

**Understanding conservation awareness through sea turtle nesting public viewings and
volunteer programs**

An Internship Report

Submitted to the Faculty
of the University of Miami,
Rosenstiel School of Marine, Atmospheric, and Earth Science
in partial fulfillment of the requirements for the
Degree of Master of Professional Science

In cooperation with
*Marine Order for Research and Action through Environmental Stewardship (MORAES) of South
Florida*

Olivia Rasmussen-Dowie

*Olivia Rasmussen-Dowie
Marine Conservation
Masters in Professional Science*

UNIVERSITY OF MIAMI
(December 2023)

Approved:



Evan D'Alessandro

*Senior Lecturer & MPS Program Director, Marine Biology & Ecology
Committee Chair*



*Shannon C. Jones
Co-Founder, MORAES
Internship Supervisor*

Understanding conservation awareness through sea turtle public viewings and volunteer programs

Abstract of a master's degree internship report at the University of Miami, Rosenstiel School of Marine, Atmospheric, and Earth Science. Supervised by: *Dr. Evan D'Alessandro and Shannon Jones*. Number of pages in text: 24.

The Marine Order for Research and Action Through Environmental Stewardship (MORAES) is a registered 501(c)(3) non-profit organization based in Miami, Florida founded with the intent to provide opportunities, spark action, and engage in scientific research that benefits the South Florida environment. Under marine turtle permit 153, MORAES leads daily nesting surveys on Virginia Key, Miami, Florida. They document, mark, report on, and excavate loggerhead turtle nests, collecting data for the Florida Fish and Wildlife Commission (FWC). The Virginia Key Sea Turtle Nesting project strives to incorporate interns and volunteers that have a passion for the marine environment and wish to be environmental stewards. Additionally, MORAES has created an experience for the public, in collaboration with Frost Science, to view a sea turtle nest excavation and learn more about the sea turtle nesting process. Through this program, called Nest Excavation for Sea Turtles (NEST), the public can learn more about the conservation of sea turtles and the efforts to protect them. But how can MORAES measure the success of their environmental stewardship program and better understand if their participants are becoming environmental stewards?

To answer this question, MORAES drafted and distributed surveys to both the survey volunteers and NEST participants to assess their conservation awareness and attitudes towards sea turtle conservation. Qualtrics through the University of Miami was used for both surveys. Both surveys assessed the participant's motivation behind volunteering and attending the NEST program, how they heard about MORAES, if any behaviors have changed from learning about sea turtle conservation, and the most important thing they've learned through their experience. The survey responses were collected and interpreted into a larger report to provide MORAES with important information about the efficacy and interpretation of their conservation goals. After interpretation, it has been concluded that volunteering in a sea turtle conservation program and attending an excavation program has positive influences on behavior change and resulted in

increased knowledge about sea turtles, conservation efforts, and anthropogenic impacts on sea turtles. Many volunteers felt as though their efforts were worthwhile and felt a sense of pride knowing they are contributing to sea turtle conservation. The surveys can be used for future volunteers and NEST participants to further evaluate success.

Keywords: Sea turtle, nest excavation, survey, conservation behavior, loggerhead, Florida

Acknowledgements

I would like to thank all the staff and volunteers at MORAES who not only contributed to my survey, but who taught me all I know about sea turtles and sea turtle conservation. Their efforts every single day during sea turtle nesting season is inspiring and doesn't go unnoticed. Special thank you to Shannon Jones at MORAES for everything you do for MORAES and for me as your intern. I would like to thank the staff at Frost Science who helped assemble the NEST programs and assisted in the sea turtle nest excavations. I would not have been able to distribute my surveys to the public if it wasn't for their help. Finally, I would like to thank Evan D'Alessandro for all his help and assistance in helping me throughout this process.

Table of Contents

1.0 Introduction	1
2.0 Materials and Methods.....	6
2.1 Volunteer Survey	6
2.2 NEST Program Participant Survey	7
3.0 Outputs	7
3.1 Volunteer Survey.....	7
3.2 NEST Program Participant Survey.....	10
4.0 Discussion	14
4.1 Volunteer Survey.....	14
4.2 NEST Program Participant Survey.....	16
5.0 Conclusions	18
6.0 References	19
7.0 Appendix.....	22

List of Tables

Table 1.1 Question 4: Are you planning on changing any behaviors after volunteering with sea turtles? If yes, which behaviors will you change?.....9
Table 1.2 Question 6: Please rate the following responses, with 1 being low/disagree and 10 being high/agree.....10
Table 2.1 Question 1: How did you hear about this outreach program?.....12
Table 2.2 Question 5: Are you planning on changing your behaviors after this experience?.....13

List of Figures

Figure 1.1 Question 8: What motivated you to join the MORAES volunteer team?.....10
Figure 1.2 Number of responses given for each question of the survey out of 25 surveys completed11
Figure 2.1 Question 2: What motivated you to sign up for this program?.....13

1.0 Introduction

The Marine Order for Research and Action Through Environmental Stewardship (MORAES) is a registered 501(c)(3) non-profit organization based in Miami, Florida founded with the intent to provide opportunities, spark action, and engage in scientific research that benefits the South Florida environment. MORAES offers a streamlined path for the public to become involved in research, publishing, education outreach, and volunteering when one wishes to become an environmental steward but is unsure of where to start. The main goal of MORAES is to protect the natural environment through community involvement and outreach.

MORAES has three main projects: the Evolution of Darwin Beach project, the Cetacean Aerial Survey project, and the Virginia Key Sea Turtle Nesting project. The Evolution of Darwin Beach project focuses on removing invasive species and planting native species along the coastline of Darwin Beach with the goal of restoring this coastal habitat to its natural state. The Cetacean Aerial Survey Project (CASP), in collaboration with the Dolphin Research Center on Grassy Key, Florida, focuses on collecting marine mammal data using unmanned aerial vehicles. The Virginia Key Sea Turtle Nesting project, which is the focus of this proposed work, operates under Florida Fish and Wildlife Commission (FWC) marine turtle permit MTP-23-153 to collect data on sea turtles nesting on Virginia Key, Florida. Every morning during sea turtle season, May 1st to October 31st, trained and permitted volunteers and interns survey the beach to monitor, track, and document marine sea turtle activity such as crawling, nesting, and hatchings. The only documented sea turtle that nests on Virginia Key is the loggerhead turtle (*Caretta caretta*), a federally designated endangered species. The data collected from the surveys is of utmost importance in protecting these threatened sea turtles, tracking their population trends, educating the public, and assisting in proper management of this species and their habitats. In addition to the daily surveys, MORAES, with collaboration with The Phillip and Patricia Frost Museum of Science (Frost Science), has created the Nest Excavation for Sea Turtles (NEST) program. NEST is a program dedicated to integrating the public into these activities.

