THESIS

THE ROLE OF YOUTH ADVENTURE PROGRAMS FOR SHAPING A CONSERVATION ETHIC

Submitted by

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ABSTRACT

ROLE OF YOUTH ADVENTURE PROGRAMS FOR SHAPING A CONSERVATION ETHIC:

Research shows that the experiences humans have with nature during their youth and adolescence can reinforce pro-environmental values, attitudes, and behaviors in adulthood (Bruni & Schultz, 2009; Tanner, 1980). Environmental education (EE) has been used to facilitate these formative experiences, especially within outdoor adventure programs committed to educating youth on conservation issues, and developing a conservation ethic (CE) that empowers participants to engage in pro-environmental behaviors (Pitt, Schultz, & Vaske, 2019). CE refers to an environmental attitude and corresponding behavioral guide as it relates to the judicious use, allocation, and protection of natural resources, for the purpose of sustainably managing the world's ecosystems and services they provide (Callicott, 1990; Ehrlich, 2002; Robinson & Garratt, 1999). This study seeks to better understand how program design and subsequent experiences impact youth in adventure programs, specifically as it relates to the development and/or expansion of a CE in participants. This study took place at the Boy Scouts of America (BSA) Florida National Sea Base High Adventure program, and included the Marine STEM Adventure, Fishing Adventure, and Keys Adventure programs. Using on a mixed-methods approach, this research consists of observational data from participation in the Marine STEM and Out Island program(s), interview data from semi-structured interviews with scouts (n=20), and pre and post-program survey data from scouts and adult leaders (n=252). Survey data was examined with an principal factor analysis and reliability tests to reveal reliable distinctions between variables, *t*-tests to determine significant differences in variables before and after

participant experiences, multivariate analyses that determined the relational strength of independent variables against the dependent variable CE, and use of one-way Analysis of Variance (ANOVA) to determine significant differences across the Sea Base programs surveyed. Interview data underwent a content analysis to identify themes as they relate to the survey data and analysis, with observational data offering additional context and validity of interpretation of survey results. Self-reported program impacts (i.e. the perception in an increase in awareness and knowledge of marine environmental issues, confidence and motivation to care for natural resources, and the fulfillment of a High Adventure Sea Base experience) was the strongest site-specific variable that predicted CE and the Sea Base program could readily influence.

This analysis provides insight on existing literature relating to youth adventure programs and how to operationalize lessons learned for Sea Base and similar outdoor programs. Informed by study results and previous literature, this research also makes recommendations for how to cultivate experiences that focus on deliberate use of EE and increase effectiveness of the youth adventure programs in their commitments to cultivating a CE in youth.

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DEDICATION

This thesis is dedicated to my sweet little sister, Ashley, and the self-reminder to just take it one oil barrel at a time…

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CHAPTER 1 – INTRODUCTION

1.1 Introduction

There are varying interpretations of how people relate to the natural world, yet it should come as no surprise that positive experiences in early adolescence contribute to pro-environmental behaviors in adulthood (Louv, 2005; McGuire, Dottavio & O'Leary, 1987; Tanner, 1980). The relationships we have with nature have always been complex, but in just a few generations they have also become increasingly estranged (The Nature Conservatory, 2011). For the perpetually growing urban populations in the U.S., nature is often regarded as abstract and distant from everyday realities. As Richard Louv (2005) bemoans, "nature has become something to watch, to consume or wear – to ignore" (p.2).

In the last few decades, human behavior has contributed to adverse environmental impacts that have become progressively severe and frequent, and as a result, implementation of environmental education (EE) has garnered worldwide attention towards youth (Barata et al., 2017). EE efforts may help facilitate a paradigm shift in how humans view the natural world and their relation to it. EE provides "systematized structure capable of developing critical, participatory, transformative and emancipatory education that encourages, enables and empowers participating subjects to be responsible and have both the desire and [capacity] to promote environmental ethics and citizenship" (Rodrigues Nunes et al., 2017, p. 59).

More specifically, adventure programs are often catered to youth and incorporate EE, serving as a pragmatic mechanism for equipping future generations with personal commitments toward environmental preservation. These programs offer intentionally constructed activities that shed light on how one comes to understand and interact with nature and develop a conservation ethic

(Cottrell, 2015). A conservation ethic (CE) refers to a pro-environmental attitude *and* corresponding behavioral guide, relating to the judicious use, allocation, and protection of natural resources, for the purpose of sustainably managing the world's ecosystems and services they provide (Callicott, 1990; Ehrlich, 2002; Robinson & Garratt, 1999).

The positive experiences people have with nature, especially during adolescence, can encourage pro-environmental attitudes and subsequent pro-environmental behaviors in adulthood (Bruni & Schultz, 2009). Pro-environmental attitudes are the favoring psychological tendencies, influences, and behavioral intentions an individual adheres to, with regard to environmentally related activities or issues (Schultz, et al., 2005; Eagly & Chaiken, 1993). Pro-environmental attitudes are also antecedent to pro-environmental behaviors, which are behaviors that have a positive impact on the current supply of natural resources, or existing structural integrity and complexity of natural ecosystems (Larson, Whiting, & Green, 2011; Lee, Kimb, Min-seong, & Choi, 2014; Yurieva, Dahmen, Pailléc, Boirala, & Guillaumie, 2020). Examples of pro-environmental behaviors include green purchases (e.g., buying organic or locally sourced food), good citizenship behavior (e.g., recycling, staying on park trails, safely putting out campfires), and environmental activist behavior (e.g., being part of an environmental coalition or having an influence on pro-environmental policies). Because attitudes guide behavior, individuals that hold a CE are more likely to engage in pro-environmental behaviors.

Youth adventure programs and their application of EE offer a variety of opportunities for development of a conservation ethic: social interactions, time spent in nature, skill-development in outdoor settings, provision of ecosystem knowledge and awareness of pressing environmental issues. Cumulation of such experiences given in a positive, mentally and physically stimulating manner may help facilitate the motivational factors that cultivate a CE.

If EE in youth adventure programs serve as the means of deliberately cultivating a stimulating, educational experience out in nature, CE serves as both the pro-environmental attitude individuals can acquire or develop, but also a behavioral model for how to engage in pro-environmental behaviors. As a behavioral model, CE can be operationalized into specific criteria (see Table 2), and used as a tool encourage pro-environmental attitudes and guide subsequent behaviors. *Because* youth adventure programs are held in structured natural environments, these programs can more readily create specific situational factors that expose youth to pro-environmental norms and provide positive experiences out in nature while utilizing EE, which may encourage pro-environmental attitudes and subsequent behaviors later on in life as well. Pro-environmental norms are a common set of behaviors and/or beliefs that groups of people conform to under social contexts and/or situations as they relate to CE and the like (e.g. environmental ethics, pro-environmental behaviors); they can also be understood as an agreed upon set of rules managed by the social approval or disapproval of said social context or situation (Farrow, Grolleau, & Ibanez, 2017).

While a significant body of literature has emerged on lessons learned from best practices of EE (Thomas et al., 2019; Bruni, Winter, Shultz, Omoto, & Tabanico, 2017; Stern, Powell, & Hill, 2014; Ernst & Theimer, 2011), research is lacking on the effects of EE within youth adventure programs specifically. Therefore, examining EE adventure program design and how youth engage in these programs may provide insight on what fosters a CE, and what it takes to rekindle the connection to nature for a populace growing increasingly dispassionate. The following review will focus on literature in CE, factors that influence pro-environmental behaviors, EE, youth adventure programs, and the Florida Sea Base adventure program specifically. These concepts illustrate the powerful influence that youth adventure programs can

have on people, particularly youth, and emphasize the need to better understand how to deliberately design programs that can help cultivate and/or enhance a CE.

1.2 Purpose of Study

The meanings people construct with their natural environment are antecedent to environmentally significant behaviors (Vaske & Kobrin, 2001). Several studies demonstrate that children growing up in more urbanized areas are less likely to have a relationship with nature (Kemp, 2015; Tam, 2018; Chawla, 2015). From the perspective of a child growing up in a world with little to no interactions with the natural environment, it would seem the creature comforts of new technologies render nature irrelevant. Yet the draw to nature persists (Wilson, 1984), whether through interactions with our pets, the potted plants we tend to in our home or office, or from the calming effect of the aquarium at a nice restaurant. Unfortunately these subtle inclusions of nature in no way amount to the structural experiences that prolonged periods of time spent in nature provide.

While it can be assumed that negative experiences outdoors can instill emotionally adverse associations towards the natural environment, the deliberate design and organizational structure of youth adventure programs with commitments to EE often have a positive effect on participant values and attitudes (Cleary, Fielding, Murray, & Roiko, 2018; Bruni & Schultz, 2009).

Youth adventure programs serve as one of the limited and oftentimes crucial opportunities today's children have for fostering relationships with the natural environment, offering insight on *how* successful versions of these programs facilitate a CE that may encourage pro-environmental attitudes and behaviors. This research helps discern how youth adventure programs may establish

a CE in participants, providing essential contributions to EE research in such programs as well. This study incorporates a mixed-method 3-phase approach (Creswell & Clark, 2018) that incorporates pre and post-test surveys, semi-structured interviews, and participant observations of scouts at the Boy Scouts of America Florida Sea Base High Adventure program in the Florida Keys.

1.3 Predictive Framework of Conservation Ethic

The theoretical implications of this thesis are informed by the Predictive Framework of Conservation Ethic (Figure 1), an adaptation of Cottrell and Meisel's (2004) Predictive Framework of Personal Responsibility among SCUBA divers. Similar to this study's investigation in predictors of a CE, Cottrell and Meisel's (2004) paper identifies predictors of personal responsibility in marine settings, using their predictive framework as a guide for investigation.

Figure 1 depicts variables hypothesized to be closely related with the prediction of CE. The model is organized into three levels of variables arranged from left to right, representing the increasing strength of the relationship between independent variables in the 1 and 2 levels, and the dependent variable in the Level 3 category (Cottrell & Graefe, 1997). Level 1 includes background variables, two of which are sociodemographic (age and education) that have shown to be predictors of pro-environmental attitudes and behavioral commitments in previous literature (Liefländer, Fröhlich, Bogner, & Schultz, 2012), although other studies have found it is often a weak and sometimes negative predictor of such (Hines, Hungerford, & Tomera, 1987). Familiarity and frequency of outdoor recreation is also thought to be a contributing predictor of pro-environmental attitudes and behaviors because an increased amount of time spent outside

may induce emotional responses towards the environment, such as place attachment (Lee, 2011). Scouting experience (measured through years scouting, scouting rank, and merit badges acquired) relates to the tradition and culture of scouting, which focuses on outdoor ethics, skill development, team building, and leadership in predominantly outdoor settings. The familiarity and frequency of outdoor experience as a scout may also predict CE.

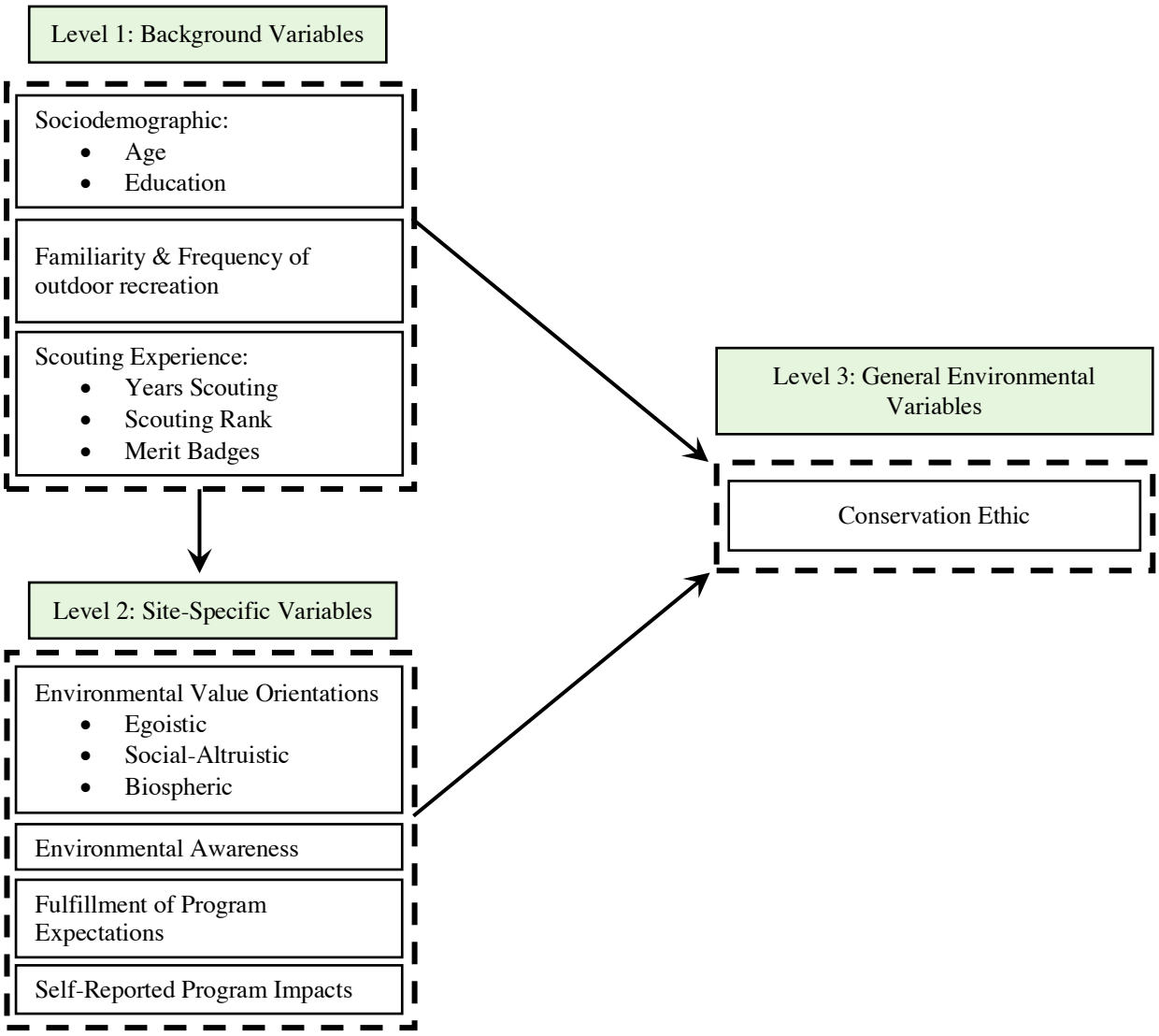

Figure 1: *Predictive Framework of Conservation Ethic, adapted from Cottrell and Meisel's (2004) Predictive Framework of Personal Responsibility in SCUBA divers*

Level 2 includes site-specific variables, such as environmental value orientations: egoistic, social-altruistic, and biospheric. Social-altruistic and biospheric variables are considered to be predictors of pro-environmental behaviors, with egoistic value orientations negatively predicting such (De Groot & Steg, 2008). Although environmental values are unlikely to change during a short youth adventure program, they appear in the Level 2 dimension of the Predictive Framework of CE because they were measured post-program (like all other variables in this dimension), and so are placed here for organizational purposes. Environmental awareness was thought to be a predictor of pro-environmental attitudes and behavior in past literature, however, it is now widely understood as an insufficient predictor for such attitudes (Amel, Manning, Scott, & Koger, 2017). Environmental awareness was included to confirm or disprove existing theory viewing it as a predictor of pro-environmental attitudes. Fulfillment of program expectations were included because positive experiences in outdoor environments are thought to be predictors of pro-environmental attitudes as well (McGuire, Dottavio & O'Leary, 1987). Environmental awareness, fulfillment of program expectations, and CE were variables on the pre and post survey, and were used to compare significant differences pre and post program through use of *t*-tests (see Chapter 5). Environmental awareness of fulfillment of program expectations are shown as post-survey variables in Figure 1, so that predictors of CE could be made on results post-program.

Finally, self-reported program impacts ask questions related to perceived program impacts, such as the belief that the program has made respondents more knowledgeable and aware of marine environmental issues, and more confident and motivated to engage in outdoor environments in a pro-environmental manner. According to Hungerford & Volk (1990), for people to have the motivation to engage in pro-environmental behaviors, they must possess a locus of control, or the knowledge *and* confidence to do so. Therefore, the inclusion of self-

reported program impacts determines whether factors such as confidence, motivations, perceived awareness, and knowledge as it relates to engagement with natural areas predicts CE.

1.4 Research Goals & Hypotheses:

Informed by Figure 1, this thesis investigates predictors of a CE under the context of the Boy Scouts of America Sea Base High Adventure program in Summerland Key, FL. It also seeks to identify significant differences before and after program experiences, and significant differences between programs surveyed (Marine STEM, Keys Adventure, Out Island). This mixed-methods study triangulates survey results with interview and observational data.

The goal of this research is to use quantitative data to identify which background and site specific variables predict a conservation ethic, and identify significant differences across programs and to use qualitative data (i.e. interviews and observations) to triangulate findings. Results can help inform Sea Base and other youth adventure programs with a focus on using EE for cultivating a CE in participants.

Hypotheses are as follows:

H1: Age will be a significant predictor of CE

H2: Education will be a significant predictor of CE

H3: Scouting experience will be a significant predictor of CE

H4: Familiarity & Frequency of outdoor activities will be a significant predictor of CE

H5: Fulfillment of program expectations will be a significant predictor of CE

H6: Environmental Awareness will be a significant predictor of CE

H7: Self-Reported Program Impacts will be a significant predictor of CE

H8: Biospheric Value Orientation will be a significant predictor of CE

H9: Social Altruistic Value Orientation will be a significant predictor of CE

H10: Egoistic Value Orientation will be a negative predictor of CE

H11: Environmental Awareness will significantly increase post-program

H12: CE will significantly increase post-program

1.5 Thesis Organization

This thesis investigates predictors of a CE under the context of the Boy Scouts of America Sea Base High Adventure program in Summerland Key, FL, organizing this document into 6 chapters (i.e. Introduction, Literature Review, Methodology, Multivariate Analysis, Mixed-Method Analysis, and Conclusion), and uses a two-article format in the 4th and 5th chapters. Results of hypotheses are outlined in chapters 4 and 5.

Article 1 (Chapter 4) uses quantitative data to investigate background and site-specific predictors of CE through multivariate analyses. This chapter asks (1) Which background variables are statistically significant predictors of a CE?, and (2) Which site-specific variables are statistically significant predictors of a CE? Background variables include age, education, scouting experience (i.e. years scouting and rank), and frequency and familiarity of outdoor recreation. Site-specific variables include environmental awareness, environmental value orientations (i.e. egoistic, biospheric, and social altruistic), and fulfillment of program expectations. If the goal is to enhance and/or foster CE in participants of youth adventure programs, investigating background and site-specific variable predictors of CE offers insight on which site specific variables to focus on in future EE design.

Article 2 (Chapter 5) uses mixed-methods to investigate whether program expectations/fulfillment of expectations, environmental awareness, and CE are significantly different before and after program (using *t*-tests*)*. This section also identifies significant differences across the Sea Base programs studied (i.e., Marine STEM, Keys Adventure, and Out Island) using the one-way Analysis of Variance (ANOVA) test. Article 2 also includes results from a content analysis of interview data, and references observational data (i.e., daily journal entries organized in an observational model of youth interaction) from the Marine STEM and Out Island Program(s), permitting triangulation of findings. In this chapter, I ask (1) Are the differences in site specific variables that predicted CE statistically significant across the Marine STEM, Keys Adventure, and Out Island Programs? (2) What do participants value most as a reason for having a CE (i.e. biospheric, social altruistic, or egoistic)? (3) What did scouts expect to get out of their experience at the Florida Sea Base? (4) What were scouts' specific highlights during program? (5) What do scouts believe it means to have a CE, and why is this important? (6) What do scouts consider to be the greatest threat to the marine environment, and what can be done about this? (7) What do scouts believe makes someone environmentally irresponsible?

Both articles include specific methods for analysis, results, and a discussion of findings. Chapter 6 concludes with a synthesized discussion of all results and highlights opportunities for future research.

CHAPTER 2. LITERATURE REVIEW

2.1 Environmental Education

EE is an educational process that relates to education on global and local human-environmental interrelationships and the anthropocentric impacts on natural and built environments, relating to: energy, resource use and allocation, population growth, the means of travel and transportation, use of technology, economic impacts, and urban and rural planning (U.S. Government Printing Office, 1983). Given that human behavior is the cause of 75% of Earth's environmental degradation (Leahy, 2018), a comprehension of pro-environmental attitudes, subsequent behaviors, and how to encourage them using EE practices is warranted.

For EE programs to encourage pro-environmental attitudes in youth, specific teaching methods proven to be effective should be considered (Wi & Chang, 2019). In their systematic literature review of EE programs and impacts on youth, Stern et al. (2014) highlight some of the best practices of effective EE programs. These include physical engagement with the environment when learning and solving problems (hands-on observation and discovery); active involvement in the educational experience, as opposed to passively receiving verbal information (active involvement); engagement in the selection, planning, implementation and evaluation of environmental projects that relate to real-world scenarios (project-based learning); learning environments that allow participants to actively cooperate or discuss what they learn (cooperative/group learning); learning that takes place outside (outdoor instruction); collection of scientific data where participants are immersed in the data collection process (data collection and immersive field investigation); and educational content conveyed through multiple forms and media, involving use of touch and smell along with visuals (multimodal delivery of content).

EE programs should not merely educate participants on ecology and environmental issues, they should allow them to truly engage with nature and develop significant life experiences that may encourage pro-environmental behaviors. For example, in his studies on the formative influences of environmentalists, Tanner (1980) observed that the experiences people have in adolescence often foreshadow pro-environmental behaviors as adults. People who dedicate their lives to conservation were likely impassioned by a love for the environment, oftentimes recalling childhood experiences that permitted them to enjoy the pleasures of nature for themselves.

Unfortunately these childhood experiences in nature are on the decline. A survey of American youth concluded that while there is a general sentiment that being outdoors is enjoyable, youth do not spend as much time in nature as they spend participating in indoor activities (The Nature Conservatory, 2011). Bruni et al. (2017) add that the drastically different life experiences of children today include less time spent outside, less knowledge about local fauna and flora, an increased metropolitan lifestyle, and overreliance on human-built features and technology. While the existing values of older generations cannot be undone, if today's "American youth are given more opportunities to have meaningful experiences outdoors, they will be more likely to value nature, engage with it, and feel empowered to do something about it" (The Nature Conservatory, 2011, p. 3). In other words, because every-day excursions in nature are on the decline, it is especially important to make those experiences count (e.g. through deliberately designed youth adventure programs).

If the aim of education is to shape human behavior (Hungerford & Volk, 1990), or at least offer guidance on what that behavior should be, EE helps to operationalize pro-environmental attitudes and subsequent behaviors in youth. EE offers a collaborative process for youth to actively engage with one another, their teachers, and the natural environment, likely fostering

attitudes that not only promote environmental conservation, but also establish life-long relationships with nature. The EE objectives intended to address behaviors towards the environment were first presented at the Tbilisi Intergovernmental Conference on Environmental Education in 1977. These objectives center on awareness, knowledge, attitudes, skills, and participation (UN Environment Program, 1978), which are outlined in Table 1.

Table 1: Categories of Environmental Education Objectives

Knowledge: To help individuals and social groups gain a variety of experience in, and acquire a basic understanding of the environment and associated problems

Skills: To help individuals and social groups acquire the skills for identifying and solving environmental problems

Awareness: To help individuals and social groups acquire an awareness of and sensitivity to the total environment and its allied problems

Attitudes: To help individuals and social groups create a set of values and feelings of concern for the environment, and motivation for actively participating in environmental improvement and protection

Participation: To provide individuals and social groups actively involved at all levels in working toward resolution of environmental problems

(United Nations Environment Program, 1978, p. 26-27)

In reference to these EE objectives, Hungerford and Volk (1990) point out that one "must be cognizant of the existence of the [environmental] issue" and have knowledge regarding what course of action to take when spending time in natural areas (e.g. knowledge of the Leave No Trace Ethics; Center for Outdoor Ethics, 2019). Skill is also needed to appropriately apply knowledge to any given environmental issue. While it does not take much skill to aim for a recycling bin upon picking up a plastic bottle found on the trail, skill and knowledge are required for more technical recreational activities, such as SCUBA diving. To avoid the physical damage of delicate corals (and oneself), proper training is required before activity engagement. This also

requires an awareness of existing environmental issues, the collective consequences tourists have on the environments they visit, and an awareness of one's personal impact. Upon grasping the first four EE objectives, a user may feel confident when engaging in these outdoor settings (i.e., hold an internal locus of control) and feel motivated to participate in outdoor activities in a pro-environmental manner (Hungerford and Volk, 1990), especially under social settings such as a Boy Scout camp, where pro-environmental behaviors are the norm (Boy Scouts of America, Sea Base High Adventure, 2020). For example, Florida Sea Base scouts that have acquired the confidence in one's knowledge, awareness, and skill when engaging in marine ecosystems may be more inclined to avoid behaviors such as improper catch-and-release techniques when releasing certain species of fish, wearing copious amounts of regular sunscreen when snorkeling over reefs, or touching/breaking off pieces of coral (whether from improper swimming techniques or the desire to take home a souvenir).

EE programs should also take a deliberative approach in executing pedagogies that have proven successful. Connecting new knowledge to pre-existing knowledge (i.e. constructivist theory) may serve as a powerful tool for programs with commitments to EE and environmental stewardship (Hendry, 1996). EE programs should not merely lecture but engage participants by relating new ecological knowledge to current understandings of their natural environments back home. It may also prove useful to incorporate a more focused type of EE, conservation education. Conservation education utilizes a "stronger advocacy component…that acknowledge[s] the role humans have in being both the cause of, and the solution to, environmental problems" (Thomas et al., 2019, p. 173). Conservation education may be especially impactful if the associated advocacy component is tied back to natural environments participants already care about and relate to back home.

Effective EE programs incorporate experimental techniques such as hands-on learning, participation during educational activities, and give participants a sense of ownership through data collection (Pitt, Schultz, & Vaske, 2019), as well as incorporate more constructivist learning measures in which participants tie lessons learned back to existing knowledge or real-world experiences (Stern et al., 2014; Jacobson, McDuff, & Monroe, 2006).

2.2 Conservation Ethics

The discourse surrounding environmental ethics like CE involve oscillating tensions between the intrinsic worth of nature and the anthropocentric interests of humanity. While such inquiries date back thousands of years, the concept of an environmental ethic does not appear until the twentieth century, gaining momentum in the 1970's environmental movement (Rolston III, 1998). During this time, concerns for the health of the planet ignited environmentalism and pro-environmental philosophies, leading to more critical ethical interpretations regarding the treatment of nature.

John Muir, a significant figure in the environmental movement in the United States, tied spiritual meaning to the natural environment, affirming that the creations put on this earth by God must be superior to those of mankind. He believed that human beings found their home in nature, and that state and local governments should not give in to political interests and sell off their wilderness areas. Muir actively campaigned for the establishment of a natural park system that directly influenced the establishment of the Yosemite National Park in 1890 (National Park Service, U.S. Department of the Interior, 2021).

Arne Naess' principles in 'deep ecology' ensued in response to environmental issues and a need for a cultural shift in how humans view themselves against nature. Naess stressed the interrelationships between humans and nature, stating that both possessed inherent values in their

own respect, or "biospherical egalitarianism," as Naess defined it (McShane, 2009, p. 414). Naess' philosophy of deep ecology argues that all humans should reevaluate how they live their lives (i.e. spending habits, policy, compliance with population growth), and that people should see themselves as related to nature, as opposed to distinct from it. The movement associated with deep ecology pushed for global reform on industrial societies, their economic systems, and cultural interpretations of nature (Naess & Rothenberg, 1989). At their core, these movements seek to establish a means of developing pro-environmental attitudes (such as a CE) that elicit pro-environmental behavior towards the environment.

