Environmental education at Florida zoos, aquariums, and animal-based theme parks in a national context:

A comparative analysis

by

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Dedication

To all of those who have supported and humored my insatiable thirst for knowledge and understanding of the world in which we reside.

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Abstract

Our society faces escalating environmental challenges with catastrophic implications. Environmental education (EE) is essential for creating an informed and active citizenry prepared to address urgent ecological problems. With a reach of over 195 million visitors annually, and diverse visitor demographics, the Association of Zoos and Aquariums (AZA) accredited zoos, aquariums, and animal-based theme parks are uniquely positioned to be critical centers of non-formal environmental education. This research investigates adult EE programming at zoos, aquariums, and animal-based theme parks in Florida, and provides a comparison of their focus and trajectory against EE programs in flagship zoos, aquariums, and animal-based theme parks throughout the country. Placing Florida's EE programs in the context of national trends helps to identify strengths and weaknesses of current educational programs at facilities in the state and at flagship facilities around the country. Zoos, aquariums, and animal-based theme parks across the nation are rife with best practices, applying unique and innovative EE opportunities. Florida has the potential to move from "ground zero" for climate change to an epicenter for social change. Zoos, aquariums, and animal-based theme parks can help get us there.

Introduction

Our society is facing increasing environmental issues with catastrophic implications, yet we continue to behave in ways detrimental to the planet and life as we know it (Oskamp, 2000). Environmental education (EE) is the process through which individuals become aware of environmental issues and develop the skills to evaluate and participate in potential solutions to address environmental challenges. Through this process, individuals develop a deeper understanding of the environment and the changes that are needed, as well as how to implement solutions through responsible decision-making. EE is considered an essential part of creating an informed and active citizenry that will be better equipped to address urgent ecological problems. However, after four decades of efforts to strengthen EE in both formal and non-formal educational settings, environmental literacy in the United States (U.S.) remains low (Coyle, 2005).

In order to reach a more significant portion of the populace, among whom environmental literacy is inadequate, educational efforts that target adults in non-formal settings must be enhanced and expanded (Johns & Pontes, 2019). The unique nature of zoos and aquariums makes them prime locations for non-formal learning in adults. These facilities are recognized by the public and scholars alike as locations that promote conservation, education, research, and entertainment (Carr & Cohen, 2011; Anderson et al., 2003). With a reach of over 195 million visitors annually (Rost, 2019) and diverse visitor demographics, these venues may prove instrumental in increasing environmental

literacy. Zoos and aquariums are uniquely positioned to be critical centers of non-formal EE (Heimlich, 2010) and deserve greater attention from scholars and activists to expand their influence over the general public's awareness of pressing ecological concerns.

While zoos and aquariums are poised to reach a more significant portion of the population, non-formal learning at these sites is not without challenges. For example, adults who frequent zoos and aquariums are often motivated by recreation as opposed to learning opportunities (Mazur, 1998). Additionally, self-guided learning may result in visitors choosing to ignore, opt out, or bypass educational displays and learning activities. Educators also report that designing multi-age learning experiences at venues frequented by families is particularly challenging (Johns & Pontes, 2018). Further, the ability of zoos, aquariums, and animal-based theme parks to meet the responsibility of educating the public about pressing environmental concerns may be hampered by inadequate funding. Given the potential of zoos, aquariums, and animal-based theme parks, it is critical that EE scholars and practitioners gain a better understanding of the current status of EE programs at facilities in Florida and across the country. Identification of both the strengths and weaknesses in EE at zoos and aquariums is essential to create a more environmentally aware and responsible citizenry.

Environmental Education

The roots of EE were established in 1972 at the United Nations (UN) Conference on the Human Environment. Twenty-four principles were developed to facilitate environmental sustainability, 19 of which highlight the need for EE for all ages and all education levels (United Nations, 1972). In 1975, the United Nations Educational, Scientific and Cultural Organization (UNESCO)/ United Nations Environment

Programme (UNEP) International Environmental Education Program (IEEP) was established to ensure the development, promotion, and funding of EE. The IEEP undertook this charter with three major goals: develop awareness of the importance of EE, create frameworks and methodological approaches for all age groups, and incorporate EE into education systems internationally (UNESCO/UNEP IEEP).

The major tenets of EE are to promote awareness, build understanding, improve skills, and promote behavioral change to address environmental issues. These were agreed upon at the Belgrade Charter, during the first International Workshop on Environmental Education (UNESCO-UNEP, 1976). Two years later, the Belgrade Charter was confirmed and built upon by the Tbilisi Declaration. Specifically, the declaration called for an increased focus on development of EE at non-formal locations such as zoos, parks and aquariums (Johns & Pontes, 2018; McKeown, 2003).

Non-formal EE in the U.S. began in the 1960s, in tandem with the rise of environmentalism and a preponderance of social justice issues, but did not become widely accepted until the 1990s with the passage of the National Environmental Education Act (Johns & Pontes, 2018; Archie & McCrea, 1998). This act created the National Environmental Education Foundation (NEEF), a federally funded, independent nonprofit organization complementary to the U.S. Environmental Protection Agency (EPA), charged with increasing environmental literacy. The goals of environmental education in the U.S., as directed by the EPA, align with international goals, and are designed to improve understanding about, and attitudes of concern toward, the natural environment, as well as skills to investigate, resolve and prevent environmental problems (EPA, 2019). EE in the U.S. happens through three primary avenues: the K-12 school

system; non-formal education organizations or sites such as parks, zoos, aquariums, nonprofits, and commercial enterprises; and through higher education. Despite four decades of development of EE programs in diverse venues, multiple challenges in EE have been identified in the academic literature and by practitioners. Some of these issues arise from a lack of consensus on what EE ought to be doing; others focus on specific content or pedagogical concerns; additional discussions address outreach and target populations (Palmer, 1998).

While environmental educators as a whole agree that EE should lead to behavior change to alleviate environmental problems, scholars continue to debate how educators should engage individuals in EE (Robottom 2007; Jickling & Spork 1998; Lucas 1980) and how this change ought to be achieved. George and Louise Donaldson first identified three threads of EE in 1958 (Quay, 2016). These threads are education *in* the environment, education *about* the environment, and education *for* the environment (Palmer, 1998). Education *in* the environment, also referred to as education *from* the environment, is a path in which all EE occurs in nature (Lucas, 1980). Education *about* the environment focuses on enhancing the knowledge and skills required for understanding the nature of an environment. In contrast, education *for* the environment seeks to develop an individual's affective and cognitive dispositions toward environmental issues to promote environmentally responsible behavior (Lucas, 1979). The three threads of EE can be woven together to form varied combinations such as "*about* and *for*, *about* and *in*, *for* and *in*, and *about*, *for* and *in* the environment" (Lucas, 1980, p.33). Indeed, the combination of *about*, *for* and *in* the environment is what

provides non-formal learning venues such as zoos, aquariums, and animal-based theme parks, a unique opportunity to increase environmental literacy (Quay, 2016).

Scholars disagree about whether EE should include collective advocacy on behalf of the environment, or a more individual approach based on developing environmental ethics and values (Kopnina, 2014a) and strengthening of scientific facts (Hart et al., 1999). Some scholars argue that EE's focus on how individuals might alter their conduct to enhance the health of the environment through, for example, the reduction of water and energy consumption, avoidance of littering, and recycling, does not go far enough. Clover et al. (2000) expand upon this point by arguing that EE programs have paid little attention to large-scale, global systems that perpetuate an entrenched and destructive human and more-than-human relationship and do not promote collective action to address environmental issues. A related concern is that EE has not emphasized the implications of our consumer lifestyles. Part of the task for educators is to engage the complexities of a global consumer society, challenging the assumptions and values of individuals and communities.

Recent trends in EE have provided new opportunities for educators to engage human systems through a growing focus on both climate change education and education of sustainable development. Climate change education expands the scope of EE with a greater focus on human agency and human causes of degradation. It often includes positive empowerment through building adaptive capacity and resilience in threatened communities. Similarly, education for sustainable development includes a focus on populations, ecosystems, and natural resources. It addresses biodiversity through the intersection of economic and social issues, thus expanding the attention of EE to broader,

more complex systems (Ramadoss & Poyya Moli, 2011). Even these trends, however, remain controversial among environmental educators (Kopnina, 2014b; Jickling & Walls, 2012). Empirical studies are needed to determine if existing EE programs are shifting their emphasis to include a focus on issues such as climate change, climate resiliency, and issues of sustainability. EE programs at zoos, aquariums, and animal-based theme parks are well-positioned to build on human affinity for, and an interest in, non-human species, providing a platform to expand from the conservation of specific animals to issues of global biodiversity.

Furthermore, it is essential to examine how these programs use systemic thinking to address complex issues. Systemic thinking is an indispensable tool in the analysis of complex environmental issues because it recognizes the complexity of the issue, while examining the environmental factors, dynamics, and relationships contributing to the problem. Through systemic thought, individuals can gain an in-depth understanding of complex issues, facilitating heightened understanding, decision making, and empowerment (Sauvé, 2005).

Environmental Literacy

Environmental literacy, as defined by Roth (1992), is an individual's ability to observe and understand the health of the environment while taking appropriate action to maintain, improve, or restore the health of ecological systems. Environmental literacy is built upon four foundational tenets: knowledge and skills, to include the ability to think critically and systemically about solutions to environmental problems; effective and cognitive dispositions toward environmental issues; understanding of the environment and environmental issues, and environmentally responsible behavior (North American

Association for Environmental Education [NAAEE], 2011). These tenets provide a foundation for the development of an environmentally literate society equipped to understand and recognize the state of environmental systems and prepared to address the problems facing our world by linking experience with action. The linking of experiences with actions provides tremendous potential for altering how environmental issues are perceived and addressed (St. Clair, 2003). While most environmental educators agree on the importance of both EE and environmental literacy, there is much debate on how to develop an environmentally literate populace (Adler et al., 2016).

Kollmus and Agyeman (2002) contend that while there is some correlation between knowledge and attitudes, knowledge alone may not be sufficient to spark a change in behavior. However, Adler and colleagues (2016) report scholars have found multiple forms of knowledge can converge to stimulate a change in pro-environmental behavior. Other research supports the notion that the educational experience is essential in understanding the impact of EE on pro-environmental behavior, with marked differences between direct and indirect experiences. The results of a series of experiments led researchers to believe that direct experiences, those that occur in the natural environment free from human development, lead to affective based attitudes. Conversely, indirect experiences, those that occur in human-made environments, such as nature centers and zoos, result in cognitive based attitudes (Millar & Millar, 1996). Duerden and Witt's (2010) findings, in their mixed method study on the impact of nature experiences, suggest that a combination of indirect and direct learning experiences may provide increased opportunities for learning and behavior change. Their findings show that direct

learning experiences increase affective growth, building upon foundational cognitive learning to increase pro-environmental behavior.

However, findings in an aquarium-based study conducted by Wyles and colleagues (2013) suggest that direct experiences are not necessarily required in a natural setting. They found that participants who were provided an educational pamphlet during their study reported improved pro-environmental intentions with no improved attitude, while those who were provided the same educational pamphlet while visiting the aquarium reported an increase in pro-environmental intentions and an improved attitude.

Specifically, Wyles et al. (2013) found that the behavior change resulting from one-way communication, in this case the educational pamphlet, resulted in pro-environmental behavior change with no additional change of attitude. The study groups that received the pamphlet and visited the aquarium were exposed to a combination of communication, marketing, and education which provided the knowledge and skills to make environmentally appropriate decisions based on an increased understanding of a complex issue; this outcome suggests that communication and education strategies, when combined, can facilitate greater changes in environmental behavior.

Environmental Education Framework

Monroe and colleagues (2008) provide a widely accepted framework for evaluating the effectiveness of EE programs. The four primary foci of intervention are: 1) convey information; 2) build understanding; 3) improve skills; and 4) enable sustainable action. This framework provides EE strategies to facilities and educators to assist in the determination of program goals and educational approaches to support their mission.

Convey Information

Foundational knowledge about key environmental processes and challenges is essential for increasing environmental literacy. This first step toward environmental literacy focuses on opportunities for the one-way transmission of information to build awareness about specific topics. Conveying information is the most appropriate option when the facts are widely agreed upon, people are missing required information, or the need for increased information is pressing. Zoos, aquariums, and animal-based theme parks can convey information through signage and permanent exhibits, shows, trams, trains, buses, monorail tours, rides, attractions, movies, and 4D experiences. While this form of EE programming may support the foundation of EE in zoos, aquariums, and animal-based theme parks, participation beyond free-choice learning is limited by one-way communication.

Build Understanding

The building of understanding expands upon foundational knowledge by engaging audiences in two-way communication in an effort to build an individual's conceptual models for examination and evaluation of concepts, values, and attitudes. Zoos, aquariums, and animal-based theme parks may build understanding through the use of park-based programming, enhanced experiences, educational programming, and events-based programming, in which two-way communication may be employed. This form of communication allows for audience assessment and tailoring of information based on group or individual participation. While this strategy allows for audience participation and feedback, educators still maintain control of the dialog and objectives, facilitating learning that supports the program mission.

Improve Skills

The third category, improve skills, moves beyond building foundational knowledge and understanding. Educators employ notions of citizenship, critical thinking, and social marketing to encourage personal responsibility and engagement while helping to improve upon skills that are required for long-term behavior changes. Zoos, aquariums, and animal-based theme parks may seek to improve skills through communication and marketing strategies, or messages that encourage behaviors. "Skills" in this context may range from cognitive abilities or social action skills, to more specific ecological monitoring skills, such as building oyster beds or monitoring turtle nesting sites.

Enable Sustainable Action

The final goal of EE, enable sustainable action, is a collaborative and iterative process. Learners and educators work together to address complex environmental issues using goals and potential solutions. This category places participants in control of the learning outcome while educators support opportunities for "transformation, empowerment and long-term problem solving" (Monroe et al., 2008 p. 214). This category represents the highest level of environmental literacy, thereby meeting the goals of EE's tenets. While sustainable action is difficult to measure and track, educators affirm that the goal of EE is to develop participants equipped and motivated to remain active citizens on behalf of the environment, taking continued action to learn about, and to participate in, the solving of critical environmental problems.

Environmental Education in Florida

Florida primary and secondary schools have undertaken significant work to improve environmental literacy by integrating environmental issues into science curricula while meeting state science standards (League of Environmental Educators of Florida [LEEF], 2018). While increases in the K-12 arena have been made, systematic approaches to improving EE among adults in the non-formal realm remain lacking. Efforts to implement a Florida Environmental Literacy Plan (FELP), for example, did not include a discussion of non-formal EE efforts, but focused instead on the K-12 arena only (Florida Environmental Literacy Plan [FELP], 2015). Even so, the FELP is stalled due to the closure of the Office of Environmental Education and Sustainability Initiatives when funding was subsumed under the Science, Technology, Engineering, and Mathematics (STEM) initiatives. Implementing a literacy plan for Florida without support from the state government remains a challenge. Florida is fortunate, however, to have an abundance of popular zoos, aquariums, and animal-based theme parks which can be leveraged to increase environmental literacy.

Zoos, Aquariums, and Animal-Based Theme Parks as Important EE Facilities

Zoos, aquariums, and animal-based theme parks present unique settings for EE. The AZA has 215 accredited zoos, aquariums, conservation facilities, and animal-based theme parks and safaris in the United States. AZA-accredited facilities maintain the highest standards of animal care and welfare, education, and conservation. Last year, AZA-accredited facilities were visited by over 195 million people (Roth, 2019). Zoos, aquariums, and animal-based theme parks appeal to a wide variety of patrons and attract a diverse demographic that other EE facilities are unable to capture. Khalil and Ardoin

(2011) report a wide variety of demographic variables in visitors at zoos. These variables include age, race, education, and socio-economic status, with a higher portion of visitors in lower income brackets. Preliminary data in "Why Zoos Matter Four" indicate that less than half of visitors frequenting AZA-accredited facilities possess a college degree, supporting the idea that these facilities provide access to a demographic that may lack formal education about environmental issues (AZA Mid-Year Meeting, 2019).

Social grouping of visitors at AZA facilities also varies (Tribe, 2004), resulting in unique opportunities for patrons to formulate and discuss their thoughts and feelings while questions and comments from others in the group can stimulate curiosity and reinforce learning outcomes (Ballentyne et al., 2011). Finally, AZA-accredited facilities are seen as trustworthy by the public and typically maintain political neutrality. This provides zoos, aquariums, and animal-based theme parks the opportunities to overcome barriers that may otherwise limit conversations and open the door for discussions about complex environmental issues such as habitat loss, overconsumption and climate change (Khalil & Ardoin, 2011).

While lacking political agendas, contemporary zoos, aquariums, and animal-based theme parks are not without goals of their own. Their four shared goals include conservation, research, education, and entertainment. Two of the goals, education and entertainment, pertain directly to the visitor (Anderson et al., 2003). Education has recently come to the forefront of zoos' missions, as their goals have evolved to include building cognitive knowledge to stimulate environmental behavior. This shift in focus has brought the goals of conservation education at AZA-accredited facilities directly in line with the goals of EE, which strives to stimulate behavior change in individuals, groups,

and society (Ogden & Heimlich, 2009). The synergistic leverage of unique opportunities for conservation education, EE, and access to a diverse demographic not found at other facilities, provides zoos, aquariums, and animal-based theme parks greater potential for significantly increasing environmental literacy in adults.

Animal Conservation

Scientists estimate that we are now losing species at a rate 1,000 to 10,000 times that of the "background" rate, which was previously assessed at one to five species annually (Chivian & Bernstein, 2008). Indeed, a recent United Nations report estimates that approximately 25% of assessed plants and animals are threatened and over one million face extinction within decades due to anthropogenic drivers such as habitat loss (Diaz et al., 2019). Habitat loss is currently recognized as the leading contributor to the decline in biodiversity (Hanski, 2011). For those species whose habitat is severely threatened, the risk to their survival is so great that the International Union for Conservation of Nature (IUCN) and the Conservation on Biological Diversity (CBD) Article 9 recognizes that habitat conservation efforts alone will not be able to sustain these species, and advocates for conservation efforts in zoos and aquariums (IUCN World Conservation Union, 2002; United Nations, 1993).

The definition of conservation for this study is aligned with the AZA definition, which defines conservation as "active stewardship of the natural environment, including animals, plants, and other natural resources" (AZA, 2019b p. 20). AZA-accredited facilities are charged with supporting in-situ (in the wild) conservation, and ex-situ (in facilities) conservation. AZA facilities are required to support and participate in Species Survival Plans (SSPs) for all endangered or threatened animals housed on site.

Despite the commitment of AZA facilities to spearhead conservation initiatives, within and outside their grounds, zoos remain hesitant to tackle complex and controversial issues where human impact, such as overpopulation and overconsumption, are significant drivers in biodiversity loss. A study conducted by Stoinski and her colleagues (2002) examining the perceived appropriateness of a bushmeat exhibit at the Willie B Conservation Center in Atlanta, Georgia, explores this issue. The illegal trade of bushmeat is rife with complex and controversial issues such as inequality, subsistence hunting, and cultural preference. The study included text and six sets of displays ranging from benign images to disturbing images of dead primates, or primates for sale. Stoinski et al. (2002) found that 83% of patrons were unaware of the bushmeat crisis and believed that zoos should educate patrons on complex, controversial issues. Additionally, 98% of patrons believed that the benign images in the displays were suitable for all ages, with a surprising 60% of patrons contending that the graphic images were appropriate for all ages. Findings from this study support the belief that patrons are often unaware of complex environmental issues but remain receptive to, and expect, conservation messaging.

With 195 million visitors annually, zoos, aquariums, and animal-based theme parks offer a unique opportunity to not only contribute to conservation efforts worldwide, but to offer unique opportunities for individuals to connect with animals that are often not available to them in natural settings. Hancocks (2001) maintains that despite concerted conservation efforts, the greatest conservation potential that AZA zoos and aquariums possess is the ability to educate and cultivate environmental awareness among their visitors.

Climate Change Education

The sixth mass extinction is expected to be further compounded by global climate change. Global climate change is considered to be one of the most critical environmental issues of the 21st century, receiving widespread recognition as a significant threat, not just to global civilization but also to biodiversity (Swim et al., 2017; Bellard et al., 2012). Indeed, the Intergovernmental Panel on Climate Change (Masson-Delmotte et al., 2018) reported with high confidence that climate impacts on humans and more-than-human systems have already materialized. Diaz et al. (2019) reported that approximately one half of all coral reefs, one half of threatened terrestrial mammals, and one quarter of threatened birds may have already been impacted by climate change, with projections of a continual decline as global warming continues. Mathematical models used to forecast climate change impacts on species distributions, abundance, and extinctions, indicate severe consequences for biodiversity, compounding the already unprecedented extinction rates since the loss of dinosaurs occurring 65 million years ago (Diaz et al., 2019; Barnosky et al., 2011; Chivian & Bernstein, 2008). Although evidence remains limited that current extinction levels are the direct result of climate change, research supports that climate change and ocean acidification could surpass the loss of habitat as the greatest threat to biodiversity within the next few decades (Leadley et al., 2010). When environmental threats are a result of human activity, education can be employed to mitigate risk. Increasing environmental literacy, and thereby climate literacy, can help visitors identify and adopt behavior changes. These changes can help to slow the rate of climate change (Dietz et al., 2009). Zoos, aquariums, and animal-based theme parks are already established as facilities well-versed in conservation education and are poised to

serve as a positive force in climate change education (Swim et al., 2017; Kelly et al., 2014; Luebke et al., 2012).

While current research indicates that approximately 70% of Americans believe climate change is occurring, only 42% say their family and friends are making an effort to mitigate their effects on climate change (Leiserowitz et al., 2017), and 69% of zoo and aquarium visitors claimed that they would like to do more to combat climate change (Luebke et al., 2012). While this is a larger percentage than the general population, foundational knowledge in science still remains a hurdle for educators that seek to engage the public in developing solutions to complex environmental issues (Johns & Pontes 2019; Geiger et al., 2017; Swim & Fraser, 2014).

While 69% of visitors claim to be interested in doing more to mitigate climate change, the remaining 31% of visitors do not, presenting additional challenges for the educator. However, Myers et al. (2009) suggest that seeing animals in a zoo may elicit empathy, and the social nature of zoos may perpetuate behavioral changes that are supported by value-based social norms. Indeed, studies have shown that seeing, interacting, and connecting with animals can enhance visitors' environmental knowledge and attitudes, leading to positive environmental behavior changes (Ballantyne et al., 2011; Mazur, 1998). These direct experiences can help to build trust and to overcome some predispositions and complexities associated with climate change education (Brownlee et al., 2013).

Controversy about EE within Zoos, Aquariums and Animal-Based Theme Parks

Over the last 40 years, there has been a growing concern regarding the role of zoos, aquariums and animal-based theme parks in animal welfare and the keeping of wild

animals in captivity (Mason, 2000; Mazur, 1998). The presence of robust education and conservation themes in modern facilities indicates that zoos and aquariums throughout the nation are indeed moving away from a culture of entertainment to a focus toward educating the public and promoting conservation behavior (Tribe, 2004). Conservation efforts within zoos and aquariums continue to be realigned as facilities face increasing pressure to sustain animal populations within their facilities, while contributing to conservation efforts in the wild. Despite their dominant image as sites of entertainment, AZA-accredited facilities recognize their role in addressing environmental issues affecting biodiversity through conservation, and the importance of increasing visitors' knowledge and understanding of animals (Moss & Esson, 2013; Patrick et al., 2007; Mason, 2000).

Moss and Esson (2013) contend that while zoos promote their roles as educational providers and recognize the need for education and modifying their mission statements to align with an increased educational focus, studies have yet to substantiate their educational claims. Unfortunately, not only have the claims of zoos and aquariums come under scrutiny, so has the published research. Falk and colleagues' (2007) "Why Zoos and Aquariums Matter" received considerable peer-reviewed criticism for methodological weaknesses and overstated conclusions among scholars (Moss & Esson, 2013; Dawson & Jensen, 2011; Marino et al., 2010).

While one of the foundational tenets of zoos is to educate patrons, the goals of the patrons do not typically align. A study conducted by Ryan and Saward (2000) found that zoos are still perceived as areas of relaxation and fun, with educational motives being a lesser priority. Critics also argue that through the presentation of live animals for our

enjoyment, zoos are presenting a false natural order (Jamieson, 1985) which lends to misconceptions or false understandings of interactions between humans and non-human creatures, such as the riding, kissing, and patting of Orcas (Williams, 1996). Some critics believe that contrived presentations are crafted deliberately to limit the questioning of why animals are being held in zoos (Rose & Farninato, 1995). However, a study conducted by Jiang (2006) found that zoo patrons were motivated by a strong desire to learn about the animals, as opposed to direct animal interaction, such as petting or feeding.

Current research in educational outcomes at zoos and aquariums has been fraught with difficulties. While researchers continue to investigate the outcomes of learning at zoos and aquariums, it seems evident that the actual content and design of EE programs must first be examined. Through careful evaluation of design, content, and context of educational programs at zoos, aquariums, and animal-based theme parks, researchers may gain a better understanding of the foundational messages being conveyed to the public. This evaluation will provide a baseline from which researchers can then examine the immediate and long-term learning outcomes of existing programs, to identify gaps and weaknesses in both topics covered and pedagogical strategies employed and thereby leverage strengths and successes to enhance EE at zoos, aquariums and animal-based theme parks. This study seeks to investigate the opportunities for non-formal visitor learning at zoos, aquariums, and animal-based theme parks within the context of urgent contemporary environmental problems and a pressing need to utilize these facilities as sites for increasing adult environmental literacy.

Permanent Exhibits

Permanent exhibits are important features in zoos, aquariums, and animal-based theme parks that provide one-way communication through signage, displays, and exhibitions. Facilities are developing innovative methods to capture and maintain the attention of guests. As previously noted, one challenge with self-guided learning is that visitors may opt to ignore such exhibits. Designing exhibits that capture and hold the attention of visitors is essential.

The Monterey Bay Aquarium, in Monterey, California, is recognized for its innovative and unique exhibit design. Rather than a facility composed of multiple exhibits, the aquarium has designed the entire facility to be an exhibit, telling the story of the Bay. This combination of message/mission-based exhibit determined the aquarium's collection of animals and their habitats, as well as the architecture of the building. Instructional design, communication theory, and interpretive labels in the aquariums contribute to the telling of the story of the Bay. As the Monterey Bay Aquarium matured, it sought to enrich visitors' experiences, shifting the focus of exhibits from message/mission-based information to visitor-based. Sensory-based, story-themed, and mixed media exhibits are rolled out to support patrons with different learning abilities and learning styles. Visitor feedback is incorporated into special annual exhibits allowing the aquarium to meet both facility goals and visitor requests. The Monterey Bay Aquarium continues to evaluate and modify specific exhibits which are designed to convey education and conservation messages through avenues that inspire change (Ramberg et al., 2002).

Similarly, the Brookfield Zoo, in Brookfield, Illinois, has deployed "Quest to Save the Earth," an interactive exhibit in their primate house. This interactive game-based exhibit was developed for mixed age groups, encouraging participants to investigate and adopt pro-environmental behaviors through a set of challenges. The first challenge in the quest, "Bog of Habitat," was found to promote adoption of behavior modification through positive message framing, example setting, interactive learning, reinforcement, and rewards (Manubay et al., 2002).

Adopting innovative approaches to special or permanent exhibits may be expensive and not all zoos, aquariums and animal-based theme parks have the ability to transition to complex and interactive exhibits. Many facilities remain dependent on traditional signage, with supplemental signage and exhibits stationed throughout the facilities. Nevertheless, signage and educational exhibits remain critical components of the educational experience at zoos and aquariums.

Theme Parks with Animal Attractions: Unknown Territory

Very little work has been done to examine the role of animal exhibits at theme parks on visitors' knowledge and attitudes towards non-human animals. However, research has shown that interactions with non-human animals provide a unique opportunity for change in perspective and opens the door for environmental learning (Mazur, 1998). Additionally, modern educational pedagogy recognizes that fun and enjoyment are not antithetical to learning, with entertainment often serving as a hook to capture the attention of audiences, and a tool that can be used to impart information in memorable ways (MacDonald & Alsford, 1995). Recent studies that examine education in theme parks have found that in addition to entertainment, educational programs and

material are often made available to visitors (Lück & Jiang, 2007; Jiang, 2006). Indeed, Jiang's (2006) study concluded that educational programs are as important to visitors as performances and entertainment in marine parks. The experiences at theme parks may expand the reach of EE, providing opportunities for individuals to connect with the greater-than-human environment. Given that Florida is home to a number of nationally prominent theme parks that contain significant animal exhibits, animal-based theme parks are included in this study. The inclusion of animal-based theme parks in the evaluation of EE fills a gap in the current research on non-formal EE and has the potential to open new opportunities for the expansion and improvement of EE in the state of Florida.

Research Goals

While recent scholarship has explored educational pedagogy of zoos and aquariums, no study has been conducted to examine the role of Florida's zoos, aquariums, and animal-based theme parks as a means to provide high-level non-formal adult EE. This study will investigate adult EE programming at zoos, aquariums, and animal-based theme parks in Florida, and provide a comparison of their focus and trajectory against EE programs in flagship zoos, aquariums, and animal-based theme parks throughout the country. Placing Florida's EE programs in the context of national trends will help to identify strengths and weaknesses of current educational programs at facilities in the state and will help determine if Florida is keeping pace with flagship facilities around the country. Research in this field indicates an urgent need to increase adult environmental literacy (Coyle, 2005) and to aid in the development of citizens who have the foundational knowledge to employ critical thinking and active engagement toward addressing urgent environmental problems.

Through careful examination of both Florida sites and national case study sites, this study will attempt to identify trends and themes to provide insight into how AZA-accredited facilities are executing the critical task of increasing environmental literacy among adults through an examination of the following research questions:

1) How do the mission statements of zoos, aquariums, and animal-based theme parks reflect the goals and priorities of non-formal environmental education?

2) How do zoos, aquariums, and animal-based theme parks implement non-formal learning to increase environmental literacy among adult visitors?
    a) To what extent do the educational programs of the study sites reflect the four primary foci of EE: convey information, build understanding, develop appropriate skills, and enable sustainable action?
3) How are zoos, aquariums, and animal-based theme parks implementing educational programming to address complex environmental issues such as specific local concerns, global inequality, first world consumption, and climate change?
    a) How are they providing suggested behavioral changes (the fourth goal of EE) at the individual and collective scales to alleviate these threats?
4) How do Florida zoos, aquariums, and animal-based theme parks compare overall to the national sample?
5) How do theme parks that include animal-attractions compare to traditional zoos and aquariums, and, specifically, how do they balance entertainment and education?

Methodology

This study features mixed methods research employing both qualitative and quantitative research methods. The combination of rigorous forms of research elicits rich outcomes allowing for a greater understanding of the research questions and provides additional support and reliability to study findings (Roe & McConny, 2014; Moss & Esson, 2013). Case studies were conducted of a sample of zoos, aquariums, and animal-based theme parks, including in-depth evaluations of EE at each location. Expert interviews were also conducted at multiple facilities. Analysis of available documentation at each case study site along with digital content was conducted. Each method is discussed in detail below.

Study Sites

This study represents an investigation into how Florida zoos, aquariums, and animal-based theme parks meet the challenge of providing non-formal EE opportunities for adult populations. These facilities were compared against national zoos, aquariums, and animal-based theme parks to gain insight on how well Florida is meeting industry standards for environmental learning and environmental literacy in adults. The study sites for this research encompass a sampling of Florida's AZA-accredited zoos, aquariums, and animal-based theme parks and a selection of comparative facilities from across the nation. A total of 15 sites are included: eight zoos, four aquariums, and three animal-based theme parks. Of the 15 sites, eight case study sites were located in Florida and sites

from across the nation comprise the other seven. No Florida facilities were included in the national case study group. Sampling techniques for each methodology are explained below.

Case Studies

In-depth case studies of the eight facilities in Florida and the seven national facilities were conducted. Each case study included site-visits, observation, permanent exhibit analysis, analysis of documents and digital resources, and expert interviews where granted. Case studies are used to provide rich, detailed data about an organization's values and operations through a combination of qualitative and quantitative research techniques. Additionally, case studies are recognized for their flexibility, and they incorporate the analysis of a wide variety of evidence such as field notes from participant observation, documents, artifacts, interview transcripts, and survey data (Yin, 2009).

The case study sites were chosen for this study using purposive sampling. Purposive sampling identifies a non-probability-based sample based on characteristics or qualities the participant possesses. While this sampling technique features deliberate selection, it is often used to achieve comparability within a study (Teddie & Yu, 2007). Additionally, this sampling technique is recognized as a standard for qualitative research and offers information-rich participant selection (Etikan et al., 2005).

Approximately half of all Florida's AZA-accredited zoos, aquariums, and animal-based theme parks were selected as sites for the Florida case study group. Florida case study sites include four zoos, two aquariums, and two theme parks. These facilities were also selected using geographic considerations to ensure a fair representation of all regions throughout the state. A group of national AZA-accredited facilities was selected to

support a comparative analysis against the Florida case study sites. Purposive sampling was used to identify the comparative case study group, consisting of four national flagship zoos, two national flagship aquariums, and one animal-based theme park. While no formal list or standardized criteria exists from which to identify flagship zoos and aquariums, there are multiple published lists on travel sites that provide rankings. Seven lists of the top zoos in the nation and seven lists of top-rated aquariums were analyzed to identify flagship facilities. The facilities that were consistently rated in the top five were selected as part of the national case study group for the purpose of this research.

Site Visits

Research methodology at each site involved the collection and examination of documents such as curricula, strategic plans, annual reports, and public relations documentation. Site visits involved visual assessment of signage and conservation messages, participation in public programming, and expert interviews. For the purpose of this study, only programs that were open to the public were chosen for attendance and evaluation. Educational evaluation was used to examine the thematic focus of each program as they relate to the following: facility mission, focus of educational messaging, the level of complexity and detail of the curriculum, the projected role of humans in environmental problems, types of solutions emphasized, and pedagogical strategies employed by the facilities.

Expert Interviews

Expert interviews were requested of all case study sites. Nine of the 15 sites granted permission, resulting in a total of 24 interviews. Interviews were designed to provide insight into the development of environmental curricula, the choice of topics, and

major themes. They included a focus on pedagogical strategies chosen by experts who oversee, design, and implement curriculum at each institution. No personal data of any kind was recorded.

Standard protocols were implemented for interviews with follow up questions and prompts to allow for further exploration of participants' perspectives and experiences as directed by qualitative research standards (Johnson, 2017). Interviews were digitally recorded with the permission of the interviewees; files were downloaded and saved in both physical and virtual spaces, transcribed, coded, and analyzed. The digital recordings and transcripts were kept on a password protected computer owned by the researcher.

Permanent Exhibits

Permanent exhibits are important features of zoos, aquariums, and animal-based theme parks. These include signage, displays, and campaign messages that offer educational information to the public. Permanent exhibits usually fall into the category of free choice learning, in which the visitor may choose to read or participate in some or all of the exhibit's features but retain the choice to ignore the messaging. Educational exhibits have become increasingly interactive through the use of mixed media to convey messaging across a multitude of senses and learning styles (Balloffet et al., 2014; Adelman et al., 2000).

