguero village has 906 residents according to Costa Rica’s 2011 census data (INEC 2012). Although the primary language of instruction is Spanish, English and creole English are also spoken within Tortuguero (Lefever 1992). Many Tortuguero residents are bilingual, speaking both English and Spanish. Lefever (1992) noted that among themselves, “many villagers speak a patois language, which is a mixture of English and Spanish.”

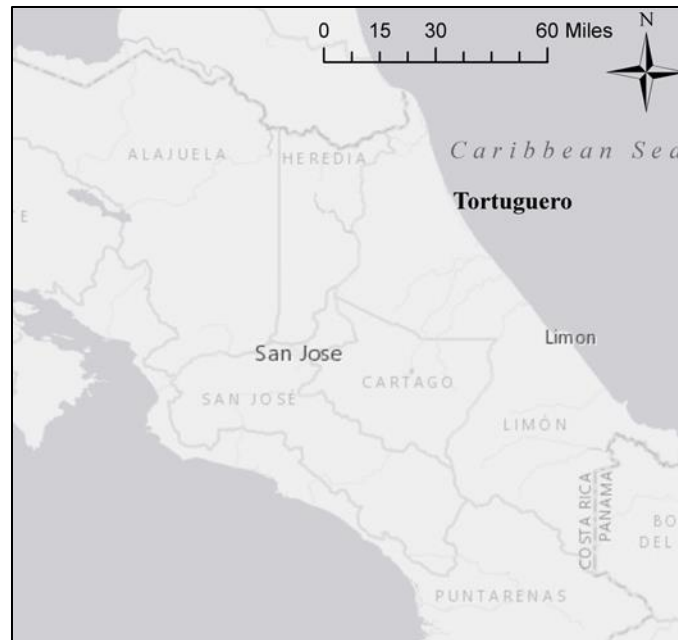


Figure 1. Tortuguero location map (basemap data sources: Esri, HERE, DeLorme, OpenStreetMap contributors).

Historically, the village of Tortuguero's economy was based on sea turtle and egg harvesting, logging, and small scale agriculture (Place 1995). In 1955, zoologist Dr. Archie Carr began a comprehensive long-term study on green turtles at Tortuguero (Carr et al. 1978). In 1959, Dr. Carr founded and led the Caribbean Conservation Corporation (CCC), which is presently called the Sea Turtle Conservation (STC). In the 1960s, the Government of Costa Rica banned egg and sea turtle collection at Tortuguero (Troëng & Rankin 2005). In 1975, TNP was established to protect 22 miles of sea turtle nesting beach (Figure 2) and adjacent lowland tropical rainforest (Carr et al. 1978; Place 1995). In the 1980s, tourism greatly accelerated and has been the primary industry in Tortuguero ever since (Jacobson & Robles 1992; Jacobson & Lopez 1994; Place 1995; Vandegrift

2007). In addition to a traditional protected areas conservation approach, the increase in tourism in Tortuguero prompted local stakeholders to adopt a community-based conservation (ecotourism) approach with an emphasis on income generation for the local community (Campbell 2002). Thus, the STC began working with Tortuguero villagers to promote ecotourism and education (Campbell & Smith 2006). In the 1990s, tourism marketing shifted from targeting Costa Ricans to instead foreign tourists, which resulted in greater profits and several hundred new residents (Place 1995). In 2012, TNP received 117,341 paying visitors, which generated approximately \$733,810 (U.S. currency) from entry fees (STC 2012).



Figure 2. Photograph of Tortuguero beach (taken by the author 2013).

The STC has conducted annual research and conservation efforts at Tortuguero since 1959 (Davis 2007; Troëng & Rankin 2005). Thus, the STC claims the longest continuing sea turtle research program in the world (Campbell & Smith 2006). Based on annual nest survey data collected at Tortuguero beach since 1971, the trend of green turtle nesting is positive (Troëng & Rankin 2005).

Sea turtle guided tours are one of the main tourist attractions in Tortuguero. Sea turtle tours are held nightly during the nesting season. In 2012, approximately 28,537 tourists participated in sea turtle guided tours (STC 2013). After receiving certification through a training program, Tortuguero residents are issued government permits permitting them to guide tourists on sea turtle tours (STC 2015).

Sea turtle-related educational activities are available to the public in Tortuguero. The STC maintains and operates a visitor's center in Tortuguero (STC 2012). In the past, the STC has operated a "Turtles of Tortuguero Research Participant Program," which provided the public with opportunities to be involved in the STC's research activities (Campbell & Smith 2006). In 2010, the STC conducted almost 100 environmental educational activities. Although these activities were mainly for local students, several workshops were also held with adults from Tortuguero (STC 2011). With no dedicated personnel to community outreach presently, the STC community educational program today is not as extensive; however, several educational activities in 2011 were conducted at Tortuguero school (STC 2012).

There are several previous research studies that have been conducted at Tortuguero. In 1986, Place (1991) interviewed members of households, TNP staff, and

business owners. Approximately half of 21 interview participants reported that their standard of living, due to inflation and unemployment, in 1986 was worse than it was before the establishment of TNP in 1975 (Place 1995). In addition, Place (1995) found a lack of understanding among Tortuguero residents of TNP's potential to generate income or employment for them.

In 1990, Brown (1991) interviewed 31 Tortuguero residents on their attitudes toward TNP and its perceived benefits. Brown (1991) found a pattern between resident resource knowledge and the number of personal benefits from TNP they cited; however, this trend could not be substantiated due to the small sample size. In addition, all respondents agreed with the statements, "it is important to protect areas where animals live," and "it is good that the park is protected." Several respondents also recommended that TNP staff be more involved with the community (Brown 1991).

Peskin (2002) surveyed 41 local tourism guides in Tortuguero related to their attitudes toward ecotourism, sea turtle conservation, and guiding. Results indicated that most tourism guides believed that tourism was improving the quality of life in Tortuguero. However, this research identified the need for survey research data from the entire community in order to gain an overall perspective on how ecotourism is affecting the community (Peskin 2002).

Meletis (2007) interviewed approximately 70 individuals from Tortuguero regarding their attitudes toward ecotourism, waste management, and concerns over the environmental impacts of ecotourism. Most of this study's respondents noted the lack of unity within Tortuguero and the difficulty in defining such a diverse community. This

study found that respondents often distinguished between groups and created divisions of “insiders” and “outsiders” depending on the person’s place of origin, date of arrival to Tortuguero, and the total time lived in Tortuguero. This study also found that 38% of surveyed tourists ($N = 949$) responded that their main reason for visiting Tortuguero was to participate in a sea turtle guided tour (Meletis 2007).

The Archie Carr National Wildlife Refuge (ACNWR)

The ACNWR is located on a barrier island on the Atlantic coast of central Florida, U.S (Figure 3). It is a fragmented refuge consisting of approximately 20.5 miles of coastline. As shown in Figure 4, the ACNWR stretches from Melbourne Beach (Brevard County) southward to near Wabasso Beach (Indian River County) (USFWS 2008). A photograph of the ACNWR beach is shown in Figure 5. The population of the communities directly adjacent to the ACNWR was estimated to be 7,902 people (U.S. Census Bureau 2010). The local economy near the ACNWR is dependent on a wide variety of industries. Professional, scientific, and technical services constitute the largest proportion of the total industry establishments near the ACNWR (represented by census data for Melbourne Beach, Florida) (U.S. Census Bureau 2012).

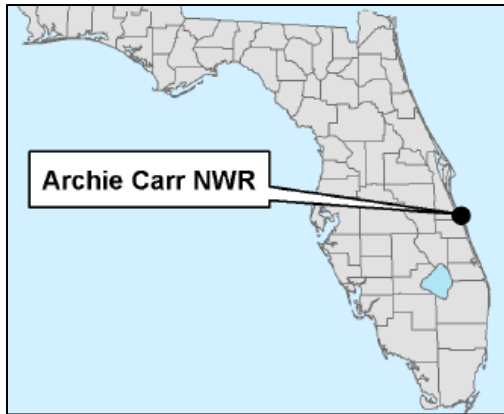


Figure 3. Location map of the Archie Carr National Wildlife Refuge (ACNWR) (USFWS 2008).

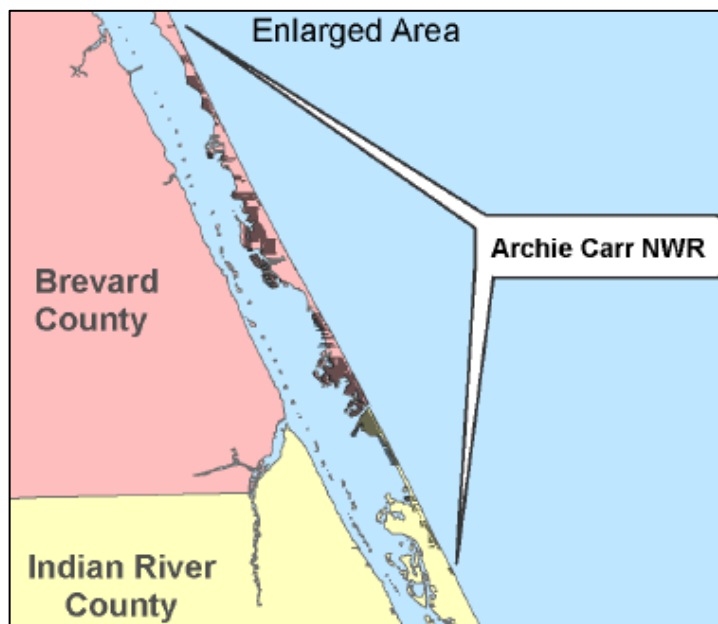


Figure 4. Enlarged map of the ACNWR (USFWS 2008).



Figure 5. Photograph of the ACNWR (taken by the author 2013).

The ACNWR serves as an important nesting beach for the loggerhead turtle (*Caretta caretta*) and green turtle (*Chelonia mydas*) (Chaloupka et al. 2008; USFWS 2008; USFWS 2014). A recent study showed that the ACNWR contains the highest loggerhead turtle nesting density in Florida; thus, it represents one of the most crucial habitats for loggerhead turtles in the Western Hemisphere (Ehrhart et al. 2014). Under the U.S. Endangered Species Act (ESA) of 1973, the ACNWR loggerhead turtle population is part of the Northwest Atlantic Ocean distinct population segment (DPS): a DPS which has a listing of threatened (USFWS & NMFS 2011). The green turtle is listed as an endangered species under the ESA (USFWS & NMFS 2007).

In the 1970s, Dr. Archie Carr first recognized the importance of south Brevard County beaches for sea turtle nesting (USFWS 2008). Aerial surveys conducted by Dr. Carr in 1977 revealed that the average loggerhead turtle nesting density at Melbourne Beach, Florida exceeded that of all other nesting sites in the state (Bjorndal et al. 1983). With wide public and political support, the ACNWR was established in 1991. In 2000, the ACNWR was listed as a candidate marine protected area (USFWS 2008). Today, numerous non-governmental organizations (NGOs) and local, state, and federal government agencies are involved with research, educational, and outreach efforts supporting the ACNWR.

Despite these conservation efforts, loggerhead turtle nesting has decreased at the ACNWR since 1998 (USFWS 2008). Loggerhead turtle nesting from 1989 to 2006 in the central east region of Florida (which includes the ACNWR) has experienced a net negative change (-28.7%) in annual mean nest density (Witherington et al. 2009). However, green turtle nest abundance from 1982 to 2005 at the ACNWR exhibited an annual growth rate of 13.9% (Chaloupka et al. 2008).

Sea turtle-related educational activities are available to the public near the ACNWR. One main educational activity is the guided sea turtle watch interpretive programs offered to the public (“sea turtle tours”). Sea turtle tours are held nightly during the nesting season. They are conducted by ACNWR staff, volunteers, STC, and Sebastian Inlet State Park partners. In addition, Brevard County and the STC conduct other sea turtle educational programs at the Barrier Island Sanctuary Management and Education Center. Despite these activities, the USFWS may wish for greater resident

awareness. The USFWS noted in their Comprehensive Plan that, “currently few of these residents [near the ACNWR] are aware of the refuge. The refuge and the resources would benefit if more local area residents become aware of the refuge and its purposes and understand its conservation goals and objectives” (USFWS 2008).

One interviewed expert discussed that a large part of cultivating public awareness about and values toward sea turtles in the ACNWR is through the sea turtle tours. This expert stated about the sea turtle tours that, “...You need to try to keep up enthusiasm for the protection of these species over time, you can only do that through education I think and getting people out there...[we had] this biker guy who came out with his girlfriend. His girlfriend really wanted to see a sea turtle...But so he gets dragged on this turtle walk and he sees this 400-pound female come out and start laying her eggs. And one of the scouts looked over and noticed that he was crying, and he said ‘I had no idea.’ So it is one of those remarkable experiences. And I had a similar experience with my cousin’s husband, and he did not want to be there. And he saw it [a nesting sea turtle], and he was aghast. It is just something life changing to see this happen. And as many people that we can let have that opportunity they can then take that back with them and they don’t think twice about donating money to [conservation]...So I think that as much as keep people emotionally attached to a given conservation target.”

Methods

Survey Methods

The primary survey method involved the use of written questionnaires, administered face-to-face, for quantitative analysis. However, semi-structured interviews

with local experts and residents were first conducted prior to the development of the questionnaire. Experts were identified through literature reviews, online research, and organically through informal discussions with local individuals. Residents were sought opportunistically at various times and places. Interview participants were asked open-ended questions about the culture and economy of the research site; sea turtle conservation issues; local sea turtle-related activities; their sources of information on sea turtles; and demographics. Expert interview participants were additionally asked about local rules and compliance with these rules. All interviews were audio-recorded, later transcribed, and analyzed for themes. The interview results, along with public observations made by the researcher during two visits to each research site, were incorporated into the research models, hypotheses, and questionnaire.

The questionnaire (Appendix A) was developed using techniques, guidelines, and suggested formatting outlined by Dillman et al. (2009). The questions presented in an order of potential interest to participants, potential sensitivity, and in a manner to reduce bias. The questionnaire asked participants about their sea turtle-related knowledge, attitude toward sea turtles, willingness to take action to help sea turtle conservation, participation in sea turtle-related activities, opportunity to participate, direct observation of sea turtles, and primary source of information on sea turtles. Demographic questions were asked at the end of the questionnaire. Most questions were closed-ended (yes/no, true/false, multiple choice, and 5-point Likert scale responses with a neutral center). All knowledge questions included an 'I don't know' response option. The questionnaire was

pretested on randomly selected individuals ($n = 15$) in the Washington, D.C. metro area in order to obtain feedback on clarity and organization.

The tailored design method was used to design the survey procedure for administering the questionnaire. In order to create a representative sample, tailored design encourages a high quality and quantity of survey response while reducing coverage, sampling, nonresponse, and measurement errors (Dillman et al. 2009). A nonprobability convenience sampling approach was employed to recruit participants. This sampling method is useful for baseline research and for studies that do not begin with a finite list of people (Huck 2012). Employing this method, questionnaire data were collected from whoever was available or could be recruited. Participants were sought face-to-face by visiting various venues seven days a week at all times of the day. The questionnaire was administered verbally when requested by the participant. Besides confirming that participants were a resident within the research site and were at least 18 years old, no specific individuals were sought for participation. Most surveys last 10 to 15 minutes.

All potential participants were informed about the main purpose of the research and that it was being conducted independently by George Mason University (GMU). An informed consent document was provided to participants (Appendix A). Participants were told that they may ask questions and/or withdraw themselves at any time during the survey. The number of individuals who declined participation and their reason for declining was documented. One researcher performed all recruitment, and a script was used to ensure all participants were recruited in the same manner.

Recruitment scripts, survey instruments, and procedures used in this research complied with the human subject research guidelines set by GMU. Risks of harm to participants were minimized by eliminating direct identifiers in surveys. No incentives for participation were provided.

Statistical Methods

All analyses in this research were conducted using the statistical software, STATA Version 13 (StataCorp 2013a). Each correct answer to a knowledge question was coded as a score of 1, and incorrect answers resulted in a score of 0. Each response to a question with a 5-point Likert scale was assigned scores (1 – 5) at appropriate intervals (with 5 representing the most positive response). In this dissertation when variables are described, the listed category number is equivalent to the assigned score.

For each research site's survey data, multiple regression analyses were conducted using an index consisting of all knowledge-based items as the dependent variable. Post-estimation diagnostic measures were conducted in order to ensure that the assumptions of linear regression were met. Outliers were investigated by visual inspection of added-variable plots and leverage-versus-squared-residual plots. Normality of residuals was visually examined through univariate kernel density estimation graphs and normal probability plots. In order to examine linearity, augmented component-plus-residual plots were examined for each variable in the models. Residuals were examined on residual-versus-fitted plots in order to examine homoscedasticity.

Logistic regression analyses were conducted to test two hypothesized models. The first model was hypothesized to explain residents' willingness to act to support sea

turtle conservation (Figure 6). The second model was hypothesized to explain residents' participation in various sea turtle conservation activities (Figure 7). Detailed models are included in Appendix B.

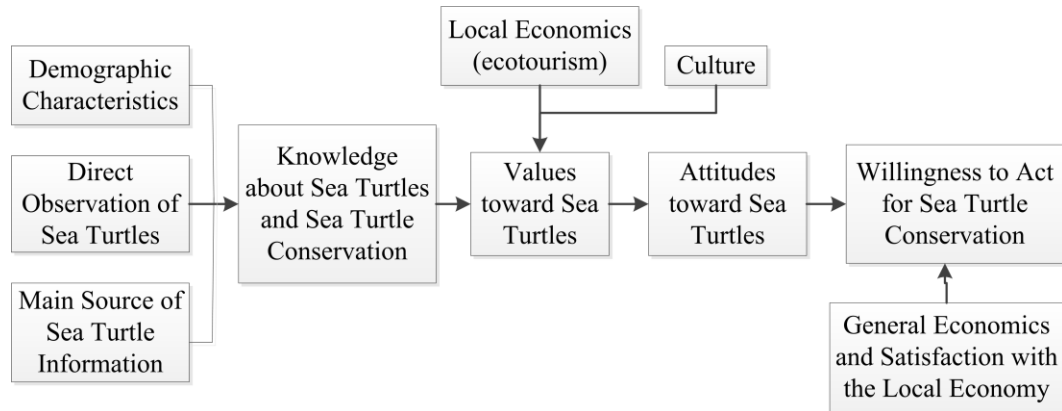


Figure 6. Hypothesized model explaining willingness to act for sea turtle conservation.

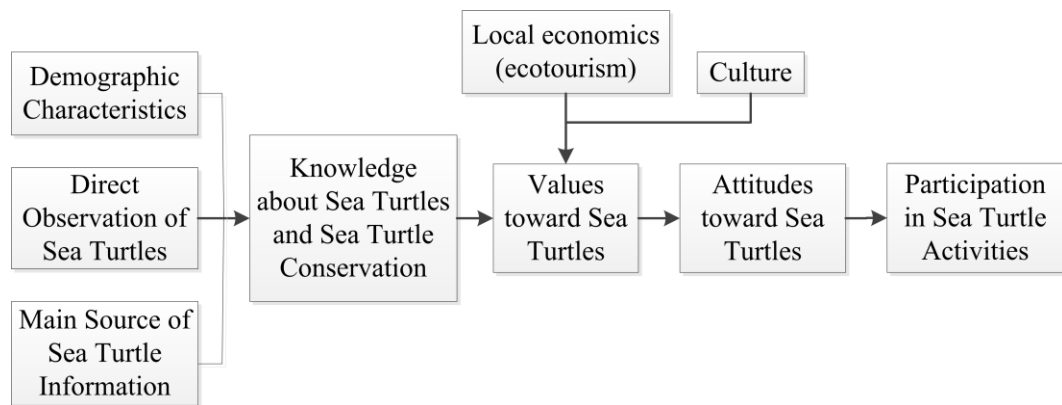


Figure 7. Hypothesized model explaining participation in sea turtle-related activities.

A stepwise selection procedure was employed for all logistic regression analyses in order to screen the independent variables for the best-fitting model (Hosmer et al. 2013). All analyses underwent a series of analyses by using a forward stepwise selection of one additional independent variable per test. If a variable improved the resulting model's goodness-of-fit, as examined using the 'Fitstat' function in STATA (Long & Freese 2014), then this variable was retained for the next regression. Variables that were not a good fit with the model were also not significant ($p > 0.05$). The overall goodness-of-fit for all final models in this research was confirmed using the Hosmer and Lemeshow's chi-square goodness-of-fit test (StataCorp 2013b).

Post-estimation diagnostic measures and statistics for the logistic regression analyses were performed. Influential observations were inspected using the standardized Pearson residuals (Hosmer et al. 2013) and Pregibon (1981) leverage statistics. The raw data for observations that exhibited high leverage were checked against the entry data to verify that an entry error had not occurred. Coefficient sensitivity was examined to ensure that the Pregibon (1981) Delta-Beta influence statistic was less than 1.0 for individual covariate patterns or observation(s), as suggested by Hosmer et al. (2013). Model specification was examined using the 'link test' statistic, of which a non-significant result ($p > 0.05$) for prediction squared was ensured for all models.

In order to detect multicollinearity for all analyses in this research, variance inflation factors (VIFs) for the independent variables were examined through tests. Acceptable VIFs were ensured for the models. The guideline that was used included that

the largest VIF should be less than 10.0, and the mean of all the VIFs should not be substantially larger than 1.0 (StataCorp 2013b).

Prior to conducting all logistic regression analyses, contingency tables were checked to ensure cells did not contain empty or many low expected frequencies of less than 5. Variables that did not meet required expected frequencies were transformed where feasible. Fisher's Exact Tests were conducted when several expected frequencies were less than 5 (Huck 2012).

After some logistic regression analyses, separate chi-square tests were conducted using independent variables that had low sample size (high non-response). Inclusion of these independent variables in the logistic regression models would have reduced the statistical power of the regression analyses. If significant differences were found, Cramer's *V* was employed to measure the strength of association.

Qualitative Methods (Values toward Sea Turtles)

Values toward sea turtles were extracted from resident responses to two open-ended survey questions: (1) "What does the conservation of sea turtles mean to you?" and (2) "Why do you like or dislike sea turtles?" This research identified ten values toward sea turtles, as expressed by the Tortuguero and ACNWR residents (Table 1). The 'nonthreatening' value originated from this research; whereas, all other values have been adapted to fit this research's results from a combination of previous research. Due to the low number of observations, values were not included in the regression models in order to maintain an adequate statistical power; thus, separate chi-square tests were conducted using the expressed values toward sea turtles and the various dependent variables.

Table 1. Definitions of values toward sea turtles identified in this research.

Values	Definition
Scientific	Interest in the physical characteristics, life history traits, migration, behavior, physiology, evolutionary biology/ancient lineage, and/or biological functioning of sea turtles (Kellert & Berry 1987; Kellert 1996; Campbell & Smith 2006).
Ecologicistic	Concern for or interest in the interrelationships between sea turtles and ecological systems (Kellert & Berry 1987). Emphasizing the interdependence among species and habitats/nature (Kellert 1996).
Esthetic	Interest in the physical attractiveness, large size, charismatic nature, and/or symbolic characteristics of sea turtles, which evokes a strong or emotional human feeling (Kellert 1994; Kellert 1996).
Naturalistic	Interest in the direct experience of sea turtles in nature. Reflects the pleasure humans get from exploring nature and recreational activities (i.e. observing sea turtles) (Kellert 1996).
Humanistic	Expressing strong affection for, attachment to, companionship toward, and/or anthropomorphic associations toward sea turtles (Kellert 1994; Kellert 1996).
Moralistic	Moral concern for the right and wrong treatment of sea turtles and/or strong opposition to exploitation (Kellert & Berry 1987). Possessing a spiritual and/or moral connectedness to sea turtles due to the kinship that unites humans to all other living creatures (Kellert 1996).
Utilitarian	Concern for the practical use and/or economic benefits of sea turtles or their habitat for present or future human needs (Kellert 1994; Kellert 1996). ^a
Negativistic	Dislike, indifference to, fear, and/or avoidance of sea turtles (Kellert 1994).
Conservation	Concern for or interest in sea turtles for their conservation or population status; threats; and/or their local conservation success (Campbell & Smith 2006).
Nonthreatening	Interest in sea turtles for their nonthreatening interactions with humans and/or their favorable docile, nonviolent, passive, calm, defenseless, and/or innocent behavior.

^aIn Tortuguero, the utilitarian value was also assigned to statements about their dependency on sea turtles for survival due to income generation from tourism.

CHAPTER TWO: DEMOGRAPHIC CHARACTERISTICS THAT EXPLAIN RESIDENTS' KNOWLEDGE OF, ATTITUDES TOWARD, AND PARTICIPATION IN SEA TURTLE CONSERVATION IN TORTUGUERO, COSTA RICA

Abstract

Established in 1975, Tortuguero National Park, Costa Rica serves as an important preserved habitat for nesting sea turtles. In June/July of 2014, questionnaires were completed by Tortuguero residents ($N = 132$) to investigate which demographics explain residents' knowledge of, attitudes toward, willingness to act for, and participation in sea turtle conservation. This study demonstrated that residents' knowledge about sea turtles was mostly explained by their gender (being male); relatively longer months of residency per year in Tortuguero; higher educational attainment; and employment as a tourism guide or conservation-related personnel. This study also revealed that residents whom are socially connected with the community (i.e. with a NGO, government agency, tourism guides, or local people) in regard to sea turtles have stronger positive attitudes toward sea turtles than residents that obtain their sea turtle information through direct observation. This illustrates the importance of social interactions between community members in cultivating positive attitudes toward wildlife. Residents with occupations as tourism guides or conservation-related personnel, and those that believed that sea turtle tourism was economically beneficial to them, were more willing to donate money to help sea turtle conservation. Residents' willingness to donate their time for sea turtle

conservation was mostly explained by their relatively lower age and higher knowledge about sea turtles. Residents' participation in sea turtle-related activities was mostly explained by their relatively higher educational attainment; lack of a main source of sea turtle information of 'local people or friends'; possession of a religion; employment as a tourism guide or conservation-related personnel; and possession of the utilitarian value toward sea turtles. Lastly, residents' participation in protecting nesting sea turtles or those in danger (on their own time) was significantly explained by their gender (being male); occupation (tourism guides, etc.); and strong attitude toward sea turtles. This study concludes that although facets of ecotourism play a large role in cultivating knowledge and participation, other demographics in the broader community matter as well, and the role of peer-to-peer communication is important in promoting positive attitudes toward sea turtles.

Introduction

Research has found that the general public's attitudes toward and knowledge about wildlife in the U.S. and other countries have specific tendencies related to demographics such as age, gender, race, educational attainment, and cultural differences (Kellert et al. 1996). For instance, a study conducted by Kellert (1991) found that Japanese participants formally educated at a higher level were more knowledgeable and appreciative of wildlife than participants formally educated at a lower level. In another study, gender was determined by Kellert and Berry (1987) to be one of the most important demographic factors in determining attitudes about wildlife. Furthermore, educational attainment has been identified in previous research as a significant influential

variable, in which respondents formally educated at a higher level expressed significantly higher ecological concern, appreciation, scientific curiosity, and/or concern for more protection toward species than did respondents formally educated at a lower level (Kellert & Berry 1987; Kellert 1993a; Luksenburg & Parsons 2013). Kellert and Berry (1987) also found that males were more knowledgeable about wildlife than females. Previous research has also found that higher-educated individuals have significantly greater knowledge about species than individuals with less formal education (Kellert & Berry 1987; Kellert 1993a). Religion, occupation, and the conservation status of the species of interest have also been found to influence attitudes toward species conservation (Khatun et al. 2012).

Understanding how demographic characteristics influence an individual's conservation knowledge, attitude, and participation can inform conservation strategies (Rockwood et al. 2008; Jacobson & Marynowski 1997). Substantial research has been conducted analyzing how demographic characteristics influence the public's attitudes toward wildlife; however, less research of this type has been conducted in developing countries and in locations where long-standing conservation efforts have been established. Are these previously identified demographics also significant influencers in locations where conservation, educational, and ecotourism efforts have been employed for many years? Tortuguero, Costa Rica represents such a location where conservation efforts have been employed for many years. With the goal of informing conservation strategies, the goal of this research is to identify what demographic characteristics and

other factors explain residents' level of knowledge, attitude toward, willingness to act for, and participation in sea turtle conservation in Tortuguero.

Methods

The statistical methods employed to analyze the Tortuguero data are detailed in Chapter 1 of this dissertation. The survey methods employed at Tortuguero are also detailed in Chapter 1. The following survey methods are specific to Tortuguero.

Semi-structured interviews with experts and residents in Tortuguero were first conducted. Expert interviews were conducted either face-to-face or via telephone in 2013. Resident interviews were conducted face-to-face in late August of 2013.

Interviews were conducted in either Spanish or English, depending on the participant's preferred language.

After pretesting the English version of the questionnaire, the finalized English questionnaire was then translated into Spanish by a professional translator with final edits provided by the primary researcher. This Spanish version of the questionnaire was then pretested in two stages. First, the Spanish questionnaire was pretested on a Spanish/English bilingual expert panel ($n = 6$) in order to obtain feedback on the clarity of the Spanish and the equivalency of the Spanish/English translation. Three of these experts had doctoral degrees, which included a George Mason University Associate Professor of Spanish Linguistics and an academic instructor of Spanish. The expert panel also included one individual with specific knowledge of the Costa Rican dialect. Recommended edits were incorporated into the questionnaire; however, revisions were not made that conflicted with the Tortuguero-specific vocabulary. The expert-vetted

questionnaire was pretested on Spanish-speaking individuals ($n = 9$) from the general public in the Washington, D.C. metro area in order to obtain feedback on clarity. Lastly, feedback on the clarity of the Spanish questionnaire was obtained from two local experts based in Tortuguero, which resulted in no additional revisions.

The 40-question questionnaire was administered in June/July of 2014 for a two-week period. Four questions were open-ended, and all other questions were closed-ended. The recruitment script and questionnaire were available to participants in Spanish and English. All Tortuguero participants were recruited in Spanish, but the recruitment was switched to English if the participant asked. Questionnaire participants were sought in Tortuguero at households; beach areas and parks; retail shops; restaurants; commercial businesses; grocery stores; and residential areas.

Results

Interview Results

Four experts having local expertise in sea turtle conservation at Tortuguero were interviewed as part of this research. Interview length ranged from 25 to 48 minutes with an average length of 34 minutes. The gender ratio was 50/50.

Interviewed experts discussed the culture and economy in Tortuguero. Several experts described the culture of Tortuguero as diverse, with one expert stating, “It is a mixed culture... There are a mixture of languages and customs.” All four experts stated that the economy of Tortuguero is dependent on tourism, and three experts specifically discussed the economic benefits of sea turtle conservation in Tortuguero. In addition,

results indicated that there may be some dissatisfaction with economic stability due to the sole dependency on and seasonality of tourism.

Expert interviews indicated that tourism and sea turtle conservation are very important topics in Tortuguero. The results indicated that although sea turtle conservation efforts are thorough in Tortuguero that more involvement with the local community may be warranted. Results also indicated there may be differences in the attitudes toward sea turtles between the year-round (full-time) residents and the temporary (part-time) residents. Sea turtle poaching and limited government resources to enforce sea turtle protection laws were reported as issues.

Ten Tortuguero residents were also interviewed. The interview acceptance rate was 50.0%. Females represented a smaller proportion of the sample (20.0%) than males (80.0%). Interview length ranged from approximately 8 to 22 minutes with an average length of approximately 10 minutes.

Resident interview results revealed a variety of topics and important variables to consider in the research hypotheses. As with the expert interviews, the resident interviews results revealed the importance of tourism to the local economy. Most interview participants believed that the economy is dependent on tourism ($n = 9$), in which three of these participants specifically mentioned sea turtle tourism. Half of the participants described the economy of Tortuguero as being depressed. When participants were asked what sea turtle conservation meant to them, most participants ($n = 7$) expressed utilitarian values, associating the importance of sea turtle conservation with the economy of Tortuguero. Participants mostly described the culture of Tortuguero as

diverse and containing many different cultures such as Nicaraguans and “foreigners.” Again, the results indicated that there may be differences between the full-time and part-time residents. The results further indicated that there may be a high awareness among residents of the history of local sea turtle conservation activities. However, the results indicated that an individual’s occupation, such as being a tourism guide, may influence knowledge. Three participants discussed how residents help to protect sea turtle nests and/or turtles (on their own, non-agency sponsored time).

When participants were asked if they knew of any local sea turtle conservation problems, sea turtle poaching was the most cited problem ($n = 6$). One of these residents noted that poaching was done only by people from outside of Tortuguero (from Limón). Another resident mentioned that there is not enough government on the coast to protect sea turtles.

Most interviewed residents (70.0%) had participated in a sea turtle-related activity. Three of these residents stated that they have participated in sea turtle conservation by helping the Sea Turtle Conservancy, and one resident noted they had participated by calling Tortuguero National Park over encountering an injured sea turtle.

Based on the interview results and literature review, it was decided to not include a direct question on sea turtle poaching on the questionnaire due to the sensitivity of the issue, the ample evidence supporting that poaching to some extent occurs presently at Tortuguero, the likelihood of nonresponse, and the likelihood of introducing measurement error. Instead, the issue of poaching was allowed to surface organically

through several open-ended survey questions (as discussed later in this chapter) and if prompted after the survey by the participant.

Quantitative Results

Survey Participant Demographics and Variable Descriptions

A total of 132 Tortuguero residents responded to the questionnaire. The 95% confidence interval for the Tortuguero population of 906 for this sample size is $\pm 7.89\%$ for responses that are evenly split (50/50) and $\pm 6.31\%$ for responses split 80/20.

Females represented a slightly smaller proportion of the sample (47.7%) than males (52.3%). The acceptance rate was 79.0%. Of the individuals that declined participation ($n = 35$), 54.3% were females and 45.7% were males¹.

The mean age of participants ($N = 130$) was 35.22 years. Age ranged from 18 to 78 years. Age had a skewness value of 0.76 and was treated as a continuous variable in all analyses for this research.

The highest level of education that participants had obtained was collected ($N = 131$). Consisting of nine intervals, educational attainment had a skewness value of 0.43 and was treated as a continuous variable in all analyses. The mean educational attainment of participants was between two intervals: (4) some secondary education

¹The most common reason provided by those who declined participation was that they were too busy ($n = 20$). Others who declined participation provided reasons such as that they simply did not want to take the questionnaire ($n = 6$), wanted someone else to complete the survey instead ($n = 4$), did not know much or anything about sea turtles ($n = 3$), and was too tired ($n = 1$). Only one individual declined participation without providing a reason.