Because the main goal of MORAES is to promote environmental stewardship and bring the public into scientific research and projects, it is imperative to understand how effective

their programs are and if conservation awareness is improving. To best determine a participant's conservation awareness, MORAES drafted and distributed a survey for both daily turtle survey volunteers and NEST participants to complete. Questions for the volunteers were written to learn more about the motivation behind volunteering, what has driven them to return for multiple seasons (if applicable), what they have learned, how volunteering has impacted their conservation awareness, and if any behaviors have changed from acquiring conservation awareness. Questions for the NEST program were designed to assess key takeaways participants may have from witnessing a sea turtle excavation, their motivation behind attending the program, if they believe any behaviors may change (such as using less plastic or not disturbing nesting areas), and if they have more conservation awareness after the program. Understanding motivations and takeaways from MORAES' conservation programs will help MORAES create more effective programs and assess their goal of generating environmental stewardship in the local community.

Literature Review

To understand the significance and importance of integrating the public into the conservation realm, one must understand recent tourism trends. Tourism has expanded from its most basic form of simply exploring, to participatory ecotourism, volunteer tourism, and wildlife tourism (Fennell, 2002; Honey 1999; Newsome, Dowling, & Moore, 2005; Rattan et al., 2011; Wearing, 2001; Wearing & Neil, 1999). Ecotourism has been on the rise in recent years and conservationists are seeking ways to keep the public informed on environmental issues and how they can help reduce their impact on the environment and species (Smith et al., 2019). Public perception of and integration into marine conservation has proven to be a useful tool in recent years in determining conservation success (Jefferson et al., 2015). Understanding the public's reception to marine conservation, such as their social values, attitudes, behaviors, motivations, interest, and knowledge, has the power to lessen the pressure on marine ecosystems and threatened species (Jefferson et al., 2015). Generally, as knowledge and interest increase, engagement and activism increase, creating a space for the public to engage in marine conservation efforts (Jefferson et al., 2015). An effective form of incorporating the public into conservation and keeping them informed of environmental issues is volunteer tourism (Wearing, Young & Everingham, 2017). A volunteer tourists' sole motivation is to benefit the communities and better the environments they visit (Wearing, Young & Everingham, 2017). While volunteer

tourism provides positive learning experiences for the volunteers and provides aid to the communities and environments they're in, the questions remains if volunteer tourism and incorporating the public into conservation is enough to raise their conservation awareness (Rattan et al., 2011; Wearing, Young, and Everingham, 2017). Understanding volunteer tourism and ecotourism is imperative for MORAES' volunteer program because the sea turtle nesting project relies so heavily on volunteers. Majority of the individuals that work on the sea turtle project are volunteers, who are participating on their own free will. Obtaining insight on what motivates people to volunteer for marine conservation projects and if the volunteer work is raising an individual's conservation awareness can help MORAES gauge the success of their volunteer program and areas that may be lacking. This will create volunteers with a high level of conservation awareness and a motivation to continue conserving the environment after their volunteer program has ended.

Sea turtles can be found circumglobally in tropical and temperate waters (Dodd, 1986). Specifically, and the main species focused in this study, the loggerhead turtle (*Caretta caretta*) is one of the sea turtle species that nest along the Atlantic coast with the second highest concentration of nesting along the southeastern coast of Florida out of any other sea turtle species and area in the world (Ehrhart et al., 2003). The loggerhead turtles that nest in southeastern Florida are a part of the Northwest Atlantic Ocean Distinct Population Segment (NAO DPS) designated by the National Oceanic and Atmospheric Administration (NOAA) and U.S. Fish and Wildlife services (FWS) and around 90% of the nesting efforts from this DPS occur in Florida (Ehrhart et al., 2003). Sexually mature females will nest every 1 to 7 years and have high site fidelity (Shamblin et al., 2017). A study performed by Antworth et al. in 2006 found an average clutch size of 98.5 eggs per loggerhead nest on Canaveral National Seashore in central Florida. As of September 2011, the NAO DPS was considered a threatened species under the Endangered Species Act and this status has not changed (NOAA, 2023). Because of the loggerhead turtle's conservation status, the data collected by MORAES is important for continued protection and to analyze how to better protect this species. All the data MORAES collects is passed along to FWC, who uses the data to make informed decisions on how to preserve the species. Without the input from MORAES, FWC's data would be missing a substantial amount of data on the loggerhead sea turtle in South Florida. In sum, conserving the loggerhead sea turtle is of utmost important not only biologically but also economically.

Sea turtles are considered one of the most popular marine species for wildlife tourism and a charismatic and alluring species that drives tourism (Campbell & Smith, 2006; Ellis, 2003; Senko et al., 2011). A study performed by Campbell & Smith in 2006 interviewed 31 volunteers who paid to engage in sea turtle conservation in Costa Rica. The most dominating value the study found was the importance of contributing to science and supporting an endangered species (Campbell & Smith, 2006). The study ultimately concluded that volunteer tourists in sea turtle conservation are driven by aesthetic and humanistic values, valued science, and the pursuit of conservation (Campbell & Smith, 2006). While this study focused on the values of volunteer tourists rather than their motivation for volunteering, the values of the volunteers appeared to align with conservationist values and conservation awareness was apparent (Campbell & Smith, 2006). This study provides a solid base for this project and majority of the methods in this project mirrored this study. While this project is aiming to understand motivations behind why individuals volunteer in sea turtle conservation and if the program increased conservation awareness, the study by Campbell & Smith also included volunteer surveys to understand the volunteer's value and mentality behind engaging in a sea turtle conservation program.

This concept is further validated by a study conducted by Senko et al. in 2011 in Bahia Magdalena, Mexico. Residents were interviewed to understand their attitudes and values towards sea turtle conservation and their thoughts on the decline of sea turtles in recent years. Over one hundred interviews were recorded, 98% of which displayed a willingness to participate in a sea turtle conservation program and 95% expressed interest in attending an educational program (Senko et al., 2011). Many residents wished to participate in existing programs but feared the cost was an expense they couldn't manage (Senko et al., 2011). These studies have solidified the importance of public perception, participation, and engagement in marine conservation and how values, behaviors, and attitudes are impacted from volunteer tourism.

While understanding public perception and the values of volunteers is critical to the success of marine conservation programs, assessing conservation awareness and the lasting impacts of conservation programs is also of utmost importance. A study by Hassan et al. spearheaded sea turtle awareness campaigns in Malaysia from October 2014 to November 2015 in local schools and organizations (2017). Without the educational programs, the public would not have known about the impacts sea turtles face and how the public may assist in preserving the marine environment (Hassan et al., 2017). This study concluded that educational programs and hands-on

learning experiences can increase the public's conservation awareness and can be a useful tool for marine conservation. Additionally, this study may have implications for the new NEST program. NEST has many of the same activities that this study by Hassan et al. had, so this study has a direct connection to the NEST program.