Photographs were taken of all educational signage at the case study facilities for later evaluation. When appropriate, the researcher participated in programming, engaged with interactive exhibits, and kept field notes about the experience. Thematic analysis of field notes was conducted during the analysis stage. A visual thematic analysis of the photographs captured at the case study sites was also conducted.

Document Analysis

Preliminary research for each case study site included examination of facility websites, facility mission statements, advertised educational programming, events, and enhanced experiences. All available documents to the public were collected during site visits and analyzed. Analysis was used to identify educational opportunities, prioritization of environmental issues, and the extent to which the four goals of EE were emphasized.

Data Analysis

All textual data, field notes, interview transcripts, educational materials, and documents available on site were coded using content and thematic analysis techniques. Field notes, transcriptions, and matrices were indexed with a closed coding format (Johnson, 2017). They were then examined each line by line to identify experiences and perspectives that addressed the research questions. Following the indexing process, notes were coded. The data was reviewed again, line by line, for items and trends that were unique to the data (DeWalt & DeWalt, 2011). After the data had been thoroughly reviewed, a list of indexes and codes was developed. Textual data, field notes, interview transcripts, and education materials were reviewed once more to verify that all items and patterns identified were captured as part of the research process.

Site Descriptions

Fifteen case study sites were selected for this research: eight zoos, four aquariums and three animal-based theme parks. The Florida case study group included eight case study sites consisting of four zoos, two aquariums, and two animal-based theme parks. The comparative national case study group consisted of four zoos, two aquariums, and

one animal-based theme park. The national case study group did not include any sites located in Florida.

Florida Case Study Sites

The eight case study sites were chosen to represent the Florida AZA-accredited zoos, aquariums, and animal-based theme parks. The chosen sites account for approximately half of all of Florida's AZA-accredited facilities. Sites were selected with geographic consideration to ensure sites were representative of the geographic regions throughout the state (Figure 1).

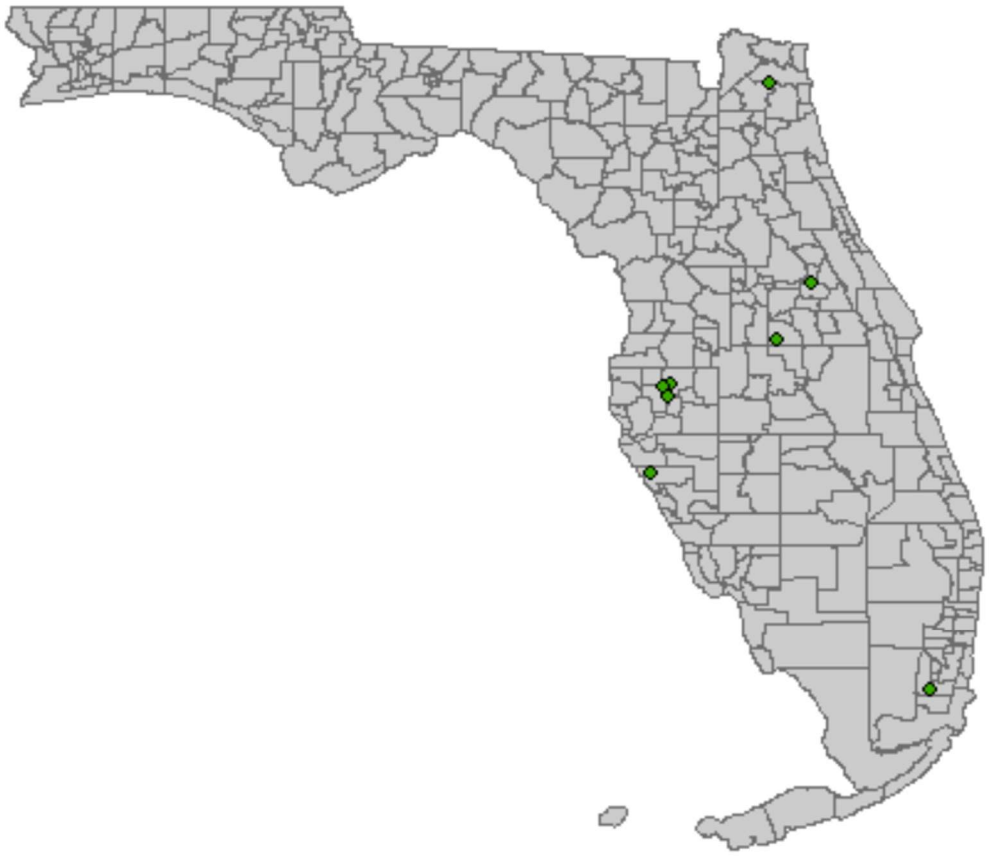

Figure 1. Map of Florida Case Study Sites

Descriptions of Florida case study sites are provided below.

Busch Gardens Tampa Bay

Busch Gardens Tampa Bay is located northeast of downtown Tampa, Florida. This expansive 335 acre, African animal-based theme park (Busch Gardens Tampa Bay, n.d.) is one of only six theme parks accredited by the AZA (AZA, 2019a). Owned and operated by SeaWorld Entertainment, this park was originally opened as a bird preserve; however, it was also known for marketing Anheuser-Busch products from the nearby brewery (Hathaway, 2009). Rides were eventually added and have since become a prominent feature throughout the facility. The Serengeti Express shuttles guests around the park, offering views of hundreds of African animals such as rhinoceros, giraffes, and wildebeests in their shared open habitat, the Serengeti Plain. Additional animal-based exhibits are located throughout the park with a newly constructed Animal Care Center to support their needs (Busch Gardens Tampa Bay Facebook, n.d.).

Central Florida Zoo and Botanical Gardens

Central Florida Zoo and Botanical Gardens is a nonprofit zoo in Sanford, Florida, located along the shore of Lake Monroe. The zoo was formally opened at its current location in 1975 under the direction of Jack Hanna. Central Florida Zoo and Botanical Gardens occupies a mere 106 acres and houses approximately 350 animals. This open-air zoo houses animals from regions with similar climates to those experienced in Florida. Despite its small size, the mission statement for this AZA-accredited facility is to be "[a] conservation resource providing experiences that excite and inspire children and adults to learn and act on behalf of wildlife." The zoo is an active community partner, hosting city events and leading clean up initiatives (Central Florida Zoo, 2019).

Disney's Animal Kingdom

Disney's Animal Kingdom is located in Lake Buena Vista, just outside of Orlando, Florida. Disney's Animal Kingdom is owned and operated by The Walt Disney Company and is the largest Disney theme park, spanning 500 acres. The facility offers family attractions and roller coaster rides, but also has an expansive collection of animals showcased throughout the property, boasting 1,700 animals (Disney Information, 2019). Guests enter through the Oasis which features animals in a lush tropical setting before the park branches out into its major sections: Discovery Island, Africa, Asia, DinoLand U.S.A., Pandora, and Rafiki's Planet Watch, each hosting animals unique by regional theme, with the exception of Pandora.

Florida Aquarium

The Florida Aquarium, located in downtown Tampa, Florida, provides guests the opportunity to view over 9,000 of Florida's aquatic and terrestrial animals within their 250,000 square foot facility. The aquarium simulates the journey taken by an upwelling of water through one of Florida's many springs as it travels through rivers, streams, and wetlands before reaching the coast. Along the way, guests are introduced to ecosystems supported by Florida's water, and the plants and animals that call them home. The Florida Aquarium's prime location, along the Tampa Bay waterfront, also allows guests to see some of Florida's native species in their natural environment. This nonprofit aquarium is heavily focused on conservation and education, as indicated by its mission statement to "entertain, educate and inspire stewardship of the natural environment" (Florida Aquarium, 2019).

Jacksonville Zoo and Gardens

Jacksonville Zoo and Gardens is located in northeast Florida along the St. Johns River. Like many Florida zoos, this 117-acre facility is an open-air zoo that houses over 2,000 animals and includes over 1,000 unique plants from regions with climates similar to those in Florida. Bioregions featured in the zoo include Asia, Africa, the African Forest, South America, Australia, and Wild Florida. Guests can experience the park, either on foot via a walking safari or on board a train from which they can see a portion of the animals as the train circles the park. This zoo is being rapidly redeveloped to include state-of-the-art, innovative exhibits. There is a clear divergence between the older section of the zoo and the modern section of the zoo, although both sections have a unique appeal. Animals and humans alike are drawn to the park, as evidenced by a rare colony of wild wood storks that arrive annually to roost overlooking the okapi and white rhinoceros exhibits in the Africa region of the park (Jacksonville Zoo, 2019).

Mote Marine Research Lab and Aquarium

Mote Marine Research Lab and Aquarium is located in Sarasota Florida, on City Island, surrounded by the Gulf of Mexico. While research is the primary function of the facility, the aquarium occupies 66,000 square feet of the 10-acre compound, with employees affectionately describing it as a research facility with an aquarium. Divided into two sections, guests can view over 100 species of aquatic animals inside a traditional indoor aquarium before heading outdoors to the open-air exhibits where they can see sharks, sea turtles, manatee, and other species. This nonprofit AZA-accredited facility truly embodies the AZA mission for conservation and education, combining the critical

work of marine scientists and showcasing that work throughout the aquarium (Mote Marine Research Lab and Aquarium, 2019).

ZooTampa

ZooTampa, previously Lowry Park Zoo, is a nonprofit zoo located on the outskirts of downtown Tampa, Florida. It is accredited by the AZA and the World Association of Zoos and Aquariums. The zoo encompasses 56 acres of subtropical environments and serves as a center for the conservation of endangered wildlife, both locally and internationally. ZooTampa houses 1,300 animals from Asia, Africa, Australia and Florida. Additionally, ZooTampa serves as a rescue and rehabilitation site for locally threatened animals such as the Florida panther, manatee, and red wolf. ZooTampa's mission statement is to "[r]escue, rehabilitate and care for animals; create exceptional personalized experiences that connect people with wildlife and each other in fun, immersive ways" (ZooTampa, 2019).

Zoo Miami

Zoo Miami is located southwest of downtown Miami and is adjacent to Larry and Penny Thompson Park. Zoo Miami originated in 1948 to support animals left behind after the local circus went out of business. The zoo has since expanded to become the largest zoo in Florida; it spans over 750 acres and houses over 3,000 animals and 1,000 species of plants. Animals that reside at Zoo Miami include species from Asia, Africa, Australia, and the Americas with exhibits designed to represent their native environments. Zoo Miami also boasts Mission Everglades, a unique region of the park dedicated to Florida's native species (Zoo Miami, 2019).

National Case Study Sites

Seven national case study sites were selected to provide a comparative analysis for the eight Florida case study sites. This case study group did not include Florida facilities. Four national flagship zoos, two national flagship aquariums, and one animal-based theme park were identified. While two animal-based theme parks would have been ideal, there is only one AZA accredited animal-based theme park outside of the state of Florida (Figure 2).

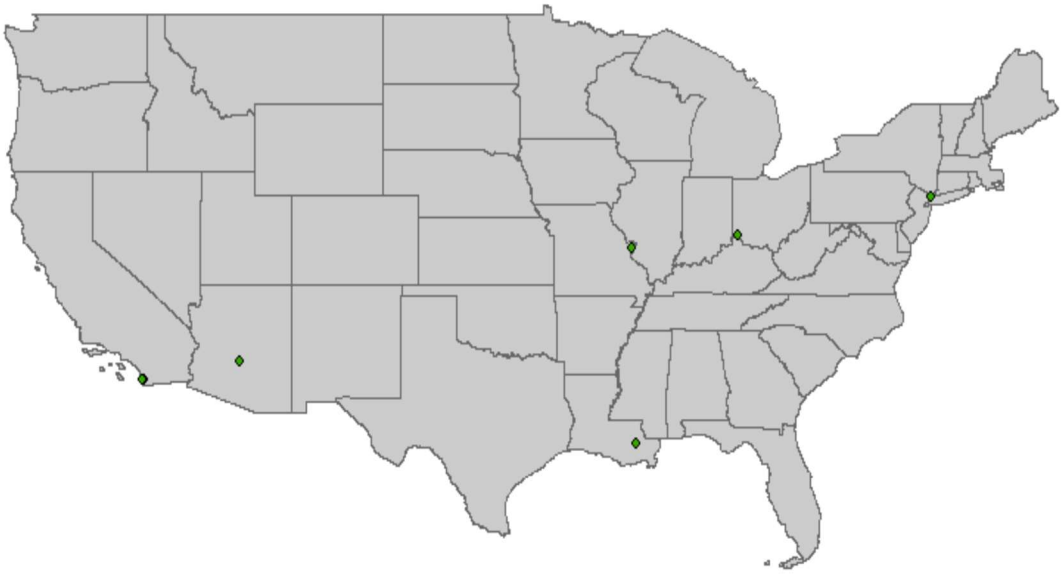

Figure 2. Map of National Case Study Sites

A description of each national case study site is provided below.

Audubon Aquarium of the Americas

Situated along the Mississippi River in New Orleans, Louisiana, Audubon Aquarium of the Americas is one of ten facilities that are run by the Audubon Nature Institute and is consistently rated among the top five aquariums in the United States. This AZA nonprofit aquarium houses over 15,000 animals from Louisiana, the Gulf of

Mexico, and the Caribbean. They also house a colony of South African penguins. The aquarium is a state-of-the-art facility built in 1990 but in 2005 Hurricane Katrina forced the aquarium to close for nearly a year. In preparation for the hurricane, some animals were transported to Monterey Aquarium while others were left behind ("Aquarium Animals to be Airlifted," 2005). Unfortunately, when the aquarium lost power, the life support system at the aquarium failed and resulted in significant loss of life for the remaining animals. Since Hurricane Katrina, Audubon Aquarium of the Americas has replenished its exhibits and has undergone remodeling; most recently including preparation for the opening of their shark and ray touch tank (Audubon Aquarium, 2019; Field Notes, Sept 6, 2019)

The Bronx Zoo

The Bronx Zoo, located in The Bronx, New York, is a nonprofit facility operated by the Wildlife Conservation Society. The Bronx Zoo is the society's flagship zoo and is consistently rated one of the top zoos in the nation. Accredited by the AZA, The Bronx Zoo and Wildlife Conservation Society endeavors to save "wildlife and wild places worldwide through science, conservation action, education, and inspiring people to value nature" (Bronx Zoo, 2019). Offering a natural environment to city dwellers and animals alike, the zoo houses over 6,000 animals within their 260-acre facility.

Cincinnati Zoo

Cincinnati, Ohio, is home to The Cincinnati Zoo and Botanical Garden, an AZA-accredited, nonprofit facility. This zoo is consistently rated among the top five zoos in the United States and was ranked the top zoo by *USA Today* in 2019 (10 Best, 2019). Like many modern zoos, the Cincinnati Zoo and Botanical Garden features primarily open-air

exhibits which are supplemented by indoor facilities, such as an insect house, a reptile house, a monkey house, and an innovative night hunter exhibit. Ambassador animals are a dominant feature at this facility; guests may encounter ambassador animals while on walks with educators and keepers, or at meet and greet stations throughout the zoo (Cincinnati Zoo, 2020).

OdySea Aquarium

OdySea Aquarium is located in Scottsdale, Arizona. This unique aquarium in the desert holds over 2 million gallons of fresh and saltwater and houses approximately 6,000 animals, making it the largest aquarium in the Southwest. The facility is designed to model the water cycle, and guests explore this non-traditional aquarium through a blend of interactive and entertaining educational opportunities. Featuring multiple touch tanks, SeaTREK underwater experiences, and the OdySea Voyager attraction, this aquarium was recently voted Best Indoor Entertainment by *Ranking Arizona* (OdySea, 2020).

San Diego Zoo

The San Diego Zoo, located just north of downtown San Diego, California, is a nonprofit facility, operated by San Diego Zoo Global. It is accredited by both the AZA and the American Alliance of Museums. The San Diego Zoo houses over 3,500 rare and endangered animals, and 700,000 exotic plants. Consistently rated as one of the top zoos in the world, this 100-acre facility houses animals spanning the globe from the Arctic to Oceania. Additionally, the San Diego Zoo and San Diego Zoo Global are renowned for their expansive conservation and breeding programs in support of the conservation of endangered animals locally and worldwide (San Diego Zoo, 2019b).

SeaWorld San Diego

SeaWorld San Diego is a marine animal-based theme park located in San Diego, California. SeaWorld San Diego is one of six AZA-accredited animal-based theme parks and is the only AZA-accredited theme park outside the state of Florida. SeaWorld San Diego is famous for its marine mammal shows but has been the focus of significant controversy over the years. Subsequently, drastic changes have been made to the way shows are conducted; to trainer/animal contact, and to the types of animals they are allowed to keep in captivity. Despite continuing controversy, SeaWorld San Diego is consistently rated the "Best Marine Life Park" by *Amusement Today* and is one of the most visited paid attractions in San Diego (SeaWorld San Diego, 2019; SeaWorld Entertainment, 2018).

St. Louis Zoo

The St. Louis Zoo, located in Forest Park, St. Louis, Missouri, is consistently rated among the top five zoos in the nation and is the most visited attraction in the region. This free zoo welcomes over three million guests annually. The St. Louis Zoo houses over 16,000 animals in both open-air exhibits and historic buildings on the property, such as Peabody Hall, the Primate House, and the 1904 World's Fair Flight Cage. The facility is comprised of six sections: River's Edge, Lakeside Crossing, Historic Hill, Red Rocks, The Wilds, and Discovery Corner. Embedded within Discovery Corner is a children's zoo that offers additional exhibits, chats, and a petting zoo for a small fee. The zoo is currently preparing for the building of a state-of-the-art primate exhibit (St. Louis Zoo, 2019).

IRB Exclusion Letter

An application for human-subjects exclusion was submitted and approved by the USF Internal Review Board in March, 2019. This research does not constitute human-subjects research and has been approved as such.

Results

The evidence obtained through site visits, photographs, field notes, interview transcripts and facilities' websites during the research period was examined using content and thematic analysis techniques to provide insight into the previously identified research questions. All information was indexed and coded to ensure patterns and trends were captured as part of the analysis. The data was viewed from multiple angles and for inclusive and exclusive points that support the identification of educational opportunities, prioritization of environmental issues, and the extent to which the four EE foci -- convey information, build understanding, improve skills, and enable sustainable action -- are met in non-formal adult learning opportunities. Findings and results are discussed in the following section as they pertain to each research question.

Research Question 1: How do the mission statements of zoos, aquariums, and animal-based theme parks reflect the goals and priorities of non-formal environmental education?

Missions of Zoos, Aquariums, and Animal-Based Theme Parks

Mission statements are crucial to the development, implementation, and execution of educational programs at zoos, aquariums, and animal-based theme parks as they provide the foundation upon which all programs should be built (Matiasek & Luebke, 2014). A mission statement is a "written declaration of the purpose of an organization,

which guides critical and strategic decision making" (Patrick et al., 2007 p. 54). The AZA requires a statement from each facility during the accreditation process regarding their mission, goals, and vision. Additionally, the AZA requires that each facility has an education and conservation component within the statement to ensure that the facilities remain in line with the goals and vision of the AZA. Therefore, as part of this study, it was essential to examine how the mission statements of zoos, aquariums, and animal-based theme parks reflect the goals and priorities of non-formal environmental education (Research Question 1).

Case study site mission statements were evaluated for the four levels of EE: convey information, build understanding, improve skills, and enable sustainable actions. Convey information (level 1) and build understanding (level 2) components of the mission statements were evaluated to determine if affective, cognitive, and general education-based statements were captured. Improvement of skills (level 3) components within the mission statements were evaluated; for example, the researcher looked for social action skills, such as notifying authorities of distressed animals or simply helping animals across the road. The highest level, enable sustainable actions (level 4), was identified based on the development of active citizens who participate in pro-environmental behavior. Mission statements for the case study sites were obtained from facility websites and publicly available documentation. Mission statements that were not available online were collected through email correspondence or during site visits.

Of the case study sites, Florida had a slightly higher average of sites that address education in their mission statements; seven of the eight Florida-based sites did comply with this AZA requirement (87.5%) when compared to the national case studies, in which

only five of the seven (71.4%) sites complied with the AZA mandate. Despite mandates and claims made by the AZA that education be included in mission statements, only 12 of the 15 (80%) sites in this study met requirements set forth by the AZA and also fulfill the primary focus of EE, to convey information (Figure 3, Table 1).

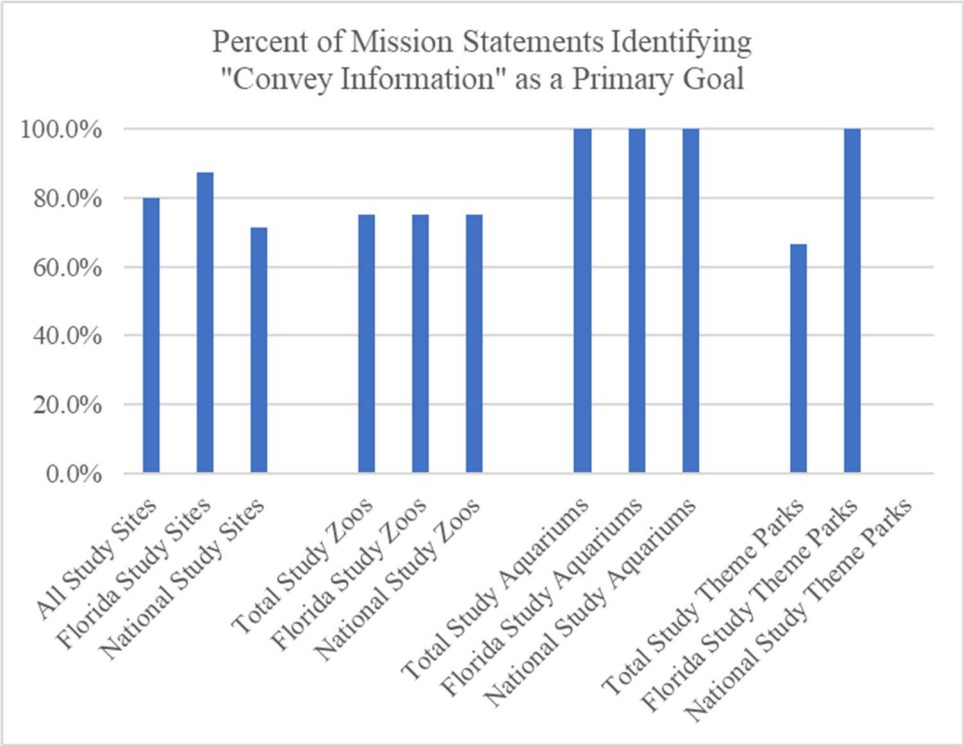

Figure 3. Percent of Mission Statements Identifying "Convey Information" as a Primary Goal

Table 1. Percent of Mission Statements Identifying "Convey Information" as a Primary Goal

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=12 80.0%	n=6 75.0%	n=4 100.0%	n=2 66.7%
Florida	n=7 87.5%	n=3 75.0%	n=2 100.0%	n=2 100.0%
National (ex FL)	n=5 71.4%	n=3 75.0%	n=2 100.0%	n=0 0.0%

Aquariums consistently had higher instances of referencing education in their mission statements, with both Florida sites and national sites mentioning education. Seventy-five percent of all zoos analyzed referred to education. Two of the three theme parks also

referred to education in their mission statement, both of which were in Florida (Figure 3, Table 1).

Of all the case study facilities, only Jacksonville Zoo and Gardens and Mote Marine Laboratory and Aquarium, both located in Florida, addressed the goal of deepening knowledge and understanding in their mission statements (Figure 4, Table 2). Improve skills (level 3) was not identified in any of the mission statements (neither Florida nor national case study sites).

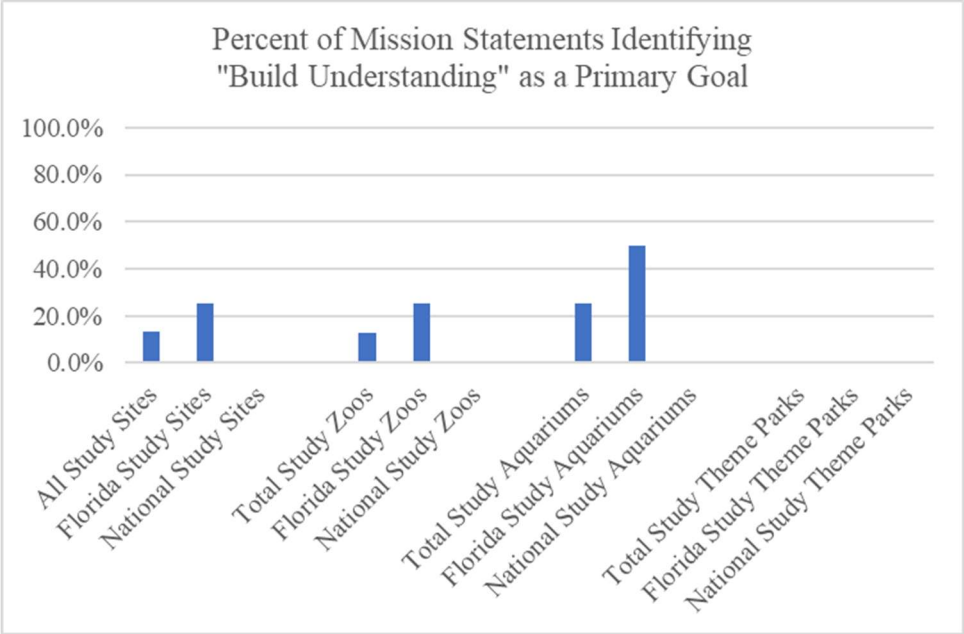

Figure 4. Percent of Mission Statements Identifying "Build Understanding" as a Primary Goal

Table 2. Percent of Mission Statements Identifying "Build Understanding" as a Primary Goal

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=2 13.3%	n=1 12.5%	n=1 25.0%	n=0 0.0%
Florida	n=2 25.0%	n=1 25.0%	n=1 50.0%	n=0 0.0%
National (ex FL)	n=0 0.0%	n=0 0.0%	n=0 0.0%	n=0 0.0%

In all EE, the ultimate goal is action (level 4). Indeed, mission statements of some facilities share the desire to change behavior of their guests. Seven of 15 facilities' (46.7%) mission statements include the goal of stimulating a change in behavior or

inspiring an increase of sustainable action in their guests. Florida case study facilities lead the national sample with four of eight facilities (50%) addressing behavior change in their mission statements. Of the national case studies, only three of seven (42.9%) specify the goal of developing active citizens who take part in pro-environmental behavior and engage in addressing critical environmental problems. For example, OdySea Aquarium's mission statement addresses sustainable action in guests claiming: "We deliver amazing guest experiences that create fun memories, heighten animal awareness, and inspire change, while fostering growth for our team members" (OdySea Aquarium, 2019). Theme parks in Florida and the national case study group have the highest instance of goals which enable sustainable action in guests, followed by aquariums and zoos, though this is likely overemphasized by the small sample of theme-parks (Figure 5, Table 3).

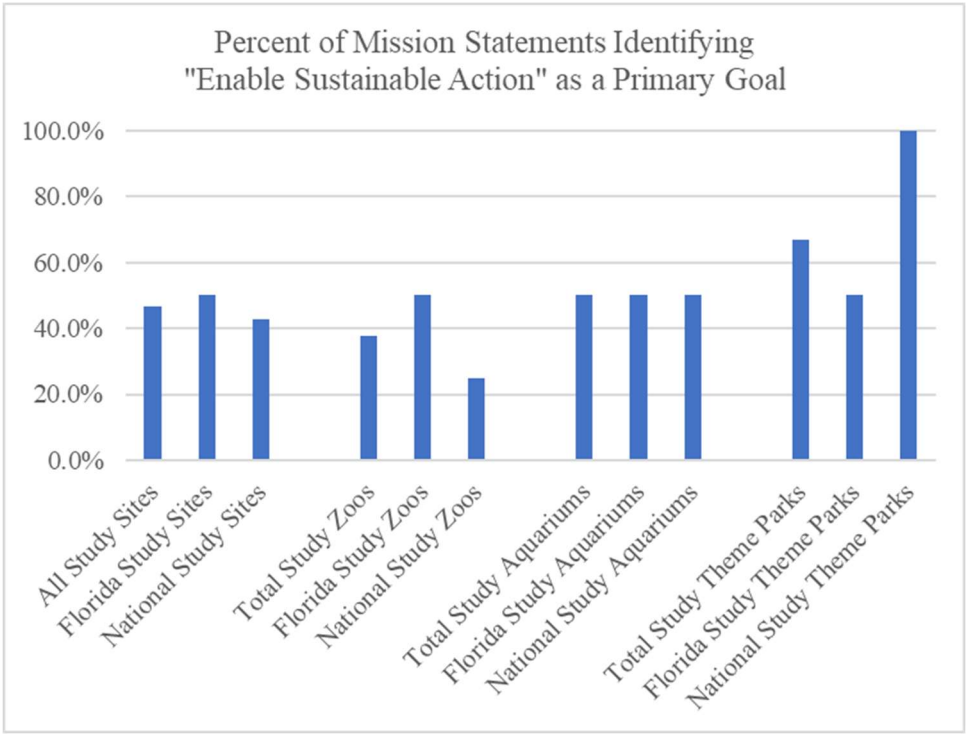

Figure 5. Percent of Mission Statements Identifying "Enable Sustainable Action" as a Primary Goal

Table 3. Percent of Mission Statements Identifying "Enable Sustainable Action" as a Primary Goal

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=7 46.7%	n=3 37.5%	n=2 50.0%	n=2 66.7%
Florida	n=4 50.0%	n=2 50.0%	n=1 50.0%	n=1 50.0%
National (ex FL)	n=3 42.9%	n=1 25.0%	n=1 50.0%	n=1 100.0%

It is essential to note that entertainment and fun is mentioned throughout mission statements in Florida and across the nation, showing a prominence of entertainment-based education, or "edutainment," in the study sample. Florida has five AZA-accredited theme parks and attractions that showcase animals. SeaWorld San Diego is the only other AZA-accredited theme park outside of Florida in the country. Fun and entertainment were directly referenced within four of the eight (50%) Florida case study sites and three of the seven (42.69%) national case study sites (Figure 6, Table 4). Given the proliferation of AZA-accredited theme parks and attractions in Florida, this does not seem surprising. However, three of the four (75.0%) facilities that mention fun and entertainment are traditional zoos and aquariums, and the fourth is Disney's Animal Kingdom. Conversely, the other two animal-based theme parks studied, Busch Gardens and SeaWorld San Diego, did not mention fun or entertainment in their mission statements.

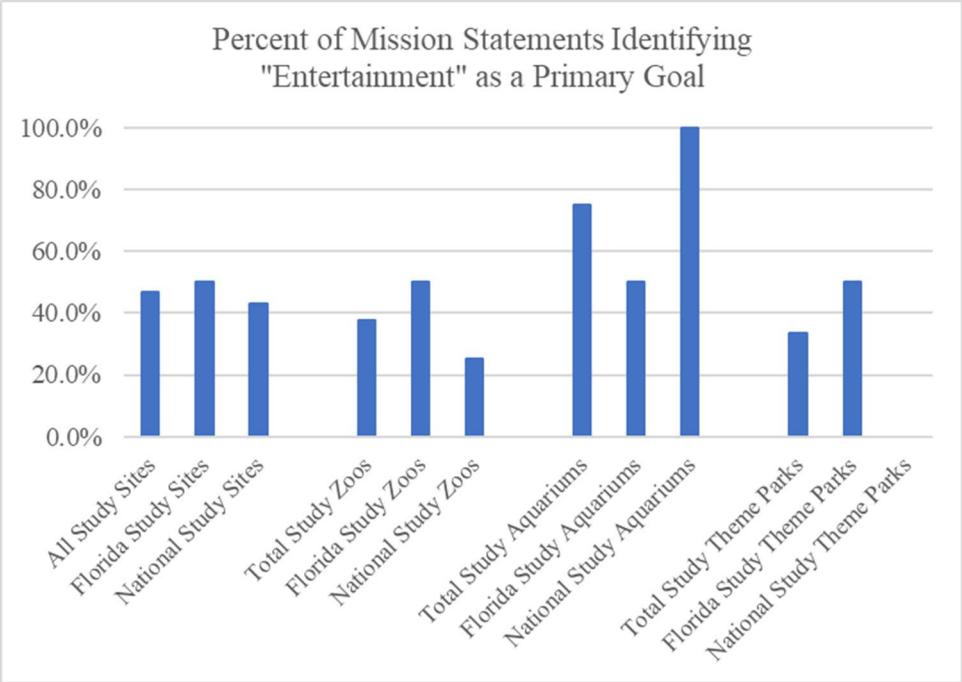

Figure 6. Percent of Mission Statements Identifying "Entertainment" as a Primary Goal

Table 4. Percent of Mission Statements Identifying "Entertainment" as a Primary Goal

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=7 46.7%	n=3 37.5%	n=3 75.0%	n=1 33.3%
Florida	n=4 50.0%	n=2 50.0%	n=1 50.0%	n=1 50.0%
National (ex FL)	n=3 42.9%	n=1 25.0%	n=2 100.0%	n=0 0.0%

The Florida case study mission statements indicate an understanding for the need to keep guests entertained while stressing the importance of education and attempting to motivate action among their constituents in an effort to sustain the ecosystems and species that make this region so unique. Overall, Florida facilities' mission statements comprise a slightly higher instance of education, a significantly higher representation of a call to action, and a significantly higher instance of entertainment and fun than the national study sites, which suggests they may be a leader in EE for the nation.

Well-structured mission statements that address all components of EE are essential for guiding the educational programming and trajectory of zoos, aquariums, and

animal-based theme parks. Mission statements of the case study facilities show a prioritization of education, identifying education consistently with about half of the facilities striving towards enabling sustainable actions in guests. Building understanding and developing skills are not prominent in mission statements and were rarely mentioned. Without concise mission statements to explicitly address the four levels of EE, it is unlikely that zoos, aquariums, or animal-based theme parks will be able to increase environmental literacy effectively. Therefore, it is imperative that mission statements identify the four levels of EE to ensure that programming is developed to align with EE goals: convey information, build understanding, improve skills and enable sustainable actions.

Research Question 2: How do zoos, aquariums, and animal-based theme parks implement non-formal learning to increase environmental literacy among adult visitors?

2a. To what extent do the educational programs of the study sites reflect the four primary foci of EE: convey information, build understanding, develop appropriate skills, and enable sustainable action?