While not a philosopher per se, Marjory Stoneman Douglas held similar environmental philosophies that underscored a need to value nature and its relationship to humans. Douglas dedicated half her life to the protection of the Florida Everglades for the "aesthetic, spiritual, and ecological value[s]" she saw in these wetland environments (Branch, 1998). Like Muir, she too battled with political interests and served as a powerful ally to the environmental moment in the 1970's up until her death at 108 years old. Douglas was actively involved on the Everglades National Park Commission, founded the prominent environmental group Friends of the Everglades, and helped stop the construction of a jetport in the eastern part of the Everglades. Her environmental activism is worth noting, as her pro-environmental attitudes overlap with Naess's philosophies in deep ecology, and CE in general.

Aldo Leopold, a wildlife ecologist, conservationist, and professor is best known for his coining of 'The Land Ethic' (Leopold, 1968). Leopold produced over 500 publications covering theories on agriculture, wildlife management, and forestry (Millstein, 2018), and while he had no formal training in philosophy, one of Leopold's most notable quotes regarding the land ethic asserts: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic

community. It is wrong when it tends otherwise" Leopold, 1968, p. 224–225). Leopold suggests that a land ethic, like a CE, is a mode of behavior for engaging with the natural environment (both in urban and rural settings), underscoring that humans and nature are part of the same interdependent social-ecological system, both deserving mutual respect (Millstein, 2018). Like Naess, Leopold's ethics on the environment emphasized the belief that humans and nature are interrelated, and that each individual is a member of the land (or biotic) community which is collectively made up of a system of interdependent parts (i.e. social-ecological systems), necessitating a code of ethics.

In Leopold's *Conservation Ethic*, he covers the ethical means of resource use, allocation, and protection, specifically stating that "an ethic may be regarded as a mode of guidance for meeting ecological situations…," further concluding that there are penalties and rewards for our relationships with the land, which individuals may not be keen to observe and therefore require a mode of guidance (Leopold, 1933, p. 635/1989, p.27). The Boy Scout Outdoor Code of Ethics (The Boy Scouts of America, 1998) and the Leave No Trace Ethics (Center for Outdoor Ethics, 2019) also use the ideas behind careful use, allocation, and protection of natural resources as a mode of guidance for both scouts and outdoor recreators throughout the United States. Table 2 showcases both of these often overlapping code of ethics.

As Table 2 suggests, CE is more than a pro-environmental attitude, it also serves as a guiding tool for pro-environmental behaviors during youth adventure programs that incorporate EE. An example of this can be observed in fishing education programs using EE and CE to facilitate environmentally responsible behavior (Palme et al., 2016). The Palme et al. (2016) study sought to identify whether such programs effectively transferred 'catch-and-release' best practices to youth anglers. Informal angler education programs seeking to modify angler behavior to meet

proper angling "were shown to potentially be an effective strategy to meet fisheries' management and conservation objectives" (Palm et al., 2016, p. 6).

These modifications to angler behavior increased proper handling techniques and prevention of deep-hooking, aiding in fish survival after release. Palme et al. (2016) acknowledge

Table 2: CE Operationalized via the Leave No Trace and BSA Outdoor Code of Ethics

Leave No Trace Code of Ethics: *A framework for outdoor recreation decision making, summarized in the following principles…*	**BSA Outdoor Code of Ethics:** *As an American, I will do my best to be…*
Plan Ahead and Prepare: Poorly prepared people, when presented with unexpected situations, often resort to high-impact solutions that degrade the outdoors or put themselves at risk. Proper planning leads to less impact.	**Clean in my outdoor manners**—we will clean up after ourselves using pack it in, pack it out techniques. We avoid leaving graffiti, fire rings, camp gadgets, and other signs of our presence.
Travel and Camp on Durable Surfaces: Damage to land occurs when surface vegetation or communities of organisms are trampled beyond repair. The resulting barren area leads to unusable trails, campsites and soil erosion.	**Careful with fire**—fire is an important tool, but one that can be devastating if it gets out of hand. We think about the need for fire, how best to use it, and how to minimize its impacts.
Dispose of Waste Properly: Though most trash and litter in the backcountry is not significant in terms of the long term ecological health of an area, it does rank high as a problem in the minds of many backcountry visitors. Trash and litter are primarily social impacts which can greatly detract from the naturalness of an area. Further, backcountry users create body waste and waste water which requires proper disposal according to Leave No Trace.	**Considerate in the outdoors**—we will think about others as well as ourselves and how our presence impacts them. We think about not just our impact on other humans, but also on wildlife and the environment.
Leave What You Find: Leave No Trace directs people to minimize site alterations, such as digging tent trenches, hammering nails into trees, permanently clearing an area of rocks or twigs, and removing items.	**Conservation-minded**—we will think about our impacts on the environment. We take steps to correct and redress damage to the environment.
Minimize Campfire Impacts: Because the naturalness of many areas has been degraded by overuse of fires, Leave No Trace teaches to seek alternatives to fires or use low-impact fires.	
Respect Wildlife: Minimizing impact on wildlife and ecosystems.	

that release rates vary and that it depends on "conservation ethics" and "compliance with regulations" (p. 2). While participates in the study may very well wish to avoid statuary

consequences from keeping fish that are not "legal," factors such as recreational involvement and "conservation commitment" through that experience can have a critical impact on environmentally responsible behaviors (Lee, 2011, p. 895).

In a qualitative study that observed the impacts of adventure tourism programs, Hanna et al. (2019) interviewed participants who shared their first-hand accounts of environmentally irresponsible and/or harmful behaviors (i.e. littering and degradation of natural environments). Their study found increases in environmental sensitivity from engaging in outdoor recreational activities, and feelings of environmental responsibility when observing environmentally irresponsible behaviors, concluding that "these feelings can spill over into the everyday attitudes and behaviors of participants" (Hanna, et al., 2019, pg. 1367). Evidently, experiences in outdoor programs do more than increase environmental sensitivity, they offer opportunities for development of other pro-environmental attitudes, such as environmental responsibility through observing environmental degradation first-hand.

As it relates to the Florida Sea Base, showcasing examples of environmental decimation in unprotected reef areas and comparing that to healthier locations may have a similar effect on participants' pro-environmental attitudes, such as CE. However, as it relates to implementing EE in marine environments along the Florida Keys, it is important to note that "healthier" reefs are not necessarily in good condition, which should be made clear to Sea Base participants. Past research studies on fish populations and coral coverage have mistakenly used "shifted baselines" of marine populations to evaluate changes in population and ecosystem health. As Al-Abdulrazzak (2012) explains:

> As each generation redefines according to personal experience what was "natural" in the oceans, degraded states can become accepted as normal. This loss of the perception of change is known as a "shifting baseline" (p.54).

Elucidating this unfortunate phenomenon to participants can further showcase the dire state in which reef populations in the Keys are in. By observing the contrast between decimated and "healthy" reefs, followed by the insight on how future generations are forgetting what reefs once were, may more effectively evoke feelings of environmental sensitivity, personal responsibility, and/or CE in participants.

Whether we view CE as a global philosophy of how the world's natural resources should be managed, or in more context-specific scenarios observed in youth adventure programs, CE can be understood as a mode of guidance on how to engage with nature, as well as a pro-environmental attitude that can help reinforce pro-environmental behaviors, especially in structured social-ecological settings. That being said, several factors (as I will outline below) play a role in affecting these pro-environmental behaviors.

2.3 Factors Affecting Pro-Environmental Behaviors

What influences a child to care for an ant farm or tend to a flower? Are the same factors at play when a child chooses to flood the ant farm, or cut the flower into pieces? American biologist E.O. Wilson (1984) suggests that all humans have an "innately emotional affiliation" to all other forms of life, otherwise known as biophilia. While Wilson has been criticized for attaching a "moral agenda" to this theory, even his critics (Katcher & Wilkins, 1993) do not explicitly denounce the existence or use of biophilia. Rather, they argue that its "ethical connotations" be made distinct

from the hypothesis that human beings are innately drawn to other life, thereby illustrating the value and use of biophilia, so that it may be "assessed independently of a moral agenda" (p.174).

This inherent draw towards other living organisms can be represented through curiosity and admiration, or violence. Katcher & Wilkins (1993) conducted two studies observing the effects on human-animal relationships. One study examined the responses of psychiatric patients upon recreational and therapeutic introduction to animals (p. 178); the other observed how children at an educational program treated small animals (e.g. hamsters, turtles, doves) when instructed to care for them and were given specific responsibilities and guidelines to do so (p. 182). Both studies reveal that "animals brought into human contact are powerful reinforcers for human attention and behavior," often eliciting positive behaviors in children, as well as evoking "human speech and nonverbal expression[s] of emotion" in previously unresponsive patients (Katcher & Wilkins, 1993, p. 185). While these are but cursory conclusions to their study, they support the hypothesis regarding the "evolutionary role" of biophilia, in that animals evoke human speech and that we tend to anthropomorphize them, enabling a "propensity to view [animals] as kin" (Katcher & Wilkins, 1993, p.185).

This example and others like it (Mueller, 2014) suggest that the intrinsic relationships humans have with other forms of life can *generally* reinforce positive relationships, and that such relationships can be cultivated during adolescence (Bruni et al., 2017). The affinity that humans have towards nature may have a hereditary or genetic basis (Tesitel, Kusovaa, & Bartos, 2001; Wilson & Kellert, 1993), but the manner in which we orient ourselves and behave towards nature is learned. Such orientations are often referred to as values or deep-rooted beliefs, and are usually learned during childhood and adolescence.

These broad value orientations can help explain and predict more specific attitudes to help inform pro-environmental behaviors. For example, someone holding the utilitarian *value* orientation or belief that humans are superior to wildlife, may hold the *attitude* that it is acceptable to hunt wolves (Teel & Manfredo, 2010). This attitude towards wolves may also predict voting *behaviors* on wolf reintroduction in Colorado (Friese, Smith, Plischke, Bluemke, & Nosek, 2012). Additionally, *norms* (e.g. the shared belief that killing wolves to protect livestock is appropriate) and *situational factors* (e.g. living in rural environments that are more susceptible to wolf attacks) may further explain why individuals choose to engage in certain voting behaviors, or environmental behaviors in general. Upon understanding deep-rooted values, we can then hope to better explain and guide the attitudes, social norms, and situational factors that may influence pro-environmental behaviors (Abrahamse & Steg, 2012; Friese et al., 2012; Manfredo et al., 2003).

While this research focuses on measuring predictors of the pro-environmental attitude CE (e.g. environmental value orientations, fulfillment of program expectations) and explaining how CE may orient pro-environmental behaviors, the following sub-section briefly describes other factors that should be considered.

2.3.1 Values, Attitudes, Norms, & Situational Factors

Values

Values can be defined as broad sets of beliefs pertaining to desired end states (i.e., terminal values such as family security, freedom, and equality) or modes of conduct to achieve those end states (i.e., instrumental values such as honesty, ambition, and respect for life). Values transcend specific situations, guide human behavior, and can be prioritized differently across individuals

(Schwartz, 1994). Values develop early on in life, are few in number compared to attitudes, and exhibit little variation among cultures and societies (Hicks et al., 2015). Theory and empirical reasoning suggest that values play a crucial role in explaining specific beliefs and behaviors, and can be used to predict environmental attitudes and behaviors (De Groot & Steg, 2008; Schwartz, 1994; Teel & Manfredo, 2009).

In Schwartz' (1994) theoretical model of relations among motivational types of values, he describes four value clusters separated into two broad value dimensions: (1) openness to change versus conservation, and (2) self-transcendence versus self-enhancement. Research shows that the self-transcendence versus the self-enhancement value dimension is correlated with environmentally significant behaviors (De Groot & Steg, 2008; Nordlund & Garvill, 2002; Schultz & Zelezny, 1999; Stern, Dietz, Troy, Guagnano, & Kalof, 1999), or behaviors that significantly change "the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself" (Stern, 2000, p. 408). For example, environmentally significant behaviors can include a tour operator that repeatedly allows tourists to throw trash along a coastline (a significantly damaging behavior), or Out Island scouts at the Florida Sea Base that clean up trash on a beach as part of their program (a pro-environmental behavior).

Imbedded in the self-transcendence versus self-enhancement value dimension are the social-altrusitic and egoistic value orientations. Egoistic value orientations are based on the personal costs and benefits derived from engaging in environmentally significant behaviors; if the anticipated benefits seem to exceed the anticipated costs, an individual is likely to engage in a pro-environmental behavior, if the costs and benefits are reversed, an individual will act contrarily. Social-altruistic value orientations are based on how a decision to engage in pro-

environmental behaviors will impact other people. Biospheric value orientations are based on how a decision to engage in pro-environmental behaviors impacts the biosphere as a whole, drawing from more intrinsic values towards the natural ecosystem(s) being considered (De Groot & Steg, 2008).

In general, social altruistic and biospheric value orientations appear to be positively related to pro-environmental behaviors, whereas egoistic orientations are known to be negatively related (Thomas et al., 2019, De Groot & Steg, 2008; Markowitz et al. 2012; Stern et al. 1999). Though comparatively uncommon to attitudinal changes, powerful value shifts in public concern towards the natural environment are found through acerbic publications such as Rachel Carson's *Silent Spring* (1962), or Al Gore's film documentary *An Inconvenient Truth* (2006). Two months after Al Gore's film was aired, U.S. zip codes within a 10-mile radius of a zip code showing the film "experienced a 50 percent relative increase in the purchase of voluntary carbon offsets" (Jacobsen, 2011, p.67). Recognition of how value orientations relate to environmentally significant behaviors and the environmental attitudes that precede them (e.g. CE) can help predict why people engage in such behaviors and further inform how to encourage such behaviors in youth adventure programs.

Attitudes

Often used in colloquial language as being synonymous with values, attitudes vary in that they are shaped by the values and beliefs that people acquire. People develop beliefs about an object or concept by applying particular associations (i.e., characteristics, qualities, attributes) to the object or concept. Humans learn to evaluate said objects or concepts as subconscious (implicit) and conscious (explicit) attitudes used every day (Fishbein & Ajzen, 2010). Additionally, deep-rooted

value orientations usually supersede existing attitudes (Teel & Manfredo, 2009). Understanding how values and attitudes are consciously and subconsciously weighted can help predict behaviors such as why a diver would choose *not* to break off a piece of coral, despite the fact that he has a collection of sea shells and other marine items at home. The behavior of gathering sea shells may suggest his attitudes towards touching and taking from marine environments: that it is OK to do so. However, his decision to not break off the piece of coral could be guided by the knowledge that coral is alive, and the value orientation (e.g., intrinsic value of non-human life) that orients a more specific attitude (e.g., concern for coral reef health), which in this case, outweighs the attitudes he holds about expanding his sea shell collection. Upon understanding deep-rooted values, we can then hope to better understand and guide attitudes that may influence pro-environmental behaviors (Friese et al., 2012; Manfredo, Teel, & Bright, 2003; Stern, Dietz, Troy, Guagnano, & Kalof, 1999).

Norms

While norms are not measured in this study, they are certainly an important factor to consider when aiming to cultivate CE and subsequent pro-environmental behaviors in youth adventure programs. Social norms are often known as a common set of behaviors and/or beliefs that groups of people conform to under specific contexts or social situations, but they can also be understood as an agreed upon set of rules managed by the social approval or disapproval of said social context or situation (Farrow, Grolleau, & Ibanez, 2017).

Descriptive social norms are beliefs about what behaviors are common and appropriate in a given situation, whereas injunctive norms describe what *should* be done in a particular situation (Abrahamse & Steg, 2012). Additionally, norms that become more salient or relevant to people

can result in the rejection of previous norms, sometimes even subconsciously. For example, an injunctive norm may suggest that taking a small piece of coral home is wrong, but if the descriptive norm reveals that everyone at the beach is taking home a piece a coral, people will be more likely to act upon that norm (assuming it does not conflict with a deep-rooted value).

The knowledge of existing norms in a social setting influence human behavior, as people may seek to assimilate to avoid social disapproval or gain social recognition; contrarily, people may go against existing norms to 'stand out from the crowd' as well (Farrow, Grolleau, & Ibanez, 2017). As it relates to assimilating to pro-environmental behaviors, people are also more likely to adopt what may be considered uncommon or new if individuals perceive such behaviors as becoming more mainstream (Jones et al., 2021). The motivations to conform include accuracy, affiliation, and positive self-image (Cialdini & Goldstein, 2004; Cialdini & Trost, 1998). Accuracy is described as the desire to be consistent about how others portray one's own behaviors, words, commitments, and values. Affiliation is the desire to belong in a social group or setting. Positive image refers to the positive depiction one represents in a social group or setting.

The influence of social norms can be observed in youth adventure programs such as the Florida Sea Base. Scouts abide by the norms outlined in their Outdoor Code of Ethics book (The BSA, 1998), such as to be "conservation minded" (i.e. injunctive norms), but also by what they observe other scouts say and do (i.e. descriptive norms; Abrahamse & Steg, 2012). The impacts that design and application of EE have on youth during their adventure programs should be well thought-out and planned deliberately, as the interactions adolescents have with their superiors, educators, and friends in these social settings will likely have long-term impacts on their values, attitudes, and subsequently, their behaviors.

Situational Factors

The available opportunities and capacities observed in varying situational contexts may further determine pro-environmental behaviors. Situational factors influencing environmentally significant behaviors include economic constraints, and the physical and emotional elements of a setting (Abrahamse & Steg, 2012; Bruyere, Teel, & Newman, 2009; Cottrell, 2003; Cottrell & Graefe, 1997; Vaske & Kobrin, 2010).

Economic constraints can influence environmentally significant behaviors in how people purchase goods, and through the education and experiences they have access to. As Bruyere et al. (2009) point out: "[T]he needs and interests of a new immigrant Latino family from the Dominican Republic, for example, would vary greatly from a Latino family in Colorado with five generations of history living in the United States" (p. 378). People under such economic constraints may have to prioritize livelihoods over pro-environmental behaviors (e.g., buying food items in bulk as opposed to organic or locally sourced, because the former is more cost-effective). Economic constraints may also determine the quality and level of education a person can attain. While education alone is not a motivation for engaging in pro-environmental behaviors, education and age have shown to be the only variables consistently correlated with the environmental concern attitude, which can be a precursor to pro-environmental behaviors (Klineberg, McKeever, & Rothenbach, 1998; Liefländer et al., 2012). After all, a person that is unaware of environmental issues has nothing to ascribe an environmental concern attitude towards.

Furthermore, much of what children learn about nature comes from personal experiences in these environments (Louv, 2005). But as cities become more urbanized and green areas continue to disappear, access to nature becomes more difficult for everyone, but especially low-

income households that may not own a car, or be able to afford the equipment to safely engage in outdoor recreation (Heckert, 2013).

The physical and emotional elements of an environmental setting may further determine environmentally significant behaviors. For example, the functional (e.g. acquirement of food) and emotional attachments one develops with a natural environment (also known as a place attachment) creates a sense of familiarity and identity with the area, likely encouraging a conservation ethic and promoting environmentally responsible behaviors (Proshansky, Fabian, & Kaminoff, 1983; Vaske & Kobrin, 2010; Cooper, Larson, Dayer, Stedman, & Decker, 2015). An example of how familiarity and identity with outdoor environments may predict pro-environmental behaviors can be observed in a study that compared wildlife recreators and non-nature recreators (Cooper et al., 2015). The authors compared self-reported pro-environmental behaviors between wildlife recreators (i.e. hunters, birdwatchers, and participants that both regularly hunted and bird-watched; n=941) and non-nature-based recreators, finding that hunters and birdwatchers were 4 to 5 times more likely than non-nature-based recreators to engage in pro-environmental behaviors (e.g. donating to local conservation efforts, enhancing wildlife habitat on public lands, participating in local environmental groups; Cooper et al., 2015). The physical and emotional experiences from outdoor recreational settings can even "offset the strong influence of certain socio-demographic attributes (e.g. education level, political orientations) that are often associated with a described likelihood of participating in pro-environmental behaviors" (Cooper, et al., 2015, p.454).

In their research on wildscape gardening Jones, Teel, Solomon, & Weiss (2021) observed that situations where pro-environmental behaviors result in reciprical benefits (i.e. wildscape gardening that benefits native speices and reduces water usage, but also results in a more

asthetically pleasing garden and costs on water usage) "created a positive feedback loop between motivation and behavior, in which gardeners became more interested when they recognized the benefits wildscaping provided" (p.6). Being able to identify the positive benefits of such behaviors can also elicit additional pro-environmental behaviors. The authors also discuss how the sense of accomplishment acquired from changing one's behavior and identifying the benefits may be a stronger motivator than relying on environmental beliefs alone (Jones et al., 2021).

Alternatively, the physical and emotional elements of an environment may also contribute to feelings of uncertainty, discrimination, or unsafety, and limit access or use of those areas (Heckert, 2013). If positive experiences in nature during adolescence are often crucial to the development of pro-environmental values, attitudes, and engagement of associated behaviors, it is therefore equality as important to consider how the feelings of uncertainty in physical environments would result in significant environmental behaviors that are negative. For example, one study observed that the number one reason parents showed restraint when allowing their children out in nature comes from fear of child abduction (Bruyere, Teel, & Newman, 2009). If feelings of fear and unsafety are associated with natural environments at an early age, opportunities for development of pro-environmental values, attitudes, and behaviors later on in life seem less likely. Such considerations become especially important when youth that have had few opportunities to engage with nature (and may associate it as scary or unsafe) are given an opportunity to participate in a youth adventure program for the first time. Should this early experience be associated negatively, it may be difficult to encourage pro-environmental values, attitudes, and subsequent behaviors later on in life.

2.4 Youth Adventure Programs and The Florida Sea Base

The principles outlined in EE and CE can be observed in a variety of adventure programs (Pitt, Schultz, & Vaske, 2019; Braun & Dierkes, 2017), often offering participants impactful experiences during their formative years in childhood and adolescence (Bruni, Winter, Shultz, Omoto, & Tabanico, 2017; Sibthorp, 2010). For example, analyzing potential predictors of pro-environmental behaviors (i.e. environmental value orientations and outdoor recreation participation during childhood and adulthood), Larson, Whiting, & Green (2011) found that outdoor recreation participation showed the strongest positive relationship with such behaviors.

Pioneers of adventure programming date back to Outward Bound (est. 1962) and the National Outdoor Leadership School (NOLS) (est. 1965), which were representative of the developing concerns regarding anthropocentric impacts to the natural environment (Attarian, 2001). The goals of Outward Bound surpassed the role of the traditional outdoor education program, as its founder Kurt Hahn encouraged personal growth and self-discovery by offering challenging excursions in the wilderness (GoodTherapy, 2016). By the 1970's the program developed as a wilderness therapy school used to treat adolescents experiencing depression, addiction, and dysfunctional behaviors. As of 2000, there were about 40 wilderness therapy programs operating throughout the United States (Russell & Hendee, 2000).

NOLS started as a small cabin in Sinks Canyon, Wyoming, initially focusing on outdoor skills for employment in local mountain ranges. Today the school includes a diverse set of leadership and training programs in wilderness management, not to mention the development of the Wilderness Medicine Institute (NOLS, 2021). NOLS founder Paul Petzoldt proclaims:

> We want [our students] to use the education to be leaders in their community with an understanding of ecology and conservation for the wild outdoors far beyond their

> legislators back home. We expect these people to be a grain of sand on the beach of future leadership (NOLS, 2017, para 1).

Predating outdoor programs such as Outward Bound and NOLS was the Boy Scouts of America (BSA), founded by William Boyce in 1910. Boyce was an American businessman inspired by the Boy Scout movement that had started in England three years earlier (BSA, 1998). The emphasis on natural science education has always been prevalent in the BSA programs, with a particular focus on outdoor learning through activities such as camping, fishing, and hiking. Included in these programs was an emphasis on knowledge and identification of plants and animals, as well as skills including woodcraft, mapping, first aid, and disease prevention (Hintz, 2009).

In the early 1920's the BSA's High Adventure Program extended the BSA legacy by incorporating group canoe trips into wilderness areas to engage older scouts in outdoor adventures beyond the campground (Cottrell, 2015). BSA High Adventure Programs expanded to include four outdoor adventure bases with a similar philosophy throughout the country. The newest program, the Florida National High Adventure Sea Base, is located along the Florida Keys with its primary base in Islamorada, Florida, and a subsidiary base at the Brinton Environmental Center on Summerland Key (Cottrell, 2015). The Florida Sea Base programs provide scouts with a myriad of outdoor activities that include snorkeling and SCUBA, sailing, kayaking, fishing, coastal hiking, and camping. The Marine STEM Adventure provides participants with hands-on experience tracking coral health and water quality, shark tagging, plant surveying and underwater robotics, with marine science lectures conducted in the field between outdoor activities such as snorkeling, sailing, and coastal hiking. The Keys Adventure provides participants the opportunity to go sailing, snorkeling, fishing, and camping, as well as some time spent in Key West, FL. The Out Island program challenges scouts to live on a coastal island and cooperate with one another

during team-building exercises, preparation of all meals, beach clean-up, while also providing participants with the opportunity to fish and snorkel.

While all programs incorporate some element of EE, only the Marine STEM program participants requires scouts to lead a discussion and presentation pertaining to lessons learned in marine ecology, citizen science, and/or conservation (BSA, Sea Base High Adventure, 2020). The BSA Sea Base program empowers participants with the knowledge and confidence to uphold the pro-environmental behaviors as they relate to CE, which they acquire in their marine program.

Outdoor adventure programs often draw from EE pedagogies, offering participants opportunities to engage with the natural environment in a way that has been lost to this generation of youth (Louv, 2005). If the purpose of conducting research on significant life experiences is not merely to document them, but to uncover *how* significance is constructed (Chawla, 1998), EE adventure programs serve as a rich opportunity for understanding *how* and *why* successful youth adventure programs cultivate a conservation ethic in youth, and how to operationalize such.

CHAPTER 3. METHODOLOGY

A significant body of literature exists on lessons learned from best practices of EE (Thomas et al., 2019; Bruni et al., 2017; Stern et al., 2014; Ernst & Theimer, 2011), however, research is lacking as it relates to design of EE youth adventure programs for enhancing and/or fostering a CE in participants. Even fewer studies take advantage of mixed-methods approaches, relying heavily on statistical analyses. Therefore, this study used a mixed-methods a 3-phase approach (Table 3) to test hypotheses and over-arching research questions as they relate to predictors of a CE. More specifically, this research used a Predictive Framework of a Conservation Ethic (Figure 1) to identify background and site-specific predictors of CE, significant differences in measurable variables before and after program, and significant differences across the three programs surveyed (i.e. Marine STEM, Keys Adventure, and Out Island).

3.1 Research Population

The research population consisted of BSA scouts (ages 13-18) and adult leaders participating in the Florida National High Adventure Sea Base Marine STEM, Keys Adventure, and Out Island programs during the summer of 2020. The Marine STEM Adventure provides participants with hands-on experience tracking coral health and water quality, shark tagging, plant surveying and underwater robotics, with marine science lectures conducted in the field between outdoor activities such as snorkeling, sailing, and coastal hiking. The Keys Adventure program provides participants the opportunity to go sailing, snorkeling, fishing, and camping, as well as some time spent in Key West, FL. The Out Island Adventure program provides participants the opportunity

fish, snorkel, cook all their own meals, engage in beach clean-ups, all while living on Munson Island for 4 days, which they must canoe to and from the main base.

Participants are encouraged to plan their trips far in advance, with bookings made available up to a year ahead of time. BSA scouts must sign up for Florida National High Adventure Sea Base programs with their local chapters; scouts and adult leaders come from all over the country.

3.2 Research Area

The Florida Sea Base National High Adventure programs are based in Summerland Key, FL, residing in the third largest reef system in the world. The Florida Keys Reef System (FKRS) stretches about 220 miles from Biscayne Bay to the southernmost point in the United States: Key West. The marine ecosystems found throughout the FKRS include America's only living barrier reef, as well as patch reefs, hardbottom reefs, sea grass meadows, mangrove island habitats, and the marine life supported by these communities.