(incomplete) and (5) secondary education complete.

Information on the number of months per year that participants reside in Tortuguero was collected ($N = 130$). This continuous variable (referred to as ‘months of residency per year’, hereafter) had a mean of 11.18 months and skewness value of -2.75. Full-time residents constituted 81.5% of the sample; whereas, part-time residents constituted 18.5% of the sample. Months of residency was treated as a continuous variable in all analyses in this chapter.

From an open-ended question, occupation data were collected from participants ($N = 127$). Because there was a high variability in occupation types, these data were transformed into a binary variable in order to examine the effects of tourism and conservation employment on the various dependent variables. This variable is referred to as ‘occupation,’ hereafter and consisted of the categories: (1) participants with occupations *not* directly related to tourism or conservation ($n = 103$); and (2) participants with occupations directly related to tourism or conservation (i.e. tourism guide, park staff, environmental educator, biologist) ($n = 24$). Most participants included in the second occupation category were tourism guides ($n = 20$).

Data on the number of years that participants had resided in Tortuguero was collected ($N = 131$). This variable (referred to as ‘years of residency’, hereafter) ranged from 1 to 58 years. Years of residency had a mean of 16.60, skewness value of 1.19, and was treated as a continuous variable in all analyses for this research.

Data on participants’ satisfaction or dissatisfaction with the local economy (called ‘satisfaction with the local economy’, hereafter) was collected ($N = 118$). Satisfaction

with the local economy consisted of five categories: (1) very dissatisfied to (5) very satisfied. This question also contained a response category of “I prefer not to respond,” which was treated as a decline/nonresponse. The mean response to satisfaction with the local economy was 3.65, which represents an overall neutral to somewhat satisfied response. Due to the high non-response rate for this question, this variable was not analyzed in the regression models within this chapter but was analyzed in separate chi-square tests.

Data were collected from participants regarding their agreement or disagreement with the statement that sea turtle tourism is economically beneficial to them or their family, which is referred to as the ‘economic benefit of tourism’ variable, hereafter ($N = 131$). Economic benefit of tourism consisted of five categories: (1) strongly disagree to (5) strongly agree. The mean response to economic benefit of tourism was 4.61, which represents an overall agreement that sea turtle tourism is beneficial to them or their family. Economic benefit of tourism had a skewness value of -1.91 and was treated as a continuous variable in all analyses for this research.

Data on religion were collected from participants ($N = 122$). Most participants (58.2%) responded that they identified with a specific religion; whereas, 41.8% responded that they did not identify with a religion. Religion was treated as a binary variable consisting of two categories: (1) participants that did *not* identify with a religion ($n = 51$); and (2) participants that identified with a religion ($n = 71$).

Number of Sea Turtles Encountered by Survey Participants

Data on the number of sea turtles that participants had encountered were collected ($N = 129$). Almost all participants (97.7%) stated that they had personally encountered a sea turtle; whereas, 2.3% of participants had never encountered a sea turtle. The mean number² of sea turtles that participants had encountered was 173. This continuous variable, the ‘number of sea turtle observations’, had a skewness value of 2.37.

Based on the interview results (see Appendix C, Comment 1), there was interest in examining the relationship between individuals that have seen very few sea turtles, an intermediate/below average number, and an above average number of sea turtles. Thus, the number of sea turtle observations variable was transformed into three categories including: (1) respondents that had encountered 0 – 10 sea turtles; (2) respondents that had encountered 11 – 172 sea turtles; and (3) respondents that had encountered an above average number (≥ 173) sea turtles. This three-category variable is called the ‘number of sea turtle observations (three categories)’ variable, hereafter. This variable was used in analyses when it was hypothesized to explain the dependent variable and when it provided a better fit to the model than the continuous version.

²Many participants ($n = 31$) could not estimate the number of sea turtles they had encountered and responded with “a lot.” These “a lot” responses were assigned a value equivalent to the mean number of sea turtles encountered (173) by those respondents who could estimate the number. Participants that indicated that they had seen “thousands” of sea turtles were assigned a value of just 1,000.

Survey Participants' Main Source of Sea Turtle Information

Of the respondents ($N = 130$), most reported that they obtain their sea turtle information from tourism guides (28.5%) and from local people or friends (28.5%) (Figure 8)³. In addition, a large portion of the sample (23.0%) reported a non-governmental organization (NGO) as their main information source. To minimize confusion among participants, the questionnaire included an “organization” response option (versus using the term NGO) and a “government” response option. Both response options had a space for the participant to write the name of the organization/NGO or government agency. The STC/CCC was the only NGO cited by respondents. In addition, some respondents (10.0%) reported they obtain their sea turtle information through direct observation. A small portion of the sample (6.9%) reported government as their main information source. TNP was the only government agency cited by respondents. Only 3.1% of respondents selected the “other” response category as their main information source, which included information sources such as books, internet, and university.

³Some respondents ($n = 18$) reported having multiple sources of sea turtle information, despite the survey instructions to list only one. The reported percentages above and in Figure 8 do not include cited sources beyond one. Where respondents listed multiple sources, only one source was selected by the researcher to represent the most likely source hypothesized to significantly explain the dependent variables used in this research.

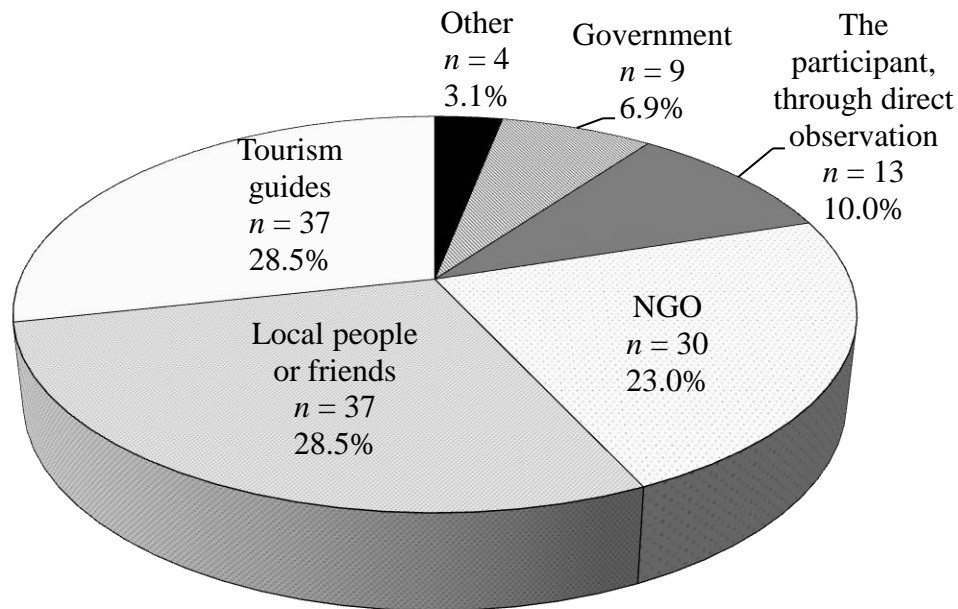


Figure 8. Tortuguero participants' main source of sea turtle information ($N = 130$).

Data were collected from participants on the extent to which they agreed or disagreed that the amount of information provided to them by their primary source of sea turtle information was adequate ($N = 99$). All respondents “agreed” to “strongly agreed” that the amount of information provided to them by their primary source was adequate (Figure 9). Respondents were asked to skip this question if their main source of sea turtle information was through direct observation. The results indicated that respondents that had a primary source of government held the most positive opinion of the adequacy of information (highest mean); however, a low frequency of respondents had government as their primary source (Figure 9).

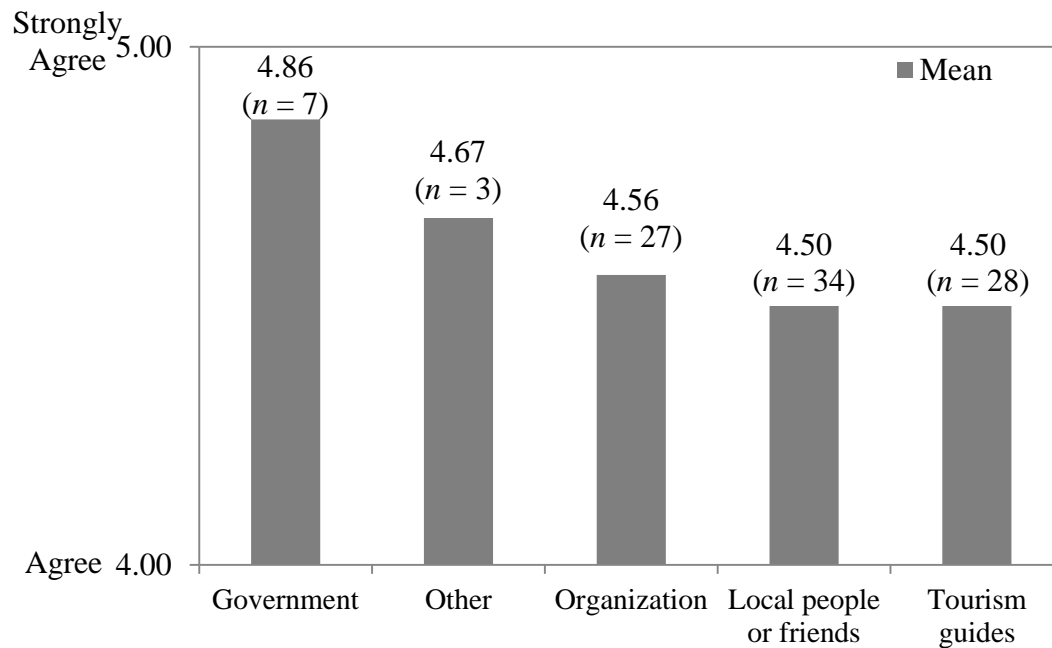


Figure 9. Mean response from Tortuguero participants ($N = 99$) on the extent to which they agreed or disagreed with the statement: “I think that the amount of information provided to me by my primary source is adequate.”

Knowledge Results

Correct responses to the knowledge-based questions varied (Table 2). The lowest correct response (44.7%) was to Question 6 (number of sea turtle species). The second lowest correct response (50.8%) was to Question 3 (year TNP established). Only a slight majority of respondents (52.3%) correctly answered Question 1 (sea turtle nesting season). The highest correct responses were to Question 7 (lights disturbing sea turtles) (97.0%) and Question 2 (most common species) (94.7%).

Table 2. Tortuguero participants' responses to the knowledge questions.

Question	Response	
	Correct	Incorrect
1. When is the sea turtle nesting/hatching season here? (<i>N</i> = 132)	52.3% (<i>n</i> = 69) <i>March 1 – October 31</i>	47.7% (<i>n</i> = 63)
2. Which sea turtle species <i>most commonly</i> nests on your local beach? (<i>N</i> = 131)	94.7% (<i>n</i> = 124) <i>Green turtle</i>	5.3% (<i>n</i> = 7)
3. In about what year do you think Tortuguero National Park was established? (<i>N</i> = 132)	50.8% (<i>n</i> = 67) <i>1975</i>	49.2% (<i>n</i> = 65)
4. In general, do you think global sea turtle populations are: Increasing, Staying the same, or Decreasing (<i>N</i> = 132)	59.8% (<i>n</i> = 79) <i>Decreasing</i>	40.2% (<i>n</i> = 53)
5. In what habitat do you think sea turtle generally get their food? (<i>N</i> = 132)	84.9% (<i>n</i> = 112) <i>Seagrass beds/coral reefs</i>	15.1% (<i>n</i> = 20)
6. How many species of sea turtles do you think exist today in the world? (<i>N</i> = 132)	44.7% (<i>n</i> = 59) <i>Seven</i>	55.3% (<i>n</i> = 73)
7. Artificial lights can disturb sea turtles. (True/False) (<i>N</i> = 131)	97.0% (<i>n</i> = 127) <i>True</i>	3.0% (<i>n</i> = 4)
8. Adult female sea turtles typically lay about 20 eggs per nest. (True/False) (<i>N</i> = 131)	87.8% (<i>n</i> = 115) <i>False</i>	12.2% (<i>n</i> = 16)
9. Sea turtles are marine mammals. (True/False) (<i>N</i> = 131)	62.6% (<i>n</i> = 82) <i>False</i>	37.4% (<i>n</i> = 49)

Multiple Regression Analysis on the Knowledge Index

In order to proceed with a multiple regression analysis, an index was created (the 'knowledge index') using the 9 knowledge-based questions from the questionnaire (Table

2). The knowledge index was found to have a weak internal reliability (Cronbach's alpha = 0.58). Subsequent attempts at creating alternative knowledge-based indices did not result in higher Cronbach's alpha, and factor analysis did not result in interpretable factors. The knowledge index ($N = 132$) had a mean of 0.57 with a standard deviation (SD) of 0.20, median of 0.56, and skewness value of -0.50.

A multiple regression analysis⁴ was performed in order to test the hypothesis that there were significant relationships between the knowledge index and eight independent variables (Table 3). Regression analysis revealed that the model significantly explained the knowledge index ($F [8, 111] = 7.38, p < 0.0001, R^2 = 0.347, \text{adjusted } R^2 = 0.300$). In terms of individual relationships, the knowledge index had significant relationships with gender ($p < 0.01$), months of residency per year ($p < 0.05$), educational attainment ($p \leq 0.01$), and occupation ($p \leq 0.001$). Males were significantly more knowledgeable about this study's knowledge items regarding sea turtles, as compared to females. Months of residency per year, educational attainment, and occupation had positive relationships with the knowledge index.

⁴Visual inspection and tests revealed no issues with normality, linearity, multicollinearity, and model specification. Heteroskedasticity was detected; thus, the main information sources (local people, tourism guides, self, and government) were not retained in the model because their removal reduced heteroskedasticity.

Table 3. Multiple regression results explaining Tortuguero's knowledge index.

Independent variable	Dependent variable (the knowledge index) (<i>N</i> = 120)		
	Unstandardized regression coefficients (<i>B</i>) ^a	Observed <i>t</i> value (<i>t</i>)	Significance level (<i>p</i>)
Gender	-0.089 (-0.228)	-2.84	0.005
Age	0.001 (0.090)	1.02	0.312
Years of residency	0.001 (0.089)	0.93	0.356
Months of residency per year	0.018 (0.198)	2.43	0.017
Educational attainment	0.022 (0.214)	2.56	0.012
Occupation	0.167 (0.332)	3.46	0.001
Number of sea turtle observations	-0.000 (-0.088)	-0.90	0.373
Main information source (NGO) ^b	0.040 (0.087)	1.08	0.283

^a Standardized regression coefficients (β) are in parentheses.

^b Dummy variable consisting of two categories: (1) main source of sea turtle information was *not* a NGO; and (2) main source of sea turtle information was a NGO.

Values toward Sea Turtles

Ten values toward sea turtles, as expressed by Tortuguero survey respondents, were identified. Refer to Chapter 1 of this dissertation for value definitions (Table 1) and to Chapter 4 for a detailed table of the values results (Table 35). Most respondents expressed at least one value toward sea turtles (*n* = 118). There were a total of 222 instances of values toward sea turtles expressed by participants.

The utilitarian value toward sea turtles was the most expressed value by Tortuguero respondents ($n = 61$). For instance, one respondent expressing the utilitarian value wrote, “It [sea turtle conservation] is very important for all of the village [or the people] that helps us to live and gives us a lot of work for its tourism it attracts.” Another respondent wrote that sea turtle conservation means, “A better future for Tortuguero and its people.” Others expressed a deeper meaning for the utilitarian value, illustrated by one statement, “[sea turtle conservation is] of most importance because we depend on conservation for survival.”

The esthetic value toward sea turtles was the second most expressed value by respondents ($n = 52$). For instance, one respondent expressing the esthetic value wrote, “[sea turtles are] very pretty and maybe in other countries they don’t have them, and we have them in Costa Rica.” Another respondent stated verbally, “They [sea turtles] are pretty and large, beautiful animals.” An additional respondent stated, “I like them because it is a very beautiful animal and mysterious [and] also their structure as it is.”

Multiple Values toward Sea Turtles

As discussed by one Tortuguero interviewed expert, “[sea turtle conservation] means a lot, of different things...For example, when I think about conservation of sea turtles, personally, I don’t see conservation just like something that we have preserve because we love it. Always conservation has to go, tie, or combine to something else. And let’s say, economy, you know, so for instance, in Tortuguero, we know that we have to preserve and that we must be involved in this research and protecting program because

thanks to the turtles that we have here that assure an income source to the community of Tortuguero by attracting a fairly big number of people that come from all over the world in order to witness the phenomena.” This statement illustrated an important concept – that the possession of multiple values toward sea turtles may be more effective (than the possession of just one value) in creating a conservation ethic among residents.

Over half of respondents (57.1%) expressed multiple values, two or more, toward sea turtles. Many respondents expressed the utilitarian and esthetic values together. For instance, one respondent stated verbally that they liked sea turtles because, “They attract tourism, and they are pretty.” Some respondents expressed the utilitarian and ecologicistic values, illustrated by one respondents’ statement that they liked sea turtles, “Because they are a source of work in our community and important in the ecosystem.”

In some cases, the expression of multiple values existed without the utilitarian value. For instance, one respondent expressed the moralistic and nonthreatening values in the statement that they liked sea turtles, “Because it seems like to me that they are a very peaceful and defenseless. I am very concerned about the mistreatment that they have by some people.” In another example, one respondent expressed the ecologicistic and conservation values reflected in their verbal statement that they liked sea turtles because, “It is important in the planet. They are threatened with extinction [and] need protection. It is important to conserve the leatherback and green [sea turtle] and is very important for the beach, for conservation.”

Some respondents expressed three or more values toward sea turtles. For instance, one expressed the scientific, esthetic, and nonthreatening values in their verbal

statement, “I walk on the beach. I like how it [sea turtles] cries salt and its behavior. It is tranquil, peaceful, defenseless, very pretty, and beautiful.” Expressing the nonthreatening, esthetic, and scientific values, one respondent verbally stated, “It is a tranquil/calm animal and very cute...Sea turtles have been here for many years before.”

A logistic regression analysis was conducted to test the hypothesis that there were significant relationships between the expression of multiple values toward sea turtles and the various independent variables. The model was significant ($\chi^2 [2, N = 124] = 9.47, p < 0.01$). The pseudo R^2 value was 0.056, and the Nagelkerke's R^2 value was 0.099. Years of residency and educational attainment were a good fit with the model. In terms of individual relationships, the expression of multiple values had significant relationships with years of residency ($p < 0.05$) and educational attainment ($p < 0.05$). For a one unit increase in years of residency and educational attainment, the odds of respondents possessing multiple values increases by a factor of 1.04 and 1.30, respectively.

Attitude toward Sea Turtles

The results of the four questions related to attitude toward sea turtles indicated an overall positive response from participants (Table 4). These four questions consisted of five response categories ranging from (1) ‘not at all important/strongly dislike’ to (5) ‘very important/strongly like’. The mean response for each attitude question was calculated (5.00 was the maximum). The lowest response mean (4.79) was for the question on how much do you like or dislike sea turtles, and the highest mean (4.98) was for the question on the importance of the preservation of sea turtle nesting beaches.

Cumulatively, the mean for all four attitude items was 4.91, which indicated a very positive attitude toward sea turtles.

Table 4. Tortuguero’s responses to the attitude toward sea turtles items.

Question (<i>N</i> = 132)	Response				
	...very important.	...somewhat important.	...neither important nor unimportant: I’m neutral.	...somewhat not important.	...not at all important.
I feel that the future survival of sea turtle species is... ^a	97.0% (<i>n</i> = 127)	3.0% (<i>n</i> = 4)	0% (<i>n</i> = 0)	0% (<i>n</i> = 0)	0% (<i>n</i> = 0)
I feel that the preservation of sea turtle nesting beaches is...	98.5% (<i>n</i> = 130)	0.8% (<i>n</i> = 1)	0.7% (<i>n</i> = 1)	0% (<i>n</i> = 0)	0% (<i>n</i> = 0)
I feel that sea turtle protection laws and policies are...	92.4% (<i>n</i> = 122)	6.1% (<i>n</i> = 8)	1.5% (<i>n</i> = 2)	0% (<i>n</i> = 0)	0% (<i>n</i> = 0)
Question (<i>N</i> = 131)	Strongly like	Somewhat like	Neutral: Neither like nor dislike	Somewhat dislike	Strongly dislike
How much do you like or dislike sea turtles?	85.5% (<i>n</i> = 112)	9.9% (<i>n</i> = 13)	3.0% (<i>n</i> = 4)	0.8% (<i>n</i> = 1)	0.8% (<i>n</i> = 1)

^a*N* = 131.

The majority of respondents (77.9%) answered all four attitude questions with a “very important/strongly like” response. A minority of respondents (22.1%) did not

answer very important/strongly like to every question; however, this did not signify an overall negative attitude. As Table 4 illustrates, there were no observations in the negative categories (somewhat not important/somewhat dislike and not at all important/strongly dislike) except for one question. This exception was for the question on how much respondents liked or disliked sea turtles, in which two respondents stated that they either “somewhat disliked” or “strongly disliked” sea turtles.

A binary logistic regression analysis was conducted to test the hypothesis that there were significant relationships between respondents’ attitude toward sea turtles and the various independent variables. This analysis had to use a binary version of ‘attitude toward sea turtles,’ consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four questions; and (2) respondents that answered very important/strongly like to all four questions (see Appendix C, Comment 2). The model was significant ($\chi^2 [4, N = 125] = 15.93, p < 0.01$). The pseudo R^2 value was 0.125, and the Nagelkerke’s R^2 value was 0.187. Age, main information source (self), and number of sea turtle observations (three categories) were a good fit with the model.

In terms of individual relationships, attitude toward sea turtles had significant relationships with main information source (self) ($p \leq 0.01$) and number of sea turtle observations (three categories) (category 2, $p \leq 0.01$) (Table 5). Respondents who did *not* have a main information source of ‘self through direct observation’ were 0.19 times more likely to have a strong positive attitude toward sea turtles, as compared to respondents who did have a main information source of ‘self through direct observation’. Respondents that had encountered an intermediate number of sea turtles (11 – 172) were

4.79 times more likely to have a strong positive attitude toward sea turtles, as compared to respondents that had encountered 0 – 10 sea turtles.

Table 5. Binary logistic regression results for the model explaining Tortuguero’s attitudes toward sea turtles.

Independent variable	Dependent variable (attitude toward sea turtles) (<i>N</i> = 125)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Age	0.036 (0.263)	2.63	0.105	1.037
Main information source (self) ^b	-1.646 (-0.273)	6.03	0.014	0.193
Number of sea turtle observations ^c				
(2)	1.566	6.32	0.012	4.786
(3)	0.957	2.89	0.089	2.603

^aStandardized regression coefficients (β) are in parentheses. In logistic regressions, the utilized STATA statistic for calculating β does not apply to categorical variables.

^bBinary variable consisting of two categories: (1) main source of sea turtle information was *not* the respondent, through direct observation; and (2) main source of sea turtle information was the respondent, through direct observation.

^cCategorical variable consisting of three categories: (1) reference category, respondents that had encountered 0 – 10 sea turtles; (2) respondents that had encountered 11 – 172 sea turtles; and (3) respondents that had encountered ≥ 173 sea turtles.

Religion was not included in the above analyses due to a low number of observations. A higher percentage (84.3%, *n* = 59) of the sample of religious respondents held a stronger positive attitude toward sea turtles than did non-religious respondents (74.5%, *n* = 38). However, a chi-square test indicated that there was no significant

relationship between attitude toward sea turtles and religion ($\chi^2 [1, N = 121] = 1.77, p = 0.183$).

Chi-square tests were conducted to examine the relationships between attitude toward sea turtles and values. There was no significant relationship between attitude toward sea turtles and the expression of multiple values ($\chi^2 [1, N = 125] = 3.62, p = 0.057$). There was also no significant relationship between attitude toward sea turtles and those that expressed the utilitarian value (the most expressed value among Tortuguero respondents) ($\chi^2 [1, N = 125] = 0.79, p = 0.375$).

Willingness to Act

The results of the four questions related to willingness to act to help sea turtle conservation ('willingness to act') indicated an overall positive response from participants (Table 6). These four questions consisted of five response categories ranging from (1) 'not willing at all/strongly oppose' to (5) 'very willing/strongly favor'. The mean for each willingness to act item was calculated (5.00 was the maximum). The means for all items were > 4.00 , which indicated an overall positive willingness to act. The lowest response mean (4.23) was for the question on respondents' willingness to pay slightly higher taxes to help sea turtle conservation, which indicated an overall somewhat to very willing response. The highest response mean (4.86) was for the question on respondents' support of or opposition to the preservation of additional sea turtle nesting habitat, which indicated a very strong positive response.

Table 6. Tortuguero's responses to the willingness to act items.

Question	Response				
	Very willing	Somewhat willing	Neutral	Somewhat not willing	Not willing at all
How willing or not willing would you be to <i>donating a little money</i> to help sea turtle conservation? (<i>N</i> = 129)	70.5% (<i>n</i> = 91)	18.6% (<i>n</i> = 24)	8.5% (<i>n</i> = 11)	2.4% (<i>n</i> = 3)	0% (<i>n</i> = 0)
How willing or not willing would you be to <i>paying slightly higher taxes</i> to help sea turtle conservation? (<i>N</i> = 124)	47.6% (<i>n</i> = 59)	32.3% (<i>n</i> = 40)	16.9% (<i>n</i> = 21)	2.4% (<i>n</i> = 3)	0.8% (<i>n</i> = 1)
How willing or not willing would you be to <i>donating a little of your time</i> to help sea turtle conservation? (<i>N</i> = 132)	80.3% (<i>n</i> = 106)	15.2% (<i>n</i> = 20)	3.8% (<i>n</i> = 5)	0.7% (<i>n</i> = 1)	0% (<i>n</i> = 0)
Question	Strongly favor	Somewhat favor	Neutral	Somewhat oppose	Strongly oppose
How much would you favor or oppose the preservation of additional sea turtle nesting habitat? (<i>N</i> = 131)	89.3% (<i>n</i> = 117)	7.6% (<i>n</i> = 10)	3.1% (<i>n</i> = 4)	0% (<i>n</i> = 0)	0% (<i>n</i> = 0)

Most respondents (92.4%) illustrated an overall positive response, indicated by a cumulative mean for all four willingness to act questions of ≥ 4.00 (on a scale out of 5.00). However, only 47 respondents (35.6%) answered all four questions with a 'very willing/strongly favor' response. No respondents expressed an overall negative response indicated by a mean for all four questions of < 3.00 .

Willingness to Donate Money

A binary logistic regression was conducted to test the hypothesis that there were significant relationships between respondents' willingness to donate a little money to help sea turtle conservation⁵ (referred to as 'willingness to donate money') and the various independent variables. Attitude toward sea turtles, economic benefit of tourism, and occupation were a good fit with the model. The model was significant ($\chi^2 [3, N = 123] = 17.17, p < 0.001$). The pseudo R^2 value was 0.113, and the Nagelkerke's R^2 value was 0.184. In terms of individual relationships, willingness to donate money had significant relationships with the economic benefit of tourism ($p < 0.05$) and occupation ($p < 0.05$) (Table 7). Respondents with occupations directly related to tourism or conservation were 5.02 times more likely to be very willing to donate money to help sea turtle conservation, as compared to respondents without such occupations. For a one unit increase in the economic benefit of tourism, the odds of respondents' willingness to donate money to help sea turtle conservation increases by a factor of 2.00.

⁵Due to numerous absent/low expected frequencies in the less willing categories, this variable had to be transformed into a binary variable, which included the categories: (1) respondents that were *not* very willing to donate money to help sea turtle conservation ($n = 38$); and (2) respondents that were very willing ($n = 91$).

Table 7. Binary logistic regression results for the model explaining Tortuguero's willingness to donate money for sea turtle conservation.

Independent variable	Dependent variable (willingness to donate money) (<i>N</i> = 123)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Attitude toward sea turtles ^b	0.711 (0.167)	2.23	0.135	2.035
Economic benefit of tourism	0.692 (0.418)	5.45	0.020	1.997
Occupation ^c	1.614 (0.289)	4.29	0.038	5.022

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) respondents that answered very important/strongly like to all four attitude questions.

^cBinary variable consisting of two categories: (1) respondents with occupations *not* directly related to tourism or conservation; and (2) respondents with occupations directly related to tourism or conservation.

Chi-square tests were conducted to examine the relationship between willingness to donate money to sea turtle conservation and: (1) religion; (2) satisfaction with the local economy; and (3) values toward sea turtles. There was no significant relationship between willingness to donate money and religion (χ^2 [1, *N* = 120] = 0.49, *p* = 0.485). There was also no significant relationship between willingness to donate money and satisfaction with the local economy (χ^2 [4, *N* = 117] = 1.10, *p* = 0.895). There was no significant relationship between willingness to donate money and the expression of multiple values (χ^2 [1, *N* = 123] = 1.79, *p* = 0.181).

Willingness to Pay Taxes

An ordinal logistic regression was conducted to test the hypothesis that there were significant relationships between respondents' willingness to pay slightly higher taxes to help sea turtle conservation⁶ (referred to as 'willingness to pay taxes') and the various independent variables. Years of residency, the knowledge index, and attitude toward sea turtles were a good fit with the model. The model was significant ($\chi^2 [3, N = 122] = 18.00, p < 0.001$). The pseudo R^2 value was 0.065, and the Nagelkerke's R^2 value was 0.153. In terms of individual relationships, willingness to pay taxes had significant relationships with years of residency ($p < 0.05$) and the knowledge index ($p < 0.05$) (Table 8). For a one unit increase in years of residency, the odds of respondents' willingness to pay slightly higher taxes to help sea turtle conservation increases by a factor of 1.04. For a one unit increase in the knowledge index, the odds of respondents' willingness to pay slightly higher taxes increases by a factor of 9.09.

⁶Prior to conducting the analysis, the dependent variable was examined ($N = 124$). The frequency of observations was extremely low in the somewhat not willing category and the not willing category. Thus, the dependent variable had to be transformed from five categories into four categories in which the not willing and somewhat willing categories were combined into one new category ($n = 4$).

Table 8. Ordinal logistic regression results for the model explaining Tortuguero's willingness to pay slightly higher taxes to help sea turtle conservation.

Independent variable	Dependent variable (willingness to pay taxes) (<i>N</i> = 122)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Years of residency	0.038 (0.245)	5.56	0.018	1.039
Knowledge index	2.208 (0.217)	5.43	0.020	9.093
Attitude toward sea turtles ^b	0.471 (0.097)	1.33	0.249	1.602

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) respondents that answered very important/strongly like to all four attitude questions.

Chi-square tests were conducted to examine the relationship between willingness to pay higher taxes to help sea turtle conservation and: (1) religion and (2) values toward sea turtles. There was no significant relationship between willingness to pay taxes and religion (χ^2 [3, *N* = 115] = 2.39, *p* = 0.496). However, a higher percentage of the sample (55.1%, *n* = 38) of respondents that expressed more than two values were very willing to pay taxes for sea turtle conservation than respondents that expressed one or no values (34.7%, *n* = 17), and this difference was significant (χ^2 [1, *N* = 118] = 4.78, *p* = 0.029, *V* = 0.201).

Willingness to Donate Time

A binary logistic regression was conducted to test the hypothesis that there were significant relationships between respondents' willingness to donate a little of their time to help sea turtle conservation⁷ (referred to as 'willingness to donate time') and the various independent variables. Age and knowledge index were a good fit with the model. The model was significant ($\chi^2 [2, N = 130] = 8.64, p \leq 0.01$). The pseudo R^2 value was 0.068, and the Nagelkerke's R^2 value was 0.103. In terms of individual relationships, willingness to donate time had significant relationships with age ($p < 0.05$) and the knowledge index ($p < 0.05$) (Table 9). For a one unit increase in age, the odds of respondents' willingness to donate their time to sea turtle conservation decreases by a factor of 0.96. For a one unit increase in the knowledge index, the odds of respondents' willingness to donate their time to sea turtle conservation increases by a factor of 10.45.

⁷Prior to conducting the analysis, the dependent variable was examined ($N = 132$). Observations were absent or low in the not willing category, the somewhat not willing category, and neutral category. Thus, the dependent variable had to be transformed into two categories: (1) respondents that were not willing, somewhat not willing, neutral, and somewhat willing ($n = 26$); and (2) respondents that were very willing ($n = 106$).

Table 9. Binary logistic regression results for the model explaining Tortuguero's willingness to donate their time to help sea turtle conservation.

Independent variable	Dependent variable (willingness to donate time) (<i>N</i> = 130)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Age	-0.041 (-0.388)	5.93	0.015	0.960
Knowledge index	2.346 (0.242)	4.06	0.044	10.445

^aStandardized regression coefficients (β) are in parentheses.

Chi-square tests were conducted to examine the relationship between willingness to donate time to help sea turtle conservation and: (1) religion and (2) values toward sea turtles. There was no significant relationship between willingness to donate time and religion (χ^2 [1, *N* = 122] = 0.08, *p* = 0.773). There was also no significant relationship between willingness to donate time and the expression of multiple values (χ^2 [1, *N* = 126] = 0.34, *p* = 0.562).

Support of Additional Preserved Habitat

A binary logistic regression was conducted to test the hypothesis that there were significant relationships between respondents' support or opposition to the preservation of additional sea turtle nesting habitat⁸ (referred to as 'support of additional preserved habitat') and the various independent variables. Attitude toward sea turtles and the knowledge index were a good fit with the model. The model was significant ($\chi^2 [2, N = 130] = 11.59, p < 0.01$). The pseudo R^2 value was 0.131, and the Nagelkerke's R^2 value was 0.172. In terms of individual relationships, support of additional preserved habitat only had a significant relationship with the attitude toward sea turtles variable ($p < 0.01$) (Table 10). Respondents with a strong positive attitude toward sea turtles were 5.68 times more likely to be strongly supportive of designating additional preserved habitat, as compared to respondents with a less positive attitude toward sea turtles.

⁸Prior to conducting the analysis, the dependent variable was examined ($N = 131$). Observations were absent or extremely low in the strongly oppose category, somewhat oppose category, and neutral category. Thus, the regression had to use a transformed dependent variable, in which the strongly oppose category, somewhat oppose category, neutral, and somewhat favor category were combined into one new category ($n = 14$).