A final study that emphasizes the importance of increasing conservation awareness through sea turtle programs was conducted in Florida by Smith et al. in 2019. A public sea turtle nesting program on Disney's Vero Beach Resort (Florida) was the focus of this study with the goal of analyzing long-term behavior changes towards conservation issues (Smith et al., 2019). In order to analyze the impact the sea turtle program had on the participants, the surveyors distributed a 25 question attitude profile survey at the beginning of the program to determine values and attitudes towards wildlife and the environment before the educational program (Smith et al., 2019). After the attitude survey, a pre and post knowledge questionnaire was distributed to assess how much the participant learned from the program along with an intention-to-act survey at the end of the nesting program to assess conservation awareness and whether routine behaviors will change (Smith et al., 2019). To bring the study together, a survey was given out six months after the program to analyze long-term behavior changes and their satisfaction with the program (Smith et al., 2019). The most significant finding from all the surveys was a momentous change from biological knowledge to conservation-based knowledge from the pre-program survey to the post-program survey, indicating the success of the sea turtle nesting program in increasing conservation awareness (Smith et al., 2019). Additionally, participants valued learning about the pressures and threats posed to sea turtle populations and noted in their post-program surveys that sea turtle conservation is important to share with others (Smith et al., 2019). Without this program being open to the public, many of these participants would have never known about the threats to sea turtles and what behaviors they may need to change (Smith et al., 2019). This study found that sea turtle watch programs that are open to the public have long-lasting impacts on one's behaviors and increases conservation awareness. This study is also closely related to both the volunteer and the NEST program and provided a baseline for this project. The surveys are complimentary based on the questions asked and the same goal of identifying the lasting impacts the programs will have on the participants.

This study was the first of its kind for MORAES and may be used for future volunteers and future community members for continuous analysis of conservation awareness through the

volunteer and NEST programs. Because this was be the first year of NEST for MORAES in partnership with Frost Science, these surveys are essential for understanding the success of the NEST program. This study bridged the gap between administrators and participants and allow MORAES to assess their success in promoting environmental stewardship and refine their protocols.

2.0 Materials and Methods

All activities have been approved by University of Miami under IRB ID 20230357. To determine the success of NEST and MORAES' volunteer program in increasing participant's conservation awareness, surveys were drafted to distribute to the volunteers and the public attending the NEST program. Two separate surveys were created using Qualtrics. Volunteer surveys were distributed to the volunteers through a link sent through a MORAES sea turtle volunteer WhatsApp group chat. NEST surveys were distributed to the participants by allowing them to scan a QR code for easy access after their program, and then reminders were sent via emails. The questions asked to the volunteers and NEST participants were created with MORAES' mission and goals in mind while pulling inspiration from past studies. Each survey was designed to be completed in under five minutes to ensure ease and full completion for a thorough study. After evaluating the responses from the volunteers and NEST participants, the data was compressed in a digestible summary to present to MORAES and Frost Science to determine their participant's conservation awareness and the success of their volunteer program.

2.1 Volunteer Survey

The MORAES' volunteers are willing, unpaid participants who have been trained, are under FWC permit 22-153, and commit a minimum of one day a week to survey Virginia Key beach for sea turtle activity. Some of the volunteers are returning from previous seasons while some volunteers are new to the program. Questions for these surveys were written to learn more about motivation behind volunteering, what has driven some of them to return over multiple seasons, what they have learned, how volunteering has impacted their conservation awareness, general ecosystem knowledge, any lifestyle changes after acquiring conservation awareness, and conservation related behavioral changes. The objective of this survey is to assess how well MORAES' conservation outreach program is functioning and how informed the volunteers are when they walk away from the program.

To begin, the surveys were created on Qualtrics. The link was shared to the volunteers in our MORAES sea turtle volunteer WhatsApp group chat and collected responses from the online platform when the surveys are completed. The goal was to have the survey questions answered in a knowledgeable and immersive way. The volunteers had until the end of the season, which was October 4th this year. The surveys were analyzed by comparing and contrasting all answers, creating codes and grouping the answers, and making percentages for the most popular answers. All surveys were anonymous and can be found in the appendix.

2.2 NEST Program Participant Survey

The stakeholders for this survey consist of the members of the public who have willingly signed up for the NEST program through Frost Science to listen to an education presentation on the Virginia Key beach ecosystem, how sea turtles interact with that ecosystem, and watch a sea turtle nest excavation while listening to a presenter explain the steps of an excavation. Only participants over the age of eighteen were surveyed and all responses were anonymous. At the end of their program, the survey was distributed. The survey was created on Qualtrics and responses were collected from the online platform when the surveys were completed. Ultimately, the participant's knowledge after the program in relation to sea turtle conservation, how turtles interact with the ecosystem, and threats sea turtles face were collected through open-ended questions. In addition, their motivation behind attending the program, if they will change any of their behaviors after learning about sea turtles, and if their conservation awareness improved/changed was analyzed through a variety of questions asked. These answers were coded and grouped based on similarities and summarized to analyze the success of the program in raising conservation awareness. An outline of the survey can be found in the appendix.

3.0 Outputs

3.1 Volunteer Survey

Overall, 15 responses were recorded from the volunteers with full completion of the survey with the exception of Question 4, which received thirteen responses, and open-ended Question 9 that asked the volunteer if they would like to add anything else. Out of the 15 responses, four were from new volunteers and 11 were from repeat volunteers. Question 1 provides a baseline for how the volunteers heard about MORAES. Nine out of the 15 responses

said they heard about the sea turtle volunteering program through knowing the owner or the permit holder via work or simply being friends. One response mentioned stumbling upon the volunteers last season on the beach while photographing the sunrise and asked about the program directly. Another volunteer had heard about the program through the University of Miami's Rosenstiel campus while another heard about the program through a friend. One response mentioned being on the Virginia Key sea turtle survey team before MORAES acquired the permit and stayed with MORAES for the following seasons.

Question 2 had responses from eleven repeat volunteers and four new volunteers. When asked what made the repeat volunteer come back for another sea turtle season, 36% said they enjoy starting their morning walking the beach looking for turtle tracks while 63% mentioned they enjoy and feel pride knowing they are contributing to sea turtle research. 2 out of the 11 responses mentioned they came back to see hatchlings and for their love of turtles in general with no mention of conservation efforts. Another 2 out of the 11 responses said they came back because of their fellow volunteers and workers of MORAES. For the four new volunteers, the responses were a 50/50 split between being interested in working in sea turtle conservation and getting involved in their local community.