Just a few of the ecosystem services provided by the FKRS include carbon sequestration, food from fisheries, erosion mitigation, storm surge protection, nursery habitats that support wildlife populations (including fisheries) and a myriad of recreational opportunities for locals and tourists alike (Johns, Kelble, Lee, Leeworthy, & Nuttle, 2013). Such services along the FKRS generate about 4.4 billion in local sales a year, bringing in an estimated $375 billion worth of goods and services as well (NOAA, 2011).

Unfortunately, the Florida Keys Reef System is experiencing an accumulation of ecological and anthropocentric stressors (e.g. coral disease and bleaching, extreme weather conditions due to climate change, depletion of populations, nutrient-loading due to poor

watershed management, harvesting of coral by tourists, and diver impacts that include anchoring and grounding over reefs; Kruczynski & Fletcher, 2012). The Florida Sea Base offers participants an exciting outdoor marine adventure that incorporates EE pedagogies and underscores awareness of marine environmental issues in the pursuit encouraging pro-environmental attitudes and behaviors.

3.3 Research Design

This research includes a mixed-methods 3-phase approach (Table 3) that incorporates pre and post-program surveys, interviews, and participant observations, triangulating the data to increase the validity of findings (Decrop, 2000). Research design included theory (i.e. that experiences in nature can contribute to pro-environmental attitudes during adolescence) to inform the variables and concepts found in this study's semi-structured interviews, pre/post surveys, and observational data, for the purpose of identifying predictors of the pro-environmental attitude CE, and comparing statistical significance across three Sea Base programs.

3.4 Sampling

The entire Florida High Adventure Sea Base program serves about 16,000 participants annually (BSA, Sea Base High Adventure, 2020), which is an appropriate theoretical population (Jennings, 2001; Veal 2017).

The program traditionally runs for 12 weeks (June through August), but due to COVID-19, operations were delayed two weeks. Sample sizes are representative of the reduced program weeks and the 50% capacity social distancing guidelines mandated by Monroe County and the State of Florida (Monroe County, 2020).

Table 3: Research Design, a Mixed-Method 3-Phase Approach

Phase	Description
Phase I: *Pre-Program Survey*	Consists of the pre-program survey, which measures familiarity and frequency of outdoor recreational experiences, scouting experience, environmental awareness, program expectations, and CE. Pre-program surveys were administered on the first night participants arrived or the morning after, but before any program activities, lectures, or events. Surveys were demarcated with participants' first names (or desired pseudo name).
Phase II: *Semi-Structured Interviews and Observational Data*	Consists of audio recorded semi-structured interviews that draw from survey questions (5.5 Interview Protocol & Content Analysis). Average interview length was about 10 minutes. Interviews were conducted between program activities, during down time, and in a variety of indoor and outdoor settings (e.g., on Catamaran vessels, in the Marine STEM classroom). Also included in Phase II are written observations of scouts in the Marine STEM (n=5 different troops) and Out Island (n=1 troop) program(s) in the form of a daily journal. Written observations were organized using an adaptation of Booren, Downer, & Vitiello's (2012) observational activity framework (Figure 2). Because of the busy and often demanding nature of the investigator's position as a Marine STEM Mate (i.e. program started at 6:45am and ended at 9:30pm each night), written observations were usually only possible from 6:15am-6:30am, which is when the investigator documented observations from the day prior.
Phase III: *Post-Program Survey*	Consists of the post-program survey which measures environmental awareness, fulfillment of program expectations, self-reported program impacts, program satisfaction, environmental value orientations (i.e. egoistic, biospheric, and social-altruistic), and CE. Repeated measurements allow pre/post program comparisons. This survey was administered on the last night of program. Participants were asked to write in their first name (or the same pseudo name from the pre-survey) on the post survey. Names were matched with the pre-survey and stapled together. When data was input into an Excel sheet, names were removed and each participant was given a unique survey ID to be matched with pre and post surveys for comparative analysis. Data from the Excel sheet what uploaded onto SPSS for qualitative analyses.

The investigator was present for 9 weeks of the remaining program (July 15th-August 20th), and the quantitative sample (n=252) included about 6 scouts (ages ranging from 13-18) and 2 adult leaders per crew, which were treated as a "family unit" to abide by COVID-19 state regulations. This sample size consisted of 92.2% of male participants (n=244) and is appropriate for program group comparisons and multivariate analyses (Krejcie & Morgan, 1979; Veal, 2017)

to examine the predictive relationships noted in Table 7. Details of the sample size are outlined in Table 4.

Collection of survey data underwent a cluster sample approach (i.e. all members for the Marine STEM program were surveyed), and a stratified sample approach (i.e. members for Keys Adventure and Out Island Adventure were selected at random; Johnson & Hruschka, 2015; Guest, 2015; Veal, 2006). All Sea Base survey participants were organized into different clusters, yet the goal was to acquire as many Marine STEM responses within that respective cluster, to better triangulate such findings with qualitative interview data. Sampling was also stratified for the Keys Adventure and Out Island programs organized into separate stratums with participants selected randomly from each.

The majority of the quantitative sample is represented by the Keys Adventure Program (n=109), followed by Marine STEM (n=91), and Out Island (n=51). With the exception of interviews from the one Out Island Program the investigator shadowed with an Out Island mate (n=2), interviews were conducted for Marine STEM program participants (n=18), using a simple random sample to select participants (Guest, 2015).

Table 4: Quantitative Sampling

	Number of Crews per Week	Program Weeks for Data Collection	Estimated Operational Sample (50% Capacity)	Actual Sample
Marine STEM	0-3	9	108	92
Keys Adventure	1-9	9	342	109
Out Island Adventure	1-3	9	108	51
Total			588	**252**
Note: Each crew size consisted of about 8 participants (2 adult leaders, 6 scouts) per crew				

3.5 Procedure

The quantitative research methods used were non-experimental, with the dataset consisting of pre-program surveys (Phase I). Pre-program surveys were distributed sometime between the first night or following morning scouts arrived to the Brinton Environmental Center in Summerland Key, FL. Upon arrival of the BSA program, the investigator gave a brief introduction of herself while wearing a face mask and remaining at least 6ft away from other scouts and scout leaders to provide an explanation of the survey and the purpose of the overall research study. All Sea Base participants were required to wear a face mask and remain at least six feet apart from one another, unless they arrived together as a "family unit." Sea Base's COVID-19 public statement asserts that each Sea Base crew must elect/assign a youth member for each crew to act as a 'Sanitation Chief' for the duration of their 7-day trip (BSA Sea Base High Adventure, 2020). Responsibilities for Sanitations Chiefs include but are not limited to: instructing/reminding crew members to refrain from touching their faces, washing hands and using hand sanitizer regularity, wearing facial coverings, sanitizing vessels and dormitories, and socially distancing from other travelers, crews, staff members.

After providing a thorough explanation of the study and answering questions, the investigator acquired written and verbal assent and consent from scout leaders and scouts, and administered the pre-survey that evening or the following morning after breakfast. The same assent and consent processes were applied to conduct and record interviews of scout participants. Surveys were demarcated with first names (or pseudo names) to tie participants' pre-survey to their respective post-survey afterward. Under the Health Insurance Portability and Accountability Act (1996), first names, when not attached to any other identifiable information (e.g., emails, last

names, date of birth) are not considered PII (personally identifiable information; Matuszewska, et al., 2020)

Figure 2: *Observational Model of Scout Interactions at the Florida Sea Base, adapted from Booren, Downer, & Vitiello's (2012) observational model of children interactions in classroom activity settings.*

As a cohort staff member of the Marine STEM program, the investigator had the opportunity to be with Marine STEM participants during their entire program. She observed participant behavior and engaged in group exercises and activities, applying ethnographic approaches via daily journal entries of such observations (Phase II). Fieldnotes and notebooks were regularly sanitized with disinfectant that contained at least 70% alcohol, then stored in a sanitized lockbox only she had access to. Written observations were typed and stored as a Word document once the fieldwork was completed. Observations were based off an adaptation of Booren, Downer, & Vitiello's (2012) observation model of children's interactions with one

another, teachers, and with assigned tasks embedded in activity settings in the classroom (Figure 2).

The investigator used this framework to organize observations of how Sea Base scouts interacted with one another, with their scout leaders, and towards program objectives (such as identifying marine species, coral disease identification, fishing, shark-tagging). Observational data is meant to confirm and supplement survey results and findings from a content analysis of interview transcripts. Phase II also consists of digitally recorded interviews of predominantly Marine STEM (n=18), and (n=2) Out Island participants. Interview length ranged from 6 to 24 minutes, averaging at about 10 minutes per interview, and were conducted at the end of their program (i.e. the last day, or second-to-last day of program).

Interviews underwent a simple random selection per Marine STEM crew the investigator ran when facilitating those programs, and simple random selection of the one Out Island program she also helped facilitate. While the investigator did follow an interview protocol, all interviews were semi-structured for the purpose of allowing new ideas to be brought up and incorporated into the interview dialogue. Interviews occurred in a range of indoor and outdoor settings during the limited period of downtime (e.g., in the Marine STEM classroom, out on Corinthian vessels, along the shore during coastal hikes).

For the purpose of allowing new ideas to be brought up and incorporated into the interview dialogue, as well as the physical constraints of the field site (e.g. coastal hiking, managing Dusky and Corinthian vessels, snorkeling, fishing) interviews were conducted in a semi-structured format, between program lectures and activities. Participants were asked to sign a consent and assent form to conduct and audio-record interviews, and were asked to verbally consent and assent as well.

On the last night of the program, the investigator administered post-program surveys (Phase III) which measured socio demographic backgrounds, environmental awareness, self-reported program impacts, fulfillment of program expectations, program satisfaction, environmental value orientations, and CE. All interview and survey procedures were conducted under the COVID-19 safety guidelines as determined by Monroe County and the State of Florida, which are outlined in the COVID-19 Safety Plan (See Appendix C), and corresponds with the Sea Base's COVID-19 Mitigation Plan and public statement (BSA Sea Base High Adventure, 2020). These repeated measurements are meant to assess the variance between responses in pre and post-program surveys and determine if these differences are statistically significant.

3.6 Survey Instrument and Variable Details:

This study utilized a pre and post program survey instrument that captures the independent and dependent variables outlined in Table 5. Table 5 also outlines details on survey variables, their respective definitions, and means of operationalization. The following subsections outline selected variables included in the survey instrument.

3.6.1 Sociodemographics: Age & Education

Age and education have shown to be predictors of pro-environmental attitudes and behavioral commitments in previous literature, however other studies emphasize that it is a weak predictor of such (Hines, Hungerford, & Tomera, 1987). Inclusion of this variable is meant to identify whether this is the case within the context of BSA scouts and their adult leaders.

3.6.2 Scouting Experience

The Florida Sea Base program focuses on the rich culture and tradition of the BSA as a means of outdoor skill development, leadership, confidence in outdoor settings, awareness of environmental issues, and conservation ethics. This variable measures scouting experience by scouting rank, years scouting, and merit badges acquired.

3.6.3 Familiarity and Frequency of Outdoor Experiences

The functional and emotional attachments one develops with increased visitation to a natural environment (i.e. place attachment) creates a sense of familiarity and identity with the area, likely encouraging a CE and environmentally responsible behaviors in general (Vaske & Kobrin, 2010; Proshansky, Fabian, & Kaminoff, 1983). Individuals who are regularly involved in outdoor recreation prior to the Sea Base program (measured through familiarity and frequency of outdoor experiences) may likely reveal a positive correlation with other measurable variables (e.g. CE).

3.6.4 Awareness of Marine Environmental Issues

Awareness of environmental issues can result in increased concern and a better understanding of the value ecosystem services provide (Ruiz-Frau, Krause, & Marbà, 2017). Awareness of environmental issues will be measured as perceptions participants hold towards the marine environment (e.g. the capacity for coral reefs to recover from anthropocentric impacts). The marine environmental awareness measurement tool is based off existing literature on the social psychology of an individual's awareness of consequences (De Groot & Steg, 2008; Schwartz, 1968; Stern, Dietz, Troy, Guagnano, & Kalof, 1999). This measurement tool has also been

previously implemented in Cottrell & Meisel's (2004) study of predictors of scuba diver personal responsibility, conducted in 2002 at the Florida Sea Base.

3.6.5 Program Expectations

Motivations fuel the expectations of a satisfactory outcome or success (Schultz, 2012), and the expectations for engaging in any given activity certainly vary (e.g. enjoyment of the activity itself, the setting of the activity, the recreational experience outcome, and from the personal, social, economic, or environmental benefits received from the activity; Ajzen, 2012; Meisel & Cottrell, 2008). Because it can be assumed that fulfilled expectations (driven by an array of motivations) result in increased satisfaction, the fulfilled expectations variable may predict CE. Program expectations are measured using an existing expectations measurement tool previously implemented in Cottrell & Meisel's (2004) study.

3.6.6 Self-Reported Program Impacts

While it is important to note the myriad of factors that influence attitudes and behavior, the perception of increased environmental knowledge and awareness, confidence when engaging out in nature, and motivations to protect natural environments can contribute to pro-environmental attitudes, especially when such perceptions exist in the same person (Hungerford & Volk, 1990). The self-reported variable aims to capture the perceived impact the program has had on participants, and identify whether this is a predictor for CE.

Table 5: Study Concepts

Concept	Definition	Operationalization
Socio demographics	Level of education and age. Data on ethnicity and state of residence were collected but not included in analysis for lack of population variance.	Survey questions on post-program survey (Phase III)
Scouting Experience	Years scouting, scouting rank, and merit badges acquired	Survey questions on pre-program survey (Phase I)
Familiarity & frequency of outdoor activities	Measured on a 7-point Likert scale asking for the amount of time participants engage in an outdoor activity in a day, week, month, 3 months, 6 months, and year, or not at all.	Survey questions on post-program survey (Phase I)
Program expectations & fulfillment of expectations	Measured on a 5-point Likert scale asking participants of their expectations of the Sea Base program, and whether those expectations were fulfilled.	Survey questions on pre/post-program survey. Phase I lists general expectations for the program; Phase III asks whether those same expectations were fulfilled.
Environmental Awareness	Measured on a 5-point Likert scale asking participants' their general understanding/awareness of the ecological health of coral reefs in the Florida Keys	Survey questions on pre/post-program surveys (Phase I and Phase III)
Self-Reported Program Impacts	Measured on a 5-point Likert scale, this variable assesses self-reported program impacts as they relate to perceived increase in marine ecological knowledge, awareness of marine environmental issues, confidence when engaging in natural environments, motivation to protect natural environments, and fulfillment of expectations for High Adventure	Survey questions on the post-program survey (Phase III)
Conservation Ethic	Measured on a 5-point Likert scale, this variable assesses CE as it relates to the intent of pro-environmental behaviors based on the Leave No Trace Code of Ethics (see Table 2)	Survey questions on pre/post program surveys (Phase I and Phase III).
Environmental Value Orientation	Measured on a 5-point Likert scale, this variable captures environmental value orientations (i.e. biospheric, egoistic, social-altruistic) as they relate to why it's important to have a CE.	A survey questions on post program surveys (Phase III).

3.6.7 Conservation Ethic

Pro-environmental attitudes such as CE are antecedent to pro-environmental behaviors, even though other factors must be considered in prediction of the latter. To capture the level of

commitment and understanding of CE, this variable draws directly from Leave No Trace code of ethics, which also overlaps with the Boy Scouts Outdoor Code of Ethics as well (see Table 2).

3.6.8 Environmental Value Orientations:

Environmental attitudes are thought to be associated with egoistic, biocentric, and social-altruistic value orientations that direct attitudes and behaviors (De Groot & Steg, 2008; Schultz, et al., 2005). To capture value orientations that may orient CE, the value orientation items from Schultz' (2001) scale of environmental concern has been used to create a Likert scale that measures *why* participants agree with the careful management and protection of natural resources (i.e., a simplified definition of CE for youth participants that may be unfamiliar with the term).

3.7 Validity, Reliability and Generalizability of Methods and Analysis

Good research designs should transparently outline the series of steps the researcher took follow so that other researchers may verify the reliability, generalizability, and validity of the study. Reliability refers to whether methods *consistently* measure intended concepts and variables under the same conditions and methods; validity refers to whether methods *actually* measure intended concepts and variables; generalizability refers to whether the findings can be applied in other cultural contexts, populations, or situations (Johnson & Hruschka, 2015).

To ensure the reliability of methods, the same survey was used throughout the summer, under the same setting (i.e. the Brinton Environmental Center), at the same time (i.e. before program activities started), on all participants surveyed. While the investigator was unable to document events or behaviors immediately after they occurred, to ensure the validity of observations, she organized journal entries in the same manner (see Figure 2) the morning after a

full day with participants (i.e. from about 6:15am-6:30am). For interviews, the same interview protocol was used for participants. However, because the age of participants varied, the investigator often paraphrased questions and provided further explanation for younger participants. Interviews were also held in a variety of different environments (e.g. classroom settings, along the marina, on Corinthian vessels), and so such settings may influence the variance of responses.

To ensure validity, previously used survey variables were used (Meisel & Cottrell, 2008; Schultz, 2001), and all variables underwent a principal factor analysis and reliability test on SPSS to ensure such variables were measuring intended concepts. As for the pro-environmental attitude CE, a principal factor analysis was used, revealing which variable items clustered onto the same factor loading; such items proved to be reliability as well.

Pertaining to the observational data, there is an unavoidable bias in the fact that only one person's observations were being documented, and that these observations were written down the morning after a full day of program. However, by sticking to the observational framework (Figure 2), it was easy to identify, remember, and document the same behaviors in similar social-ecological settings. Evidently, this also means a lesser focus on observations outside of the observational framework, but for the purposes of supplementing survey and interview data, focusing on the interactions between scouts and activities, scouts and leaders, and scouts with other scouts, it is appropriate to accept some losses to the validity of written observations. As for interviews, questions were written in a format that was meant to be appropriate for children between the ages 13 and 20. As the investigator was the only one conducting the interviews, she could readily elaborate on any questions that participants were confused by. Furthermore, concepts found in questions were often repeated (e.g. CE, marine environmental awareness),

allowing participants to elaborate on the same concepts throughout multiple questions. The content analysis of interview data was also conducted with the assistance of two other coders that were unfamiliar with the specifics of the research, but helped transcribe interviews and were Honors Students at the Warner College of Natural Resources at CSU. The codebook used to analyze interview transcripts was created via an iterative process between three coders identifying categories, themes, and codes, therefore, the validity of findings in the content analysis should be high.

Finally, while many elements of this inquiry can certainly be applied to other adult and youth populations (i.e. environmental value orientations, measurement of a CE), survey, interview, and observational methods are very much catered to the BSA's Florida Sea Base program. Survey and interview questions ask participants about their scouting experience, and/or are directly related to marine environmental settings in the Florida Keys. As it relates to findings, it would be best to not overgeneralize results, as all of participants were involved with the BSA and resided in the U.S., and were predominantly male (92.2%) and white (95.5%).

CHAPTER 4. PREDICTORS OF CONSERVATION ETHIC: A MULTIVARIATE ANALYSIS

4.1 Introduction:

Research has shown that the experiences humans have with nature during adolescence can reinforce pro-environmental values, attitudes, and/or behaviors in adulthood (Bruni & Schultz; 2009; Tanner, 1980). Environmental Education (EE) has been used to facilitate these formative experiences, especially within outdoor adventure programs committed to educating youth on environmental issues and developing a conservation ethic that empowers participants to engage in pro-environmental behaviors (Rodrigues Nunes et al., 2017). Given that human behavior has resulted in 75% of Earth's environmental degradation (Leahy, 2018), a comprehension of pro-environmental attitudes, subsequent behaviors, and how to encourage them using EE practices is warranted. Referencing Figure 1, this chapter investigates which background and site-specific variables predict a conservation ethic (CE), for the purpose of informing EE design in youth adventure programs that wish to enhance CE in participants. To answer hypothesizes 1-10, this study investigates the following over-arching research questions:

1. Which background variables show to be statistically significant predictors of a CE?
2. Which site specific variables show to be statistically significant predictors of a CE?

4.2 Independent and Dependent Variables

Using The Predictive Framework of Conservation Ethic (Figure 1) this chapter investigates the statistical relationships between background variables (Level 1) and CE (Level 3) and site specific variables (Level 2) and CE (Level 3), to determine statistically significant predictors of CE. Analysis of the following independent variables include age, level of education, familiarity and

frequency of outdoor recreational experiences, and scouting experience (Level 1), and environmental value orientations (i.e. egoistic, social altruistic, biospheric), environmental awareness, fulfillment of program expectations, and self-reported program impacts (Level 2). CE serves as the primary dependent variable (Level 3).

4.3 Methods:

The software program Statistical Package for the Social Sciences (SPSS) was used to analyze survey data. Socio-demographics, scouting experience, and familiarity/frequency of outdoor activities were used to create a descriptive profile of Sea Base participants. However, this analysis focuses on the significant predictors of CE and their significance across Sea Base programs.

Reliability of variables were determined using SPSS to run a principal factor analysis and reliability test of all pre and post survey variables. Details of factor loadings and respective reliability scores (i.e. Cronbach's Alpha) are outlined in Tables 6a through 6e. Data from pre and posttest surveys underwent an principal factor analysis to reveal distinctions between variables, reliability tests, computation of new variables using the means of reliable variable items, and multiple regression(s) to determine the relational strength of independent variables towards the measurement of CE. Referencing the over-arching research questions, these steps are described in more detail:

1. A principal factor analysis was run on all pre/post variables.
2. Referencing the principal factor analysis loadings, variable items that either did not load at a .40 or above or loaded strongly on multiple factor loadings were removed (Vaske, 1999).
3. To verify the reliability of variable items under their corresponding factor loadings, reliability tests of said items were used to compute new variables. This step was done for

pre and post background and site-specific variables. Variable items that resulted in a low Cronbach's Alpha ($\alpha < .60$) were eliminated from further analysis (Vaske, 1999). Final factor loadings, scale means, and reliabilities are found on tables 6a through 6e.

4. To answer the first research question, a multiple regression was used to identify the predictive relationships of background variables against the CE post variable as a reduced model. To answer the second research question, a multiple regression using site-specific variables against CE was used. Lastly, a multiple regression that included both background and site-specific independent variables against CE was used to create a total model.
5. Finally, each background and site-specific variable underwent a correlation to test the correlational strength of said variables against CE (Table 7).

4.4 Results:

4.4.1 Principal Factor Analysis and Reliabilities:

Tables 6a through 6e present the final factor loadings of post variables; variable items that loaded poorly (i.e. <.4) were removed (Vaske, 1999). The tables show how specific variable items cluster together based on the questions, for the purpose of identifying and computing reliable variables.

In Table 6a, environmental value orientations cluster into two factor loadings, as opposed to three (i.e. egoistic, social-altruistic, and biospheric). The two factor loadings make sense, as egoistic and social-altruistic are both anthropocentric value orientations. However, these these value orientations are kept as three separate variables because this scale is an adaptation of Schultz' (2001) environmental value orientation scale, which has been used as a reliable measurement in previous research. The original scale asks *why* participants are concerned for the

well-being of the environment (i.e. biospheric, social-altruistic, and egoistic values, which may reveal distinct results). The adaptation of Schultz' (2001) scale also treats these value orientations as distinct variables, instead asking *why* participants agree with the careful management and protection of natural resources (i.e. a simplified definition of CE).

Table 6a Factor Analysis of Egoistic, Social Altruistic, and Biospheric Value Orientations (POST) (n=249)

Item	Factor 1 Loading	Factor 2 Loading
Factor 1: Anthropocentric Value Orientation (i.e. egoistic and social altruistic)		
The environment's natural resources should be carefully used, managed, and protected for…		
My Future	.854	
Myself	.838	
My Family	.836	
People in my Community	.831	
My Health	.831	
All People	.796	
My Lifestyle	.757	
Future Generations	.683	
Factor 2: Biospheric Value Orientation		
The environment's natural resources should be carefully used, managed, and protected for…		
Marine Life		.893
Animals		.891
Plants		.884
Birds		.837
Eigenvalue	7.02	1.96
Percentage of Total Variance	58.52	16.39

Reliability Results of Egoistic, Social Altruistic, and Biospheric Value Orientations (POST) (n=249)

	Biospheric	**Social Altruistic**	**Egoistic**
The environment's natural resources should be carefully used, managed, and protected for…	Marine Life	People in my community	My Future
	Animals	My family	Myself
	Plants	All people	My Health
	Birds	Future generations	My Lifestyle
Scale Mean	4.58	4.47	4.25
Reliability (Cronbach's Alpha; α)	.919	.918	.901

Note: On a 5-point Likert scale 1=low environmental values and 5=high environmental values

The scale averages and reliability scores (i.e. Cronbach's Alpha) for the biospheric, egoistic, and social-altruistic value orientations (Table 6a) are as follows: Biospheric (M=4.58; α=.919); Social-Altruistic (M=4.47; α=.918); Egoistic (M=4.25; α=.901).

As demonstrated in 6b, environmental awareness loaded onto two factors: environmental awareness of predominantly macro impacts of ecological health of coral reefs in the Florida Keys (Factor 1), and environmental awareness of predominantly micro impacts of ecological health of coral reefs in the Florida Keys (Factor 2). Factor 1 was comprised of 5 items reported on a 5-point Likert scale that explained almost 39% of the variance with factor loadings from .647 to .775. Factor 2 was comprised of 4 items reported on a 5-point Likert scale that explained almost 12.31% of the variance with factor loadings from .590 to .788. The scale averages and reliabilities for these two factor loadings (Table 6b) are as follows: Factor 1 (M=3.77; α=.777); Factor 2 (M=2.85; α=.662).

Table 6c shows that program expectations loaded onto three factors: I saw undamaged reefs and experienced good/easy underwater conditions (Factor 1), I saw large fish, marine life (other than fish), and unique underwater conditions (Factor 2), and I experienced, saw, and learned more about the natural environment (Factor 3). Factor 1 was comprised of 4 items reported on a 5-point Likert scale that explained almost 40% of the variance with factor loadings from .580 to .796. Factor 2 was comprised of 3 items reported on a 5-point Likert scale that explained almost 12.68% of the variance with factor loadings from .547 to .829. Factor 3 was comprised of 3 items reported on a 5-point Likert scale that explained almost 11.36% of the variance with factor loadings from .584 to .790. The scale averages and reliabilities for these factor loadings (Table 6c) are as follows: Factor 1 (M=4.27; α=.763); Factor 2 (M=4.48; α=.740); Factor 3 (M=4.66; α=.688).

Table 6d shows that self-reported program impacts loaded onto a single factor: This trip has made me more aware, confident, motivated, knowledgeable, and fulfilled my expectation of High Adventure (Factor 1). Factor 1 was comprised of five items reported on a 5-point Likert scale that explained almost 62% of the variance with factor loadings ranging from .668 to .836. The scale average and reliability for this single factor loading (Table 6d) was M=4.346; α=.845.