Table 10. Binary logistic regression results for the model explaining Tortuguero’s support of additional sea turtle preservation habitat.

Independent variable	Dependent variable (support of additional preserved habitat) (<i>N</i> = 130)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Attitude toward sea turtles ^b	1.738 (0.399)	8.22	0.004	5.684
Knowledge index	1.875 (0.205)	1.87	0.172	6.522

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four questions on attitude toward sea turtles; and (2) respondents that answered very important/strongly like to all four attitude questions.

Chi-square tests were conducted to examine the relationship between respondents’ support of designating additional preserved habitat and: (1) religion and (2) values toward sea turtles. There was no significant relationship between support of additional preserved habitat and religion (χ^2 [1, *N* = 122] = 0.11, *p* = 0.737). There was also no significant relationship between support of additional preserved habitat and the expression of multiple values (χ^2 [1, *N* = 125] = 3.09, *p* = 0.079).

Summary of the Willingness to Act Items

Table 11 provides a summary of the regression analyses for the four willingness to act models. Factors varied in explaining each of the models. These results are deliberated in the discussion section of this chapter.

Table 11. Summary of the regression analyses for the effects of the independent variables on Tortuguero's willingness to act items.

Independent variable ^a	Dependent variable			
	Willingness to donate money	Willingness to pay taxes	Willingness to donate time	Support of additional preserved habitat
Occupation ^b	(2) > (1)*	n.s.	n.s.	n.s.
Years of residency	n.s.	(+)*	n.s.	n.s.
Age	n.s.	n.s.	(-)*	n.s.
Attitude toward sea turtles ^c	n.s. [†]	n.s. [†]	n.s.	(2) > (1)**
Economic benefit of tourism	(+)*	n.s.	n.s.	n.s.
Knowledge index	n.s.	(+)*	(+)*	n.s. [†]

^an.s. [†] = not significant at the alpha 0.05 level but was included in the final model; n.s. = not significant at the alpha 0.05 level and not included in the model/not a good fit; * = $p \leq 0.05$; ** = $p \leq 0.01$; *** = $p \leq 0.001$; (+) = positive regression coefficient; (-) = negative regression coefficient.

^b(1) = respondents with occupations *not* as tourism guides or conservation-related personnel; and (2) = respondents with occupations as tourism guides or conservation-related personnel.

^c(1) = respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) = respondents that answered very important/strongly like to all four attitude questions.

Participation in Sea Turtle-Related Activities

Data were collected from participants, in two survey questions, regarding their opportunity to participate in sea turtle-related activities. The first question asked participants if they had ever been asked by an organization or group to participate in a sea turtle-related activity ($N = 132$). The majority of respondents (58.3%) reported that they had *never* been asked by an organization or group to participate in a sea turtle-related activity. Conversely, 41.7% of respondents reported that they had been asked by an

organization or group to participate. The second question asked participants to what extent they agreed or disagreed that opportunities for them to participate in sea turtle-related activities were adequate ($N = 131$). Most respondents (89.3%) reported that they either “strongly agreed” or “agreed” that opportunities for them to participate in sea turtle-related activities were adequate (Table 12).

Table 12. Tortuguero’s response to the adequacy of participation opportunities.

Question	Response ($N = 131$)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
To what extent do you agree or disagree with this statement: “I feel that opportunities for me to participate in sea turtle related activities are adequate.”	55.7% ($n = 73$)	33.6% ($n = 44$)	3.8% ($n = 5$)	6.1% ($n = 8$)	0.8% ($n = 1$)

In an open-ended survey question, data were collected from participants regarding their desire to have more sea turtle-related activities offered to them ($N = 116$). Of the participants that responded to this question, most participants (85.3%, $n = 99$) reported that they would like to have more activities offered and listed specific activities (Figure 10). One response was not legible; thus, this response was not included in Figure 10. However, some participants (14.7%) responded that they would not like more activities offered. Included in this category, five participants indicated that the current level of activities offered was sufficient. For example, one respondent noted that they thought that the sea turtle tours were enough. Another respondent noted that the STC does a good

job with the sea turtle nest studies, and one respondent noted that sea turtle-related activities are sufficient, good, and organized. Note that sixteen respondents shared two activities each and one respondent shared three activities, which is reflected in Figure 10.

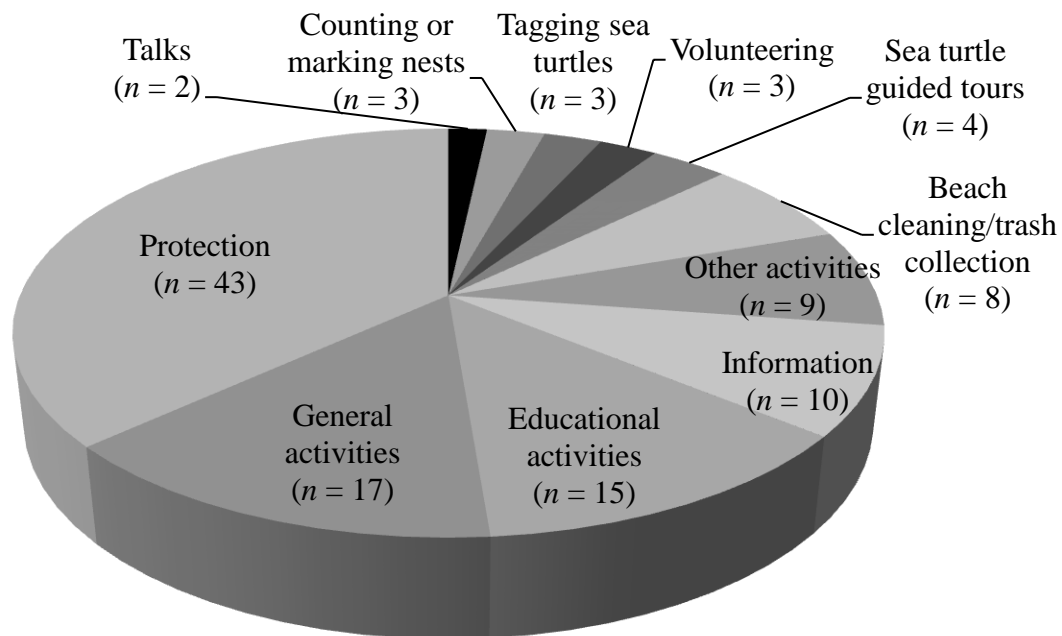


Figure 10. Sea turtle-related activities that Tortuguero participants reported they would want offered ($n = 99$).

As shown in Figure 10, the most frequently listed activity that respondents wanted more of included sea turtle protection activities ($n = 43$). Such protection activities included wanting more general protection of sea turtles ($n = 11$), beach surveillance or patrolling ($n = 10$), taking care of sea turtles or nests ($n = 8$), sea turtle protection from predators and/or poaching ($n = 8$), protection of sea turtle hatchlings ($n = 3$), protection of

sea turtle nests ($n = 2$), and protection of sea turtles carried out by community volunteers ($n = 1$). The general activities category included respondents that simply wanted more sea turtle activities without giving specifics, beach-related activities, activities involving green turtles, and activities specifically for the community, children, or tourism guides. In addition, one respondent wanted more participation for “civil society” (i.e. the community/public) to be allowed by MINAE (Ministerio de Ambiente y Energía). Included in the information category were respondents that wanted more information to be provided to the community, more environmental information, more data-related information, and one respondent wanted more general openness of the involved organizations.

Data were collected from participants regarding their membership in a sea turtle organization ($N = 132$) and if they donate money to a sea turtle organization ($N = 132$). The majority of respondents (84.9%) reported that they were *not* a member of a sea turtle-related organization; whereas, only 15.2% were members. Most respondents (87.9%) reported that they had *not* donated money to a sea turtle-related organization; whereas, 12.1% had made a donation.

Data were collected from participants regarding what sea turtle-related activities, if any, they had participated in ($N = 132$). Most respondents (74.2%) reported that they had participated in one or more sea turtle-related activities, with only a quarter (25.8%) having not participated in any activities. Of the participating respondents, the sea turtle tours were the most frequently reported activity (Table 13). Most respondents ($n = 46$)

were not a lead guide or assistant in these sea turtle tours; however, 36 respondents reported that they were a guide or assistant in the tour.

Table 13. Frequency of Tortuguero’s participation in sea turtle-related activities.

Type of sea turtle-related activity	Frequency
Sea turtle tour	82
Educational	48
Monitoring	28
Other	20
Total frequency of participation	178
Total participating respondents (<i>n</i>)	98

A binary logistic regression was performed to test the hypothesis that there were significant relationships between participation in a sea turtle-related activity (referred to as ‘participation,’ hereafter) and the various independent variables. Participation consisted of two categories: (1) respondents that had *not* participated in any sea turtle-related activities (*n* = 34); and (2) respondents that had participated in at least one sea turtle-related activity (*n* = 98). Educational attainment, main information source (local people), and attitude toward sea turtles were a good fit with the model. It was hypothesized that participation in sea turtle-related activities would influence the knowledge index, not the reversed; thus, the knowledge index was not included in this model.

The model was significant ($\chi^2 [3, N = 128] = 23.35, p < 0.0001$). The pseudo R^2 value for the model was 0.162, and the Nagelkerke’s R^2 value was 0.247. In terms of

individual relationships, participation had significant relationships with educational attainment ($p \leq 0.001$) and main information source (local people) ($p < 0.01$) (Table 14). For a one unit increase in educational attainment, the odds of participating in a sea turtle-related activity increases by a factor of 1.64. Respondents that did *not* have local people as their main source of sea turtle information were 0.26 times more likely to participate in a sea turtle-related activity, as compared to respondents having a main information source of local people.

Table 14. Binary logistic regression results for the model explaining Tortuguero's participation in sea turtle-related activities.

Independent variable	Dependent variable (participation) ($N = 128$)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (p)	Odds ratio
Educational attainment	0.494 (0.460)	10.78	0.001	1.639
Attitude toward sea turtles ^b	0.831 (0.195)	2.57	0.109	2.296
Main information source (local people) ^c	-1.363 (-0.344)	8.13	0.004	0.256

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four questions on attitude toward sea turtles; and (2) respondents that answered very important/strongly like to all four attitude questions.

^cBinary variable consisting of two categories: (1) main source of sea turtle information was *not* local people or friends; and (2) main source of sea turtle information was local people or friends.

Chi-square tests were conducted to examine the relationship between participation in sea turtle-related activities and: (1) religion; (2) satisfaction with the local economy; and (3) values. A higher percentage (80.3%, $n = 57$) of the sample of the religious respondents participated in sea turtle-related activities than did non-religious respondents (64.7%, $n = 33$), and this difference was significant ($\chi^2 [1, N = 122] = 3.72, p = 0.054, V = 0.175$). In addition, there was a significant relationship between participation and the expression of the utilitarian value ($\chi^2 [1, N = 126] = 5.87, p = 0.015, V = 0.216$). However, there was no significant relationship between participation in a sea turtle-related activity and: (1) satisfaction with the local economy ($\chi^2 [4, N = 118] = 1.84, p = 0.607$); and (2) the expression of multiple values ($\chi^2 [1, N = 126] = 2.49, p = 0.114$).

A separate chi-square test had to be performed to examine the relationship between participation in sea turtle-related activities and occupation, because occupation was omitted from the previous regression model due to predicting success perfectly. A higher percentage (95.8%, $n = 23$) of the sample of the respondents that had occupations directly related to tourism or conservation participated more in sea turtle-related activities than did respondents with occupations not directly related to these areas (68.9%, $n = 71$), and this difference was significant ($\chi^2 [1, N = 127] = 7.32, p = 0.007, V = 0.240$). Chi-square tests indicated that there were significant relationships between participation in all of the specific sea turtle-related activities (educational, sea turtle tours, and monitoring) and occupation (see Appendix C, Comment 3).

Helping to Protect Sea Turtles

Another participation-related question asked respondents if they have ever helped to protect nesting sea turtles or hatchlings ($N = 132$) (referred to as the ‘helping to protect sea turtles’ variable, hereafter). The majority of respondents (69.7%) reported that they had protected nesting sea turtles or hatchlings at least one time, with the minority of respondents (30.3%) having never done so. The helping to protect sea turtles variable consisted of two categories: (1) respondents that have *never* helped to protect sea turtles or hatchlings ($n = 40$); and (2) respondents that have helped to protect sea turtles or hatchlings at least one time ($n = 92$).

A binary logistic regression was performed to test the hypothesis that there were significant relationships between helping to protect sea turtles and the various independent variables. The model was significant ($\chi^2 [5, N = 120] = 27.95, p < 0.0001$). Gender, occupation, educational attainment, attitude toward sea turtles, and utilitarian value toward sea turtles were a good fit with the model. The pseudo R^2 value for the model was 0.191, and the Nagelkerke’s R^2 value was 0.295. In terms of individual relationships, helping to protect sea turtles had significant relationships with gender, occupation, and attitude toward sea turtles (Table 15). Males were 0.28 times more likely than females to protect sea turtles on their own. Respondents with occupations as tourism guides or conservation-related personnel were 5.97 times more likely to protect sea turtles than respondents without such occupations. Respondents having a strong positive attitude toward sea turtles were 4.94 times more likely to protect sea turtles than respondents with less of a positive attitude toward sea turtles. These results revealed that

residents' active participation in helping to protect sea turtles (on their own) was mostly influenced by their gender (being male); occupation (as a tourism guide or conservation-related personnel); and strong positive attitude toward sea turtles.

Table 15. Binary logistic regression results for the model explaining Tortuguero's participation in helping to protect sea turtles.

Independent variable	Dependent variable (helping to protect sea turtles) (<i>N</i> = 120)			
	Unstandardized regression coefficients (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Gender	-1.273 (-0.348)	7.35	0.007	0.280
Occupation ^b	1.787 (0.320)	4.04	0.044	5.972
Educational attainment	0.252 (-0.234)	3.54	0.060	0.778
Attitude toward sea turtles ^c	1.596 (0.375)	8.60	0.003	4.935
Utilitarian value ^d	0.809 (0.205)	3.02	0.082	2.246

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) respondents with occupations *not* directly related to tourism or conservation; and (2) respondents with occupations directly related to tourism or conservation.

^cBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four questions on attitude toward sea turtles; and (2) respondents that answered very important/strongly like to all four attitude questions.

^dBinary variable consisting of two categories: (1) respondents that did *not* express the utilitarian value towards sea turtles; and (2) respondents that expressed the utilitarian value towards sea turtles.

Chi-square tests were conducted to examine the relationships between helping to protect sea turtles and: (1) religion and (2) values toward sea turtles. There was no

significant relationship between helping to protect sea turtles and: (1) religion ($\chi^2 [1, N = 122] = 2.12, p = 0.146$); and (2) the expression of multiple values ($\chi^2 (1, N = 126) = 0.01, p = 0.911$).

Helping Sea Turtles in Danger

Another participation-related question asked respondents if they have ever helped a sea turtle that was in danger or was injured ($N = 132$) (referred to as the ‘helping sea turtles in danger’ variable, hereafter). The helping sea turtles in danger variable consisted of two categories: (1) respondents that have *never* helped a sea turtle in danger ($n = 60$); and (2) respondents that have helped a sea turtle in danger ($n = 72$).

A binary logistic regression was performed to test the hypothesis that there were significant relationships between helping sea turtles in danger and the various independent variables. Gender, occupation, and attitude toward sea turtles were a good fit with the model. The model was significant ($\chi^2 [3, N = 126] = 34.96, p < 0.0001$). The pseudo R^2 value for the model was 0.202, and the Nagelkerke’s R^2 value was 0.324. In terms of individual relationships, helping sea turtles in danger had significant relationships with gender ($p < 0.05$), occupation ($p < 0.01$), and attitude toward sea turtles ($p < 0.001$) (Table 16). Males were 0.41 times more likely than females to have helped sea turtles in danger. Respondents with occupations as tourism guides or conservation-related personnel were 5.65 times more likely to have helped sea turtles in danger, as compared to respondents with occupations not related to these fields. Respondents with a strong positive attitude toward sea turtles were 10.80 times more likely to have helped

sea turtles in danger, as compared to respondents with a less positive attitude toward sea turtles.

Table 16. Binary logistic regression results for the model explaining respondents' participation in helping sea turtles in danger.

Independent variable	Dependent variable (helping sea turtles in danger) (<i>N</i> = 126)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Gender	-0.894 (-0.247)	4.35	0.037	0.409
Occupation ^b	1.732 (0.375)	6.85	0.009	5.653
Attitude toward sea turtles ^c	2.380 (0.547)	16.57	0.000	10.800

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) respondents with occupations *not* directly related to tourism or conservation; and (2) respondents with occupations directly related to tourism or conservation.

^cBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four questions on attitude toward sea turtles; and (2) respondents that answered very important/strongly like to all four attitude questions.

Chi-square tests were conducted to examine the relationships between helping sea turtles in danger and: (1) values toward sea turtles and (2) religion. There was a significant relationship between helping sea turtles in danger and the expression of the nonthreatening value ($\chi^2 [1, N = 126] = 5.48, p = 0.019, V = 0.209$). For instance, a higher percentage (84.6%, *n* = 11) of the sample of the respondents that expressed the nonthreatening value toward sea turtles participated in helping sea turtles in danger than

did those respondents not expressing this value (50.4%, $n = 57$). However, there was no significant relationship between helping sea turtles in danger and: (1) religion ($\chi^2 [1, N = 122] = 0.47, p = 0.495$); and (2) the expression of multiple values ($\chi^2 [1, N = 126] = 2.24, p = 0.135$).

Donating Money to a Sea Turtle Organization

Respondents were asked if they have ever donated money to a sea turtle organization ($N = 132$) (referred to as the ‘donating money’ variable, hereafter). Most respondents (87.9%, $n = 116$) reported that they had *never* donated money to a sea turtle organization; whereas, 12.1% ($n = 16$) of respondents had donated money. Analyses indicated that residents’ active donation of money to a sea turtle organization was explained by their occupation (as a tourism guide, park staff, environmental educator) (Fisher’s Exact, $p \leq 0.01$); main source of sea turtle information being a NGO (Fisher’s Exact, $p < 0.01$); and possession of the humanistic value (Fisher’s Exact, $p \leq 0.05$) (see detailed analyses in Appendix C, Comment 4). Based on comments from participants and experts, positive responses to this survey question may represent monetary involvement in the Tortuguero Guides Association program. Sea turtle tourism guides are expected to donate a portion of their sea turtle tour fees to the association. The significant results of occupation provide evidence supporting this inference.

Tourism and the Local Economy

Chi-square tests were conducted to examine the relationships between occupation and: (1) satisfaction with the local economy; and (2) economic benefit of tourism. It was hypothesized that respondents with occupations directly related to tourism or conservation would be more satisfied with the local economy and more in agreement that sea turtle tourism is economically beneficial to them or their family. However, there was no significant relationship between occupation and satisfaction with the local economy ($\chi^2 [4, N = 114] = 4.19, p = 0.241$). Surprisingly, there was also no significant relationship between occupation and the economic benefit of tourism ($\chi^2 [1, N = 126] = 1.04, p = 0.308$). These results suggested that it is not simply the tourism guides or residents with conservation-related occupations that are benefiting from sea turtle tourism. Instead, these results suggested that the economic benefits of sea turtle tourism in Tortuguero are similarly distributed among tourism guides/conservation-related occupations and non-tourism guides/non-conservation related occupations.

Discussion

Knowledge

This study found that Tortuguero residents possessed a strong understanding about certain types of sea turtle-related knowledge, which ranged from local to global knowledge about sea turtles. For instance, most residents knew the most common sea turtle nesting species in Tortuguero (94.7%) and that artificial lights can disturb sea turtles (97.0%). However, the two lowest correct responses was to the knowledge item

about the number of sea turtle species in the world (44.7%) and about the year the TNP was established (50.8%).

From a conservation perspective, the most crucial knowledge item in this research was in regard to knowledge about the timing of the sea turtle nesting/hatching season. Increasing knowledge about the timing of the nesting season seems paramount in minimizing disturbance to sea turtles and increasing caution and compliance with beach rules among residents during the nesting season. Only 52.3% of residents correctly knew that the sea turtle nesting/hatching season is from March 1 – October 31; thus, more educational awareness could be cultivated about this knowledge item.

This research revealed that residents' sea turtle-related knowledge (as defined by this study's knowledge index) could only be significantly explained by gender, months of residency per year in Tortuguero, educational attainment, and occupation. Overall, males were significantly more knowledgeable about sea turtles than females. As residents' months of residency per year in Tortuguero and educational attainment increased, their knowledge about sea turtles also increased. Residents employed as tourism guides or conservation-related personnel were more knowledgeable about sea turtles than residents with other occupations. Thus, ecotourism (i.e. expressed through occupation) in Tortuguero is partly driving an increase in knowledge about sea turtles. However, the significance of other demographics (i.e. gender, educational attainment) implies that knowledge about sea turtles also exists in the general community: A Tortuguero resident doesn't have to be employed as a tourism guide to have knowledge about sea turtles. The significance of gender and educational attainment are similar to previous studies in which

these demographic characteristics explained individuals' knowledge about wildlife. Previous research has generally observed that males have greater knowledge about wildlife than females (Kellert & Berry 1987).

Based on observations made by the researcher during visits to Tortuguero, there are no visible beach access signs that detail the timing of sea turtle nesting/hatching season or the beach rules. Without being permanently visible on signs, specific dates are likely easily forgotten; thus, residents may associate the timing of the nesting season with when they see the most sea turtles. The addition of signs at beach access points, along with additional educational outreach to the community, that detail the nesting season may increase awareness and serve as a reminder to residents (and to tourists as well).

Values toward Sea Turtles

This research found that utilitarian value toward sea turtles was the most expressed value by Tortuguero residents, and the esthetic value was the second most expressed. In addition, over half of the residents expressed multiple values toward sea turtles. The expression of multiple values toward sea turtles was mostly explained by residents' longer length of residency in Tortuguero and by their relatively higher educational attainment. This suggests that time is an important factor in shaping values toward sea turtles: Exposure to sea turtle conservation in Tortuguero over a longer period of residency may be needed for multiple values toward sea turtles to cultivate. Since educational attainment was an important factor, it is surprising that this study's knowledge index did not significantly explain the expression of multiple values.

However, more data from residents on their knowledge related to sea turtle behavior, life history traits, evolutionary history, and their role in ecosystems would be needed to fully examine this topic.

Attitude toward Sea Turtles

This study found that Tortuguero residents possessed an overall strong positive attitude toward sea turtles. The majority of respondents (77.9%) answered with the most positive response (“very important” or “strongly like”) to all four sea turtle attitude-related questions. This research showed that Tortuguero residents whom are connected socially with the community (i.e. with a NGO, government agency, tourism guides, or local people) in regard to sea turtles have stronger positive attitudes toward sea turtles, as compared to residents that obtain their sea turtle information through direct observation. On a broader level, this result stresses the importance of social interactions between community members in cultivating positive attitudes toward a conserved species.

In addition, the results indicated that residents that had encountered an intermediate number of sea turtles (11 – 172) were almost five times more likely to have a strong positive attitude toward sea turtles, as compared to residents that had encountered 0 – 10 sea turtles. This suggested that encountering an intermediate number of sea turtles may spark interest in (or attitude toward) the species, with this interest declining after having seen an above average number. Surprisingly, educational attainment did not explain residents’ attitude toward sea turtles, which differs from the

results of previous research with respect to attitudes toward wildlife (Kellert & Berry 1987; Kellert 1993a).

Willingness to Act

This study found that the majority of Tortuguero residents possessed an overall positive willingness to act for sea turtle conservation. However, the overall willingness to act response was less positive as compared to the response to the purely attitude-related questions. This indicated that Tortuguero residents were slightly less willing to take action to support sea turtle conservation.

The results also demonstrated that different factors explained each of the four items related to willingness to act for sea turtle conservation (Table 11). Overall, the results suggested that a willingness to take action to support sea turtle conservation is not a function educational attainment, which is contrary to what was hypothesized based on previous research related to purely attitudes (Kellert & Berry 1987; Kellert 1993a).

Occupation and the economic benefit of tourism were significant factors that explained residents' willingness to donate money to help sea turtle conservation. Residents with occupations as tourism guides or conservation-related personnel were over five times more likely than residents without such occupations to be willing to donate money. Residents that believed sea turtle tourism was economically beneficial to them or their family were twice more likely to be willing to donate money. This result illustrated the significant influence of ecotourism in cultivating a willingness to monetarily support sea turtle conservation.

Years of residency in Tortuguero and the knowledge index were significant factors that explained residents' willingness to pay slightly higher taxes to help sea turtle conservation. As years of residency and their knowledge about sea turtles increased, the odds of a residents' willingness to pay higher taxes for sea turtle conservation increased. This result indicated that a willingness to pay higher taxes to help sea turtle conservation may be a function of residents' long-term connection with Tortuguero and sea turtles. Additionally, a separate analysis revealed that residents possessing multiple values toward sea turtles were more willing to pay taxes for sea turtle conservation. Surprisingly, residents' willingness to pay higher taxes for sea turtle conservation was not explained by their occupation or by the economic benefit of sea turtle tourism, as was seen in the willingness to donate money analysis. Thus, a willingness to pay higher taxes to help sea turtle conservation has less to do with ecotourism and more to do with other community demographics. There were most likely variables missing from this model.

Age and the knowledge index were the only two significant factors that explained a residents' willingness to donate a little time to help sea turtle conservation. As age increased, the odds of a residents' willingness to donate their time decreased. As residents' knowledge about sea turtles increased, the odds of their willingness to donate their time increased. Surprisingly, occupation and the economic benefit of tourism had no significant relationship with willingness to donate time, which indicated that a willingness to donate time to sea turtle conservation encompasses the entire Tortuguero community beyond just tourism guides or conservation-related personnel.

Lastly, attitude toward sea turtles was the only significant factor that explained a residents' support of designating additional preserved habitat for sea turtles. Residents with a strong positive attitude toward sea turtles were almost six times more likely to be strongly supportive of the preservation of additional sea turtle nesting habitat, as compared to residents with a less positive attitude toward sea turtles.

Participation in Sea Turtle-Related Activities

This research revealed that residents' educational attainment and their main source of sea turtle information played a significant role in explaining their participation in a sea turtle-related activity. As residents' educational attainment increases, the odds of them participating in a sea turtle-related activity increases by a factor of almost two. In addition, residents that did *not* have local people or friends as a main source of sea turtle information were slightly more likely to participate in a sea turtle-related activity, as compared to residents that had a main information source of local people. Although this significance is likely reflective of the fact that tourism guides, NGOs, and government are the entities sponsoring sea turtle-related activities, it also likely reflects the successful outreach of these entities with transmitting sea turtle participation information to residents. However, these results indicated that there is not one particular source that takes the lead on promoting such activities.

Several variables were analyzed separately to examine their relationship with participation in sea turtle-related activities. The analysis found that religious residents participated more in sea turtle-related activities than did non-religious residents.

Underlying spiritual values may be driving participation in such activities. Additionally, the results revealed that residents that possess the utilitarian value towards sea turtles participated more in sea turtle-related activities. Moreover, tourism guides and residents with conservation-related occupations participated more in sea turtle-related activities than residents having other occupations. This result likely reflects that tourism guides and residents with conservation-related occupations demand or require participation in activities such as sea turtle tours, educational activities, or monitoring.

Helping to Protect Sea Turtles and those in Danger

The results of this study demonstrated that residents' active participation in helping to protect nesting sea turtles and helping sea turtles in danger (on their own) was mostly influenced by their gender (being male); occupation (as a tourism guide or conservation-related personnel); and strong positive attitude toward sea turtles. Since residents' participation in these activities was not a function their number of sea turtle observations, helping to protect nesting sea turtles or those in danger may mostly represent a precarious situation, especially when encountering poaching. Certain demographics engage in the situation, while others disregard. Males, tourism guides or conservation-related personnel, and residents with a strong attitude toward sea turtles are more likely to engage in possibly such unsafe situations. However, it is important to recall that one interviewed resident (pre-questionnaire) noted they had helped a sea turtle once by calling Tortuguero National Park over encountering an injured sea turtle. Thus,

specific demographics may feel more equipped to handle situations where sea turtles are injured or in danger from poaching.

Other Discussion Topics

Overall, this research has illustrated that a variety of demographic characteristics played influential roles in shaping residents' knowledge of, attitude toward, and participation in sea turtle conservation. This study found that facets of ecotourism played a significant role in partly explaining residents' knowledge about sea turtles; willingness to donate money for sea turtle conservation; participation in sea turtle-related activities; and participation in helping sea turtles (on their own, non-agency sponsored time). Applied on a broader level, this result suggests that ecotourism (and the creation of tourism guide occupations) may increase the voluntary workforce capable of protecting a conserved species. The results also showed how an individuals' strong positive attitude toward a conserved species translates into their voluntarily action to help a conserved species in danger or in need of protection.

Based on this research, additional volunteer support from the community could be leveraged to help sea turtle conservation in Tortuguero. The majority of participants (85.3%) reported that they would like to have more sea turtle-related activities offered to them, with some residents specifically reported volunteering activities. Furthermore, most residents (80.3%) were very willing to donate a little time to help sea turtle conservation, and another 15.2% of residents were somewhat willing. Based on this study, targeting younger residents for volunteering would yield more successful

recruitment. As a reminder, this research only included participants 18 years of age or greater. Increasing knowledge about sea turtles among residents would also promote residents' willingness to volunteer for sea turtle conservation.

Contrary to what was hypothesized based on the pre-questionnaire interviews, months of residency per year in Tortuguero did not play a large role in the analyses for this research. One exception was that full-time residents were significantly more knowledgeable about sea turtles than part-time residents (as defined by this study's knowledge index). Increased sea turtle knowledge did partly explain residents' willingness to pay higher taxes and to donate their time for sea turtle conservation. Although there was no direct relationship between months of residency in Tortuguero and the two willingness to act items, there was a causal flow.

In conclusion, this study demonstrated that the role of peer-to-peer communication about sea turtles within the community could be fostered even more, as a way of further promoting positive attitudes toward sea turtles. From whom this communication needs to come from does not necessarily matter – as this research showed that multiple channels for creating sea turtle awareness exist. Most likely the reason why one main information source of sea turtle information did not surface as a “leader” in creating sea turtle awareness is that successful and open communication between tourism guides, the STC, and Tortuguero National Park already exist. In addition, information likely travels fast among local residents. Nevertheless, keeping these communication channels open and continually keeping the entire community informed is important for sea turtle conservation in Tortuguero. As one interviewed expert stated, “raising

awareness,” “sharing information with people,” and “keeping them updated about different [sea turtle] activities that are going on” are important aspects of current educational outreach programs in Tortuguero.

CHAPTER THREE: UNDERSTANDING RESIDENTS' KNOWLEDGE OF, ATTITUDES TOWARD, AND PARTICIPATION IN SEA TURTLE CONSERVATION NEAR THE ARCHIE CARR NATIONAL WILDLIFE REFUGE, FLORIDA, USA

Abstract

Established in 1991, the Archie Carr National Wildlife Refuge (ACNWR) serves as an important preserved habitat for nesting sea turtles. In 2014, questionnaires were completed by residents living adjacent to the ACNWR ($N = 131$) to investigate which demographics explain residents' knowledge of, attitudes toward, willingness to act for, and participation in sea turtle conservation. The study demonstrated that residents' sea turtle knowledge was mostly explained by their longer length of residency near the ACNWR; higher age; above average number of sea turtle observations; and by the information obtained from their NGO or government source. This study also revealed that as residents' educational attainment increases, their attitude toward sea turtles becomes more positive. Additionally, residents that had a NGO or government agency as their sea turtle information source were more likely to have a stronger positive attitude toward sea turtles than residents with other information sources. This illustrates the effectiveness of local NGOs and government agencies with cultivating residents' positive attitudes toward sea turtles. Overall, residents' willingness to act for sea turtle conservation was explained the most by their general positive attitude toward sea turtles and, to a lesser extent, their main source of sea turtle information. Residents'

participation in sponsored sea turtle-related activities and participation in helping sea turtles in danger (on their own) was explained by their main source of sea turtle information (being a NGO or government agency). However, residents' participation in protecting nesting sea turtles (on their own) was explained by their relatively lower educational attainment and full-time residency status near the ACNWR. Overall, this research illustrated that residents' main source of sea turtle information being a NGO or government agency frequently played a significant role in shaping residents' knowledge of, attitude toward, willingness to volunteer for, and participation in sea turtle conservation near the ACNWR.

Introduction

Research has found that the general public's attitudes toward and knowledge about wildlife in the U.S. have specific tendencies related to demographic characteristics such as age, gender, educational attainment, race, and cultural differences (Kellert et al. 1996). For instance, gender was determined by Kellert and Berry (1987) to be one of the most important demographic factors in determining attitudes about wildlife. Previous research has also illustrated that respondents formally educated at a higher level expressed significantly higher ecological concern, appreciation, scientific curiosity, and/or concern for more protection toward species than did respondents formally educated at a lower level (Kellert 1993a; Kellert & Berry 1987; Luksenburg & Parsons 2013). Kellert and Berry (1987) also found that males were more knowledgeable about wildlife than females. Previous research has also found that higher-educated individuals

have significantly more knowledge about species than individuals with less formal education (Kellert 1993a; Kellert & Berry 1987).

Understanding how these demographic characteristics influence an individual's conservation knowledge and attitude can inform conservation strategies (Jacobson & Marynowski 1997; Rockwood et al. 2008). Considerable research has been conducted analyzing how demographic characteristics influence the publics' attitudes toward wildlife; however, less research of this type has been conducted in locations where long-standing species conservation efforts have been established. Do these previously identified demographic characteristics also influence the publics' knowledge about and attitudes toward wildlife in locations where species conservation efforts have been employed for many years? The Archie Carr National Wildlife Refuge (ACNWR) represents such a location where sea turtle habitat preservation and conservation efforts have been established for many years. With the goal of informing conservation strategies, the primary research objective was to identify what demographic characteristics and other factors explain residents' knowledge of, attitudes toward, willingness to act for, and participation in sea turtle conservation of the residents living directly adjacent to the ACNWR.

Methods

The statistical methods employed to analyze the ACNWR data are detailed in Chapter 1 of this dissertation. The survey methods employed at the ACNWR are also detailed in Chapter 1. The following survey methods are specific to the ACNWR.