Educational Opportunities for Guests in Zoos, Aquariums, and Animal-Based Theme Parks

Educational opportunities were examined to identify how major zoos, aquariums, and animal-based theme parks implement non-formal learning to increase environmental literacy among adult visitors, and to what extent these educational programs reflect the four primary foci of EE: convey information, build understanding, develop appropriate skills, and enable sustainable action (Research Question 2 and 2a). Educational

opportunities at zoos, aquariums, and animal-based theme parks can be divided into four primary categories: park-based programming, enhanced experiences, educational programming, and event-based programming. Park-based programming includes educational opportunities available to guests at facilities during their visit, such as signage, keeper chats, and shows. These opportunities are included in the admission fee or are available for purchase while at the facility for a small fee ($10 or less). Enhanced experiences are also available during guests' visits for an additional charge. These enhanced experiences offer guests personalized, up-close animal encounters with the potential to touch, feed, or take photographs, and often include behind-the-scenes opportunities. Educational programming is available to guests at scheduled intervals. These programs are not included as part of an admission fee and typically meet for multiple sessions over a given period. Event-based educational opportunities may also be scheduled as standalone events or supplemental to park admission. These events can range from animal appreciation days hosted at the facility to community clean-ups at an offsite location.

Park-Based Programming

Park-based programming in zoos, aquariums, and animal-based theme parks consists of educational opportunities that can be made available to guests during their visit. Park-based programming opportunities are self-guided and may include signage and permanent exhibits, keeper chats, conservation stations, shows, train, tram, buses and monorail tours, roller coasters and attractions, movies and 4D experiences, animal feedings and touch opportunities.

Signage and Permanent Exhibits

Signage in zoos, aquariums, and animal-based theme parks is an important tool for educators to convey information to guests. Information is primarily conveyed using animal exhibit signage with supplemental information strategically placed in displays and exhibitions throughout the park. Exhibit signage varied dramatically within (Figure 7 and 8) and across all case study sites (Figure 7 to Figure 11). For example, some signs merely list the name of the animal on exhibit, while other signs are elaborate and engaging, supporting all levels of environmental learning. Signage also varied significantly by type of animal. Signs about charismatic megafauna were typically more involved and informative and were accompanied by supplemental signage or exhibitions nearby. Smaller, lesser known animals garnered less space in exhibit signage. Animal exhibits across the case study sites were typically adorned with placards that provide the common name of the species, the scientific name, range or habitat of the animal, if the animal was involved in the AZA SSP, and interesting facts or adaptations unique to the animal on exhibit. Most sites include the global conservation status of animals and outline threats to the species on a portion of the signs throughout the facility. Only a few case study sites consistently provide this information across enclosures.

Figure 7. Black Rhinoceros Exhibit Signage, St. Louis Zoo

Figure 8. Grizzly Bear Exhibit Signage, St. Louis Zoo

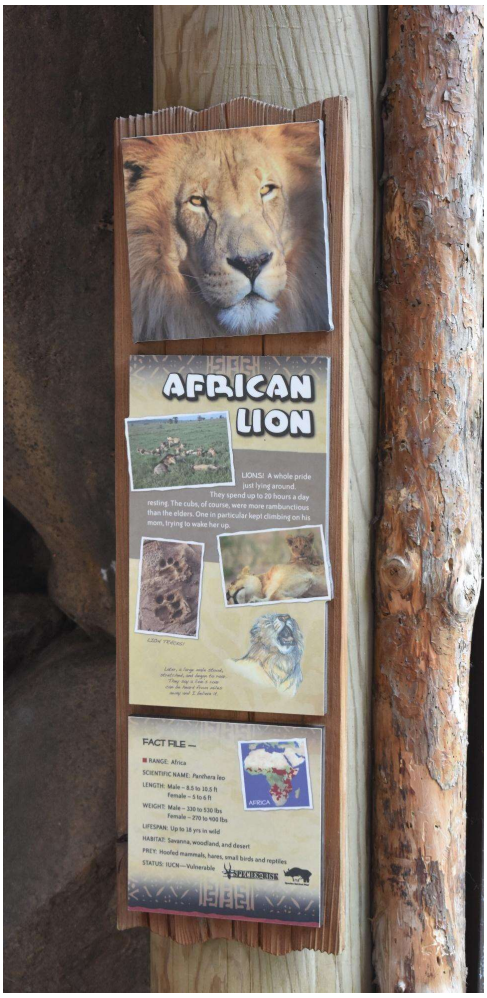

Figure 9. Lion Exhibit Signage, Cincinnati Zoo

Figure 10. Lion Exhibit Signage, Zoo Miami

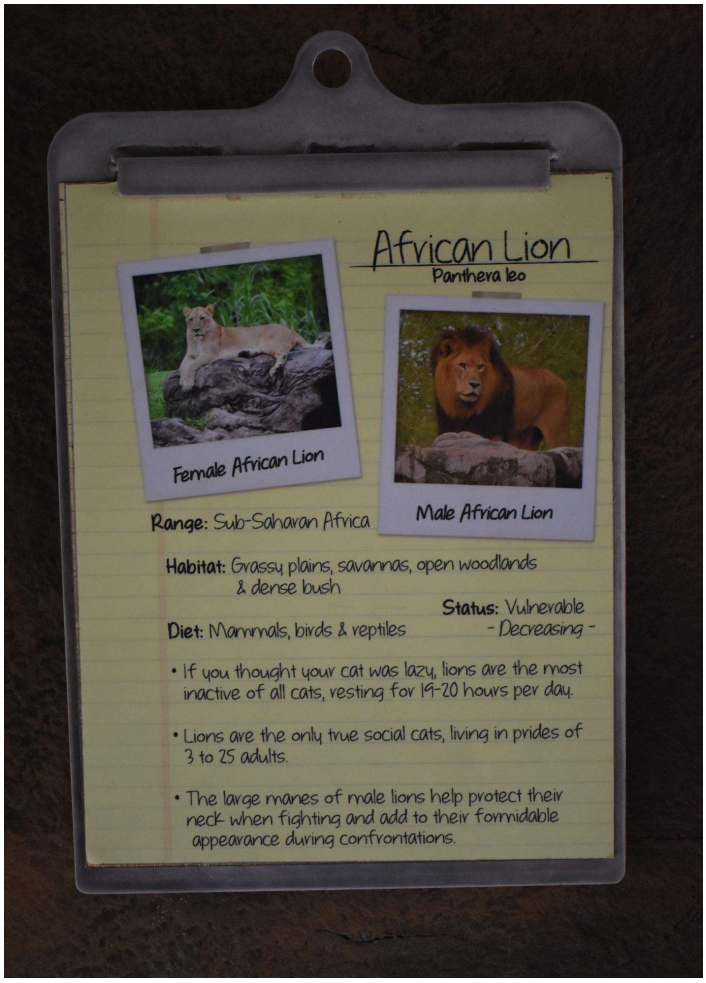

Figure 11. Lion Exhibit Signage, Busch Gardens Tampa Bay

Supplemental signage often accompanies exhibit signage to provide guests additional information about the species on exhibit or conservation initiatives. Zoo Miami uses significant supplemental signage throughout their facility (Figure 12 and Figure 13) to provide prominent messaging and conservation initiatives pertinent to the species on display. For example, the supplemental signage for the Sumatran tiger provides information to guests on the extinction of three of nine tiger subspecies and the Palm Oil Crisis. The sign explains what palm oil is, the impact palm oil plantations have on habitats, and the viability of the Sumatran tiger: "Tigers have already lost 93% of their historical range. If this continues, all that will remain are distant legends, and zoo signings." Suggested actions guests can take to help address this critical concern include responsible purchases, voicing their concern through letters to companies who use palm oil in manufacturing, and ecotourism. (Field Notes, August 3, 2019).

Figure 12. Supplemental Signage Accompanying the Sumatran Tiger Exhibit, Zoo Miami

Figure 13. Sumatran Tiger Exhibit Signage, Zoo Miami

Permanent exhibits are important features in parks, zoos, and aquariums that provide one-way communication through signage, displays, and exhibitions. Education through signage is particularly challenging in non-formal education in that it must attract and hold the attention of visitors. Some facilities have implemented innovative, engaging, and immersive exhibit designs to overcome some of these challenges and use multiple education techniques to engage visitors. Storytelling is a common method of engaging guests and is appealing to both adults and children. Through storytelling, zoos, aquariums, and animal-based theme parks are able to convey information to guests in a unique format to build understanding. Cincinnati Zoo also uses storytelling throughout their facility to attract guests and to build curiosity (Figure 14) (Field Notes, August 20, 2019).

Figure 14. Supplemental Storytelling Signage Accompanying the Gorilla Exhibit, Cincinnati Zoo

The OdySea Aquarium, located in the desert of Scottsdale Arizona, has implemented innovative and engaging facility design supported by structured exhibits throughout the aquarium. The aquarium is thematically designed to educate guests about the water cycle. Upon entry, guests are asked to imagine themselves as a drop of water journeying through the aquarium and the water cycle. Suspended orb shaped exhibits and repurposed water bottles fashioned into droplets welcome guests into the main entrance of the aquarium (Figure 15). Guests then "evaporate" as they ascend on an escalator before being "condensed" and deposited into the freshwater system. Exhibits highlight major rivers throughout the world and are accompanied by the display of freshwater species

native to the waters of the southwest United States (Figure 16). Touch tanks are also available to guests. As guests wind through the exhibits, they transition to ecosystems fed by brackish waters to the coast where they can view animals in shallow water settings and connect with saltwater species through additional touch tanks. Progressing further into the aquarium, guests descend deeper into the ocean, and are provided underwater views of aquatic animals through a series of underwater exhibits (Figure 17). This sensory journey through the aquarium facilitates learning and the development of a greater understanding, not only of aquatic animals and their habitats showcased by OdySea Aquarium, but a deeper understanding of the water cycle. The deliberate design of the aquarium helps guests who may have never seen the ocean to better understand the environmental connections between the world's oceans and the desert in which they reside (Field Notes, June 25, 2019).

Figure 15. Suspended Exhibits Fashioned as Water Droplets, OdySea Aquarium

Figure 16. Rivers of the World Exhibit, OdySea Aquarium

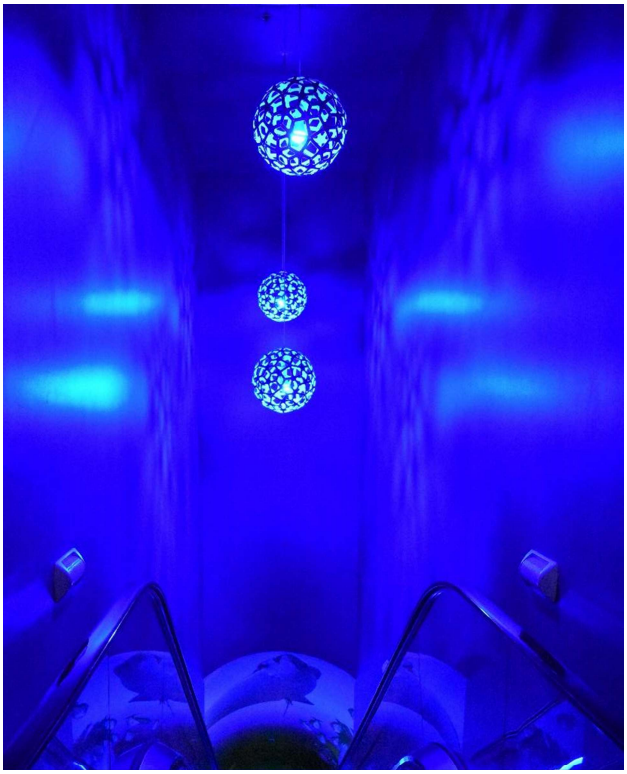

Figure 17. Escalator Transitioning Guests from Coastal Exhibits to Ocean Exhibits, OdySea Aquarium

Central Florida Zoo and Gardens has also developed an innovative and engaging exhibit at their facility. Their Florida Black Bear exhibit is dramatically different from the typical zoo exhibit and is designed to replicate a typical Florida home (Figure 18). Guests enter

the exhibit through the front door of the house which consists of a living area with study, a kitchen, a garage, a porch, and a backyard. The living area has bookcases filled with books on bears, notes on bear safety, and bear artifacts. There is a movie playing that provides in-depth information on the Florida Black Bear. Informational signage designed to mimic wall artwork is posted throughout the home. The porch has a grill that is adorned with steps one can take to grill safely. As guests progress through the home they enter a passage with a galley kitchen to one side and sliding glass doors that overlook the backyard on the other. Through the sliding glass doors, the guests are provided a view of the backyard habitat, which is complete with a play structure and shallow pool. The garage is partially furnished with a fridge, recycle bins, and a bear proof trash can. The garage door is open and provides additional viewing opportunities of the black bears (Figure 19). Educational information, tips, and skills are strategically placed throughout the home to convey information, build understanding, set an example, and provide guidelines for living peacefully with bears (Field Notes, July 18, 2019).

Figure 18. Florida Black Bear Exhibit, Central Florida Zoo and Botanical Garden

Figure 19. Florida Black Bear Exhibit (Garage), Central Florida Zoo and Botanical Garden

Stephanie Williams, the Zoo Director at Central Florida Zoo and Botanical Garden, provides additional insight into the design of the bear exhibit explaining,

> [The] bear habitat… [is] the newest one that was done with education in mind. That one was tied specifically to Seminole County… making sure that… folks that live in Seminole County are aware of what they can do to help protect themselves and the bear population… [W]e have bears here in Seminole County. They do get into the trash cans, they do get into people's garages… [T]hat one is really geared to adults because that's who's buying houses and who's putting out the trash in the morning and who's closing their garage doors and who's taking walks with their families. So that one's a big one where it's all education in mind like that you walk through it and it was everything that is put out whether to sign a graphic, an interactive that was for education, for the sole purpose of

> understanding bears, bear biology, bear nature, and what residents can do to help protect themselves and, and keep the bear safe (S. Williams, personal communication, July 18, 2019).

While the innovative educational design shines through in this exhibit, the placement of the bear exhibit in the backyard can easily be viewed through two vastly different lenses. Guests keeping with the theme and design of the exhibit can easily see the convergence of habitat between humans and more-than-humans, which enforces the importance of coexistence. However, bear exhibits in the backyard of the house, complemented by a shallow pool and climbing structure, can potentially misconstrue to guests that the bears on exhibits are pets, which reinforces the dominance of captivity and the relationship between humans and animals. Furthermore, the exhibit may promote the dangerous idea that bears are akin to a family's pet. Nevertheless, this exhibit excels in helping people to understand how to coexist with bears by conveying knowledge, building understanding, improving on skills, and promoting sustainable actions in guests. This exhibit successfully addresses all four goals of EE.

Keeper Chats

Zookeeper chats, hereinafter referred to as keeper chats, are a tool that allows guests to interact with zookeepers involved in caring for the animals at the zoos, aquariums, and animal-based theme parks. A zookeeper is an individual who manages, and is responsible for, the care of animals held in captivity and their habitats, ensuring that health and wellbeing needs are met. While zookeepers typically host the keeper chats, docents and educators also conduct keeper chats across the case study facilities.

Keeper chats are a key tool used, not only for conveying knowledge, but for building understanding among guests that patronize zoos, aquariums, and animal-based theme parks. Building understanding expands foundational knowledge by engaging audiences in two-way communication in an effort to develop an individual's conceptual models for examining and evaluating concepts, values, and attitudes. This additional communication allows for audience assessment and the tailoring of information based upon group or individual participation. While this strategy allows for audience participation and feedback, educators maintain control of the dialog and objectives, facilitating learning to support the program mission.

Keeper chats primarily include key facts about species such as habitat, diet, lifespan, and breeding traits. These facts are often supplemented with enrichment activities, feeding, or training displays for the public. Personal information about the particular animal on exhibit may also be included, such as how the facility acquired the animal or unique traits and behaviors particular to the animal on exhibit. In some instances, the major drivers leading to the need for conservation in an animal-based facility are mentioned with the occasional sustainable action recommendation provided to the public.

Scheduled keeper chats were conducted throughout the 15 case study zoos, aquariums, and animal-based theme parks; each lasted approximately 10 minutes with opportunities for questions throughout the talk. Guests are informed of keeper chat times and locations through listings in the facility maps and posted on signage throughout the grounds.

Of the 15 case study sites examined, 13 of these facilities (86.7%) employed the use of keeper chats to convey educational information to the public (Figure 20, Table 5). All eight of the case study zoos and four case study aquariums used keeper chats. Busch Gardens was the only one of three animal-based theme parks to utilize keeper chats throughout the park as an education tool. The chats were similar, in both frequency and content, to those provided at traditional zoos and aquariums. Disney's Animal Kingdom had educators stationed at animal exhibits to answer guests' questions as opposed to employing standard chats. SeaWorld San Diego educators were only observed at touch tanks, enhanced experiences, and shows.

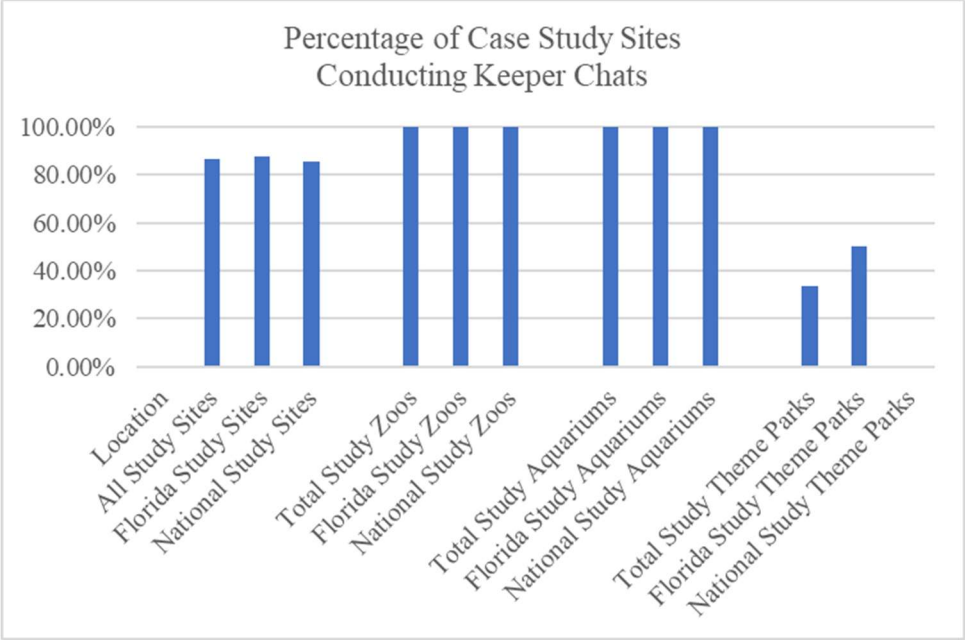

Figure 20. Percentage of Case Study Sites Conducting Keeper Chats

Table 5. Percentage of Case Study Sites Conducting Keeper Chats

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=13 86.7%	n=8 100.0%	n=4 100.0%	n=1 33.4%
Florida	n=7 87.5%	n=4 100.0%	n=2 100.0%	n=1 50.0%
National (ex FL)	n=6 85.7%	n=4 100.0%	n=2 100.0%	n=0 0.0%

Approximately half of the scheduled keeper chats were observed at each facility during case study site visits. Keeper chats were coded based on the four goals of EE: convey information, build understanding, improve skills and enable sustainable action. Of the 58 chats observed across 13 facilities, all endeavored to convey information (Figure 21, Table 6), providing foundational knowledge through the presentation of key facts and information about the animal.

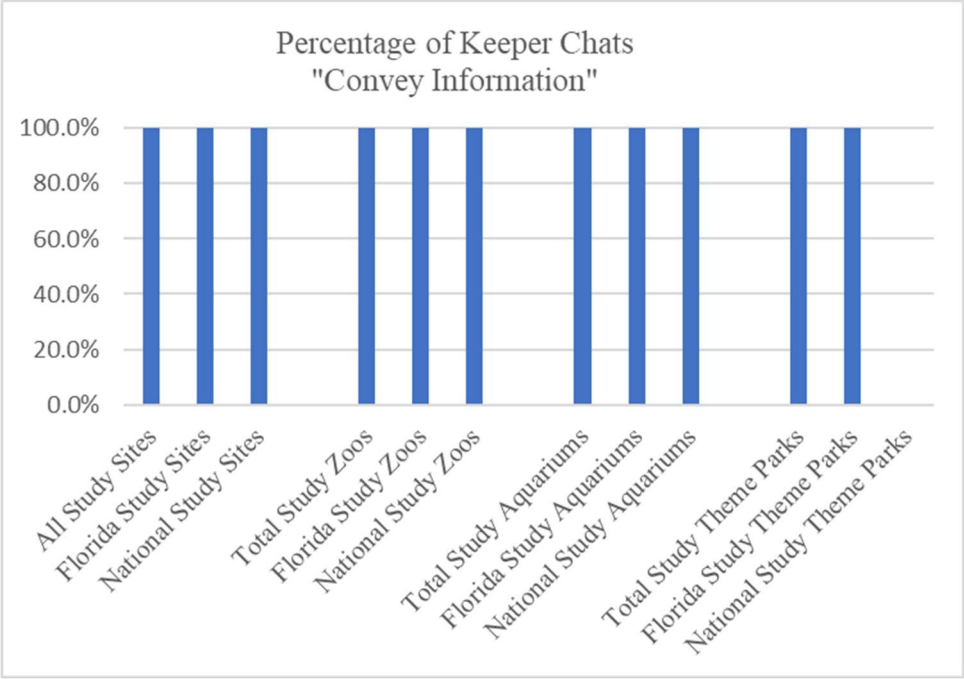

Figure 21. Percentage of Keeper Chats "Convey Information"

Table 6. Percentage of Keeper Chats "Convey Information"

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=54 100.0%	n=32 100.0%	n=16 100.0%	n=6 100.0%
Florida	n=32 100.0%	n=18 100.0%	n=8 100.0%	n=6 100.0%
National (ex FL)	n=22 100.0%	n=14 100.0%	n=8 100.0%	n=0 0.0%

The majority of keeper chats attended sought to build understanding (Figure 22, Table 7) in guests through two-way communication and tailoring of information based on audience demographics and interests. Despite tailoring, zookeepers and educators

maintained control of the dialog and objectives, redirecting audiences as necessary to ensure major talking points supporting educational mission objectives were covered.

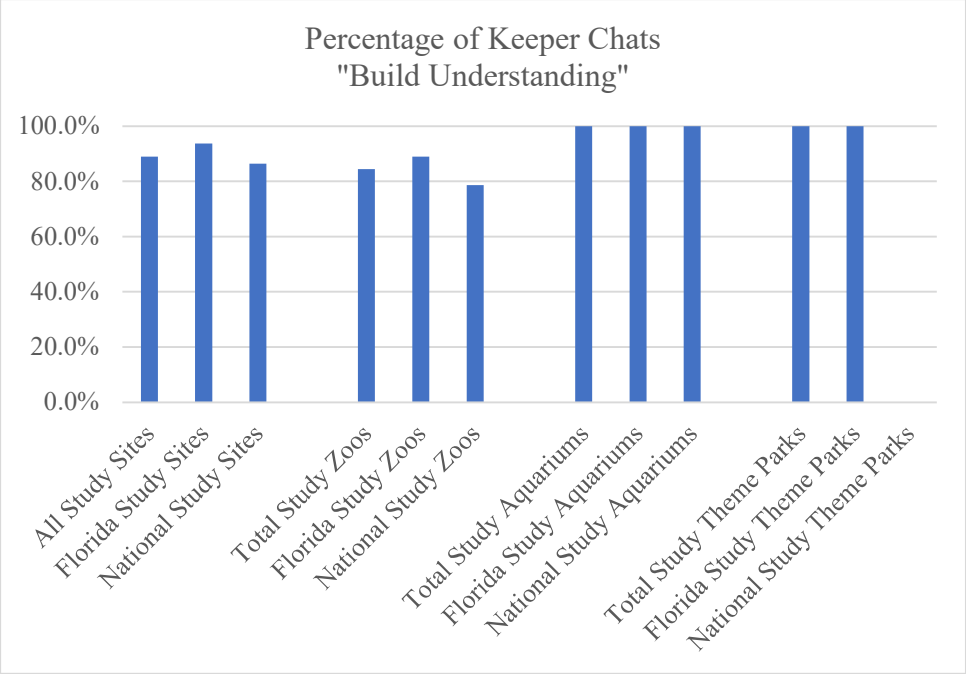

Figure 22. Percentage of Keeper Chats "Build Understanding"

Table 7. Percentage of Keeper Chats "Build Understanding"

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=48 88.9%	n=27 84.3%	n=16 100.0%	n=6 100.0%
Florida	n=30 93.8%	n=16 88.9%	n=8 100.0%	n=6 100.0%
National (ex FL)	n=19 86.4%	n=11 78.6%	n=8 100.0%	n=0 0.0%

ZooTampa was the only facility of the zoos, aquariums, and animal-based theme parks to take advantage of opportunities to improve skills (Figure 23, Table 8). Skills development was coded based on social action skills. Observed keeper chats at ZooTampa explained to guests how to identify a manatee in duress and the proper procedures for notifying authorities. A keeper chat was also held in which guests were educated on how to assist a gopher tortoise stranded in the middle of the road due to traffic, and the importance of moving the tortoise only in the direction it was headed.

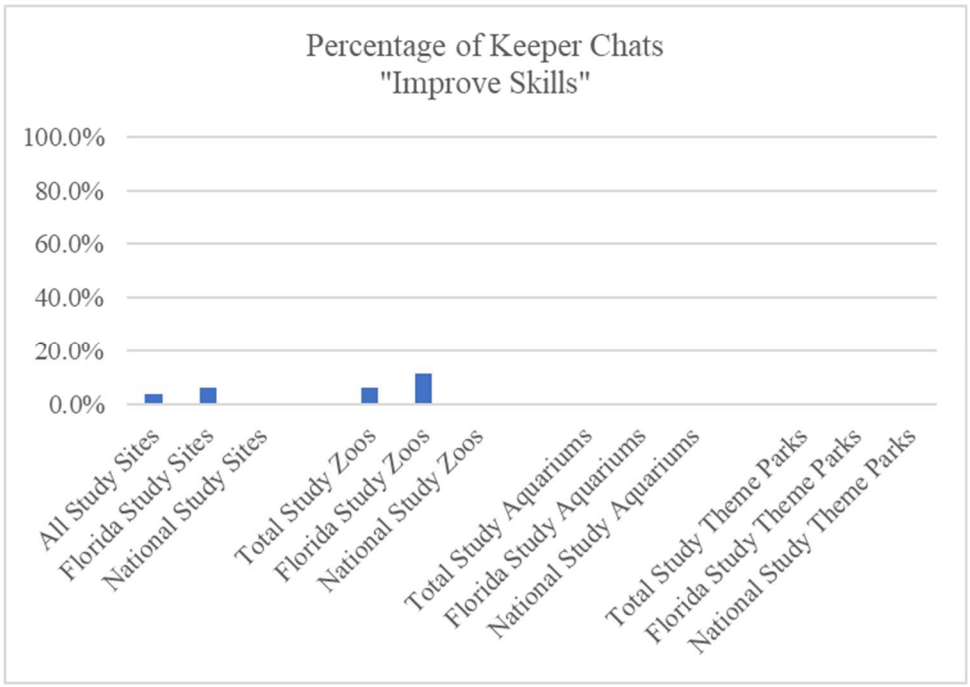

Figure 23. Percentage of Keeper Chats "Improve Skills"

Table 8. Percentage of Keeper Chats "Improve Skills"

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=2 3.7%	n=2 6.3%	n=0 0.0%	n=0 0.0%
Florida	n=2 6.3%	n=2 11.1%	n=0 0.0%	n=0 0.0%
National (ex FL)	n=0 0.0%	n=0 78.6%	n=0 0.0%	n=0 0.0%

On average, less than half (46.3%), of the observed chats delved into EE level four by recommending actions, individual or collective, that guests could take to help wildlife and environment conservation (Figure 24, Table 9). The chats observed in Florida facilities offered recommendations for sustainable action (50.0%) more frequently than their national counterparts (40.9%) across the case study sampling of zoos, aquariums, and animal-based theme parks.

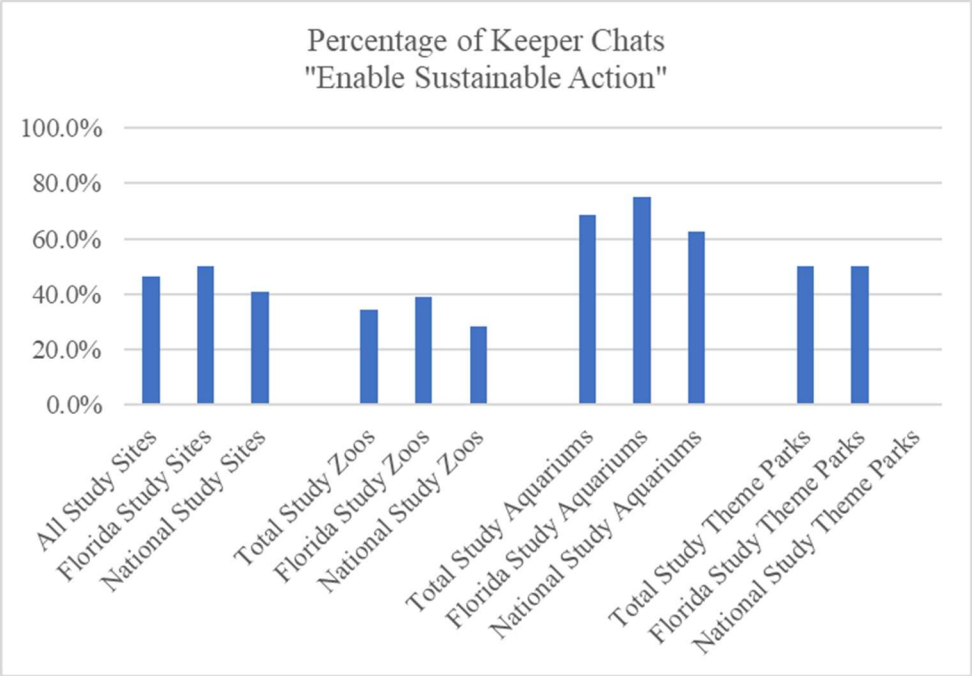

Figure 24. Percentage of Keeper Chats "Enable Sustainable Action"

Table 9. Percentage of Keeper Chats "Enable Sustainable Action"

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=25 46.3%	n=11 34.4%	n=11 68.8%	n=3 50.0%
Florida	n=16 50.0%	n=7 38.9%	n=6 75.0%	n=3 50.0%
National (ex FL)	n=9 40.9%	n=4 28.6%	n=5 62.5%	n=3 50.0%

Audubon Aquarium of the Americas had a particularly interesting format to their keeper chats. Their chats ranged from around 10 to 20 minutes with a member of the education team opening the chat, introducing the species, and providing information about the species and their habitat in the wild. The educator was joined by trainers inside the animal exhibit who engaged in feeding or training activities. This team presentation of keeper chats provided an opportunity for guests not only to learn about animals but also provided opportunities for the keepers to talk about individual animals, training and husbandry activities, and to demonstrate trained behaviors. The educators and trainers worked together to stress threats to the subject and steps individuals can take to

contribute to conservation efforts. Following the chat, educators remained at the exhibit to supply literature, answer questions, and share biofacts about the species, allowing guests the opportunity to engage directly with the educator or in small groups (Field Notes September 6, 2019).

Conservation Stations

Conservation Stations are used as educational tools to help convey information, build understanding, develop skills, and enable sustainable actions. Conservation stations are located throughout facilities to offer guests opportunities to engage with knowledgeable staff in small groups or on an individual basis. Additionally, conservation stations often employ games, showcase biofacts, teach skills, and provide additional literature to help build upon information provided through exhibit signage and chats. While many conservation station activities are designed to attract younger audiences, volunteers are trained in interpretation and how to engage parents and other adult guests in cross discussions about environmental and conservation threats, as well as recommended actions individuals can take to help limit their environmental impact and to support conservation initiatives. Arinne Bolin, ZooTampa's Conservation Manager, describes the conservation stations at her facility as:

> [I]t's just free for guests to interact… our volunteers host these stations, so they are intended to be hands on where they have components for guests to come up and touch and interact. There's a live human there for them to ask questions and learn more about the animals in our care. And then… a conservation message [is] included at the end of a conversation (A. Bolin, personal communication, June 7, 2019).

While conservation stations are excellent tools to engage guests, many facilities are only able to support stations on days that are projected to have higher levels of attendance, or when volunteers are available to support and staff the stations. Unfortunately, by limiting the availability of conservation stations to days when attendance at zoos, aquariums, and animal-based theme parks is expected to be low, the opportunity for potential in-depth, one-on-one conversations that support non-formal education for persons of all ages is also limited.

Ten of the 15 (66.7%) case study sites have employed conservation stations, with the majority of these stations located in zoos. While conservation stations were observed in aquariums and animal-based theme parks in Florida, none of the national case study or animal-based theme parks were observed using conservation stations during site visits (Figure 25, Table 10).

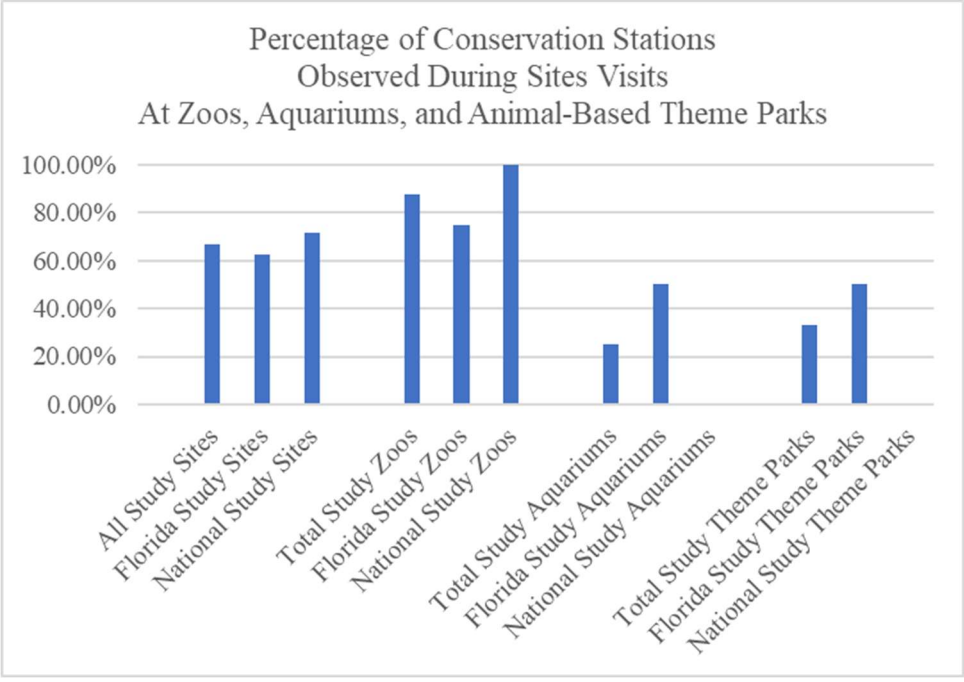

Figure 25. Percentage of Conservation Stations Observed During Site Visits at Zoos, Aquariums and Animal-Based Theme Parks

Table 10. Percentage of Conservation Stations Observed During Site Visits at Zoos, Aquariums and Animal-Based Theme Parks

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=10 66.7%	n=7 87.5%	n=1 25.0%	n=1 33.3%
Florida	n=5 62.5%	n=3 75.0%	n=1 50.0%	n=1 50.0%
National (ex FL)	n=5 71.4%	n=4 100.0%	n=0 0.0%	n=0 0.0%

Typical conservation stations use an activity, game, or provide biofacts to facilitate conversation and lead the discussion. For example, the rhinoceros conservation station at Central Florida Zoo and Botanical Garden (Figure 26 and Figure 27) used a guessing game that was complemented by biofacts to facilitate discussion about keratin in rhinoceros horns and poaching. A mask and a Styrofoam cup were tools used to help guests understand the limited vision of the rhinoceros and demonstrate their reliance on sound. Laminated questions and answers were made available to facilitate conversation about interesting adaptations unique to the species, range of habit, conservation work that has been done, and actions individuals can take to help support rhinoceros conservation. Suggestions included messages such as: educate your friends, share your knowledge on social media, support conservation organizations, and don't purchase products that contain keratin from rhinoceros horns (Field Notes, July 19, 2019).