Table 6b Factor Analysis of Environmental Awareness (POST) n= 241

Item	Factor 1 Loading	Factor 2 Loading
Factor 1: Environmental awareness of predominantly macro impacts of ecological health of coral reefs in the Florida Keys		
Global climate change is affecting the ecological health of coral reefs in the Florida Keys	.775	
Residential areas are affecting the ecological health of coral reefs in the Florida Keys	.739	
Hurricanes are affecting the ecological health of coral reefs in the Florida Keys	.674	
Agriculture/Farming are affecting the ecological health of coral reefs in the Florida Keys	.661	
Recreational boating is affecting the ecological health of coral reefs in the Florida Keys	.647	
Factor 2: Environmental awareness of predominantly micro impacts of ecological health of coral reefs in the Florida Keys		
Snorkeling is affecting the ecological health of coral reefs in the Florida Keys		.788
Scuba diving is affecting the ecological health of coral reefs in the Florida Keys		.668
Water quality is affecting the ecological health of coral reefs in the Florida Keys		.605
Recreational fishing is affecting the ecological health of coral reefs in the Florida Keys		.590
Eigenvalue	3.86	1.23
Percentage of Total Variance	38.63	12.31
Reliability (Cronbach's Alpha; α)	.777	.662
Scale Mean	3.77	2.85
Note: All variables were reverse coded so that on a 5-point Likert scale 1=low environmental awareness and 5=high environmental awareness		

Table 6c Factor Analysis of Program Expectations (POST) (n=238)

Item	Factor 1 Loading	Factor 2 Loading	Factor 3 Loading
Factor 1: I saw undamaged reefs and experienced good/easy underwater conditions			
I saw undamaged reef sites	.796		
I saw healthy reefs	.764		
I experienced good underwater conditions	.694		
I experienced easy snorkeling/SCUBA diving conditions	.580		
Factor 2: I saw large fish, marine life (other than fish), and unique underwater conditions			
I saw large fish		.829	
I saw marine life (other than fish)		.783	
I saw unique underwater formations		.547	
Factor 3: I experienced, saw, and learned more about the natural environment			
I experienced natural surroundings			.790
I learned more about the natural environment			.774
I saw live coral			.584
Eigenvalue	4.05	1.268	1.136
Percentage of Total Variance	40.53	12.68	11.36
Reliability (Cronbach's Alpha; α)	.763	.740	.688
Scale Mean	4.275	4.48	4.66
Note: On a 5-point Likert scale 1=low fulfillment of expectations and 5=high fulfillment of expectations			

Table 6d Factor Analysis of Self-Reported Program Impacts (POST) n= 241

Item	Factor 1 Loading
Factor 1: This trip has made me more aware, confident, motivated, knowledgeable, and fulfilled my expectation of High Adventure	
This trip has made me much more aware of the conditions of the marine environment	.836
This trip has made me much more confident in my ability to care for natural resources	.829
This Sea Base trip has motivated me to make a positive difference in caring for the environment where I live	.812
This trip has increased my knowledge of marine natural resources	.779
This trip has fulfilled my expectation of High Adventure	.668
Eigenvalue	3.1
Percentage of Total Variance	61.995
Reliability (Cronbach's Alpha; α)	.845
Scale Mean	4.346
Note: On a 5-point Likert scale 1=low agreement with self-reported program impact variables, 5=high agreement	

Table 6e, shows conservation ethic items that loaded on Factor 1 and were used for the CE continuous variable; the other factor loadings either loaded poorly or were less relevant to the Factor 1 loading. Factor 1 was comprised of 8 items reported on a 5-point Likert scale that explained almost 39% of the variance with factor loadings from .506 to .743. The scale average and reliability for Factor 1 (Table 6e) was (M=4.45; α=.794).

Table 6e Factor Analysis of Conservation Ethic (POST) (n=246)

Item	Factor 1 Loading
Factor 1: Conservation Ethic Attitude	
It is okay to break off branches from standing trees to build a fire*	.743
I should camp on durable surfaces	.713
I should find unmarked areas to build a campfire*	.677
It is okay to feed or pet wild animals in a natural area*	.675
I should prepare and plan ahead for outdoor adventures	.625
It is okay to take an artifact as a souvenir*	.624
I should stay on the designated trail when hiking	.575
I should pack out my belongings and waste products after leaving a campsite	.506
Eigenvalue	3.705
Percentage of Total Variance	30.87
Reliability (Cronbach's Alpha; α)	.794
Scale Mean	4.457
Note: * = reverse coded item; On a 5-point Likert scale 1=low CE and 5=high CE	

4.4.2 Multiple Regression of Level 1 Background Variables and CE (Reduced Model):

The reduced model of Level 1 background variables included ten variables with two predictors of CE (Table 7). Education (β= -.270) and age (β= .352) were not significant predictors of CE (H1 and H2). Additionally, years scouting (β= -.063) and acquirement of environmental science/conservation merit badges (β= -.025) were not predictors of CE either (H3). Familiarity and frequency of non-consumptive outdoor experience (β= -.018), fishing (β= .85), and hunting (β= -.162) were also not significant predictors of CE; although hunting (r=-.224; $p<0.02$) was significantly inversely correlated with CE (H4). Contrarily, scouting rank (β=.231; $p<0.01$) and

acquirement of the Leave No Trace / Outdoor Ethics merit badges (β=.148; p<0.05) were significant predictors of CE (R^2=.099; p<0.05), explaining 9.9% of the variance of this reduced model (H3). Scouting rank was also significantly correlated with CE (*r*=.213; p<0.01).

Table 7: Multiple Regression of Background Variables, Site-Specific Variables, and Conservation Ethic (n=168)

Variable	Reduced Model		Total Model	
	r	β	*r*	β
Background Variables (Level 1):				
Age	.098	.352	.098	.423*
Education	.084	-.270	.084	-.345
Familiarity and Frequency of Non-Consumptive Outdoor Recreational Activities	-.09	-.018	-.09	.006
Familiarity and Frequency of Fishing	-.06	.085	-.06	-.010
Familiarity and Frequency of Hunting	-.224**	-.162	-.224**	-.100
Years Scouting	.023	-.063	.023	-.036
Scouting Rank	.213**	.231**	.213**	.154
Environmental Science & Conservation Merit Badges	-.018	-.025	-.018	-.041
Leave No Trace / Outdoor Ethics Merit Badges	.077	.148*	.077	.109
R^2 Background Variables Model:		.099*		
Site-Specific Variables (Level 2):				
Self-Reported Program Impacts	.280**	.140*	.280**	.213**
Program Expectation, I learned about/experienced natural surroundings	.222**	.039	.222**	.007
Environmental Awareness, Macro Impacts	.230**	.141*	.230**	.065
Environmental Awareness, Micro Impacts	.093	.016	.093	.023
Environmental Values, Egoistic	.160**	-.189*	.160**	-.193
Environmental Values, Social-Altruistic	.296**	.205*	.296**	.116
Environmental Values, Biospheric	.457**	.347***	.457**	.366***
R^2 Site-Specific Variables Model:		.270***		
R^2 Entire Model				.316***

*p<.05, **p<.01, ***p<.001; *r*=Pearson's correlation ; β=standardized beta

4.4.3 Multiple Regression of Level 2 Site-Specific Variables and CE (Reduced Model):

The reduced model of Level 2 background variables included seven variables with three predictors of CE. Fulfillment of the program expectation to learn about and experience natural surroundings was not a significant predictor of CE (β=.039; H5); however, it was significantly correlated (*r*=.222; p<.01). Environmental awareness of predominantly macro impacts (e.g., hurricanes, climate change) was a significant predictor of CE (β=.141; p<.05), and significantly correlated as well (*r*=.230; p<.01). Environmental awareness of predominantly micro impacts (e.g. snorkeling, recreational fishing) was not a predictor of CE (β=.016).

As previous literature would suggest, the egoistic environmental value orientation was significantly inversely related to CE (β=-.189; p<.05), the social-altruistic environmental value orientation was a significant predictor of CE (β=.206; p<.05), and the biospheric value orientation was the strongest predictor of CE (β=.437; p<.000; H10, H11, H12). Egoistic (*r*=.160; p<0.01), Social-altruistic (*r*=.296; p<0.01), and biospheric (*r*=.457; p<0.01) value orientations were also significantly correlated with CE. The self-reported program impacts variable was a significant predictor of CE (β=.140; p<0.05; H7), and significantly correlated (*r*=.280; p<0.01) as well.

Social altruistic and biospheric value orientations, self-reported program impacts, and environmental awareness of predominantly macro issues explained 27% of the total variance of this reduced model; each of these variables were also significantly correlated with CE.

4.4.4 Multiple Regression of Level 1 and Level 2 Variables and CE (Total Model):

The total model of Level 1 and Level 2 variables included all 16 variables with three predictors of CE (Table 7). In the total model, familiarity and frequency of non-consumptive outdoor recreational activities (β=.006), scouting rank (β=.154), acquirement of Leave No Trace /

Outdoor ethics merit badges (β=.109), the fulfilled expectation to learn about/experience natural surroundings (β=.007), environmental awareness of macro (β=.065) and micro (β=.023) impacts, and the social-altruistic value orientation (β=.116) were not significant predictors of CE.

Under the total model, age (β=.423; $p<.05$), self-reported program impacts (β=.213; $p<.01$) and the biospheric value orientation (β=.366; $p<.001$) were significant predictors of CE, explaining 32% of the total model ($R^2=.316$; $p<0.01$).

4.5 Discussion:

As it relates to previous literature (De Groot & Steg, 2008; Hungerford & Volk, 1990), the biospheric value orientation and self-reported program impacts (which include perceived increases in knowledge, awareness, confidence) were site-specific variables that showed to be strong predictors of the pro-environmental attitude CE in both the total and reduced multiple regression models. Furthermore, similar to findings in previous studies (Cottrell & Graefe, 1997; Heberlein & Black, 1976), site-specific variables were stronger predictors of CE than background variables were.

As De Groot and Steg (2008) would suggest, the social-altruistic value orientation was a predictor of CE, with the egoistic value orientation being a significantly negative predictor of the pro-environmental attitude in the reduced model of background variables. While environmental awareness of predominantly micro impacts to coral reefs in the Keys did not predict CE, environmental awareness of predominantly macro impacts to coral reefs in the Keys (e.g. hurricanes and climate change) was a significant predictor of CE in the reduced model. Being that environmental awareness of such macro impacts were a significant predictor of CE, it may be a good idea to couple this finding while also appealing to biospheric and social altruistic values as

they relate to broader environmental issues (e.g. climate change) in participants' home environments. In this way, the Sea Base program can incorporate effective EE (i.e. connecting existing knowledge or awareness of environmental issues in participants' home environments with knowledge of marine environments in the Florida Keys), but also simultaneously appeal to biospheric value orientations and awareness as they more readily relate to participants' home environments. Such considerations relate to previous research that links "emotional connection[s] to nature with environmentally responsible behavior, and argue that this affinity should be a key consideration in conservation strategies" (Thomas et al., 2019, p.175).

Such recommendations can readily be applied to the Marine STEM program. For example, when discussing environmental issues such as climate change, lessons in the Marine STEM program may consider including discussions about how climate change does not just negatively affect coral reefs in the Florida Keys, but also impacts natural environments where participants recreate and feel emotional attachments to. Boy scouts and their family members regularly engage in local outdoor settings; therefore, the focus should not merely be to lecture, but to provide hands-on learning that in this case, taps into the relationships participants already have with home environments (i.e. outdoor settings in which place attachment is more likely). By tying awareness of broader marine environmental issues in the Florida Keys to the emotional bonds participants have with natural environments back home, it may be possible to better relate to the biospheric and social altruistic values participants evidently hold, and more directly tie this back to environments they already associate with.

While countless factors influence pro-environmental attitudes and subsequent behaviors, this study suggests that *perceptions* of increased marine environmental awareness and knowledge, confidence in one's ability to care for natural resources, the motivation to make a positive

difference in caring for the home environments, and fulfillment of participants' expectations for High Adventure (i.e. the self-reported impacts variable), is a strong predictor of CE. It is crucial to consider this finding with the last point focusing on biospheric and social-altruistic value orientations when aiming to apply effective EE for the purpose of fostering and/or enhancing CE in participants. As Hungerford & Volk (1990) point out, having a locus of control (e.g. perceived confidence in one's skills, knowledge, and/or awareness as it relates to motivation to engage in a given behavior) may serve as a precursor to pro-environmental behaviors.

If a goal at the Florida Sea Base is to enhance and/or foster CE, it is important that participants do not leave emotionally paralyzed by some of the sobering realities of broader environmental issues such as climate change. Instead, we should ensure participants depart feeling confident in their ability to care for natural resources, so that they may be more motivated to care for their environments back home. Therefore, it may be useful to deliberately design Sea Base programs so that all scouts (as opposed to scouts from specific programs) get the opportunity to see the positive results of their impact first hand (e.g. a 1-hour beach clean-up, data collection and input of diseased coral identified). Furthermore, it may be helpful to offer reasonable suggestions for being more environmentally-friendly back home in a way that allows scouts to observe the positive impacts of their behavioral changes, and therefore feel accomplished and confident in making a difference they can identify (e.g. use of EE for wildscape gardening where youth participants can save their parents money on utilities but also see how their behaviors decrease water usage; Jones et al., 2021). Targeting what pro-environmental behaviors participants already engage in, and commending that while suggesting simple and related behaviors that result in reciprocal benefits that can be *identified* may further encourage the positive feedback loop between motivations and behaviors that Jones et al. (2021) discuss.

Finally, it may be worth applying a competitive element to these suggestions (e.g. which troop or scout will pick up the trash along the coast the fastest?; who can find the most interesting piece of trash?).

Knowledge of environmental issues can be rewarded in a competitive manner as well. For example, the troop or scout that can identify the names of coral diseases on corals that must also be identified, aid data collection and input, explain what causes such diseases, and present on this, will earn the Environmental Science merit badge. This would not be out of the norm for Sea Base programs such as Marine STEM, where participants are already required to create a presentation on the marine environment. The point is to encourage pro-environmental attitudes such as CE by teaching participants how to make positive differences that they can actually see benefit the environment (which would also be catering to biospheric value orientations). In this way, the program can contribute to establishing confidence in one's ability to make positive differences through pro-environmental behaviors and associate these experiences with a sense of accomplishment (e.g. acquirement of a merit badge) in the hopes that such experiences may at least *contribute* in motivating such behaviors after their program.

With consideration to previous points as to why future Sea Base programs should focus on biospheric and social-altruistic values, awareness of macro environmental issues, and self-reported program impacts (and to make connections of these variables back to home environments), the reduced model of Level 1 variables (Table 7) offers additional insight as well. As it relates to the scouting experience variables, scouting rank and acquirement of Leave No Trace / Outdoor Ethics merit badges were significant predictors of CE. It should come as no surprise that acquirement of the Leave No Trace / Outdoor Ethics merit badges were significant

predictors of CE, as the CE variable directly draws from the Leave No Trace Code of Ethics and BSA Outdoor Code, so such participants would be familiar with the language of these questions.

Years scouting and the Environmental Science / Conservation Merit badges were actually negative predictors of a CE in the reduced and full models (Table 7). Such findings are representative of the results related to education (which negatively predicted CE), and previous literature that suggests age and education are at best minor predictors of CE, if at all (Hines, Hungerford, & Tomera, 1987). However, the total model (Table 7), revealed that age was a significant (albeit weak) predictor of CE, which does suggest that younger participants scored higher on the CE variable, as about 61% of surveyed participants were between the ages 13 and 17; 20% of all participants were 15.

As it relates to the reduced model (Table 7), it would also make sense that scouting rank would be a strong predictor of CE, as a higher rank does not merely suggest familiarity and frequency in outdoor settings (which proved to negatively predict CE) as years scouting does. A higher scouting rank implies that a scout has acquired the necessary experience, knowledge, skill development in outdoor settings, and actual proof of such through achievement of a higher ranking, which would likely increase their confidence (as well as their awareness and knowledge, even if partially perceived) in outdoor environments.

If the aim is to deliberately design youth adventure programs that use EE to foster and/or enhance CE, program facilitators should consider tapping into biospheric and social-altruistic value orientations and seek to empower participants in outdoor environments (i.e. cultivate experiences where participants feel accomplished and confident), as such approaches are more likely to predict pro-environmental attitudes like CE than relying on environmental awareness or fulfillment of program expectations alone.

This chapter revealed fulfillment of program expectations, suggesting a positive program experience, were not a significant predictor of CE. The most notable predictor of CE was the self-reported program impacts variable, since it is the only variable in the full multiple regression model (see Table 7) that could readily be influenced by the Sea Base program. The reduced multiple regression model with background variables revealed that frequency and familiarity of outdoor recreation was not a predictor of CE, but scouting rank was (Table 7). This suggests that time in outdoor settings may not be enough to predict pro-environmental behaviors. Scouting rank not only implies familiarity with outdoor environments, it also demonstrates acquirement of certain skills and knowledge, having proof of such accomplishments through an increase in rank. Practitioners seeking to encourage pro-environmental attitudes and behaviors in participants of youth adventure programs should consider cultivating experiences where participants can feel and confirm a sense of accomplishment (e.g., a certificate or title that demonstrates to others of an increase in knowledge or ability). Such programs should also aim to instill confidence in outdoor settings, particularly home environments participants already feel emotional attachments towards.

CHAPTER 5. BEFORE & AFTER PROGRAM: A MIXED METHODS APPROACH

5.1 Introduction

There are varying interpretations of how people relate to the natural world, yet it should come as no surprise that experiences in early childhood or adolescence contribute to pro-environmental values, attitudes and behaviors in adulthood (Louv, 2005; McGuire, Dottavio & O'Leary, 1987). Environmental education (EE) has been used to facilitate these formative experiences, especially within outdoor adventure programs committed to educating youth on environmental issues and developing a conservation ethic (CE) that empowers participants to engage in pro-environmental behaviors (Rodrigues Nunes et al., 2017). Human behaviors have contributed to adverse environmental impacts that have become progressively severe and frequent, making the research on how to encourage pro-environmental attitudes and subsequent behaviors in youth especially pressing.

Referencing Figure 1 and findings from Chapter 4, this section compares the statistical significance of the variance of variables in the pre/post survey, and compares the statistical significance of post survey variables across the Marine STEM, Keys Adventure, and Out Island programs. This chapter also includes data from the interviews that identify prevalent themes through a content analysis of interview data, referencing observational data organized via the Observational Model of Scout Interactions (Figure 2). Examples of observational journal entries are found in Appendix B. The following over-arching research questions triangulates findings and address hypotheses 11 and 12:

1. Do the following variables show statistically significant differences before/after program?
    - Environmental Awareness
    - Expectations vs Fulfillment

- CE

2. Are the following site-specific variables statistically different across programs?

    - Environmental Awareness (of predominantly macro environmental impacts of ecological health of coral reefs in the Florida Keys)
    - Fulfillment of Program Expectations (i.e. I experienced, saw, and learned more about the natural environment)
    - CE
    - Self-Reported Program Impacts
    - Environmental Value Orientations (i.e. social-altruistic & biospheric)

3. What did scouts expect to get out of their experience at the Florida Sea Base?
4. What were scouts' specific highlights during program?
5. What do scouts believe it means to have a CE, and why is this important?
6. What do scouts consider to be the greatest threat to the marine environment, and what can be done about this?
7. What do scouts believe makes someone environmentally irresponsible?

5.2 Independent and Dependent Variables

This section outlines results of cross-program mean comparisons (i.e. one-way ANOVA) of CE and site-specific predictors of CE (i.e. biospheric and social altruistic value orientations, self-reported program impacts, and environmental awareness of predominantly macro impacts), and fulfillment of the expectation to experience natural surroundings (significantly correlated with CE). To make such comparisons, CE and site-specific variables are treated as dependent, while

program type (i.e. Marine STEM, Keys Adventure, and Out Island) are independent variables. To determine whether there are statistical differences between the means of dependent variables across program type, six one-way ANOVA tests with each dependent variable were conducted. All variables are continuous and measured on a 5-point Likert scale.

5.3 Methods

Using the variables computed in Chapter 4, the SPSS program is used to run pairwise *t*-tests between all pre and post variables to determine if variance in pre and post program means were statistically significant. To compare statistically significant variances of post survey variables across programs (i.e. Marine STEM, Keys Adventure, Out Island), a one-way ANOVA was run for each. To supplement statistical findings and gain a qualitative perspective of survey inquiries, interview questions underwent a content analysis and observational data is referenced to triangulate findings of the Marine STEM program. Referencing the over-arching research questions in this chapter, below are the steps described in more detail:

1. After completing the steps in the previous chapter, a pairwise *t*-test determined if changes in environmental awareness, expectations vs. fulfillment, and CE between their respective pre and post survey means were statistically significant (Question 1)
2. To identify whether post-program variables (i.e. environmental awareness, fulfillment of program expectations, self-reported program impacts, and CE) were significantly different across the Marine STEM, Keys Adventure, and Out Island programs, a one-way ANOVA test was used for each variable (Question 2).
3. To analyze the qualitative data (and answer Questions 3 through 9), a content analysis identified, analyzed, and reported patterns and/or themes that appeared throughout the

interview transcripts (Braun & Clarke, 2006). Based on Braun & Clarke's (2006) thematic analysis method, this process consisted of the following: (1) Digitally recording interviews, (2) transcription and familiarization of interview data with cooperation of two coders (i.e. Honors Students at CSU's Warner College of Natural Resources). The investigator and the two coders first identified "open codes" or broad categories (3), then through re-reading transcriptions over and over, all three Warner College students identified more specific themes within these broad categories (4), and finally codes or "subthemes" were identified as they continued to read over transcripts (axial coding).

This process was conducted through bi-weekly 2-3 hour meetings that started on September 17th until October 16th, 2021. The investigator and the two other coders remained socially distanced and wore masks, and were able to discuss transcripts, created codes from these themes and categories, and used the codes to create a codebook. The codebook was created through an iterative process that defined inclusion and exclusion criteria for each code. The codebook was not finalized or implemented until the coders acquired an inter-rater reliability of 79.3%, which is considered to be a substantial and acceptable interrater agreement (McHugh, 2012). This process consisted of a deductive, but predominantly inductive approach. It was deductive in that coders actively sought out environmental value orientations (i.e. egoistic, social-altruistic, and biospheric) in the text, but otherwise applied an inductive approach by allowing the data to determine and form themes/categories from the transcript itself.

5.4 Results:

5.4.1 T-Tests of Pre and Post Variables

Pre and post variables were compared using paired sample *t*-tests to determine significant differences before Sea Base participants started their program, and after their experience (Question 1 in this Chapter). All variables were measured via 5-point Likert scales, where a higher score signifies a higher CE, fulfillment of program expectations, and environmental awareness (Table 8). Variables were created via a principal components factor analysis and reliabilities (see Chapter 4). As it relates to CE, there were no significant differences between CE across all programs before (4.53 ± .525) and after (4.46 ± .556) their Sea Base experience, t(250)= 1.869 (H12). Environmental awareness of predominantly macro impacts also showed no significant change before (3.75 ± .642) and after (3.78 ± .670) program; t(245)= -.605. However, there was a significant decrease of environmental awareness of predominantly micro impacts across all programs before (3.37 ± .526) and after (2.85 ± .637); t(245)=13.108, p<0.001 (H11).

Program expectations and fulfillment of said expectations showed significant increases across the board, suggesting participants' program expectations were greatly exceeded. As it relates to the expectation to see reefs (4.00 ± .642), participants reported significantly higher ratings after their program (4.28 ± .699), t(247)= -5.309, p <.001. Regarding the expectation to see fish (4.26 ± .677), participants reported significantly higher ratings after their program (4.47 ± .709); t(247)= -3.70, p <.001. The expectation to experience natural surroundings (4.43 ± .642), also showed significantly higher ratings after their program (4.67 ± .466), t(247)= -5.537, p <.001.

Table 8: Pairwise *t*-tests of Conservation Ethic, Program Expectations/Fulfillment, and Environmental Awareness Before and After Participants' Sea Base Experience

Variable	Pre Survey *M*	*Std. Dev*	Post Survey *M*	*Std. Dev*	*df*	*t*-value
Conservation Ethic (n=251)	4.53	.525	4.46	.556	250	1.869 *(ns)*
I expected to see/saw undamaged reefs and experienced good/easy underwater conditions (n=248)	4.00	.642	4.28	.699	247	-5.309***
I expected to see/saw large fish, marine life (other than fish), and unique underwater conditions (n=248)	4.26	.677	4.47	.709	247	-3.700***
I expected to experience, see, and learn/experienced, saw, and learned more about the natural environment (n=247)	4.43	.642	4.67	.466	246	-5.537***
Environmental Awareness of predominantly macro impacts (n=246)	3.75	.624	3.78	.670	245	-.605 *(ns)*
Environmental awareness of predominantly micro impacts (n=246)	3.37	.526	2.85	.637	245	13.108***
*p<.05, **p<.01, ***p<.001, *ns*=not significant						

5.4.2 One-Way ANOVAs for Program Comparisons

To compare significant variances of post survey variables across the Marine STEM, Keys Adventure, and Out Island program (Question 2 in this Chapter), one-way ANOVA tests were used. For each one-way ANOVA, the homogeneity of variance of mean scores is confirmed through use of Levene statistic with at least $p<0.05$. The Levene test results determine which post hoc to use by indicating whether variances differ statistically or not (Vaske, 1999). A significant Levene score (i.e. $p<0.05$) suggests that a post hoc test for "equal variances not assumed" should be used (e.g. the Games-Howell test); an insignificant Levene test score (i.e. $p>0.05$) suggests a post hoc test for "equal variances assumed" *should* be used (e.g. Tukey's HSD).

The Tukey HSD test is a conservative post hoc test that is less likely to find differences in across groups, while the Games-Howell test is considered to be slightly liberal and appropriate for

unequal comparisons (Vaske, 1999). Also included for variables that show significant differences across program is the eta (η) test, which measures the association of a continuous level dependent variable and categorical independent variable; an effect size of .10 signifies a minimal relationship, .243 signifies a typical relationship, and .371 signifies a substantial relationship (Vaske, 1999). Depending on the statistical significance of the Levene statistic, a Games-Howell or Tukey's honestly significant difference (HSD) post hoc comparison test was used to identify where significant mean differences between the Marine STEM, Keys Adventure, and Out Island programs were found.

Table 9 shows results of 5 one-way ANOVAs across the Keys Adventure, Marine STEM, and Out Island programs (independent variables), against their respective dependent variables: CE; Environmental Awareness, Macro Impacts ; Fulfillment of Program Expectations, I Learned About/Experienced Natural Surroundings; Self-Reported Program Impacts; Environmental Value Orientations, Biospheric and Social-Altruistic. Program satisfaction was not included in Table 9, as 29% of respondents (n=73) did not answer this question. There were no significant differences across the Marine STEM, Keys Adventure, and Out Island Programs (F= 2.52), anyway.

Columns include independent variables, overall/specific mean scores, *F* values which demonstrate whether there are statistically significant differences in mean scores across programs, and eta (i.e., η) values, which demonstrates relational strength of those significant differences. Superscript letters (i.e. a, b, c) indicate exactly where those statistically differences are, based on the appropriate post hoc test. The ◊ symbol represents a significant Levine statistic for that particular one-way ANOVA, and that the Games-Howell post hoc test was used; if this symbol is not present, the Levene statistic was not significant, and a Tukey's HSD post hoc test was used.

Table 9: One-Way ANOVAs of CE and Program Type (n=108-109)

Dependent Variable	Program Type				*F-value*	η
	Overall *M*	Keys Adventure	Marine STEM	Out Island		
Conservation Ethic	4.46	4.50	4.44	4.41	.546	.066
Environmental Awareness, Predominantly macro impacts of ecological health of coral reefs in the Florida Keys	3.78◊	3.66$^{(b)}$	3.92$^{(a)}$	3.78	3.68*	.171
Fulfillment of Program Expectations, I experienced, saw, and learned more about the natural environment	4.67◊	4.63	4.77$^{(a)}$	4.57$^{(b)}$	3.51*	.167
Self-Reported Program Impacts	4.35◊	4.25$^{(b)}$	4.53$^{(a)}$	4.23$^{(c)}$	6.73***	.228
Environmental Value Orientation, Social-Altruistic	4.47	4.53 $^{(a)}$	4.50	4.28$^{(b)}$	2.98*	.153
Environmental Value Orientation, Biospheric	4.58◊	4.58	4.67$^{(a)}$	4.41$^{(b)}$	3.61*	.168

**p<.05, **p<.01, ***p<.001; use of (a), (b) and/or (c) signifies where statistically significant differences lie between programs; ◊=Levine statistic was statistically significant (i.e. p<0.05); All variables use a 5-point Likert scale, where a higher score signifies a higher CE, environmental awareness, fulfillment of program expectations, self-reported program impacts, and biospheric value orientation*

For CE, findings on Table 9 indicate no significant differences across the Marine STEM, Keys Adventure, and Out Island Programs (F= .546, p >.05; η= .066). However, there was a substantial difference in environmental awareness of predominantly macro impacts on coral reefs in the Florida Keys (e.g. hurricanes and climate change) between Marine STEM and Keys Adventure (F =3.682; p<0.05; η= .171), but not between Keys Adventure and Out Island, or Marie STEM and Out Island. Therefore, the fact that environmental awareness of predominantly macro impacts was higher in Marine STEM participants (M=3.92) than Keys Adventure (M=3.66) is statistically significant.