Semi-structured interviews with experts ($n = 4$) and residents ($n = 11$) near the ACNWR were first conducted. The 44-question questionnaire was administered in April of 2014 for a one-week period. All questions, but six, were closed-ended. Sampling was conducted within and adjacent to the entire span of the ACNWR. Participants were sought at households; residential neighborhoods; beach areas and parks; restaurants; retail and commercial businesses; a community center; and a golf course. Potential participants were asked to confirm their residency within the research site boundary, which was defined as the communities adjacent to the ACNWR (from the northern terminus to the southern terminus). Individuals who lived slightly outside of the research site boundary, but worked within the ACNWR on a full-time basis, were also included in the sample ($n = 2$).

Results

Interview Results

Four experts having local expertise in sea turtle conservation at the ACNWR were interviewed as part of this research. Interview length ranged from 25 to 42 minutes with an average length of 32 minutes. The gender ratio was 50/50. Interviews were recorded, transcribed, and analyzed for themes.

In summary, expert interview results indicated that compliance with lighting restrictions is an important topic at the ACNWR. In addition, the results indicated that residents may be unaware of restrictions on the ACNWR beach, such as the rule about keeping pets off the beach. Results also indicated there may be differences in the knowledge of and attitude toward sea turtles between the year-round (full-time) residents

and the temporary (part-time) residents. Additionally, the length of residency (in years) that residents have near the ACNWR may be an important explanatory factor.

In January of 2014, residents near the ACNWR were also interviewed ($n = 11$). The interview acceptance rate was 64.7%. Females represented a smaller proportion of the sample (36.4%) than males (63.6%). Interview length ranged from approximately 5 to 17 minutes with an average length of approximately 10 minutes. Two of the participants worked within the research site boundary near the ACNWR; however, they were residents from slightly outside of the boundary. Because these individuals had worked within the ACNWR for many years, they were included in the sample since they were important employed members of the ACNWR community.

Resident interview results revealed a variety of topics and important variables to consider in the research hypotheses. The results indicated that retirees were a large portion of the local economy and provide economic stability in an otherwise stagnant environment for job opportunities. Interview participants believed that the economy is dependent on mostly tourism ($n = 5$), industries or specific businesses ($n = 3$), retirees ($n = 2$), or a combination of both tourism and retirees ($n = 1$). Participants mostly described the culture near the ACNWR as laid-back and as consisting of well-educated people that enjoy outdoor physical activity. Again, the results indicated that there may be differences between the full-time and part-time residents. Most participants expressed positive attitudes toward sea turtle conservation ($n = 9$); whereas, two participants expressed indifferent or anti-conservation views. The results further indicated that residents near the ACNWR may be unaware of the history of conservation activities at the ACNWR.

However, four participants believed that presently there is more sea turtle conservation and educational awareness among residents near the ACNWR. Although several participants mentioned lighting during their interview, it was not to the extent that was anticipated based on the previous results from the expert interviews. The resident interview results supported the potential importance of residents' direct observation of sea turtles in shaping their attitudes toward sea turtles.

Slightly more than half (54.5%) of interviewed residents had participated in a sea turtle-related activity. Three of these residents stated that they have participated in sea turtle conservation by helping sea turtles that were in danger. Although the ESA prohibits the harassment or pursuit of listed sea turtle species (16 U.S.C. § 1538), interviewed residents expressed having participated in innocent and altruistic behaviors, such as waving away sea gulls from predating sea turtle hatchlings.

Quantitative Results

Survey Participant Demographics and Variable Descriptions

A total of 131 residents near the ACNWR responded to the questionnaire. The 95% confidence interval for the estimated ACNWR population of 7,902 for this sample size is $\pm 8.49\%$ for responses that are evenly split (50/50) and $\pm 6.79\%$ for responses split 80/20. Females represented a smaller proportion of the sample (38.9%) than males (61.1%). The acceptance rate was 74.4%. Of the individuals that declined participation

($n = 45$), 55.6% were females and 44.4% were males⁹.

Table 17 contains the demographic characteristics of the survey sample and compares it to the U.S. Census Bureau (2010) data for the approximate research site. For educational attainment, the U.S. Census 2010 data represents all of Brevard County, Florida for the population 25 years and greater. Educational attainment data were not available for the specific research site.

⁹The most common reason provided by those who declined participation was that they were, “too busy” ($n = 25$). Others who declined participation provided reasons such as that they did not want to participate or were not interested ($n = 12$), had a prior engagement soon ($n = 4$), did not know enough about the subject ($n = 2$), and wanted their spouse to complete the survey instead ($n = 1$). In addition, one individual withdrew participation half way through the questionnaire.

Table 17. Demographics of the ACNWR survey sample compared to census data for the approximate research site (U.S. Census Bureau 2010).

Demographic variable	Survey sample	U.S. Census 2010
Age	<i>N</i> = 126	<i>N</i> = 7,902 ^a
Under 18	--	11.6%
18 – 19	1.6%	0.8%
20 – 24	3.2%	2.1%
25 – 34	7.9%	4.2%
35 – 49	19.1%	14.1%
50 – 64	42.9%	29.0%
65 and over	25.4%	38.2%
Gender	<i>N</i> = 131	<i>N</i> = 7,902 ^a
Male	61.1%	49.1%
Female	38.9%	50.9%
Educational attainment	<i>N</i> = 130	<i>N</i> = 339,738 ^b
Less than 9th grade	--	3.3%
9th to 12th grade, no diploma	2.3%	10.3%
High school graduate (and equivalency)	18.5%	28.9%
Some college, no degree	23.9%	25.0%
Associate degree	11.5%	8.9%
Bachelor's degree	26.9%	15.2%
Graduate or professional degree	16.9%	8.4%
Race	<i>N</i> = 116	<i>N</i> = 7,902 ^a
White	95.7%	97.2%
African American	0.9%	0.4%
Asian	--	1.1%
American Indian or Alaska Native	0.9%	0.1%
Native Hawaiian/Other Pacific Islander	--	0.2%
Some other race	2.5%	0.2%
Two or more races	--	0.8%

^aPercentages and *N* have been estimated for the research site.

^bEducational attainment data represents all of Brevard County, Florida and only the population 25 years and greater.

The mean age of participants ($N = 126$) was 54.67 years. Age ranged from 18 to 86 years. Age had a skewness value of -0.44 and was treated as a continuous variable in all analyses.

The mean educational attainment of participants ($N = 130$) was approximately equivalent to a university associate's degree. No participants had an educational attainment of 8th grade or less; thus, this interval was removed from the variable. Consisting of six intervals, educational attainment had a skewness value of -0.09 and was treated as a continuous variable in all analyses.

Information on race was also collected from participants ($N = 116$). The majority of the sample population was white (95.7%), which is comparable to the U.S. Census Bureau 2010 percentage of 97.2%. Because of extremely low or absent frequencies in the other race categories ($n = 5$), the race variable could not be analyzed in this research.

The number of months per year that participants reside in the research site was collected ($N = 129$). Full-time residents constituted 82.2% of the sample; whereas, part-time residents constituted 17.8% of the sample. In its' continuous form (referred to as 'months of residency per year', hereafter) had a mean of 10.83 months and skewness value of -2.22. Months of residency per year was treated as a continuous variable in the multiple regression analysis in this chapter. For the logistic regression analyses in this research, a categorical version of the months of residency per year variable (referred to as 'residency status') provided a better fit to the models. Residency status was a binary variable consisting of two categories: (1) part-time residents ($n = 23$); and (2) full-time residents ($n = 106$).

Although the majority of participants (67.2%) were employed or semi-retired, a large percentage of the sample (32.8%) was also fully retired. An attempt was made to categorize the occupations of the employed participants. However, the high variability in occupations was too substantial to create a reasonable number of categories.

Data on the number of years that participants had resided in the research site was collected ($N = 131$). This variable (referred to as 'years of residency', hereafter) ranged from 1 to 58 years. Years of residency had a mean of 18.09, skewness value of 0.89, and was treated as a continuous variable in all analyses.

Data on yearly household income was collected from participants ($N = 97$). Income was separated into five categories: (1) less than \$25,000; (2) \$25,001 – \$50,000; (3) \$50,001 – \$75,000; (4) \$75,001 – \$100,000; and (5) greater than \$100,000. Income had a skewness value of -0.08 and a mean within the range of \$50,001 – 75,000.

Data on participants' satisfaction or dissatisfaction with the local economy (called the 'satisfaction with the local economy' variable, hereafter) was collected ($N = 127$). This question consisted of five response categories ranging from (1) 'very dissatisfied' to (5) 'very satisfied'. The mean response was 3.17, which represents an overall approximate neutral response. Satisfaction with the local economy had a skewness value of -0.49 and was treated as a continuous variable in all analyses for this chapter.

Data were collected from participants regarding their agreement or disagreement with the statement that sea turtle tourism is economically beneficial to them or their family, which is referred to as the 'economic benefit of tourism' variable, hereafter ($N = 130$). Economic benefit of tourism consisted of five response categories: (1) strongly

disagree ($n = 8$); (2) disagree ($n = 14$); (3) neutral ($n = 47$); (4) agree ($n = 36$); and (5) strongly agree ($n = 25$). The mean response to economic benefit of tourism was 3.43, which represents an overall neutral agreement. Economic benefit of tourism had a skewness value of -0.32 and was treated as a continuous variable.

Data on political leaning was also collected from participants ($N = 110$). Political leaning consisted of five categories: (1) very conservative; (2) somewhat conservative; (3) moderate ('middle of the road'); (4) somewhat liberal; and (5) very liberal. The mean political leaning of surveyed participants was between two categories: somewhat conservative and moderate ('middle of the road').

Data on religion was collected from participants ($N = 108$). The majority of participants (62.0%) reported a specific religion that they identified with; whereas, 38.0% responded that they did not identify with a religion. Religion was treated as a binary variable consisting of two categories: (1) participants that did *not* identify with a religion ($n = 41$); and (2) participants that identified with a religion ($n = 67$).

Number of Sea Turtles Encountered by Survey Participants

Data on the number of sea turtles that participants had encountered were collected ($N = 131$). Almost all participants (95.4%) stated that they had personally encountered a sea turtle; whereas, 4.6% of participants had never encountered a sea turtle. The mean number of sea turtles that participants had encountered was 101. This continuous variable, the 'number of sea turtle observations,' had a skewness value of 3.44.

Based on the interview results (see Appendix C, Comment 1), it was hypothesized that the number of sea turtle observations may have a positive relationship with some dependent variables but may develop into a negative relationship at some point (i.e. after observing an above average number of sea turtles). In order to test this hypothesis, data were transformed into a two-category variable including the categories: (1) respondents that had encountered a below average number of sea turtles ≤ 99 ; and (2) respondents that had encountered an above average number of sea turtles ≥ 100 . This two-category variable is referred to as the ‘number of sea turtle observations (two categories)’ variable, hereafter. This variable was used in analyses when it was hypothesized to explain the dependent variable and when it provided a better fit to the model than the continuous version.

Survey Participants’ Main Source of Sea Turtle Information

Of the respondents ($N = 127$), most reported that they obtain their sea turtle information from local people or friends (30.7%) (Figure 11)¹⁰. In addition, many respondents (28.4%) reported that they obtain their sea turtle information through direct observation. A large portion of the sample (22.0%) reported a NGO as their main information source. Specific NGOs cited by respondents included the Sea Turtle

¹⁰Some respondents ($n = 18$) reported having multiple sources of sea turtle information, despite the survey instructions to list only one. The reported percentages and in Figure 11 do not include cited sources beyond one. Where respondents listed multiple sources, only one source was selected by the researcher to represent the most likely source hypothesized to significantly explain the dependent variables used in this research.

Conservancy, Sea Turtle Preservation Society, and Friends of Sebastian Inlet State Park. In addition, some respondents (11.0%) reported they obtain their sea turtle information from ‘other’ sources, which included information sources such as books, internet, news, newspaper, college radio, school, television, personal interest/life, and a relative. Only 4.7% of respondents reported the government as their main information source. Government agencies cited by respondents included county, state, and federal entities.

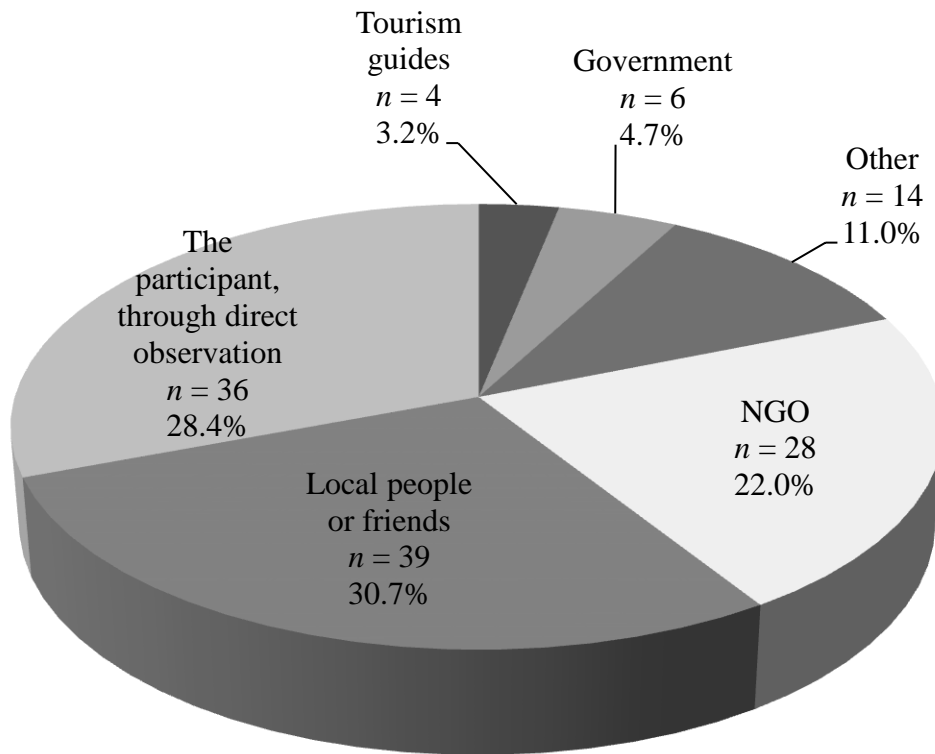


Figure 11. ACNWR participants’ main source of sea turtle information (N = 127).

Data were collected from survey participants on the extent to which they agreed or disagreed that the amount of information provided to them by their primary source of sea turtle information was adequate ($N = 89$). The extent to which respondents thought that the amount of information provided to them was adequate slightly varied among the five main information sources (Figure 12). Respondents were asked to skip this question if their main source of sea turtle information was ‘through direct observation’.

Respondents that had a main information source of government ($n = 6$) or a NGO ($n = 28$) “agreed” to “strongly agreed” that the amount of information provided by their source was adequate. On average, respondents that had a main information source of tourism guides ($n = 4$), local people or friends ($n = 38$), or other source ($n = 13$) were neutral to in agreement that the amount of information provided by their source was adequate. Overall, the results indicated a more positive response (higher mean) from those respondents that had a primary source of government or a NGO (Figure 12).

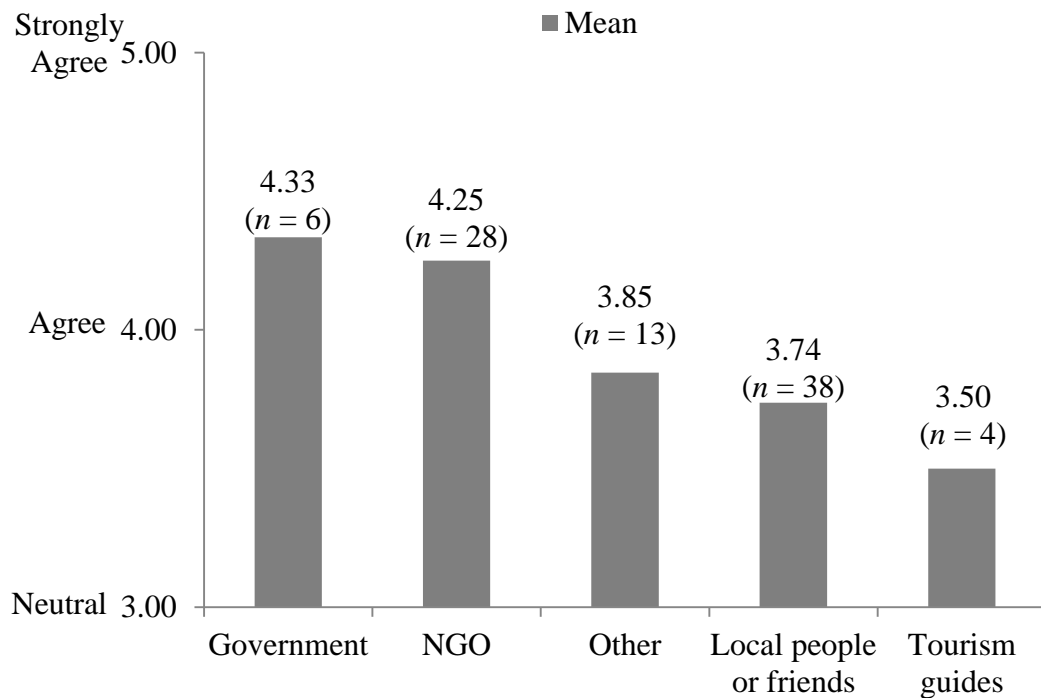


Figure 12. Mean response from ACNWR participants ($N = 89$) on the extent to which they agreed or disagreed with the statement: “I think that the amount of information provided to me by my primary source is adequate.”

Knowledge Results

Correct responses to the knowledge-based questions are shown in Table 18. The lowest correct response (27.5%) was to Question 3 (the year the ACNWR was established). The highest correct responses were to Question 4a (disturbance to sea turtles rule) (96.2%) and Question 8 (lights disturbing sea turtles) (94.7%). The four rules (Questions 4a – 4d) are listed on signs posted near beach access points (Figure 13). In an effort to reduce the survey length, not all of the listed sign rules were used on the questionnaire.

Table 18. ACNWR participants' responses to the knowledge questions.

Question	Response (<i>N</i> = 131)	
	Correct	Incorrect
1. When is the sea turtle nesting/hatching season here?	53.4% (<i>n</i> = 70) <i>March 1 – October 31</i>	46.6% (<i>n</i> = 61)
2. Which sea turtle species <i>most commonly</i> nests on your local beach?	81.7% (<i>n</i> = 107) <i>Loggerhead turtle</i>	18.3% (<i>n</i> = 24)
3. In what year was the Archie Carr National Wildlife Refuge established?	27.5% (<i>n</i> = 36) <i>1991</i>	72.5% (<i>n</i> = 95)
4. Which of the following rules exist at the Archie Carr National Wildlife Refuge? (<i>mark all that apply</i>)	71.0% (<i>n</i> = 93) <i>Marked all four correct.</i>	29.0% (<i>n</i> = 38)
4a. Do not interfere with nesting sea turtles, eggs, or hatchlings.	96.2% (<i>n</i> = 126) <i>True</i>	3.8% (<i>n</i> = 5)
4b. Shield or turn off all lights that shine on the beach or are visible from the beach.	93.1% (<i>n</i> = 122) <i>True</i>	6.9% (<i>n</i> = 9)
4c. Campfires and motorized vehicles are prohibited on the beach.	85.5% (<i>n</i> = 112) <i>True</i>	14.5% (<i>n</i> = 19)
4d. Keep pets off the beach.	72.5% (<i>n</i> = 95) <i>True</i>	27.5% (<i>n</i> = 36)
5. Do you think global sea turtle populations are: Increasing, Staying the same, or Decreasing	43.5% (<i>n</i> = 57) <i>Decreasing</i>	56.5% (<i>n</i> = 74)
6. In what habitat do you think sea turtles generally get their food?	90.8% (<i>n</i> = 119) <i>Seagrass/coral reefs</i>	9.2% (<i>n</i> = 12)
7. How many species of sea turtles do you think exist today in the world?	39.7% (<i>n</i> = 52) <i>Seven</i>	60.3% (<i>n</i> = 79)
8. Artificial lights can disturb sea turtles. (True/False)	94.7% (<i>n</i> = 124) <i>True</i>	5.3% (<i>n</i> = 7)
9. Adult female sea turtles typically lay about 20 eggs per nest. (True/False)	64.9% (<i>n</i> = 85) <i>False</i>	35.1% (<i>n</i> = 46)
10. Sea turtles are marine mammals. (True/False)	41.2% (<i>n</i> = 54) <i>False</i>	58.8% (<i>n</i> = 77)



Figure 13. Photograph of the sign listing the ACNWR beach rules (taken by the author in 2013).

Multiple Regression Analysis on the Knowledge Index

In order to proceed with a multiple regression analysis, an index was created (the ‘knowledge index’) using the 13 knowledge-based questions from the questionnaire (Table 18). The knowledge index was found to have a weak internal reliability (Cronbach’s alpha = 0.57). Subsequent attempts at creating alternative knowledge-based indices did not result in higher Cronbach’s alpha, and factor analysis did not result in interpretable factors. The knowledge index ($N = 131$) had a mean of 0.61 ($SD = 0.16$), median of 0.62 and skewness value of -0.76.

A multiple regression analysis was performed in order to test the hypothesis that there were significant relationships between the knowledge index and nine independent variables (Table 19). Regression analysis revealed that the model significantly explained the knowledge index ($F [8, 111] = 5.91, p < 0.0001, R^2 = 0.299, \text{adjusted } R^2 = 0.248$). In terms of individual relationships, the knowledge index had significant and positive relationships with years of residency ($p < 0.01$), age ($p < 0.05$), main information source (NGO or government) ($p < 0.05$), and number of sea turtle observations (two categories) ($p < 0.01$). These results demonstrated that residents' correct knowledge about sea turtles and sea turtle conservation were mostly explained by their relatively longer length of residency near the ACNWR; by their relatively older age; by the information obtained through their NGO or government agency source; and by their observation of many (above average) sea turtles.

Table 19. Multiple regression results explaining the ACNWR's knowledge index.

Independent variable	Dependent variable (the knowledge index) (<i>N</i> = 120)		
	Unstandardized regression coefficients (B) ^a	Observed <i>t</i> value (<i>t</i>)	Significance level (<i>p</i>)
Gender	0.033 (0.097)	1.16	0.250
Years of residency	0.003 (0.248)	2.72	0.008
Months of residency per year	0.001 (0.008)	0.10	0.922
Age	0.002 (0.174)	2.08	0.040
Educational attainment	0.003 (0.024)	0.29	0.776
Main information source (self)	0.062 (0.171)	1.90	0.060
Main information source (NGO or government)	0.081 (0.216)	2.41	0.017
Number of sea turtle observations ^b	0.084 (0.239)	2.72	0.008

^aStandardized regression coefficients (β) are in parentheses.

^bDummy variable consisting of two categories: (1) respondents that had encountered a below average number of sea turtles (0 – 99); and (2) respondents that had encountered an above average number of sea turtles (≥ 100).

For this regression analysis, visual inspection and tests revealed no issues with normality, linearity, and multicollinearity. There was evidence of model misspecification caused by the inclusion of age and educational attainment; however, these variables were retained in model to illustrate their deficiency in explaining the knowledge index.

Occupation was not included in the model because its inclusion reduced the model's statistical power (to *N* = 117), and it provided no explanation to the model.

Values toward Sea Turtles

Ten values toward sea turtles, as expressed by ACNWR survey respondents, were identified. Refer to Chapter 1 of this dissertation for value definitions (Table 1) and to Chapter 4 for a detailed table of the values results (Table 35). Most respondents expressed at least one value toward sea turtles ($n = 81$). There were a total of 159 instances of values toward sea turtles expressed by participants.

The esthetic value toward sea turtles was the most expressed value by ACNWR respondents ($n = 27$). For instance, one respondent expressing the esthetic value wrote, “They are beautiful. They are huge, gorgeous, beautiful, and elegant in the water.” Other respondents used words such as, “awesome looking,” “cool,” “lovely,” “amazing,” “powerful,” “truly natural,” and “cute” to describe why they like sea turtles. This result was intuitive of one of the interviewed experts who discussed how sea turtles are an easy species to keep people emotionally attached to because, “...They are sea turtles, I mean people inherently like sea turtles. There are a lot of less glamorous ones that are harder to get the public to buy into. So we are fortunate that we’ve got sort of a glamorous species to work with, something that’s attractive, interesting, and they’re just cool.”

The ecologicistic value toward sea turtles was the second most expressed value by respondents ($n = 22$). For instance, one respondent expressing the ecologicistic value stated that they liked sea turtles, “Because they are a part of this habitat and a reminder of the importance of the larger fabric of the world. They are not meant to be sacrificed. We should not destroy it. [They are an] ancient cycle of life.” Other respondents noted that they liked sea turtles because sea turtles are, “a part of nature,” “good for the ecosystem,”

“an important part of the ecosystem,” “great to keep reef health,” and “an indicator of the health of the sea.”

Multiple Values toward Sea Turtles

Less than half of respondents (43.1%) expressed multiple values, two or more, toward sea turtles. For instance, one respondent expressed the moralistic and scientific values in their statement, “Because I respect every animal, but I have a lot of respect for sea turtles. They are ancient and have wisdom.” Another respondent expressed the aesthetic and nonthreatening values in their statement, “They fascinate me. They look like prehistoric creatures. They are non-intrusive. They don't bother nobody [anybody].” Additionally, one respondent expressed the scientific and humanistic values in their statement, “They have been here for thousands of years, and the poor little babies only one out of one hundred live.”

Some respondents expressed three or more values toward sea turtles. For instance, one respondent expressed the ecologicistic, humanistic, moralistic, and naturalistic values in their statements, “They are a part of nature, so I love them. They are god's creature. I love all of god's creatures. I enjoy observing them.” Another respondent (a recreational fisherman) expressed the utilitarian, naturalistic, and humanistic values in the verbal statement that they liked sea turtles, “Because when I see them, there is cobia [a type of fish] on or around them. And I like to watch them at night. They are in my life.”

Attitude toward Sea Turtles

The results of the four questions related to attitude toward sea turtles indicated an overall positive response from participants (Table 20). These four questions consisted of five response categories ranging from (1) 'not at all important/strongly dislike' to (5) 'very important/strongly like'. The mean response for each attitude question was calculated, in which 5.00 was the maximum. The means for all attitude questions were > 4.00, which indicated an overall positive attitude for the sample. The lowest response mean (4.78) was for the question on how much do you like or dislike sea turtles, and the highest mean (4.89) was for the question on the importance of the preservation of sea turtle nesting beaches. Cumulatively, the mean for all four attitude questions was 4.85, which indicated a very positive attitude toward sea turtles.

Table 20. ACNWR's responses to the attitude toward sea turtles items.

Question (<i>N</i> = 131)	Response				
	...very important.	...somewhat important.	...neither important nor unimportant: I'm neutral.	...somewhat not important.	...not at all important.
I feel that the future survival of sea turtle species is...	88.5% (<i>n</i> = 116)	9.2% (<i>n</i> = 12)	2.3% (<i>n</i> = 3)	0% (<i>n</i> = 0)	0% (<i>n</i> = 0)
I feel that the preservation of sea turtle nesting beaches is...	91.6% (<i>n</i> = 120)	7.6% (<i>n</i> = 10)	0.8% (<i>n</i> = 1)	0% (<i>n</i> = 0)	0% (<i>n</i> = 0)
I feel that sea turtle protection laws and policies are...	89.3% (<i>n</i> = 117)	7.6% (<i>n</i> = 10)	1.5% (<i>n</i> = 2)	1.5% (<i>n</i> = 2)	0% (<i>n</i> = 0)
Question (<i>N</i> = 130)	Strongly like	Somewhat like	Neutral: Neither like nor dislike	Somewhat dislike	Strongly dislike
How much do you like or dislike sea turtles?	81.5% (<i>n</i> = 106)	14.6% (<i>n</i> = 19)	3.9% (<i>n</i> = 5)	0% (<i>n</i> = 0)	0% (<i>n</i> = 0)

^aResponses were assigned a score of 5 for very important/strongly like, 4 for somewhat important/somewhat like, 3 for neutral, 2 for somewhat not important/somewhat dislike, and 1 for not at all important/strongly dislike.

The majority of respondents (74.8%) answered all four attitude questions with a very important/strongly like response. A minority of respondents (25.2%) did not answer very important/strongly like to every question; however, this did not signify an overall

negative attitude. As Table 20 illustrates, there were no observations in the negative categories (somewhat not important/somewhat dislike and not at all important/strongly dislike) except for one question. This exception was for the question on attitude toward sea turtle protection laws, in which two respondents stated that sea turtle protection laws and policies were somewhat not important.

A binary logistic regression analysis was conducted to test the hypothesis that there were significant relationships between respondents' attitude toward sea turtles, and the various independent variables. Prior to analysis, however, contingency tables were examined. The absent or low frequency of observations in the neutral category and negative categories made conducting an ordinal logistic regression analysis using all five categories inappropriate. For this reason and because the four attitude questions combined had internal reliability (Cronbach's alpha = 0.70), a dichotomous variable was created. This binary variable was based on the sum of scores (1 – 5 per question) of the four attitude toward sea turtle questions. Group one ($n = 33$) consisted of respondents with a score of less than 20 (i.e. they did *not* answer very important/strongly like to every question). Group two ($n = 98$) consisted of respondents with a score of exactly 20 (i.e. they answered very important/strongly like to every question). This binary variable ($N = 130$) is referred to as 'attitude toward sea turtles', hereafter.

The model was significant ($\chi^2 [3, N = 127] = 17.87, p < 0.001$). The pseudo R^2 value was 0.123, and the Nagelkerke's R^2 value was 0.192. Three variables were a good fit with the model: gender, educational attainment, and main information source (NGO or government). In terms of individual relationships, attitude toward sea turtles had

significant relationships with educational attainment ($p \leq 0.05$) and main information source (NGO or government) ($p < 0.05$) (Table 21). For a one unit increase in educational attainment, the odds of a respondents' positive attitude toward sea turtles increases by a factor of 1.34. Respondents having a main information source of a NGO or government were 6.59 times more likely to have a strong positive attitude toward sea turtles, as compared to respondents having all other main information sources. These results revealed that residents' strong positive attitudes toward sea turtles were mostly influenced by their relatively higher educational attainment and by the information obtained through their NGO or government source.

Table 21. Binary logistic regression results for the model explaining the ACNWR's attitudes toward sea turtles.

Independent variable	Dependent variable (attitude toward sea turtles) ($N = 127$)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (p)	Odds ratio
Gender	0.513 (0.140)	1.10	0.293	1.670
Educational attainment	0.295 (0.274)	3.80	0.051	1.343
Main information source (NGO or government) ^b	1.886 (0.470)	5.91	0.015	6.593

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) main source of sea turtle information was *not* a NGO or government agency; and (2) main source of sea turtle information was a NGO or government agency.

Religion, income, and political leaning were not included in the above analyses due to a high non-response rate. Therefore, separate chi-square tests were conducted to examine the relationships between attitude toward sea turtles and these independent variables. There was no significant relationship between attitude toward sea turtles and religion ($\chi^2 [1, N = 108] = 2.25, p = 0.134$). There was also no significant relationship between attitude toward sea turtles and political leaning ($\chi^2 [4, N = 110] = 6.01, p = 0.198$). There was also no significant relationship between attitude sea turtles and income ($\chi^2 [4, N = 97] = 7.28, p = 0.122$).

Chi-square tests were also conducted to examine the relationships between attitudes toward sea turtles and values. A higher percentage of the sample (84.0%, $n = 42$) of respondents that expressed more than two values held a strong positive attitude toward sea turtles than respondents that expressed one or no values (72.7%, $n = 48$); however, this differences was not significant ($\chi^2 [1, N = 116] = 2.08, p = 0.149$).

Willingness to Act

The results of the four questions related to participants' willingness to take action to support sea turtle conservation ('willingness to act') indicated an overall neutral to somewhat positive response from participants ($N = 131$) (Table 22). These four questions consisted of five response categories ranging from (1) 'not willing at all/strongly oppose' to (5) 'very willing/strongly favor'. The mean response for each willingness to act item/question was calculated (5.00 was the maximum). The means for all items were > 3.00, which indicated an overall neutral position on willingness to act. The lowest

response mean (3.34) was for the question on willingness to pay slightly higher taxes to help sea turtle conservation, which indicated a cumulative neutral to somewhat willing response. The highest response mean (4.49) was for the question on support of or opposition to the preservation of additional sea turtle nesting habitat, which indicated an overall somewhat to a strongly favor response.

Table 22. ACNWR's responses to the willingness to act items.

Question	Response (N = 131)				
	Very willing	Somewhat willing	Neutral	Somewhat not willing	Not willing at all
How willing or not willing would you be to <i>donating a little money</i> to help sea turtle conservation?	35.1% (n = 46)	30.5% (n = 40)	21.4% (n = 28)	6.1% (n = 8)	6.9% (n = 9)
How willing or not willing would you be to <i>paying slightly higher taxes</i> to help sea turtle conservation?	19.1% (n = 25)	38.2% (n = 50)	20.6% (n = 27)	1.5% (n = 2)	20.6% (n = 27)
How willing or not willing would you be to <i>donating a little of your time</i> to help sea turtle conservation?	40.5% (n = 53)	28.2% (n = 37)	19.9% (n = 26)	4.6% (n = 6)	6.9% (n = 9)
Question	Strongly favor	Somewhat favor	Neutral	Somewhat oppose	Strongly oppose
How much would you favor or oppose the preservation of additional sea turtle nesting habitat?	64.9% (n = 85)	24.4% (n = 32)	6.9% (n = 9)	2.3% (n = 3)	1.5% (n = 2)

A slight majority of respondents (57.3%) possessed an overall positive willingness to act for sea turtle conservation, indicated by their cumulative mean of all four willingness to act questions of ≥ 4.00 (on a scale out of 5.00). Only fourteen respondents (10.7%) answered all four willingness to act questions with a ‘very willing/strongly favor’ response. Thirty-five respondents (26.7%) illustrated an overall neutral response to all four questions ($3.00 \leq \text{mean} \leq 4.00$). Twenty-one respondents (16.0%) illustrated an overall negative response to all four questions (mean < 3.00).