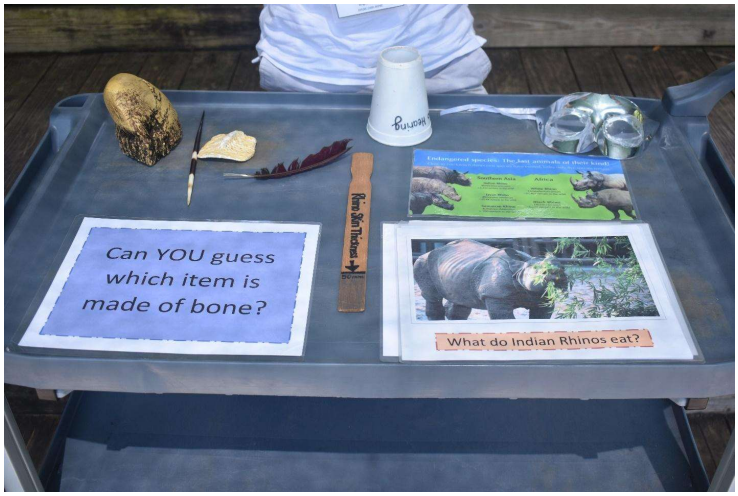

Figure 26. Indian Rhinoceros Conservation Stations, Central Florida Zoo and Botanical Garden

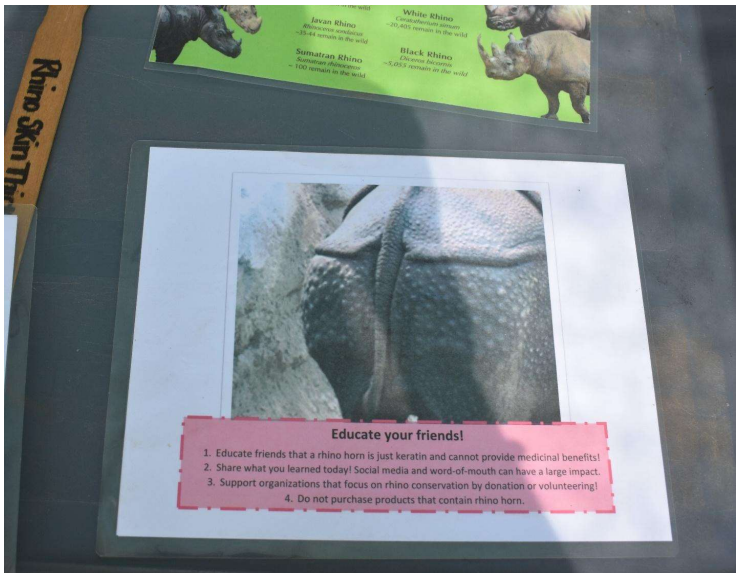

Figure 27. Indian Rhinoceros Conservation Stations, Central Florida Zoo and Botanical Garden

Disney's Animal Kingdom and the Bronx Zoo have developed innovative programs that use a strategy similar to conservation stations which promotes exploration of the entire park or zoo. Learning and activities are required at each station throughout the park to encourage all levels of environmental learning; imparting basic knowledge to guests, developing understanding, building skills, and promoting sustainable actions in a fun and innovative manner. The "Wilderness Explorers" program at Disney's Animal Kingdom and the "Quest" program at the Bronx Zoo typically attract younger guests: however, adults and parents are also encouraged to complete their own journey. Educators are trained to impart knowledge and modify activities to ensure opportunities are age relevant and appropriate for guests.

During the site visit to Disney's Animal Kingdom, the researcher endeavored to complete the *Wilderness Explorers Handbook*. This 29-activity exploration routed the researcher through the park on an adventure that highlighted the animals, cultures, and traditions of the inhabitants in the different regions of the park. The *Wilderness Explorers*

Handbook required traversing some of the less frequented regions of the park, ensuring guests experience the full breadth of the offerings that are available at Disney's Animal Kingdom, as opposed to limiting the activities to rides and attractions. Disney's *Wilderness Explorers Handbook* provides key facts along the way and is complemented by conversations with Wilderness Guides to facilitate in-depth understanding. Tracking skills were taught to the "explorer" in a fun and engaging manner, with clues strategically placed in and around animal exhibits. Environmental issues, including deforestation, pro-environmental behavior, and the importance of consumer choices were highlighted at some explorer stations (Figure 28 and Figure 29).

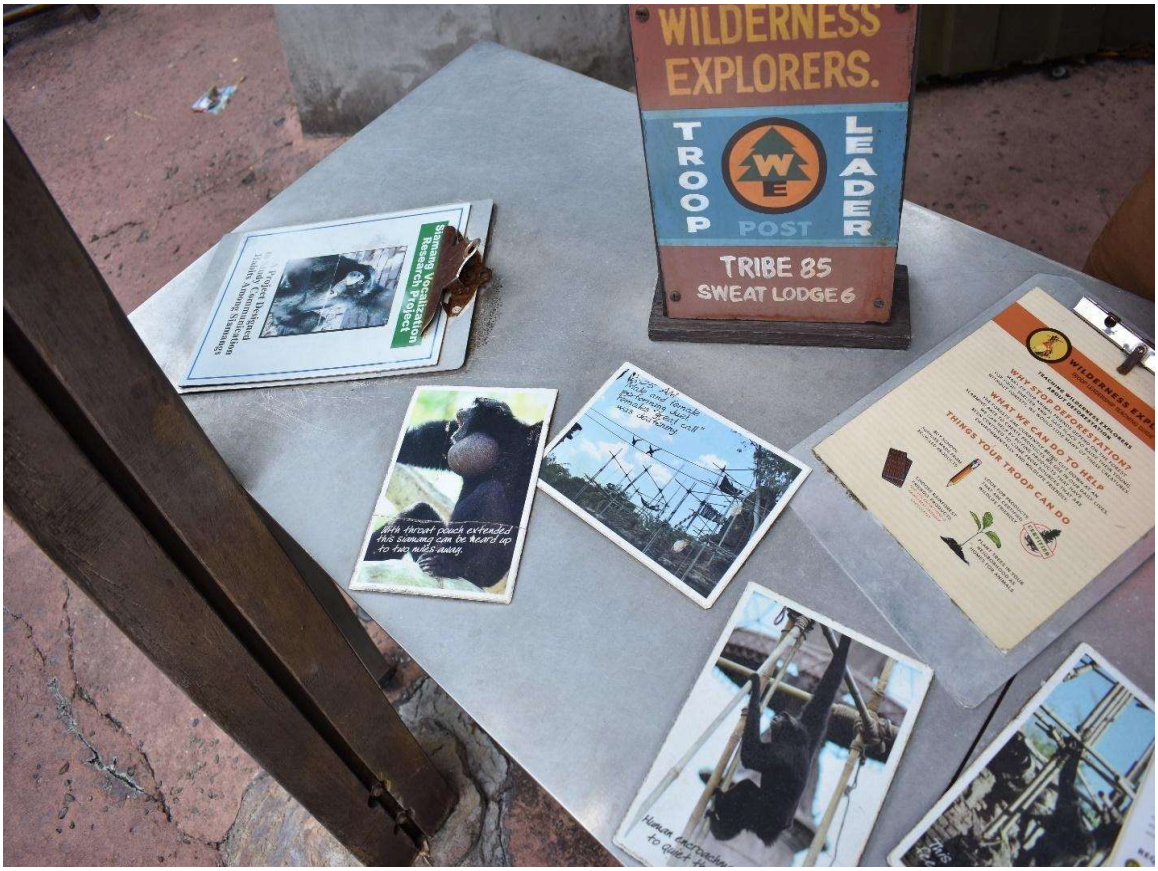

Figure 28. Wilderness Explore Forestry Badge Station, Disney's Animal Kingdom

Figure 29. Wilderness Explorer Forestry Badge Station, Disney's Animal Kingdom

Cultural exploration was also embedded within the explorer stations, allowing guests the opportunity to chat with individuals from regions across the world. These stations facilitate the sharing of cultures and traditions and help guests to better understand the people and cultures that live near the animals on exhibit (Figure 30). For instance, to achieve the Africa Explorer badge, guests are required to meet someone from Africa. The *Wilderness Explorers Handbook* reads:

> Wilderness Explorers meet people from all over the world. There is no better sign of friendship and respect than talking with people and learning about their countries and cultures. Learn about a country and culture in Africa by talking with a cultural representative (*Wilderness Explorers Handbook*, 2018).

Figure 30. Wilderness Explore African Culture Badge Station, Disney's Animal Kingdom

The Cultural Badge Guide was dressed in traditional African clothing rather than the facility's explorer guide uniform. A nearby table included maps, art, and photos of traditional food and buildings. The cultural guide shared where he was from and specifically shared with the researcher a few words in Swahili. Additional cultural stations that were required to be completed as part of the *Wilderness Explorers Handbook* encouraged explorers to meet cultural guides from Asia, providing additional opportunities to learn about other cultures, traditions, and legends.

Shows

Animal-based shows are available at nine of the 15 (60%) case study sites. These animal-based shows are an interesting marriage of both entertainment and educational experiences for guests, in which animals and facilitators enact scripted performances.

Five of the eight (62.5%) case study zoos offer animal-based shows, and one of the four (25%) case study aquariums held a show. All the animal-based theme parks conducted shows. The eight Florida case study sites offer shows more frequently than the seven from the national case study grouping (Figure 31, Table 11).

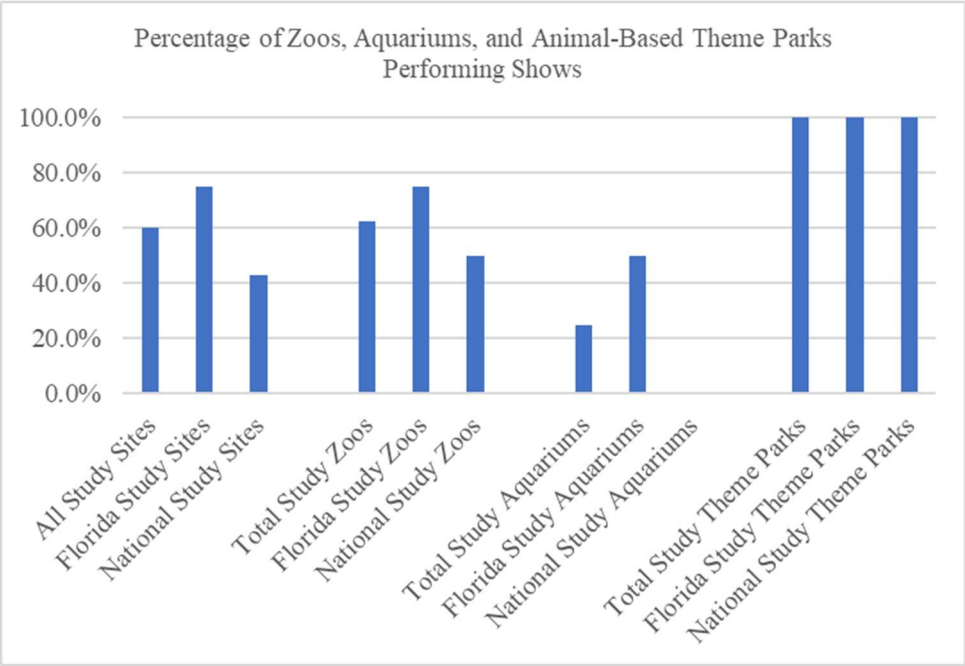

Figure 31. Percentage of Zoos, Aquariums and Animal-Based Theme Parks Performing Shows

Table 11. Percentage of Zoos, Aquariums and Animal-Based Theme Parks Performing Shows

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=9 60.0%	n=5 62.5%	n=1 25.0%	n=3 100.0%
Florida	n=6 75.0%	n=3 75.0%	n=1 50.0%	n=2 100.0%
National (ex FL)	n=3 42.9%	n=2 50.0%	n=0 0.0%	n=1 100.0%

All shows that were observed by the researcher provided educational messaging accompanied by a demonstration of trained husbandry behaviors and tricks that showcased the animal on display. Shows ranged from circus-like performances with animals jumping through hoops and acrobatic displays, to highlighting unique adaptations and demonstration of hunting behaviors, often during same performance.

For example, the California Sea Lion Show can be viewed at the St. Louis Zoo for a small premium. This show demonstrates unique sea lion behaviors and showcases some athletic, acrobatic, and husbandry training. Sea lions perform powerful swimming behaviors, jumps, and flips. Keepers work with the sea lions to discuss and demonstrate some of their husbandry behaviors, such as dental examinations and the brushing of their teeth. There remains a strong sense of entertainment throughout the show as sea lions perform tricks such as tossing frisbees, blowing kisses, and dancing to music. Educational messaging is consistently interwoven into these demonstrations, such as asking a sea lion to balance a ball on their whiskers (Figure 32). During this demonstration the keeper explains the importance of whiskers for hunting in the wild, and why balancing a ball is a trained behavior in the zoo:

> Another really cool adaptation sea lions have… are their whiskers. All sea lions have very fine whiskers on either side of their faces, and what sea lions out in the oceans can use those whiskers for is to help them hunt. If they are ever in dark or murky waters, they can flare them out just like that and actually sense the vibrations of the fish swimming around them. But here at the zoo, Dixie does not have any hunting to do. So instead we trained her another very cool behavior to showcase these whiskers…What you should notice is her whiskers are going to flare out around the ball and then she should adjust her head and body underneath, sensing where it is going with her whiskers (Field Notes, August 12, 2019).

In addition to showcasing adaptations of the species, trainers discuss the need for conservation of sea lion habitats. The sea lions are even trained to use reusable bags, the main conservation message of the show (Field Notes, August 12, 2019).

Figure 32. Sea Lion Show Depicting Demonstration of Whisker Sensitivity, St. Louis Zoo

The Florida Aquarium's show, "Secret Sea Life Superhero," replicates an interactive game show (Figure 33) co-hosted by a scientist and an entertainer and is suitable for all ages. Guests are invited to participate and work together to answer multiple-choice trivia

questions with divers in the Coral Reef Exhibit, who assist the teams by providing clues. Teams shout out answers to questions such as "[o]ne of a Sand Tiger Shark's most distinct features is…." (Figure 34) and "[s]ea turtles sometimes mistake plastic bags for tasty jellyfish," with game show hosts expanding on the answers to the questions. For example, following the sea turtle plastic bags question, the game show host recommends reducing the use of single-use plastics such as straws, cups and plastic bags in order to help reduce the possibility of sea turtles ingesting these items. During the final lightning round, environmental and conservation messaging is more pronounced as teams are required to identify the mystery superhero of the sea, a keystone species, through key facts and its ecological role in the ocean (Field Notes, August 2, 2019).

Figure 33. Secret Sea Life Superhero Game Show, Florida Aquarium

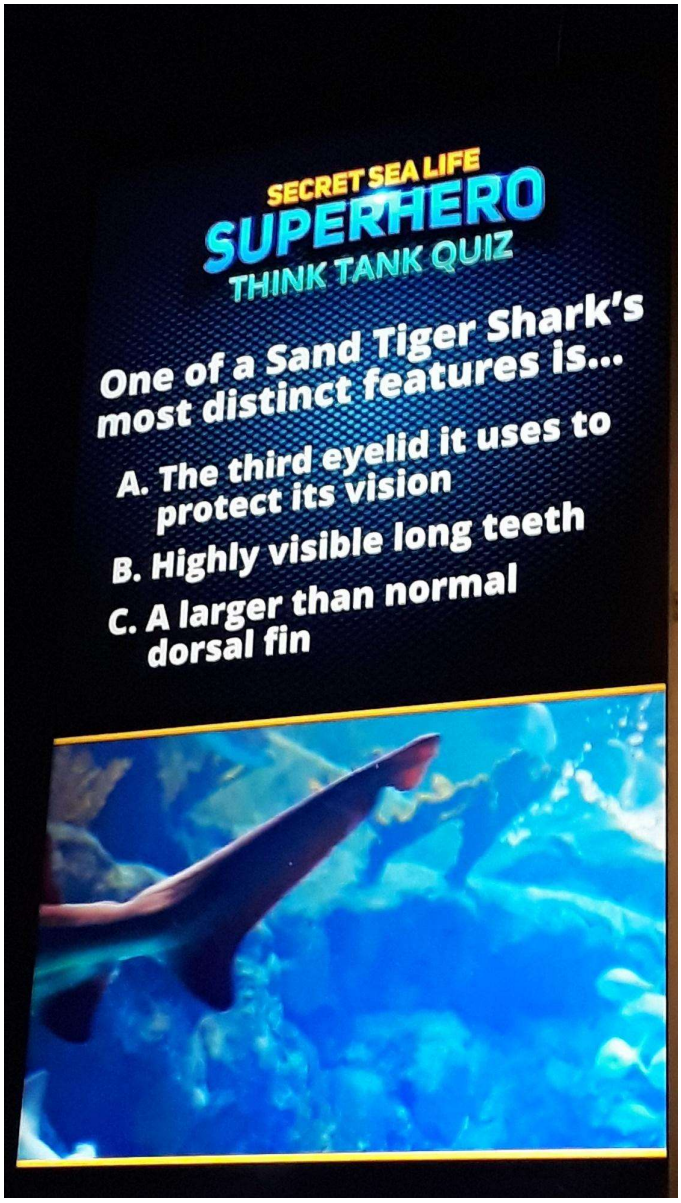

Figure 34. Secret Sea Life Superhero Game Show Question, Florida Aquarium

Sea World's "Orca Encounter" is an educational presentation that educates guests about the ecosystems in which the orcas reside, and the unique adaptations and physical features they possess (Figure 35). The show also highlights and explains orca communication, hunting, and play behaviors. The show emphasizes the care that orcas and all animals receive while at SeaWorld San Diego. While waiting for the show to begin, guests are invited to participate in interactive ocean and orca trivia, holding up

fingers to annotate the correct answer. The show opens with a video that stresses the theme of interconnectedness of the ocean, which remains central to the show. SeaWorld promotes the role that captive orcas housed at the facility play in helping orcas in the wild by being used as research subjects, such as an investigation into the composition of mother orcas' milk to help understand how toxins in the ocean impact the species. However, the conservation message falls short as the show closes with:

> [W]hat we learn from the whales in our care every day is actively helping whales in the wild survive, and just by being here today you supported our rescue, research and conservation efforts all around the world. If we work together like the killer whale, we can protect the future of the Orcinus orca and this beautiful planet that we all share (Field Notes, July 20, 2019).

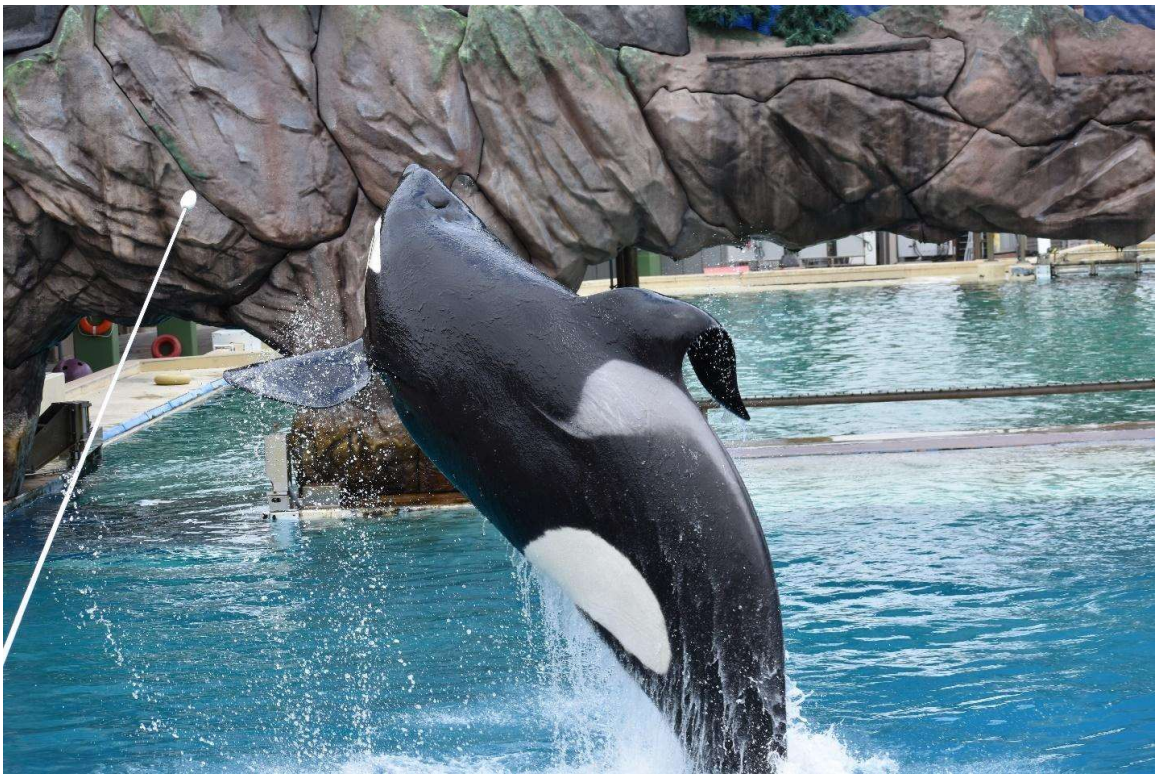

Figure 35. Orca Encounter Show, SeaWorld San Diego

The availability of these shows across the case study sites indicate that zoos, aquariums, and animal-based theme parks acknowledge the desire for entertainment among their constituents, particularly in Florida. The way the shows are conducted suggests that zoos, aquariums, and animal-based theme parks not only recognize the demand for entertainment but are willing and able to capitalize on this desire through the integration of learning in a fun environment.

Trams, Trains, Buses, and Monorails Tours

Trains, trams, buses, and monorail tours are available to guests as part of the cost of admission or for an additional small fee. The tours often serve as methods of transportation for guests to explore the grounds, possibly even areas not accessible on foot or for those that have difficulty walking, while providing an opportunity to see animals on display and glimpse behind-the-scenes activities. Tours are often narrated, which typically provides additional information about the history of the zoo, an overview of the regions of the park, as well as some key facts about animals that can be seen from the vehicles. However, some zoos choose not to provide narration, allowing guests to enjoy the views and the company of their companions.

Nine of the 15 (60%) case study sites provided trams, trains, buses, and monorails to supplement their guests' entertainment and/or education while at the facility. Zoos consistently offer these tours, both in the Florida case study site grouping and the national case study site grouping. Florida theme parks also offer this form of tours for their guests (Figure 36, Table 12).

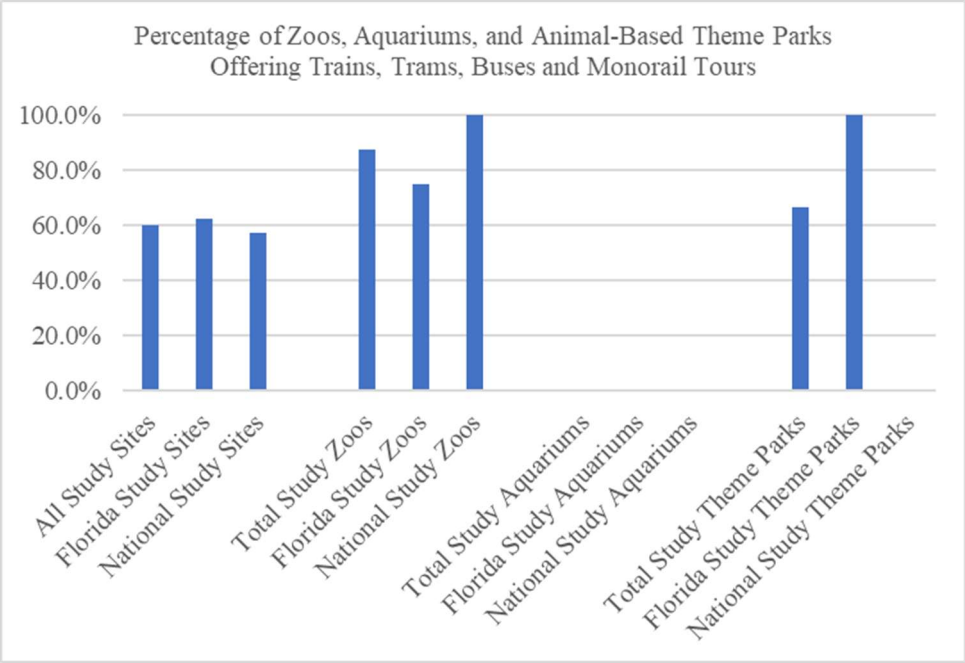

Figure 36. Percentage of Zoos, Aquariums and Animal-Based Theme Parks Performing Offering Trains, Trams, Busses and Monorail Tours

Table 12. Percentage of Zoos, Aquariums and Animal-Based Theme Parks Performing Offering Trains, Trams, Busses and Monorail Tours

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=9 60.0%	n=7 87.5%	n=0 0.0%	n=2 66.7%
Florida	n=5 62.5%	n=3 75.0%	n=0 0.0%	n=2 100.0%
National (ex FL)	n=4 57.1%	n= 100.0%	n=0 0.0%	n=0 0.0%

An illustrative example is the San Diego Zoo's bus tour. The tour provides a brief history of the park, key facts about animals, threats to animals, and information regarding conservation initiatives. The tour provides educational information in a conversational format, as illustrated in this excerpt provided during the bus tour:

> [T]his is the Fern Canyon trail, and it's actually the first manmade rainforest that was planted in the U.S. back the 1930s. And rainforests are very important habitats around the world. They only cover about 6% of our world's landmass, but they hold over 50% of all our species and most

> of our biodiversity. You'll find a lot of plants and animals in those forest regions… Obviously, we get things like lumber from rainforests. We've actually cured a lot of diseases from medicinal plants from out of the forest…. So, a few tips for you to help save the rainforest if you have a big construction projects using sustainable lumbers is a good way to do so. Also, just buying sustainable lumber products in general. And if you're also a coffee drinker using shade grown coffee can also help the forests because unfortunately the coffee industry cuts down a lot of forests each year in order for those coffee plants…. It's pretty good stuff so you can check it out (Field Notes, June 23, 2019).

This bus tour is an excellent example of a strong EE opportunity, meeting three of the four EE foci: convey information, build understanding, and enable sustainable actions. While the only sustainable actions mentioned on the bus tour were a host of individual actions, this is still a positive way to contribute to building environmental literacy in citizens.

Roller Coasters and Attractions

While not traditional to zoos and aquariums, roller coaster rides and attractions are becoming more frequent in AZA-accredited facilities as parks continue to compete for guests. Roller coasters and attractions for the purpose of this study are considered separate from trams, trains, buses, and monorail tours based on the entertainment nature of the attractions, which is expected to elicit the feelings of a thrill rather than the more placid ride through the surroundings and exhibits experienced on trams, trains, buses and monorails. Only six of 15 (40%) of the case study facilities offer rides and attractions,

primarily those that identify as theme parks. Zoo Miami, ZooTampa, and OdySea Aquarium are the only zoos and aquariums with rides and attractions (Figure 37, Table 13).

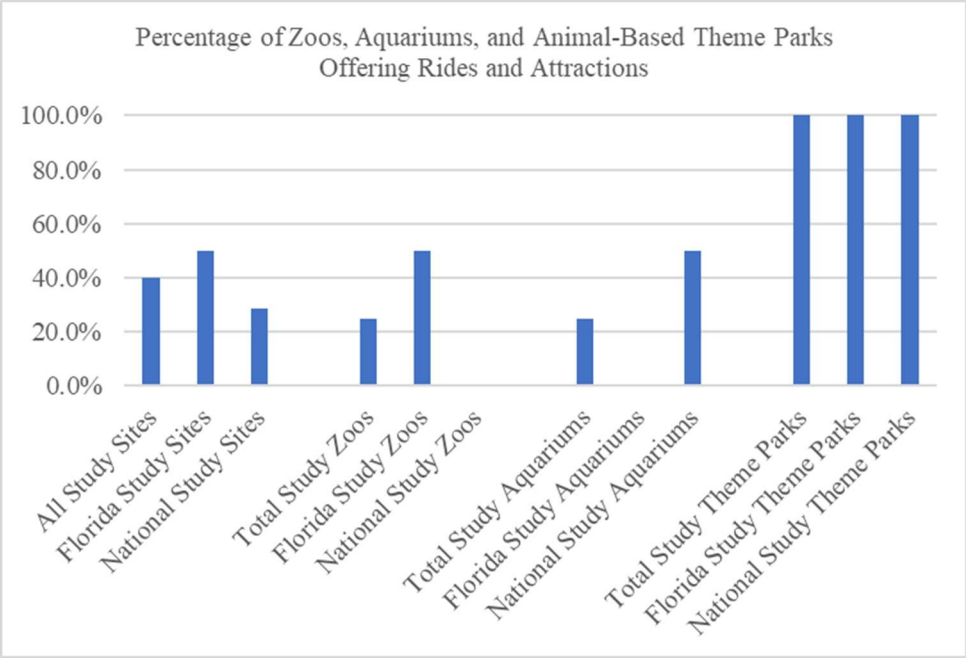

Figure 37. Percentage of Zoos, Aquariums, and Animal—Based Theme Parks Offering Rides and Attractions

Table 13. Percentage of Zoos, Aquariums, and Animal—Based Theme Parks Offering Rides and Attractions

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=6 40.0%	n=2 25.0%	n=1 25.0%	n=3 100.0%
Florida	n=4 50.0%	n=2 50.0%	n=0 0.0%	n=2 100.0%
National (ex FL)	n=2 28.5%	n=0 0.0%	n=1 50.0%	n=1 100.0%

Zoo Miami has a water-based attraction in the Florida region of the facility that mimics an airboat ride, during which guests are transported along a simulated river. ZooTampa also offers a water-based ride. The zoo's newest attraction, "Roaring Springs," makes ZooTampa the only zoo in the sample to have an adult-sized roller coaster. The Vice President of Education, Jennifer McLachlan explains:

> We're doing this because we have rides for kids, toddler-driven ones. We have water plays that are for kids, toddler-driven ones. And we do know based on some evaluation that our chief executive officer team did that we're missing kind of that adult, older child… component. So… we ha[ve] this water ride trying to make sure we get everyone seated next to each other, and it's an immersive family experience or an adult experience…. The animal is primary, but… the entertainment side is just to make it lively (J. McLachlan, personal communication, June 7, 2019).

ZooTampa is divided into five regions: Florida, Asia, Africa, Primates, and Wallaroo, which houses animals from Australia. "Roaring Springs" is located in the Florida region of the zoo. Guests board the boat that floats gently atop a crystal-clear spring surrounded by local flora and fauna, including palms and an osprey nest, designed to recreate the natural springs environment, before riders plunge three stories (Field Notes, June 7, 2019).

OdySea Aquarium also has developed an attraction for guests, although they employ a completely different approach. Their signature attraction, "OdySea Voyager," is an innovative and unique opportunity to attract and entertain guests while providing an educational experience. The "OdySea Voyager" is an interactive guest experience in which guests experience an underwater adventure with the renowned researcher "Commander Brizo," and her new research intern, Nathan. Guests enter the research vehicle and sit in stadium style seating while crews prepare the ship for the voyage. Once underway, the research vehicle's curtains are opened to reveal viewing windows into the aquarium that are only observable from the Voyager. The Voyager rotates through

exhibits of sea turtles, broad rays, seals, sea lions, and sharks. This 20-minute journey is narrated and provides interesting facts about the animals that are on view, their roles in the ecosystems, threats and challenges they face in the wild, and actions that guests can take to support conservation of the animals and their habitats. This attraction effectively and artfully addresses all four components of EE while providing information through multiple mediums to reach a broader audience, which makes the information presented suitable for all audiences and keeps guests engaged (Field Notes, June 25, 2019).

Another example of an attraction is Disney's Animal Kingdom's "It's Tough to be a Bug." This 3D attraction is suitable for all audiences and highlights what it is like to be a bug, explaining important roles bugs play in our ecosystems and the challenges they face at the hands of humans. As guests queue for the attraction, they are routed around Discovery Island, circling the park's signature Tree of Life. Insect-based movie posters line the attraction walls as guests wait in the lobby of the theater (Figure 38).

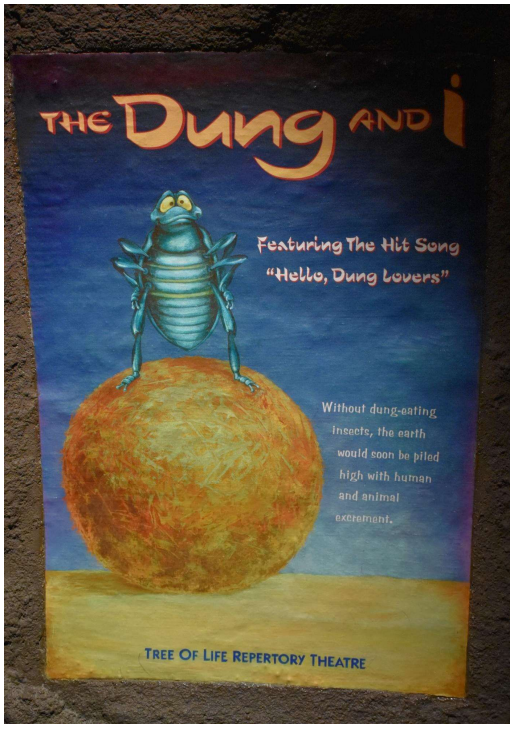

Figure 38. It's Tough to be a Bug Movie Poster, Disney's Animal Kingdom

The attraction starts with the host, “Flink”, introducing the show:

> You know, we have been doing this act for over three hundred million years and with bugs making up more than 80% of the animal world, we’re the biggest cast of them all. Still you guys just don’t seem to see us, so um, that’s why we gave you the special bug eyes (Field Notes, July 20, 2019).

Bugs appear and disappear on the 3D screen, highlighting some of their adaptations in fun and creative ways. Approximately five minutes into the show, “Puffer” appears and questions the presence of humans and their honorary bug status claiming:

> You humans have always seen us as monsters. If you had it your way, you would destroy us all, but you never will because we outnumber you 200,000,000 to one. Maybe it’s time you honorary bugs got a taste of your own medicine (Field Notes, July 20, 2019).