Question 3 asks the volunteers about what knowledge they've gained from volunteering while Questions 4 and 5 dive into conservation awareness and behavior changes. For Question 3, 53% of responses mentioned the importance of beaches for sea turtles, that survivorship is low so protection is critical, and how strong mothers and hatchlings need to be to make their way out and into the ocean. 20% mentioned that data collection is the most important thing they learned. The other varied answers included responses such as, how difficult it can be to perform field work in hot, buggy, and rainy conditions, how predation is impacting sea turtle nests, and the unpredictability of nesting. For Question 4, 13 out of the 15 respondents said "Yes" that they would change their behaviors while 2 out of the 15 said "No". 46% said they would use less plastic, watch their CO2 emissions, and live a more sustainable life. 38% said they would have more awareness of beaches in the future, such as looking for tracks, filling in holes that emerge, and removing debris off nests and nesting areas. One volunteer said they would participate in more beach cleanups in the future and work harder on plastic-free initiatives, while another mentioned they will begin educating their friends and families about anthropogenic impacts on turtles. Additionally, one response noted reducing noise and light on beaches at night. Question 5

reiterated many of the same responses as Question 4.

Questions 6 and 8 asks volunteers to rank how connected they feel to the work they're doing and what motivated them to volunteer. Question 6 asked volunteers to rank their responses on a 1-10 sliding scale for three statements. For all three statements, the lowest value was a 6 out of 10 and the highest value was a 10 out of 10. The average mean value for the three statements was 9.31 out of 10.

Finally, Question 7 asks volunteers if volunteering in sea turtle conservation is worth it. All fifteen responses responded positively and believe that volunteering in sea turtle conservation is worth it. 46% said it was worth it because they get to contribute to conservation and research efforts, another 46% said it was worth it because it was a beautiful way to start the morning knowing you're making a difference, learning about sea turtles and the environment, and 27% said it was worth it to help hatchling, specifically, have a higher chance of survival to the ocean.

These questions were formulated to analyze conservation awareness, behavior changes, and motivations of individuals who are dedicating time out of their mornings to better sea turtle populations and provide valuable data to FWC. Below are a few charts and graphs from my survey.

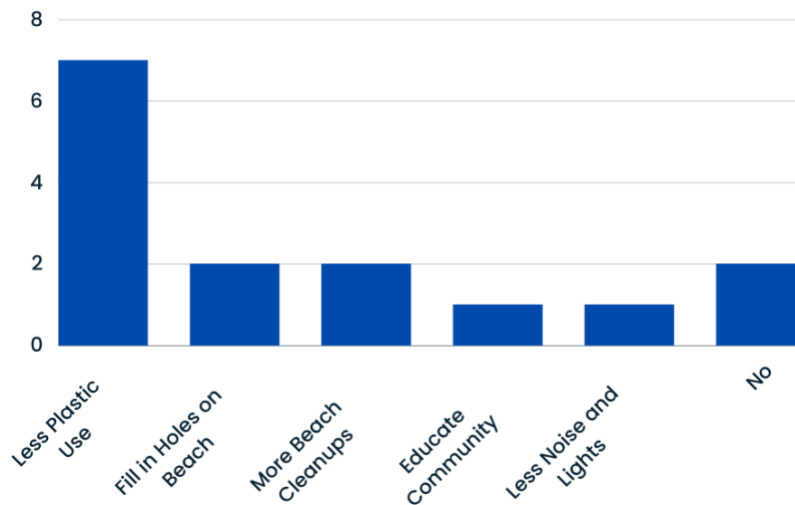


Table 1.1 Question 4: Are you planning on changing any behaviors after volunteering with sea turtles? If yes, which behaviors will you change?

15 out of 15 responses recorded.

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	The volunteering I am doing with MORAES feels worthwhile and I feel like I am making a difference in sea turtle conservation	6.00	10.00	9.13	1.15	1.32	15
2	I feel stronger about conserving marine life after volunteering with sea turtles	6.00	10.00	9.33	1.14	1.29	15
3	I feel more connected to the marine ecosystem and its inhabitants through volunteering	6.00	10.00	9.47	1.09	1.18	15

Table 1.2 Question 6: Please rate the following responses, with 1 being low/disagree and 10 being high/agree

15 out of 15 responses recorded.

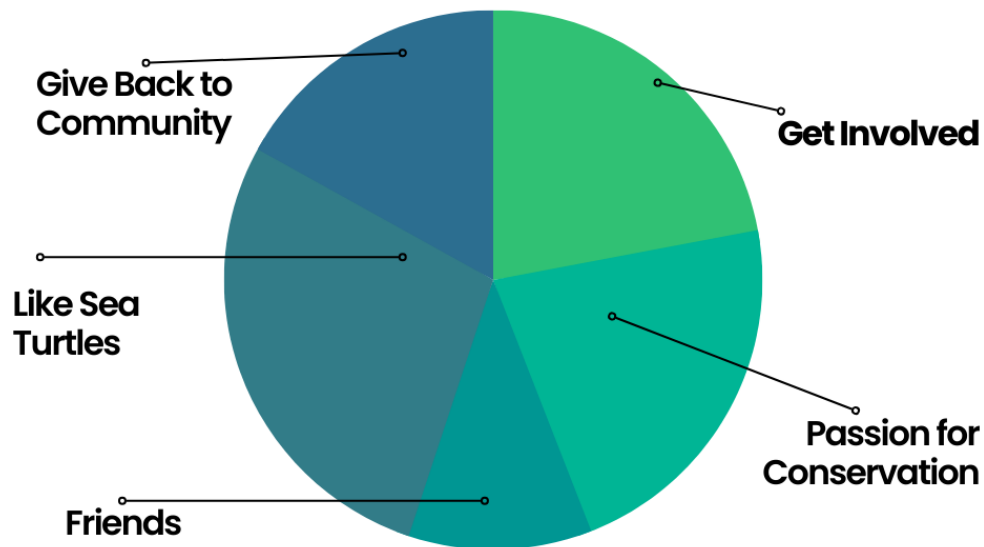


Figure 1.1 Question 8: What motivated you to join the MORAES volunteer team?

15 out of 15 responses

3.2 NEST Program Participant Survey

In total, 25 responses were recorded from the NEST program survey. However, not all nine questions received 25 responses. Below is a figure detailing the amount of responses each question received.