Willingness to Donate Money

An ordinal logistic regression was conducted to test the hypothesis that there were significant relationships between respondents’ willingness to donate a little money to help sea turtle conservation¹¹ (referred to as ‘willingness to donate money’) and the various independent variables. Five variables were a good fit with the model: gender, attitude toward sea turtles, satisfaction with the local economy, and the main information sources (self and NGO or government). The model was significant ($\chi^2 [5, N = 124] = 34.67, p < 0.0001$). The pseudo R^2 value was 0.106, and the Nagelkerke’s R^2 value was 0.263. In terms of individual relationships, willingness to donate money had significant relationships with gender ($p < 0.05$), main information source (self) ($p < 0.05$), and attitude toward sea turtles ($p < 0.001$) (Table 23). Females were 2.24 times more likely

¹¹In order to meet adequate expected frequencies, the dependent variable had to be transformed into four categories, in which the not willing and somewhat not willing categories were combined into one new category.

than males to be willing to donate money. Respondents that obtain their sea turtle information through direct observation were 2.43 times more likely to be willing to donate money, as compared to respondents having any of the other main information sources (local people, NGO or government, and other). Respondents with a strong positive attitude toward sea turtles were 5.27 times more likely to be willing to donate money, as compared to respondents with a less positive attitude toward sea turtles. These results demonstrated that residents' willingness to donate a little money to help sea turtle conservation was mostly influenced by their gender (being female), by the information obtained through their direct observation (of sea turtles, signs, etc.), and by their strong positive attitude toward sea turtles.

Table 23. Ordinal logistic regression results for the model explaining the ACNWR's willingness to donate money for sea turtle conservation.

Independent variable	Dependent variable (willingness to donate money) (<i>N</i> = 124)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Gender	0.807 (0.188)	4.83	0.028	2.240
Main information source (self) ^b	0.887 (0.191)	4.45	0.035	2.428
Main information source (NGO or government) ^c	0.599 (0.128)	1.98	0.160	1.821
Satisfaction with the local economy ^d	0.205 (0.109)	1.76	0.185	1.228
Attitude toward sea turtles ^e	1.662 (0.352)	15.48	0.000	5.269

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) main information source was *not* the respondent, through direct observation; and (2) main information source was the respondent, through direct observation.

^cBinary variable consisting of two categories: (1) main source of sea turtle information was *not* a NGO or government agency; and (2) main source of sea turtle information was a NGO or government agency.

^dContinuous variable with possible scores ranging from 1 (very dissatisfied) to 5 (very satisfied).

^eBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) respondents that answered very important/strongly like to all four attitude questions.

A chi-square test found no significant relationship between willingness to donate money to sea turtle conservation and religion (χ^2 [3, *N* = 108] = 0.76, *p* = 0.858). Due to numerous low expected frequencies, a chi-square test could not be conducted to examine relationships between willingness to donate money and: (1) political leaning and (2) income.

Chi-square tests were conducted to examine the relationships between willingness to donate money and values toward sea turtles. A higher percentage of the sample (46.0%, $n = 23$) of respondents that expressed more than two values were very willing to donate money to help sea turtle conservation than respondents that expressed one or no values (31.8%, $n = 21$), and this difference was significant ($\chi^2 [1, N = 116] = 4.90, p = 0.027$).

Willingness to Pay Taxes

An ordinal logistic regression was conducted to test the hypothesis that there were significant relationships between respondents' willingness to pay slightly higher taxes to help sea turtle conservation¹² (referred to as 'willingness to pay taxes') and the various independent variables. Five variables were a good fit with the model: gender, main information source (self), main information source (NGO or government), number of sea turtle observations (two categories), and attitude toward sea turtles. The model was significant ($\chi^2 [5, N = 127] = 30.22, p < 0.0001$). The pseudo R^2 value was 0.089, and the Nagelkerke's R^2 value was 0.228.

In terms of individual relationships, willingness to pay taxes had significant relationships with main information source (self) ($p < 0.05$), number of sea turtle observations (two categories) ($p < 0.05$), and attitude toward sea turtles ($p < 0.001$)

¹²In order to meet adequate expected frequencies, the dependent variable had to be transformed into four categories, in which the not willing and somewhat willing categories were combined into one new category.

(Table 24). Respondents who obtained their sea turtle information mainly through direct observation were 2.24 times more likely to be willing to pay slightly higher taxes to help sea turtle conservation, as compared to respondents having any of the other main information sources. Respondents that had encountered a below average number of sea turtles (≤ 99) were 0.46 times more likely to be willing to pay higher taxes, as compared to respondents that had encountered an above average number of sea turtles (≥ 100). Respondents with a strong positive attitude toward sea turtles were 4.61 times more likely to be willing to pay higher taxes, as compared to respondents with a less positive attitude. These results demonstrated that residents' willingness to pay slightly higher taxes to help sea turtle conservation was mostly influenced by their strong positive attitude toward sea turtles, by the information obtained through their direct observation (of sea turtles, signs, etc.), and by the relatively lower number of sea turtles that they have observed.

Table 24. Ordinal logistic regression results for the model explaining the ACNWR's willingness to pay slightly higher taxes to help sea turtle conservation.

Independent variable	Dependent variable (willingness to pay taxes) (<i>N</i> = 127)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Gender	0.558 (0.132)	2.51	0.113	1.746
Main information source (self) ^b	0.809 (0.177)	3.92	0.048	2.245
Main information source (NGO or government) ^c	0.746 (0.160)	2.98	0.084	2.110
Number of sea turtle observations ^d	-0.771 (-0.179)	4.50	0.034	0.463
Attitude toward sea turtles ^e	1.527 (0.325)	14.28	0.000	4.605

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) main information source was *not* the respondent, through direct observation; and (2) main information source was the respondent, through direct observation.

^cBinary variable consisting of two categories: (1) main source of sea turtle information was *not* a NGO or government; and (2) main source of sea turtle information was a NGO or government.

^dBinary variable consisting of two categories: (1) respondents that had encountered a below average number of sea turtles ≤ 99 ; and (2) respondents that had encountered an above average number of sea turtles ≥ 100 .

^eBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) respondents that answered very important/strongly like to all four attitude questions.

A chi-square test was conducted to examine the relationship between willingness to pay taxes and religion. A slightly higher percentage (24.4%, *n* = 10) of the sample of non-religious respondents were very willing to pay slightly higher taxes than were religious respondents (20.9%, *n* = 14). There was no significant relationship between

willingness to pay taxes and religion ($\chi^2 [3, N = 108] = 4.90, p = 0.180$). Due to numerous low expected frequencies, a chi-square test could not be conducted to examine relationships between willingness to pay taxes and: (1) political leaning and (2) income.

Chi-square tests were conducted to examine the relationships between willingness to pay higher taxes to help sea turtle conservation and values toward sea turtles. A higher percentage of the sample (40.9%, $n = 9$) of respondents that expressed the ecologicistic value very willing to pay higher taxes to help sea turtle conservation than respondents that did not express this value (14.9%, $n = 14$), and this difference was significant ($\chi^2 [3, N = 116] = 8.76, p = 0.033, V = 0.274$). However, there was no significant relationship between willingness to higher pay taxes and the expression of multiple values ($\chi^2 [3, N = 116] = 5.17, p = 0.160$).

Willingness to Donate Time

An ordinal logistic regression was conducted to test the hypothesis that there were significant relationships between respondents' willingness to donate a little of their time to help sea turtle conservation¹³ (referred to as 'willingness to donate time') and the various independent variables. Four variables were a good fit with the model: age, gender, main information source (NGO or government), and attitude toward sea turtles. The model was significant ($\chi^2 [4, N = 122] = 38.16, p < 0.0001$). The pseudo R^2 value

¹³Due to low expected frequencies, the dependent variable had to be transformed into four categories, in which the not willing and somewhat willing categories were combined into one new category.

was 0.120, and the Nagelkerke's R^2 value was 0.290.

In terms of individual relationships, willingness to donate time had significant relationships with age ($p < 0.01$), main information source (NGO or government) ($p < 0.01$), and attitude toward sea turtles ($p < 0.001$) (Table 25). For a one unit increase in age, the odds of a respondent's willingness to donate their time to sea turtle conservation decreases by a factor of 0.97. Respondents with a main information source of a NGO or government were 3.55 times more likely to be willing to donate their time, as compared to respondents having any of the other main information sources. Furthermore, respondents with a strong positive attitude toward sea turtles were 6.45 times more likely to be willing to donate their time, as compared to respondents with a less positive attitude toward sea turtles. These results demonstrated that residents' willingness to donate a little of their time to help sea turtle conservation was mostly influenced by having a relatively lower age, by the information obtained through their NGO or government source (or by their association with this source), and by their strong positive attitude toward sea turtles.

Table 25. Ordinal logistic regression results for the model explaining ACNWR's willingness to donate their time to help sea turtle conservation.

Independent variable	Dependent variable (willingness to donate time) ($N = 122$)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (p)	Odds ratio
Gender	-0.547 (-0.125)	2.33	0.127	0.579
Age	-0.035 (-0.240)	8.57	0.003	0.966
Main information source (NGO or government) ^b	1.266 (0.259)	7.94	0.005	3.545
Attitude toward sea turtles ^c	1.863 (0.386)	18.53	0.000	6.446

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) main source of sea turtle information was *not* a NGO or government agency; and (2) main source of sea turtle information was a NGO or government agency.

^cBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) respondents that answered very important/strongly like to all four attitude questions.

A chi-square test was conducted to examine the relationship between willingness to donate time and religion. There was no significant relationship between willingness to donate time and religion ($\chi^2 [3, N = 108] = 0.35, p = 0.951$). Due to low expected frequencies, chi-square tests could not be conducted to examine the relationship between willingness to donate time and: (1) political leaning and (2) income.

Chi-square tests were conducted to examine the relationships between willingness to donate time to help sea turtle conservation and values toward sea turtles. A higher percentage of the sample (48.0%, $n = 24$) of respondents that expressed more than two

values were very willing to donate their time to help sea turtle conservation than respondents that expressed one or no values (37.9%, $n = 25$). However, there was no significant relationship between willingness to donate time and the expression of multiple values ($\chi^2 [3, N = 116] = 4.83, p = 0.185$).

Support of Additional Preserved Habitat

An ordinal logistic regression was conducted to test the hypothesis that there were significant relationships between respondents' support or opposition to the preservation of additional sea turtle nesting habitat¹⁴ (referred to as 'support of additional preserved habitat') and the various independent variables. Five variables were a good fit with the model: gender, age, years of residency, attitude toward sea turtles, and the economic benefit of tourism. Inclusion of residency status violated the proportional odds assumption; thus, this variable was not included in the model.

The model was significant ($\chi^2 [5, N = 125] = 24.48, p < 0.001$). The pseudo R^2 value was 0.115, and the Nagelkerke's R^2 value was 0.217. In terms of individual relationships, support of additional preserved habitat only had a significant relationship with attitude toward sea turtles ($p < 0.001$) (Table 26). Respondents with a strong positive attitude toward sea turtles were 4.58 times more likely to be strongly supportive of designating additional preserved habitat, as compared to respondents with a less

¹⁴In order to meet adequate expected frequencies, the dependent variable had to be transformed into three categories, in which the strongly oppose category, somewhat oppose category, and neutral category were combined into one new category.

positive attitude toward sea turtles. These results revealed that residents' support of the preservation of additional sea turtle nesting habitat was mostly influenced by their strong positive attitude toward sea turtles.

Table 26. Ordinal logistic regression results for the model explaining ACNWR's support of additional sea turtle preservation habitat.

Independent variable	Dependent variable (support of additional preserved habitat) (<i>N</i> = 125)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Gender	0.477 (0.115)	1.25	0.264	1.612
Years of residency	0.021 (0.155)	2.15	0.143	1.021
Age	-0.017 (-0.127)	1.71	0.191	0.983
Attitude toward sea turtles ^b	1.522 (0.329)	12.26	0.000	4.581
Economic benefit of tourism	0.325 (0.176)	3.00	0.083	1.384

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) respondents that answered very important/strongly like to all four attitude questions.

Chi-square tests were conducted to examine the relationships between respondents' support of designating additional preserved habitat and values toward sea turtles. There was a significant relationship between support of additional preserved habitat and the expression of multiple values (χ^2 [2, *N* = 116] = 10.42, *p* = 0.005, *V* = 0.230). For instance, respondents that expressed two or greater values were more

supportive of the preservation of additional sea turtle nesting habitat than respondents that expressed one or no values.

Summary of the Willingness to Act Items

Table 27 provides a summary of the ordinal logistic regression analyses of the four willingness to act models. Attitude toward sea turtles was a significant explanatory factor for all four models; however, other factors varied in significantly explaining the models. These results are further deliberated in the discussion section of this chapter.

Table 27. Summary of the regression analyses for the effects of the independent variables on the ACNWR's willingness to act items.

Independent variable ^a	Dependent variable			
	Willingness to donate money	Willingness to pay taxes	Willingness to donate time	Support of additional preserved habitat
Years of residency	n.s.	n.s.	n.s.	n.s. [†]
Gender	F > M*	n.s. [†]	n.s. [†]	n.s. [†]
Age	n.s.	n.s.	(-)**	n.s. [†]
Number of sea turtle observations ^b	n.s.	(1) > (2)*	n.s.	n.s.
Main information source (self) ^c	(2) > (1)*	(2) > (1)*	n.s.	n.s.
Main information source (NGO or government) ^d	n.s. [†]	n.s. [†]	(2) > (1)**	n.s.
Attitude toward sea turtles ^e	(2) > (1)***	(2) > (1)***	(2) > (1)***	(2) > (1)***
Satisfaction with the local economy	n.s. [†]	n.s.	n.s.	n.s.
Economic benefit of tourism	n.s.	n.s.	n.s.	n.s. [†]

^an.s.[†] = not significant at the alpha 0.05 level but was included in the final model; n.s. = not significant at the alpha 0.05 level and not included in the model/not a good fit; * = $p \leq 0.05$; ** = $p \leq 0.01$; *** = $p \leq 0.001$; F = female, M = male; (-) = negative regression coefficient.

^b(1) = respondents that had encountered a below average number of sea turtles ≤ 99 ; and (2) = respondents that had encountered an above average number of sea turtles ≥ 100 .

^c(1) = main information source was *not* the respondent, through direct observation; and (2) = main information source was the respondent, through direct observation.

^d(1) = main source of sea turtle information was *not* a NGO or government agency; and (2) = main source of sea turtle information was a NGO or government agency.

^e(1) = respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) = respondents that answered very important/strongly like to all four attitude questions.

Participation in Sea Turtle-Related Activities

Data were collected from participants, in two survey questions, regarding their opportunity to participate in sea turtle-related activities. The first question asked participants if they had ever been asked by an organization or group to participate in a sea turtle-related activity ($N = 131$). The majority of respondents (67.9%) reported that they had *never* been asked by an organization or group to participate in a sea turtle-related activity. Conversely, 32.1% of respondents reported that they had been asked by an organization or group to participate in an activity. The second question asked participants to what extent they agreed or disagreed that opportunities for them to participate in sea turtle-related activities were adequate ($N = 129$). The majority of respondents (68.2%) reported that they either strongly agreed or agreed that opportunities for them to participate in sea turtle-related activities were adequate (Table 28). A portion of the sample (26.3%) was neutral that such opportunities to participate were adequate.

Table 28. ACNWR’s response to the adequacy of participation opportunities.

Question	Response ($N = 129$)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
To what extent do you agree or disagree with this statement: “I feel that opportunities for me to participate in sea turtle related activities are adequate.”	22.5% ($n = 29$)	45.7% ($n = 59$)	26.3% ($n = 34$)	3.9% ($n = 5$)	1.6% ($n = 2$)

In an open-ended survey question, data were collected from participants regarding their desire to have more sea turtle-related activities offered to them ($N = 55$). A slight majority of participants (58.0%) did not respond to this question. Of the participants that responded to this question (42.0%), 19 participants reported that they would like to have more activities offered and listed specific activities (Table 29). However, many participants (27.4%) responded that they would not like more activities offered. Included in this category, seven participants indicated that the current level of activities offered were sufficient. As shown in Table 29, the most frequently listed activity that respondents wanted more of included educational activities ($n = 10$).

Table 29. Sea turtle-related activities that the ACNWR participants reported they would want offered.

Sea Turtle-Related Activity ^a	<i>n</i>
<i>Fundraisers</i>	3
<i>Volunteering</i>	2
<i>Beach cleaning or trash collection</i>	1
<i>Community involvement</i>	1
<i>Educational activities</i>	
in general	6
for children/in schools	1
for children of lower income families	1
for the community	1
such as presentations and clinics	1
<i>Protection</i>	
in general	1
of sea turtle nests	1
<i>Sea turtle guided tours</i>	
sea turtle tours	1
observation of the sea turtle hatching process	1

^aTwo respondents shared two activities each.

Data were collected from participants regarding their membership in a sea turtle organization ($N = 131$). The majority of respondents (93.1%) reported that they were not a member of a sea turtle-related organization. A marginal number of respondents (6.9%) were members of such an organization.

Data were collected from participants regarding if they donate money to a sea turtle organization ($N = 129$). A slight majority of respondents (59.7%) reported that they had donated money to a sea turtle-related organization. A slight minority of respondents (40.3%) had not donated money.

Data were collected from participants regarding what sea turtle-related activities, if any, they had participated in ($N = 131$). A slight minority of respondents (43.5%) reported that they had participated in one or more sea turtle-related activities (Table 30). Of these participating respondents, educational activities were the most frequently reported activity (Table 30). However, the majority of respondents (56.5%) had not participated in any sea turtle-related activities.

Table 30. Frequency of the ACNWR's participation in sea turtle-related activities.

Type of sea turtle-related activity	Frequency
Sea turtle tour	18
Educational	34
Monitoring	10
Other	25
Total frequency of participation	87
Total participating respondents (n)	57

A binary logistic regression analysis was conducted to test the hypothesis that there were significant relationships between the dependent variable, participation in a sea turtle-related activity (referred to as the ‘participation’ variable hereafter), and the various independent variables. The participation variable consisted of two categories: (1) respondents that had *not* participated in any sea turtle-related activities ($n = 74$); and (2) respondents that had participated in at least one sea turtle-related activity ($n = 57$). Three variables were a good fit with the model: educational attainment, attitudes toward sea turtles, and main information source (NGO or government).

This model was significant ($\chi^2 [3, N = 127] = 36.00, p < 0.0001$). The pseudo R^2 value for the model was 0.207, and the Nagelkerke’s R^2 value was 0.331. In terms of individual relationships, participation only had a significant relationship with main information source (NGO or government) ($p < 0.001$) (Table 31). Respondents having a main information source of a NGO or government agency were 9.75 times more likely to participate in a sea turtle-related activity, as compared to respondents not having this main information source. These results demonstrated that residents’ active participation in a sea turtle-related activity was mostly influenced by the information obtained through their NGO or government source (or by their association with this source).

Table 31. Binary logistic regression results for the model explaining the ACNWR's participation in sea turtle-related activities.

Independent variable	Dependent variable (participation) (<i>N</i> = 127)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Educational attainment	0.250 (0.232)	2.84	0.092	1.284
Attitude toward sea turtles ^b	0.717 (0.168)	1.91	0.167	2.048
Main information source (NGO or government) ^c	2.278 (0.567)	19.06	0.000	9.754

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four questions on attitude toward sea turtles; and (2) respondents that answered very important/strongly like to all four attitude questions.

^cBinary variable consisting of two categories: (1) main source of sea turtle information was *not* a NGO or government agency; and (2) main source of sea turtle information was a NGO or government agency.

Chi-square tests were conducted to examine the relationships between participation and: (1) religion; (2) political leaning; and (3) values toward sea turtles. There was no significant relationship between participation and: (1) religion (χ^2 [1, *N* = 108] = 0.025, *p* = 0.874); and (2) political leaning (χ^2 [4, *N* = 110] = 9.04, *p* = 0.060). There was, however, significant relationships between participation and: (1) the expression of multiple values (χ^2 [1, *N* = 116] = 3.76, *p* = 0.052, *V* = 0.180); and (2) the expression of the scientific value (χ^2 [1, *N* = 116] = 3.98, *p* = 0.046, *V* = 0.185). For instance, more respondents that expressed the scientific value toward sea turtles participated in sea turtle-related activities.

Helping to Protect Sea Turtles

Another participation-related question asked respondents if they have ever helped to protect nesting sea turtles or hatchlings ($N = 127$) (referred to as the ‘helping to protect sea turtles’ variable, hereafter). The majority of respondents (57.5%) reported that they had protected nesting sea turtles or hatchlings at least one time. The minority of respondents (42.5%) had never protected nesting sea turtles or hatchlings. The helping to protect sea turtles variable consisted of two categories: (1) respondents that have *never* helped to protect sea turtles or hatchlings ($n = 54$); and (2) respondents that have helped to protect sea turtles or hatchlings at least one time ($n = 73$).

A binary logistic regression was conducted in order to test the hypothesis that there were significant relationships between helping to protect sea turtles and the various independent variables. The model was significant ($\chi^2 [4, N = 224] = 23.58, p < 0.0001$). The pseudo R^2 value for the model was 0.139, and the Nagelkerke’s R^2 value was 0.233. In terms of individual relationships, helping to protect sea turtles had significant relationships with residency status ($p < 0.01$) and educational attainment ($p < 0.05$) (Table 32). Respondents that were full-time residents were 5.60 times more likely to protect sea turtles or hatchlings, as compared to part-time residents. For a one unit increase in educational attainment, the odds of respondents helping to protect sea turtles decreases by a factor of 0.74. These results revealed that residents’ active participation in helping to protect sea turtles or hatchlings (on their own) was mostly influenced by their full-time residency status near the ACNWR and by their relatively lower educational attainment.

Table 32. Binary logistic regression results for the model explaining the ACNWR's participation in helping to protect sea turtles.

Independent variable	Dependent variable (helping to protect sea turtles) (<i>N</i> = 124)			
	Unstandardized regression coefficients (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Educational attainment	-0.307 (-0.286)	4.52	0.034	0.736
Years of residency	0.027 (0.206)	3.34	0.068	1.027
Residency status ^b	1.723 (0.367)	8.72	0.003	5.601
Attitude toward sea turtles ^c	0.880 (0.207)	3.43	0.064	2.411

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) part-time residents; and (2) full-time residents.

^cBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) respondents that answered very important/strongly like to all four attitude questions.

Chi-square tests were conducted to examine the relationships between helping to protect sea turtles and: (1) religion; (2) political leaning; and (3) values. There were no significant relationships between helping to protect sea turtles and: (1) religion (χ^2 [1, *N* = 104] = 0.10, *p* = 0.751); (2) political leaning (χ^2 [4, *N* = 107] = 4.71, *p* = 0.319); and (3) the expression of multiple values (χ^2 [1, *N* = 112] = 0.79, *p* = 0.375).

Helping Sea Turtles in Danger

Another participation-related question asked respondents if they have ever helped a sea turtle that was in danger or was injured (*N* = 122) (referred to as the 'helping sea

turtles in danger' variable, hereafter). The helping sea turtles in danger variable consisted of two categories: (1) respondents that have *never* helped a sea turtle in danger ($n = 63$); and (2) respondents that have helped a sea turtle in danger ($n = 59$).

A binary logistic regression was conducted in order to examine what factors explain respondents' participation in helping sea turtles in danger. The number of sea turtle observations and main information source (NGO or government) variables were a good fit with the model. The model was significant ($\chi^2 [2, N = 119] = 8.71, p \leq 0.01$). The pseudo R^2 value for the model was 0.053, and the Nagelkerke's R^2 value was 0.094. Helping sea turtles in danger only had a significant relationship with main information source (NGO or government) (Table 33). This revealed that residents' participation in helping sea turtles in danger (on their own) was mostly influenced by the information obtained from their NGO or government source (or by their association with this source).

Table 33. Binary logistic regression results for the model explaining the ACNWR's participation in helping sea turtles in danger.

Independent variable	Dependent variable (helping sea turtles in danger) ($N = 119$)			
	Unstandardized regression coefficient (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (p)	Odds ratio
Number of sea turtle observations	0.002 (0.271)	3.22	0.073	1.002
Main information source (NGO or government) ^b	0.872 (0.217)	4.14	0.042	2.391

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) main source of sea turtle information was *not* a NGO or government agency; and (2) main source of sea turtle information was a NGO or government agency.

Chi-square tests were conducted to examine the relationships between helping sea turtles in danger and: (1) religion; (2) political leaning; and (3) values toward sea turtles. There was no significant relationship between helping sea turtles in danger: (1) religion ($\chi^2 [1, N = 101] = 0.54, p = 0.463$); (2) political leaning ($\chi^2 [4, N = 103] = 4.30, p = 0.367$); and (3) the expression of multiple values ($\chi^2 [1, N = 108] = 0.23, p = 0.629$).

Donating Money to a Sea Turtle Organization

Another participation-related question asked respondents if they have ever donated money to a sea turtle organization ($N = 129$) (referred to as the ‘donating money’ variable, hereafter). A slight majority of respondents (59.7%) reported that they had *never* donated money to a sea turtle organization; whereas, 40.3% of respondents had donated money. The donating money variable consisted of two categories: (1) respondents that had *never* donated money to a sea turtle organization ($n = 77$); and (2) respondents that had donated money to a sea turtle organization ($n = 52$).

A binary logistic regression was conducted in order to examine what factors explain respondents’ donating money to a sea turtle organization. The gender, age, attitude toward sea turtles, the knowledge index, and participation in an educational activity¹⁵ variables were a good fit with the model.

¹⁵Contrary to the hypothesized model as shown in Chapter 1, it was speculated that participation in a sea turtle-related activity might be an explanatory factor in donating money to an organization. Analyses revealed that goodness-of-fit and significance was only being provided by participation in an educational activity; thus, participation in an educational activity was retained.

The model was significant, ($\chi^2 [5, N = 124] = 44.55, p < 0.0001$). The pseudo R^2 value for the model was 0.266, and the Nagelkerke's R^2 value was 0.408. In terms of individual relationships, donating money had significant relationships with age ($p \leq 0.01$), the knowledge index ($p < 0.05$), and participation in an educational activity ($p < 0.001$) (Table 34). For a one unit increase in age, the odds of donating money to a sea turtle organization increases by a factor of 1.05. For a one unit increase in the knowledge index, the odds of donating money to a sea turtle organization increases by a factor of 28.01. Respondents who participated in sea turtle-related educational activities were approximately 6.19 times more likely to donate money, as compared to respondents that had not participated. These results suggested that residents' action of donating money to a sea turtle organization was mostly influenced by their relatively higher age, greater knowledge about sea turtles, and by their active participation in a sea turtle-related educational activity. These results support the time order that residents that have participated in educational activities (such as visiting the Barrier Island Center) were learning about sea turtles and then donating money after their participation.

Table 34. Binary logistic regression results for the model explaining the ACNWR respondents' active donation of money to sea turtle conservation.

Independent variable	Dependent variable (donating money) (<i>N</i> = 124)			
	Unstandardized regression coefficients (B) ^a	Observed Wald χ^2 value (χ^2)	Significance level (<i>p</i>)	Odds ratio
Gender	0.851 (0.233)	3.54	0.060	2.341
Age	0.044 (0.416)	6.13	0.013	1.045
Attitude toward sea turtles ^b	1.065 (0.250)	3.28	0.070	2.903
Knowledge index	3.332 (0.230)	4.11	0.043	28.005
Participation in an educational activity ^c	1.822 (0.466)	12.47	0.000	6.186

^aStandardized regression coefficients (β) are in parentheses.

^bBinary variable consisting of two categories: (1) respondents that did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) respondents that answered very important/strongly like to all four attitude questions.

^cBinary variable consisting of two categories: (1) respondents that have never participated in a sea turtle-related educational activity; and (2) respondents that have participated in an educational activity.

Chi-square tests were conducted to examine the relationships between donating money and: (1) religion; (2) income; (3) political leaning; and (4) values. There was a strong and significant relationship between donating money and political leaning (χ^2 [4, *N* = 108] = 10.61, *p* = 0.031, *V* = 0.313). For instance, a higher percentage of the sample of the very liberal respondents (57.1%, *n* = 8) donated money than the very conservative respondents (16.7%, *n* = 4). Additionally, there was a significant relationship between donating money and the expression of the ecologicistic value (χ^2 [1, *N* = 114] = 5.65, *p* =

0.017, $V = 0.223$). However, there were no significant relationships between donating money and: (1) religion ($\chi^2 [1, N = 108] = 0.01, p = 0.926$); (2) income ($\chi^2 [4, N = 96] = 2.17, p = 0.704$); and (3) the expression of multiple values ($\chi^2 [1, N = 114] = 0.48, p = 0.489$).

Discussion

Knowledge

This research found that residents near the ACNWR possessed an overall strong local knowledge or knowledge of local importance in regard to sea turtles. For instance, the majority of respondents (71.0%) possessed the correct knowledge about all four sea turtle-related beach rules at the ACNWR. The rule about not interfering with nesting sea turtles, eggs, or hatchlings had the highest correct response rate (96.2%) out of the four rules; whereas, the rule about keeping pets off the beach had the lowest correct response rate (72.5%). In addition, the majority of respondents (81.7%) knew that the loggerhead turtle was the most common nesting species on the ACNWR, and 94.7% possessed the correct knowledge that artificial lights can disturb sea turtles.

These results suggest that any non-compliance by residents with these rules is most likely intentional. As one expert noted, “There are some people that live here that understand the rules and understand that there are sea turtles here, so they will keep the lights from their house from shining on the beach. But on the other hand, their familiarity with the beach and their sense of ownership of the beach leads them to think that they can

do what they want and that they are not really hurting anything if they disturb a couple of sea turtles.”

Although residents had an overall strong local knowledge, more awareness of the rule about keeping pets off the beach could be cultivated. Two interviewed experts noted that there was low compliance with this rule. For instance, one expert stated, “There are no pets allowed on the beach here within the refuge, except within the Sebastian Inlet State Park. But anyone who has walked on any portion of the beach realizes that there are dogs all over the place.” ACNWR signage that lists the beach rules could be edited to provide stronger language. For instance, the rule on all signs stated, “Keep pets off the beach,” which could be modified to, “Pets are not allowed on the beach (this includes leashed and unleashed pets).” Of course, more enforcement of this rule is needed because most residents know this rule and choosing to ignore it. As one expert stated, “I think there is a sense that the public understands that you can call the cops for me having a dog on the beach. But by the time he gets here, I’ll be gone.”

Additionally, more educational awareness could be cultivated about the timing of the sea turtle nesting/hatching season at the ACNWR. Only 53.4% of respondents correctly knew that the sea turtle nesting/hatching season is from March 1 – October 31. The timing of the sea turtle nesting/hatching season is clearly labeled on beach access signs; thus, additional educational outreach is evidently required to increase awareness. Increasing knowledge about the timing of the sea turtle nesting/hatching season seems paramount in increasing caution and compliance with beach rules among residents while they are on the beach during nesting season.

Compared to local knowledge as discussed above, residents possessed less globally-related knowledge regarding sea turtles. For instance, 58.8% of respondents incorrectly believed that sea turtles are marine mammals, 60.3% of respondents did not know that there are seven sea turtle species in the world, and 56.5% of respondents did not know that global sea turtle populations are decreasing.

The results revealed that residents' sea turtle-related knowledge (as defined by this study's knowledge index) could only be significantly explained by the years of residency, age, number of sea turtle observations, and main information source (NGO or government) variables. As residents' years of residency near the ACNWR, age, and number of sea turtle observations (encounters above average) increased, their overall knowledge about sea turtles increased. Residents whose main source of sea turtle information was a NGO or government agency also had a greater overall knowledge about sea turtles than residents that had any of the other information sources. Surprisingly, the non-significance of gender and educational attainment in explaining knowledge about sea turtles were contrary the results of previous research (Kellert & Berry 1987).

Attitude toward Sea Turtles

This study found that residents near the ACNWR possessed an overall strong positive attitude toward sea turtles. The majority of respondents (74.8%) answered with the most positive response ("very important" or "strongly like") to all four sea turtle attitude-related questions. The results revealed that residents' attitude toward sea turtles

could only be significantly explained by the educational attainment and main information source (NGO or government) variables. As residents' educational attainment increases, their positive attitude toward sea turtles increases. The significance of educational attainment found in this research is similar to the results of previous research with respect to attitudes toward wildlife (Kellert 1993a; Kellert & Berry 1987). In addition, residents that had a NGO or government agency as their main source of sea turtle information were approximately seven times more likely to have a stronger positive attitude toward sea turtles, as compared to residents having any of the other information sources (i.e. local people, self, and other). This illustrates the effectiveness of NGOs and government agencies in the ACNWR in cultivating positive attitudes toward sea turtles among local residents.

Willingness to Act

This research revealed that residents near the ACNWR possessed an overall neutral to somewhat positive willingness to act for sea turtle conservation. However, the overall willingness to act response was less positive as compared to the response to the purely attitude-related questions. This indicated that ACNWR residents were slightly less willing to take action to support sea turtle conservation.

The results demonstrated that residents' overall willingness to act for sea turtle conservation was mostly significantly explained by their general attitude toward sea turtles (Table 27). In addition, residents' that obtained their sea turtle information through direct observation were more willing to donate money and willingness to pay

taxes to help sea turtle conservation than residents who obtain their information through other sources (i.e. NGO or government, local people, etc.). However, residents that obtained their sea turtle information through a NGO or government were more willing to donate their time to help sea turtle conservation. In addition, as age increased, a resident's willingness to donate time decreased; thus, younger residents are more willing to volunteer for sea turtle conservation. This research also found that females were two times more likely than males to be willing to donate money to help sea turtle conservation. Residents that had encountered a below average number of sea turtles were slightly more likely to be willing to pay higher taxes, as compared to residents that had encountered an above average number. Based on the interview results, this could be because residents encountering many sea turtles may be more inclined to believe that sea turtles do not need monetary conservation assistance.

Values toward sea turtles that residents' possessed explained several aspects of this study's analyses. For instance, residents possessing multiple values toward sea turtles were more willing to donate money to help sea turtle conservation. In addition, more residents that possessed the ecologicistic value towards sea turtle were willing to pay higher taxes for sea turtle conservation. Lastly, more residents that possessed multiple values toward sea turtles were supportive of the preservation of additional sea turtle nesting habitat.

Overall, these results suggested that residents' willingness to take action to support sea turtle conservation was significantly explained the most by their general positive attitude toward sea turtles and, to a lesser extent, by their main information

source. However, gender, age, and number of sea turtle observations helped to further explain specific willingness to act items.

Participation in Sea Turtle-Related Activities

The results of this study revealed that residents' main source of sea turtle information played a significant role in explaining their participation in a sea turtle-related activity. Residents that had a main information source of either a NGO or government agency participated almost ten times more in sea turtle-related activities. Although this significance is likely reflective of the fact that local NGOs and government are the entities sponsoring sea turtle-related activities, it also likely reflects the successful outreach of these entities with transmitting sea turtle participation information to residents.