The show ends with a musical that highlights the importance of bugs and the roles they play in our environment, including waste disposal and the pollinating of plants, before reminding guests that magnifying glasses are for seeing bugs, not killing bugs (Field Notes, July 20, 2019).

Movies and 4D Experiences

Ten of 15 (66.7%) case study facilities offer movies or 4D experiences that are included in park admission or as add-on opportunities to supplement guest experiences (Figure 39). Movie offerings range from educational films to children’s movies. Multiple sites offered Smallfoot 4D, a condensed version of the longer Warner Brothers Pictures that details a Yeti’s journey to prove to his village that humans do exist.

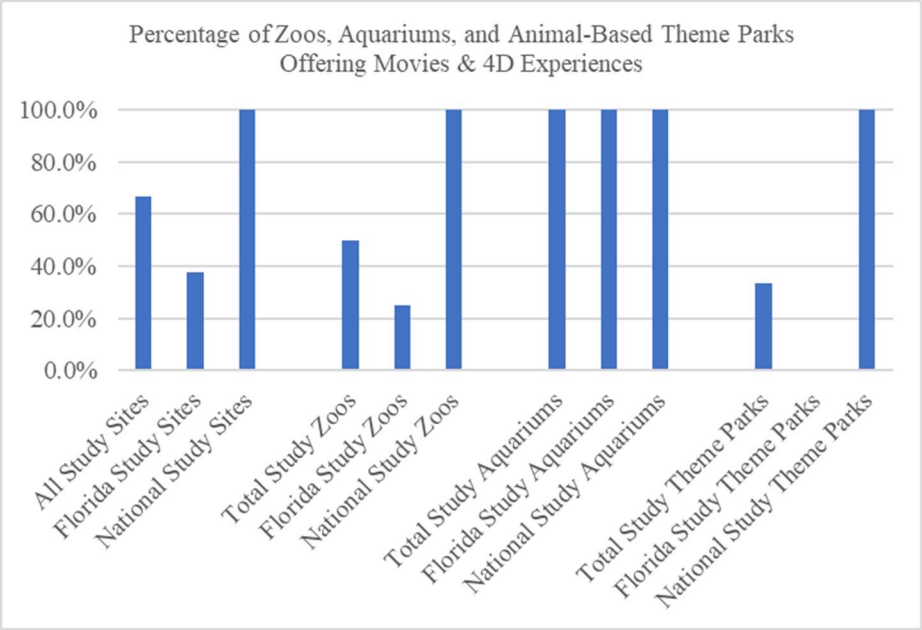

Figure 39. Percentage of Zoos, Aquariums, and Animal-Based Theme Parks Offering Movies & 4D Experiences

Table 14. Percentage of Zoos, Aquariums, and Animal-Based Theme Parks Offering Movies & 4D Experiences

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=10 66.7%	n=4 50.0%	n=4 100.0%	n=1 33.3%
Florida	n=3 37.5%	n=2 100.0%	n=2 100.0%	n=0 0.0%
National (ex FL)	n=7 100.0%	n=0 0.0%	n=2 100.0%	n=1 100.0%

Case study sites also had more traditional education and conservation-based movies available for viewing, such as “Underwater Giants,” “The Congo 4D,” and “Sharks, a 4-D Experience”. Audubon Aquarium of the Americas had multiple movies available as add-on experiences for guests, ranging from movies that explore Hurricane Katrina and the environmental degradation that perpetuated such catastrophic effects for the residents of Louisiana, to movies that highlight the beauty of the Pacific Ocean, the importance of the ocean system and the environmental impacts that are changing the composition of the region.

Overall, the seven sites in the national case study grouping had significantly more facilities offering movies than the eight sites in the Florida case study grouping. Aquariums had the highest instance of movie and 4D experience use and were the only sites to offer 4D virtual movie viewing to their guests (Figure 40).

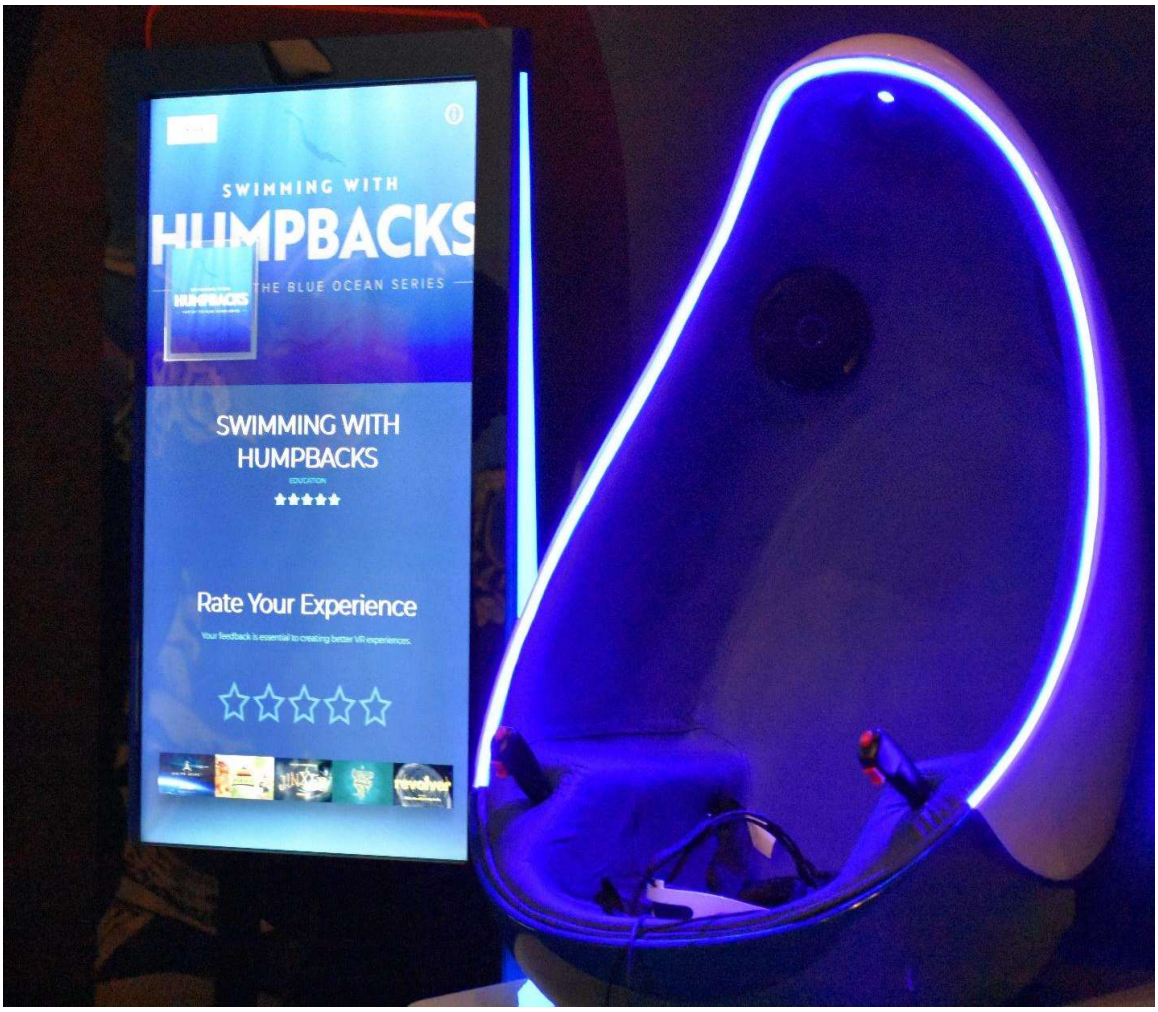

Figure 40. Movie Pod, Mote Marine Research Lab and Aquarium

Movie offerings were more prominent among the four zoos in the national case study group than the four zoos in Florida, with all four zoos in the national group offering movies throughout the facility. Finally, of the three animal-based theme parks, only SeaWorld San Diego offered movie-viewing opportunities.

Animal Feeding and Touch Opportunities

All facilities in the sample offered touch and/or feeding opportunities with animals except for Disney's Animal Kingdom. Touch and feeding opportunities facilitate connections with animals based on the common theory that proximity to, and interaction with, animals increase empathy and contribute to sustainable actions. While scholars continue to debate this correlation, research does indicate that when education is provided in conjunction with these opportunities, learning increases (Lieflander et al., 2013; Fletcher, 2017; Ogle, 2016). However, a study conducted by Carr and Cohen (2011) found that more than half of these touch and feed opportunities in zoos were entertainment-based rather than education-based. Findings during field observations at zoos, aquariums, and animal-based theme parks for this study supported Carr and Cohen's findings. Attending staff was always present and engaged; however, information that was provided was primarily safety oriented. Occasionally, staff provided additional information, such as key facts about the animal participating in the interaction, or answered guests' questions; however, the focus of both guests and staff remained on interaction, connection, and safety.

Enhanced Experiences

Enhanced experiences offer guests personalized, up-close animal encounters with the potential to touch, feed, or take photographs with animals, as well as access to behind-the-scenes facilities, such as barns and night houses. Enhanced experiences are typically offered for small groups during which guests can interact not only with animals, but also with zookeepers and educators. Tours typically start out with an expanded version of a keeper chat, providing guests with additional details about the species as well

as extensive information about the particular animal ambassador involved in the experience. Guests are also educated about animal habitats both in the wild and within the facility. Finally, most experiences promote sustainable actions to promote conservation.

Enhanced experiences are not included in zoo, aquarium, and animal-based theme park admission, but may be added at a premium to a guest's visit. All 15 facilities studied offered enhanced experiences. In most cases, enhanced encounters could be scheduled the day of one's visit; however multiple facilities require a party of two or more to complete the tour. Enhanced experiences were completed by the researcher at 13 of the 15 facilities. Jacksonville Zoo required a party of six or more to conduct a tour, while the Cincinnati Zoo required a party of two or more.

The Florida Aquarium offers a 30-minute enhanced experience called "Penguins: Back Stage Pass." This experience allowed guests to visit the penguin habitat, an exhibit that is not available with standard admission due to space constraints in the aquarium. Guests are walked to the region where the penguins reside and were provided a viewing opportunity before being asked to take a seat. The keeper began her chat, walking one of the ambassador penguins around the room, and gave guests the opportunity to touch the penguin. Afterward, the group moved over to a pool area where the penguin was placed in the pool and fed while the keeper continued to discuss adaptations and husbandry for the penguin. Guests were not allowed to touch the penguin; however, time was provided for photo opportunities. After the swimming demonstration, guests were provided additional photo opportunities with the penguin sitting next to them. The tour focused on

building understanding in guests with limited conservation actions provided in the last few moments of the tour (Field Notes August 2, 2019).

During the site visit to San Diego, the researcher participated in the 120-minute "Inside Look: Surprise Tour" that promised unique experiences at two surprise animal exhibits. Upon pick up, the tour guide greeted all six guests, asking common questions such as where they were from, had they been to the zoo, and their favorite animal. Each guest was provided a lanyard with an animal identification card attached. The front of the card had a picture of an animal, and the back of the card had a description of conservation initiatives that were being taken by the zoo as well as conservation initiatives that guests could take (Figure 41). The tour guide called upon individuals to read their conservation cards while traveling between exhibits. After the reading of the card, the guide expounded on the animal's characteristics, and provided additional information such as interesting facts, habitat, and issues being faced in the wild. Guests were surprised as many of the stops, of which there were significantly more than the two advertised, aligned with animals that participants had identified as their favorites. Feeding opportunities, behind-the-scenes habitat tours, and close viewing opportunities were provided. Threats and conservation status at each exhibit were discussed, as well as an in-depth conversation on some of the complex challenges faced by the animals. Personalized conservation actions were provided to guests based on information the guide had gleaned about their interests, while also discussing more general conservation efforts that other guests could take in support of animals. Towards the end of the tour, the guide asked each participant specifically what they had committed to do in support of conservation of species and/or their environment (Field Notes, June 23, 2019).

Figure 41. Animal Identification Card Provided During Enhanced Experience, San Diego Zoo

"Caring for Giants" is another example of a unique enhanced experience at Disney's Animal Kingdom. This 60-minute experience provides guests the opportunity to meet with keepers and to learn about what is required to provide care for elephants in the theme park. Guests are greeted by the tour guide in the park. After introductions and a brief safety discussion, guests follow the guide behind the scenes to a van that shuttles participants to the elephant barn and a viewing yard within 100 feet of the elephants. Here, guests are met by a keeper and a cultural representative. The keeper introduces the herd of elephants as well as some individual elephants, describing differences between

the animals, including their lineage and their unique personalities. Training and husbandry are also discussed; keepers explain the trained behaviors and how training benefits the animals or helps keepers care for them. The zookeeper is very forward about the difficulties and rewards that are involved in caring for such enormous animals, sharing stories about interactions and unique personalities of the animals, and some challenges in communicating with the animals.

The cultural representative from Tanzania hosts the second half of the "Caring for Giants" experience, discussing elephant care and conservation in the wild. He starts his discussion by introducing himself and explaining where he is from in Tanzania. He chats briefly about his country, highlights national parks, the unique animals, tanzanite, and the importance of tourism to the economy of the country, even mentioning Freddie Mercury who was born in Tanzania.

After introducing himself and his country, he quickly transitions to talking about the decline in elephant populations in the wild, asking guests directly why they think the population is decreasing. Poaching was the only answer provided by the participants. The representative expounds upon poaching, talks about the enormity of the challenge of controlling poaching in his country due to the networks available to poachers. He also explains that most of the poachers are not actually Africans. Poachers come into the country to hunt the elephants, harvest the ivory, and sell it in markets outside the country for use in jewelry, sculptures, medicine, and piano keys. The cultural representative stresses the importance of not purchasing ivory, maintaining that if the demand for ivory were to decrease, so would the killing. Tagua nuts are provided as an alternative to ivory,

with the cultural representative referring to them as “vegetable ivory.” This substitute not only looks like ivory when polished, but it is cheaper, lighter, and more sustainable.

Conflict between farmers and elephants is also discussed. The cultural representative discusses farmers killing the elephants out of frustration for ruining their livelihood, as well as government compensation programs that have been enacted to help farmers recover from trampling of crops. An innovative project is discussed; beehive fences are being used to deter elephants from crossing into farms. The cultural representative explains how the beehives are connected with thin wires that are difficult for elephants to see (Figure 42).

Figure 42. Cultural Representative Presentation During Enhanced Experience, Disney’s Animal Kingdom

The cultural guide explains that when elephants try to attempt to cross into a farm, the wires shake the beehives and result in a swarm of bees, discouraging the elephants from crossing into the farmer’s land or area. The hive protects the elephants from the farmers, farmers’ crops are protected from the elephants, and farmers are able to harvest the honey, all using a natural deterrent.

Finally, the guide discusses tracking and monitoring of elephants to provide information to governments to help protect the animals as well as to provide data for research. A GPS collar is passed around to guests as “wildlife armies” and their efforts to help protect animals is expanded upon before the talk was wrapped up with questions. Disney’s Animal Kingdom's innovative use of cultural representation was a unique approach to help convey the difficulties and challenges faced when caring for these animals in the wild. This approach helps guests understand the challenges at a more personal level, while broadening understanding of both environmental and conservation challenges. Additionally, exposure to different cultures and perspectives adds weight to the discussions resulting in richer experiences and a greater sense of urgency (Field Notes, July 20, 2019).

As one can see from the examples provided above, all tours convey information, seek to build understanding, and serve as a platform to enable sustainable actions. The focus of each experience was markedly different; the Florida Aquarium penguin tour highlighted animal connections, the San Diego Zoo tour promoted conservation, and Disney’s Animal Kingdom tour was a blend of building understanding and enabling sustainable actions. Guests who are willing to spend additional time and money to attend an enhanced experience have already exhibited a strong desire to learn more about or connect to an animal. Educators have a unique opportunity to build understanding in guests and to explore complex and systemic issues, which enhances environmental literacy in guests was noted in Disney’s Animal Kingdom “Caring for Giants” experience. Furthermore, as educators and zookeepers expand upon these in-depth conversations, the opportunity to recommend personalized sustainable actions that meet

and challenge the guests' level of pro-environmental behavior is a huge opportunity to stimulate growth, as witnessed during the "Inside Look: Surprise Tour" at the San Diego Zoo.

Educational Programming

Zoos, aquariums, and animal-based theme parks offer numerous programs that are geared towards various age groups, as well as programs that are available to specific age groups. A wide variety of programming is available for different age groups; however, there is a standard set of programs that are fairly common across zoos, aquariums, and animal-based theme parks for each demographic.

Children and Young Adult-Based Programming

Groups with children are the largest demographic of visitors to zoos and aquariums (Lenhhardt, 2010; Khalil & Ardoin 2011). Two of three adult visitors frequent the zoo with a child, and one in two adult visitors frequents an aquarium with a child (AZA, 2019c). As such, zoos, aquariums, and animal-based theme parks offer a variety of programs for toddlers, children, and young adults, including camps, field trips, scout activities, homeschool activities, and special events, such as birthday parties and sleepovers. While these are the most prominent programs for children and young adults, each facility offers a slightly different set of programs based on their mission and guests' interests and needs.

Camps are the most common programs available for children and young adults at the sample sites. Camps are structured to increase factual knowledge about the animals and the ecosystems in which they live. Children are provided opportunities to engage with animal ambassadors and see animal keepers in action. Camps are often

supplemented by age-appropriate activities during which children may be called upon to build animal enrichment toys during crafting activities or to engage in scavenger hunts throughout the facility. Additionally, camps aim to engage children through arts and crafts activities, games, experience, interaction with animal ambassadors, and the chance to see keepers in action. Children's camps are grounded in the common theory that establishing connections to animals increases empathy and ultimately contributes to the development of pro-environmental behavior. While the connection between empathy and pro-environmental behavior remains debatable (Lieflander et al., 2013; Fletcher, 2017), this strategy remains a common ideology in many facilities. When asked what she wants her students to walk away with after an educational program, St. Louis Zoo's Laura Seger, Manager of Learning Experiences claims:

> [C]ritical thinking is huge because you can't do anything else without that. You can't go on to be a scientist, a scientifically literate citizen if you're not a critical thinker. And you have to be able to do that first. And then that leads into being scientifically literate. So just understanding the basics of how the world works and what is ecology…. You don't have to be a biologist, you don't have to have those intense specialties, but you do have to have a basic understanding of how it all works together. And then just that the emotional connection to the natural world, you have to have that. If you don't, if that's not developed, then you have no reason to. You have no invested interest in helping… if you don't understand the connection and you don't feel the connection, then you're never going to get there (L. Seger, personal communication, August 13, 2019).

Field trips for students are also a common occurrence, with over twelve million students visiting AZA-accredited facilities annually (AZA, 2019c). Zoos, aquariums, and animal-based theme parks support field trips by providing age-appropriate curriculum and activities. Students are led through the facilities by their educators and chaperones, or they can request educational tours and specialized chats to supplement their trips. Activity sheets, scavenger hunts, and to exercises encourage children and young adults to engage with animal exhibits, read signage, and think critically. The purpose of these field trips is primarily to bolster classroom learning while exposing children to nature and animals.

While school-based programming is dominant throughout zoos, aquariums, and animal-based theme parks, there exists a plethora of homeschool programs made available to children who do not attend public schools. Similar to public school programs, these opportunities are aligned with required curricula and are based in scientific and environmental learning, covering subjects that range from life science to environmental science and conservation. Enhanced opportunities for homeschooled children to learn and interact with animals, nature, and other children, are therefore provided with a frequency that ranges from individual classes to bi-monthly meetings.

Scout programming opportunities are also provided to assist Boy Scouts and Girl Scouts in learning about ecosystems, animals, and the facilities that house them while Scouts earn merit badges for participating in service projects. For example, the Central Florida Zoo offers programs in which scouts can earn identified badges through a standardized set of activities claiming: “[E]ven the youngest Scouts can earn merit badges at the Zoo with programs that put Cub and Boy Scouts in the center of all the wild

action" (Central Florida Zoo and Botanical Gardens, 2019c). The zoo also offers troop leaders the opportunity to work with the education team to develop a unique activity tailored to the scout group.

Family Based Programming

Families comprise the largest demographic of zoo visitors and activities that are available to family units with children, ranging from infants to adults, are widely available. Family-based programming has been developed for a wide span of age groups with activities from families with toddlers to families with adult children. Standard family-based educational programming in zoos, aquariums, and animal-based theme parks creates the opportunity for a family to recreate while learning about nature.

The Bronx Zoo offers a stroller safari series that meets weekly for a month. During this time, children as young as 10 months and their parents or caregivers can tour exhibits, learn about wildlife, meet animal ambassadors, and engage in sensory, art, and dramatic activities (Bronx Zoo, 2019b). Similarly, Jacksonville Zoo offers an early childhood program for kids, one to three years of age, which includes a themed story, songs, nature-themed play, crafts, and an animal encounter in a classroom setting. As children grow, family-based programming opportunities vary allowing families to grow with the zoo and to build on progressive learning, not only at the zoo facility but in the local community. "Outdoor Explore!" is designed for families with children ages seven to eleven and their siblings of any age group. "Outdoor Explore!" meets in various locations throughout the Jacksonville to explore green spaces, encouraging children and families to interact with the natural environment (Jacksonville Zoo and Botanical Gardens, 2019b).

Zoo Miami's, "Nature Play," is designed to get families out into nature by offering skill-building clinics in local county parks. Families are taught basic nature play safety and skills such as kayaking, snorkeling, and camp building. "Nature Play" is also used to enhance the appreciation of, and to build a connection with, nature (Zoo Miami, 2019).

While most family programming is geared toward young families with children or young adults, zoos report that families with adult children still frequent family-based programming. Cincinnati Zoo's Director of Educational Dan Marsh explains:

> [W]e often see families, but they're families with adult children. So, it's mom, dad, and adult kids coming into a wild about wine or… an adult event of some sort…. We were doing some focus groups here and discover that's not an uncommon thing…. That says, that for whatever reason here in Cincinnati… the people that come to the zoo see it as a place where a family experience happens. Regardless of how you've defined your family, it's a shared experience (D. Marsh, personal communication, Aug 18, 2019).

Indeed, educators at other facilities mentioned seeing families with adult children that still attend family-based programs. Additionally, zoos, aquariums, and animal-based theme parks offer adult-based programming as an option for individuals who are looking for a more adult based experience.

Adult-Based Programming

While most of the programming available at zoos is intended for families and young audiences, there are adult-specific activities and events targeting adult audiences.

Zoos, aquariums, and animal-based theme parks support adult education in both the formal and non-formal arenas. One example of a formal education opportunity is the Advanced Inquiry Program (AIP), "Project *Dragonfly,"* through Miami University. "Project *Dragonfly"* has been made available at four of the case study sites: Jacksonville Zoo and Botanical Garden, Cincinnati Zoo, Bronx Zoo, and the San Diego Zoo. Cincinnati's AIP program, titled "Zoo Expeditions," offers web-based graduate coursework that is supplemented with experiences unique to the Cincinnati Zoo and Botanical Garden. Project *Dragonfly* is an inquiry-based program that covers topics such as animal behavior, plant ecology, ecosystems, and evolution (Cincinnati, 2019a) while developing investigative, critical thinking, and leadership skills (Project Dragonfly, 2019).

Most of the adult programming at the case study sites was identified as non-formal education. Non-formal educational opportunities are available through scheduled programming and events. Scheduled programs are structured educational opportunities that offer courses and/or lecture series. For example, Mote Marine Aquarium and Research Laboratory offers a scheduled program titled, "Endless Oceans," for adults that wish to engage in a lifelong learning experience. "Endless Oceans" is a ten-class series; however, options are available for students to register for one class or the entire series. Sample classes include: Introduction to Marine Science 101, Florida Coastal Habitats, Red Tide and Environmental Health, and Coral Reefs and Ocean Acidification (Mote Marine, 2019b).

Educator-Based Programming

EE in Florida and throughout the U.S. has been provided mainly through the formal education system. However, educators often turn to the non-formal education sector to supplement and to provide experiential learning and nature-based experiences to students. Zoos, aquariums, and animal-based theme parks have recognized, and have worked to solidify, relationships with educators. This has been achieved not only by providing experiential learning opportunities for students, but through lending educator support. Many AZA-accredited zoos, aquariums, and animal-based theme parks provide professional development, resources, and lecture series in life and environmental sciences for teacher development.

Mote Marine Aquarium and Research Lab provides educator assistance to local teachers through resources. Classroom kits, such as skeletons, are loaned out and are accompanied by an age-appropriate lesson for educators for use in classrooms, modeling appropriate science and STEM-based lessons for educators. Mote also supports educators through outreach opportunities, such as virtual classroom lectures and school visits, during which Mote's educators provide STEM-based lessons (Mote Marine, 2019b).

The St. Louis Zoo, in addition to providing resources for educators, helps in the development of scientific teaching, as well as life science and conservation education. The zoo offers resources, access to its library, and case studies that teachers can incorporate into their curriculum. They also offer a lecture series and professional development to help educators meet curriculum requirements and the needs of their students (St. Louis Zoo, 2019b).

Discussion

Educational programming opportunities offered at zoos, aquariums, and animal-based theme parks are geared primarily toward children and families, with only a small portion of available programs offered to adults. The Florida case study sites offered a combined total of 46 programs, with 26 of 46 (56.5%) programs designed for children and young adult audiences. The second largest group of offerings was designed to support adult audiences (10 of 46 or 21.8% of programs). Six of 46 (13%) programs were designed for families, and three of 46 programs (6.6%) were suitable for audiences of all ages. Finally, educator programs accounted for one of 46 (2.2%) of education programs offered and were the smallest group of programs made available at the 15 case study sites identified for this research (Figure 43, Table 15).

The national case studies offered a combined total of 39 educational programs, with 20 of the 39 (51.3%) of those programs being designed to facilitate child and young adult learning. National case study sites offered 12 of 39 (30.8%) different kinds of adult-geared education program offerings. Family educational programs and non age-specific educational programs accounted for three of 39 (7.7%) each. Finally, educator programming accounted for one of 39 (2.6%) of the educational offerings (Figure 43, Table 15).

Compared to national case study sites, Florida case study sites offered a higher percentage of child-based and family-based educational programming. Educator-based and all audience-based educational programming comprised a slightly lower percentage in Florida than their national counterparts. Surprisingly, the adult-based educational

programs in Florida comprised a much lower percentage (9.1% less) than the national case study sample (Figure 43, Table 15).

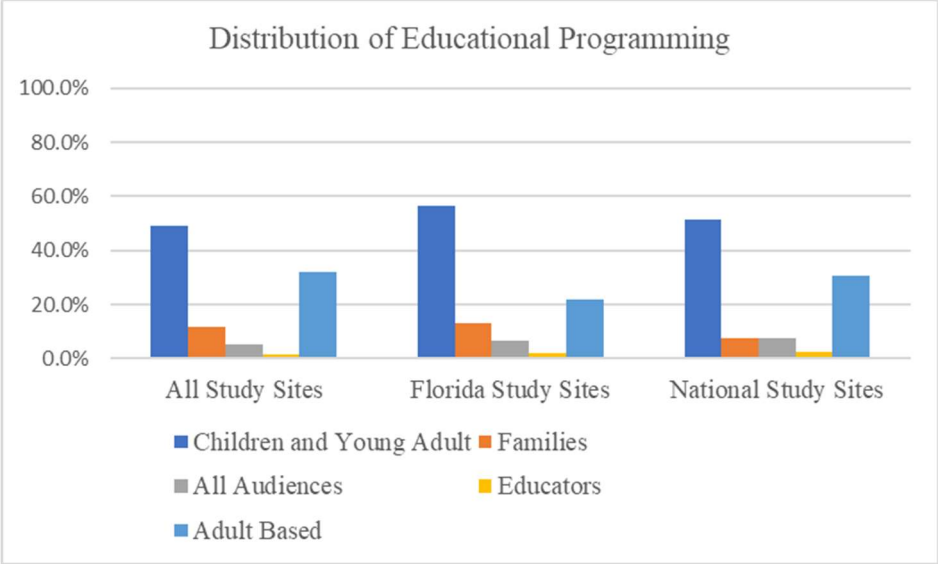

Figure 43. Distribution of Educational Programming

Table 15. Distribution of Educational Programming

	Children and Young Adults	Families	All Audiences	Educators	Adults
All	n=29 49.2%	n=7 11.9%	n=3 5.1%	n=1 1.7%	n=19 33.2%
Florida	n=26 56.5%	n=6 13.0%	n=3 6.6%	n=1 2.2%	n=10 21.8%
National (ex FL)	n=20 51.3%	n=3 7.7%	n=3 7.7%	n=1 2.6%	n=12 30.8%

Florida's case study zoos offer a higher percentage of child-based and family-based programming, with a slightly lower percentage of educator programming than available within the national sample. Educational programming suitable for all audiences is more common in Florida zoos than their national counterparts. However, adult educational opportunities account for only 14.3% of the educational programs offered, compared with counterparts in the national case study zoos, who offer 33.3% (Figure 44, Table 16).

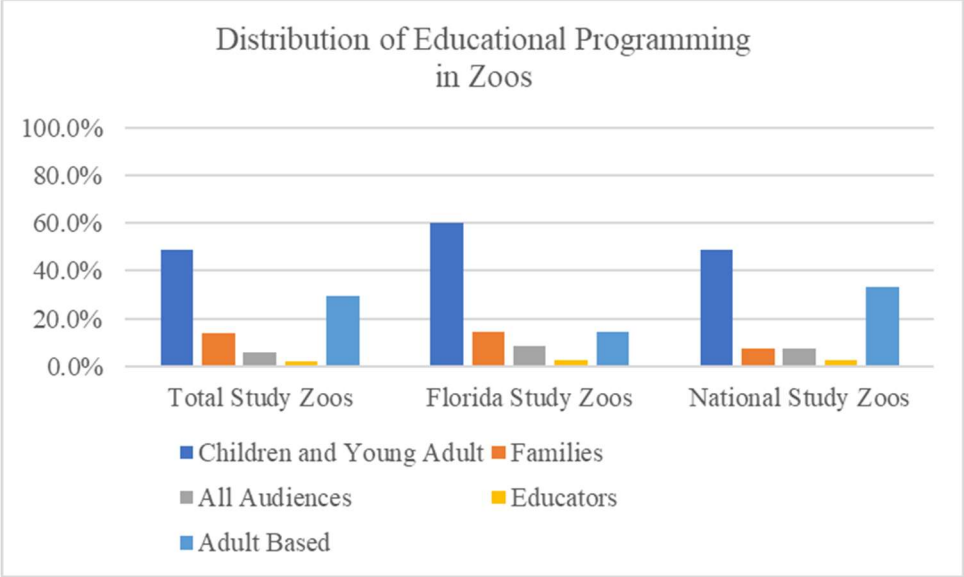

Figure 44. Distribution of Educational Programming in Zoos

Table 16. Distribution of Educational Programming in Zoos

	Children and Young Adults	Families	All Audiences	Educators	Adults
All	n=25 49.0%	n=7 13.7%	n=3 5.9%	n=1 2.0%	n=15 29.4%
Florida	n=21 60.0%	n=5 14.3%	n=3 8.6%	n=1 2.9%	n=5 14.3%
National (ex FL)	n=19 48.7%	n=3 7.7%	n=3 7.7%	n=1 2.6%	n=13 33.3%

Aquariums' educational programming distribution also differs from the distribution in the overall sample. Florida case study aquariums have a significantly lower percentage of programs for children and educators than their national counterparts. Florida aquariums offer a higher percentage of programs for families and all audiences than the national case study aquariums. Surprisingly, Florida's aquariums have a much higher instance (25%) than their national counterparts (12.5%) of adult educational programming (Figure 45, Table 17).

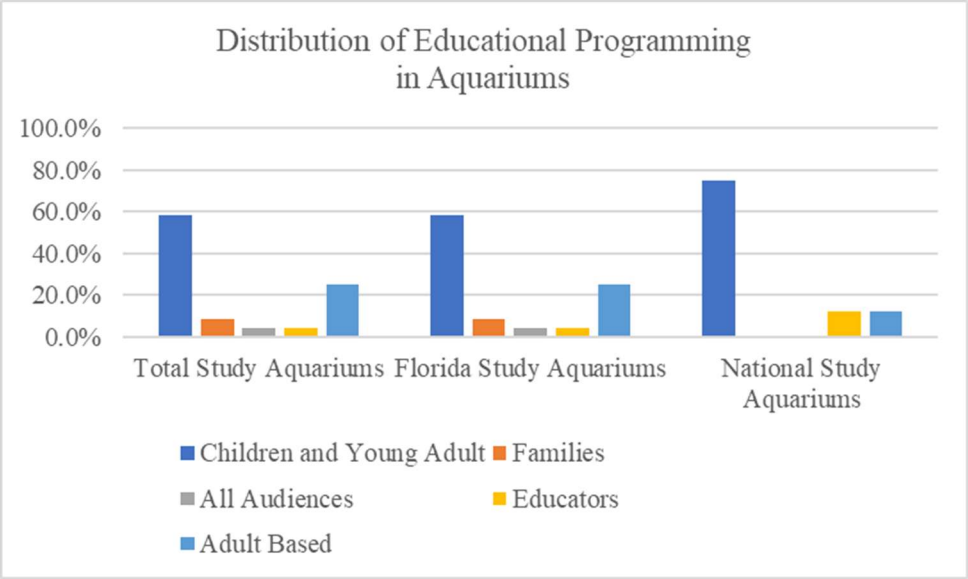

Figure 45. Distribution of Educational Programming in Aquariums

Table 17. Distribution of Educational Programming in Aquariums

	Children and Young Adults	Families	All Audiences	Educators	Adults
All	n=14 58.3%	n=2 8.3%	n=1 4.2%	n=1 4.2%	n=6 25.0%
Florida	n=14 58.3%	n=2 8.3%	n=1 4.2%	n=1 4.2%	n=6 25.0%
National (ex FL)	n=6 75.0%	n=0 0.0%	n=0 0.0%	n=1 2.5%	n=1 2.5%

Finally, it is worth noting that the age distribution of educational programming in animal-based theme parks is dramatically different from that available in zoos and aquariums, with almost two-thirds of opportunities geared toward children. Florida's case study animal-based theme parks have a higher percentage of educational program offerings for children and all audiences, albeit only slightly higher than their national based case study counterpart. The national case study animal-based theme park had a higher percentage of programs available for education but neither the Florida, nor the national, case study site has any educational offerings that target families or adults. Unfortunately, this lack of programming in both categories results in no educational

programming opportunities for adults at all, with or without their children (Figure 46, Table 18).