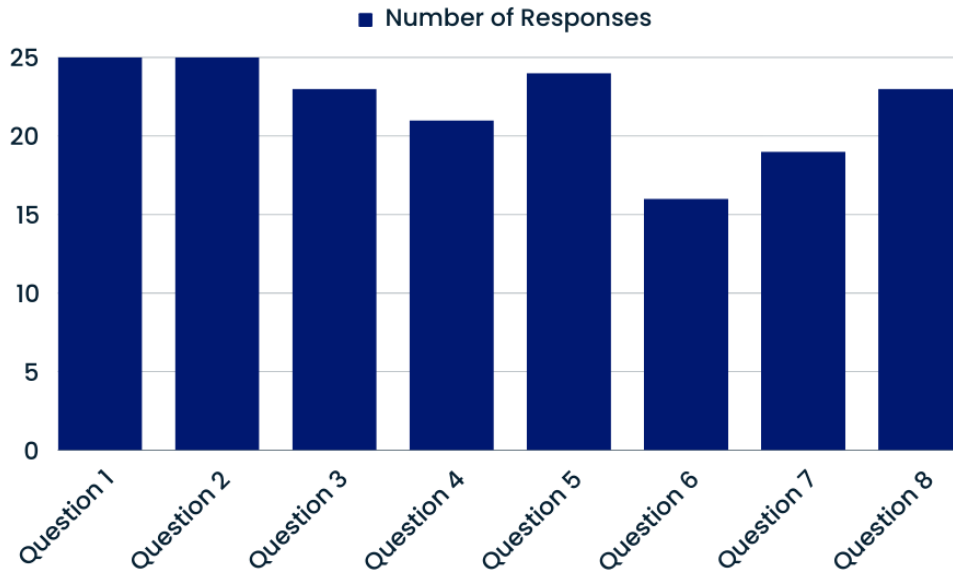


Figure 1.2 Number of responses given for each question of the survey out of 25 surveys completed

Questions 1 and 2 asked participants how they heard about the program and what motivated them to sign up to better understand outreach and what drives the public to participate. Question 3 tested their knowledge before the program to receive a baseline of prior sea turtle familiarity how they would rank themselves on a scale of 1-10. The minimum value was 2/10 with the maximum being 10/10. The mean value was 4.39/10.

Question 4 asked about the most valuable take-away from the program to assess the educators and the program. All 21 responses had slightly different answers, which means the program is speaking on a variety of topics. 52% of the responses were related to sea turtle ecology, like how a nest is build, how many eggs are in a clutch, survivorship, variety of species, and 48% of the responses were related to conservation, like predator prevention, how conservationists help turtles, the knowledge of leaving nature alone, and artificial light. Majority of the answers spoke to turtle survivorship, the mechanics of laying a nest, the importance of protecting turtle nests and leaving them alone if encountered, and predators. A few answers touched on the work of conservationists and showed comprehension of leaving sea turtle conservation and nest excavations to experts. One participant mentioned how harmful artificial light is for new hatchlings emerging from the nest.

Questions 5 and 6 were closely related with Question 5 asking if participants were actively going to change their behaviors as a result of this experience and Question 6 asking participants to elaborate and specify behaviors they will change. There were 24 responses for Question 5 but only 16 for Question 6, meaning eight people didn't feel compelled to change any of their behaviors after this experience. However, 14 individuals responded with a "Definitely yes" and 4 responded with a "Probably yes" when asked if they would change their behaviors. For Question 6, 57% spoke about reducing plastic and single use waste consumption, 21% spoke about already having a sustainable lifestyle that is consistent with beach and aquatic animal conservation, 21% spoke about heightened awareness of nest and turtle activity on beaches, and 1% mentioned reducing light pollution around the beach at night.

Question 7 asked participants what they could do in the future to protect sea turtles and how they might put their conservation awareness into practice.

Question 8 allowed the participants to rate how strongly they disagree or agree with 4 statements concerning the program and their conservation awareness on a sliding scale of 1-10.

Question 9 is an open-ended feedback question that allowed participants to share any thoughts they might have that was not asked in the survey. Below are a few charts and graphs from the survey.

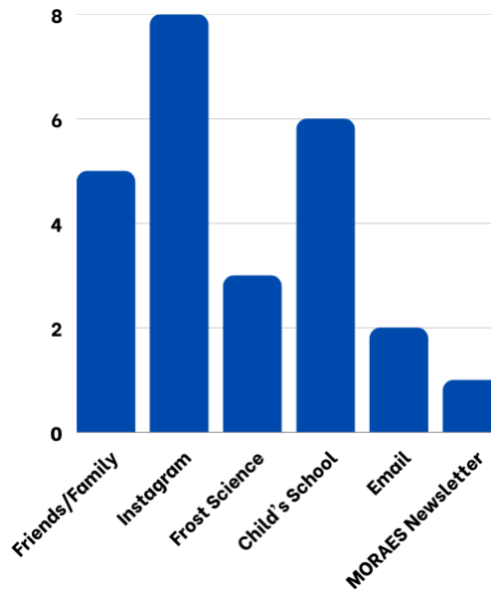


Table 2.1 Question 1: How did you hear about this outreach program?
25 out of 25 responses were recorded.