Fulfillment of the program expectation to learn about/experience natural surroundings showed a substantial difference between Marine STEM and Out Island (F =3.514; p<0.05; η= .167), but not Marine STEM and Keys Adventure, or Keys Adventure and Out Island. Therefore,

the fact that fulfillment of program expectations was higher in Marine STEM participants (M=4.77) than Out Island (M=4.57) is statistically significant.

Findings on Table 9 indicate a substantial difference in the self-reported program impacts between Marine STEM and Out Island, and Marine STEM and Keys Adventure (F =6.732; p<0.001; η= .228), but not Keys Adventure and Out Island. Therefore, the fact self-reported program impacts were higher in Marine STEM participants (M=4.53) than Out Island (M=4.23) *and* Keys Adventure participants (M=4.25) is statistically significant.

As it relates to the social-altruistic environmental value orientation, there was a substantial difference between Keys Adventure and Out Island participants (F =2.98; p<0.05; η= .153), but not Marine STEM and Keys Adventure, or Marine STEM and Out Island. Therefore, the fact that the social-altruistic value orientation was higher in Keys Adventure participants (M=4.53) than Out Island participants (M=4.28) is statistically significant.

Pertaining to the biospheric environmental value orientation, there was a substantial difference between Marine STEM and Out Island participants (F =3.608; p<0.05; η= .168), but not Marine STEM and Keys Adventure, or Keys Adventure and Out Island. Therefore, the fact that the biospheric value orientation was higher in Marine STEM participants (M=4.67) than Out Island participants (M=4.41) is statistically significant.

5.5 Interview Protocol & Content Analysis

The Interview Protocol relates to the expectations and highlights of Sea Base program, CE, and marine environmental concerns. These interviews and their subsequent analysis resulted in a total of 173 responses (20 interviews, 9 questions per interview, minus 7 questions that were unable to be asked and/or answered). 18 of these interviewees participated in the Marine STEM program;

the remaining two interviewees participated in the Out Island Program. This analysis is organized by (3) broad categories, (9) themes, and (49) codes, with a frequency of (337) total codes identified throughout all responses. This examination revealed why participants did (or did not) choose the STEM program, their expectations and highlights for their experiences, what they believe it means to have a conservation ethic/why they believe this is important, what is believed to be the greatest threat to the marine environment/what can be done about this, and what makes someone environmentally irresponsible.

Interview Protocol

1) Can you please tell me what Florida Sea Base program you are currently signed up for? Why did you choose this one?
2) What do you expect to get out of your experience at Sea Base?

2a.) What's been the highlight of your week thus far?

3) What do you think it means to have a conservation ethic?
4) Do you think it is important to have a conservation ethic? Why?
5) Do you believe that the environment's natural resources should be carefully managed and protected? Why?
6) What do you think is the greatest threat to the marine environment?

6a) What do you think can be done about this?

7) What do you think would make someone environmentally irresponsible?

5.6 Results

Results are presented by themes which are organized by interview question. Participant replies are organized by the (3) broad categories: Program (Table 10a), Conservation Ethic (Table 11a), and Environmental Concern dimensions (Table 12a). The themes found in each category are organized by the order of questions asked to participants. The codes found in each theme are organized by order of highest frequency of codes found in that respective theme.

5.6.1 Program Category

Table 10a shows how responses under the Program Category were organized into three themes, which are directly correlated with interview questions: Why the STEM program?, Program Expectations, and Program Highlights. Table 10a includes descriptions of the Program Category and the themes it houses, as well as the frequency of codes identified in this category. Themes are presented in chronological order in which questions were asked.

Table 10a: Program Category & Themes	Theme Description	Frequency of Codes per Category
Why participants chose the Marine STEM program, their expectations of the program, and program highlights		
Why the STEM program?	Includes four codes for responses that expressed why participants choose the marine STEM program, if it was a first/top choice. This theme also includes a No-Code for Out Island Participants	**21.28**% [20/94]
Program Expectations	Includes eight codes for responses that expressed what participants expected from the Marine STEM program prior to arrival.	**35.11**% [33/94]
Program Highlights	Includes seven codes for responses that expressed what the highlights of participants' Sea Base Experience was	**43.62**% [33/94]

Why the Marine STEM Program?

Table 10b shows descriptions, example quotes, and response frequencies of codes (i.e. number of responses for each code out of the 20 responses). This theme relates to why participants chose the Marine STEM program, under the Program Category (Table 10a). Codes are presented by their frequency.

Table 10b: Why the STEM program?	Example Quote(s)	Frequency of Codes
STEM *was* a first/top choice for their Sea Base program, and/or STEM was a first/top choice because of the variety of activities the program seemed to offer and/or because of pre-existing interests in the STEM field or STEM program	"The STEM program [has] a lot more of…everything, like with the other programs it's a lot about one thing, but this [has] a bunch of different things you get to do." "I wanted to learn more about what's in the ocean and it sounded interesting."	**55%**[11/20]
Didn't choose STEM, but enjoyed it	"I personally am not too interested in it [STEM], but I've had a lot of fun in the program..."	**25%**[5/20]
STEM *was not* was not a first/top choice for their Sea Base program	"…it was chosen for me."	**10%** [2/20]
Participated in the Out Island Program	"Originally we were gonna… do Key West [referring to Keys Adventure program] but we…came here instead cause it was too full, but I've enjoyed this much more than I would [the KA program]."	**10%**[2/20]

Program Expectations

Table 10c shows descriptions, example quotes, and response frequencies of codes (i.e. number of responses for each code out of the 33 responses). This theme relates to program expectations under the Program Category (Table 10a). Codes are presented by their frequency.

Table 10c answers Question 3 in this chapter, revealing that most participants expected to be learning a lot, as the "expected to be learning" code was identified 30% of the time under the Program Expectations theme.

Table 10c: Program Expectations	Example Quote(s)	Frequency of Codes
Expected to be learning a lot, learning about the marine/general environment. Expressed this in a positive light.	"Learn about the reefs in the area and the ecosystems in the Florida Keys." "I figured it would lean very heavily into the science aspect of STEM, focusing more in biology, ecology, oceanography…a lot of observing…"	**30%**[10/33]
Expected to be sitting down a lot, watching presentations, being in classroom settings, taking lots of notes on marine environmental topics. Expressed feeling indifferent or unexcited about this	"A lot of sitting down doing nothing, a lot of presentations..." "I expected to… do less fun stuff to be honest….Marine STEM ended up being a lot more fun than I had expected."	**12%**[4/33]
Expected to tag sharks and/or go shark fishing	"[Expected] to tag sharks and stuff."	**9%**[3/33]
Expected to catch fish, go fishing, catch different types of fish	"I was expecting to do some deep sea fishing."	**6%**[2/33]

Program Highlights

Table 10d shows descriptions, example quotes, and response frequencies of codes (i.e. number of responses for each code out of the 41 responses). This theme relates to highlights in the Program Category (Table 10a). Codes are presented by their frequency. Table 10d answers Question 4 in this chapter, and revealed under the Program Highlights theme that most participants considered snorkeling, swimming, and/or boating (24% of codes) to be their number one highlight. This was followed by fishing or mahi-mahi tagging (19.5% of codes), and shark-fishing/ shark tagging (15% of codes). Additionally, 19.5% of all codes under this theme revealed that first-time experiences contributed to a major program highlight.

Table 10d: Program Highlights	Example Quote(s)	Frequency of Codes
Snorkeling, swimming and/or boating	"It was just fun, really fun…being out on the water all day."	**24%** [10/41]
Fishing or mahi-mahi tagging as being a highlight	"Obviously the fishing…catching the dolphin fish…" "I would have to say fishing was very, very fun." "The fishing. I enjoyed that the most."	**19.5%**[8/41]
Describing a **first time experience** in marine environment as a highlight	"It was nice to be able to experience snorkeling for the first time." "It was my first time actually catching saltwater fish. So that was a really cool experience." "Shark fishing...Like I've never done something like that!" "Snorkeling with a shark cause that was really cool… I had never done that before."	**19.5%**[8/41]
Shark fishing/ Shark tagging	"I think my favorite thing [was]…catching a shark…" "I would say definitely the shark tagging." "…reeling in the shark. That was pretty cool"	**15%**[6/41]
Seeing or **being close to fish**	"I got to go snorkeling with a shark cause that was really cool." "Like to see the dolphins, the flying fish…"	**10%**[4/41]
Learning about marine environment	**"**Learning stuff I didn't know…the animals here, the reefs…the environments here… ecosystems in the ocean."	**10%**[4/41]
ROV building, ROV race, or any engineering related-activity as being a highlight	"I'd have to say…working on the ROV…that was really appealing to me."	**2%**[1/41]

5.6.2 Conservation Ethic Category

Table 11a shows how responses under the Conservation Ethic Category were organized into two themes, which are directly correlated with interview questions: What It Means to Have a CE, and Why It's Important to Have a CE. Table 11a includes descriptions of the Conservation Ethic Category and the themes it houses, as well as the frequency of codes identified in this category. Themes are presented them in chronological order in which questions were asked.

Table 11a: Conservation Ethic Category & Themes	Theme Description	Frequency of Codes per Category
Why participants believe it means to have a CE, and why they believe having a CE is important		
What It Means to Have a CE	Includes nine codes for responses that expressed what it means to have a conservation ethic for participants as they described it	**34.84**% [46/132]
Why It's Important to Have a CE	Includes 14 codes for responses that expressed why participants believe it is important to have a CE. These codes encompass two separate questions asked to participants combined into a single theme: Do you believe it is important to have a CE? Why? (1), and do you believe it's important to carefully manage and protect natural resources? Why? (2). The latter question is the definition I assign to having a CE. I also treat these as 2 questions (as opposed to 4) because all participants responded "yes" to the first questions of (1) and (2). The same question is therefore asked twice in a different way to confirm their inter item reliability (Downey, 1980).	**65.15**% [86/132]

What It Means to Have a CE

Table 11b shows descriptions, example quotes, and response frequencies of codes (i.e. number of responses for each code out of the 46 responses). This theme relates to the Conservation Ethic Category (Table 11a). This section includes mention of biospheric and social-altruistic values as they relate to the concern/need for proper management and/or protection of natural resources because of a concern for the environment, animals, and/or plants *or* because of a concern for other people, family members, community, and future generations, respectively. Codes are presented by their frequency. Table 11b reveals that most scouts believe that having a sense of personal responsibility towards the environment means having a CE (Question 5 in this chapter), as 28% of such codes were identified under the What It Means to Have a CE theme.

Table 11b: What It Means to Have a CE	Example Quote(s)	Frequency of Codes
A **sense of personal responsibility** towards the environment as it relates to having a CE	"...One of our jobs… To help regrow the environment." "If you see something that may be out of place or some trash on the ground or something…. And always trying to do a little bit extra." "Do all you can to keep nature as clean as possible."	**28%**[13/46]
Mention negative examples of human behavior (i.e. **what one *shouldn't* do**) as it relates to having a CE	"Not just be a careless swimmer." "Not throw so much stuff in the landfills." "At least don't cause any more garbage to be left behind. That wouldn't be a good conservation ethic." "Make sure you're not throwing your trash everywhere because it will end up in the ocean. Make sure you're not littering." "The people that just don't show care about… oceans or…corals."	**19.5% [**9/46]
Self-awareness of human impacts towards environment as it relates to having a CE	"It's more like being aware of different things and like especially in the environment." "Being mindful of what you do to nature." "I means to be actively aware of like trash on the ground and picking it up and not just ignoring that type stuff."	**17%** [8/46]
Biospheric Concern	"Keep in mind the impacts on the animals that live there, not just the humans who visit." "Keep the reefs and animals safe so people don't try to take them." "Keep our world the way it is…help the wildlife so more wildlife doesn't die. Especially like sea turtles."	**13%** [6/46]
Principles for environmental behaviors as it relates to having a CE	"It just like the whole, the Boy Scouts…the "Leave No Trace" sort of thing." "To set a standard of what is and isn't okay based on the facts on what is detrimental and contributes positively to the environment…and to view nature through that lens."	**7%** [3/46]
Social-altruistic Concern	"[Having a CE] means caring about your fellow human and people that are going to come after you…like future generations." "[Having a CE means] being mindful of what you do to nature. Because no matter what, it always comes back to you."	**7%** [3/46]
Mention that **humans are exploitative**/naturally destructive towards the environment	"People are just like 'Oh, well I can throw this in the ocean. It'll be fine.'"	**4%** [2/46]

Use as few natural resources as possible, **reduce or keep environmental impacts to a minimum**	"Try to use as little as you can…don't have the water running the whole time...reduce your impact…and that kind of stuff, and carrying reusable water bottles instead of buying single-use plastics every time you need to drink water."	**2%** [1/46]
Having a plan and/or being prepared for how one should behave and engage with the environment	[Talking about what it means to have a CE]: "Have a plan."	**2%** [1/46]

Why It's Important to Have a CE

Table 11c shows descriptions, example quotes, and response frequencies of codes (i.e. number of responses for each code out of the 86 responses). This theme relates to the Conservation Ethic Category (Table 11a). This section includes mention of biospheric, social-altruistic, and egoistic values as they relate to the concern/need for proper management and/or protection of natural resources because of a concern for the environment, animals, and/or plants *or* because of a concern for other people, family members, community, and future generations *or* because of a concern for one's self, for one's lifestyle, or one's wants, needs, and desires, respectively. Codes are presented by their frequency. Question 5 also asks why scouts believe having a CE is important. As demonstrated in table 11c, scouts believed social-altruistic (24% of codes) and biospheric (15% of codes) concerns explained why having a CE is important.

Table 11c: Why It's Important to Have a CE	Example Quote(s)	Frequency of Codes
Social-altruistic Concern:	"It doesn't just affect you it affects everyone on the planet." "Down the road [environmental damage caused by humans] is gonna hurt not only the environment but it's gonna hurt the economy as well." "I mean, we all have to share it, so we might as well take care of it." "To keep the world clean for …. further generations ahead of us."	**24%** [21/86]

Biospheric Concern:	"To keep the world clean for all of our animals." "We have to drive [boats] a specific way…because…of the coral…and to drop the anchors for the coral…" "Well, just like [for] nature in general. Like the reefs, that's like a gem of the world."	**15%** [13/86]
Mentions a **sense of personal responsibility** towards the environment as it relates to having a CE	"…we've done so much harm to earth that now we need to step back and rewind and say, 'what can we do to help?' and help Earth in a way…and take away all those negative effects that we did to it early." "There's also spots where we have damaged and we need to step in and fix…"	**11.6%** [10/86]
Because **humans are exploitative**/naturally destructive towards the environment	"Cause humans are naturally invasive I guess…we see something and we take it…species have gone extinct because we have driven them to extinction." "We are naturally invasive…and we need to fight natural instinct to do that, in order to preserve what could be destroyed." "In a world undergoing global warming. We've already done so much to the planet without even knowing about it. The fact that we know about it now and there's people who do it is infuriating"	**11.6%** [10/86]
Because **our resources are finite** and should be preserved for that reason, and that's why having a CE is important	"There's only so much of everything, you don't want to waste it, and use more than we really have to." "We should be careful to manage it because several animals are already protected because they are endangered, they're going extinct." "[Fish] won't be able to reproduce as fast as [people] would want them to for new resources."	**11.6%** [10/86]
Ignorance towards environmental issues as a reason for having a CE/protecting natural resources	"Without a CE, a lot of people wouldn't know about the dying coral reef…"	**5.8%** [5/86]
Mention negative examples of human behavior (i.e. **what one *shouldn't* do**) as it relates to having a CE	"People throwing their plastic in places where it can't be."	**4.7%** [4/86]
Self-awareness of human impacts towards environment as it relates to having a CE	"I think it would be good for everyone to just be aware of their environment and like what happens where the stuff they throw away goes and where it goes and why it goes there."	**3%** [3/86]
Egoistic Concern:	"It's important because I don't like the environment to be damaged beyond repair..."	**2.3%** [2/86]

	"I'd hate to see any animal I care about just disappear."	
A **false sense of helping the environment**, the idea that people are helping the environment when they really are not as a reason for having a CE/protecting NRs	"We're trying to reduce plastic by not using as many plastic straws, but we're using paper but the way we get paper is by cutting down trees." "[Talking about the 'no-straw movement'] I feel like it's so self-righteous and stuff, and it doesn't help the environment as much as people want to think…"	**2.3%** [2/86]
The environment should be protected, but not heavily manipulated	"I feel like there's a certain amount where we shouldn't touch…and it should work by itself…" "[The environment] should be protected but not manipulated."	**2.3%** [2/86]
General concern for the environment (could be marine environment but doesn't have to)	"Cause if you don't have [a CE], you're not really helping the environment, you're hurting it..."	**2.3%** [2/86]
Principles for environmental behaviors as it relates to having a CE	"If you don't set a standard of what is and isn't OK of conservation and the natural environment, soon there won't be a natural environment…"	**1%** [1/86]
Having a plan and/or being prepared for how one should behave and engage with the environment	"You need to have a plan to follow."	**1%** [1/86]

5.6.3 Environmental Concern Category

Table 12a shows how responses under the Environmental Concern Category were organized into three themes, which are directly correlated with interview questions: Greatest Threat to the Marine Environment, What Can Be Done About The Greatest Threat to the Marine Environment?, and What Makes Someone Environmentally Irresponsible? Table 12a includes descriptions of the Environmental Concern Category and the themes it houses, as well as the frequency of codes identified in this category. Themes are presented them in chronological order in which questions were asked.

Table 12a: Environmental Concern Category & Themes	Theme Description	Frequency of Codes per Category
What participants believe to be the greatest threat to the marine environment, what participants believe can be done about this, and what participants believe makes someone environmentally irresponsible		
The Greatest Threat to the Marine Environment	Includes four codes for responses that expressed what participants believe is the greatest threat to the marine environment	**31.73%** [33/104]
What Can be done about The Greatest Threat to the Marine Environment?	Includes eight codes for responses that expressed what participants believe can be done about the greatest threat to the marine environment	**34.62%** [36/104]
What Makes Someone Environmentally Irresponsible?	Includes six codes for responses that expressed what participants believe makes someone environmentally irresponsible	**33.65%** [35/104]

The Greatest Threat to the Marine Environment

Table 12b shows descriptions, example quotes, and response frequencies of codes (i.e. number of responses for each code out of the 33 responses). This theme relates to the Environmental Concern Category (Table 12a). This section includes mention of biospheric and social-altruistic values as they relate to the concern/need for proper management and/or protection of natural resources because of a concern for the environment, animals, and/or plants *or* because of a concern for other people, family members, community, and future generations, respectively. While each of these codes can be considered an anthropocentric threat, I delineate between responses that specifically blame human's lack of respect for the environment, directly blame human behavior, and the more amorphous responses where participants do not *specifically* assign blame to humans (i.e. climate change). Codes are presented by their frequency. As Table 12b reveals, 100% of codes identified under The Greatest Threat to the Marine Environment Theme were attributed to anthropocentric impacts (answering Question 6 in this chapter). In nearly a

three-way split, scouts attributed littering, pollution, or climate change (33%), humans and their specific behaviors (30%), and a lack of respect and/or concern for the environment (27%) to being the great threat(s) to the marine environment.

Table 12b: The Greatest Threat to the Marine Environment	Example Quote(s)	Frequency of Codes
Littering, pollution, or climate change as it relates to harming the environment; blame not assigned specifically to humans	"Plastic and oil, and just pollution in general, they could eventually choke and kill sea turtles and fish and sharks." "Probably pollution...like um landfills, plastics… chemicals." "Microplastics… it harms a lot of wildlife down there."	**33%** [11/33]
Humans and their behaviors; blame assigned to humans specifically	"The higher the sea level the warmer the water gets…cause the ice is melting…causing hurricanes...our impact on the water, is getting warmer, and less salt…these storms are more reoccurring...global warming…" "Humans. Because of all the stuff that we've done to harm the waterways." "Definitely ourselves. Like people throwing the trash… most trash will end up down here [referring to the Florida Keys]."	**30%** [10/33]
Lack of respect and/or concern for the environment	"Because we're greedy in a way with oil because basically oil now is like the new kind of gold." "Sometimes it's really shallow and the boats are really big and they just cut through and they make like big scars and stuff….maybe they just don't care."	**27%** [9/33]

What Can Be Done About the Greatest Threat to the Marine Environment?

Table 12c shows descriptions, example quotes, and response frequencies of codes (i.e. number of responses for each code out of the 36 responses). This theme relates to the Environmental Concern Category (Table 12a). Codes are presented by their frequency. Question 6 in this chapter is also a two-part question, and is answered from results in table 12c. Under the What Can Be Done About the Greatest Threat to the Marine Environment theme, scouts believed that giving

humans the knowledge and/or awareness on marine environmental issues (25%) and to encourage a willingness for humans to change behaviors towards the environment (22%) could mitigate the greatest threat(s) to the marine environment.

Table 12c: What Can Be Done About the Greatest Threat to the Marine Environment?	Example Quotes(s)	Frequency of Codes
Giving humans the knowledge and/or awareness on marine environmental issues	"The best thing to do would just be aware to just like throw your stuff away." "I think what we should just make just get people aware of what happens. Because most people don't even know what that stuff [e.g., litter, pollution,] is doing" "Just more awareness, and just having more people recycle…and just know the after-effects of what they're doing…educating them on the consequences of their choices"	**25%** [9/36]
Encourage a willingness for humans to change behaviors towards the environment	"Instead of fixing the environment we need to fix what we do to the environment. Change people's perspectives and they'll want to change themselves" "…how can you make people appreciate [the environment], that's the thing. Maybe [find] a way how we could make people care"	**22%** [8/36]
Biospheric Concern:	"We need to change the way we're living on earth, to help the animals that were here before us…" "And that [plastic, oil and pollution] kills and destroys environments and it takes months upon months to clean up those messes and so many animals and mammals die"	**16.6%** [6/36]
Implementing **more stringent rules, regulations, and/or policies** towards environmental protection	"There needs to be more rules in place on the government level that restricts what people do and don't do…such as, y'know boating places you're not supposed to, overfishing areas." "Make a bigger fine for littering. And for bigger companies, give them some type of bigger punishment if they like get caught doing that."	**16.6%** [6/36]

Social-altruistic Concern:	"It's not just your earth, it's everyone's earth"	**8%** [3/36]
Use of social media, TV, radio, or any similar platform as a tool or resource for benefiting or aiding in environmental issues	"Those people and those ads [on YouTube] and everything kind of get young people thinking about how they could help"	**5%** [2/36]
Mention that our resources are finite and should be preserved for that reason, and that's why having a CE is important	"If we overhunt horseshoe crabs [for research purposes], the horseshoe crab population is gonna dip."	**3%** [1/36]
General concern for the environment (could be marine environment but doesn't have to)	"Because [oil getting dumped into the ocean] is going to cause a lot of damage very rapidly."	**3%** [1/36]

What Makes Someone Environmentally Irresponsible?

Table 12d shows descriptions, example quotes, and response frequencies of codes (i.e. number of responses for each code out of the 35 responses). This theme relates to the Environmental Concern Category (Table 12a). This section includes mention of biospheric and social-altruistic values as they relate to the concern/need for proper management and/or protection of natural resources because of a concern for the environment, animals, and/or plants *or* because of a concern for other people, family members, community, and future generations, respectively. Codes are presented by their frequency. Table 12d answers Question 7 in this chapter, revealing that most scouts (43% of codes) thought a lack of respect for the environment made someone environmentally irresponsible.

Table 12d: What Makes Someone Environmentally Irresponsible?	Example Quote(s)	Frequency of Codes
Lack of respect for the environment	"…Their boat gets stuck in the seagrass, what they'll do is they'll just go full throttle and send it through, tearing all the seagrass." "Ignoring the environment itself…not respecting the natural course of things	**43%** [15/35]

	"I guess any conscious choice that they make, that in the long run, will have a negative effect on the environment... Yeah, conscious. Choosing to throw a bottle out of a window or something like that" "Well, obviously carelessness...and like also recklessness too I would say. Like I think there's just some people that like, that do like the environment – they just don't think! Like I have friends out there that'll like find a frog and be like 'Oh, cool!' and then they'll just like, they'll like accidentally kill it and they're like 'aw, whoops'. And it's like, yeah you gotta be a little careful…"	
Ignorance towards environmental problems	"Well if they don't learn about it, if they don't learn about…what to do, how they can help, they just do what they think is good but sometimes it's not." "Because they don't know! They haven't learned about it….no one's really told them anything, right? I would say to not understand what we're doing, what we're doing wrong [makes someone environmentally irresponsible]….but it could also not be your fault because you haven't been taught…"	**17%** [6/35]
Overuse of natural resources; exploiting natural resources	"There's a lot of like overfishing and over-poaching and whatnot." "Overfishing an area, fishing areas that are prohibited like reefs… like catching fish that are too small to keep." "People that buy cases and cases of single use plastic water bottles for trips and that kind of stuff…they y'know, leave the car running when they don't need to"	**17%** [6/35]
Biospheric Concern:	"Not having that awareness can lead to destroying whole ecosystems and not even realizing it until it's too late." "That really kills a lot of animals. And the numbers are getting smaller and smaller and smaller until eventually – they're all just gone."	**17%** [6/35]
Explanations and/or examples of what makes someone environmentally responsible (i.e. **what one *should* do**)	[Talking about being aware and conscious towards environmental issues]: "I feel like it's one of those things that everybody should really like should get to know… get up to program with"	**3%** [1/35]
Social-altruistic Concern	"One day I'd love to have like my kids see this [referring to the Florida Keys]. And have their kids see this. And have generations keep seeing this, and how beautiful it really is."	**3%** [1/35]

5.6.4 No-Codes

Table 13 shows descriptions, example quotes, and response frequencies of codes (i.e. number of responses for each code out of the 3 responses under the No-Code theme in Table 13).

Table 13: No-Codes	Example Quote(s)	Frequency of NCs
Overpopulation makes GMOs necessary	"I do not agree with [using GMOs] but I understand why it is like that"	**33.33%** [1/3]
People/ companies being near the ocean as being more likely to dump pollution and/or trash near the ocean, and that is a great or the greatest environmental threat	"People or companies are dumping their waste and stuff into the oceans… if they're near the ocean, they just like throw their trash everywhere outside you know?"	**33.33%** [1/3]
Expected more structured environment prior to arriving.	"I'm used to normal Boy Scout camps...you have to be everywhere at a certain time. Everything is right after other and that's kind of like what I was expecting…But…I got here I loved it here because is very chill and you just go with the flow and everything's clean and kept under order."	**33.33%** [1/3]

5.7 Discussion

This discussion seeks to triangulate findings between pre and post-surveys across all programs (*t*-tests*)*, the significance of post survey results across the Marine STEM, Keys Adventure, and Out Island programs (one-way ANOVAs), observational data from 6 Marine STEM and 1 Out Island program (see Appendix B), and results from a content analysis of 18 Marine STEM interviews and 2 Out Island interviews.

When comparing results of pre and post surveys, all expectations (i.e. to see fish, reefs, and experience natural surroundings) were exceeded significantly across all programs. A surprising find revealed that environmental awareness of predominantly micro impacts to coral reefs in the Florida Keys (e.g. snorkeling, recreational fishing) decreased significantly after program across all programs, with no significant differences between the results across programs.