Helping to Protect Sea Turtles and those in Danger

This research showed that residents' participation in helping to protect sea turtles or hatchlings was significantly explained by the residency status and educational attainment variables; however, residents' active participation in helping sea turtles in danger (on their own) was mostly influenced by the information obtained from their NGO or government source (or by their association with this source). Full-time residents were more almost six times more likely to protect sea turtles or hatchlings, as compared to part-time residents. This may reflect that full-time residents have a deeper sense of stewardship to protect sea turtles at the ACNWR. Furthermore, residents with relatively

lower educational attainment were slightly more likely to protect sea turtles, as compared to residents with a higher level of formal education. Residents having a NGO or government source of information were more than twice as likely to help sea turtles in danger. This may reflect that residents informed by NGOs or government are more equipped to handle such situations where sea turtles are in danger.

Donating Money to a Sea Turtle Organization

These results suggested that residents' action of donating money to a sea turtle organization was mostly influenced by their relatively higher age, greater knowledge about sea turtles, and by their active participation in a sea turtle-related educational activity. Although political leaning was not included in the overall model, it was demonstrated directly that more liberal residents donated money to sea turtle organization than conservative residents. Despite their lack of significance in the model at the alpha 0.05 level, gender (being female) and the possession of a strong positive attitude toward sea turtles helped to explain the model. These results support the time order that residents that have participated in educational activities (such as visiting the Barrier Island Center) were learning about sea turtles and then donating money after their participation. Lastly, more residents that possessed the ecologicistic value towards sea turtles donated money to sea turtle conservation. These results suggest that simply getting patrons to participate in educational activities and learn about the species of interest can be a successful way to increase donations. Educational activities stressing

the importance of the species' role in the ecosystem might be of most importance in increasing donations.

Other Discussion Topics

From a conservation perspective, the two most crucial knowledge items in this research included knowledge about the timing of sea turtle nesting/hatching season and knowledge about the beach rules protecting sea turtles. In the researcher's opinion, resident knowledge about these two items is important in minimizing disturbance to sea turtles at the ACNWR. Based on observations made by the researcher during visits to the ACNWR, there are abundant signs, which detail the timing of sea turtle nesting/hatching season and the beach rules. These signs are located at the ACNWR beach access points. The addition of more of these signs at *private* beach access points, along with additional educational outreach to beach-side businesses, may increase awareness among residents.

Although this study showed that residents near the ACNWR had quite high awareness and knowledge regarding sea turtles, additional volunteer support could be leveraged to educate those residents who have less knowledge about the sea turtle nesting season and the beach rules. Based on this research, targeting younger residents for volunteering would yield more successful recruitment. As a reminder, this study only included participants 18 years of age or greater. Educational outreach from local NGOs and/or government agencies would also increase volunteers willing to help sea turtle conservation.

This research revealed that residents' residency status (part-time or a full-time) did not significantly explain residents' knowledge of, attitudes toward, or participation in sea turtle conservation. Based on pre-questionnaire interviews, it was hypothesized that part-time residents may have less knowledge of, attitude towards, and participation in sea turtle conservation. However, residency status only helped to significantly explain residents' participation in helping to protect sea turtles and was not a significant explanatory variable in any other hypothesized models.

Overall, this research has illustrated that residents' main source of sea turtle information played an influential role in shaping their knowledge of, attitude toward, and participation in sea turtle conservation. NGOs and government agencies, along with a residents' educational attainment, were found to explain residents' positive attitude toward sea turtles. Not surprisingly, residents that had a strong positive attitude toward sea turtles were also significantly more willing to engage in a wide variety of pro-conservation behaviors for sea turtles. To a lesser extent, residents that mainly obtained their sea turtle information through direct observation were also more willing to act on certain behaviors, such as donating money and paying taxes to help sea turtle conservation.

CHAPTER FOUR: UNDERSTANDING RESIDENTS' KNOWLEDGE OF, ATTITUDES TOWARD, AND PARTICIPATION IN SEA TURTLE CONSERVATION ACROSS CULTURES: A COMPARISON BETWEEN TORTUGUERO, COSTA RICA AND THE ARCHIE CARR NATIONAL WILDLIFE REFUGE, USA

“My survival depends on the observation of the turtles.”

~ Tortuguero survey participant

Abstract

Tortuguero, Costa Rica and the Archie Carr National Wildlife Refuge (ACNWR), Florida, USA represent two critically important sea turtle nesting sites where habitat preservation has been established for many years. In 2014, questionnaires were completed by residents living adjacent to the ACNWR ($N = 131$) and from Tortuguero residents ($N = 132$) using a nonprobability convenience sampling approach in order to investigate differences in their knowledge of, attitudes toward, willingness to act for, and participation in sea turtle conservation. This study found that a significantly higher number of Tortuguero residents (71.0%) strongly agreed that sea turtle tourism was economically beneficial to them or their family than the ACNWR residents (19.2%). A significantly higher percentage (18.9%) of the Tortuguero sample held occupations as tourism guides or conservation-related personnel than the ACNWR sample (4.8%). Tortuguero residents also expressed utilitarian toward sea turtles significantly more than the ACNWR residents. Compared to the ACNWR residents, this research revealed that

Tortuguero residents had significantly higher knowledge of, willingness to act for, and participation in sea turtle conservation; however, similarities were found with regard to their general attitudes toward sea turtles. The reasons why Tortuguero had greater outcomes were attributed to demographic, cultural, and economic factors. Specifically, this study showed that ecotourism in Tortuguero predominantly accounts for residents' higher sea turtle-related knowledge, willingness to donate money to help sea turtle conservation, participation among residents in sea turtle-related activities, and participation in helping to protect sea turtles (on their own). On a broader level, these results illustrate that community-based ecotourism, employed in developing countries, can lead to higher knowledge about a conserved species of interest, higher pro-species conservation behaviors, and greater participation in species conservation among local residents than non-ecotourism based conservation strategies based in developed countries.

Introduction

Species conservation issues and context may vary among developing and developed countries. Developing countries may be characterized by lack of a conservation ethic, disempowerment, conflict, or poaching (Clayton & Myers 2009). Although developed countries may not be heavily characterized by poaching or conflict, research has found that environmental views of most U.S. citizens are based on limited ecological knowledge and that concern for wildlife is mostly restricted to attractive or emotionally appealing species (Jacobson & Marynowski 1997). Positive conservation attitudes and behaviors may reflect both economic and moral (value) factors (Auster et al.

2008). Kellert (1993b) found that three developed countries expressed similar positive attitudes toward large and higher vertebrate species generally regarded as aesthetically appealing; however, the countries differed in their species knowledge and behaviors toward wildlife.

Ecotourism has been used as a strategy in developing countries to theoretically promote biodiversity conservation while empowering local communities to economically benefit from conservation (Bookbinder et al. 1998; Chase et al. 1998; Almeyda et al. 2010). Although some ecotourism ventures have shown limited economic benefits to local communities, other ecotourism projects have increased revenues for local communities while strengthening local stewardship toward conservation (Bookbinder et al. 1998). For example, Almeyda et al. (2010) illustrated how ecotourism (through an eco-lodge) has positively contributed to environmental conservation and local economic incomes within surrounding communities in Nicoya Peninsula, Costa Rica. However, in an analysis by Koens et al. (2009), the environmental, social, and economic effects of tourism in Costa Rica were found to be both positive and negative. Stem et al. (2003) found that community members that indirectly benefit from tourism (i.e. through improved infrastructure or environmental conditions) and directly benefit from tourism (i.e. through income generation) are more likely to engage in pro-conservation practices and to possess pro-conservation attitudes. In Tortuguero, direct economic benefits exist for tourism guides that make money on leading tourists on nightly sea turtle tours during the nesting season (Peskin 2002).

This study explores how economic differences (mainly ecotourism) in a developing country (Tortuguero, Costa Rica) has shaped residents' knowledge of, attitudes toward, willingness to act for, and participation in sea turtle conservation through a comparison of quantitative survey results with another sea turtle preservation site in a developed country (the Archie Carr National Wildlife Refuge, Florida, USA). Although economic effects are the focus of this study, other demographic and cultural factors are also analyzed and discussed. This research examines participation in sea turtle-related activities because local community involvement may promote positive attitudes toward and behaviors in support of conservation, offer alternatives to exploitation, and result in voluntary compliance with existing sea turtle protection laws (Stem et al. 2003; Senko et al. 2011).

The general and local economy differs between Tortuguero and the Archie Carr National Wildlife Refuge (ACNWR). In the 1980s, tourism greatly accelerated and has been the primary industry in Tortuguero ever since (Jacobson & Robles 1992; Jacobson & Lopez 1994; Place 1995; Vandegrift 2007). This increase in tourism in Tortuguero prompted local action to embrace a community-based conservation (ecotourism) approach with an emphasis on income generation for the local community (Campbell 2002). Today, ecotourism in Tortuguero provides a needed source of employment and income to the community, both directly and indirectly (Meletis 2007). Conversely, the local economy near the ACNWR is dependent on a wide variety of industries. Although some tourism industry exists near the ACNWR, it's the professional, scientific, and technical services that constitute the largest proportion of the total industry

establishments near the ACNWR (represented by census data for Melbourne Beach, Florida) (U.S. Census Bureau 2012).

Despite cultural and economic differences, several similarities exist between Tortuguero and the ACNWR. For instance, Tortuguero and the ACNWR represent locations where conservation efforts have been established for many years. At both locations, the Sea Turtle Conservancy (STC) maintains a presence. Both locations also employ sea turtle research and educational efforts including opportunities for community participation. In addition, the preserved coastal habitat of Tortuguero and the ACNWR both contain high densities of nesting sea turtles and have exhibited annual increases in green turtle nesting (Troëng & Rankin 2005; Chaloupka et al. 2008).

Methods

Survey Methods

This chapter analyzes the results of the same survey questions from questionnaires administered in Tortuguero and the ACNWR. The survey methods employed at Tortuguero and the ACNWR are detailed in Chapter 1 of this dissertation.

Statistical Methods

The statistical methods employed in this chapter are detailed in Chapter 1 of this dissertation. Regression analyses performed in Chapters 2 and 3 are compared in this chapter's discussion section to provide additional explanation, where appropriate. Pertinent to only this chapter, however, are a few additional statistical tests. For instance, an independent samples *t* test was conducted to compare the means of the knowledge index between Tortuguero and the ACNWR samples. Mann-Whitney *U* tests were

conducted to compare the two samples means when one or more variables were not normally distributed. Chi-square tests were conducted to determine significant differences in nominal questionnaire responses between Tortuguero and the ACNWR. Additional regression analyses were conducted in this chapter that include the entire sample (Tortuguero and the ACNWR) in order to provide additional support for the given models.

Results

Survey Participant Demographics

This study involved 263 participants, of which 132 (50.2%) were Tortuguero residents and 131 (49.8%) were ACNWR residents. The acceptance rate was slightly higher in Tortuguero (79.0%), than it was in the ACNWR (74.4%). However, the refusal rate was relatively low for both locations. Compared to males, females represented a slightly smaller proportion of the sample in Tortuguero (47.7%) and an even smaller proportion of the sample in the ACNWR (38.9%). However, the proportion of female Tortuguero participants in the sample was not significantly higher than the proportion of female ACNWR participants ($\chi^2 [1, N = 263] = 2.07, p = 0.150$).

The mean age of Tortuguero participants ($N = 130$) was 35.22 years (range: 18 – 78 years). The mean or median age for the entire Tortuguero population is not available from the census. However, the mean age for the study's sample is similar to that of Costa Rica (median age = 28.4) (INEC 2013). In addition, the census data for the Pococí canton (which includes Tortuguero) has a comparable age structure (INEC 2011).

The mean age of the ACNWR participants ($N = 126$) was 54.67 years (range: 18 – 86 years) (INEC 2011). The median age of the sample (57.0) was similar to the median age for the estimated ACNWR research site (includes under 18 years of age) (58.3) based on U.S. Census 2010 data (U.S. Census Bureau 2010). The mean age of Tortuguero resident sample was significantly lower than the mean age of the ACNWR resident sample (Mann-Whitney U test; $z = -9.07$, $p < 0.001$), which was expected based on census data.

The number of months per year that participants reside in Tortuguero ($N = 130$) and the ACNWR ($N = 129$) was collected. The mean residency status of Tortuguero participants was 11.18 months, and 10.83 months for the ACNWR participants. There was no significant difference of the mean residency status between the Tortuguero and the ACNWR participants (Mann-Whitney U test; $z = -0.13$, $p > 0.05$).

Data were also collected from Tortuguero ($N = 131$) and the ACNWR participants ($N = 131$) regarding participants' years of residency in Tortuguero/ACNWR. Tortuguero participants had a mean of 16.60 years of residency (range: 1 – 58 years); whereas, the ACNWR participants had a mean of 18.09 (range: 1 – 58 years). There was no significant difference of the mean participants' years of residency between the two locations (Mann-Whitney U test; $z = -0.25$, $p > 0.05$).

Survey Participants' Main Source of Sea Turtle Information

Most Tortuguero respondents reported that they obtain their sea turtle information from 'tourism guides', 'local people or friends', or a 'NGO' (Figure 14). Although

similarly most ACNWR respondents also reported that they obtain their sea turtle information from ‘local people or friends’ or from a ‘NGO’, ‘through direct observation’ was also highly reported. Chi-square tests (1, $N = 257$) indicated significant differences between the Tortuguero and ACNWR residents for those obtaining their sea turtle information from ‘tourism guides’ ($\chi^2 = 31.53$, $V = -0.348$), ‘through direct observation’ ($\chi^2 = 14.01$, $V = 0.234$), and from ‘other’ main information sources ($\chi^2 = 6.23$, $V = 0.156$) (Figure 14).

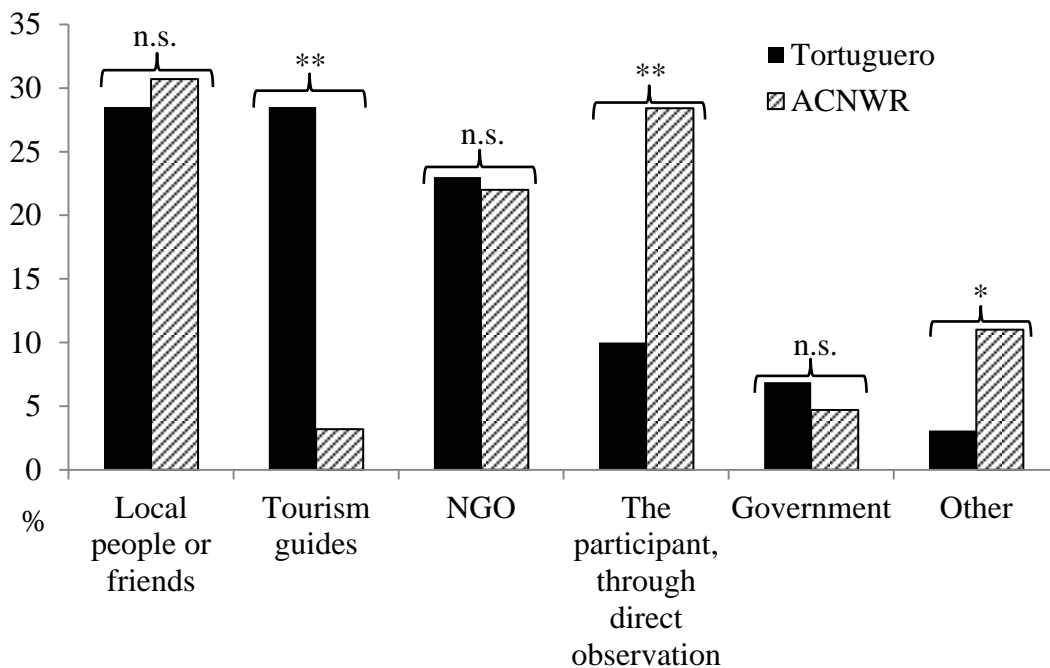


Figure 14. Percentage and statistical differences between Tortuguero and the ACNWR respondents’ main source of sea turtle information. Significance levels (χ^2) are indicated where n.s. = not significant, * = $p < 0.01$, ** = $p < 0.001$.

Sea Turtle Tourism, the Local Economy, and Occupation

Data were collected from participants regarding their agreement or disagreement with the statement: “Sea turtle tourism is economically beneficial to me or my family.” This question consisted of five response categories ranging from (1) ‘strongly disagree’ to (5) ‘strongly agree’. A chi-square test revealed a strong significant difference in response between the Tortuguero and ACNWR residents ($\chi^2 [4, N = 261] = 84.93, p = 0.000, V = 0.570$). A higher percentage (71.0%, $n = 93$) of the Tortuguero residents strongly agreed that sea turtle tourism is economically beneficial to them or their family than the ACNWR residents (19.2%, $n = 25$).

Data were collected from participants regarding their satisfaction or dissatisfaction with the local economy. This question consisted of five response categories ranging from (1) ‘very dissatisfied’ to (5) ‘very satisfied’. A chi-square test revealed a strong significant difference in response between the Tortuguero and ACNWR residents ($\chi^2 [4, N = 245] = 22.39, p = 0.000, V = 0.302$). A higher percentage of the Tortuguero residents (30.5%, $n = 36$) were very satisfied with the local economy than the ACNWR residents (7.87%, $n = 10$).

Data were collected from participants regarding their occupation in an open-ended question. Participants’ occupations were binned into one of two categories: (1) respondents with occupations *not* directly related to tourism or conservation ($n = 222$); and (2) respondents with occupations directly related to tourism or conservation (i.e. tourism guide, park staff, or environmental educator) ($n = 30$). A higher percentage of the Tortuguero sample (18.9%, $n = 24$) held occupations directly related to tourism or

conservation than the ACNWR sample (4.8%, $n = 6$), and this difference was significant ($\chi^2 [1, N = 252] = 11.94, p = 0.001, V = -0.218$).

Number of Sea Turtles Encountered by Survey Participants

Data were collected from participants regarding their encounters with sea turtles. Most Tortuguero residents (97.7%) and ACNWR residents (95.4%) had encountered one or more sea turtles. There was no significant difference in response between the Tortuguero and ACNWR residents ($\chi^2 [1, N = 263] = 1.06, p = 0.303$). However, Tortuguero residents had encountered a significantly higher number of sea turtles (mean = 173) than ACNWR residents (mean = 101) (Mann-Whitney U test; $z = 3.83, p < 0.001$).

Values towards Sea Turtles Expressed by Participants

This research identified ten values toward sea turtles, as expressed by residents. Refer to Chapter 1 of this dissertation for value definitions (Table 1). Tortuguero residents expressed a higher frequency of values toward sea turtles than the ACNWR residents (Table 35). The utilitarian and esthetic values were the two most expressed values by the Tortuguero residents; whereas, the esthetic and ecologicistic values were most expressed by the ACNWR residents. Tortuguero residents also expressed significantly more multiple values ($\chi^2 [1, N = 242] = 4.76, p = 0.029, V = -0.140$). For instance, 57.1% of Tortuguero residents expressed two or more values; whereas, 43.1% of the ACNWR residents expressed two or more values.

Table 35. Values toward sea turtles expressed by Tortuguero and ACNWR residents.

Values	Frequency of Values Expressed	
	Tortuguero respondents (<i>N</i> = 126) ^a	ACNWR respondents (<i>N</i> = 116) ^a
Utilitarian	<i>n</i> = 61	<i>n</i> = 10
Esthetic	<i>n</i> = 52	<i>n</i> = 27
Conservation	<i>n</i> = 29	<i>n</i> = 20
Scientific	<i>n</i> = 21	<i>n</i> = 16
Moralistic	<i>n</i> = 15	<i>n</i> = 20
Nonthreatening	<i>n</i> = 13	<i>n</i> = 12
Humanistic	<i>n</i> = 10	<i>n</i> = 11
Ecologistic	<i>n</i> = 9	<i>n</i> = 22
Naturalistic	<i>n</i> = 9	<i>n</i> = 18
Negativistic	<i>n</i> = 3	<i>n</i> = 3
Total expressed values ^b	222	159
No values expressed in response	<i>n</i> = 8	<i>n</i> = 35
Total respondents that expressed values	<i>n</i> = 118	<i>n</i> = 81

^aRespondents that expressed the same value in twice were only counted as one instance in the total.

^bIncludes multiple (but different) values expressed by the same respondent; thus, the total expressed values are greater than *N*.

Tortuguero residents expressed the utilitarian value significantly more than the ACNWR residents ($\chi^2 = 46.13$, $V = -0.437$) (Figure 15 [a]). In addition, Tortuguero residents expressed the esthetic value significantly more than the ACNWR residents ($\chi^2 = 8.89$, $V = -0.192$) (Figure 15 [b]). However, the ACNWR residents expressed the ecologistic value significantly more than the Tortuguero residents ($\chi^2 = 7.56$, $V = 0.177$) (Figure 15 [d]). The ACNWR residents also expressed the naturalistic value significantly more than the Tortuguero residents ($\chi^2 = 4.27$, $V = 0.133$) (Figure 15 [g]).

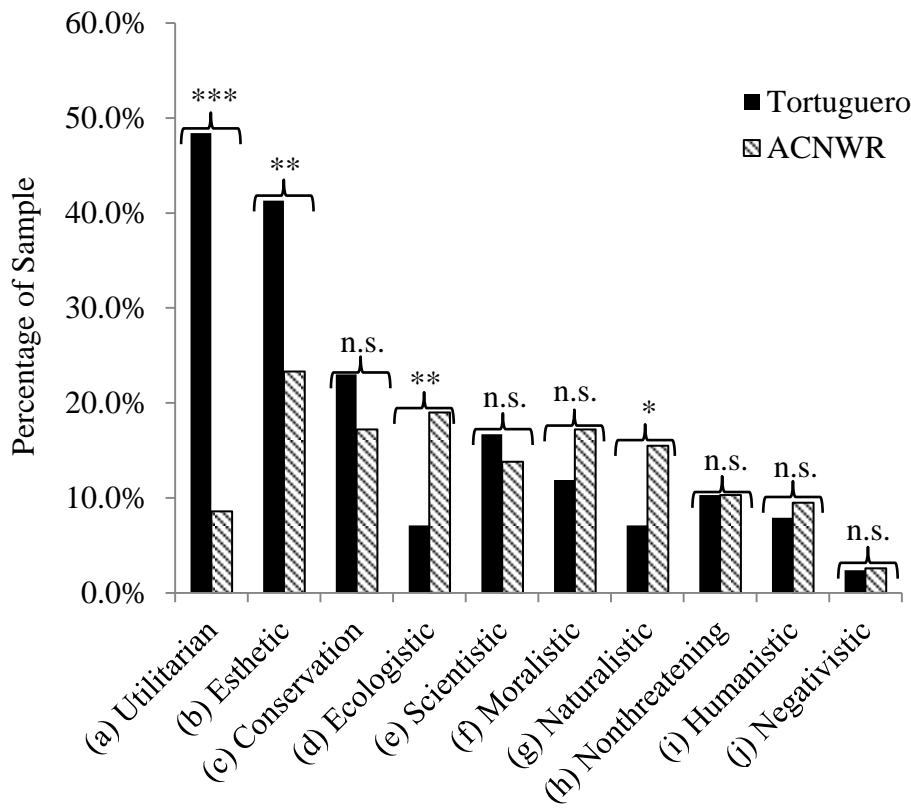


Figure 15. Percentage and statistical differences between Tortuguero and the ACNWR residents' expressed values toward sea turtles. Significance levels (χ^2) are indicated where n.s. = not significant, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Knowledge Results

Data were collected from participants regarding their knowledge about sea turtles. An index was created using nine questions (Cronbach's alpha = 0.462), which includes a combination of local-, global-, and biology-related knowledge about sea turtles and sea turtle conservation (see questions listed in Table 2, Chapter 2). The knowledge index ($N = 263$) had a mean of 0.54 ($SD = 0.19$) and skewness value of -0.19. An independent samples t test revealed that Tortuguero residents ($M = 0.57$, $SD = 0.02$) were significantly

more knowledgeable about sea turtles (as defined by the knowledge index) than ACNWR residents ($M = 0.50$, $SD = 0.01$) as hypothesized ($t [261] = 3.08$, $p < 0.01$).

Attitude toward Sea Turtles

Mean responses to the four questions related to attitude toward sea turtles indicated an overall positive attitude among Tortuguero and the ACNWR residents (Figure 16). In order to examine differences in attitude toward sea turtles between Tortuguero and the ACNWR residents, a binary form of the dependent variable was generated. This binary variable was created because of low or empty expected frequencies in the negative response categories, and it was created by summing the scores (1 – 5 per question) for the four questions. Group one consisted of respondents with a score of less than 20 (i.e. they did *not* answer very important/strongly like to all four questions). Group two consisted of respondents with a score of exactly 20 (i.e. they answered very important/strongly like to all four questions). Although a slightly higher percentage of the Tortuguero residents (77.9%, $n = 102$) had the strongest positive attitude toward sea turtles possible (i.e. score of 20) than the ACNWR residents (74.8%, $n = 98$), this difference was not significant ($\chi^2 [1, N = 262] = 0.34$, $p = 0.561$). As reflected in the means in Figure 16, responses were assigned a score of 5 for very important/strongly like, 4 for somewhat important/somewhat like, 3 for neutral, 2 for somewhat not important/somewhat dislike, and 1 for not at all important/strongly dislike.

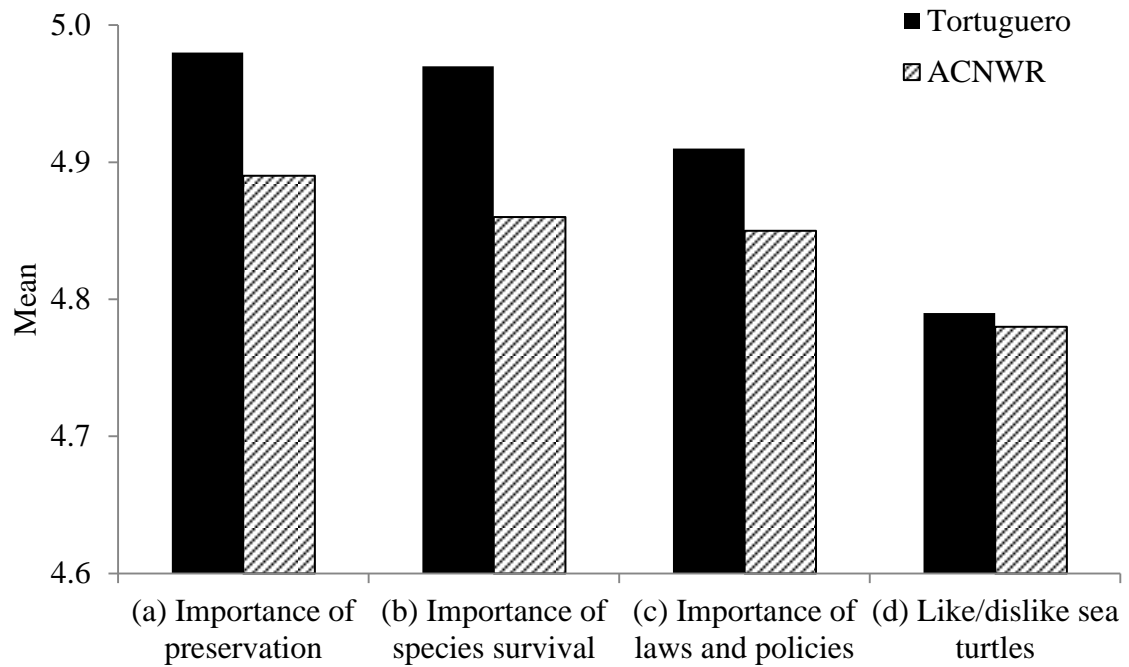


Figure 16. Mean differences between Tortuguero and the ACNWR residents' attitudes toward sea turtles, which includes four items: (a) "I feel that the preservation of sea turtle nesting beaches is..."; (b) "I feel that the future survival of sea turtle species is..."; (c) "I feel that sea turtle protection laws and policies are..."; (d) 'How much do you like or dislike sea turtles?'

Willingness to Act

The significant results ($\chi^2, p < 0.001$) for all four 'willingness to act' questions indicated that Tortuguero residents were more willing to act to support sea turtle conservation than the ACNWR residents (Figure 17). The significant difference in 'support of additional preservation' was strong ($V = 0.291$) between the Tortuguero and ACNWR residents ($\chi^2 [2, N = 262] = 22.15$) (Figure 17 [a]). For example, a higher percentage of the Tortuguero residents (89.3%, $n = 117$) were strongly in favor of the

preservation of additional sea turtle nesting habitat than the ACNWR residents (64.9%, $n = 85$). In addition, the significant difference in ‘willingness to donate time’ was strong ($V = 0.433$) between the Tortuguero and ACNWR residents ($\chi^2 [3, N = 263] = 49.21$) (Figure 17 [b]). A higher percentage of the Tortuguero residents (80.3%, $n = 106$) were very willing to donate a little of their time to help sea turtle conservation than the ACNWR residents (40.5%, $n = 53$). The significant difference in ‘willingness to donate money’ was also strong ($V = 0.372$) between the Tortuguero and ACNWR residents ($\chi^2 [3, N = 260] = 35.98$) (Figure 17 [c]). For instance, a higher percentage of the Tortuguero residents (70.5%, $n = 91$) were very willing to donate a little money to help sea turtle conservation than the ACNWR residents (35.1%, $n = 46$). Lastly, the significant difference in ‘willingness to pay taxes’ was strong ($V = 0.363$) between the Tortuguero and ACNWR residents ($\chi^2 [3, N = 255] = 33.53$) (Figure 17 [d]). A higher percentage of the Tortuguero residents (46.8%, $n = 58$) were very willing to pay slightly higher taxes to help sea turtle conservation than the ACNWR residents (19.1%, $n = 25$). As reflected in the means for Figure 17, responses were assigned a score of 5 for ‘very willing/strongly favor,’ 4 for ‘somewhat willing/somewhat favor,’ 3 for ‘neutral,’ 2 for ‘somewhat not willing/somewhat oppose,’ and 1 for ‘not willing at all/strongly oppose.’

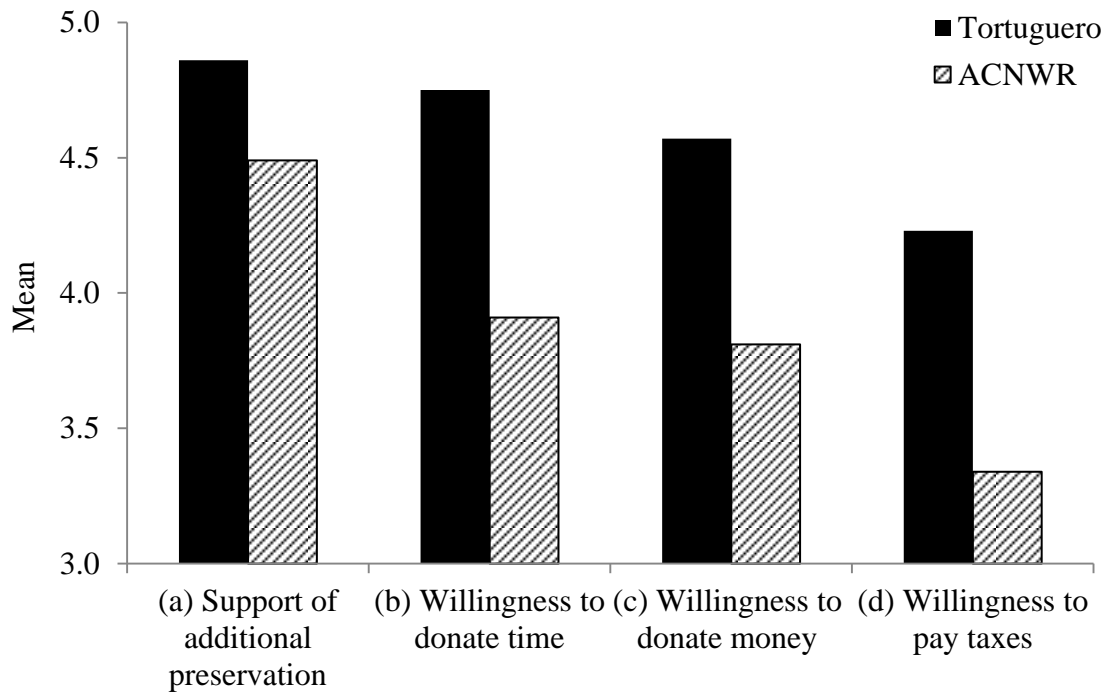


Figure 17. Mean and significant differences ($\chi^2, p < 0.001$) found between Tortuguero and the ACNWR residents' willingness to act, which included four questions: (a) 'How much would you favor or oppose the preservation of additional sea turtle nesting habitat?'; (b) 'How willing or not willing would you be to donating a little of your time to help sea turtle conservation?'; (c) 'How willing or not willing would you be to donating a little money to help sea turtle conservation?'; (d) 'How willing or not willing would you be to paying slightly higher taxes to help sea turtle conservation?'

Controlling for location, ordinal logistic regression analyses were conducted to analyze what variables best explained the Tortuguero and ACNWR residents' willingness to act items (Table 36). Residents' willingness to donate money to help sea turtle conservation (Model $\chi^2 [7, N = 224] = 65.92, p < 0.0001, R^2 = 0.129$) was mostly explained by their occupation (as a tourism guide, park staff, or environmental educator); strong positive attitude toward sea turtles; belief that sea turtle tourism is economically beneficial to them; possession of the moralistic value towards sea turtles; and location in

Tortuguero. Residents' willingness to pay slightly higher taxes to help sea turtle conservation (Model χ^2 [6, $N = 232$] = 57.49, $p < 0.0001$, $R^2 = 0.095$) was mostly explained by their greater knowledge about sea turtles/sea turtle conservation; strong positive attitude toward sea turtles; possession of the ecologicistic value toward sea turtles; and location in Tortuguero. Residents' willingness to donate their time to help sea turtle conservation (Model χ^2 [7, $N = 228$] = 88.84, $p < 0.0001$, $R^2 = 0.190$) was mostly explained by their relatively younger age; greater knowledge about sea turtles/sea turtle conservation; possession of the moralistic and utilitarian values toward sea turtles; strong positive attitude toward sea turtles; and location in Tortuguero. Residents' support of the preservation of additional sea turtle habitat (Model χ^2 [5, $N = 254$] = 55.00, $p < 0.0001$, $R^2 = 0.162$) was mostly explained by their strong positive attitude toward sea turtles.