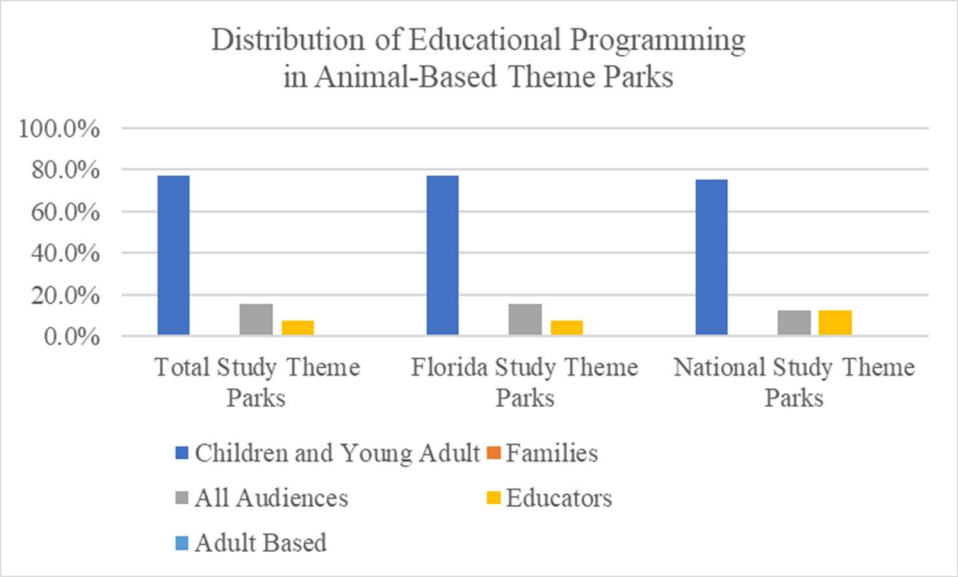

Figure 46. Distribution of Educational Programming in Animal-Based Theme Parks

Table 18. Distribution of Educational Programming in Animal-Based Theme Parks

	Children and Young Adults	Families	All Audiences	Educators	Adults
All	n=10 76.9%	n=0 0.0%	n=2 15.4%	n=1 7.7%	n=0 0.0%
Florida	n=10 76.9%	n=0 0.0%	n=2 15.4%	n=1 7.7%	n=0 0.0%
National (ex FL)	n=6 75.0%	n=0 0.0%	n=1 12.5%	n=1 12.5%	n=0 0.0%

It is important to remember that while important, educational programming opportunities are not the primary means of educating guests in zoos, aquariums, and animal-based theme parks. These educational opportunities are supplemental to park-based programming, included in admission fees, and available to all guests who choose to participate. Educational programs are discrete events require separate registrations or enrollments into the programs at a premium price. Zoos, aquariums, and animal-based theme parks in the sample offered additional events to help attract and capture audiences that may not otherwise attend educational programming.

Event-Based Programming

Educational opportunities are also conducted through event-based programming. This form of programming may be scheduled as stand-alone events or events that are supplemental to the park's admission fee. Events have a primary purpose that is not necessarily educational, but information about animals may be woven into the activity. For example, Yoga at the Zoo is an event. Guests visit the zoo, practice yoga together, and then have a meet and greet opportunity with an ambassador animal. There are educational components, but it is not the primary focus of the event.

Events hosted at the zoos, aquariums, and animal-based theme parks during the study period were captured through interviews with members of the education teams, as well as through the monitoring of facility websites and Facebook events pages. Events co-listed as educational programs were analyzed under educational programming. During the four-month study period, approximately 170 events were held across all 15 case study sites. These events spanned a vast array of topics and age groups, ranging from celebrating animal awareness days to events geared toward raising money for conservation agencies through galas and art auctions.

Children and Young Adult Events

Children and young adult event-based programming at the study sites was extremely limited. Events advertised over the four-month observation period included an Iron Kids fun run and meetup events for children and their caregivers. Additionally, an open water schooling day promoted educational opportunities and highlighted programs available to families who take part in home school activities.

Family Events

Family events comprised the largest group of events offered at the case study facilities. Events spanned a wide variety of topics, recognizing guests, holidays and animal awareness days. These events contributed to a significant portion of family-oriented opportunities at zoos, aquariums, and animal-based theme parks. Additional events, such as a concert series, also comprised a considerable portion of family-based events and offered additional activities with the intent of attracting families to the facility. Conservation and environmental awareness, as well as clean-up activities, were also prominent among family events such as "Climate Solutions Day" and beach cleanup activities that were hosted by St. Louis Zoo and Central Florida Zoo, respectively.

Adult Events

The variety of adult programming was significant, ranging from scientific discussions and current research, to beer and wine sampling during after-hours admission. For example, Mote Marine Laboratory and Aquarium hosts quarterly "Science Cafes" in which current research techniques are discussed by scientists. The scientists are typically paired with experts representing varied professions to encourage panel discussions, during which panelists discuss their roles relative to the topic. For instance, the "Shark Science Cafe" panel, hosted August 7, 2019, was comprised of shark researchers and the resident artist at the Florida Aquarium. The panel discussed the importance of sharks and how panelists' work is helping people better understand and connect with sharks. Researchers and artists worked together to build and develop a deeper understanding of the animals, explaining their role and importance in the ecosystem, and suggesting steps that individuals can take to contribute to a cleaner ocean

and habitat for these majestic animals. The event also provided an example by providing meal options made with sustainable seafood and plant-based dishes to guests (Field Notes August 7, 2019).

Conversely, other events seem geared solely toward entertainment. The Bronx Zoo, for example, hosted "Brew at the Zoo" on June 15th, during which adults over the age of 21 were able to experience the zoo (Figure 47). The event boasts an after-hours experience in which a wide variety of beer and wine, food vendors, themed trivia, carousel rides, and animal viewing opportunities that included sea lions, lemurs, grizzly bears, and more (Bronx Zoo, 2019). Many adult events hosted by zoos and aquariums were similar to that of the Bronx Zoo's "Brew at the Zoo" event.

Figure 47. "Brew at the Zoo" Advertisement, Bronx Zoo (Bronx Zoo, n.d.)

The Florida Aquarium hosted an event titled, "Sips Under the Sea," in which guests over the age of 21 were admitted to the aquarium after hours. Guests were greeted by dueling pianos in the entry way, as well as a bar to pick up a complimentary beverage. Light snacks, candy tables, and bars were set up throughout the aquarium making both

snacks and drinks available to guests. Additionally, music was played throughout the aquarium with a DJ stationed on the outdoor patio and a saxophonist in the coral reef section. Divers were on display in the main tank in the coral reef section, posing with guests for pictures. Stingray Bay was open to enhance the sensory experience with the opportunity to touch resident sting rays. Finally, keepers provided animal encounter opportunities with a penguin, an alligator, and an iguana, offering key facts about the animals. Surprisingly, the content of such talks was minimal, offering only basic facts about the animals such as habitat, diet, and age, without delving into discussion to develop understanding, skills development, or promotion of action (Field Notes July 26, 2019).

Discussion

Of the approximately 170 events across all 15 case study sites, 34 events were adult only and 28 events were adult-centric, totaling 62 adult events (36.5% of all advertised events). One hundred five of the 170 events (61.8%) were geared toward families, and the remaining three events were geared toward children (1.8%). While the variety in programming may be beneficial for attracting guests from different demographics, educators have voiced some concerns about attracting adults to events, scheduling proper times, choosing relevant topics, and reaching a wide demographic of guests. Bronx Zoo educator, Veronica Barnes contends:

> [W]e're still figuring out a little bit of what our audience wants and will come to… we are finding that the things that we think are great, don't necessarily attract... the people that we think it will. Also, there are a lot of options here in New York… so we have a lot to compete with, which is a

> challenge as well, because a lot of other facilities are able to offer some adult programming that's free, and we aren't able to do that just the way that we're structured (V. Barnes, personal communication, August 29, 2019).

The pricing for adult events can also limit citizens' ability to attend. Of the eight adult events attended, the majority of participants appeared to be of middle-class socio-economic means and ranged in age between the mid-thirties and sixties. Barnes (2019) recognizes the impact that pricing has on demographics stating:

> Overall, the like average age of our adult audiences has skewed a little higher than we thought it would… which was surprising. Surprising and not surprising when you think about it a little bit just in terms of like they're not the cheapest programs, so they're maybe in the more established adults that are able to come to something like that… that was a surprise (V. Barnes, personal communication, August 29, 2019).

While generating revenue can be a determining factor in program and event viability, ZooTampa has taken a different approach. Jennifer McLachlan, Vice President of Education explains:

> Within the education department… we went ahead and looked at everything that we offered as an education department, from girl scout [and] boy scout programs to signature encounters… to camps sleep overs. And we went through that, that document, and we really took some time to list what was mission driven and what wasn't mission driven.… And we really just wanted to make sure that we were homing in on the mission.

> Our department went from a department that was fully focused only on revenue goals, mission, okay, but revenue goals… to rightsizing ourselves into a program that has…. about 45% of what we do is not revenue, [but] enhancing guest experiences…. We invested… on the signature experience side… we had them at a high price bringing down them down to a more affordable price for people to participate (J. McLachlan, personal communication, June 7, 2019).

While this approach has limited the type of programs and events that ZooTampa offers to its guests, it has opened the door for enhanced experiences in the facility and encourages a larger demographic for guest participation. In fact, many of the case study facilities are turning to enhanced experiences and guest engagement opportunities to augment not only learning opportunities, but also connections with both the environment and the animals at the facility.

As evidenced by the data collected at case study sites, educational opportunities at zoos, aquariums, and animal-based theme parks are made available to guests through a multitude of different categories and mediums. Educational opportunities are further delineated between age-based content and knowledge-based content, with educators trained in interpretation to facilitate learning and to meet guests at their level, spanning the four levels of EE. Additionally, EE opportunities bridge a wide variety of topics in an effort to ensure that guests are able to receive and process the information. Park-based education provides ample learning opportunities to guests and is supplemented by enhanced encounters, educational programming and event-based programming. These supplemental learning opportunities are available at the facility for an additional fee and

offer guest encounters with animals and their keepers. These individual and small group settings are excellent opportunities for guests to have in-depth conversations about the threats facing animals in the wild and steps guests can take to help mitigate damage. Additionally, adult-specific educational opportunities and events are typically provided at a premium; however, some facilities graciously offer lecture series and clean-up activities free of charge.

Research Question 3: How are zoos, aquariums, and animal-based theme parks implementing educational programming to address complex environmental issues such as specific local concerns, global inequality, first world consumption, and climate change?

3a. How are they providing suggested behavioral changes (the fourth goal of EE) at the individual and collective scales to alleviate these threats?

Complex Environmental Issues

Building an environmentally literate populace, that understands and recognizes the state of environmental systems and the criticality of addressing environmental and conservation issues, is foundational to EE. Therefore, it is imperative that an EE program address these complex and systemic issues, helping citizens to understand the complexity of issues and equipping them with actions to enable change. This section examines how zoos, aquariums, and animal-based theme parks are implementing educational programming to address complex environmental issues, such as specific local concerns, global inequality, first world consumption, and climate change; and, how they are providing suggested behavioral changes (the fourth goal of EE) at the individual and collective scales to alleviate these threats (Research Question 3 and 3a).

Regional and Local Environmental/Conservation Issues

Ensuring that citizens understand local and regional conservation issues is imperative as critical decisions are made at three levels: local, regional and global (Jianping et al., 2014). Familiarity with critical environmental issues at a local level is important so that citizens are better able to correlate threats with individual and collective sustainable activities. In sampling a variety of zoos, aquariums, and animal-based theme parks across the nation, it seems natural that the case studies sites for this study would address a variety of issues unique to the local and regional environments. As with much of the programming across the case studies, there is a wide variety of approaches used to promote such awareness. All the facilities researched during this study addressed regional environmental or conservation struggles with the exception of Florida's animal-based theme parks (Figure 48, Table 19).

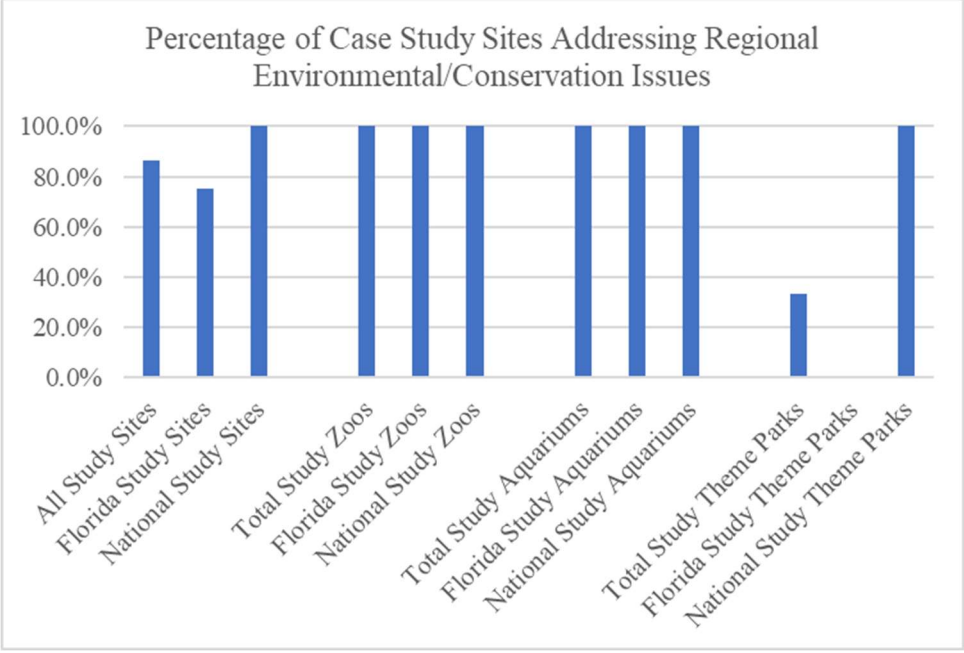

Figure 48. Percentage of Case Study Sites Addressing Regional Environmental/Conservation Issues

Table 19. Percentage of Case Study Sites Addressing Regional Environmental/Conservation Issues

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=13 86.7%	n=8 100.0%	n=4 100.0%	n=1 33.3%
Florida	n=6 75.0%	n=4 100.0%	n=2 100.0%	n=0 0.0%
National (ex FL)	n=7 100.0%	n=4 100.0%	n=2 100.0%	n=1 100.0%

Zoos and aquariums are addressing environmental and conservation issues unique to their region, providing in-depth information about animals and the ecosystems in which they reside. All case study zoos and aquariums (100%) identified at least one keystone species that is facing severe conservation issues resulting from environmental degradation. Some zoos and aquariums set aside entire sections to showcase local and regional animals. Finally, two of the four (50%) aquarium case study sites have dedicated their entire facility to educating the public about local and regional animals while showcasing the ecosystems in which they reside. While zoos and aquariums are devoting considerable effort to local and regional environmental and conservation issues, only one of the three animal-based theme parks (33.3%) is addressing regional environmental and conservation issues.

Florida Environmental/Conservation Issues

All of Florida's case study zoos and aquariums have exhibits that are dedicated to Florida specific species facing conservation threats as a direct result of complex and systemic processes. Conversely, the Florida animal-based theme park study sites, (Busch Gardens and Disney's Animal Kingdom) did not address any of Florida's environmental or conservation issues, nor did they address any environmental issues directly related to North America.

ZooTampa has dedicated nearly one-third of its facility to animals native to Florida (Figure 49). Animal exhibits boast native keystone species that are threatened in the wild due to over hunting and habitat loss, as well as common animals that are native to the region. Situated within the Florida section of the zoo is a state-of-the-art David A. Straz, Jr. Manatee Critical Care Center. The center serves as a powerful education tool, providing guests the opportunities to see, firsthand, the threats and resultant impacts that manatees face in the wild. To support this message, keepers and educators provide conservation messages directly related to the struggles of the individual animals that are permanent residents at the zoo due to debilitating injuries, and those undergoing rehabilitation for release. ZooTampa's manatee conservation messaging is not only thorough but illustrative, discussing the impacts boaters are having on the species in the region while providing a compelling visual to guests about the severity of injury caused by boat strikes to manatees (Field Notes, July 27, 2019).

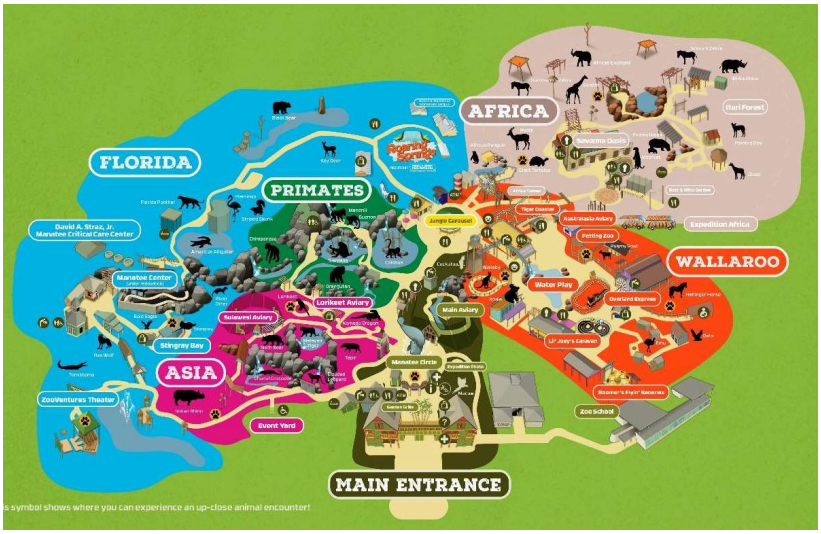

Figure 49. ZooTampa Map (ZooTampa, 2019)

Educators and docents at ZooTampa endeavor to incorporate Florida environmental issues into keeper chats for animals from different regions. For example, the Aldabra

tortoise chat incorporated Florida's gopher tortoise and highlighted the role the gopher tortoise plays in Florida's ecosystems. The chat also recommended proper skills for relocating gopher tortoises that are stranded on roadways (Field Notes, July 7, 2019).

The Florida Aquarium houses animals that are local to Florida with exhibit designs based on local and regional ecosystems, evidenced in the theme of a simulated journey taken by an upwelling of water that originates from one of Florida's springs (Figure 50). This approach allows guests to not only learn about the species on exhibit, but the ecosystems they inhabit, the adaptations unique to that environment, and/or the role they serve (Field Notes July 11, 2019).

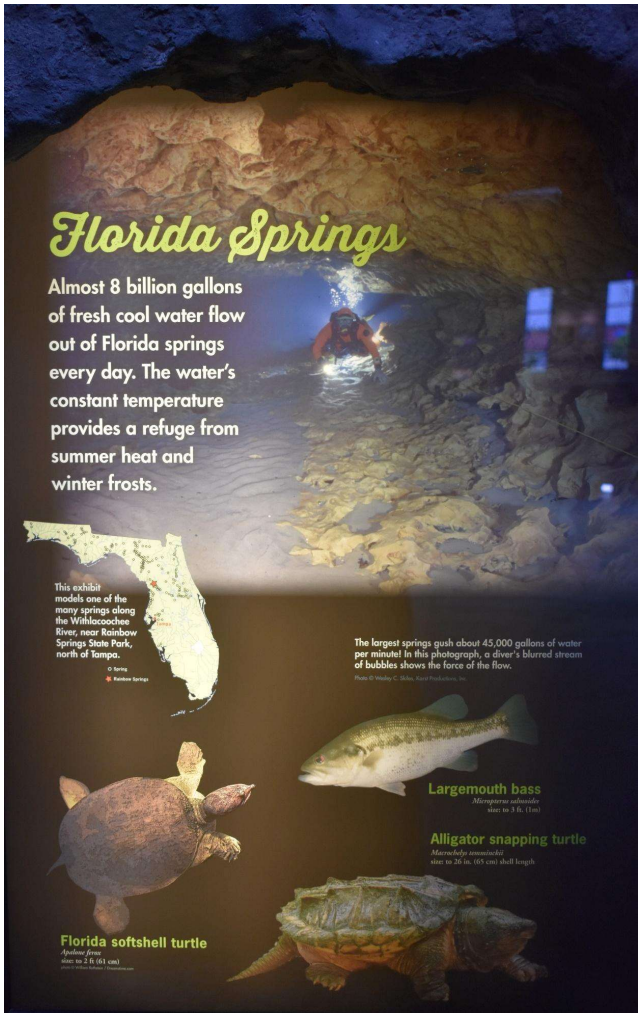

Figure 50. Florida Springs Ecosystem Signage, Florida Aquarium

With the exception of animal-based theme parks, the Florida case study sites strive to make citizens aware of environmental issues and conservation stressors that affect animal species housed in their facilities, successfully addressing the four foci of EE: conveying information, building understanding, developing skills, and promoting sustainable actions. ZooTampa's innovative process of relating the plight of international animals to the struggles of native Florida animals, helps guests to better understand and relate to environmental issues at a local, regional and global level.

National Case Study Environmental/Conservation Issues

All of the national case study sites have exhibits dedicated to local and regional species facing conservation threats as a direct result of complex and systemic processes. These exhibits strive to convey knowledge, build understanding, and enable sustainable actions to help mitigate environmental threats addressing three of the four EE goals.

A good example of local environmental and conservation issues highlighted in one of the national case study sites is the California condor exhibit at the San Diego Zoo. The exhibit has descriptive signage detailing the plight of the condor and the progression of the conservation initiative to help restore the population. In 1982, the California condors were on the verge of extinction, with only 23 condors remaining in the wild. Taking drastic measures, the Fish and Wildlife Service captured the wild condors and placed them in the care of breeding programs in the Los Angeles Zoo and the San Diego Zoo's sister facility, the San Diego Wild Animal Park (Woodbridge & Flaherty, 2012). While conservation efforts have been relatively successful, environmental threats to the species remain. Supplemental signage at the exhibit identifies current environmental threats such as power lines and litter, highlighting the aversion training with California

condors so that they can more successfully adapt to urban environments (Figure 51). A conservation cart placed by the exhibit provide personalized discussions with guests about the condor, offering biofacts such as condor feathers and eggs to help facilitate discussions with guests (Figure 52). Lead-based threats from ammunition is a major discussion point, with recommendations that guests switch from lead-based shot when hunting to help alleviate some environmental stressors on the birds (Field Notes, June 23, 2019).

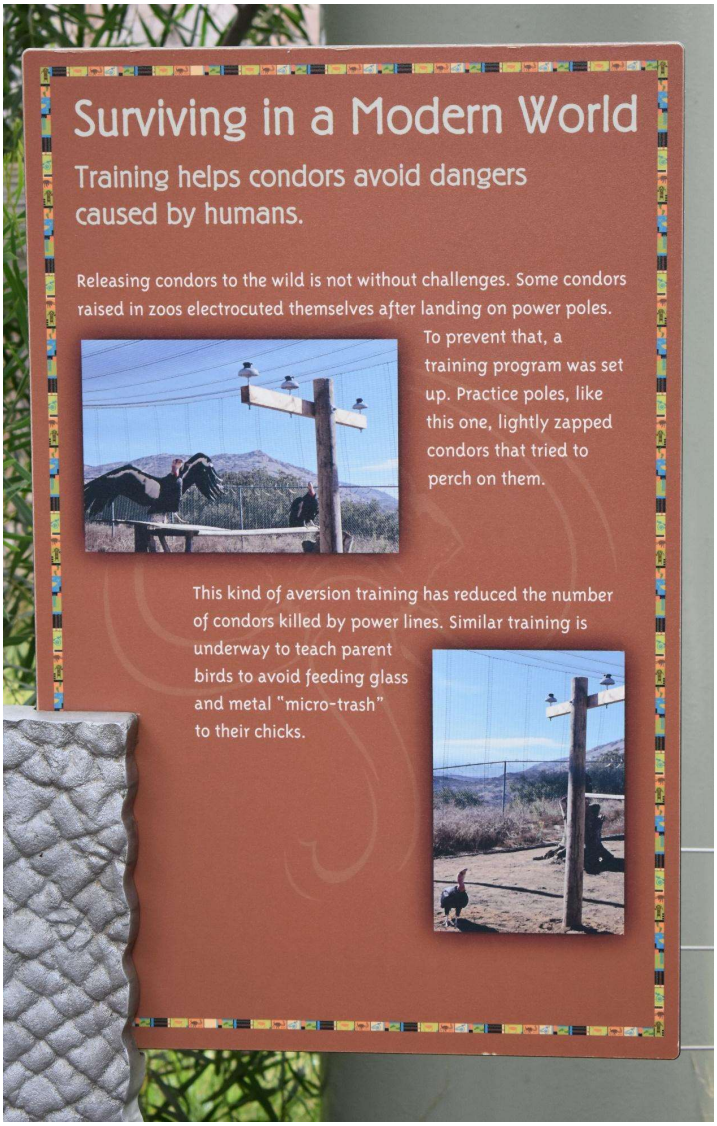

Figure 51. Supplemental Signage Highlighting Power Line Aversion Training for the California Condor, San Diego Zoo

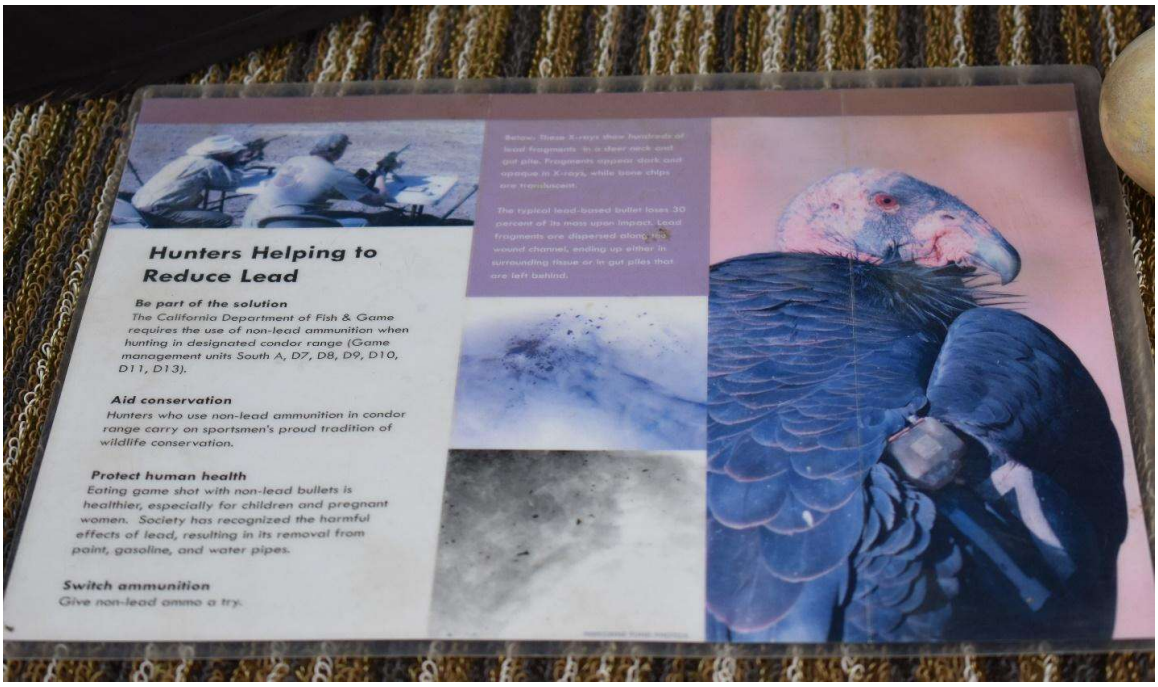

Figure 52. California Condor Conservation Station Sustainable Action Messaging, San Diego Zoo

Another example of strong local emphasis was observed at the Bronx Zoo. The Bronx Zoo highlights their local ecosystem and the animals that rely upon it, both inside and outside of the zoo, stressing the importance of healthy ecosystems in a heavily developed area. Signage outside the zoo reads “A part of the natural world flowing through a major urban community, the Bronx River supports a busy community of its own,” and promotes the zoo’s Mitsubishi Riverwalk, a walking path along the River (Figure 53). Additional signage outside the park highlights the change in water quality resulting from an environmental initiative through the return of the beaver, an animal that stopped inhabiting the region due to poor water quality (Figure 54). Signage inside the zoo promotes the importance of the River to the local community of animals and steps that guests can take to help to protect local wildlife, such as proper disposal of garbage (Figure 55) (Field Notes, August 31, 2019).

Figure 53. Bronx River Signage Located Outside the Facility, Bronx Zoo

Figure 54. Bronx River Signage Located Outside the Facility, Bronx Zoo

Figure 55. Bronx River Signage Located Inside the Facility, Bronx Zoo

SeaWorld San Diego also has an excellent local exhibit that addresses environmental and human-induced issues resulting in the decline of sea otter populations. The large exhibit is surrounded by signage introducing the individual sea otters on display and presentation times. To the right of the display is a sign titled, "A Limited Range," illustrating the historic and present-day distribution of sea otters in the Pacific Ocean. Supportive text on the sign expounds upon the decline of sea otters in the region explaining, "[S]ea otter's range was diminished by fur hunting to just a few scattered populations." The sign continues to expound on the ranges for the different sea otters, then summarizes by stating: "The Alaska and California sea otter species are listed as 'threatened.' Increased predation by killer whales in Alaska, and deaths from toxins and parasites in California waters, have prevented these populations from thriving" (Figure 56). The back wall of the exhibit is lined with interactive signs that convey information to guests about the otters' fur, grooming habits, and diet. A sign discussing fur asks visitors to consider how many people it would take together to have as many hairs as otters have on one square inch of their bodies, and to select their answers through a series of interactive buttons. Similarly, a sign on otters' diet asks guests to consider who eats more, an otter, a human, or a shark with an interactive answering system. The grooming sign has a touch opportunity for guests to feel otter fur.

Supplementing the sea otter exhibit is a short tape (on a loop) that builds upon the messages displayed on exhibit signage. The tape discusses key facts, habitats, and diets of sea otters, then delves into how the fur trade has impacted sea otter populations. Guests are told about legislation that was enacted to help protect sea otters, but continues by explaining that despite conservation efforts, sea otter populations remain in peril due to

environmental threats such as oil, pollution, fishing net entanglements, boating accidents, contamination of food sources, parasites, disease, predators, starvation, and infectious diseases from cat feces washing down storm drains. The tape continues by outlining conservation actions that SeaWorld is taking and details actions guests can take, such as contributing to organizations, contacting their legislators, recycling, reducing contaminants, reducing hazardous waste, and properly disposing of cat litter. (Field Notes, June 20, 2019).

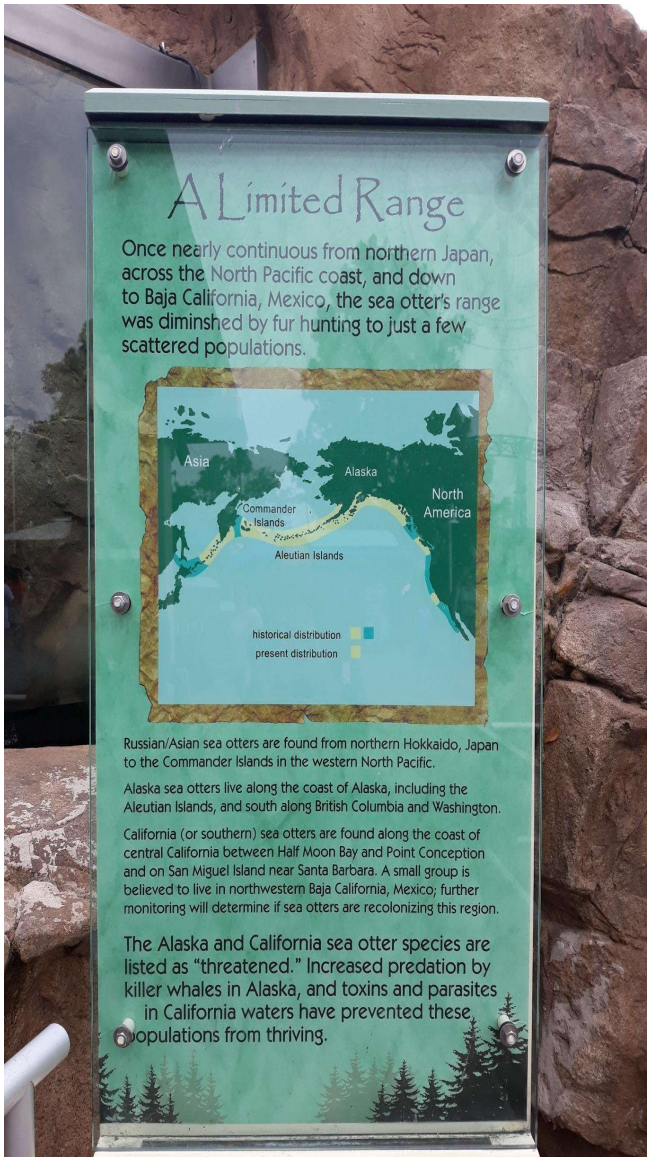

Figure 56. Supplemental Signage Highlighting Cases in Range of the Sea Otter, SeaWorld San Diego

The national case study sites have implemented strong local and regional campaigns to promote awareness and understanding of local and regional environmental issues to facilitate citizens' understanding of the resultant impact on animals and ecosystems. A number of zoos and aquariums have also incorporated Florida specific environmental and conservation issues into exhibits.

Florida Environmental/Conservation Issues Highlighted Throughout the Country

Two of the four national case study zoos (50%), and both of the national case study aquariums (100%), address conservation and environmental struggles that are unique to Florida (Figure 57, Table 20). Florida is the richest biological region in the North American Coastal Plain and is a globally recognized biodiversity hotspot that spans from Texas to Florida and along the East Coast (Kotala, 2016). Biodiversity hotspot classifications are based on richness of species diversity, rarity, the conservation of species, and the percentage of habitat loss (Reid, 1998). The minimum criteria to be classified as a biodiversity hotspot are over 1,500 endemic vascular plants and over 70% habitat loss (Noss, 2006). Indeed, Florida's ecosystems are also the most threatened, due to high rates of population growth directly impacting habitat loss (Kotala, 2016). Further compounding the already threatened ecosystems, Florida is also considered "ground zero" for climate change, with over 1,350 miles of vulnerable coastline, permeable bedrock, and little topographic relief (Muro et al., 2019; Melillo et al. 2014; Meyers & Ewell, 1990). The representations of Florida's unique animals, ecosystems, and threats throughout national sites is likely a result of the biodiversity and vulnerability of the region.