While the pre/post program differences in awareness of predominantly macro impacts to coral reefs in the Florida Keys (e.g. climate change, hurricanes) was not significant, the differences across program were statistically significant. Marine STEM participants reported the highest level of awareness in predominantly macro impacts to coral reefs in the Florida Keys, especially when compared against the Keys Adventure program. It would make sense that Marine STEM would have a significantly higher level of environmental awareness of predominantly macro impacts to coral reefs in the Florida Keys, as the program's lectures often underscore the impacts of climate change, agricultural run-off, hurricanes, littering, and their cumulation on coral reef health. Part of the Marine STEM program includes a 90-minute visit to the coral nursery and discussion on coral fragmentation for eventual outplanting, as well as lectures on coral diseases (e.g. Stony Coral Tissue Loss) and how such diseases are likely the result of anthropocentric impacts, namely eutrophication and climate change (Lapointe, Brewton, Herren, Porter, & Hu, 2019). During interviews, participants also attributed all marine environmental threats to humans, with 63% of responses relating to factors such as littering, pollution, climate change, and "all the stuff that we've done to harm the waterways" (Table 11a).

As mentioned, all expectations and their fulfillment across all programs saw a statistically significant increase. However, the expectation to experience and learn about natural surroundings and see live coral was highest among the Marine STEM program, and significantly higher when compared to the Out Island program. As it relates to fulfillment of learning about natural surroundings, it would of course make sense that fulfillment of these expectations were significantly higher among Marine STEM participants. Fulfillment of experiencing natural surroundings and seeing live coral may be related to the fact that Marine STEM participants go snorkeling 3 to 4 days during their program; Out Island program participants spend most their

time on Munson Island, and have only 1 or 2 snorkeling days. Furthermore, the number #1 program highlight was snorkeling, swimming, and/or boating, but none of those interview responses came from Out Island participants (Table 10d). In fact, during the two interviews with Out Island scouts, both expected to go snorkeling, but poor weather conditions resulted in only one true snorkeling day at Looe Key. As suggested by the investigator's notes in her journal entry that day, it was the worst snorkeling day documented all summer (see Appendix B):

> I knew the weather would be bad, but I had no idea how terrible it really would be…it was impossible to see anything at all. The visibility might as well have been equivalent to night, and the waves were so rough scouts kept accidently hitting the coral. It was hard to watch… We must have been in the water for about 15 minutes max. Maybe it was more, since it was so difficult to swim in water that kept pounding us against the reef…but we certainly weren't there for long. It was clear that this was going to be one of the most disappointing days for the crew.

All participants verbalized their disappointment, and one OI interviewee noted he expected to see more while snorkeling, but understood there was not much that could be done about the weather. This is of course but one example of a week of terrible weather on Munson Island (where the Out Island program takes place). However, based on the survey data that reported participants' fulfillment of the expectation to see live coral and learn/experience natural surroundings, it may make sense to schedule an opportunity to have an additional snorkeling day to Looe Key, should the weather go sour on the day initially planned.

As it relates to the biospheric value orientation, Marine STEM participants reported the highest mean scores as well. While the differences in the mean scores of Marine STEM and Keys Adventure were not statistically significant, these scores were significantly different between

Marine STEM and Out Island programs. To complement these quantitative findings, environmental value orientations where identified 61 times throughout the text, and 51% were biospheric (31/61), 45% were social altruistic (28/61), and 3% were egoistic (2/61).

Self-reported program impacts were highest among Marine STEM participants, and these differences when compared to Keys Adventure and Out Island programs were statistically significant. Self-reported impacts asked participants their perceptions on increases in marine ecological knowledge, awareness of marine environmental issues, confidence when engaging in natural environments, motivation to protect natural environments, and fulfillment of expectations for High Adventure. It's possible that Marine STEM participants scored highest because of the focus program lectures have on marine environmental issues and how participants can do their part by being environmentally conscientious. When asked what it means to have a CE, one Marine STEM scout shared that it means "being mindful of what you do to nature. Because no matter what, it always comes back to you" (Scout MS_073020). Another stated it's best to "[t]ry to use as little as you can…don't have the water running the whole time...reduce your impact… that kind of stuff, and carrying reusable water bottles instead of buying single-use plastics every time you need to drink water" (Scout MS_070220). Many of these specific suggestions were made a few days after Marine STEM lectures.

One presentation in particular focuses on the harm microplastics have on the bioaccumulation of toxins in living organisms and biomagnification through tropic levels (Appendix B). It is clear that presentations such as this one have an impact on scouts when 30% (n=6) of interviewees perceived *microplastics* as being a great (if not the greatest) threat to the marine environment; all 6 interviewees were Marine STEM participants. Referring to microplastics the day after the microplastics lecture, one scout specifically shared that he "never

knew how big of an issue it was…But it was scary to learn about" (Scout_MS070620). Therefore, deliberately giving all Sea Base scouts (as opposed to just the Marine STEM) opportunities to have memorable and even shocking experiences as it relates to environmental issues (e.g. the trash on Munson Island, the contrast between a living reef and a dead reef), coupled with providing silver linings for how to help (to avoid discouraging scouts) could prove to be extremely helpful in instilling perceived (and actual) awareness, knowledge, and confidence in outdoor settings.

Based on interviewee responses and the investigator's experience as a Marine STEM educator at the Florida Sea Base, it is clear the Marine STEM program has had an impact on what scouts learn about marine ecology, perceptions of marine ecological issues, and how to engage with the marine environment in a pro-environmental manner. Many of these responses from Marine STEM scouts direct back to specific classroom lectures and from educational discussions while out on the water. During interviews it was clear that scouts were drawing from their program experience when describing what they had learned about marine ecology and environmental issues, and how this awareness may have had an impact on their perceptions of the marine environment. It is also possible that the Marine STEM experience and subsequent impacts are more impactful for scouts who state this was their first experience swimming/snorkeling out in the ocean, that code consisted of 19.5% all identified codes under the Program Highlights theme; Table 10d).

This chapter revealed that the experience participants have in their youth adventure program can influence *predictors* of a CE, especially when comparing across program type. The self-reported program impacts variable, which as Chapter 4 confirms predicts CE, was highest among Marine STEM participants. The Marine STEM program does more than lecture participants on environmental issues and provide a fun experience. The Marine STEM program had the ability

to shock and awe participants by revealing sobering facts (e.g. the microplastics lecture) and exploring breath-taking coral reef environments, it empowered participants during activities such as shark tagging, and encouraged pro-environmental behaviors that could be readily applied in home environments. Therefore, practitioners seeking to encourage pro-environmental attitudes and behaviors in participants of youth adventure programs should consider empowering participants in a variety of outdoor settings and activities, encourage a sense of accomplishment, and instill confidence in their ability to engage and care for natural environments.

CHAPTER 6: CONCLUSION

6.1: Bringing It All Together

This study investigated predictors of a CE and the statistical significance of differences in these predictors across the Florida Sea Base's Marine STEM, Keys Adventure, and Out Islands programs; it also sought to identify significant differences in mean scores of pre and post survey variables (n=251). Unique to other studies that measured predictors of pro-environmental attitudes (Cottrell & Graefe, 1997), this research used a mixed-methods approach: Statistical data underwent multivariate and comparative analyses, which were triangulated via a content analysis of interview (n=20) and observational data in the form of a daily journal entries. Background variables such as age and education were hypothesized as positive predictors of CE. Site-specific variables such as fulfillment of program expectations and environmental awareness were also hypothesized as predictors of CE.

Use of a multivariate analysis (Chapter 4) confirmed that biospheric and social-altruistic, as well as self-reported program impacts (i.e. perceptions of increased environmental knowledge and awareness, confidence in one's ability to care for natural resources, motivations to make a positive difference in home environments, and fulfillment of the expectation for High Adventure) were the only site-specific variables that predicted CE in the total model. Age was the only background variable that showed to predict CE in the total model. Scouting rank and acquirement of the Leave No Trace / Outdoor Ethics merit badges were the only background variables that predicted CE in the reduced model. To compare statistical differences of mean scores before and after program, as well as across programs, *t*-tests and one-way ANOVAs (Chapter 5) were used to find that Marine STEM participants showed to have the highest mean scores of biospheric values and self-reported program impacts, and that such scores were statistically significant.

Prior research suggests that awareness or knowledge of environmental issues through EE could motivate individuals to engage in pro-environmental behaviors (Hungerford & Volk, 1990). The majority of Marine STEM scouts surveyed also believed that "educating [people] on the consequences of their choices" would help mitigate the greatest threat(s) to the marine environment (see Table 12c). However, knowledge and awareness are not sufficient in predicting pro-environmental attitudes and subsequent behaviors (Runhaar, Wagenaar, Wesselink, & Runhaar, 2019), especially when considering that many studies rely on single-variable or correlational examinations that do not appropriately examine predictive relationships (Cottrell & Graefe, 1997), or don't included mixed-methods to confirm qualitative findings (Vaske & Kobrin, 2010).

Runhaar et al., (2019) recommend viewing "educational organizations…as situations or cultural environments where students live and learn," for the purpose of encouraging pro-environmental behaviors (p.46). In such settings, individuals can more readily identify pro-environmental cues that may foster such behaviors (Runhaar et al., 2019). Such settings can be realized in youth adventure programs, assuming EE is designed in a deliberate manner that actually facilitates these "situations or cultural environments." Furthermore, even though previous literature suggests that positive experiences in nature during adolescence contributes to pro-environmental attitudes and behaviors, this study at the Florida Sea Base revealed otherwise (Bruni & Schultz; 2009; Tanner, 1980). Despite the fact that the fulfillment of program expectations was significant and would suggest a positive experience for participants, CE did not significantly change post-program. Therefore, to further enhance CE and subsequent pro-environmental behaviors, it may make sense to avoid reliance on environmental awareness and positive experiences alone, as many other factors play into such influences.

While countless factors beyond the scope of this study will influence pro-environmental attitudes and subsequent behaviors, this research found that *perceptions* of increased marine environmental awareness and knowledge, as well as confidence in one's ability to care for natural resources, the motivation to make a positive difference in caring for the home environments, and fulfillment of participants' expectations for High Adventure (i.e. the self-reported impacts variable), was strongest site-specific predictor of CE (See Table 7), only second to biospheric value orientations, which are unlikely to change after a 7-day program. This relates to the theoretical implications that a locus of control (i.e. that perceived confidence in one's skills, knowledge, and/or awareness as it relates to motivations for behavior) has on pro-environmental attitudes and subsequent behaviors (Hungerford & Volk, 1990). It also relates to more recent literature that found reciprocal benefits of pro-environmental behaviors resulted in positive feedback loops between motivation and said behaviors (Jones et al., 2021). It would seem that a means of deliberately designing EE to better foster and/or enhance CE would be to ensure participants are able to identify positive benefits of such behaviors during their Sea Base program, and that some of these behaviors can readily be applied in participants' home environments. In both situations, these behaviors should be rewarded (e.g. through merit badges or social prestige at Sea Base, an aesthetically pleasing garden that provides habitat for native species and reduces water costs and usage) to evoke a sense of personal accomplishment.

Implementing "a stronger advocacy component" into program design may also show to be more effective in EE practices (Thomas et al., 2019, p.173). Self-reported program impacts consist of questions as they relate to advocacy for natural resources, and were significantly highest among Marine STEM program participants (see Table 9). During interviews, 28% of codes identified under the What it Means to Have a CE theme described having a sense of

personal responsibility towards the environment (Table 11b), revealing that participants acknowledge the harm to marine environments as predominantly anthropocentric (see table 11c), but also acknowledge that "we need to step back and rewind and say, 'what can we do to help?'" (Table 11c). Being that the Marine STEM program incorporated the strongest advocacy component for inspiring pro-environmental behaviors, it would make sense that self-reported impacts would be highest among Marine STEM participants. Therefore, if the goal is to enhance CE, it may prove useful offer Sea Base program participants (other than Marine STEM) the opportunity to engage in activities and lectures that focus on building strong advocacy in participants after their program. While programs such as Out Island include activities such a beach clean-up and/or clearing of invasive plant species on Munson Island, Marine STEM participants are given lectures that can more readily be related back to home environments. Marine STEM participants are taught about the ostensibly innocuous impacts of microplastics, encouraged to purchase alternative and reusable products (e.g. metal water bottles, reusable grocery bags) and to support companies that practice plastic reduction (e.g. companies that offer biodegradable alternatives), as well as participate in environmental cleanups (which can be used towards required volunteer hours), and to educate others on what they've learned from their program. Such lectures (as many occurred outside the classroom) may have contributed to Marine STEM participants' perceived awareness, knowledge, confidence and motivation as it relates to marine environmental issues natural resources in general. In this way, programs can contribute to establishing confidence in one's ability to make positive differences through pro-environmental behaviors and associate these experiences with a sense of accomplishment (e.g. acquirement of a merit badge, a cleaner beach to enjoy) in the hopes that such experiences may at least *contribute* in motivating such behaviors after their program.

However, all programs may benefit from precisely targeting pro-environmental behaviors participants already engage in, and commending that while suggesting simple and related behavioral changes that result in reciprocal benefits, thereby encouraging the positive feedback loop between motivations and behaviors that Jones et al. (2021) discuss. It may also prove useful to tap into broad biospheric and social altruistic values participants evidently hold into the lectures and activities that provide awareness and knowledge of marine environmental issues at Sea Base, and to relate this to the emotional bonds participants have with natural environments back home.

Based on previous literature and the investigator's findings from this research as a Marine STEM educator, there are a few reasons that may contribute to the insignificant changes in CE pre/post-program. For one, most participants at the Florida Sea Base were 15, and previous research suggests that younger participants (ages 9-10) are more likely to experience attitudinal shifts due to positive experiences in nature (Bruni, Winter, Shultz, Omoto, & Tabanico, 2017). Secondly, a one-week experience may not be enough to significantly change environmental attitudes. It takes participants time to get accustomed to social-ecological settings, and especially shy participants may have trouble overcoming this. In her written observations, the investigator found that most participants did not "come out of their shell" until the end of the week, thereby reducing the opportunities for attitudinal shifts that more long-term programs such as NOLS and Outward Bound offer. Lastly, being affiliated with the BSA, the population sampled consists of participants familiar with outdoor settings, which may suggest that most already hold pro-environmental attitudes and therefore explain the insignificant changes to CE post-program.

In pursuit of cultivating a CE in participants, design of youth adventure programs should be deliberate, based on on-going research, and refer to literature in human dimensions of natural

resources. This research adds to existing literature in suggesting that awareness, knowledge, and positive experiences in nature are not sufficient for fostering and/or enhancing pro-environmental attitudes (e.g. CE) and subsequent behaviors. Therefore, if encouraging pro-environmental attitudes and behaviors is the goal, youth adventure programs should consider coupling these approaches with additional EE design methods. An adaptation of the Predictive Framework of Conservation Ethic (Figure 1) could be implemented in other youth adventure programs, assuming variables pertaining to the BSA are removed and replaced with more context-specific questions.

Youth adventure programs should give participants opportunities to have memorable and even shocking experiences relating to environmental issues (e.g. witnessing an ostensibly healthy, legally protected reef, followed by a completely degraded, unprotected one). Such programs should also seek to cultivate experiences that permit a sense of accomplishment, that may also encourage reciprocal relationships between engaging in pro-environmental behaviors and the motivation to continue doing so. Program lectures and activities should also relate back to natural environments participants are from and may already hold emotional attachments to, as this may have an influence on the biospheric and social altruistic values that predict pro-environmental attitudes. The cumulation of these approaches may contribute to participants' perceived (and actual) awareness, knowledge, and confidence in outdoor settings – which as this study determined, is a significant predictor of CE.

6.2: Future Research

Future research as it pertains to the Florida Sea Base programs and other youth adventure programs should consider routine research on program evaluations (Thomas et al., 2019) to verify

whether such programs are actually enhancing participant knowledge, environmental awareness, pro-environmental attitudes, and confidence in outdoor settings. Regular program evaluations can also help program facilitators identify how program design helps meet those goals, which can be used to create or improve the validity and reliability of indicators and measurements meant to capture such outcomes (Thomas et al. 2019). It would be best to continue incorporating a mixed-methods approaches to not rely on quantitative data alone.

Future research should also involve an exploratory phase of analysis, where the researcher can ask management and staff questions (i.e. important stakeholders) to help inform better research, survey, and/or interview questions, thereby providing insight on program goals and perceptions of the impacts of their program on participants before the start of the study. Future inquiries should consider various means of "program success" other than cognitive outcomes (e.g. measured changes in cognitions such as environmental awareness and attitudes; Thomas et al, 2019; Heimlich, 2010). It may also be worth conducting longitudinal studies on Sea Base participants, before and after their experience (to investigate both cognitive, and behavioral outcomes), as well as environmental impacts the program is having on conservation efforts (ecological outcomes). Youth adventure programs may also see improvements in desired outcomes through constructive partnerships with other organizations such as the National Oceanic Atmospheric Administration, Reef Watch, and the Florida Keys Water Watch (all of which Sea Base associates itself with). Therefore, measuring the effectiveness of social outcomes (i.e. social capital and communication across such partnerships) may serve as another indicator for the success of ecological outcomes (Thomas et al., 2020; Heimlich, 2010).

Another important consideration is the lack of demographic diversity of this study, limiting the generalizability of results (see Chapter 3). 90% of participants were male (n=225),

93% were white (n=234), and 100% were involved with scouting, which suggests regular experience in outdoor settings of participants (e.g. almost 50% of participants reported going camping once a month). Future research should considered applying similar mixed-methods investigations of pro-environmental attitudes and/or behaviors of more diverse populations. This research was also based in a marine-environmental setting, with many survey questions (e.g. environmental awareness, program expectations) catered to the location of the study site. Future research should use CE (a general environmental attitude) to identify how participants respond at a youth adventure program that take place in forested environments.

Additionally, this study revealed the significance of the biospheric value orientations and self-reported program impacts (e.g. perceived increases in knowledge, awareness in marine environmental issues, and confidence in how to protecting natural resources back home) for predicting a CE. While such cognitive functions are different from emotions, some authors suggest (Teel, Dietsch, & Manfredo, 2015) it may prove useful to research the links between the emotional bonds participants have with natural environments back home (i.e. place attachment) with recreational experiences (e.g. of awareness and shock of marine environmental issues during participants' Sea Base program). Perceptions of what participants believe other people are doing as it relates to pro-environmental behavior engagement may provide some insight on social norms and how such norms relate in social settings such as those at the Florida Sea Base. Even though people generally seek to assimilate to the descriptive and injunctive norms of a social setting, as it relates to environmentally significant behaviors, such norms are often in opposition, as "most people approve of sustainable behaviors but behave in unsustainable ways" (Amel, Manning, Scott, & Koger, 2017, p.5). However, it is possible to cultivate positive feedback loops between motivation and behavior in settings where reciprocal benefits are easily identified (Jones et al.,

2021), especially if the latter can be shared and approved of others in social situations. Therefore, it may be crucial to research how individual participants in youth adventure programs "interact with and are impacted by broader cultural and societal forces (e.g. urbanization, globalization), environmental factors, institutions, governance structures, and social networks," to gain insight on their perceptions in these various social contexts, and better understand how pro-environmental behaviors may be informed (Teel, Dietsch, & Manfredo, 2015, p. 24).

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APPENDICES

Appendix A

Florida Sea Base Summer 2020 Sea Base Instrument (Pre Survey)

Conservation Ethic of Sea Base Adventurers in the Florida Keys (*Pre-Program Survey*)

Dear Sea Base Participant,

Welcome aboard and thank you for helping with this study. Your time and effort are very much appreciated. Study results will help us understand how the Sea Base high adventure programs cultivate a conservation ethic among scouts before and after your Sea Base experience. Part I of this survey will take approximately 10 minutes, Part II will be taken on the last night of your Sea Base program and also take about 10 minutes. The information you give will be kept confidential and only used for the purpose of this study.

This study is being conducted as a collaborative effort between the Florida High Adventure Sea Base and Colorado State University

Please contact Ara Jimenez at (786) 659-3457 or aracelis.jimenez@colostate.edu with any questions or concerns you may have about this survey or the broader research project. If you have any questions about your rights as a volunteer in this research, contact CSU IRB at RICRO_IRB@colostate.edu or 970-491-1553.

Scouting Background

1. How many years have you been in scouting? _____

2. What is your scouting rank? __Tenderfoot __2nd Class __1st Class __Star __Life __Eagle

3. Have you earned any merit badges of Scouting awards related to the environment, including: *(Check all that apply)*

___ Soil & Water Conservation MB	___ Outdoor Ethics Award
___ Sustainability MB	___ Leave No Trace Training
___ Oceanography MB	___ Treat Lightly Training
___ Conservation Good Turn Award	___ Nature MB
___ Forest MB	___ Environmental Science MB
___ Fish & Wildlife Management MB	

4. Have you been to Sea Base previously? No ____ Yes ____

4a. If yes, what year was your first visit? _____

4b. What program(s) did you participate in at Sea Base **the last time you were here?**

_____

5. What program are you participating on this trip? *(Check one only)*

___ Florida Keys Adventure	___ Out Island Adventure
___ Florida Fishing Adventure	___ Marine STEM Adventure
	___ Other (*Please specify*) _____

Expectations for your experience

6. To what extent do you expect to do the following during this trip? *(Circle one number for each statement below)*

	Not at all	Slight Extent	Unsure	Moderate Extent	To a great extent
To see healthy reefs	1	2	3	4	5
To experience easy snorkeling/SCUBA diving conditions	1	2	3	4	5
To experience good underwater conditions	1	2	3	4	5
To see undamaged reef sites	1	2	3	4	5
To see marine life (other than fish)	1	2	3	4	5
To see large fish	1	2	3	4	5
To see unique underwater formations	1	2	3	4	5
To see live coral	1	2	3	4	5
To experience natural surroundings	1	2	3	4	5
To learn more about the marine environment	1	2	3	4	5

You have now completed the Pre-Program Survey:

- Thank you for your voluntary participation in the Pre-Program Survey! **Please hand the survey back to the researcher.** If you have already approved to participate in a face-to-face interview, you may be asked to participate in a 10-15 minute interview sometime this week, and the Post-Program survey on the last night of your adventure.
- If you wish to stop taking this survey, prefer not take the Post-Program survey, or prefer not to participate in a face-to- face interview, any information already collected will be discarded and there will be no penalties for doing so.
- There are no risks or direct benefits to you, but this study will help give us insight into the various factors of the Florida Sea Base program that may enforce the development of a conservation ethic.

11. Many people believe that the environment's natural resources should be carefully used, managed, and protected, but may differ as to why. Please indicate how much you ***strongly disagree (1)*** or ***strongly agree (5)*** with the following statement:

The environment's natural resources should be carefully used, managed, and protected for:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Plants	1	2	3	4	5
Marine life	1	2	3	4	5
Animals	1	2	3	4	5
Birds	1	2	3	4	5
Myself	1	2	3	4	5
My lifestyle	1	2	3	4	5
My health	1	2	3	4	5
My future	1	2	3	4	5
People in my community	1	2	3	4	5
All people	1	2	3	4	5
Future generations	1	2	3	4	5
My family	1	2	3	4	5

Outdoor Experience

7. How often do you participate in the following outdoor activities? (*Circle one number for each statement below*)

	Never	Once a year	Every 6 months	Every 3 months	Monthly	Weekly	Daily
Backpacking	1	2	3	4	5	6	7
Camping	1	2	3	4	5	6	7
Hiking/Walking	1	2	3	4	5	6	7
Running/Jogging	1	2	3	4	5	6	7
Bicycling	1	2	3	4	5	6	7
Wildlife Viewing	1	2	3	4	5	6	7
Swimming	1	2	3	4	5	6	7
Sailing	1	2	3	4	5	6	7
Boardsailing/Windsurfing	1	2	3	4	5	6	7
Wakeboarding/Water-skiing	1	2	3	4	5	6	7
Skiing/Snowboarding	1	2	3	4	5	6	7
Surfing	1	2	3	4	5	6	7
Canoeing/Kayaking	1	2	3	4	5	6	7
Rafting	1	2	3	4	5	6	7
Rock Climbing/Bouldering	1	2	3	4	5	6	7
Fishing	1	2	3	4	5	6	7
Hunting	1	2	3	4	5	6	7
Other (*Please specify*): _____	1	2	3	4	5	6	7

Environmental Perceptions

8. Please indicate your level of agreement of the following statements from ***(1) strongly disagree*** to ***(5) strongly agree***. *(Circle one number for each statement)*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Coral reefs in the Florida Keys can recover from any impact due to snorkeling/diving without long term damage	1	2	3	4	5
Coral reefs in the Florida Keys can recover from any impact due to commercial fishing without long term damage	1	2	3	4	5
Coral reefs in the Keys are generally in healthy condition	1	2	3	4	5
Snorkelers/divers cause damage to reefs in the Keys, which has long lasting effects on coral reef health	1	2	3	4	5
Recreational fishing causes damage to reefs in the Keys, which has long lasting effects on coral reef health	1	2	3	4	5

9. On a scale from ***very negative impact (1)*** to ***very positive impact (5)***, how do you feel the following are affecting **the ecological health of coral reefs** in the Florida Keys?

	Very Negative Impact	Negative Impact	Neutral	Positive Impact	Very Positive Impact
Water quality	1	2	3	4	5
Scuba diving	1	2	3	4	5
Commercial fishing	1	2	3	4	5
Hurricanes	1	2	3	4	5
Snorkeling	1	2	3	4	5
Recreational Fishing	1	2	3	4	5
Global climate change	1	2	3	4	5
Recreational boating	1	2	3	4	5
Agriculture/Farming	1	2	3	4	5
Residential areas	1	2	3	4	5

Conservation Ethics

10. Please indicate your level of agreement of the following statements from ***strongly disagree (1)*** to ***strongly agree (5)***. *(Circle one number for each statement)*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I should prepare and plan ahead for outdoor adventures	1	2	3	4	5
I should stay on the designated trail when hiking	1	2	3	4	5
I should look for unmarked areas to build a campfire	1	2	3	4	5
I should feed or pet wild animals in a natural area	1	2	3	4	5
I should take an artifact as a souvenir	1	2	3	4	5
I should make an effort to enhance skills and practice beforehand so I have better control when in the water	1	2	3	4	5
I should set up camp on durable surfaces	1	2	3	4	5
I should put out fires with dirt	1	2	3	4	5
I should pack out my belongings, leftover food, and waste products after leaving a campsite	1	2	3	4	5
I should set up my campsites right along a river or lake	1	2	3	4	5
I should break off branches from standing trees to build a fire	1	2	3	4	5
I should share information about shipwreck locations on social media	1	2	3	4	5

Florida Sea Base Summer 2020 Sea Base Instrument (Post Survey)

Conservation Ethic of Sea Base Adventurers in the Florida Keys (*Post-Program Survey*)

Dear Sea Base Participant,

We truly hope you've enjoyed your marine adventure at the Florida Sea Base! The time and effort you've put into the pre-program survey is very much appreciated. The post-program survey is the final part of this research study. Should you wish to discontinue your participation in this research study, know that you may do so at any time without penalty.

This study is being conducted as a collaborative effort between the Florida High Adventure Sea Base and Colorado State University

Please contact Ara Jimenez at (786) 659-3457 or araceli.jimenez@colostate.edu with any questions or concerns you may have about this survey or the broader research project. If you have any questions about your rights as a volunteer in this research, contact CSU IRB at RICRO_IRB@colostate.edu or 970-491-1553.