Table 36. Summary of the regression analyses for the effects of the independent variables on the Tortuguero and ACNWR residents' willingness to act items.

Independent variable ^a	Dependent variable			
	Willingness to donate money	Willingness to pay taxes	Willingness to donate time	Support of additional preserved habitat
Attitude toward sea turtles ^b	(2) > (1)***	(2) > (1)***	(2) > (1)***	(2) > (1)***
Location ^c	(1) > (2)***	(1) > (2)***	(1) > (2)**	n.s. †
Knowledge index	n.s.	(+)**	(+)**	n.s. †
Moralistic value ^d	(2) > (1)**	n.s.	(2) > (1)*	n.s.
Economic benefit of tourism	(+)*	n.s.	n.s.	n.s. †
Age	n.s.	n.s.	(-)***	n.s. †
Ecologistic value ^e	n.s.	(2) > (1)**	n.s.	n.s.
Utilitarian value ^f	n.s.	n.s.	(2) > (1)*	n.s.
Occupation ^g	(2) > (1)**	n.s.	n.s.	n.s.
Main information source (NGO)	n.s.	n.s.	n.s. †	n.s.
Main information source (self)	n.s. †	n.s.	n.s.	n.s.
Gender	n.s. †	n.s. †	n.s.	n.s.
Number of sea turtle observations	n.s.	n.s. †	n.s.	n.s.

^an.s. † = not significant at the alpha 0.05 level but was included in the model; n.s. = not significant at the alpha 0.05 level and not included in the model/not a good fit; * = $p \leq 0.05$; ** = $p \leq 0.01$; *** = $p \leq 0.001$; (-) = negative regression coefficient; (+) = positive regression coefficient.

^b(1) = did *not* answer very important/strongly like to all four attitude toward sea turtle questions; and (2) answered very important/strongly like to all four attitude questions.

^c(1) = Tortuguero; and (2) = ACNWR

^d(1) = respondent did *not* express the moralistic value towards sea turtles; and (2) = respondent expressed the moralistic value towards sea turtles.

^e(1) = respondent did *not* express the ecologistic value towards sea turtles; and (2) = respondent expressed the ecologistic value towards sea turtles.

^f(1) = respondent did *not* express the utilitarian value towards sea turtles; and (2) = respondent expressed the utilitarian value towards sea turtles.

^g(1) = occupation was *not* a tourism guide or conservation-related personnel; and (2) = occupation was a tourism guide or conservation-related personnel.

Participation in Sea Turtle-Related Activities

Data regarding whether participants had engaged in any sea turtle-related activities were also collected. Sea turtle-related activities included sea turtle guided tours, educational activities, monitoring activities, or other unlisted activities. A chi-square test demonstrated a significant difference in participation in such activities between the Tortuguero and ACNWR residents ($\chi^2 [1, N = 263] = 25.66, p = 0.000, V = 0.312$). A higher percentage of the Tortuguero residents (74.2%, $n = 98$) had participated in one or more sea turtle-related activities than the ACNWR residents (43.5%, $n = 57$). Increased participation in Tortuguero can only be attributed to sea turtle guided tours and monitoring activities, not to educational or other activities (see Appendix C, Comment 5).

A binary logistic regression analysis was conducted to analyze what variables best explained Tortuguero and the ACNWR residents' participation in sea turtle-related activities. Residents' participation (Model $\chi^2 [5, N = 227] = 63.98, p < 0.0001, R^2 = 0.212$) was mostly explained by their occupation (as a tourism guide or conservation-related personnel) ($p < 0.05$); higher educational attainment ($p < 0.01$); information obtained through their NGO source or by their association with this source ($p < 0.001$); possession of the utilitarian value towards sea turtles ($p < 0.01$); and location in Tortuguero ($p < 0.001$). Although a good fit with the model, attitude toward sea turtles was not significant at the alpha 0.05 level.

Respondents were asked to what extent they agreed or disagreed that opportunities for them to participate in sea turtle-related activities were adequate. There was a significant difference in response between the Tortuguero and ACNWR residents

(χ^2 [4, $N = 260$] = 43.74, $p = 0.000$, $V = 0.410$). For instance, a higher percentage of the Tortuguero residents (55.7%, $n = 73$) ‘strongly agreed’ that opportunities for them to participate in sea turtle-related activities were adequate than the ACNWR residents (22.5%, $n = 29$). Despite this difference, there was no significant difference in the ‘opportunity to participate’ between the Tortuguero and ACNWR residents (χ^2 [1, $N = 263$] = 2.61, $p = 0.106$). ‘Opportunity to participate’ represents data collected from participants regarding if they had ever been asked by an organization or group to participate in a sea turtle-related activity.

Participation in Sea Turtle Stewardship

In two questions, data were collected from participants regarding their non-sponsored participation in sea turtle stewardship. Results for the first question illustrated that the majority of respondents (63.7% [$n = 165/259$]) have ‘protected nesting sea turtles’; however, Tortuguero residents had participated significantly more than the ACNWR residents ($\chi^2 = 4.18$, $V = -0.127$) (Figure 18 [a]). Results for the second question illustrated that approximately half of respondents (51.6% [$n = 131/254$]) have ‘helped sea turtles in danger’; however, there was no significant difference in participation between the Tortuguero and ACNWR residents (Figure 18 [b]).

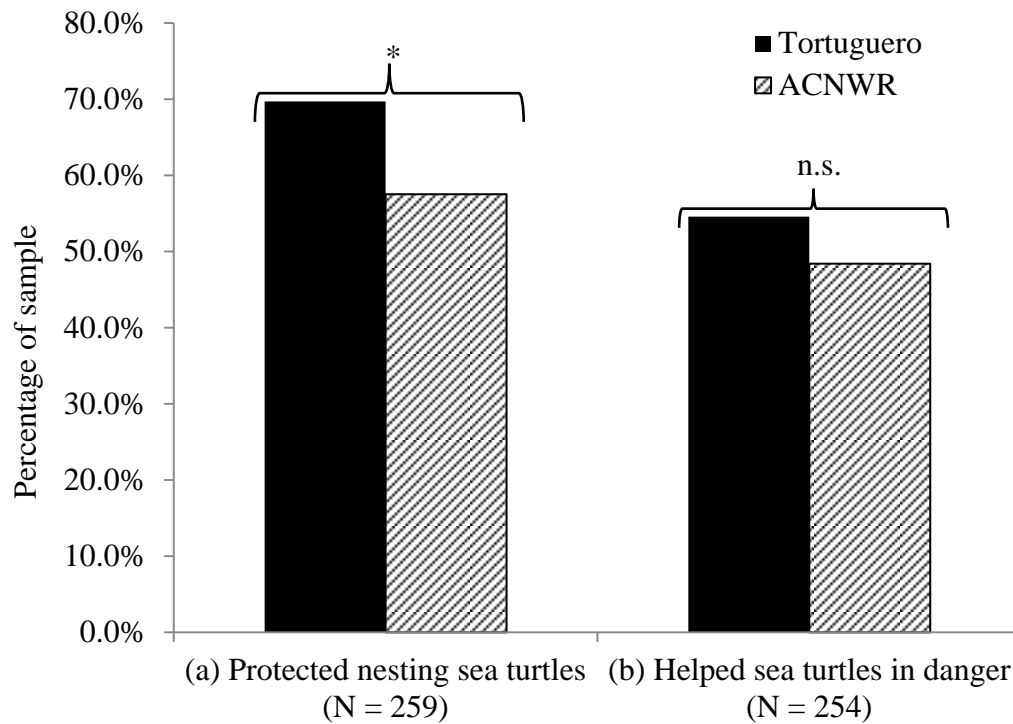


Figure 18. Percentage and statistical differences between Tortuguero and the ACNWR residents' participation in sea turtle stewardship, which included two yes/no questions: (a) 'Have you ever helped to protect nesting sea turtles or hatchlings?' and (b) 'Have you ever helped a sea turtle that was in danger or was injured?' Significance levels (χ^2) are indicated where n.s. = not significant, * = $p < 0.05$.

A binary logistic regression analysis was conducted to analyze what variables best explained Tortuguero and the ACNWR residents' participation in protecting nesting sea turtles. Residents' participation in helping to protect sea turtles (Model χ^2 [7, $N = 224$] = 49.84, $p < 0.0001$, $R^2 = 0.171$) was mostly explained by their full-time residency status ($p < 0.01$); gender, being male ($p < 0.05$); occupation (as a tourism guide, park staff, or environmental educator) ($p < 0.05$); and their strong positive attitude toward sea turtles ($p < 0.05$).

Discussion

Knowledge

This research revealed that Tortuguero residents were significantly more knowledgeable about sea turtles than the ACNWR residents, as tested by this study's local-, global-, and biology-related sea turtle knowledge items. What factors might be contributing to significant differences in knowledge between Tortuguero and the ACNWR? This study's sample included a higher number of Tortuguero residents with occupations directly related to tourism or conservation, as compared to the ACNWR. Occupation was not a significant factor in explaining the knowledge index in the ACNWR (Chapter 3). Conversely, the significance of occupation in explaining the knowledge index in Tortuguero (Chapter 2) indicated that greater employment in occupations directly related to tourism or conservation is contributing, in part, to the higher knowledge in Tortuguero. However, the significance of other variables (gender, months of residency per year, and educational attainment) in Tortuguero indicated that other demographics in the general community are also knowledgeable about sea turtles.

Attitudes toward Sea Turtles

The results of this study indicated that there was not a significant difference in attitudes toward sea turtles between the Tortuguero and ACNWR residents; however, attitudes toward sea turtles were explained by different factors in the two locations. The analysis in Chapter 2 revealed that Tortuguero residents who did *not* obtain their sea turtle information through direct observation were more likely to have a strong positive

attitude toward sea turtles. This result suggested that Tortuguero residents whom are connected socially with the community in regard to sea turtles have stronger positive attitudes toward sea turtles. In addition, Chapter 2 revealed that residents' encountering an intermediate number of sea turtles were more likely to have a strong positive attitude toward sea turtles, as compared to residents that encountered 0 – 10 sea turtles, with attitudes declining after having seen an above average number. Conversely, the analysis in Chapter 3 indicated that ACNWR residents' strong positive attitudes toward sea turtles were influenced by their relatively higher educational attainment and by the information obtained through their NGO or government source. This comparison indicates that while NGOs and government play a large role in cultivating attitudes in the ACNWR, additional information sources (i.e. 'local people or friends', 'tourism guides') are also equally effective in Tortuguero. This comparison also shows that similar and strong attitudes toward a species of interest can be achieved in multiple ways and depends on the local culture.

Willingness to Act

Contrary to general attitudes, this research showed that Tortuguero residents were significantly more willing to act to support sea turtle conservation than were the ACNWR residents. It is important to recall that in order to explain significant differences in willingness to act between Tortuguero and the ACNWR, the variables that both explained Tortuguero's individual model (Chapter 2) and the overall model with combined data (this chapter) should be considered.

This chapter illustrated that Tortuguero residents were more willing to donate money to help sea turtle conservation than the ACNWR residents. The analysis in Chapter 2 indicated that within only Tortuguero that residents' willingness to donate money was significantly explained by their occupation (as tourism guides, park staff, and environmental educators) and their belief that sea turtle tourism is economically beneficial to them. Supporting this conclusion, this chapter found that in the overall model, occupation and the economic benefit of tourism were also significant factors. Thus, Tortuguero's greater willingness to donate money to help sea turtle conservation was most likely because of their significantly higher belief that sea turtle tourism is economically beneficial to them and their greater employment as tourism guides, park staff, and environmental educators (occupation). The significance of 'location' in this overall model indicated that other variables in Tortuguero, not accounted for in this study, are also contributing to their willingness to donate money to sea turtle conservation.

This chapter illustrated that Tortuguero residents were more willing to pay slightly higher taxes to help sea turtle conservation than the ACNWR residents. The analysis in Chapter 2 indicated that Tortuguero residents' willingness to pay taxes was mostly explained by their higher knowledge regarding sea turtles (the 'knowledge index'), by their relatively longer length of residency in Tortuguero, and by their possession of multiple values toward sea turtles. Partly supporting this conclusion, this chapter found that in the overall model, the knowledge index was also a significant factor. Thus, Tortuguero's greater willingness to pay slightly higher taxes to help sea

turtle conservation was mostly because of their higher knowledge regarding sea turtles. Since years of residency and possession of multiple values toward sea turtles were not reflected in the overall model (presented in this chapter), these variables likely represent significant cultural factors in influencing willingness to pay taxes only found in Tortuguero. Again, the significance of 'location' in the overall model means that other variables in Tortuguero, not accounted for in this research, are also explaining their willingness to pay higher taxes for sea turtle conservation.

This chapter found that Tortuguero residents were more willing to donate a little of their time to help sea turtle conservation than the ACNWR residents. The analysis in Chapter 2 revealed that Tortuguero residents' willingness to donate their time was mostly influenced by their relatively lower age and their higher knowledge about sea turtles (the 'knowledge index'). Similarly, having a relatively lower age was also one significant factor in the ACNWR. Partly supporting this conclusion, this chapter illustrated that in the overall model, age and the knowledge index were also significant factors. Thus, Tortuguero's greater willingness to donate their time was most likely because of their relatively younger age (of the population compared to the ACNWR) and greater knowledge about sea turtles.

This chapter found that Tortuguero residents were more supportive of the preservation of additional sea turtle nesting habitat than the ACNWR residents. The analyses in Chapters 2 and 3 indicated that both Tortuguero and the ACNWR residents' support of the preservation of additional sea turtle nesting habitat was mostly influenced by their strong positive *general* attitude toward sea turtles. With no significant

differences between Tortuguero's and the ACNWR's general attitude toward sea turtles, it is unclear why Tortuguero had a greater support of the preservation of additional sea turtle nesting habitat.

Participation

This study demonstrated that significantly more Tortuguero residents had participated in sea turtle-related activities than the ACNWR residents. This difference is mostly attributable to a higher participation in sea turtle tours and monitoring activities by Tortuguero residents. Although there was not a significant difference between Tortuguero and the ACNWR in terms of residents being asked by organizations or groups to participate in sea turtle-related activities, significantly more Tortuguero residents believed that opportunities to participate in such activities were adequate.

The analysis in Chapter 2 revealed that participation in sea turtle-related activities in Tortuguero was mostly influenced by their relatively higher educational attainment and by their lack of 'local people or friends' as their main source of sea turtle information. For instance, residents that had a main information source of a tourism guide, NGO, government, or self (through direct observation) participated more than residents having local people or friends as a source. There was also a direct and significant relationship between participation in Tortuguero and: (1) religion (with religious residents participating more); (2) occupation (with tourism or conservation-related occupations participating more); and (3) the utilitarian value (with residents who expressed this value participating more).

Supporting this conclusion, in part, this chapter illustrated that in the overall model, occupation, higher educational attainment, and possession of the utilitarian value towards sea turtles were also several significant factors. Since the non-reliance of ‘local people or friends’ as their main source of sea turtle information and religion were not significant in the overall model (presented in this chapter), these factors likely represent significant cultural factors in influencing participation only found in Tortuguero. For instance, in Tortuguero, many of the information sources (NGOs, government, and tourism guides) provide equivalent information to local residents on sea turtle-related activities. Conversely, only NGOs or government partly explained participation in the ACNWR, which explains the significance of NGO in the overall model. Thus, Tortuguero’s greater participation in sea turtle-related activities was most likely because of their higher employment as tourism guides or conservation-related personnel; and their greater possession of the utilitarian value towards sea turtles. However, religion and the social structure of where residents in Tortuguero obtain their sea turtle information (mainly the presence of tourism guides as an additional source) are also likely accounting for some participation differences between the two locations.

Participation in Tortuguero was also significantly higher than in the ACNWR in terms of helping to protect nesting sea turtles or hatchlings (on their own). The analysis in Chapter 2 indicated that Tortuguero residents’ participation in helping to protect sea turtles was mostly explained by their gender (being male); occupation (as a tourism guide, park staff, or environmental educator); and strong positive attitude toward sea turtles. Supporting this conclusion, this chapter illustrated that in the overall model, these

same factors were also significant. Thus, Tortuguero's greater participation in helping to protect sea turtles was most likely because of their significantly higher number of residents having occupations directly related to tourism or conservation.

This chapter revealed that there was no significant difference between Tortuguero and the ACNWR in terms of helping sea turtles in *danger* or injured sea turtles. This is a surprising result when all of the other willingness to act and participation items for Tortuguero have been significantly higher than the ACNWR. As discussed in Chapter 2, the word 'danger' in Tortuguero likely implies encountering mostly poaching situations; whereas, in the ACNWR (Chapter 3) 'danger' likely implies a much less tenuous situation (i.e. not poaching). In Tortuguero, those demographics that are helping sea turtles in danger include: males; tourism guides and those with conservation-related jobs; residents with a very strong positive attitude toward sea turtles; and those possessing the nonthreatening value toward sea turtles. Other residents in Tortuguero, lacking these demographics, may not feel equipped to deal with potentially dangerous situations. In the ACNWR, helping sea turtles in danger was only a function of residents that had a NGO or government agency as their main source of sea turtle information. Thus, the non-significant differences among Tortuguero and the ACNWR for helping sea turtles in danger are likely a reflection of the difference in meaning of the word 'danger' between the two locations.

Other Discussion Topics

While this dissertation does not cover the many, both positive and negative, impacts of ecotourism, this dissertation does dissect one crucial aspect of community-based ecotourism – its impact on local human knowledge, attitudes, and behavior toward a conserved species. Compared to the ACNWR residents, this research revealed that Tortuguero residents had significantly greater knowledge of, willingness to act for, and participation in sea turtle conservation; however, similarities were found in their general attitudes toward sea turtles. The reasons why Tortuguero had greater outcomes are complicated, cannot be attributed to only several factors, vary contingently on the given dependent variable, and reflect cultural differences among influencing variables. Despite these considerations, this study illustrated that community-based ecotourism can directly and positively impact local residents' willingness to donate money to help the conservation of a species of interest; increase species-related knowledge among residents; increase participation among residents in species-related activities (i.e. educational, monitoring, guided tours); and in part, increase participation in helping to protect a species of interest (on their own, non-agency sponsored time).

It is important to note that the significantly higher results for Tortuguero do not mean that the ACNWR had negative results. Overall, survey responses for both Tortuguero and the ACNWR reflected strong positive attitudes toward sea turtles. Both locations should be proud of the high level of sea turtle conservation awareness and positive attitudes among local residents. As one interviewed expert stated about the

ACNWR, “it is one of the great success stories in conservation, and it’s not really promoted as much as perhaps it should be.”

CHAPTER FIVE: DISCUSSION AND FUTURE RESEARCH

Discussion

Sea Turtle Poaching

The issue of sea turtle poaching in Tortuguero was a large concern brought up by many survey respondents in this study and was an issue as discussed in previous research (Meletis 2007). In the 2012 nesting season, the Sea Turtle Conservancy identified 134 poached green turtle nests (0.5% of the total nests) and 22 adult green turtles (STC 2013). Unsolicited, residents' concern with poaching was expressed in their responses to this research's survey question: "If any, what sea turtle-related activities would you like offered to you more?" The most frequently listed activity that respondents wanted more of included sea turtle protection activities, including beach surveillance and nest protection ($n = 43$). In addition, the need for more enforcement personnel was mentioned informally by numerous survey participants and non-survey participants. With 80.3% of Tortuguero residents very willing to donate a little of their time to help sea turtle conservation, it seems logical to recruit and train community volunteers to protect sea turtle nests. In addition, it might be beneficial to establish a system for reporting poaching activities that extends beyond local enforcement and includes trained community members. A system that alerts enforcement and community volunteers simultaneously could result in a greater force to deal with poaching.

In addition, the need for a boat to enforce sea turtle protection laws was also mentioned by several local residents. One resident noted that often off-shore boats will be caught poaching adult sea turtles from the water. With no boat, local enforcement cannot stop the poachers and thus can only, watch and do nothing. This is an issue that warrants further discussion with local experts.

Convenience Sampling Considerations

Observations made by the researcher regarding the convenience sampling approach chosen for this research resulted in important considerations for this type of sampling. For one, the efficiency and feasibility of convenience sampling depends on the sampling frame's population size. Given the small population size of Tortuguero, finding new faces to recruit for survey participation became more difficult after reaching approximately participant number 100. After this point, redundancy in sampling could have also occurred. For instance, it was observed that two individuals from the same family were, unknowingly, recruited at completely different locations and times. Another important consideration for convenience sampling is that adherence and awareness of local social norms is of most importance, possibly more so than in other types of sampling methods. Lastly, convenience sampling represents a more universal sampling method that can be implemented in various localities, which is beneficial in comparing results from different cultures.

Recommendations

Based on the results of this study, Tortuguero would benefit from the installation of beach access signage that details the timing of the sea turtle nesting/hatching season

and beach restrictions related to sea turtles. Because this research revealed certain demographics (females, non-tourism occupations, lower positive attitude toward sea turtles) were less likely to help sea turtles in danger, it is recommended that a contact number of whom to call to report potential sea turtle poaching activities be placed on the signage. Obviously, this action would require funding, but it would likely increase awareness among Tortuguero residents and tourists. Although the ACNWR had plenty of signage detailing the beach rules as they pertain to sea turtles, additional signs at private beach access points, along with educational outreach to particularly beach-side businesses, may also increase awareness among residents (and tourists).

As noted also by previous research (Meletis 2007), this study's expert and resident interviews indicated that some Tortuguero residents created divisions of groups, with opposing sea turtle conservation ethics, based on the person's place of origin and residency status (part-time vs. full-time). However, the results of this study's quantitative survey results within the entire community found that when it comes to the topic of sea turtle conservation that there is unity. Tortuguero residents are in consensus with their general positive attitudes toward sea turtles. It is crucial to recall that the participants in this survey were recruited in a random manner and not recruited on the basis of their residency in Tortuguero (part-time vs. full-time) or on the basis of their country of origin. Thus, it is recommended that sea turtle conservation educational outreach extends to all members of the community without regard to residency status or country of origin.

Future Research

One future research proposal, stemming from this research, would be to conduct the same survey, as performed in this research, in a location where sea turtle tourism is a possibility or is currently under consideration. Ideally, this location would be in a developing country where ecotourism is feasible and could be designed to provide economic benefits to local communities. The survey results could inform the development of an ecotourism strategy. In addition, the results would establish a baseline of local attitudes toward sea turtles for future comparison after the enactment of an ecotourism strategy.

Future research could also be conducted in order to analyze the differences between tourists and residents near the ACNWR. Pre-questionnaire interview results and public observations made by the researcher supported the hypothesis that differences in knowledge about and attitudes toward sea turtles may exist between tourists and residents.

APPENDICES

Appendix A: Questionnaires and Informed Consent

The following items are included in Appendix A:

Version 1, for use near the Archie Carr National Wildlife Refuge, Florida, USA

Informed consent for questionnaires, Florida, USA

Version 2, for use in Tortuguero, Costa Rica (in Spanish and English)

Informed consent for questionnaires, Costa Rica (in Spanish and English)




Questionnaire

Please place one mark (X) in one box for each question to indicate your answer, unless otherwise directed.

1. Have you ever personally encountered a sea turtle?

Yes

No

 If yes, about how many sea turtles have you seen?

Enter number

2. What does the conservation of sea turtles mean to you? _____

3. About when is the sea turtle nesting/hatching season here?

November 1 – February 31

March 1 – October 31

May 1 – June 31

I don't know

4. Which sea turtle species most commonly nests on your local beach?

Hawksbill turtle (*Eretmochelys imbricata*)

Leatherback turtle (*Dermochelys coriacea*)

Loggerhead turtle (*Caretta caretta*)

I don't know

5. In about what year do you think the Archie Carr National Wildlife Refuge was established?

1975

1991

I don't know

6. Which of the following rules exist at the Archie Carr National Wildlife Refuge? (mark all that apply)

Do not interfere with nesting sea turtles, eggs, or hatchlings.

Shield or turn off all lights that shine on the beach or are visible from the beach.

Campfires and motorized vehicles are prohibited on the beach.

Keep pets off the beach.

I don't know

7. In general, do you think global sea turtle populations are:

Increasing


Staying the same

Decreasing

I don't know

8. In what habitat do you think sea turtles generally get their food?
- Coastal sandy beaches
 - Seagrass beds and coral reefs
 - I don't know
9. How many species of sea turtles do you think exist today in the world?
- 3
 - 7
 - More than 15
 - I don't know
10. Artificial lights can disturb sea turtles. (True/False)
- True
 - False
 - I don't know
11. Adult female sea turtles typically lay about 20 eggs per nest. (True/False)
- True
 - False
 - I don't know
12. Sea turtles are marine mammals. (True/False)
- True
 - False
 - I don't know

Opinion Questions

13. How much do you like or dislike sea turtles?
- Strongly like
 - Somewhat like
 - Neutral: Neither like nor dislike
 - Somewhat dislike
 - Strongly dislike
-  Why do you like or dislike sea turtles? _____
- _____

14. To what extent do you agree or disagree with this statement:
"Sea turtle tourism is economically beneficial to me or my family."
- Strongly agree
 - Agree
 - Neutral: Neither agree nor disagree
 - Disagree
 - Strongly disagree

Please complete the following three sentences:

15. "I feel that the future survival of sea turtle species is

- very important."
- somewhat important."
- neither important nor unimportant: I'm neutral."
- somewhat not important."
- not at all important."

16. "I feel that the preservation of sea turtle nesting beaches is

- very important."
- somewhat important."
- neither important nor unimportant: I'm neutral."
- somewhat not important."
- not at all important."

17. "I feel that sea turtle protection laws and policies are

- very important."
- somewhat important."
- neither important nor unimportant: I'm neutral."
- somewhat not important."
- not at all important."

18. How willing or not willing would you be to *donating a little money* to help sea turtle conservation?

- Very willing
- Somewhat willing
- Neutral: Neither willing nor unwilling
- Somewhat not willing
- Not willing at all

19. How willing or not willing would you be to *paying slightly higher taxes* to help sea turtle conservation?

- Very willing
- Somewhat willing
- Neutral: Neither willing nor unwilling
- Somewhat not willing
- Not willing at all

20. How willing or not willing would you be to *donating a little of your time* to help sea turtle conservation?

- Very willing
- Somewhat willing
- Neutral: Neither willing nor unwilling
- Somewhat not willing
- Not willing at all

21. How much would you favor or oppose the preservation of additional sea turtle nesting habitat?

- Strongly favor
 Somewhat favor
 Neutral: Neither favor nor oppose
 Somewhat oppose
 Strongly oppose

Participation Questions

22. Are you a member of a sea turtle organization?

- Yes \Rightarrow If yes, please list which organization(s): _____
 No

23. Do you donate money to a sea turtle organization?

- Yes
 No

24. Have you ever been asked by an organization or group to participate in a sea turtle related activity?

- Yes
 No

25. What sea turtle activities have you participated in? (mark all that apply)

None ("I have not participated in any of the sea turtle activities mentioned below.")

Sea Turtle Guided Tours

\Rightarrow If selected, about *how often* do you participate?

of times per year OR # of times total in lifetime

Enter date of most recent participation

\Rightarrow Are you leading or assisting with the guided tour? Yes No

Educational activities (such as attending educational programs, lectures, etc.)

\Rightarrow If selected, about *how often* do you participate?

of times per year OR # of times total in lifetime

Enter date of most recent participation

Monitoring or research activities

\Rightarrow If selected, about *how often* do you participate?

of times per year OR # of times total in lifetime

Enter date of most recent participation

Other (please list): _____

\Rightarrow If selected, about *how often* do you participate?

of times per year OR # of times total in lifetime

Enter date of most recent participation

26. Have you ever helped to protect nesting sea turtles or hatchlings?

- Yes \Rightarrow If yes, about *how many times*? # of times
 No \curvearrowright Enter year of most recent time

27. Have you ever helped a sea turtle that was in danger or was injured?

- Yes \Rightarrow If yes, about *how many times*? # of times
 No \curvearrowright Enter year of most recent time

28. To what extent do you agree or disagree with this statement:

“I feel that opportunities for me to participate in sea turtle related activities are adequate.”

- Strongly agree
 Agree
 Neutral: Neither agree nor disagree
 Disagree
 Strongly disagree

29. If any, what type of sea turtle related activities would you like offered to you more? _____

Source of Information Questions

30. Who is your *primary* source of information on sea turtles? (*mark ONLY one answer*)

- Local people or friends
 Tourism guides
 Myself through direct observation (if selected, skip to Question 32)
 Organization (please list the name): _____
 Government (please list the agency name): _____
 Other (please list): _____

31. To what extent do you agree or disagree with this statement:

“I feel that the amount of information provided to me by my *primary* source is adequate.”

- Strongly agree
 Agree
 Neutral: Neither agree nor disagree
 Disagree
 Strongly disagree

Demographic and Economic Questions

32. What is your gender?

- Male
 Female

33. What is your occupation? _____

34. How many years have you lived in the Melbourne Beach/Vero Beach area?

of years

35. How many months out of the year do you live in Melbourne Beach/Vero Beach?

of months out of the year

36. In what year were you born?

Year born

37. What is the *highest* level of education that you have completed?

8th grade or less

Some high school, no diploma

High school graduate, received diploma (include GED)

Some university or technical training, no degree

University Associate's degree

University Bachelor's degree

University graduate, professional degree, or higher

38. What is your average yearly household income? (*Your best estimate is fine.*)

Less than \$25,000

\$25,001-50,000

\$50,001-75,000

\$75,001-100,000

Greater than \$100,000

39. What political view do you generally identify with?

Very liberal

Somewhat liberal

Moderate, middle of the road

Somewhat conservative

Very conservative

I don't know

40. How satisfied or dissatisfied are you with your local economy?

Very satisfied

Somewhat satisfied

Neutral: Neither satisfied or dissatisfied

Somewhat dissatisfied

Very dissatisfied

41. What is your ethnicity and race? _____

42. What religion, if any, do you generally identify with? _____

Thank you for your time with completing this questionnaire!



Department of Environmental Science & Policy
Fairfax, Virginia, USA
Website: <http://esp.gmu.edu/>

Understanding Resident Knowledge of, Attitudes toward, and Participation in Sea Turtle Conservation in Tortuguero and Cahuita, Costa Rica and near the Archie Carr National Wildlife Refuge, Florida, USA

INFORMED CONSENT FORM (for Questionnaires)

RESEARCH PROCEDURES

This research is being conducted to identify and understand resident knowledge of, attitudes toward, and participation in sea turtle conservation. Survey data will be collected from residents (18 years of age or greater) at three sites: (1) near the Archie Carr National Wildlife Refuge, Florida, USA, (2) Tortuguero, Costa Rica, and (3) Cahuita, Costa Rica. In a random manner, survey participants will be sought at various places, dates, and times. The intent is to create a representative sample of the entire community. In addition to questions on sea turtles, you will be asked basic demographic and economic-related questions. This demographic data will be analyzed to help explain what factors influence a resident's level of knowledge, attitudes toward, and participation in sea turtle conservation. If you agree to participate, the questionnaire should not take you more than 10-15 minutes to complete.

RISKS

There are no foreseeable risks for participating in this research.

BENEFITS

There are no benefits to you as a participant in this research. Your participation may further research in sea turtle conservation and community involvement strategies.

CONFIDENTIALITY

The data in this study will be confidential. All information provided by you is confidential and anonymous. You will not be personally identified by name or other identifiers in any surveys, reports, or publications. However, the information and aggregate data derived from the questionnaire will be made available to the general public in the form of presentations, journal articles, reports, and/or books.

PARTICIPATION

Your participation in this study is voluntary. If you choose to participate, you may withdraw at any time or decline to answer any question for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty or loss of benefits. There are no costs to you or any other party.

CONTACT

This research is being conducted by Emily Cella with the Department of Environmental Science & Policy at George Mason University. If you have any questions, you may ask her at any time during your completion of the questionnaire or you may contact her at elux@gmu.edu. In addition, you may contact the principle research advisor, Dr. Chris Parsons at 703-993-1211, if you have any questions. You may contact the George Mason University Office of Research Integrity & Assurance at 703-993-4121, if you have questions or comments regarding your rights as a participant in the research. This research has been reviewed according to George Mason University procedures governing your participation in this research.

CONSENT

I have read this form and agree to participate in this study.

Cuestionario

Marque con (X) en una casilla de cada pregunta para indicar su respuesta, a menos que se indique lo contrario.

1. ¿Se ha encontrado alguna vez usted con una tortuga marina?

Sí

No

Si la respuesta es sí, ¿cuántas tortugas marinas ha visto?

Escriba el número (Su mejor cálculo está bien.)

2. ¿Qué significa para usted la conservación de tortugas marinas? _____

3. ¿Cuándo es la temporada de anidación/desove de las tortugas marinas aquí?

1 de noviembre - 28 de febrero

1 de marzo - 31 de octubre

1 de mayo - 30 de junio

No lo sé

4. ¿Qué especie de tortuga marina anida más comúnmente en su playa local?

Tortuga cabezona (*Caretta caretta*)

Tortuga baula o laúd (*Dermochelys coriacea*)

Tortuga verde (*Chelonia mydas*)

No lo sé

5. ¿En qué año cree usted que se estableció el Parque Nacional Tortuguero?

1959

1975

No lo sé

6. En general, ¿cree usted que las poblaciones de tortugas marinas:

Están aumentando

Se mantienen iguales

Están disminuyendo

No lo sé

7. ¿En qué hábitat cree usted que las tortugas marinas generalmente obtienen su comida?

Playas arenosas costeras

Lechos de algas marinas y arrecifes de coral

No lo sé

8. ¿Cuántas especies de tortugas marinas cree usted que existen hoy en día en el mundo?

3

7

Más de 15

No lo sé

Por favor, indique si usted cree que las siguientes oraciones son verdaderas (correctas) o falsas (incorrectas):

9. Las luces artificiales pueden molestar a las tortugas marinas.

- Verdadero
 Falso
 No lo sé

10. Normalmente, las tortugas marinas hembras adultas ponen cerca de 20 huevos por nido.

- Verdadero
 Falso
 No lo sé


11. Las tortugas marinas son mamíferos marinos.

- Verdadero
 Falso
 No lo sé

Preguntas de opinión

12. ¿Cuánto le gustan o no le gustan las tortugas marinas?