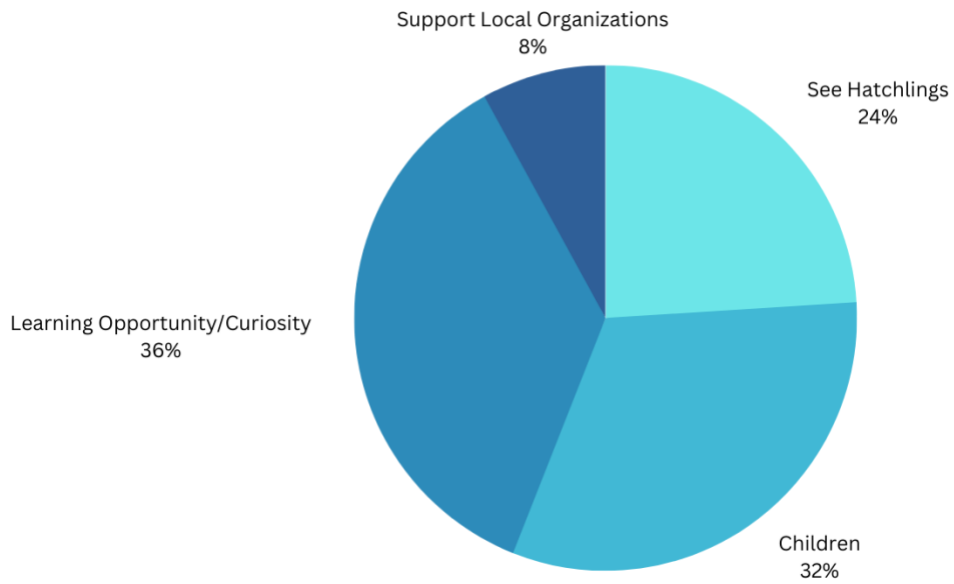
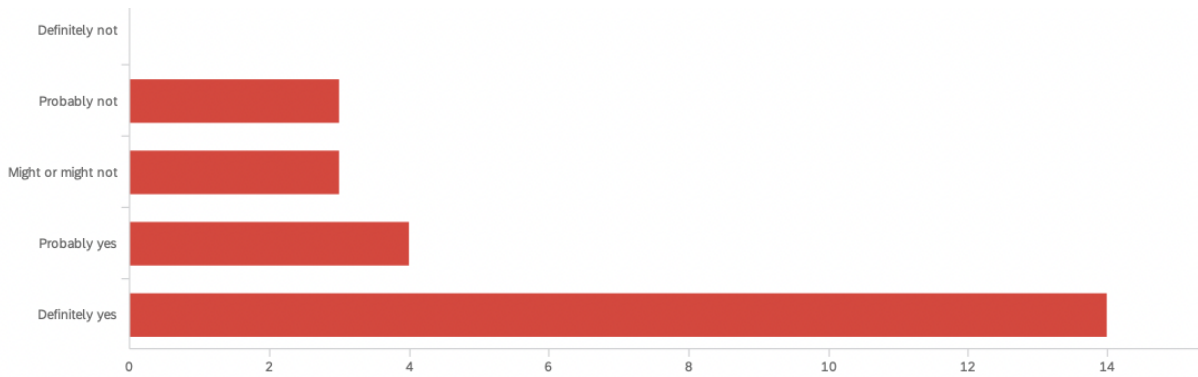


Figure 2.1 Question 2: What motivated you to sign up for this program?
25 out of 25 responses were recorded.



#	Field	Choice Count
1	Definitely not	0.00% 0
2	Probably not	12.50% 3
3	Might or might not	12.50% 3
4	Probably yes	16.67% 4
5	Definitely yes	58.33% 14

Table 2.2 Question 5: Are you planning on changing your behaviors after this experience? Such as less plastic use, more awareness on the beach, etc.?
24 out of 25 responses collected.

4.0 Discussion

4.1 *Volunteer Survey*

Throughout the fifteen responses to my survey, the main path to finding MORAES and its volunteer program was through knowing the permit holder and the founders of the organization. Because of this, attitudes towards sea turtle conservation and the volunteer program were largely positive. With the exception of the six responses that heard about the volunteer program from different avenues, word of mouth is the main source of where the volunteers heard about MORAES. This may have implications for obtaining more volunteers in the future and provides opportunities to branch out of friends and family when looking for more volunteers in the future.

Having input from four new volunteers was beneficial to this study because it provides MORAES with a fresh perspective on their program. The four new volunteers were motivated by a drive to give back to their community and their interest in sea turtles regardless of their educational background. This has implications for securing more volunteers in the future by advertising this program as a way to connect to their local ecosystem while giving back in a positive way regardless of their background. The eleven repeat volunteers offered similar motivations and the fact that they have chosen to volunteer again proves their motivation remains prominent. Many are motivated by a passion for sea turtles and aiding conservation efforts in general, which align with MORAES' mission and goals for their volunteer program. Question 7 ties into this question by asking volunteers if the program is worth their time and efforts. 100% of the responses said "yes", that volunteering in sea turtle conservation is worthwhile and said so for a variety of reasons and multiple reasons. Four of the responses mentioned how rewarding the program was because they were able to meet like-minded people and share the experience with other volunteers. It is beneficial for MORAES to know that the four new volunteers responded as the same as the repeat volunteers and believe volunteering is a worthwhile venture. This is positive feedback that the volunteer program is engaging and pushes for retention.

Question 8 is also related to Questions 2 and 7 and dives into volunteer motivation. Community involvement, aiding their local ecosystem, and loving sea turtles were the largest motivators for joining the MORAES volunteer program. The responses were positively align with high levels of conservation awareness, which shows that the program is assisting volunteers towards conservation-motivated behaviors. Because the majority of the volunteers are friends or co-workers with the MORAES co-founder and permit holder or heard of the program through

word-of-mouth, it may be worth noting that the volunteers will have a similar outlook and conservation awareness as the person they heard about the program from.

To analyze how much knowledge is being shared with the volunteers throughout their time, Question 3 asks what is the most important thing the volunteer has learned about sea turtle conservation. As with a few of the other questions in the survey, the responses were varied and mentioned multiple topics. The most predominant topic seen throughout the responses was the resiliency of sea turtles and the many anthropogenic effects impacting the population. These responses show MORAES that not only are they providing positive opportunities for the public to engage in sea turtle conservation, but they are also providing an educational component in their program. Many of the responses mentioned learning about anthropogenic effects and how best to protect sea turtle populations through data collection. A future recommendation for the volunteer program could be including more educational topics to the volunteers to increase their conservation knowledge and awareness. These responses positively point to conservation awareness and knowledge about conservation for the volunteers.

Because the volunteers did gain knowledge from their experiences, Question 4 asked about behavior changes as a result of this newfound knowledge. Majority of the responses positively swayed towards behavior change and specific behaviors they will change to protect sea turtles. These positive responses indicate a definite increase in conservation awareness and point to the success of the volunteer program in changing behaviors to better sea turtle conservation. These responses coincide with Question 5's responses, which asked volunteers to state one way they can help sea turtles. Many of the responses matched up with the responses from Question 4 such as less plastic use, educating their friends, family, and community, keeping beaches pristine and free of debris, and keeping lights off at night when on or near the beach. Because 86% of the respondents said they would change their behaviors because of this volunteer experience, MORAES is successful in creating a program that is driving positive change for conservation.

When asked to rank their responses for Question 6, almost all the volunteers strongly agreed that the volunteer program felt worthwhile, that they feel more connected to conservation and the marine ecosystem, and feel that they are personally making a difference in sea turtle conservation. These high values are driving conservation awareness, positive behavior change, and volunteer retention for upcoming seasons. A recommendation for the program in order to drive up the minimum value would be to check in with the volunteers throughout the season to

see what they may be lacking in their experience or what they may need in order to deepen their connection to the work they are performing.

4.2 NEST Program Participant Survey

Although this is the first year of the NEST program, the twenty-five responses received provided ample data to assess the success of this program in providing the public with conservation awareness. Majority of the participants learned about the NEST program through social media with the second highest value being word-of-mouth. This result reinforces the importance of continuously posting events through social media and the importance of having an online presence for both MORAES and Frost Science. The more people who attend the program, the more people will speak about the program to their friends and family, which will increase outreach and connectivity in the community. Emails and newsletters have also proven to be an effective way to communicate with the community because a few responses mentioned this method as the way they were notified of the program.