Satisfaction & Expectations

12. On a scale of 1 to 10, with 10 being the perfect trip, and 1 being the worst trip, **how satisfied** are you with your Sea Base trip? _____

13. Please indicate your level of agreement with the following statements from **(1) strongly disagree** to **(5) strongly agree**. *(Circle one number for each statement.)*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
This Sea Base trip has motivated me to make a positive difference in caring for the environment where I live	1	2	3	4	5
This trip has fulfilled my expectation of High Adventure	1	2	3	4	5
This trip has increased my knowledge of marine natural resources	1	2	3	4	5
This trip has made me much more aware of the conditions of the marine environment	1	2	3	4	5
This trip has made me much more confident in my ability to care for natural resources	1	2	3	4	5

14. To what extent were your **expectations** for the following fulfilled? *(Circle one number for each statement below)*

	Not at all	Slight Extent	Unsure	Moderate Extent	To a great extent
I saw healthy reefs	1	2	3	4	5
I experienced easy snorkeling/SCUBA diving conditions	1	2	3	4	5
I experienced good underwater conditions	1	2	3	4	5
I saw undamaged reef sites	1	2	3	4	5
I saw marine life (other than fish)	1	2	3	4	5
I saw large fish	1	2	3	4	5
I saw unique underwater formations	1	2	3	4	5
I saw live coral	1	2	3	4	5
I experienced natural surroundings	1	2	3	4	5
I learned more about the natural environment	1	2	3	4	5

Thank you for your voluntary participation in this study! If you wish to stop taking this survey, any information already collected will be discarded. There are no risks or direct benefits to you, but this study will help give us insight into the various factors of the Florida Sea Base program that may enforce the development of a conservation ethic.

Please provide any additional comments, opinions or concerns here:

_____
_____
_____
_____
_____
_____

Demographics:

This demographic data will used to gather information that allows us to better understand the background characteristics of our audience. Your responses and identity will remain completely anonymous.

19. What is your age? _____

20. What is your gender (select one):
Male____ Female____ Non-binary/Self-describe____

21. What state do you currently live in? _____

22. What is your level of education (please select one):
No schooling completed ____
Pre-K-8th grade ____
Some high school, no diploma ____
Highschool graduate, with diploma or equivalent (for example, GED) ____
Some college credit, no degree ____
Trade/Technical/Vocational training ____
Some college, no degree ____
Bachelor's Degree ____
Master's Degree ____
Doctorate Degree ____

23. Please select your ethnicity (check all that apply):

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic of Latino
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Other (please describe): _____

Environmental Perceptions

15. On a scale from ***very negative impact (1)*** to ***very positive impact (5)***, how do you feel the following are affecting the ecological health of coral reefs in the Florida Keys?

	Very Negative Impact	Negative Impact	Neutral	Positive Impact	Very Positive Impact
Water quality	1	2	3	4	5
Scuba diving	1	2	3	4	5
Commercial fishing	1	2	3	4	5
Hurricanes	1	2	3	4	5
Snorkeling	1	2	3	4	5
Recreational Fishing	1	2	3	4	5
Global climate change	1	2	3	4	5
Recreational boating	1	2	3	4	5
Agriculture/Farming	1	2	3	4	5
Residential areas	1	2	3	4	5

16. Please indicate your level of agreement of the following statements from ***strongly disagree (1)*** to ***strongly agree (5)***. ***(Circle one number for each statement)***

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Coral reefs in the Florida Keys can recover from any impacts due to snorkeling/diving without long term damage	1	2	3	4	5
Coral reefs in the Florida Keys can recover from any impacts due to commercial fishing without long term damage	1	2	3	4	5
Coral reefs in the Keys are generally in healthy condition	1	2	3	4	5
Snorkelers/divers cause damage to reefs in the Keys which has long lasting effects on coral reef health	1	2	3	4	5
Recreational fishing causes damage to reefs in the Keys which has long lasting effects on coral reef health	1	2	3	4	5

Conservation Ethics

17. Please indicate your level of agreement of the following statements from (1) ***strongly disagree (1)*** to (5) ***strongly agree. (Circle one number for each statement)***

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I should prepare and plan ahead for outdoor adventures	1	2	3	4	5
I should stay on the designated trail when hiking	1	2	3	4	5
I should camp on durable surfaces	1	2	3	4	5
It is okay to break off branches from standing trees to build a fire	1	2	3	4	5
It is okay to take an artifact as a souvenir	1	2	3	4	5
I make an effort to enhance skills and practice beforehand so I have better control when in the water	1	2	3	4	5
I should find unmarked areas to build a campfire	1	2	3	4	5
Fires can be safely put out with dirt	1	2	3	4	5
It is okay to feed or pet wild animals in a natural area	1	2	3	4	5
Campsites should be set up right along a river or lake	1	2	3	4	5
I should pack out my belongings and waste products after leaving a campsite	1	2	3	4	5
Information about shipwrecks should be made easily accessible to the public	1	2	3	4	5

18. Many people believe that the environment's natural resources should be carefully used, managed, and protected, but may differ as to why. Please indicate how much you ***(1) strongly disagree*** or ***(5) strongly agree*** with the following statement:

The environment's natural resources should be carefully used, managed, and protected for:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Plants	1	2	3	4	5
Marine life	1	2	3	4	5
Animals	1	2	3	4	5
Birds	1	2	3	4	5
Myself	1	2	3	4	5
My lifestyle	1	2	3	4	5
My health	1	2	3	4	5
My future	1	2	3	4	5
People in my community	1	2	3	4	5
All people	1	2	3	4	5
Future generations	1	2	3	4	5
My family	1	2	3	4	5

Appendix B

Example Journal Entries

Journal Entry 1: Troop 062020_MS

June 21st 2020
Arrival, Flags, Dinner, Opening Ceremony, Presentations/Introductions (including introducing the research), and start working on ROVs.

June 22nd 2020

Flags, Breakfast, Snorkeling in Looe Key, Dinner on the Boat.

How have scouts responded to staff/adult leaders?

- **163MS062220:** Asking questions, showing interest, more confidence than the first day he arrived to do the swim lesson….as, like his brother, had a moment of panic when first entering the water. He seems generally more comfortable and trusting of us.

- **160MS062220:** Responsive throughout, as the crew leader, he actively tries to exhibit leadership and appears to always be paying attention. He uses strong eye contact and a "thumbs up" to signal his understanding of something staff have informed him of.

- **162MS062220:** Comfortable speaking about what he's familiar with. He and his father fell asleep during the dissolved oxygen activity

- **158MS062220:** Quiet, shy, appears to always be listening

- **161MS062220:** Gets distracted easily, however he clearly wants to connect with staff and will listen when you address his inattentiveness
-
- **157MS062220:** Gets even more distracted easily. He wants to rush through activities, and appears to want to demonstrate that he can complete activities quickly. He doesn't always seem to be listening to leaders.

- **How have scouts responded to each other?**

Generally, the scouts work well with one another, because they already know each other. It is only day two, but they are already much more talkative with each other and staff than they were yesterday.

- **How have scouts responded to group activities?**

Generally, very excited! A few scouts had never been snorkeling before. Some were initially a little squeamish about being so close to fish in the water, but they quickly adjusted. Many were

exhausted by the snorkeling activity. Many enjoyed being able to identify fish per staff recommendations. Some scouts were tired of snorkeling, and so kayaking along the mangroves past the bridge was an exhausting, less pleasant activity.

- **Free time activities vs assigned group activities?**

Last night the scouts were eager to build robots together during their free time in the evening after dinner. During this chosen group activity, they all worked well together but some (e.g. 163MS & 160MS, Ages 16) were more hands-on than others (e.g. 162MS, Age 16).

One of the scouts (MS157, Age 13) freaked out a bit when he first jumped in the water, because he wasn't used to seeing all the fish all around him. It was unfortunate because it seemed like this was the scouts' most anticipated day and they were rushed by the captain. You can tell they wanted to see healthy coral reefs more than anything else, so it is a shame that we didn't end up squeezing another dive through the reef that day. After snorkeling we kayaked to the backcountry to where the mangroves were over the bridge. We were going against the current so the scouts were not too fond of this part. In addition to that, everyone was right up against one another and splashing frantically and therefore stirring up sediment making it basically impossible to see fish along the mangroves. Some scouts saw a pair of horseshoe crabs mating, and there were a few Cassiopeia's. Scouts were visibly exhausted by this point

June 23rd 2020

This is our 3rd day w/ my first STEM crew. Keeping a steady journal has proven to be much harder than I imagined. I need to organize myself better by:

- Waking up and going to bed earlier
- Prep research materials before hand
- Have 1 journal, as opposed to 3
- Consistently write before breakfast/ lunch/ dinner

Regarding observations today, we snorkeled at Fort Zachary Taylor – all scouts went in the water, but a few tired out quickly and went back to the beach to rest. Others seemed less excited about viewing these reefs as the ones in Looe Key were so amazing! It's a tough reef to beat, so I understand this. A handful of scouts chose to eat lunch earlier, as opposed to snorkeling first. Being that this is Day 3 of the program, but really day 2 of their adventure, it's possible they're less excited to snorkel this time around. Especially the younger ones that tire out more easily. The older scouts seem more interested in the snorkeling activity. They generally seemed more involved as well.

Before heading out to the Fort, we visited the coral nursery and taught the scouts how and why we cut coral. I was impressed to see the younger scouts fascinated by this part. MS161 specifically showed interest and understanding when I asked him if he understood why we cut coral. He responded yes and explained that we cut them to grow more to plant them in the wild to help them because they are being negatively affected by many factors. He sometimes is visibly bored by lectures and have proven to be easily distracted, but he appeared to be entirely present when MaleMS1 was giving his "Coral Talk" and demonstration on the cutting. I wonder how much of this was related to his expressed interest and knowledge of coral (as several scouts have verbally shared that they were most excited to see live coral on this trip), and how much of it is related to the fact that MalesMS1 could easily be someone the scouts look up to. A

knowledgeable young man, working a machine that cuts (and ultimately helps) coral /coral reefs would be someone the scouts may admire and relate to. During the coral talk, MS161 stated that he would love to work a job like ours. This was stated immediately after MalesMS1 coral talk. It was incredibly heartwarming. MS161 has also asked me if I enjoy my job (this was asked our first night, while the scouts were working on ROVs).

In general, the scouts have completely come out of their shells with staff. Especially the older ones. MS158 and MS157 are still very quiet. MS157 prefers to be working on ROVs in the classroom, and is glued to his phone while we're driving to different locations in the van. MS158 on the other hand is quiet, but VERY observant. Especially while we were driving through key West. It is worth noting that MS158. and MS160 are brothers. MS158 and MS160's father is one of the 2 adult leaders (MS159). MS159 is extremely kind / related and does not impose on his scouts (including his kids) at all. MS162's dad is the 2nd adult Leader (MS156). After snorkeling at Looe Key they fell asleep on the boat almost simultaneously. Like father like son, I suppose.

MS162 is an artist. He prefers to draw/observe animals. He admits to not knowing much of the science behind animals, but likes learning about their ecology. He was thoughtful about his apparent at Key West. He also likes asking his dad to take pictures of him w/ nature in the background (i.e. beach, trees, at the base).

As expected, the scouts are very involved /w social media apps and gaming consoles. MS163, MS160, and I spent about 30 minutes while in the van talking about video games. He lost me with apps like Tik Tok. Maybe I should download it. MS157 is definitely most interested in technology, and seems less interested in the physical world.

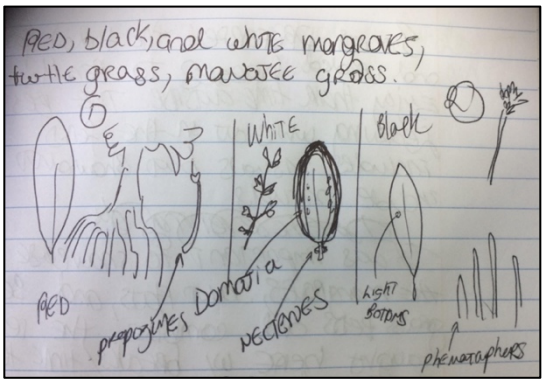
June 24th 2020

This morning we headed to Munson Island. This island, as cruel as it can be w/ it's heat (104 degrees F today) and the mosquitos and poison oak, it gave the scouts a place to observe a wealth of ecological environments all in one place.

Munson island was cleaned up prior to the scouts arriving, but the scouts and adulting immediately noticed the litter along the shore. While they weren't big fans of the sargassum, the litter, as one adult put it, couldn't be "unseen." Hopefully the visual leave an impact.

Today's activity consisted of locating points of interest on a map/GPS. We walked through tidal pools, mangrove habitats, and the salt flats. Plans that we saw today included Bahamian nightshade, sea lavender, saltwort, poison oak, blood wort, purpose porter, Gumbo limbo, sea oats, red, black and white mangroves, turtle grass, manatee grass.

MaleMS2 suggests I explain the location of mangroves first: Reds in the water, black in the tidal area, whites will be more inland:



Scouts preferred the tidal pools and needed breaks to really enjoy their time outside. The best learning while out in the field requires visuals after all.

It was important to showcase the mangroves, salt flats, and sea grass beds and combine the lessons taught here with breaks and time to process the stories i.e. the story of Kevin the camel)

I also thought ending the day w/ snorkeling in the sea grass beds and seeing the nurse shark was a good way to finish this trip.

In the evening, during their night activity, the scouts worked on their presentations, the older scouts were again very cooperative with one another, but needed a little direction. Josh, from the younger group, continuously tried to take control and does not give his fellow scouts an opportunity to participate.

June 25th 2020 *(see next entry)*

June 26th 2020
I am writing today on June 26th at 7:08am, reflecting on the previous day, which consisted of fishing and a semi-chaotic shark tagging episode. The water was pretty rocky that morning. One of the scouts threw up and a few were sea sick. Surprisingly, I wasn't this time. Every scout caught at least 2 or 3 fish. Their experience on the water at first demonstrated excited but soon melted away to boredom, as they were no longer catching fish in the deeper water. I have to admit I was finally getting into it as I was starting to understand how to not have my bait eaten every time. After a few hours of catching grouper (released), white and French grunts (some kept), yellow tail and mangrove snapper (some kept), and 1 pork fish, we moved over to Munson Island's floating docks to catch and tag sharks. At first we only caught 2 nurse sharks. But this was an opportunity for all the scouts to finally see a shark up close. With the chum we saw several nurse sharks and sting rays. However when catching it, we could not tag it…more specifically, I could not tag it…The skin was too deep….we let them go and tried to catch a lemon shark. It was a success but the lemon shark brought the line over a floating dock and under a cooler…so the line was stuck and our options were to swim over or cut it. I managed to swim over and it took me a while but I was able to climb on…but by then MaleCaptain1 swam over as well. We brought the line over and around, brought the shark up close to our boat and tagged it. It made the seasonal record at 5.5 total feet.

After driving the boat back to shore, the scouts washed the boat, and rested until flags at 5:45pm. We did flags and quickly grabbed our dinner and brought it over the chickee to also prepare our freshly caught fish. As the scouts ate I seasoned and cooked our fish. I was a little nervous as to how good they would turn out – it was delicious. At least the scouts thought so. Many talked about how this was the freshest fish they had ever had. Will mentioned how different it must taste from farm raised fish (as he doesn't eat fish) and they agreed.

After that, the scouts went back to building their ROVs and I have to say the older group's ROV will likely take the win tonight. It's extremely well built /put together. Everyone at this point is extremely talkative, the adult, the kids. It's a shame that they leave tomorrow morning. I hope this experience has had an impact on them. Tonight I'll be administering their surveys.

I am writing Friday June 26th at 11:13pm. My first crew leaves tomorrow morning! What an adventure and pleasure to get to know these kids! I've learned a lot this week…even if it is the third week of "training." I hope I can prove to be a great guide for their adventure while still being the researcher I aspire to be.

Today we snorkeled through the mangroves in Tarpon Belly and another island next to the ridge…but it was quite painful as I had cuts all over my legs and hands and feet and the salt stung. It was worse when a Cassiopeia got to my inner thigh. I need to study the ecology and scripts more but I think I'll make a great mate. We could not do Looe Key again, as the water conditions would not permit it. 2 scouts (younger, 13) choose not to snorkel today. After lunch we did a water quality test at 12:20

At the tail-end of dinner the scouts did their surveys. I'm starting to wonder if the "why" part of my measurement of a conservation ethic means anything….since many of the scouts put 5's across the board. The interviews have spoken a bit more to that however. I hope to learn from them.

After snorkeling/dinner, the kids raced their ROVs and the older group won. The younger group's motor died. I saw Conner 1 touch the water and then touch the battery. So no surprise there. After the race, the gave presentations. The older group did excellent.
Then we discussed our roses, thorns, and buds. The good, the bad, and what you hope to take with you. My rose was the fishing day. I genuinely had a great time with the scouts, and was so excited to see them catch fish and the excitement of bringing the nurse shark and the lemon shark (which we tagged) as well. I need to get better at tagging sharks and prepping beforehand. We also tried doing water quality tests while snorkeling which did not go well. I need to get better at prepping beforehand!

My "thorn" was snorkeling through them mangroves as I got stung by either Cassiopeia or stray strands of another jelly's tentacle. My "bud" was to see the kids light up and learn from this experience. I hope to take this with me to continue creating the same experience with future scouts.

June 27th 2020 (Departure)

Journal Entry 2: Troop 070620_MS

July 5th 2020 Sunday
Arrival, Flags, Dinner, Opening Ceremony (done in the nursery this time), Presentations/Introductions (including introducing the research), and start working on ROVs.

July 6th Monday
Flags, Breakfast, Snorkeling in Looe Key, Lunch on the Boat.
Today's the first day we'll be heading out to snorkel with the scouts this morning. Weather should be nice today. 85 F with 72 humidity (relatively low for a Florida day).

I look forward to getting to know these scouts a bit better. This group is from Hoover, Alabama. The kids are a bit older as well.

I need to get those last names in, ensure I've got the birthday at the end of the week right as well.

I'm only a bit concerned about 184MS070620 right now….as he fell asleep during the entire presentation and opening of the program. FemaleMS_1 seem much more offended by this than I was (and I usually find myself offended by this sort of thing). But he's been up since 3am and so I think we should give him the benefit of the doubt.

Our leaders are 184MS070620 and 191MS070620. I would appear that 191MS070620will be a better leader…but I could be wrong.

I spoke with the adult leader Thomas the most. He seems the most interested in my study, asking several questions and speaking to me for about 15 minutes as the scouts built their ROVs.

The way the ROVs are going, I'd say we will be in a similar place as we were with my first STEM group (with little time for nighttime outdoor activities, such as paddle boarding or snorkeling).

- **How have scouts responded to staff/adult leaders?**

184MS070620: Slept during the presentation/opening ceremony, but besides that seems to have a good attitude towards staff (although he gave a bit of frivolous attitude while we jokingly confronted him about sleeping yesterday)

191MS070620: Good attitude, funny, doesn't mind being the butt of a joke. Appears to be a good leader.
192MS070620: Quieter, does his own thing. Took his sweet time during the swim training despite his fellow peers egging him to go faster

186MS070620: Still haven't gotten a good read on him. I'd peg him as a quieter kid right now, but time will tell

189MS070620: Facetiously calls himself Alex the Great. Smart, friendly, funny, likes to draw…is currently designing the flag.

193MS070620: Seems polite, present in both youth and adult conversations, don't know enough about him to make a solid statement.

Adults:
188MS070620 (Female)
190MS070620 (Male)
187MS070620 (Female)
183MS070620 (Male)

- **How have scouts responded to each other?**

All scouts respond well to each other, because all are in the same age group (I presume)

- **How have scouts responded to group activities?**

They often respond well to group activities. The program involved nonstop activities, and while for some that is ideal, for others it can be a be a bit exhausting. 189MS070620 in particular would've like some more free time between activities…to recharge. I am this way too, but I also understand that soon the adventure will be over.

- **Free time activities vs assigned group activities?**

July 7th Tuesday
Key West day. Coral Nursery in the morning. Then snorkeling. Then Key West. Good group. Easy-going. 184MS070620 continues to be on his phone.

It is July 8th at 7:15am and I am writing on the day and night before.
During the Coral nursery we had FemaleMS_1 and my group come out, along with FemaleMS_2 crew. They seemed interested in the coral nursery, but the adults (generally) seemed to be asking more questions. 193MS070620 asked a few questions. 193MS070620 seems to behave "the way he is supposed to," and after meeting his mother, who truly reminds me of my mother in many ways, I am not surprised. 193MS070620's mother is very Christian, enough to mention it and "Jesus" in conversation, but not in any way be imposing. She loves making silly jokes or calling actors such as Chris Evans and Jason Mamoa "hot." She seems like the person who's usually in charge and has taken a back seat on this trip, as she specifically said yesterday. I think she's pretty easy to talk to and find a connection with.

One of the adults, in front of 189MS070620 (about 15/16) asked me, "I take it you're an introverted extrovert. You enjoy engaging with people, but you need your alone time." I laughed and agreed, it was nice to be so accurately described in this light. He said this after we had gone snorkeling. 189MS070620 agreed he was this way as well, adding, "are you ever around other people for a while, just having fun, and then suddenly…you just feel sort of down…" and he emphasizes this last bit by shrugging his shoulders. I immediately responded with agreement. That it happens to me all the time at parties. But that I've gotten a bit better at controlling those emotions. It just comes with age. He thought about it and agreed.

When we arrived at Fort Zachary Taylor, we immediately went snorkeling. Fortunately most of the participants saw the stingray in the water – 188MS070620 (age 48) in particular was happy to be able to get a good shot of it as well. They seemed to enjoy the snorkeling, but I can tell it hasn't "wow'd" them like the other groups have. The spot we got on Looe Key the day before yesterday was not a great as I would've hoped (of course, they don't know better), and yesterday the clarity was not the best either.

After snorkeling we explored the Fort. IT WAS HOT. 188MS070620 stayed behind in the shade. The scouts thought it was neat but 184MS070620 mentioned (and I had to agree) "your first Fort is SUPER COOL…but they all look the same!" I wish we could've taken him to Dry Tortugas. COOLEST. FORT. EVER.

After that we dropped off everyone at the southernmost point for their picture. 188MS070620 saw the line and said "I don't know how much I care to do this." I laughed. It was again, something my mom would say. They took their picture, we picked them up, and they were just happy to have some virgin drinks in the shade for a bit.

It was hard to find things to do in Key West because there was little to do for the kids anyway, and now everything was closed down. Mallory Square was just sad and depressing. Dinner at the Conch Republic would've been a success if not for the fact that 188MS070620 (being that she has an onion and garlic allergy) couldn't get anything but salad.

I'm glad the scouts/adults got a chance to see the fish and tarpon while they waited for us to get the car.

July 8th Wednesday
Today we went shark fishing and mahi-mahi tagging w/ Male_Captain_2. It was amazing! We caught 2 mahi/tagged them, and 3 sharks/tagged 1, and 8 mangrove snappers (that we had for dinner).

I'll write more tomorrow in the AM.

I'm writing at 7am in reference to all of yesterday. I think when I ask the scouts what was the best part of their experience, today will be their favorite day…for several reasons…one – despite the fact that it wasn't a great day for mahi-mahi, it was an extremely lucky and eventful day, that all the scouts and adult leaders got a chance to be a part of. Unfortunately our group got split on different boats with different captains (I had Male_Captain2, the other half of our crew had MaleCaptain1, but I was able to see 191MS070620, 186MS070620, 193MS070620, 183MS070620, and 188MS070620really have a great time. 186MS070620 in particular I believe really came out of his shell. I assumed he and 192MS070620where the quietest, but during night activity, I learned that 192MS070620just recently had some tooth surgery so he's in a bit of pain and is just avoiding speaking. 186MS070620 on the other hand *is* shy, and younger as well. But I could see how happy he was on the boat. I was able to have all the kids pet the shark's tail, show them that touching it one way makes the skin feel like sand paper, and touching it the other way is so smooth. "Cooooool!" was the common response.

I was a bit concerned when our captain had us eat lunch AND troll for mahi mahi…as when the fish started reeling in, some were like, "but I've still got a sandwich I'm eating!" To which Male_Captain2 responded, "when you come back that sandwich will still be there, but that fish, he'll be gone if you don't reel him in now!" That had the kids going to the reel. We only caught two mahi (apparently it was a bad day for mahi across the board) but still a great day. Even ended with a pod of dolphins we were able to get pretty close to…one of the females had a calf with her.

After a day of fishing, Male_Captain2 fileted our fish and a few of our scouts had the opportunity to filet a fish as well. According to the captain, they were excited to filet but were hard on themselves for not picking out enough meat in their filets…the captain says they were a bit hard on themselves about it, but he ensured them that a.) it's tough getting all the meat, and b.) as first-timers, that was great!!

After this, we did flags, regular dinner, and two PowerPoint presentations (one on microplastics and one on sea turtles).

Then, we brought the kids back to the room to work on their projects. They're doing a project on sargassum. Which they're joking calling "sarcasm" in their presentation. They made such quick progress with their ROVs that a night snorkel might be possible tomorrow (or today, as it is not 7:12am and I am writing about yesterday as if it were today).

We'll see. The night snorkel will likely not be an option because a.) there aren't any boats going out to Looe Key today, and b.) the bugs at Horseshoe are pretty bad…

July 9th Thursday
Today we do MUNSON. Which has consistently been the least favorite day. The average rating of Munson was 5.5 (yes I did a poll at the end of the day). Scouts think we should build a dock on it. Although it was their least favorite day, participants see themselves talking about Munson for years to come. Many especially loved the story of Kevin the Camel.

July 10th Friday
Luau Day. We snorkeled at Looe Key this morning and it was easily the best snorkeling of the summer, let alone this week. When we went out to the reef this time the clarity was better, the reef we visited was shallower, so scouts were able to see more of the reef, and it was the best day for wildlife viewing. We say two giant eagle spotted rays, a sea turtle, several reef sharks, and swam with bottle nose dolphins. Many scouts describe this day as perfect. A few still say the fishing day is their favorite day of the week, as it allowed scouts to work together to reel in and tag the sandbar shark. We did roses buds and thorns. What stood out to me the most was 188MS070620's response…about seeing the beautiful/protected reefs in Looe Key, in comparison to the dead reefs at American Shoal. As she put it, "it was just sad…" and she felt like if more people saw this contrast they would care more.

July 11th Saturday
Departure day, groups left this morning at 5am, 5:30, and 6am.

Journal Entry 3: Troop 072020_OI

Monday July 20th 2020
Day 1: *Arrival @ 12:30PM*

Scouts:
155OI072020
151OI072020
149OI072020
152OI072020

Adults:
153OI072020
150OI072020
148OI072020
154OI072020

~Getting to know the scouts this afternoon was exciting at first, being that they are my first OI group. Dinner was a bit quiet with the scouts, but the adult leaders were curious about our backgrounds.

~We didn't seem to really "break-through" to the scouts/adults until after opening ceremony. We pumped up scouts with our silliness/craziness and it likely pumped up their expectations for our trek out on the island.

Tuesday July 21st 2020
Day 2: *Supposed Transition Day*

The weather's been pretty brutal this morning. My outdoor shelf behind my dorm completely fell apart due to the strong rain and wind this morning. I saw an entire shelf sitting upon some branches on a tree. The wind conditions were about three times the preferred conditions we look for when war canoeing out to Munson Island for the next four nights.

Initially we were going to take a Dusky (as the war canoes were now out of the question), but the weather was just too terrible to even get a boat out there. We had packed everything out on the boat, including individual bags, but our only option was to stay an additional night at Base.

- **How have scouts responded to staff/adult leaders?**

~Scouts respond to each other with familiarity (as they know each other from previous camping trips), they are generally friendly with one another, and have no problem poking fun at one another, as several scouts mocked 152OI072020 for his exceptional sleepiness.

- **How have scouts responded to each other?**

These scouts are younger, and a bit more soft-spoken. It has been frustrating to have them not immediately respond to FemaleOI_1 or my questions when collectively spoken to (as opposed to individually addressed). Usually when we address them by name, we do get a response, but it's

truly like pulling teeth, even the adults notice their lack of responsiveness. To be fair, the scouts tried to take FemaleOI_1's advice to take Dramamine when on a boat (i.e. fishing day), but they took medication prior to boarding the war canoes (which *was* the plan for today).