- Me gustan mucho
 Me gustan un poco
 Soy neutral: Ni me gustan, ni no me gustan
 No me gustan mucho
 No me gustan en absoluto

 ¿Por qué le gustan o no le gustan las tortugas marinas? _____

13. En qué medida está usted de acuerdo o en desacuerdo con esta afirmación:

«El turismo de tortugas marinas es económicamente beneficioso para mí o para mi familia».

- Estoy totalmente de acuerdo
 Estoy de acuerdo
 Soy neutral: No estoy ni de acuerdo, ni en desacuerdo
 Estoy en desacuerdo
 Estoy totalmente en desacuerdo

Por favor, complete las tres oraciones siguientes de acuerdo a su opinión:


14. «Creo que la supervivencia futura de las especies de tortugas marinas es

- muy importante».
 de cierta importancia».
 ni importante ni sin importancia: Soy neutral».
 de poca importancia».
 sin importancia en absoluto».

15. «Creo que la preservación de las playas de anidación de las tortugas marinas es
- muy importante».
 - de cierta importancia».
 - ni importante ni sin importancia: Soy neutral».
 - de poca importancia».
 - sin importancia en lo absoluto».
16. «Creo que las leyes y las políticas de protección de las tortugas marinas son
- muy importantes».
 - de cierta importancia».
 - ni importantes ni sin importancia: Soy neutral».
 - de poca importancia».
 - sin importancia en lo absoluto».
17. ¿Cuán dispuesto estaría usted o no estaría dispuesto a donar una pequeña cantidad de dinero para ayudar a la conservación de las tortugas marinas?
- Muy dispuesto
 - Un poco dispuesto
 - Yo estaría neutral: Ni uno ni lo otro
 - Yo no estaría un poco dispuesto
 - Yo no estaría dispuesto en absoluto
18. ¿Cuán dispuesto estaría usted o no estaría dispuesto a pagar impuestos un poco más altos para ayudar a la conservación de las tortugas marinas?
- Muy dispuesto
 - Un poco dispuesto
 - Yo estaría neutral: Ni uno ni lo otro
 - Yo no estaría un poco dispuesto
 - Yo no estaría dispuesto en absoluto
19. ¿Cuán dispuesto estaría usted o no estaría dispuesto a donar un poco de su tiempo para ayudar a la conservación de las tortugas marinas?
- Muy dispuesto
 - Un poco dispuesto
 - Yo estaría neutral: Ni uno ni lo otro
 - Yo no estaría un poco dispuesto
 - Yo no estaría dispuesto en absoluto
20. ¿En qué medida estaría usted a favor o en contra de la preservación adicional de hábitat de anidación de tortugas marinas?
- Yo estaría totalmente a favor
 - Yo estaría un poco a favor
 - Yo estaría neutral: Ni a favor, ni en contra
 - Yo estaría un poco en contra
 - Yo estaría totalmente en contra

Preguntas de participación

21. ¿Es usted miembro de alguna organización de tortugas marinas?

Sí  Si la respuesta es sí, escriba el nombre de la organización: _____
 No

22. ¿Dona dinero a alguna organización de tortugas marinas?

Sí
 No


23. ¿Le ha pedido alguna organización o grupo que participe en una actividad relacionada con las tortugas marinas?

Sí
 No

24. ¿En qué actividades relacionadas con las tortugas marinas ha participado? (*marque todas las que correspondan*)


En ninguna («No he participado en ninguna de las actividades mencionadas debajo»).

Tours guiados a ver de desove de tortugas marinas


 Si fue seleccionado, ¿con qué frecuencia ha participado?

Número de veces por año O Número total de veces en su vida

Escriba la fecha de la participación más reciente

 ¿Era usted un guía o ayudante en el tour guiado? Sí No


Actividades educativas (como asistir a programas educativos, conferencias, etc.)

 Si fue seleccionado, ¿con qué frecuencia ha participado?

Número de veces por año O Número total de veces en su vida

Escriba la fecha de la participación más reciente


Actividades de monitoreo o investigación

 Si fue seleccionado, ¿con qué frecuencia ha participado?

Número de veces por año O Número total de veces en su vida

Escriba la fecha de la participación más reciente


Otras actividades (por favor especifique): _____


 Si fue seleccionado, ¿con qué frecuencia ha participado?

Número de veces por año O Número total de veces en su vida



Escriba la fecha de la participación más reciente

25. ¿Ha ayudado alguna vez a proteger los nidos de las tortugas marinas o tortuguitas (tortugas bebé)?

Sí  Si la respuesta es sí, ¿cuántas veces? Número de veces

No  Escriba el año de la última vez

26. ¿Ha ayudado alguna vez a una tortuga marina lastimada o una tortuga marina en peligro?

- Sí  Si la respuesta es sí, ¿cuántas veces? Número de veces
 No  Escriba el año de la última vez

27. En qué medida está usted de acuerdo o en desacuerdo con esta afirmación:

«Creo que las oportunidades para participar en actividades relacionadas con las tortugas marinas son adecuadas».

- Estoy totalmente de acuerdo
 Estoy de acuerdo
 Soy neutral: Ni de acuerdo, ni en desacuerdo
 Estoy en desacuerdo
 Estoy totalmente en desacuerdo

28. ¿Qué tipo de actividades relacionadas con las tortugas marinas quisiera usted que se ofrecieran más?

Fuente de información sobre las tortugas marinas

29. ¿Quién es su fuente principal de información sobre las tortugas marinas? (por favor marque **SOLO una respuesta**)

- Gente local o amigos
 Guías de turismo
 Yo mismo a través de la observación directa (si fue seleccionado, vaya a la Pregunta 31)
 Organización (por favor escriba el nombre): _____
 Gobierno (por favor escriba el nombre de la agencia): _____
 Otras (por favor especifique): _____

30. En qué medida está usted de acuerdo o en desacuerdo con esta afirmación:

«Creo que la cantidad de información que me brindó mi fuente principal es adecuada».

- Estoy totalmente de acuerdo
 Estoy de acuerdo
 Soy neutral: Ni de acuerdo, ni en desacuerdo
 Estoy en desacuerdo
 Estoy totalmente en desacuerdo

Preguntas demográficas y económicas (Como un recordatorio, se puede declinar a responder cualquiera de las preguntas, pero esta información es muy importante por este estudio. Su nombre no es registrado. ¡Muchas gracias!)

31. ¿Es usted hombre o mujer?

- Hombre
 Mujer

32. ¿Cuál es su trabajo? _____

33. ¿Cuántos años ha vivido en Tortuguero?

- Número de años

34. ¿Cuántos meses en el año vive usted en Tortuguero?

Número de meses al año

35. ¿En qué año nació usted?

Año de nacimiento

36. ¿Cuál es el nivel *más alto* de educación que ha completado?

- Preparatoria, enseñanza especial o menos
- Algo de educación primaria, incompleta
- Educación primaria completa
- Algo de educación secundaria, incompleta
- Educación secundaria completa (bachillerato)
- Algo de universitaria o capacitación técnica, no título de grado
- Título parauniversitaria o tecnológica completa
- Título universitario de grado (licenciatura)
- Título universitario de posgrado, especialización, maestría o más alto

37. ¿Cuán satisfecho o insatisfecho está usted con la economía local?

- Muy satisfecho
- Algo satisfecho
- Neutral: Ni satisfecho ni insatisfecho
- Algo insatisfecho
- Muy insatisfecho
- Prefiero no responder

38. ¿Se identifica usted con una religión específica?

- Sí \Rightarrow Si la respuesta es sí, ¿cuál? Nombre de religión
- No
- No lo sé
- Prefiero no responder

¡Muchas gracias por su tiempo!

Questionnaire

Please mark with (X) in one box for each question to indicate your answer, unless otherwise directed.

1. Have you ever personally encountered a sea turtle?

Yes

No

If yes, about how many sea turtles have you seen?

Write number (*Your best estimate is fine.*)

2. What does the conservation of sea turtles mean to you? _____

3. When is the sea turtle nesting season here?

November 1 – February 28

March 1 – October 31

May 1 – June 30

I don't know

4. What sea turtle species most commonly nests on your local beach?

Loggerhead turtle (*Caretta caretta*)

Leatherback turtle (*Dermochelys coriacea*)

Green turtle (*Chelonia mydas*)

I don't know

5. In about what year do you think Tortuguero National Park was established?

1959

1975

I don't know

6. In general, do you think global sea turtle populations are:

Increasing

Staying the same

Decreasing

I don't know

7. In what habitat do you think sea turtles generally get their food?

Coastal sandy beaches

Seagrass beds and coral reefs

I don't know

8. How many species of sea turtles do you think exist today in the world?

3

7

More than 15

I don't know

Please indicate if you think the following sentences are true (correct) or false (incorrect):

9. Artificial lights can disturb sea turtles.

- True
- False
- I don't know

10. Adult female sea turtles typically lay about 20 eggs per nest.

- True
- False
- I don't know

11. Sea turtles are marine mammals.

- True
- False
- I don't know

Opinion Questions

12. How much do you like or dislike sea turtles?

- Strongly like
- Somewhat like
- I'm neutral: I neither like nor dislike
- Somewhat dislike
- Strongly dislike

 Why do you like or dislike sea turtles? _____

13. To what extent do you agree or disagree with this statement:

“Sea turtle tourism is economically beneficial to me or my family.”

- Strongly agree
- Agree
- I'm neutral: I neither agree nor disagree
- Disagree
- Strongly disagree

Please complete the following three sentences according to your opinion:

14. “I think that the future survival of sea turtle species is

- very important.”
- somewhat important.”
- neither important nor unimportant: I'm neutral.”
- somewhat not important.”
- not at all important.”

15. "I think that the preservation of sea turtle nesting beaches is
- very important."
 - somewhat important."
 - neither important nor unimportant: I'm neutral."
 - somewhat not important."
 - not at all important."
16. "I think that sea turtle protection laws and policies are
- very important."
 - somewhat important."
 - neither important nor unimportant: I'm neutral."
 - somewhat not important."
 - not at all important."
17. How willing or not willing would you be to *donating a little money* to help sea turtle conservation?
- Very willing
 - Somewhat willing
 - I'm neutral: I'm neither willing nor unwilling
 - Somewhat not willing
 - Not willing at all
18. How willing or not willing would you be to *paying slightly higher taxes* to help sea turtle conservation?
- Very willing
 - Somewhat willing
 - I'm neutral: I'm neither willing nor unwilling
 - Somewhat not willing
 - Not willing at all
19. How willing or not willing would you be to *donating a little of your time* to help sea turtle conservation?
- Very willing
 - Somewhat willing
 - I'm neutral: I'm neither willing nor unwilling
 - Somewhat not willing
 - Not willing at all
20. How much would you favor or oppose the preservation of additional sea turtle nesting habitat?
- Strongly favor
 - Somewhat favor
 - I'm neutral: I neither favor nor oppose
 - Somewhat oppose
 - Strongly oppose

Participation Questions

21. Are you a member of a sea turtle organization?

Yes \Rightarrow If yes, write the name of the organization(s): _____
 No

22. Do you donate money to a sea turtle organization?

Yes
 No

23. Have you ever been asked by an organization or group to participate in a sea turtle related activity?

Yes
 No

24. What activities related to sea turtles have you participated in? (mark all that apply)

None ("I have not participated in any of the activities mentioned below.")

Guided tours to see nesting sea turtles

\Rightarrow If selected, *how often* have you participated?

Number of times per year OR Number of times total in lifetime

Write date of most recent participation

\Rightarrow Were you a guide or assistant in the guided tour? Yes No

Educational activities (such as attending educational programs, lectures, etc.)

\Rightarrow If selected, *how often* have you participated?

Number of times per year OR Number of times total in lifetime

Write date of most recent participation

Monitoring or research activities

\Rightarrow If selected, *how often* have you participated?

Number of times per year OR Number of times total in lifetime

Write date of most recent participation

Other activities (please specify): _____

\Rightarrow If selected, *how often* have you participated?

Number of times per year OR Number of times total in lifetime

Write date of most recent participation

25. Have you ever helped to protect nesting sea turtles or hatchlings?

Yes \Rightarrow If yes, *how many times*? Number of times
 No \Rightarrow Write year of most recent time

26. Have you ever helped a sea turtle that was in danger or was injured?

- Yes \Rightarrow If yes, how many times? Number of times
 No \Rightarrow Write year of most recent time

27. To what extent do you agree or disagree with this statement:

“I think that opportunities for me to participate in sea turtle related activities are adequate.”

- Strongly agree
 Agree
 I'm neutral: I neither agree nor disagree
 Disagree
 Strongly disagree

28. If any, what type of sea turtle related activities would you like offered to you more? _____

Source of Information on Sea Turtles

29. Who is your *primary* source of information on sea turtles? (please mark **ONLY one** answer)

- Local people or friends
 Tourism guides
 Myself through direct observation (if selected, skip to Question 31)
 Organization (please write the name): _____
 Government (please write the agency name): _____
 Other (please specify): _____

30. To what extent do you agree or disagree with this statement:

“I think that the amount of information provided to me by my *primary* source is adequate.”

- Strongly agree
 Agree
 I'm neutral: I neither agree nor disagree
 Disagree
 Strongly disagree

Demographic and Economic Questions (As a reminder, you may decline to respond to any of the questions, but this information is very important for this study. Your name is not recorded. Thank you!)

31. Are you male or female?

- Male
 Female

32. What is your occupation? _____

33. How many years have you lived in Tortuguero?

- Number of years

34. How many months out of the year do you live in Tortuguero?

Number of months out of the year

35. In what year were you born?

Year born

36. What is the *highest* level of education that you have completed?

- Preparatory school, special education, or less
- Some primary education, incomplete
- Primary education complete
- Some secondary education, incomplete
- Secondary education complete (baccalaureate)
- Some university or technical training, no degree title
- Parauniversitaria degree, Associate's degree, or technical school degree
- University Bachelor's graduate degree
- University post-graduate degree, specialization, master degree, or higher

37. How satisfied or dissatisfied are you with the local economy?

- Very satisfied
- Somewhat satisfied
- Neutral: Neither satisfied or dissatisfied
- Somewhat dissatisfied
- Very dissatisfied
- I prefer not to respond

38. Do you identify with a specific religion?

- Yes \Rightarrow If the answer is *yes*, which? Name of religion
- No
- I don't know
- I prefer not to respond

Thank you very much for your time!



Departamento de Ciencia Ambiental y Política
Fairfax, Virginia, Estados Unidos
Sitio web: <http://esp.gmu.edu/>

Título de estudio: Comprender el conocimiento sobre, actitudes hacia y participación de los residentes en la conservación de las tortugas marinas en Tortuguero y Cahuita, Costa Rica y cerca del Refugio Nacional de Vida Silvestre Archie Carr, Florida, Estados Unidos

FORMULARIO DE CONSENTIMIENTO INFORMADO (para cuestionarios)

PROCEDIMIENTOS DE INVESTIGACIÓN

Esta investigación se está llevando a cabo para identificar y entender el conocimiento, actitudes y participación de los residentes en la conservación de las tortugas marinas. Los datos de la encuesta se recolectarán de los residentes (de 18 años de edad o mayores) en tres lugares: (1) cerca del Refugio Nacional de Vida Silvestre Archie Carr, Florida, Estados Unidos, (2) Tortuguero, Costa Rica y (3) Cahuita, Costa Rica. Los participantes de la encuesta se buscarán de manera aleatoria en diferentes lugares, fechas y momentos. Se intenta tomar una muestra representativa de la comunidad entera. Además de preguntas sobre tortugas marinas, el cuestionario tiene preguntas básicas relacionadas con la demografía y la economía. Estos datos demográficos se analizarán para ayudar a explicar qué factores influyen en el nivel de conocimiento, actitudes hacia y participación de los residentes en la conservación de la tortuga marina. Además, estos datos se compararán con los datos del censo para analizar si una muestra representativa de la comunidad fue recogido. Si usted acepta participar, el cuestionario no le tomará más de 10 a 15 minutos en completar.

RIESGOS

No hay riesgos previsibles por participar en esta investigación.

BENEFICIOS

No existen beneficios para usted como participante en esta investigación. Sin embargo, su participación puede aportar a una investigación adicional en la conservación de las tortugas marinas y en las estrategias para la participación comunitaria.

CONFIDENCIALIDAD

Los datos de este estudio serán confidenciales. Toda la información que usted brinde es confidencial y anónima. Nombres no se registran. No será identificado por su nombre u otras identificaciones en ninguna encuesta, informe o publicación. Sin embargo, la información y datos agregados derivados del cuestionario estarán disponibles para el público en general en la forma de presentaciones, artículos de diarios, informes, revistas y/o libros.

PARTICIPACIÓN

Su participación en este estudio es voluntaria. Si usted decide participar, se puede retirar en cualquier momento y se puede declinar a contestar cualquiera de las preguntas del cuestionario por cualquier razón. Si usted decide no participar o retirarse de este estudio, no hay pena ni pérdida de beneficios. No hay costos para usted o cualquier otra parte.

CONTACTO

Esta investigación se está llevando a cabo por Emily Cella con el Departamento de Ciencia Ambiental y Política de la Universidad de George Mason. Si usted tiene alguna pregunta, puede hacerla en cualquier momento durante el llenado de cuestionario o puede comunicarse conmigo a elux@gmu.edu. Además, si usted tiene alguna pregunta adicional, se puede comunicarse con el director de investigación principal, el doctor Chris Parsons al 1-703-993-1211. Si usted tiene alguna pregunta o comentario acerca de sus derechos como participante en la investigación, se puede contactar la Universidad de George Mason en la Oficina de Investigación Integridad y Assurance al 1-703-993-4121. Esta investigación ha sido revisada según procedimientos de la Universidad de George Mason que rigen su participación en esta investigación.

CONSENTIMIENTO

He leído este formulario y estoy de acuerdo participar en este estudio.



Department of Environmental Science & Policy
Fairfax, Virginia, USA
Website: <http://esp.gmu.edu/>

Study Title: Understanding Resident Knowledge of, Attitudes toward, and Participation in Sea Turtle Conservation in Tortuguero and Cahuita, Costa Rica and near the Archie Carr National Wildlife Refuge, Florida, United States

INFORMED CONSENT FORM (for questionnaires)

RESEARCH PROCEDURES

This research is being conducted to identify and understand resident knowledge, attitudes, and participation in sea turtle conservation. The survey data will be collected from residents (18 years of age or greater) at three locations: (1) near the Archie Carr National Wildlife Refuge, Florida, United States, (2) Tortuguero, Costa Rica, and (3) Cahuita, Costa Rica. Survey participants will be sought in a random manner at various places, dates, and times. The intent is to take a representative sample of the entire community. In addition to questions on sea turtles, the questionnaire has basic demographic and economic-related questions. This demographic data will be analyzed to help explain what factors influence a resident's level of knowledge, attitudes toward, and participation in sea turtle conservation. In addition, this data will be compared with the census data in order to analyze if a representative sample of the community was collected. If you agree to participate, the questionnaire should not take you more than 10 to 15 minutes to complete.

RISKS

There are no foreseeable risks for participating in this research.

BENEFITS

There are no benefits to you as a participant in this research. However, your participation may further research in sea turtle conservation and community participation strategies.

CONFIDENTIALITY

The data in this study will be confidential. All information provided by you is confidential and anonymous. Names are not recorded. You will not be identified by name or other identifiers in any surveys, reports, or publications. However, the information and aggregate data derived from the questionnaire will be made available to the general public in the form of presentations, journal articles, reports, magazines, and/or books.

PARTICIPATION

Your participation in this study is voluntary. If you decide to participate, you may withdraw at any time and you may decline to answer any question on the questionnaire for any reason. If you decide not to participate or withdraw from the study, there is no penalty or loss of benefits. There are no costs to you or any other party.

CONTACT

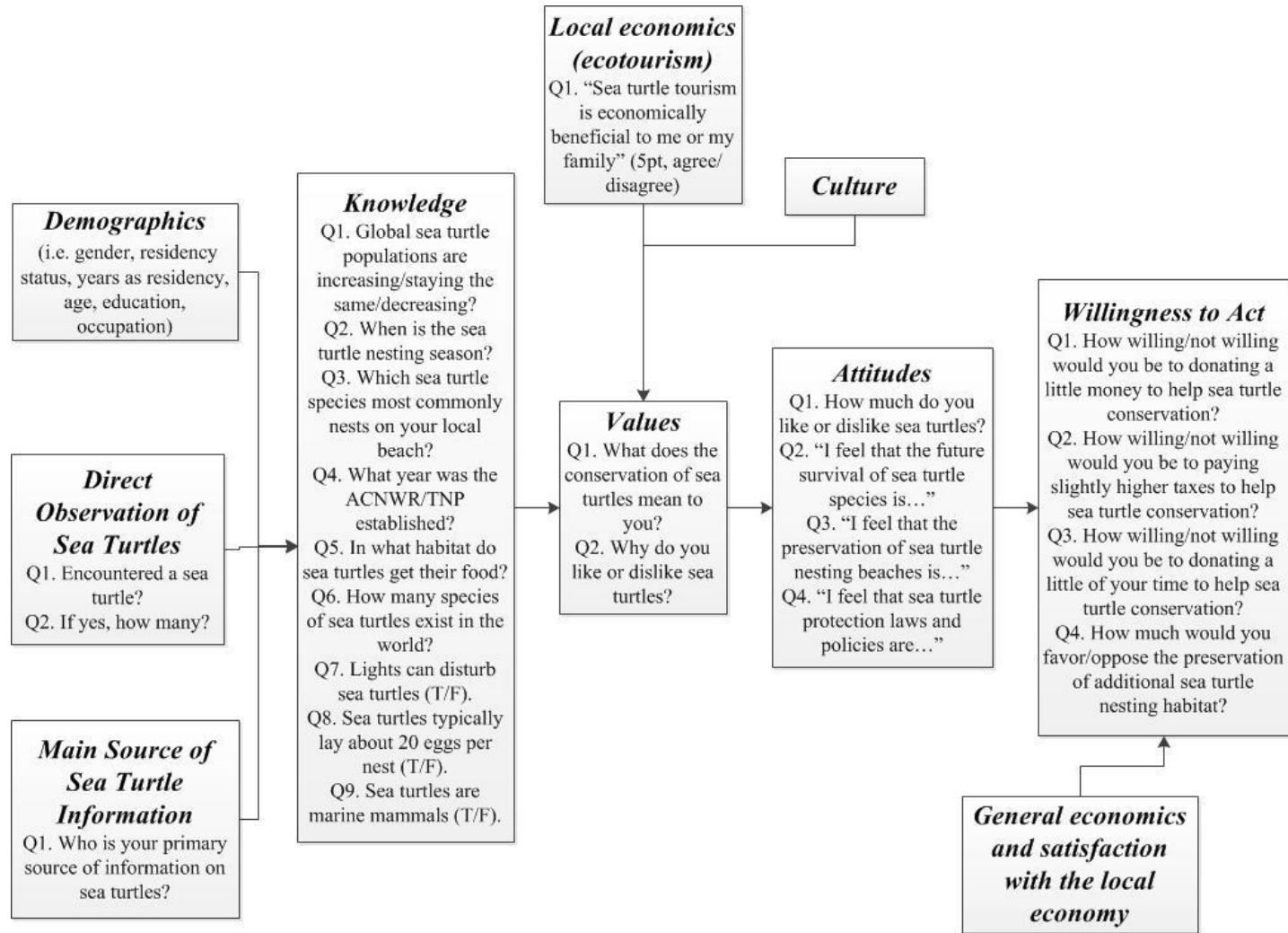
This research is being conducted by Emily Cella with the Department of Environmental Science & Policy at George Mason University. If you have any questions, you may ask her at any time during the completion of the questionnaire or you may contact her at elux@gmu.edu. In addition, if you have any additional questions, you may contact the principle research advisor, Dr. Chris Parsons at 1-703-993-1211. If you have questions or comments regarding your rights as a participant in the research, you may contact the George Mason University Office of Research Integrity & Assurance at 1-703-993-4121. This research has been reviewed according to George Mason University procedures governing your participation in this research.

CONSENT

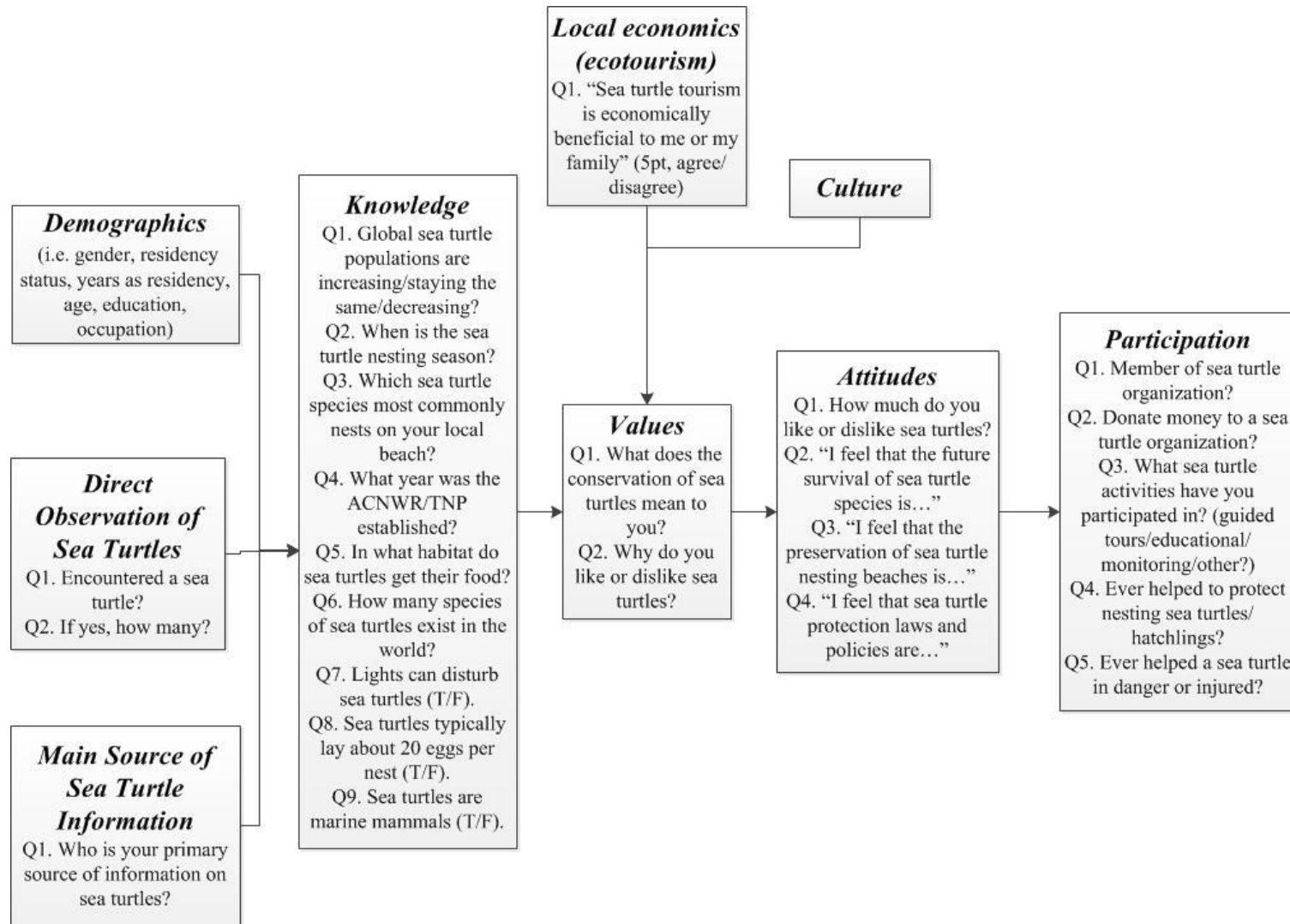
I have read this form and agree to participate in this study.

Appendix B: Detailed Models

Willingness to Act Detailed Model:



Participation Detailed Model:



Appendix C: Supplemental Methods and Analyses

Comment 1: The number of sea turtle observations that a resident had surfaced as a theme, both positive and negative, throughout the interviews conducted in the ACNWR. Most residents expressed their interactions with sea turtles as positive. However, one resident noted, “I think there is an abundance [of sea turtles]. I off-shore fish, and I mean I see them, and they are all over. There are just tons and tons of them...I see a lot of other things disappearing, but I don't see the sea turtles disappearing. I see loggerheads, I see some greenies...I see a wide variety of them.” This viewpoint implied that some local residents that observe many sea turtles, and thus believe them to not be endangered, may show less concern for and have a lower attitude towards sea turtles. This viewpoint may mostly exist without educational awareness. Another resident (a fisherman) discussed how sea turtles, “are a nuisance,” to them because loggerhead sea turtles, “destroy the crab pots, trying to get the crabs out of them...the 300 pound turtles and they sit on them and squash them and destroy them.” This resident further noted that there are not as many sea turtles today locally as there were 10 years ago stating, “I have noticed a difference. I mean they [loggerhead sea turtles] used to crimple me and now they just bother me.”

Comment 2: Prior to regression analysis, however, contingency tables were examined. The absent and low frequency of observations in the negative categories made conducting an ordinal logistic regression analysis inappropriate. For this reason, a binary variable was created based on the sum of scores (1 – 5 per question) of the four attitude toward sea turtle questions. Group one ($n = 29$) consisted of respondents with a score of

less than 20 (i.e. they did *not* answer very important/strongly like to all four questions). Group two ($n = 102$) consisted of respondents with a score of exactly 20 (i.e. they answered very important/strongly like to all four questions).

Comment 3: In order to further examine the relationship between participation and occupation, three chi-square tests were conducted using three specific participation activities (educational, sea turtle tours, and monitoring activities). The first chi-square test indicated that there was a strong and significant relationship between participation in a sea turtle educational activity and occupation ($\chi^2 [1, N = 127] = 21.54, p = 0.000, V = 0.412$). A higher percentage (79.2%, $n = 19$) of the sample of the respondents that had occupations directly related to tourism or conservation participated more in sea turtle educational activities than did respondents with occupations not directly related to tourism or conservation (28.2%, $n = 29$). The second chi-square test indicated that there was a strong and significant relationship between participation in a sea turtle tour and occupation ($\chi^2 [1, N = 127] = 14.79, p = 0.000, V = 0.341$). A higher percentage (95.8%, $n = 23$) of the sample of the respondents that had occupations directly related to tourism or conservation participated more in sea turtle tours than did respondents with occupations not directly related to tourism or conservation (53.4%, $n = 55$). The third chi-square test indicated that there was a strong and significant relationship between participation in sea turtle monitoring and occupation ($\chi^2 [1, N = 127] = 13.45, p = 0.000, V = 0.326$). A higher percentage (50.0%, $n = 12$) of the sample of the respondents that had occupations directly related to tourism or conservation participated more in sea turtle

monitoring activities than did respondents with occupations not directly related to tourism (15.5%, $n = 16$).

Comment 4: A binary logistic regression was conducted in order to examine what factors explain Tortuguero respondents' active donation of money to a sea turtle organization; however, the model was not significant. The donating money variable consisted of two categories: (1) respondents that had *never* donated money to a sea turtle organization ($n = 116$); and (2) respondents that had donated money to a sea turtle organization ($n = 16$). The following variables could not be used in the regression model due to numerous low expected frequencies: the main information sources (local people, tourism guides, self, NGO, and government), occupation, residency status, and economic benefit of tourism. For this reason, Fisher's Exact Tests were conducted on the variables with low expected frequencies. The Fisher's Exact Tests indicated that there were significant relationships between donating money and: (1) occupation ($p = 0.013$); and (2) main information source (NGO) ($p = 0.007$). A higher percentage (29.2%, $n = 7$) of the sample of the respondents with occupations directly related to tourism or conservation donated money than respondents with occupations not directly related to tourism or conservation (8.7%, $n = 9$). Additionally, a higher percentage (26.7%, $n = 8$) of the sample of the respondents having a NGO as their main source of sea turtle information donated money than respondents having all other main information sources (7.0%, $n = 7$).

Chi-square tests were also conducted to examine the relationships between donating money to help sea turtle conservation and: (1) religion; (2) satisfaction with the local economy and; (3) values toward sea turtles. There was no significant relationship

between donating money and religion ($\chi^2 [1, N = 122] = 0.01, p = 0.932$). The chi-square test conducted to examine the relationship between donating money and satisfaction with the local economy revealed four low expected frequencies; thus, the non-significant results were viewed as inconclusive ($\chi^2 [4, N = 118] = 3.84, p = 0.280$). There was no significant relationship between donating money and the expression of multiple values ($\chi^2 [1, N = 126] = 1.31, p = 0.252$). However, there was a significant relationship between donating money and the expression of the humanistic value ($\chi^2 [1, N = 126] = 3.92, p = 0.048, V = 0.177$). More respondents that expressed the humanistic value towards sea turtles donated money to help sea turtle conservation, than those respondents not expressing this value.

Comment 5: In terms of specific sea turtle-related activities, there was a significant difference between the Tortuguero and ACNWR residents for participation in sea turtle guided tours ($\chi^2 [1, N = 263] = 65.31, p = 0.000, V = -0.498$) and for participation in monitoring activities ($\chi^2 [1, N = 263] = 9.81, p = 0.002, V = -0.193$). For example, a higher percentage of the Tortuguero residents (62.1%, $n = 82$) had participated in one or more sea turtle tours than the ACNWR residents (13.7%, $n = 18$). Participation in guided tours was the most frequently reported sea turtle-related activity among Tortuguero residents. Most Tortuguero residents ($n = 46$) who reported participation in a sea turtle tour were not a lead guide or assistant the tour(s). In addition, a higher percentage of the Tortuguero residents (21.2%, $n = 28$) had participated in one or more sea turtle monitoring activities than the ACNWR residents (7.63%, $n = 10$). Conversely, there was no significant difference between the Tortuguero and ACNWR

residents in participation in educational activities ($\chi^2 [1, N = 263] = 3.32, p = 0.068$) or in 'other' sea turtle-related activities ($\chi^2 [1, N = 263] = 0.717, p = 0.397$).

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BIOGRAPHY

Emily L. Cella graduated from the Ohio University with a Bachelor of Science in Biological Sciences – Environmental Biology in 2002 and with a Master of Science in Environmental Studies in 2004. Since 2004, she has worked as an environmental scientist and project manager for consulting firms located in the Washington, DC metro area. She graduated from George Mason University with a doctorate in Environmental Science and Public Policy in 2015.