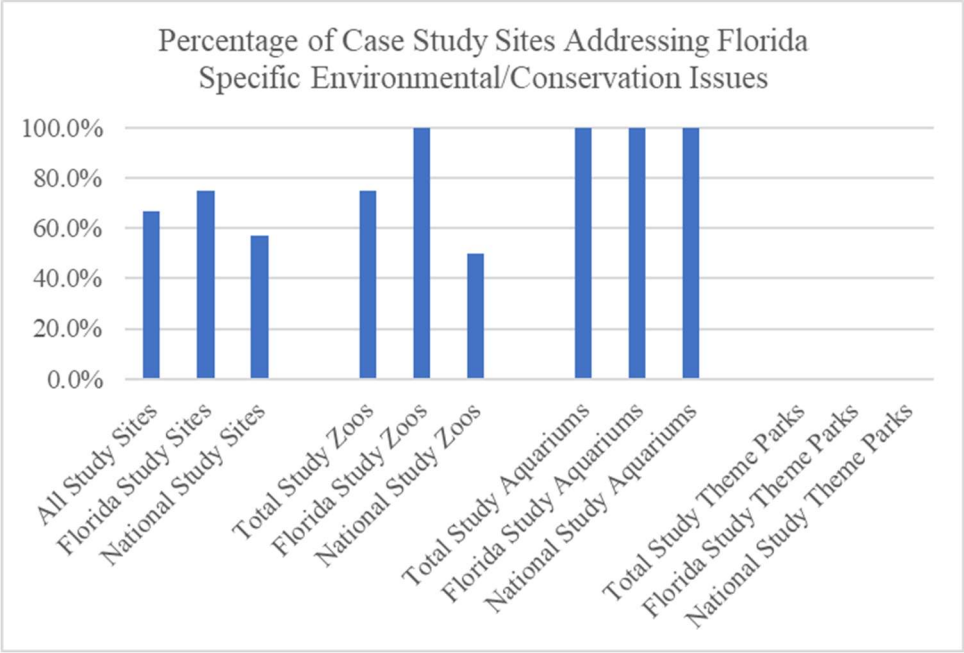

Figure 57. Percentage of Case Study Sites Addressing Florida Specific Environmental/Conservation Issues

Table 20. Percentage of Case Study Sites Addressing Florida Specific Environmental/Conservation Issues

	All	Zoos	Aquariums	Animal-Based Theme Parks
All	n=10 66.7%	n=6 75.0%	n=4 100.0%	n=0 0.0%
Florida	n=6 75.0%	n=4 100.0%	n=2 100.0%	n=0 0.0%
National (ex FL)	n=4 57.1%	n=2 50.0%	n=2 100.0%	n=0 0.0%

Cincinnati Zoo has a bioregion in their facility dedicated to Florida and named, “Manatee Springs” (Figure 58). “Manatee Springs” is the exhibit side of the Manatee Rescue and Rehabilitation facility, one of two locations outside of Florida where visitors can see manatee. The Cincinnati Zoo, together with the U.S. Fish and Wildlife Service (USFWS) Manatee Rescue & Rehabilitation Partnership, is working to educate citizens about the charismatic species and the human-caused threats they face in the wild (Cincinnati Zoo, 2020). Guests enter “Manatee Springs” through an aviary that houses birds, reptiles, and fish that are unique to, or reside in Florida, such as the indigo banting, the American crocodile, the green anole, and the eastern mosquito fish. Unique Florida habitats, such as

coastal mangroves, are also discussed, while native Florida plants provide a constructed nature for the animals on display. Once through the open-air exhibit, guests proceed through a set of double doors and are greeted by a display dedicated to the Everglades, named “River of Grass.” Housed inside is a large manatee exhibit offering guests an expansive viewing area of the manatees, accompanied by information and conservation signage, videos, and interactive displays. Educators and docents are on site to discuss the threats to manatee, and outlines steps that individuals can take in Ohio to help these creatures. The interactive display includes quizzes designed to help guests understand how choices made both in Ohio, and while vacationing in Florida, can impact manatees.

Figure 58. Manatee Springs (Florida Bioregion) Exhibit Signage, Cincinnati Zoo

Significantly, this exhibit also has the only signage observed on display for all the 15 case study sites that directly addresses population growth and the impact it has on habitats in the U.S. stating, “Don’t make the mistake of thinking that human population growth only effects wildlife in developing countries” (Figure 59) (Field Notes, Aug 18, 2019).

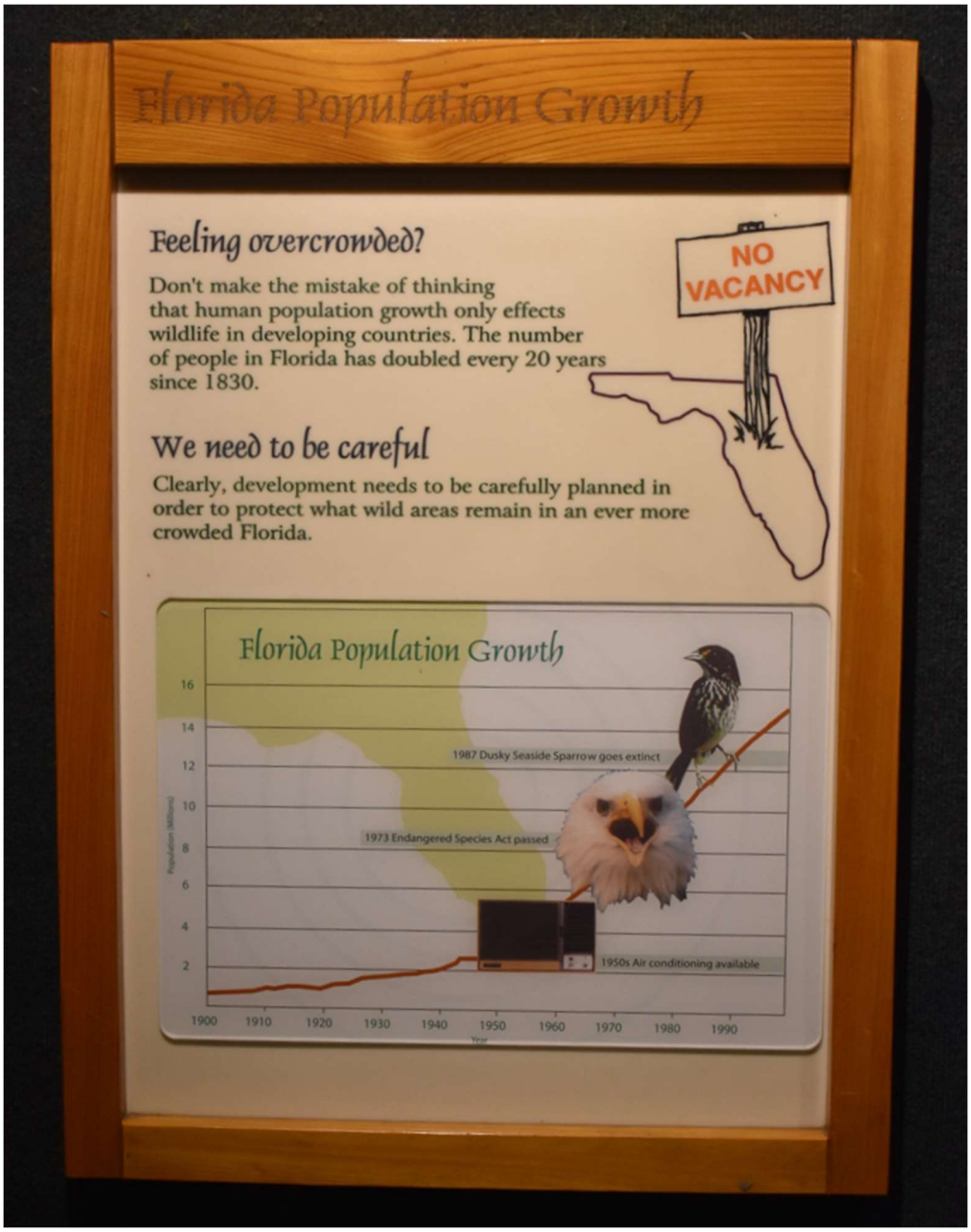

Figure 59. Florida Population Growth Accompanying Manatee Springs Exhibit, Cincinnati Zoo

Another example of the uniqueness of Florida is highlighted in the Audubon Aquarium of the Americas' "Reefs of the World" display. This display covers a large wall and is comprised of five monitors with videos that highlight the major reefs of the world, including the Florida Reef Tract. Information is provided on the location and the formation history of each reef (Figure 60). Corals that comprise the Florida Reef Tract

are identified along with their threat status. Natural threats to the reef are described, providing insight into some of the challenges that these corals face: “Nature can wreak havoc on coral reefs through cold fronts, hurricanes, disease, and rising sea levels and surface temperatures. In the Florida Reef and others around the world, balancing human use with conservation is an ongoing, critical challenge.” Conservation efforts for coral growth in nurseries and labs are identified in the streaming video; however, no personal or collective actions are suggested to guests (Field Notes, September 6, 2019).

Figure 60. Reefs of the World Exhibit, Audubon Aquarium of the Americas

Given the fragility of the environment in Florida, it is reassuring to see the amount of EE that targets the State in zoos and aquariums around the nation. Exhibits evaluated during site visits hit squarely on three of the four EE goals: convey information, build understanding, and enable sustainable actions. These efforts ensure that guests understand the importance of both the animals and ecosystems in Florida, and that the plights they face result from drastic human-induced environmental changes.

Global Inequality and First World Consumption

Complex and systemic issues are large-scale global dilemmas, and are interlaced with multiple components such environmental, social, and economic components. These complex and systemic issues are typically entrenched conflicts over access to, and control of, natural resources. The interconnected nature of these issues and the potential impacts of changes within the system can lead to unintended negative consequences. The Global Risk Report (2018) contends:

> Humanity has become remarkably adept at understanding how to mitigate countless conventional risks… [b]ut we are much less competent when it comes to dealing with complex risks in systems characterized by feedback loops, tipping points and opaque cause-and-effect relationships that can make intervention problematic (World Economic Forum, 2018 p. 15).

It is imperative that EE programs address these multi-scalar and multi-system issues to help citizens understand the complex, entangled causes of environmental problems, and equip them with actions that enable real change. First world consumption continues to perpetuate resource transfers in the form of raw materials, cash crops, and resource exploitation from poor, less developed countries (Næss, 2004). Achim Steiner Executive Director of UNEP reports:

> If current trends continue and the world fails to enact solutions that improve current patterns of production and consumption, if we fail to use natural resources sustainably, then the state of the world's environment will continue to decline. It is essential that we understand the pace of environmental change that is upon us and that we start to work with nature

> instead of against it to tackle the array of environmental threats that face us (”Rate of Environmental Damage Increasing,” 2016).

Second only to China, the U.S. exhibits a voracious demand for energy resources, causing an increase in demand for natural resources globally (Muradian et al., 2012; The Shift Project, n.d.). Conde (2016) reports that speculative trading, technological advances, and depletion of natural resources are sending expeditions further into ecologically or socially vulnerable areas. A current example is the push for the reopening of U.S. federal waters for deep sea oil and gas drilling. This encroachment into ecosystems results in loss of lands and livelihood for both animals and non-human others, perpetuating global inequality. However, wide scale complex and systemic issues, such as global inequality and first world consumption, are not being addressed in zoos, aquariums, or animal-based theme parks. These facilities are, however, addressing environmental threats which ultimately result from intertwined global economic and political processes, such as deforestation, the bushmeat crisis, and palm oil.

Deforestation is defined as the cutting, clearing, and removal of forests or related ecosystems into lands such as pasture, cropland, or plantations (Kricher, 1997). Deforestation has primarily been driven by agricultural expansion. Between the 1960s and 1980s, deforestation resulted from small-scale farmers clearing land. As urbanization and globalization spread during the 1980s, demand for resources increased, resulting in the expansion of logging, ranches, and plantations, which led to higher rates of deforestation (Rudel et al., 2009). Long-term, direct impacts of deforestation include habitat loss, biodiversity loss, soil contamination, erosion, water pollution, disrupted water cycles, and air pollution. The indirect impacts of logging can be just as damaging

as the direct impacts, such as the creation of new roads that are made to provide ease of entry to the forest, supporting the development of new settlements and perpetuating the bushmeat trade (Thibault & Blaney, 2003).

The Bronx Zoo addresses deforestation in multiple exhibits dedicated to increasing guests' understanding of the impacts and intricacies of deforestation. One of these exhibits describes not only the impacts deforestation has on rainforests, but the ripple effect of logging (Figure 61). Signage for the exhibit reads:

> Loggers create roads to gain access to the inner forest. Every year more than 37,000 square miles of African rainforests, an area 6 times the size of Connecticut, is opened by logging. Commercial hunters follow these roads deep into the forest. Gorillas are killed for meat; one animal brings $40 when sold to a restaurant. In Central Africa, people eat over 1 million tons of bushmeat each year from wild animals. Farmers follow roads in search of new forests to cut and burn for farming. Most tropical soils cannot support long-term farming, so farmers need to constantly find new land to farm. Having wiped out West African forests, commercial logging has moved into Central Africa. In the last ten years alone 25 million acres of Central African rain forests were logged and their wildlife lost. Africa's population is the fastest growing in the world. By the year 2050, the population of Central Africa is expected to double by 198 million (Field Notes, August 31, 2019).

Figure 61. Deforestation Signage, Bronx Zoo

While this display discusses the ripple effects of logging, it fails to mention the major drivers for logging and the bushmeat trade, instead placing the blame for the perpetuation of the bushmeat trade on African population growth and poor farmers. In reality, increases in urbanization and global demand by first world nations have led to higher demands for resources, driving the continuous expansion of logging into vulnerable ecosystems and communities. Commercial hunters are indeed following the roads that are created through logging to meet an increasing demand for bushmeat, a status symbol among the wealthy. The signage also fails to mention the demand in the U.S. for bushmeat, with thousands of pounds being smuggled into the country illegally (U.S. Fish and Wildlife Service International Affairs, 2020). Farmers also move in behind the clearcutting of forests; however, as previously discussed, these are not typically family farms, but vast enterprises establishing plantations for commercial crops. Finally,

Awumbila (2017) contends that while population rates are indeed projected to increase in Africa, nearly two-thirds of that population growth is expected to occur in cities as families living in rural areas migrate to the city searching for economic opportunities and to escape environmental degradation. This exhibit falls short of addressing the complexities involved in deforestation an instead places blame on poor farmers struggling to survive amidst the environmental issues generated through consumption, resource demands, and inequality.

Another example of complex and systemic issues being addressed by zoos, aquariums, and animal-based theme parks was identified in Busch Gardens Tampa Bay. Busch Gardens' "Myombe Reserve" includes a supplemental display in their lowland gorilla exhibit that addresses deforestation and the resultant impacts on local animals. Within the same exhibit, signage explains the bushmeat crisis and expounds upon the drivers, issues, and the complexity of the problem. Signage reads:

> At one time, bushmeat hunting was sustainable and used to feed just local families. As urban development and logging proceeds deeper into untouched forests, hunting in these areas has become unsustainable in that the amount taken from the forest is far greater than the rate it can be replenished (Field Notes, June 30, 2019).

Additional signage in the exhibit encourages guests to "become part of the solution," and recommends responsible consumer choices by explaining how guests can be helpful in addressing environmental issues. For example, one of the three identified consumer choices reads; "[r]ecycling unused cell phones and other electronic devices helps reduce mining for coltan in the gorillas' home range. Coltan is an essential metallic ore used in

electronic circuit boards" (Field Notes, June 30, 2019). Thus, a rare connection is made between North American consumerism and habitat destruction for the patrons at this facility.

While these examples are only a few of the exhibits throughout the case study sites, no sample facility addresses first world consumption as a primary driver of local, national or global environmental problems. Although it is true global inequality, and first world consumption creates exorbitant demands on already strained resources, the complex economic and political processes that drive inequality and consumption patterns may be difficult for zoos, aquariums, and animal-based theme parks to address using signage and 10-minute keeper chats. Entrenched economic and political processes may be too complex to address within the confines of the resources available to zoos, aquariums, and animal-based theme parks. While they are not fully engaging the public in overarching issues, they are addressing smaller components, helping to develop and broaden guests' understanding of the threats and some of the nuances of the issues.

Finally, guests that frequent zoos, aquariums, and animal-based theme parks are overwhelmingly attending these facilities to relax, spend time with family, or are in search of entertainment. Messages riddled with complex and systemic issues on a global scale are not inherently fun. Addressing these difficult and hard to hear issues causes one to look carefully at their role in the destruction of the environment to meet personal and collective demands. We are all complicit.

Zoos, aquariums, and animal-based theme parks must walk a tightrope, between their responsibilities to educate and motivate citizens to engage in sustainable behaviors, without running the risk of alienating the public coming through the gates. Educators

recognize the importance of balance. Jessica Peranteau, OdySea Aquarium's Director of Animal Training and Education, explains how her educators navigate some of these tough issues:

> We want to create fun memories and experiences while really driving change.... We don't want to preach, we want to engage, so we want to bring people into our world and why it's important and really just be real with them. It's also important for us to empower people on how they can make a difference…. I think there was actually a study done… zoos and aquariums of late were creating a feeling of defeat in people because it was very sad. It was like going through… a very sad museum, like the Titanic or a Holocaust museum… [S]o we bring awareness and then we drive change. So, here's what you can do to make a difference by just using a reusable water bottle or a reusable shopping bag. Here's what you're doing. You are making an impact. So, making sure we give back to that bank that we take out emotionally a little bit (J. Peranteau, personal communication, June 25, 2019).

Unfortunately, this tightrope between fun and education diminishes the magnitude of the environmental issues we, as a society, are facing. Furthermore, oversimplifying issues and solutions, failing to hold individuals accountable for their role in degradation, and placing blame on others, further perpetuates environmentalism of the poor. Until expanding economies address exorbitant consumption rates, vulnerable communities and ecosystems will continue to struggle against globalization and loss of their way of life. Through better understanding of these complex and systemic issues, communities can

band together with NGOs (non-governmental organizations) and interested parties willing to join the fight to prevent the loss of lands and livelihood at the hands of consumer lifestyles.

Addressing Climate Change

Climate change and ocean acidification are projected to exceed habitat loss as the greatest threats to biodiversity in the next few decades (Leadley et al., 2010). Increasing environmental literacy and promoting the adoption of behavior changes may help to slow the rate of climate change (Dietz et al., 2009). Site visits during this case study revealed that zoos, aquariums, and animal-based theme parks are addressing climate change through varying degrees across the country.

The St. Louis Zoo addresses climate change numerous times throughout their facility. Their most notable exhibit addressing climate change is the polar bear exhibit, "Polar Bear Point," which showcases Kali, their resident polar bear. A portion of the expansive, state-of-the-art exhibit is viewable from a walking path. Limited signage accompanying the outdoor portion of the exhibit; however, a video cycles above the enclosure. The video begins by describing how Kali came to reside at the St. Louis zoo, and then transitions seamlessly into the effects of climate change on polar bears:

> Kali is our resident polar bear here at the Saint Louis Zoo. As a young cub, Kali was rescued from the wild by a hunter after his mom had died. It is important to note, though, that hunting is not the major impact for conservation of polar bears in the wild. Climate change is the major focus impacting polar bear conservation and the species in the wild (Field Notes, August 13, 2019).

The video continues with sharing key facts about polar bears and how the exhibit is maintained to ensure that the needs of the polar bear are met. The video concludes with images of the Arctic, where humans and polar bears coexist interspersed, including statements such as “Sea ice in these regions is melting due to climate change,” “Climate change is making life difficult for polar bears for a number of reasons,” and “Less ice means polar bears don’t have much time to hunt.” Inside the exhibit, the air is cool and images of the Arctic are placed around the room, rather than traditional signage. There is a large viewing window through which guests can watch the polar bear swim, and two large monitors stream a video titled, “Voices from the Arctic.” This is a three-segment video in which the Siberian Yup’ik people discuss encounters with polar bears, how changes in sea ice are impacting their culture and polar bears, and how modernization is affecting both humans and polar bears.

While the exhibit and accompanying video have a strong impact on building knowledge and understanding with viewers, no actions are suggested on how guests can help address the looming impacts of climate change. Viewers are, instead, referred to the St. Louis Zoo website for conservation and action tips (Field Notes, August 13, 2019).

Another strong climate change exhibit, albeit notably smaller, is located at the St. Louis Zoo Insectarium, supplementing the coral exhibit. The coral exhibit stands in the middle room with signage above a tank showcasing a variety of corals. There is a message describing what coral reefs are, the value of reefs, and why coral reefs are endangered. Next to the exhibit is a supplemental sign titled, “10 Easy Steps To Help Protect Coral Reefs.” These steps outline simple tasks that individuals can perform, from conserving water and reducing pollutants, to collective actions, such as volunteering for a

stream clean up and contacting government representatives to "[D]emand they take action to protect coral reefs by stopping sewage pollution of our oceans, expanding marine protected areas and taking steps to address climate change." For guests that are not as open to climate change discussions, messaging that is less direct is included on a sign promoting the planting of trees claiming that, "Trees absorb carbon dioxide. Less carbon dioxide in the atmosphere means less warming and less warming keeps ocean temperatures cool and stable." The sign is particularly effective in that it addresses climate change on different levels, suggesting individual and collective actions that guests can take to help protect reefs; it also describes the benefits of each action. Signage on the back of the display details additional steps guests can take to help save coral reefs, explaining how small changes in Missouri, such as eating local grown foods, can help reduce the effect of climate change on animals through the limitation of carbon emissions. The sign goes on to describe how carbon emissions and carbon dioxide is absorbed in ocean water, perpetuating acidification and the resulting impact on sea animals (Figure 62) (Field Notes August 12, 2019).

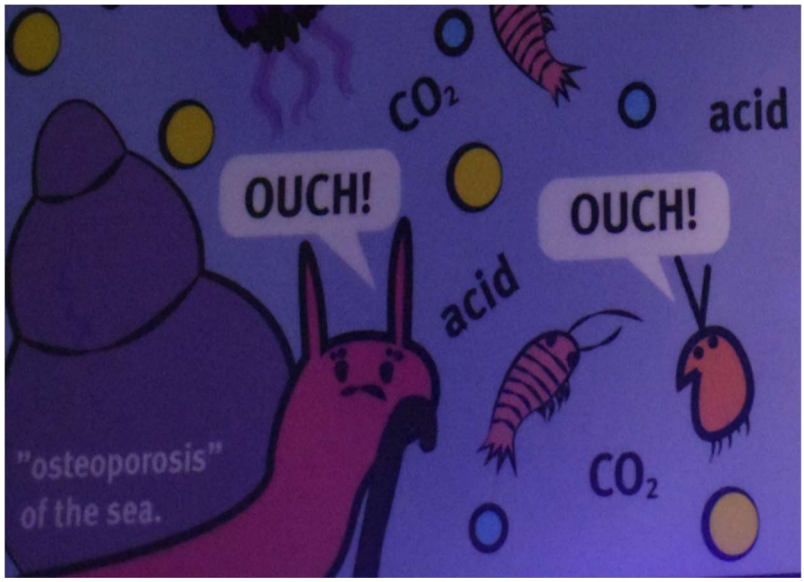

Figure 62. Climate Change Analogy Signage, St. Louis Zoo

While some zoos, aquariums, and animal-based theme parks use exhibits and signage to directly address climate change, other facilities struggle with incorporating systemic environmental issues into their exhibits. ZooTampa had previously integrated climate change messaging into their talking points with guests and signage throughout their facility; however, research conducted in partnership with Eckerd College indicated that the public was not open to climate change messaging and such messaging was creating a negative reaction in guests. As a result, ZooTampa has limited the level of climate change discussions to the effects that climate change has on animals (Field Notes, June 7, 2019).

Other facilities also struggle with guest receptiveness to climate change and have turned to analogies, illustrations, and discussions that describe the impacts of climate change without using the words "climate change." For instance, Audubon Aquarium of the Americas does not mention climate change directly but instead refers to warming ocean temperatures, coral bleaching events, ocean acidification, and rising sea levels. Stephanie Smith, Audubon's Administrative Coordinator for the education team explains, "We're still kind of like working our messaging on climate change…. We don't have official messaging on that because it's still like a hot topic, especially down here" (S. Smith, personal communication, September 6, 2019).

The San Diego Zoo also uses illustrative messaging to address the impacts of climate change. Their polar bear exhibit, "Polar Bear Plunge," addresses climate change in a subtle manner. It uses analogies and illustrations to build understanding among guests without using the words "climate change." Guests are encouraged to walk on the "ice" floes painted on the walking path. Floes are initially painted close together to allow

for guests to step from floe to floe easily; however, as guests journey further into the exhibit, the painted markers become further spaced until it is impossible to jump between them (Figure 63) (Field Notes, June 22, 2019). This innovative interactive approach to helping guests build an understanding of the impact climate change is having in the Arctic is an excellent example of addressing climate change and its impacts without the politically-charged wording, possibly reaching a different demographic of guests who may not be as open to climate change messaging.

Figure 63. Climate Change Illustration Signage, San Diego Zoo

SeaWorld San Diego addresses climate change in their "Arctic Wild" exhibit, stressing the impact of carbon emissions on sea ice. Prior to entering the exhibit, guests are routed past a conservation fund donation point that directly addresses climate change reading

"Throughout the world, threats such as habitat destruction, overfishing, and climate change challenge wildlife. Species such as polar bears, beluga whales, and walruses face extinction without changes from us." Nearby signage uses an allegory to explain the beluga whales' reliance on sea ice for hunting and refuge:

> [O]ur changing climate is causing a reduction in sea ices. As we burn fossil fuels–such as gas to drive cars–more carbon dioxide (CO_2) than normal is released into Earth's atmosphere. This build-up of CO_2 surrounds the Earth like a heat trapping blanket, leading to warmer air temperatures, warmer oceans, and less sea ice (Field Notes, June 20, 2019).

Another sign highlights the importance of sea ice to walruses, providing a place to rest while hunting and a place to raise calves, and the stresses diminishing sea ice is having on walruses and their calves. The sign reads "When sea ice is farther from food resources, walrus mothers have difficulty finding enough food for themselves and their calves." These three signs suggest actions for guests to consider. The conservation station suggests providing change for change, and the beluga whale and the walrus signs suggest changes in driving habits, such as reducing how much we drive, limiting idling, and biking to work or school.

Once inside the "Arctic Wild" exhibit, guests may choose to experience a simulated jet helicopter ride over the Arctic or continue further into the exhibit to see the research station and the beluga whale, polar bear, walrus, and sea otter exhibits. Interactive exhibits are placed throughout the exhibit; guests may walk through a polar bear den, explore a research station, and touch an ice wall. The walrus exhibit has signage

reiterating the impact that the reduction of ice flows is having on walruses and reads: “Some areas of the sea have experienced extreme reductions in ice flows which most scientists link to climate change.” The sign also promotes the reduction of carbon emissions (Field Notes, June 20, 2019).

Using multiple approaches, from analogies and illustrations to direct messaging, zoos, aquariums, and animal-based theme parks may overcome a lack of fundamental knowledge and increase understanding of climate change among their guests, a foundational challenge identified in current research (Johns & Pontes 2019; Geiger et al., 2017; Swim et al. 2014). The varied approach to messaging, particularly the use of analogies and illustrations, allows zoos, aquariums, and animal-based theme parks to overcome barriers to learning about climate change in guests who are less receptive, facilitating conversations about the impact that climate change is having on animals, ecosystems, and the planet. While those facilities engaging in climate change discussions should be lauded for the role they are playing in building an environmentally and climate literate populace, their programs could be enhanced by strong messaging to promote the power of collective actions that guests can take to facilitate large scale change, in addition to individual changes. Unfortunately, changes required to address complex and systemic issues such as climate change cannot be brought about simply by recycling or planting a tree. Collective actions, however, can drive large scale change, providing an infrastructure for citizens to engage in pro-environmental behaviors to address this complex and systemic problem.

Perplexing Messaging: Inconsistencies and Conundrums

Humans are impacting the physical environment through deforestation, development, consumption, and the burning of fossil fuels resulting in threats to other species. As previously discussed, large-scale dilemmas are embroiled and intertwined with environmental, social, and economic processes. Ensuring that the public has a firm understanding of the environmental impact of human systems is vital for enabling large-scale sustainable change; however, some zoos, aquariums, and animal-based theme parks struggle with the education of guests about human-based systems and their threat to other species.

Oil Rigs?

Audubon Aquarium of the Americas' main exhibit, "Gulf of Mexico," is sponsored by Chevron, BP, ExxonMobil and Shell. The 400,000-gallon exhibit houses sharks, sea turtles, Queensland grouper, tarpon, various schooling fish, and an oil rig (Figure 64) (Field Notes, September 6, 2019). The exhibit is used as an example of the benefits of marine debris in the Gulf of Mexico and is meant to illustrate the ecological function that oil rigs serve. Stephanie Smith explains:

> The legs of these oil rigs, once they've been there for a long period of time, it almost turns into a new environment. So, when a rig is decommissioned, rather than ripping the entire thing out and essentially destroying that new ecosystem, they'll leave it in… sometimes they'll keep it intact, they'll just take the top portion off. Other times they'll cut it in half and move it somewhere else or they'll knock it over…. You can see the difference and from open water versus the rig portion… a lot of

smaller animals are going to hang out by the rigs because it's safer. You know, maybe some bits and pieces like a pipe or whatever that has fallen off on below is a good hiding spot for a fish…. So, there's a lot of that, a lot of those out in the Gulf of Mexico. So that is a big talking point (S. Smith, personal communication, September 6, 2019).

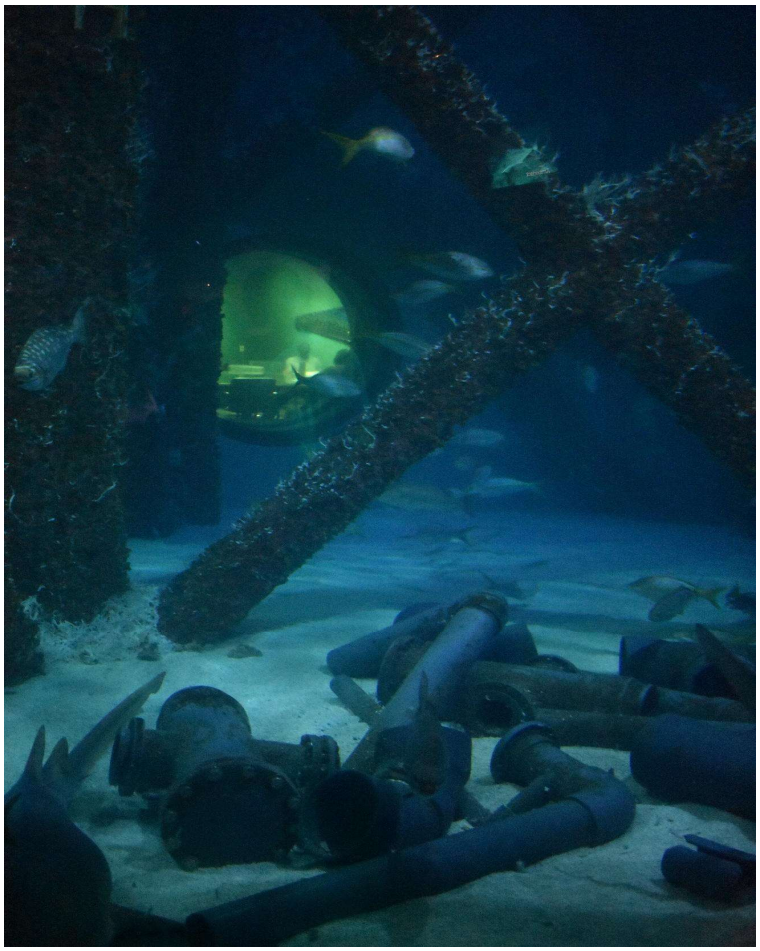

Figure 64. Gulf of Mexico Exhibit, Audubon Aquarium of the Americas

Indeed, research indicates that oil rigs support higher biomass growth (Claisse et al., 2014); however, a study conducted the same year contends that the nutritional condition of fish residing in natural reefs is higher than those feeding in artificial reefs provided by oil and gas (Schwartzkopf, 2014). Further compounding the complexity of this artificial habitat is the debris and contaminants accumulating on the seafloor

surrounding the rigs (Breuer et al., 2004). Given the history of environmental degradation resulting from oil spills, most recently Deep Water Horizon, it is surprising that Audubon Aquarium of the Americas has allowed the influence of funding to permeate the aquarium, sacrificing not only their political neutrality, but becoming an apologist for the oil industry.

Ecotourism

Wildlife tourism, while expected to double over the next 50 years, is not ecologically harmless. With the significant increase in individuals traveling to observe animals in their native habitats, the importance of ecotourism is becoming essential to environments and its inhabitants. Ecotourism differs from traditional wildlife tourism in the impact it has on resident ecosystems. Traditional wildlife tourism does not consider the short-term or long-term impact that the influx of tourists has on the ecosystem. Ecotourism, or ecologically sustainable tourism, is best defined as tourist activities that do not have long-lasting or permanent ecological impacts associated with them, when compared to the baseline information derived from scientific research or historical records (Trave et al., 2017). Ecotourism is not without its perils. Despite the efforts of ecotourism to limit long-term, permanent impacts, short-term impacts and stressors to the ecosystem remain.

Albeit better than traditional wildlife tourism, ecotourism remains controversial due to the short-term impacts on the environment, the local community, and the animals. The presence of visitors into the animals' environment results in changes in behavior and elevated stress levels (Monte et al., 2018; Barnett et al., 2016; Gallagher et al., 2015). Environmental impacts caused by increased travel, consumption of resources, and refuse

disposal further impact ecosystems. Local communities are also impacted, as resources are set aside for tourist use and lands become protected, limiting access to resources such as food and lumber essential to subsistence living. Serenari et al. (2016) contend that the development of ecotourism in private, protected areas can have positive impacts on communities but may also contribute to negative social outcomes such as changes in lifestyle, lack of resources, increased conflict, and community disempowerment.

Finally, the travel associated with ecotourism is often substantial. Ecotourism frequently occurs in remote sites (Boyd & Butler, 1996). Travel associated from the traveler's home destination to the region, island, or country is often significant and involves international air travel (Simon & Beckens, 2004). Once in the region, travelers must be shuttled to the ultimate destination where ecotourism occurs. While there are many kinds of ecotourism events, travelers are typically shuttled throughout their destination aboard four-wheel-drive vehicles or boats, generating a sizeable carbon footprint.

The promotion of ecotourism within the confines of zoos, aquariums, and animal-based theme parks seems an unlikely recommendation to guests wishing to support the conservation of animals and their habitats. Signage observed at the San Diego Zoo promotes ecotourism as a potential solution to the bushmeat crisis and a financial boon to local communities, encouraging them to protect local ecosystems to attract tourists while generating income (Figure 65). Signage reads:

> Conservationists face the task of convincing local people that this practice [bushmeat trade] will lead to disaster. Without alternative sources of income, killing wildlife for profit will remain an attractive option. Eco-

tourism, expeditions that visit these unusual sites to discover their beauty and diversity, is one alternative that provides locals with income and an immediate reason not to destroy their natural resources (Field Notes, June 22, 2019).