- **How have scouts responded to group activities vs free time?**

Group Activities

~Scouts never appear to be visibly thrilled (e.g. packing food to take to the island as a group, with the crew leader very lethargically instructing the rest of the crew to verify we have this or that).
~Scouts were always slow moving, with no sense of urgency whatsoever

Free time
~Scouts just wanted to rest and sleep during their free time

The alternative activities we did today (because we had to stay on base an additional day due to poor weather) include:

1. Coral Nursery Tour (STEM addition!)
2. Dissolved Oxygen Test (STEM!)
3. Bahia Honda trip (to relax / snorkel for about an hour)
4. Burgers on the grill under the chickee near the fish fileting area)
5. 2 Episodes of Parks n' Rec + an ice cream party

Wednesday July 22nd 2020
Day 3: *Finally on the Island!*

MaleCaptain_3 took us on the Corinthian to the "Backyard" of Munson. It was cloudy, and the waves were rough…normally we can just jump off with our gear and start wading through the water from the boat to the shore, which is about a quarter of a mile. It appeared to be high tide (the water was about 8 ft) and the weather was not on our side. We each walked down the ladder on the side of the Corinthian, and had our captain throw our gear at us for us to start swimming (with our fins) towards the shore instead. The wind was blowing SE, away from the spot we were trying to reach on the island which was directly NW.

In the process of swimming over, 151OI072020 lost his goggle / snorkel, and 155OI072020 lost his snorkel as well.

[10am] We hiked through the Salt Flats while it was high tide, the entire way. The scouts / adults seemed interested during this part of the hike! Finally, some visible curiosity/excitement. Because it was high tide and it had recently rained, the normally dry salt flats with crystalized salt all over were flooded with cool water to wade through. It was windy and cloudy as well. A nightmare out on the water, but a dream on the island, which is normally brutally hot (e.g. during my first STEM program visit to the island there was a heat index of 104 F).

We showed the scouts the buttonwood tree (which was once the largest buttonwood in Florida), the cistern, Kevin's grave, and Noah's hut. We showed them the three different types of mangroves, fiddler and hermit crabs. We discussed some of the fauna and Florida (e.g. salt wort, glass wort, sea lavender, Bahama nightshade, the white crowned pigeon and their love of the

poisonwood fruit). It seemed like the scouts favorite part of visiting the West side of the island was relaxing in the flooded helicopter pad.

After the salt flats, we walked down the beach (i.e. East) to drop off our stuff and start the mangrove maze! Scouts responded well during the mangrove maze challenge. At the opening of the maze scouts were asked to find the route that leads to the ocean, and when a couple scouts find it (as there are 2 scouts per kayak) they are to shout "MUNSON!" to alert the others of their discovery. Scouts appeared to be having a good time, and did a good job of working together to get through the maze. To paddle at the same time, scouts would shout "paddle, paddle, paddle" to remain in unison. When having to limbo under (or over!) branches, scouts were not afraid to get out of the water and push the kayak over the limbs of fallen mangrove trees. Much of the mangrove forest here is dead, due to hurricane Irma (2017). It gave the forest a creepy appearance.

After the Mangrove Maze we came back to set up our campsite. During dinner, 149OI072020 and 155OI072020 took the lead as our chefs. An interesting part of the OI experience that the STEM scouts do not partake in is cooking every meal. They decide what we're having that evening per the ingredients brought from the base. Items included in this are: spam, spaghetti, spaghetti sauce, canned chicken, tuna, hash browns, canned fruit, granola bars, Gatorade, canned vegetables, rice, beans...). Chef 149OI072020 and 155OI072020 served 'spamghetti' tonight. I have to say, MUCH tastier than it sounds!

152OI072020 and 151OI072020 did the dishes. 152OI072020 still moves at the speed of molasses. He responds especially slowly towards unfun activities. He is often not paying attention to our conversation, whether it's the adults from the crew or FemaleOI_1 and I. The other scouts continue to mock him for this. The adults mock him for this as well. He sincerely does not seem to mind or care at all. I think he kinda likes it actually.

After dinner we relaxed a bit and tried to go shark fishing as the sun was setting. We waded through the water and headed for the floating docks. The plan was to use our fishing poles to hook a shark on a piece of ballyhoo bait. Prior to fishing however, everyone must bite the head off the ballyhoo. This is done for good luck of course. All the scouts minus 155OI072020 partake in this experience.

We caught no sharks that night, and 3 of the 4 fishing poles stopped working. 148OI072020 made a comment about 155OI072020 not biting the head off the ballyhoo, she jokingly said that because of this, we had bad luck on the water and didn't catch anything as a result. The scouts immediately agreed that their bad luck was his doing. This really seemed to upset and hurt 155OI072020.

After about an hour of no luck and the night creeping upon us, FemaleOI_1 sat us down on the floating dock, moving up and down from the strong waves underneath us. Only two dim lights offered any clarity during this dark, almost moonless night. The clouds blocked most of the moonlight. It starts to rain and FemaleOI_1 decides it's time to tell the story of the cistern. 154OI072020 (adult) is trying to catch fish on the other end of the floating dock as she begins. The rest of us are circled around her….

[To preserve the sanctity of this Out Island folklore, I have omitted my rendition of the cistern story, but know it is meant to be a scary story]

It was pitch black minus the dock lights as FemaleOI_1 told this story. The waves were thrashing, the chum was still releasing its fish oil and guts into the black water, and 154OI072020

caught a small fish. When he interrupted to share his content, 149OI072020 (his son) asked him to be quiet, as FemaleOI_1 was in the middle of her story then. You could see all the scouts and adults (minus 154OI072020) were fixated on her story. In a trance, really. They couldn't look away. Not even 152OI072020 (molasses kid) was immune to the moment. It was exhilarating to be there as she told it.

But now it was time to head back. It was dark, chilly, and we were still wet from the trek over. No one wanted to get in the water because of this, and the possibility of sharks. 155OI072020 was the most afraid of the latter. We reassured him that sharks are much more afraid of us than we are of them. But I have to admit….that the trek over was not pleasant. It was *very* cold and very windy (as cold and windy as it can get in Florida, I suppose). The scouts held their fishing poles up, to prevent them from rusting, and I held the lead hooks up (meant for catching those sharks) up in the air as well. They jangled like a spooky windchime in the night. We had no lights other than the faint moonlight behind the clouds. As we were walking back we could see the diatoms' bioluminescence in the water. Cool.

After arriving to shore, FemaleOI_1 and I went to our evening meeting with the commissioner's, and the scouts and adult leaders changed into their dry(ish) clothes in preparation for bed.

Thursday, July 23rd 2020
Day 4: *Fishing Day!*

FemaleOI_1 walked us along the backyard to where we would wade out onto the floating docks to get picked up by MaleCaptain_4 for fishing day. It was my first time fishing with MaleCaptain_4…and I was planning on incorporating some "STEM stuff" (i.e. shark tagging!). The weather, as usual this week, wasn't great. We couldn't get much deeper than 25 feet to fish for anything, let along sharks. It was my first time fishing with him and I was a bit worried about how he would respond to my proposition of incorporating something new to the program.

Given the circumstances with the water, we had a pretty good fishing day. We caught 3 Atlantic sharp nose sharks, each about 2.5 feet (maturity is 3.5ft). We only tagged 1 though, and it was a male (as it had the prevalent claspers).

The scouts appeared to respond very well to fishing day! Unfortunately 151OI072020 was sea sick, so he wasn't involved…but 152OI072020 and 149OI072020 were really into everything about fishing, from catching fish to gutting and cleaning fish. 155OI072020 liked catching fish but was not a fan of the fileting at all.

It rained hard on our way back. A painful kind of rain. But we were laughing through it all the same. It was still a good day. We were all involved in the process of fishing. We caught about 4 / 5 red groupers, and were able to keep none. The largest size was 18.5inches, and the legal size is 20. The adults seemed to have a great time as well.

While fishing, scouts responded well to adult leaders (myself included, as FemaleOI_1 could not participate). They paid more attention, and heeded my advice when they weren't getting any fish but saw me catch a few right away. I showed them how they should pull the line up and they actually listened. I heard 149OI072020 also call the Captain "sir" as MaleCaptain_4 explained what he should be doing as well. The scouts appeared to be more responsive to me, even 152OI072020. Before today the scouts often acted as if FemaleOI_1 and I weren't there. But after we spent a day fishing, they watched me fish, pull up the anchor repeatedly (eventually they wanted to try it too) it seemed that they respected me a little bit more. I realize a lot of the

indifference to our questions may stem from shyness, as they are, once again, very young…but a way to break that barrier is definitely being involved in the same struggles as they were, and engaging in the same activity they were heavily a part of, like fishing day!

After getting back (which was a struggle in itself with the rain/wind), the scouts got to work cooking dinner….but not before FemaleOI_1 made those *amazing* PB and J's on the stove. 152OI072020 and 151OI072020 were in charge of cooking this time. The fish was a bit undercooked. But the rice/corn/beans that accompanied our catch was delicious. After dinner, we walked around the East side of the island. Normally we do the full island tour in a single day…but since we lost a day on the island, we needed to break up our tour over the course of 2 days.

It was low tide as we walked along the shore. Small wading birds like sand pipers took this as an opportunity to pick as the teeny invertebrates that get left behind after the tide receded. The sun was starting to set, and the dead mangroves created beautiful silhouettes against the orange sky. The scouts loved exploring the tidal pools. They said they found a pool of blood in one of the tidal pools.

We stopped by one of the unused Keys Adventure campsites and told the story of the mysterious one-armed man. This character was actually real. The STEM camera caught a picture of him collecting hermit crabs on the island. Soon after, OI mates saw him, and asked him to leave the island. He claimed to know the island belonged to the BSA and said he was here doing research on the hermit crabs. What is more likely is that he was collecting hermit crabs for the pet trade. We told scouts that it's possible that he still wanders around at night, so they should always stay with a buddy. As we were talking about the one-armed man, some trees rustled in the distance. It could have very well been a key deer, but we saw nothing to confirm this. It was perfectly eerie. On our walk back the scouts were in a visibly happier mood than previous days. It was a good fishing day after all.

As a surprise dessert, FemaleOI_1 prepared a cherry pie treat. Then it was time for bed.

Friday July 24th, 2020

Day 5: *Snorkeling Day / + Special Last-Day Evening Event*

The AM started with the scouts making breakfast. I believe we had pancakes this morning. Pretty good! We grabbed all out snorkel gear, waded through the water to the floating docks again, and waited for captain Male_Captain_3 on the Corinthian to pick us up for a day of snorkeling in Looe Key. I knew the weather would be bad, but I had no idea how terrible it would really be…it was impossible to see anything at all. The visibility might as well have been equivalent to the night, and the waves were so rough scouts kept accidently hitting the coral. It was hard to watch. By the time FemaleOI_1 and I got off the boat (as we let the scouts/adults get into the water first) the crew was about 3 Corinthian's behind us…that's how strong and dangerous those waves were. We must have been in the water for about 15 minutes max. Maybe it was more, since it was so difficult to swim in water that kept pounding us against the reef….but we certainly weren't there for long. It was clear that this was going to be one of the most disappointing days for the crew.

Back on the boat we drove closer to Munson, where the water as a bit calmer. We had lunch (pulled pork sandwiches). When we got off the boat and waded back onto the island, everyone was exhausted. After a short break the scouts did their SCENE project, which was to pick up trash along the beach. The scouts had a goal of finding a weird piece of trash to take back home with them. 151OI072020 found a weird tiny pencil that wasn't actually a pencil? 155OI072020 found a glass octopus. As we walked along the beach and talked about all the trash

that was washed up in the sargassum, you can tell both the adults and scouts were influenced by this. There is SO much trash, and it doesn't come from people residing on the island! This trash comes from the Gulf of Mexico (this troop is from Alabama), the Atlantic, and tourists and locals as well. To visibly see how much trash there was, and how scouts on the island have to do this repeatedly was eye-opening for both scouts and adults…but I think the adults were more vocal about the impact this project had on them. "I never realized how much of the trash from elsewhere can end up down in The Keys!" said one adult leader.

After this project, the scouts needed to start working on a fire for the night…to prepare for the cobbler cook off. Watching the scouts figure out how the start the fire on their own was interesting. At first they were very eager to work on the fire together, *they are boy scouts after all*! This was the mentally the adults held about their children. It is worth noting that this was a newer troop (if I have not said this already). Three of the four scouts ended up kicking 155OI072020 out of their fire building operation. When he sulked back to the kitchen area, I asked what happened.

"They didn't need me anymore apparently.."

FemaleOI_1 had asked me to let them do their own thing, but I had to give him some form of consolidation… "Well maybe you can help in a different way…"

155OI072020 shrugs sadly.

"You could start some cobbler prep for the group?" I suggest. "Cut some fruit to put to the side?" I thought it would be a good idea since he was very proud of his spamghetti and enjoyed playing 'chef.' He liked my idea and immediately went to work.

It took about an hour to get the fire started. The scouts ultimately got it going with Pringles….several scouts came and went from where they were trying to get the fire started. There was a moment where 151OI072020 and 149OI072020 also kicked 152OI072020 out of the fire-starting operation temporarily. At the tail end of all of this, 155OI072020, after finishing up his cobbler prep, returned to where the fire was being started and brought some snacks. He brought Pringles as moral support and to ease the tension that had occurred earlier. Some of those Pringles ended up being used to start the fire! Good to know…

So the fire's started at least…but the scouts are still wondering what's up with our entrée…However, they're more focused on prepping the cobbler which will be rated by our commissioners first. During this time, FemaleOI_1 and I grab the individually wrapped steaks at the Commissioner's site, buried them in a spot in the sargassum, and headed back over to the scouts.

In a very serious tone, I ask them, "Guys, don't' you care about the environment? There was a huge spot of plastic you missed in the sargassum!"

The scouts looked confused and when I gestured for them to follow me to the spot, they quietly trailed behind me. I continued saying along the way, "It seems like you guys were in a bit of a rush to finish up your project huh? Because it looks like you guys completely ignored this spot." Still, utter silence as the scouts followed me over to the spot. We finally get to the spot.

152OI072020 was the first to start clearing away the sargassum and he saw the steaks and had a beaming smile. "I really thought you were mad!" 151OI072020 responds, "I really couldn't tell if you were kidding or not…" They all laugh and joyously run back to the campsite with steaks in their hands and begin preparing the entrée for dinner.

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After dinner/ the cobbler cookoff, FemaleOI_1 and I inform the group that we must leave to prepare for ….

[To preserve the sanctity of Out Island folklore and experience, I have omitted my observations of this special last-day evening event]

How have scouts responded to one another?
~During moment of frustration (e.g. building the fire) scouts asked each other for some space. Scouts that felt pushed away were happy to conduct alternative activities (e.g. food prep
~Scouts (for the most part) made an effort to remedy disputes on their own, even if it was a bit one-sided (e.g. Wesley coming back w/ Pringles)
~ 151OI072020 (scout leader) did not to an amazing job of leading his troop. He often had to be reminded to take the lead. I realize this was a young group of 13 year old boys (except for 149OI072020 who was 15), but I still expected 151OI072020 to be more involved in his leadership.
~ Scouts would poke fun at other scouts that weren't paying attention to activities (e.g. 152OI072020 who fell asleep during the dissolved oxygen test)
~ Scouts would mock other scouts for not fulfilling certain challenges (e.g. 155OI072020 refused to bite the head off the ballyhoo…which resulted in other scout's taunting him for it…blaming him for their unlucky fishing night)

How to scouts respond to adult leaders?
At last!! Scouts are more responsive to us…it's our last night on the island and it feels like they are getting a bit more comfortable with us…they are much more responsive to our requests. I would say the peak of their responsiveness was fishing day, and it came back down a bit, but still several leagues above what it was the first two days together. We still had to give the scouts verbal pushes/shoves (i.e. repeat ourselves!), but there's definitely been a great shift in their attitudes and overall responsiveness towards FemaleOI_1 and I as well. I found the scouts to be more responsive towards me than FemaleOI_1. I wonder several things about this… 1st, the whole "good cop/bad cop role." Where FemaleOI_1, being the true leader is the bad cop, and me, being a shadow is the good one. That being said I seconded everything she did and I spoke in a more assertive tone as well. FemaleOI_1 has a brighter, sweeter, more bubbly voice than I do. I also think I got some points from having spent fishing day together. Fishing day is always such a momentous /transformative day for the scouts it seems (referring to previous MS programs I ran).

How do scouts respond to activities?
In a similar vein to the previous paragraph, scouts were much more responsive to activities by the end of the week. Day 1 they were slow, and today FemaleOI_1only had to repeat herself about 1 time, whereas Day 1 required 2/3 repeated requests…often until she specifically called out scouts by name. I wonder what this change would've looked like if we had another night on the island…as was originally planned…I think we would've seen another day of maturity and a progression in their comfort, drive, and confidence towards activities…this is of course just an assumption based on the progression I've seen the last 3 days.

Saturday July 25th 2020
Day 6: *The Transition Back*

It was a bit of a confusing start to our day, since we assumed we'd get a motor transition today, but were told (this morning) that we'd actually be taking the war canoes back instead! This is of course great news, but it was given to us a little later and there wasn't a whole lot of information as to when it would be arriving and when we were going to be heading back. The parents made it clear to me that they didn't appreciate the lack of information regarding this and other weather dependent events / activities in general. An adult said that the lack of information "shows a lack of leadership." One of the scouts also echoed his father's discontent. But we were trying to keep some element of mystery during this OI adventure…despite the desire to keep them more informed. In comparing this to the MS program, I feel like we codded our MS scouts…

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Upon arriving to the base we charged towards the Galley for our "sadness circles" (i.e. pizza) around 1pm. Since our war canoes were delivered about an hour and a half later than usual, we arrived late to the base. Everyone inhaled their lunch.

After taking a 3 hour break, we met up again to staple the troop's patch in the Galley. The scouts and adults were very involved in and excited to do this. After that, we spent time doing Luau festivities (i.e. volleyball, a scout led skit, and 2 poems / writing relating to our experience with OI and what it means to be a BSA scout). 149OI072020, who would like to be a comedian someday, also felt comfortable enough to try out his first skit ever in front of us. He was mimicking another comedian that I didn't know…he did very well for being so shy around us. I guess the scouts were finally feeling comfortable with us. They were giddy and excited and happy all evening.

Sunday July 26th 2020
Day 7: Departure

We had our usual flags and breakfast this morning, and after that, the troop left and we waved them goodbye on the caprock at the entrance of the Base.

Appendix C

COVID-19 Safety Plan

Work Safety Plan: Florida Sea Base National High Adventure Program, June 15th – August 2020
Stuart Cottrell, Primary Investigator
Aracelis Jimenez, Secondary Investigator
May 21st 2020

From June 6th – August 15th I will be employed as a Marine STEM educator at the Florida Sea Base National High Adventure program operated by the Boy Scouts of America (BSA) at the Brinton Environmental Center on Summerland Key, FL. Room and board are provided at the Sea Base facility with private staff quarters or individual private tent (please see section *E. Lodging, water and meals* for details). The Sea Base facility (Brinton Environmental Center, a 6-acre property) consists of a dining hall with outdoor dining areas, dormitories, staff accommodations, marina, boats and outdoor pavilion program spaces.

Sea Base programs are set up on a 7-day basis and consist of 6 scouts (ages ranging from 13-20) and 2 adult leaders per crew, for a total of 8 participants per group (i.e. crew). Crews are treated as a single unit (similar to a family unit) and are kept separate from other crews at all times. For example, each crew has specified hours for accessing indoor and outdoor dining areas (more details on this section *E. Lodging, water, and meals)*. All persons must arrive to the Sea Base with personal PPE (i.e. standard cloth or medical face masks). Anyone not wearing a standard cloth or medical face mask will not be permitted on the Sea Base facility. Programs include activities such as tracking coral health, water quality, coral surveying, snorkeling, fishing, and marine science lectures conducted outside. The research I intend to conduct for my Master's Thesis will be based off the data I collect as a cohort employee of the Boy Scouts of America (BSA). My dataset will consist of pre-program surveys the night of Day 1, semi-structured interviews midweek, observations of group behavior during program activities, and post-program surveys the last night of their program (Day 6). The BSA Sea Base has prepared a public statement that corresponds with their Sea Base, BSA (COVID-19) Overview Plan for Mitigation & Operation Updated: 5/7/2020 submitted to local and state health departments in Florida. Much of these procedures are outlined in their COVID19 public statement (https://www.bsaseabase.org/wp-content/uploads/2020/05/Preparing-for-Sea-Base-in-2020.pdf). As per the Monroe County Florida response guidelines, facility and program capacities are limited to 50% (https://www.monroecounty-fl.gov/1169/COVID-19-Coronavirus) until further notice while BSA Sea Base Guidelines adhere to Monroe County COVID19 policies reducing the number of participants to 50% at the Brinton Environmental Center and all Sea Base facilities.

A. Social distancing procedures during field work and during off hours

Each Sea Base crew will have a designated youth member for each crew to act as a 'Sanitation Chief' for the duration of the 7-day trip. Responsibilities for Sanitation Chiefs include:

- Instructing/reminding crew members to socially distance (by at least 6 feet) from other travelers, crews, and staff members
- Instructing/reminding crew members not to touch their eyes, nose, mouth
- Instructing/reminding crew members to wash hands and use hand sanitizer
- Instructing/reminding crew members to wear facial coverings
- Instructing/reminding crew members to sanitize vessels/dormitories.

For my research, I will conduct 5-10 minute interviews at least 6 feet apart from the interviewee. Observations will be written in a notebook that I will regularly sanitize and store in a sanitized lockbox only I have access to. For collection of questionnaire data, I will store surveys in a new Ziploc bag until I intend to administer them. I will wear gloves to give each scout/scout leader a survey to fill out. After scouts/scout leaders fill out their surveys, I will place back in a Ziploc bag to store in a separate lockbox for at least 14 days. I will follow these procedures for both pre and post surveys, which will be two physically separate surveys (as opposed to being included in the same physical survey).

B. Crew organization (small groups/pods) – describe plan for minimizing potential virus transmission between crew members and to/from public

Scout crews (including myself) will not be in direct contact with the public or other crews. Crews are considered a single unit of 6 to 8 participants, and are required to socially distance from other crews, the public and non-assigned staff members. Crews refusing to socially distance will not be permitted to remain onsite. Sea Base participants and/or staff that refuse to wear a mask will not be permitted to remain onsite. Participants are also expected to avoid traveling by train or bus from their homes to the Florida Keys unless the provider has social distancing and air purification plans in place. All Sea Base staff and participants are required to have a medical examination before arriving to the Sea Base facilities, with medical form reviews by a Sea Base nurse and EMTs provided at check-in as part of the screening process. Participants with a temperature of 100.4 will not be permitted to participate in the Sea Base program.

C. Travel to the off-campus work site

This fieldwork does not involve CSU travel. Employed by the BSA, I will collect data onsite at my place of residence and workplace at the Brinton Environmental Center, Summerland Key, FL between June 15th and August 15th 2020.

D. Transportation while at the site

Transportation while at the site will be limited to use of a personal bicycle and walking. I will not have a vehicle while onsite and no need to buy groceries as meals will be provided. I will bring essential items (toiletries and snacks to last for 2 months).

E. Lodging, water and meals

Lodging, water, and meals will be fully provided by the Florida Sea Base. Sea Base will restrict the number of people who access dining facilities at one time to maintain 6ft minimum social distancing. The total number of people at the Brinton Environmental Center will not exceed 50% of its capacity at any one time per week from June 15 through August until further notice from Monroe County, FL.

Meals: Crews and staff will be assigned specific mealtimes upon arrival, with no more than one crew allowed to access the main food service area at a time. Crews will also be assigned seating with a minimum of 6ft to separate each crew. Crews must wear facial coverings when lining up for meals, walking through the dining hall and before/after eating with much of the dining space outdoors at outdoor covered pavilions.

Sea Base has also enacted a sanitation plan for food service areas including front of the house, back of the house, delivery and refuse disposal. Service line staff will clean and sanitize service lines between each service. Food preparation staff will clean and sanitize non-service areas in accordance with Florida Department of Health regulations. Staff will clean and sanitize all seating prior to and following each series of services: breakfast, lunch, dinner. Crews will also be provided sanitation spray and towels to sanitize their seating area before and after meals.

Lodging: Each crew will have designated private dormitory room separate from other groups. Crews will clean and sanitize their dormitory room upon arrival and prior to departure. Meanwhile, I will be housed in separate individual staff facilities.

F. PPE

PPE I will bring will include gloves at least 5 standard cloth face masks (to be washed regularly). The Sea Base will not be providing masks for staff or participants. All Sea Base members are required to arrive wearing cloth or medical masks and must have a sufficient supply for the full program. Anyone that arrives to the Sea Base without wearing a mask will not be permitted on site.

G. Sanitation of workspaces, equipment and tools

I will bring disinfectant spray, hand sanitizer containing 70% alcohol, and regularly sanitize my notebooks and the lock boxes that store my notebooks, and pre & post surveys which are in Ziploc bags. Sea Base surveys will be handed to participants while I wear gloves; after completion, participants will hand the surveys back to me. Surveys will first be sprayed with a disinfect spray that has at least 70% alcohol and left to dry in direct sunlight, then I will store the surveys in a Ziploc bag each time I collect a new round of surveys and stored in a lockbox for at least 14 days before further handling. Gloves will be responsibly discarded afterward. This process will occur for both pre and post surveys each week.

a. For program equipment - no more than one crew may be aboard a program vessel (boat) at a time in the Florida Keys, and each vessel will be limited to reduced capacity and all participants must wear facial coverings while onboard. Captains and vessel personnel will clean and sanitize vessels upon crew arrival and before crew departure or as designated upon arrival. Each vessel will be sectioned off areas, creating +6 ft distance between crews. Vessels will be cleaned and sanitized before and following each use. Sea Base participants are to purchase their own mask and snorkel.

H. Symptom monitoring plan; under what conditions will medical care be sought?

Sea Base staff and captains will be subject to medical review, mandatory illness reporting and

temperature checks. Staff will attend COVID-19 specific training and be required to socially distance from all non-assigned crews. Staff will also be required to wear facial coverings in common areas, retail, food service areas, and aboard program vessels.

I. Logistical/contingency plans for illness

If I become ill I will go the Lower Keys Medical center in Key West and self-isolate at the Sea Base for at least 14 days. The exact building/space for quarantined personnel has yet to be determined but will be at the Brinton Environmental Center.

J. List nearest medical care facility

Lower Keys Medical Center, 5900 College Rd, Key West, FL 33040 located 20 miles from the Brinton Environmental Center.

K. Evacuation or isolation plans for ill crew members

Sick crew members must self-isolate at the Sea Base for at least 14 days. The exact building/space for quarantined personnel has yet to be determined but will be at the Brinton Environmental Center.

L. Emergency communications plan (indicate frequency of contact among personnel and between personnel and the PI, if applicable) and communication equipment in the field (cell phone, satellite phone, InReach SPOT or similar)

I will be in regular communication with the PI, Stuart Cottrell (via cellphone and email), and in daily communication with Sea Base personal (face-to-face).

M. Check in system for crew working alone:

To ensure proper social distancing when checking in at the Sea Base program, all participants are required to wear facial coverings upon arrival at Sea Base. Only one adult leader is allowed to check in his/her crew at a time in the main office, and no other youth or adults are allowed at check-in area during this time. Each crew is required to wait in an assigned area, with the second adult leader ensuring that other youth and adults remain in this area during check in. Part of the check-in process also includes medical and screening/temperature checks. Every person participating in the Sea Base program (e.g. scouts, scout leaders, Sea Base personnel) will have their temperature taken upon arrival. Crews arriving with a sick individual or individual with temperature exceeding 100.4 degrees will not be permitted to remain onsite.

N. Provisions for personnel that are not comfortable with risk of COVID-19 exposure.

Not applicable.