Question 2 dives further into understanding the drive behind wanting to attend the NEST program. The highest value at 36% saw the program as a learning opportunity, not only for sea turtles and their life cycle but also the environment, and a fun and new experience that they might not get elsewhere. The second biggest motivation was children's curiosity. Because the study only surveyed individuals over 18 years of age, majority of the participants were parents with small children. Many responses spoke to wanting to get their children interested in the environment or thinking it would be something exciting for their children to experience. These top two responses provide MORAES and Frost Science with data on how to market this program to motivate and engage the public to attend. Making the program more geared towards children may be a possibility for better engagement. Following children being a strong motivation, seeing sea turtle hatchlings was 24% of people's motivation to sign up. This value may be slightly less tangible because seeing a hatchling is never guaranteed. The final 8% of the public was motivated to sign up to support their local conservation organizations, like MORAES.

Question 3 provides another baseline for how much information to give to the participants in the small lecture before witnessing the nest excavation. The low minimum value and low mean value show that participants have a slightly lower than average knowledge of sea turtles and sea turtle conservation before attending the program. Moving forward, it would be beneficial to ask

how the participant would rank their knowledge after the program to analyze how much knowledge they are gaining from the program. Additionally, adding a question asking the participant to expand on their pre-experience knowledge so the NEST program educators know which information may be included or left out of the learning session.

Overall, the program was successful in introducing the public to a variety of different topics within the realm of sea turtle conservation. Seeing this variety of answers shows that the Frost Science educators are teaching the appropriate topics within the first part of the NEST experience and the participants are retaining the information. Comprehensively, there was almost a 50/50 split between knowledge gained in sea turtle ecology and sea turtle conservation efforts. A recommendation could be gearing the program more towards conservation and anthropogenic effects on sea turtles if increased awareness and behavior changes are the end goal of the NEST program. Otherwise, the program is successful in providing participants with an even educational experience.

When looking at the responses for Questions 5 and 6, it should be noted that some people may have felt pressured to answer the “correct” response for this question or simply didn’t answer for fear of not responding in a conservation-positive way. It should also be noted that reducing plastic consumption and heightened beach awareness were two examples given after Question 5, so 78% of the answers matched the example provided. A possibility for a future study could be omitting the examples and see if there is a difference in responses. This question was asked to stimulate the participant into making conscious efforts towards conservation and resulted in 16 positive responses. A recommendation to increase this number could be providing participants with more achievable and tangible behavior changes that do not intimidate them. For example, turning lights off at night if you live by the beach is a more tangible behavior change than reducing the amount of times you drive your car and opting for public transportation to reduce CO2 emissions.

Question 7 received short answers that were either one or two words with no elaboration. Majority of the responses, around 68%, said using less plastic, recycling, and keeping the ocean and beaches clean was the best way that individuals could help sea turtles. These responses correlated with the Frost Science educator’s presentation during the program, which proves that the program is successful in educating participants on their own conservation behaviors. A few responses mentioned keeping the car lights off at night, raising awareness in their local

community, and educating others about the importance of climate change and recycling. 15% mentioned staying away from a nest on the beach and leaving sea turtles alone. The conservation awareness resulting in this program seems to be very high when analyzing these responses. All 19 responses touched on a key conservation topic presented during the NEST program.

Lastly, for Question 8, the mean value between the four statements was 8.805, which is a high average. Many of the participants felt stronger about conserving marine life after attending the program and felt more connected to the marine ecosystem and its inhabitants. The lowest value was a 2 on one statement, meaning some participants strongly disagreed that they would be likely to recommend this program to a family member or friend. The lowest value was a 3 for two of the statements, meaning some participants ranged from strongly disagree to disagree that the program was beneficial and increased their knowledge on sea turtle conservation and feeling connected to the marine ecosystem. Overall, the 8.805 average on the four statements shows a positive correlation between the program and the participant's conservation awareness. It would be worth discussing with participants on how the program could improve so they would feel more confident in recommending it to others.

This study is closely related to Smith et al., 2019. In the future, I would like to include a six-month post survey, like Smith et al., 2019, to better understand the lasting effects of the NEST program on its participants. I would also like to add a pre-experience survey to receive data on how much a participant knew before the NEST program to compare to the post-experience survey. The last question that was open-ended and asked on the survey was if the individual had any other comments or concerns about the program. One participant noted that they may not have attended the program if there wasn't a guarantee of seeing a hatchling. It may be beneficial to clearly state that hatchling may not be encountered on every nest excavation and to provide a better understanding of how an individual can better sea turtle conservation. One participant said they would have liked to learn more about the intersection of the government and sea turtle conservation. Taking these considerations into future programs may improve outreach and increase participant's conservation awareness.

5.0 Conclusions

The volunteer study is closely related to the Campbell & Smith study from 2006. Just like in Campbell & Smith's study, the volunteers were motivated and driven by contributing to science

and data collection and a desire to protect sea turtles. While Campbell & Smith focused on evaluating volunteer values and this study focused on motivation and conservation awareness, both provide key insights into how bringing the community into sea turtle conservation can increase conservation-positive behaviors and behavior changes. The NEST participant program survey relates to the study performed by Smith et al. in 2019. While this study lacked a pre-knowledge survey and a six-month long-term survey, the results are complimentary in that without a nest excavation viewing program, participants may never have learned about the negative impacts sea turtles face and how changing to a more sustainable and conservation-focused lifestyle can benefit sea turtle populations.

This study aimed to understand how an individual's conservation awareness and behavior may change after participating in a sea turtle conservation volunteer program or nest excavation viewing program. It has been concluded that volunteering in a sea turtle conservation program and attending an excavation program has positive influences on behavior change and resulted in increased knowledge about sea turtles, conservation efforts, and anthropogenic impacts on sea turtles. Many volunteers felt as though their efforts were worthwhile and felt a sense of pride knowing they are contributing to sea turtle conservation. More than half of the participants that responded to the survey after attending a NEST program reported they are planning on changing their behaviors and wish to reduce plastic use and have a heightened awareness when on a beach. This study is the first of its kind for MORAES and presents positive reinforcement of its programs. It's important to continue bringing the community into the conservation realm for better outreach, increase conservation awareness, and promote behavior changes to create positive change for sea turtle populations in South Florida. In the future, this study can expand to include a pre-program survey and a post-program long-term survey to further analyze prolonged conservation awareness and obtain a baseline of knowledge before the program. Additionally, advertising the NEST and volunteer program to expand operations may be beneficial for reaching more community members.