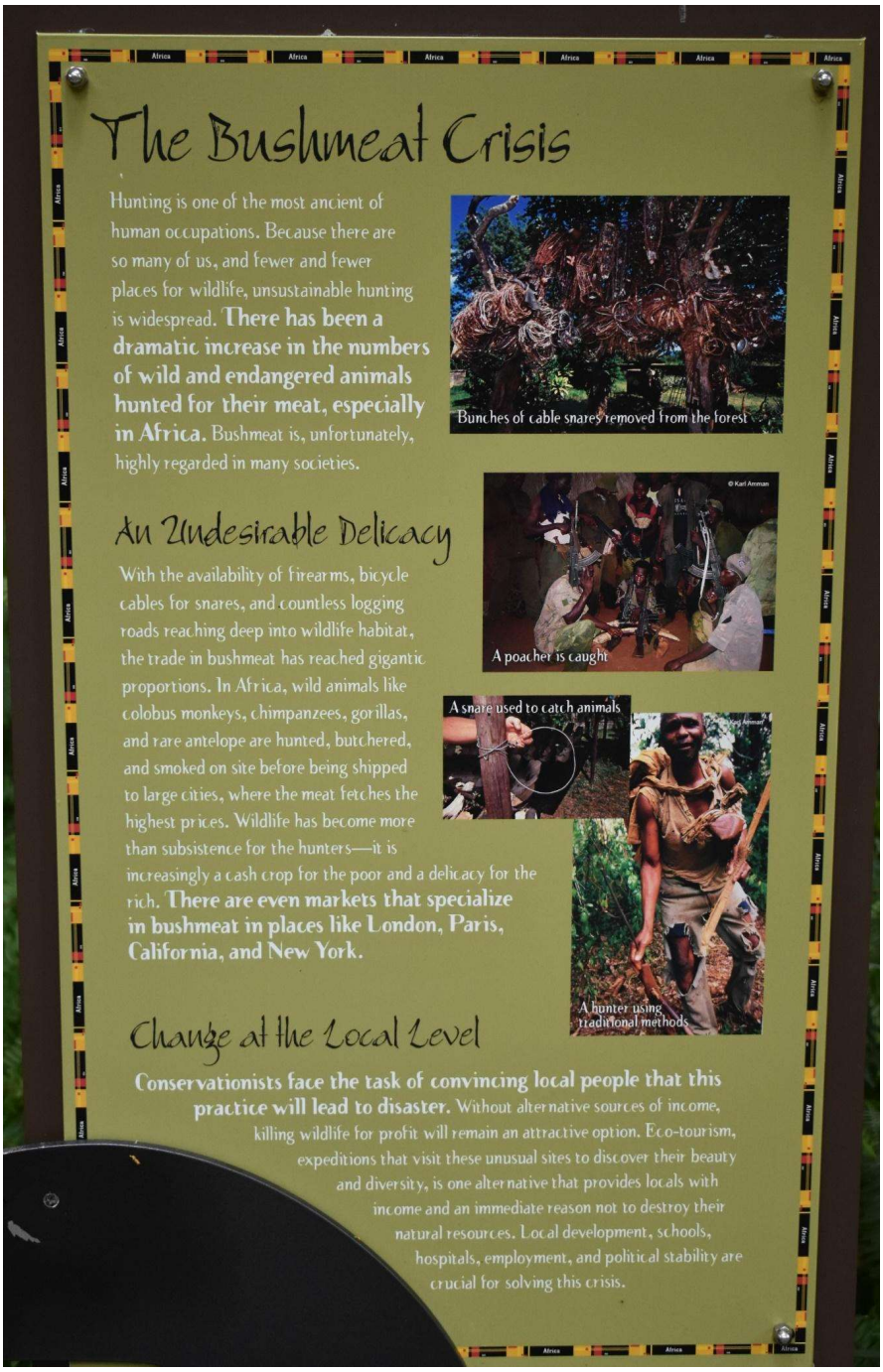

Figure 65. The Bushmeat Crisis (Ecotourism) Signage, San Diego Zoo

Indeed, the suggestion of ecotourism promotes the very consumption of nature. Given the stresses placed on animals, local impacts, and environmental stressors that are compounded by traveling large distances to see animals that are available for viewing at zoos, aquariums, and animal-based theme parks, it is surprising that these facilities would encourage this behavior. Yet ecotourism continues to be recommended to guests as a sustainable action to assist conservation efforts for animals hosted at zoos, aquariums, and animal-based theme parks.

Promoting Sustainable Action

The environmental education and conservation efforts of zoos, aquariums, and animal-based theme parks provide a strong platform for elevating environmental literacy in guests. When environmental threats, such as climate change and habitat loss, are a result of human activity, education can be used to mitigate the risk. Increasing environmental literacy can help visitors identify and adopt behavior changes, the fourth goal of Monroe and colleague's (2008) EE framework. Signage, exhibits, and educators promote sustainable actions across all educational opportunities. This section examines several examples of facilities that promote sustainable actions and pro-environmental behavior change in their guests, illustrating how zoos, aquariums, and animal-based theme parks are working to develop and build environmentally literate individuals by engaging guests in the adoption of sustainable actions and pro-environmental behavior changes (Research Question 3a).

Sustainable Seafood

Choosing sustainable seafood is identified as a primary action in the zoos, aquariums, and animal-based theme parks across the case study. Signage and educators

promote responsible consumerism when choosing seafood, linking this sustainable action directly to healthy oceans and ensuring the availability of food, not only for humans but also for endangered and threatened animal species. Promoted as a simple way to ensure consumers make responsible choices when eating fish, guests were referred to the Monterey Bay Seafood Watch brochure and mobile app. Seafood Watch evaluates how fisheries and farmed seafood impact the environment and provides recommendations to consumers on which fish are "Best Choices," "Good Alternatives," and fish that consumers should "Avoid" (Seafood Watch, 2020). While this positions citizens as consumers and encourages individual actions only, it remains a positive contribution to EE's fourth goal of encouraging sustainable action.

Sustainable Palm Oil

Another example of the ways in which zoos, aquariums, and animal-based theme parks encourage sustainable action is the sustainable palm oil campaign. Palm oil is the most widely used oil product in the market today. It is used in packaged foods, cosmetics, and cleaning agents. Palm oil plantations directly contribute to deforestation and biodiversity loss. Plantations are expanding to meet consumer demands, replacing rain forests in countries like Indonesia and Malaysia, are destroying habitats in stressed ecosystems, contributing to greenhouse emission and climate change. Zoos, aquariums, and animal-based theme parks in this case study are promoting the purchase of products that use sustainable palm oil with the help of a mobile app created by the Cheyenne Mountain Zoo. This app is designed to help consumers determine if the product they wish to purchase uses sustainable palm oil. Figure 66 illustrates a conservation cart with products that use sustainably sourced palm oil, providing examples of products that

support environmentally friendly purchasing options. Similar to the sustainable seafood campaign, zoos, aquariums, and animal-based theme parks are positioning guests as consumers, promoting sustainable purchasing decisions. While these actions remain individual, they continue to build environmental literacy in guests which meets EE's fourth goal of encouraging sustainable action.

Figure 66. Palm Oil Conservation Station, ZooTampa

Native Gardening and Plants for Pollinators

Native gardening and planting for pollinators are recommended throughout zoo, aquarium and animal-based theme parks as sustainable actions. Visitors are provided tips, guides and symposiums to help build and maintain native and pollinator gardens. Some urban facilities have recognized that gardening, while important, is not always possible for guests that live in apartments or urban environments and they have adapted messaging to ensure that suggested, sustainable actions are applicable to all audiences. When asked about how Cincinnati Zoo addresses inclusive messaging, Shasta Bray, Manager of Interpretive Exhibits, Visitor Research, Conservation Communications and Fun at the Cincinnati Zoo explains:

> So some of the actions that we promote with that are things that you could do, [be]cause everyone has, well I hope everybody has a window… if you can open your window, you can put a bird feeder with a sucker suction cup. They make those for right on the window. You could create a window box and put plants for pollinators in there… or promoting to them to get involved in your community, your neighborhood in a larger way (S. Bray, personal communication, August 18, 2019).

The Bronx Zoo has also worked to provide inclusive messaging by identifying actions that urban and suburban dwellers can do to support the environment, as illustrated in Figure 67 and Figure 68. Signage along the pathway leading to the "World of Bird" exhibit offers suggestions for guests living in both urban and suburban environments. Suburban guests are encouraged to provide gardens with native plants that provide food and shelter for native and migratory birds. Guests are also encouraged to add a birdbath.

Urban guests are provided realistic suggestions about how they can also engage in pro-environmental behaviors with urban signage encouraging community gardening, the creation of green spaces, and the watering of urban trees (Field Notes, August 30, 2019).

Figure 67. Suburban Native Gardening Recommended Sustainable Action, Bronx Zoo

Figure 68. Urban Native Gardening Recommended Sustainable Action, Bronx Zoo

'Reduce, Recycle, and Reuse'

'Reduce, recycle, reuse' was identified as a recommended sustainable action across zoos, aquarium, and animal-based theme parks; facilities set the example by limiting single use plastics within the study sites. Conservation stations are equipped with suggested items that are alternatives to single-use plastics, such as reusable straws, water bottles, travel cutlery, and silicone Ziplock bags. Reduction of single-use plastics and recycling was even featured in animal-based shows, with animal ambassadors trained to retrieve reusable bags or pick up used water bottles and place them in recycle bins. The importance of single use plastics was integrated into keeper chats as well, with the mention of the Pacific Garbage Patch and microplastics found in our water and food sources.

Recommended Sustainable Actions

The case study facilities often promoted additional sustainable actions to the major campaigns listed above. Table 21 provides a sampling of recommended actions captured during site visits. Major categories of suggested actions are energy conservation, water conservation, recycling, responsible pet ownership, responsible recreation, responsible gardening, responsible consumerism, and advocacy. All of the recommended sustainable actions were described as simple steps that guests can take to make positive impacts in the environment and/or conservation; however, many of the suggested steps can be quite cumbersome, depending upon the level of guest engagement.

Table 21. Promoted Sustainable Actions

	Simple Personal Actions	Difficult Personal Actions	Collective Actions
Energy Conservation	use CFC light bulbs turn off power strips wash full loads of clothes use cruise control	air dry clothes do not idle car take public transportation ride your bike reduce fossil fuel use reduce carbon energy footprint	
Water Conservation	water lawn before 8 am turn off water when brushing teeth	collect shower water fix leaky faucets and sprinkler systems	
Reduce, Recycle, and Reuse'	recycle recycle your cell phone use reusable bags reduce plastics refuse		
Responsible Pet Ownership	do not engage in the illegal pet trade keep cats indoors pick up pet waste		
Responsible Recreation	adhere to no wake zones	participate in ecotourism do not use lead shot visit national parks	visit your local AZA accredited facility
Responsible Gardening		garden using native plants landscape for wildlife plant trees	plant trees in your community
Responsible Consumerism	participate in meatless Mondays buy local	purchase products using sustainable palm oil purchase sustainable seafood purchase shade grown coffee eliminate single use plastics avoid pesticides and fertilizers	
Participate and Advocate		start a conversation about conservation write letters advocating for sustainable palm oil use	donate to conservation organizations support elected officials that care about climate change join clean up activities become a citizen scientist volunteer support alternative energy support habitat restoration

For example, reducing one's carbon footprint was promoted as a step guests could take to engage in pro-environmental behavior. This action can be simple, or quite difficult, depending upon the level of involvement and dedication of the guest. Guests can take simple steps to reduce their carbon footprint, such as turning off power strips when not in use or using cruise control if their car is equipped with that feature. However, some actions can be significantly more difficult to implement due to lack of supportive infrastructure, proximity to public transportation, or lack of pro-environmental choices in the markets. Due to the magnitude and complexity of many environmental issues, individuals' actions alone are not sufficient to create meaningful change. . Collective actions must continue to be promoted to the public, supporting advocacy for viable environmental choices in the market while providing the required infrastructure to support a carbon friendly lifestyle.

Zoos, aquariums, and animal-based theme parks are addressing some of the smaller environmental issues through regional environmental and conservation education, climate change discussions, and the effects of primary drivers of complex and systemic issues. However, the findings of this study support the claims of scholars that EE's focus does not go far enough (Clover et al., 2000). Without addressing global inequality and first world consumption, the health of the environment will continue to degrade. Educators are not fully engaging guests in the complexities of a global consumer society, nor are they challenging the assumptions and values of individuals and communities.

Finally, while responsible consumerism does address the fourth goal of EE, it is not substantial enough to bring about the wide-scale change so desperately needed to address our entrenched and destructive relationship with the natural environment.

Individual actions are not enough. An emphasis needs to be placed on collective actions. In the meantime, zoos, aquariums, and animal-based theme parks continue to provide educational opportunities to build foundational knowledge and to stimulate change.

Research Question 4: How do Florida zoos, aquariums, and animal-based theme parks compare overall to the national sample?

Florida Compared to the Nation

Florida zoos, aquariums, and animal-based theme parks examined as part of this study appear to outperform their national counterparts, striving to address all components of EE, and to build an environmentally literate population that is better prepared to handle some of Florida's mounting environmental concerns (Research Question 4). Indeed, the mission statement of zoos, aquariums, and animal-based theme parks in Florida reflect their prioritization of education in these facilities.

Identified as a critical hotspot for biodiversity and "ground zero" for climate change, it is imperative that Florida has strong EE programs in place to help build a populace that understands the critical issues that we are facing and has the ability to promote and enable sustainable action, individually and collectively. As evidenced through the analysis of this project, Florida's zoos, aquariums, and animal-based theme parks are on par with their national counterparts. In fact, some best practices were identified in Florida that were not evidenced in the national case study group.

Florida excels at educating guests about local and regional conservation issues resulting from environmental degradation. All of Florida's zoos and aquariums have dedicated sections in their parks or extensive exhibits that educate guests about the

species and the threat or threats they face in the wild (Table 22). Keeper chats discuss the plight of the animals, what is being done to help conserve them in the wild and provide recommendations for sustainable actions. Dedicating a portion of the zoo and aquarium to local and regional wildlife is also beneficial, allowing Florida's tourists to better understand animals that are unique to the region.

Table 22. Florida Centric Facilities, Bioregions, and Exhibits

Facility Name	Local and Regional Animals Only	Dedicated Florida Bioregion	Dedicated Florida Species Exhibit
Busch Gardens Tampa Bay			
Central Florida Zoo and Botanical Gardens			X
Disney Animal Kingdom			
Florida Aquarium	X		
Jacksonville Zoo and Gardens		X	
Mote Marine Research Lab and Aquarium	X		
ZooTampa		X	
Zoo Miami		X	

While Florida's zoos and aquariums excel at addressing local and regional issues, neither of the theme parks studied in Florida address state-wide environmental or conservation issues. This is, unfortunately, a huge missed opportunity. Animal-based theme parks have an opportunity to capitalize on their unique appeal to enhance awareness of animals, local and global environments, and current local and global issues, providing education

opportunities to a wide demographic of local, national, and international guests. Admittedly, Busch Gardens, with its African animal theme may have more challenges addressing Florida's environmental problems; however, comparisons to local animals' conservation issues (as illustrated by ZooTampa) is one tactic that might be employed.

Conservation Stations and Quests observed during site visits were impressive. Disney's Animal Kingdom "Wilderness Explorers" program set the bar for conservation stations across all the case study sites, offering a 29-station activity exploration handbook that routed explorer around the park to meet with badge guides or troop leaders. The hosts facilitated conversations about animals, cultures, skills, and sustainable actions throughout different regions of the park. Cultural exploration, as previously mentioned, is also embedded into the explorer stations allowing guests an opportunity to chat with individuals from different regions across the world, providing unique insights and perspectives while broadening guests' understanding (Field Notes, July 20, 2019).

Busch Gardens Tampa Bay was also the only facility of all 15 case study sites to link consumerism with habitat distribution in their lowland gorilla exhibit. This concept was also discussed at length during the "Gorilla Insider Tour." The keeper took time to educate guests about the mineral coltan, and its use in electronics, making clear that everyone in the group likely had coltan on their person. The keeper explained the destructive mining processes and the impacts it is having on gorillas' habitats, while stressing to guests the importance of recycling electronics (Field Notes, June 30, 2019).

Climate change is also being discussed at six of the eight Florida case study sites through signage, keeper chats, and conservation stations. However, Florida facilities do not address climate change in the same fashion as their national counterparts. While most

Florida facilities house animals that live in similar climates, the facilities in Florida do not have polar bears, walruses, or beluga whales to use to facilitate discussion about climate change and changes in ice flows. Florida does, however, have coral reefs that can be used as a talking point to address climate change and to support conversation about sea level rise, ocean acidification, and warming ocean temperatures. The Florida Aquarium, Mote Marine, and Zoo Miami maintain the strongest representation of climate change education of the Florida case study sites. Both aquariums have coral exhibits and discuss coral diseases affecting the Florida Reef Tract, coral bleaching and ocean acidification and coral research and restoration efforts. While Zoo Miami does not have corals nor polar bears on exhibit, educators make use of a taxidermied Polar Bear, supplemented by signage and a movie that discusses the impacts of climate change on polar bears' habitats and our environment.

Florida's zoos, aquariums, and animal-based theme parks are keeping pace with flagship facilities across the nation. Environmental education programming endeavors to build an environmentally literate populace equipped to handle mounting environmental issues; edutainment, innovative exhibit designs and comparative discussions help to build awareness of regional and global issues, making Florida's zoos, aquariums and animal-based facilities poised to take the lead in non-formal EE.

Research Question 5: How do theme parks that include animal-attractions compare to traditional zoos and aquariums, and, specifically, how do they balance entertainment and education?

Edutainment and Theme Parks

Scholars have only recently begun to explore the role that animal-based theme parks play in visitors' knowledge; however, they have the potential to reach a wide variety of guests and to expand EE opportunities in Florida and across the nation. Therefore, theme parks that include animal attractions were examined to identify how they compare to traditional zoos and aquariums, and how better understand how these facilities balance entertainment and education (Research Question 5).

Animal-based theme parks have done an impressive job blending entertainment and education for their guests. Signage is artfully placed throughout the facilities, similar to zoos and aquariums. Main thoroughfares are adorned with exhibits and signage in areas that guests might naturally stop, impressing the importance of the animals within the facility. Exhibits and corresponding messaging rival signage observed in zoos and aquariums; they introduce the species, provide key facts about the species, identify the range or habitat of the species in the wild, and typically address the species' conservation status. Theme parks offer similar activities to those hosted by zoos and aquariums, such as feeding and touch opportunities at select locations throughout the parks. There are keeper talks scheduled and/or educators stationed at exhibits, as well as enhanced experiences that allow guests to participate in behind-the-scenes tours or personalized experiences, much like those hosted at zoos and aquariums. The exception is Disney's Animal Kingdom, which instead engages guests in their Disney "Wilderness Explorers"

program. Personalized guest opportunities to engage in behind-the-scenes activities are available and comparable to those offered by zoos and aquariums. Shows are also available throughout the parks, and although they are entertainment based, they are also educational in nature and showcase the animals and some of their trained behaviors.

Theme parks offer a significantly greater number of rides and attractions; however, they also embed animals and education into entertainment mediums to assist in imparting new knowledge in fun and engaging ways. Rides are often designed, or named after, an animal, with supplemental signage about the animal strategically placed throughout the lines. While guests wait to ride their favorite thrill ride, they are exposed to educational messaging about animals and their ecosystems.

Disney's Animal Kingdom offers numerous rides and attractions that build guests' knowledge and understanding. For example, during the "Kilimanjaro Safaris" ride, guests are exposed to signage and videos that provide information about the animals that will be viewed during the safari, highlighting challenges that they face in the wild, and encouraging respect for animals in their natural habitat. Guests embark upon a safari narrated by the bus driver with an opportunity to view animals in a contrived natural environment. Narration for this attraction is not scripted, and allows for tailored narration based on sighting opportunities and animal activity. This provides guests a more personalized experience, but also limits the standardization of information provided to guests.

During this study, the "Kilimanjaro Safaris" ride was completed twice. The first tour provided key facts, information about the ecosystems, and shared information to build understanding about some challenges these animals face in the wild. Conflicts

between humans and animals were discussed, as well as tools that locals use to facilitate a peaceful coexistence. Suggested actions and behavior changes for guests were also provided. The second tour on the "Kilimanjaro Safaris" was quite different. Key facts about the ecosystem and the animals were provided; however, the driver was clearly frustrated that the giraffes were not staying clear of the truck path, causing massive delays during the ride. The undertone of the frustration supported the idea that the guests in the park were indeed the priority and the animals needed to adjust their behavior to accommodate the guests, despite being in their own enclosure (Field Notes, July 20, 2019). The divergence between the two experiences based upon driver narration supports that, while tailored messaging allows for a more personalized experience for guests, it may also have a negative effect on messaging, dependent upon individual personalities, agendas, and frustrations that impact the learning experience.

Disney's Animal Kingdom's "Avatar Flight of Passage" is located in the newest section of the park, Pandora. Pandora is modeled after Disney's *Avatar* movie that was released in 2009. Pandora is the only section of Disney's Animal Kingdom that does not contain any animals. Rather than animals, the natural environment of Pandora is showcased, which demonstrates the destruction caused by the colonization of humans during the movie, as well as nature's resilience. Nature's ability to recover from human destruction is also addressed throughout the queue for the attraction, "Avatar Flight of Passage." Guests wait in line, winding through radioactive regions of the celestial planet that were turned toxic through over mining. Guests are also exposed to recovering ecosystems and scientific labs before the final preparation of their journey. Upon entering the attraction, guests are shuttled into a genetic matching room in which they are greeted,

scanned for microparasites to prevent the transmission of invasive species, and given a mission brief:

> Over a generation ago, this enormous company called the RDA created a lot of damage to the area through their bad mining processes and conflicts with the Na'vi. Just like on Earth it can take decades for ecosystems to recover. One way to understand what's going on with an ecosystem is to study what are called keystone species. These are animals like tigers, jaguars, seals, the Banshee is one of these important animals (Field Notes, July 20, 2019).

The mission brief continues with matching guests with avatar bodies, enabling guests to link to the Avatar and to achieve flight. After the matching simulation, guests enter into the main ride where they are connected to an Avatar and commence with the rite of passage – a flight through Pandora. The flight highlights the beauty of Pandora's unique animals and ecosystems. While the messaging throughout the queue is subtle, messaging during the mission brief has a strong EE component, explaining the importance of keystone species and the role of natural ecosystems, stressing the connection to nature and non-human species (Field Notes, July 20, 2019).

Busch Gardens in Tampa, Florida offers multiple rides named after animals and correlated with animal exhibits. Attractions are incorporated into animal exhibits with keepers mentioning the rides during their chats. Signage placed throughout the queue provides additional messaging and key facts about the animals to captive audiences that await their turn on a roller coaster. "Cheetah Hunt" is an interesting example of how Busch Gardens has tied a roller coaster and a unique animal adaptation together. The ride

is a fast-paced roller coaster that mimics the movements of a cheetah on the hunt. The cheetah's agility and speed are highlighted throughout the attraction visually, verbally, and experientially. Guests are able to experience, firsthand, a replication of movements and agility that are unique to a cheetah's hunt. The ride starts with a zero to sixty mile per hour acceleration and incorporates steeply-banked turns that help to build a firm understanding of the unique adaptations of this animal (Field Notes, September 30, 2019).

SeaWorld San Diego's "Manta" roller coaster also capitalizes on a nearby animal exhibit as guests enter and exit near the stingray touch tank. The queue channels guests past the large stingray exhibit, offering glimpses of the animals the ride was named after. Once aboard, guests are surrounded in a virtual underwater scene before being launched onto an exhilarating ride that travels above the ray exhibit (Field Notes, June 20, 2019).

While there are significant similarities between theme parks and traditional zoos and aquariums, there are some prominent differences that remind guests that they are indeed at a theme park. The sheer expanse of the parks, the volume of guests, and ride noises prevent guests from losing sight of the fact that they are at a theme park. Gift shops and merchandizing are also more prevalent and located throughout the park, as opposed to one or two main locations. Theme parks rival large zoos and aquariums in their exhibit signage; however, education programming and event programming opportunities are significantly fewer than those available at traditional zoos and aquariums. Additionally, animal-based theme parks appear to have less variety in their animal collections as there seems to be a competition for space between the animals that are housed at the park and the attractions.

Despite these aesthetic differences, animal-based theme parks are using mixed method mediums to reach their audience. Their unique nature may prove instrumental in reaching demographics of the population who are unlikely to frequent centers of non-formal EE such as parks, zoos and aquariums. This broad reach, subversive education, and experiential learning through thrill-based rides, provides unique opportunities for learning in a fun and entertaining setting. Scholars and practitioners alike would be well served to partner with these facilities to share innovative ways to attract hard-to-reach audiences and employ unique educational techniques. Animal-based theme parks would also benefit from this discussion and the integration of keeper chats, where not already being employed, and enhanced guest interactions to facilitate conversations about the environment.

Study Limitations and Future Research

It should be noted that there were some limitations to the study and analysis. A broad sampling of Florida case study sites and national cases study sites was used for analysis. While case studies are renowned for providing rich, detailed data about an organization and for eliciting explanatory, descriptive, illustrative or enlightening outcomes, this study was limited by both time and funding, resulting in approximately 15 hours spent at each case study site. Given the amount of park-based educational programming available on a daily basis, as well as the enhanced experiences, educational programming opportunities, and event-based programming, it was impossible to attend and evaluate all offerings. A systematic process was employed to ensure that all signage and permanent exhibits were captured for later evaluation. Systematic sampling of park-based programs such as shows, chats and conservation stations was used, to ensure that at least one half of the offerings available at each site were attended. Enhanced experiences and events were evaluated on a limited basis. Finally, formal educational programs were not attended due to funding and timing constraints and availability. While not fully inclusive, this level of research allows for identification of patterns and trends within EE opportunities in zoos, aquariums, and animal-based theme parks. However, as with any sampling or analysis of aggregate data, nuances in programming may have been missed, especially in data with wide variability.

Limited access to key personnel, information and documentation was experienced during this study. Interviews were only granted at 60% of the case study sites, with no interviews conducted at animal-based theme parks. Requests were either ignored or denied based upon the site's ability to support research requests during the summer when zoos, aquariums, and animal-based theme parks are most busy with educational programming such as kids' camps, and an influx of guests due to vacations. Proprietary information in annual reports and strategic plans resulted in information and documentation being withheld. Gatekeepers were cautious of requests as the researcher was from an outside entity in a time when zoos, aquariums, and animal-based theme parks are facing increased scrutiny, with facilities striving to adjust to changing requirements and public expectations of their roles in animal welfare and the keeping of wild animals in captivity.

As zoos, aquariums, and animal-based theme parks continue to increase and develop adult education programs, a time study of the progress and changes in adult EE would benefit not only the public (who benefit from exposure to EE from a trusted source) but would also provide a platform for zoos, aquariums, and animal-based theme parks to learn about programs that are attracting guests, times that work best, and messaging that is successful in building environmental literacy. Zoos, aquariums, and animal-base theme parks have the ability and capacity to build understanding and to foster sustainable action to address local, regional and global EE and are uniquely positioned to become leaders in the non-formal education realm.

Recommendations and Conclusion

While previous research has explored educational pedagogy in zoos and aquariums, no study has previously completed a broad-based case study to examine non-formal EE in zoos, aquariums, and animal-based theme parks in Florida and across the nation. This comprehensive analysis provides a foundational baseline of how zoos, aquariums, and animal-based theme parks are implementing non-formal learning to increase environmental literacy among adult visitors. An analysis of the extent to which educational programs reflect the four goals of EE provides a measure for evaluating the effectiveness of EE programs. As this is the first study of its kind to include animal-based theme parks, it is critical to investigate how these unique facilities are managing the balance between entertainment and education. Finally, interwoven through the entire analysis is how Florida-based zoos, aquariums, and animal-based theme-parks are performing when compared with their national counterparts, especially with regard to incorporating EE and building environmental literacy in their guests.

Zoos, aquariums, and animal-based theme parks have identified education as a primary goal in their missions. They are implementing non-formal learning in hope of increasing environmental literacy among adult visitors through multiple avenues and mediums. On-site educational programming that is available as part of admission is appropriate for all guests. Interactions with keepers and educators on-site, through keeper chats and conservation stations, are tailored based on audience ages and levels of interest,

ensuring guests' educational needs are met at the proper levels. Upgraded experiences are also tailored to guests through the discussion of age-appropriate topics. Cross discussions are used for mixed audiences, ensuring that all parties are involved in discussions and educational experiences. Zoos, aquariums, and animal-based theme parks offer some supplemental educational programming opportunities for adults, but the majority of adult-specific opportunities are held during event-based programming. Event-based programming, however, has a wide variability of topics and depth of information, ranging from after-hours access to zoos, aquariums, and animal-based theme parks to science talks with researchers and professionals. While events hold the most opportunities for adult-specific learning, these events are typically lighter in EE, with the heavy lifting being done though standard park-based programming.

All of the educational programming observed meets the first goal of EE: convey information. Most of the educational programming also met the second goal of EE: building knowledge and understanding in guests through messaging and discussion about conservation issues resulting from environmental degradation. Zoos and aquariums evaluated in this case study were found to address both local and global environmental and conservation issues, building knowledge of various ecosystems and their importance throughout the world. Indeed, some facilities have designed special exhibits or dedicated entire sections of their facilities to showcase local and regional animals. However, zoos, aquariums, and animal-based theme-parks are not addressing the primary drivers of complex and systemic environmental issues, such as global inequality and first-world consumption, and are instead tackling symptoms such as habitat loss, decreased global biodiversity, and climate change.

While zoos, aquariums, and animal-based theme parks have not elevated the discussion to the primary drivers, they are addressing topics such as deforestation, the bushmeat crisis, and palm oil support, and are therefore building understanding and developing environmental literacy in guests. Zoos, aquariums, and animal-based theme parks are helping to equip guests with ideas and actions to combat environmental issues, enabling and recommending sustainable actions through messaging. Trends across the case study sample indicate that predominant sustainable actions include encouraging responsible consumers with regard to palm oil and sustainable seafood; the reduction of single-use plastics through 'reduce, recycle, and reuse' initiatives; and native gardening and planting for pollinators. Educational programming at zoos, aquariums and animal-based theme parks provide ample opportunities for conveying information, building understanding and enabling sustainable actions; opportunities for the development of skills (goal three in EE) were very limited. Only a few facilities endeavor to teach guests how to help animals in distress or in conflict with humans, and how to safely and peacefully coexist when living in proximity to wild animals.

While one of the initial goals of this project was to better understand how animal-based theme parks balance entertainment and education, this appeared to be a common thread across all case study sites, as educators strive to make education and entertainment seamless. Indeed, animal-based theme parks were found not to be the only sites engaging in edutainment. Surprisingly, the newly built OdySea Aquarium promotes itself as theme park-style entertainment, and ZooTampa has recently added a roller coaster to their facility. Nevertheless, the major differences between traditional zoos and aquariums and animal-based theme parks remain the sheer volume of attractions. Park-based educational

programming in theme parks rivals that of zoos and aquariums; however, animal-based theme parks offer significantly fewer supplemental educational programming and events above and beyond what is included in park admission.

Florida's facilities offer a wider variety of programming and events, providing new and exciting opportunities for guests. Signage and keeper chats consistently convey information, build understanding, and engage audiences in discussions about sustainable actions, with some striving to build guests' skills. Florida's zoos, aquariums, and animal-based theme parks have higher instances of shows and rides, which allows them to capture and compete with local tourist attractions in the region. While all facilities can improve in the skill development of their guests and on enhancing understanding of complex and systemic issues overall, Florida facilities remain competitive with, and in most instances outpace, their national counterparts.

This analysis demonstrates not only how Florida compares to trends on a national scale, but illustrates areas in which the state leads the charge in EE. Without continued EE programs that can meet all four goals, American adults are unlikely to become the kind of informed and active environmental citizens desperately needed in the current context of environmental threats. Zoos, aquariums, and animal-based theme parks bear a large responsibility, laid upon them first by the Tbilisi Declaration, for creating environmentally active citizens. Unique opportunities to attract diverse demographics at zoos, aquariums, and animal-based theme parks, when combined with the synergistic leverage of unique opportunities for EE and conservation education, position zoos, aquariums, and animal-based theme parks as potential powerhouses for elevating environmental literacy in adults.

Through an increased focus on drivers of large-scale, pervasive environmental problems, zoos, aquariums, and animal-based theme parks can help increase citizens' understanding on a regional, national, and global scale and better equip citizens to tackle complex and systemic issues. Elevating discussions about primary drivers in habitat loss, decreases in global biodiversity, and climate change facilitates the understanding of the economic and political nuances inherent to complex systems, while enabling sustainable actions. While these discussions are indeed difficult and weighty, without addressing global inequality and first world consumption, citizens are unlikely to understand the criticality of environmental issues or to adopt the necessary behaviors required to enable change.

With the support of an environmentally literate populace, zoos, aquariums, and animal-based theme parks will be better equipped to move from species conservation initiatives to global diversity conservation. Florida is a good place to start and is already identified as a critical biodiversity hotspot. Residents not only have firsthand knowledge of the perils we are facing, but are motivated to act on behalf of the animals and ecosystems that thrive here. Furthermore, due to local proximity, they can see the results of change, from personal behavior changes to supporting and witnessing the synergistic effects of collective action. Florida has the potential to move from "ground zero" for climate change to an epicenter for social change. Zoos, aquariums, and animal-based theme parks can help get us there.

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Appendix A: Case Study Facilities

Florida Facilities

Zoos
ZooTampa
Jacksonville Zoo
Central Florida Zoo and Botanical Gardens
Miami Zoo

Aquariums
The Florida Aquarium
Mote Marine Research Lab and Aquarium

Animal-Based Theme Parks
Busch Gardens Tampa Bay
Disney's Animal Kingdom

National Facilities

Zoos
Bronx Zoo
St. Louis Zoo
Cincinnati Zoo
San Diego Zoo

Aquariums
Audubon Aquarium of the Americas
OdySea Aquarium

Animal-Based Theme Parks
SeaWorld San Diego

Appendix B: Interview Protocol

1. Can you tell me about the mission of the zoo?
2. Do you have an educational mission specifically?
3. Tell me about the programs you have developed to fulfill that mission.
4. What kinds of information do you emphasize in your educational programs?
5. What are the goals of the educational programs?
    - 5.1.1. Are you looking to provide factual information, or hoping to inspire people to work to change the conditions of wild animals?
    - 5.1.2. Do your programs focus on loss of habitat? Human impacts?
    - 5.1.3. Do your education programs cover any of these topics: climate change, urbanization, hunting, habitat loss, industrial pollution, population pressure, poaching, sea level rise…..
6. What is your participation population like–mostly kids or adults or a mix?
    - 6.1.1. Who is the target of the educational information?
    - 6.1.2. How do you balance educational information for mixed audiences (children and adults)?
    - 6.1.3. Tell me about interactive programs you offer.
7. Do you have programs that allow visitors to get "behind the scenes" with animals?
    - 7.1.1. How is education incorporated into these experiences?
8. Do you offer programs for schools or colleges?
9. Who designs your educational programs?
    - 9.1.1. Is there an approval process?
    - 9.1.2. Is the curriculum related to conservation education standards?
    - 9.1.3. How often do you revise them?
    - 9.1.4. Do you measure effectiveness? If so, how?
        - 9.1.4.1.1. How is this information incorporated back into the curriculum to help better achieve your goals?
10. How many animals do you house here?
    - 10.1.1. Do you specialize in a certain type of animal or region?
11. Do you have a research mission? Tell me about that.
12. Do you have a breeding program?
13. How is your zoo funded?
14. What are the zoo's biggest challenges in terms of meeting its goals and mission?
15. What do you think about the impact of the zoo on the public's understanding of threats to wildlife?
16. Are there ways you could do a better job?
17. What outcomes do you hope for, from your educational programs–a best case scenario?