6.0 References

Campbell, L. M., & Smith, C. (2006). What makes them pay? Values of volunteer tourists working for sea turtle conservation. *Environmental Management*, 38(1), 84-98. DOI: 10.1007/s00267-005-0188-0

- Dodd, C. K. Jr. (1988). Synopsis of the biological data on the loggerhead sea turtle *Caretta caretta* (Linnaeus 1758). *Biological report* 88(14). U.S. Fish and Wildlife Service, Washington, D.C.
- Ehrhart, L. M., Bagley, D. A., & Redfoot, W. E. (2003). *Loggerhead turtles in the Atlantic Ocean: Geographic distribution, abundance, and population status*. Loggerhead Sea Turtles. Smithsonian Institution Press, Washington, D.C., p. 157-174.
- Ellis, C. (2003). Participatory environmental research in tourism: A global review. *Tourism Recreation Research*, 28(3), 45-55. DOI: 10.1080/02508281.2003.11081416
- Fennell, D. A. (2002). The Canadian ecotourist in Costa Rica: Ten years down the road. *International Journal of Sustainable Development*, 5(3), 282-299. DOI: 10.1504/IJSD.2002.003754
- Hassan, R., Yahya, N. K., Ong, L. M., Kheng, L. K., Abidin, Z. Z., Ayob, A., & Jainal, A. M. (2017). Public awareness program and development of education toolkit for green sea turtle conservation in Sarawak, Malaysia. *International Journal of Environmental & Scientific Education*, 12(3), 463-474. DOI:/10.12973.ijese.2016.1241p
- Honey, M. (1999). *Ecotourism and sustainable development: Who owns paradise?* Washington, DC: Island Press
- Jefferson, R., Mckinley, E., Capstick, S., Fletcher, S., Griffin, H., & Milanese, M. (2015). Understanding audiences: Making public perceptions research matter to marine conservation. *Ocean & Coastal Management*, 115, 61-70. DOI: 10.1016/j.ocecoaman.2015.06.014
- Newsome, D., Dowling, R. K., & Moore, S. A. (2005). *Wildlife tourism*. Clevedon: Channel View Publications

NOAA. (2023). Loggerhead sea turtle (*Caretta caretta*) Northwest Atlantic Ocean DPS 5 year review: Summary and Evaluation. NOAA Fisheries website, https://media.fisheries.noaa.gov/2023-3/Signed_5YrReview_NWAtlantic_Loggerhead.pdf

Rattan, J. K., Eagles, P. F.J., & Mair, H. L. (2011). Volunteer Tourism: Its role in creating conservation awareness. *Journal of Ecotourism*. DOI: 10.1080/14724049.2011.604129

Senko, J., Schneller, A. J., Solis, J., Ollervides, F., & Nichols, W. J. (2011). People helping turtles, turtles helping people: Understanding resident attitudes towards sea turtle conservation and opportunities for enhanced community participation in Bahia Magdalena, Mexico. *Ocean & Coastal Management*, 54, 148-157. DOI: 10.1016/j.ocecoaman.2010.10.030

Shamblin, B. M., Dodd, M. G., Griffin, D. B., Pate, S. M., Godfrey, M. H., Coyne, M. S., Williams, K. L., Pfaller, J. B., Ondich, B. L., Andrews, K. M., Boettcher, R., & Nairn, C. J. (2017). Improved female abundance and reproductive parameter estimates through subpopulation-scale genetic capture-recapture of loggerhead turtles. *Marine Biology* 164(6). DOI:10.1007/s00227-017-3166-1

Smith, J. R., Witherington, B., Heimlich, J. E., Lindborg, R. J., Neidhardt, E., & Savage, A. (2019). Public sea turtle watches serve as effective environmental education. *Environmental Education Research*, 25(2), 292-308. DOI: 10-1080/13504622.2018.1509300

Wearing, S. (2001). Volunteer tourism: *Experiences that make a difference*. New York: CABI

Wearing, S., & Neil, J. (1999). *Ecotourism: Impacts, potentials and possibilities*. Boston, MA: Butterworth-Heinemann

Wearing, S., Young, T., & Everingham, P. (2017). Evaluating volunteer tourism: Has it made a difference? *Tourism Recreational Research*, 42(4), 1-10. DOI: 10.1080/02508281.2017.1345470

7.0 Appendix

Volunteer Survey Outline

1. How did you hear about this volunteer program with MORAES?
 1. Comment Box
2. Are you a repeat volunteer or a new volunteer?
 1. This or That
 2. If a repeat volunteer, what made you come back?
 1. Comment Box
 3. If a new volunteer, what you decide to sign up?
 1. Comment Box
3. What is the most important thing you've learned in regard to sea turtle conservation?
 1. Comment Box
4. Are you planning on changing your behaviors after volunteering with sea turtles?
 1. Yes or No
 2. If yes, which behaviors?
 3. List behaviors
5. What is one thing you can do to help sea turtles?
 1. Comment box
6. Rate the following responses:
 1. The volunteering I'm doing with MORAES feels worthwhile and I feel like I'm making a difference in sea turtle conservation
 1. 1-10
 2. I feel stronger about conserving marine life after assisting with sea turtle nesting
 1. 1-10
 3. I feel more connected to the marine ecosystem and its inhabitants through volunteering
 1. 1-10

7. Would you say volunteering in sea turtle conservation is worth it? Why or why not?
 1. Comment box
8. What motivated you to join the MORAES volunteer team?
 1. Comment Box
9. Anything else you'd like to add regarding your conservation awareness and the effectiveness of the MORAES volunteer program?
 1. Comment Box

NEST Participant Survey Outline

1. How did you hear about this outreach program?
 1. Comment Box
2. What motivated you to sign up for this program?
 1. Comment Box
3. On a scale of 1-10, how would you rate your knowledge of sea turtles and sea turtle conservation before this experience?
 1. 1-10
4. What is the most important thing you learned today about sea turtle conservation?
 1. Comment Box
5. Are you planning on changing your behaviors after attending this experience? Such as less plastic use, more awareness on the beach, etc.?
 1. Yes or No
 2. If yes, which behaviors?
 3. List behaviors
6. What is one thing you can do to help sea turtles?
 1. Comment Box
7. Rate the following responses:
 1. This outreach program was very beneficial and increased my knowledge on sea turtle conservation
 1. 1-10
 2. I feel stronger about conserving marine life after attending this program
 1. 1-10

3. I feel more connected to the marine ecosystem and its inhabitants through this program
 1. 1-10
4. How likely would you recommend this program to a family member/friend?
 1. 1-10
8. Anything else you'd like to add regarding your conservation awareness and the effectiveness of the NEST Program?
 1. Comment Box