Spring 5-2009

The Effects of Dolphin Education Programs on Visitors' Conservation-related Knowledge, Attitude and Behavior

Lance Joseph Miller
University of Southern Mississippi

The University of Southern Mississippi

THE EFFECTS OF DOLPHIN EDUCATION PROGRAMS ON VISITORS' CONSERVATION-RELATED KNOWLEDGE, ATTITUDE AND BEHAVIOR

by

Lance Joseph Miller

Abstract of a Dissertation
Submitted to the Graduate Studies Office
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

May 2009

The University of Southern Mississippi

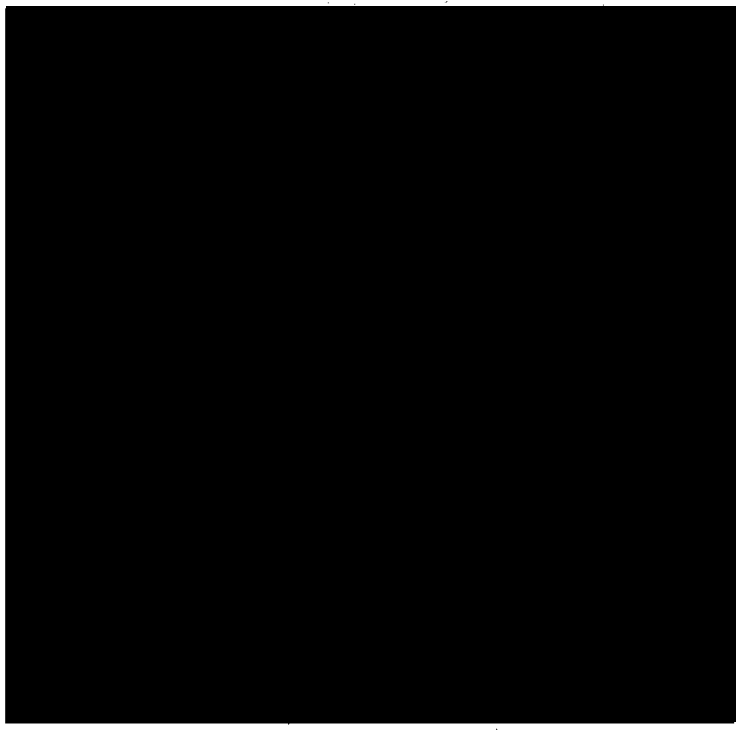
THE EFFECTS OF DOLPHIN EDUCATION PROGRAMS ON VISITORS' CONSERVATION-RELATED KNOWLEDGE, ATTITUDE AND BEHAVIOR

by

Lance Joseph Miller

A Dissertation
Submitted to the Graduate Studies Office
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

Approved:



May 2009

ABSTRACT

THE EFFECTS OF DOLPHIN EDUCATION PROGRAMS ON VISITORS' CONSERVATION-RELATED KNOWLEDGE, ATTITUDE AND BEHAVIOR

by Lance Joseph Miller

May 2009

Zoological institutions typically exhibit dolphins in educational programs such as dolphin shows and interaction programs. The goal of these programs is to entertain visitors while increasing their conservation-related knowledge, attitude and behavior towards dolphins and the marine environment. The purpose of the current study was to examine dolphin shows and interaction programs in terms of their effectiveness in meeting these goals. A multi-institutional study was conducted at six different facilities throughout the United States. A repeated measures design was used to examine the knowledge, attitude and behavior of visitors before, immediately after and three months following participation in dolphin shows or interaction programs. Participants of dolphin shows reflected a significant short-term increase in knowledge, attitudes and behavioral intentions. These participants' attitudes and behavioral intentions returned to entry levels three months following the shows. However, knowledge and reported behavior were significantly higher three months following the show compared to entry levels. Participants of interaction programs had a short-term increase in knowledge, attitudes and behavioral intentions immediately following the program and levels were significantly higher three months following the program when compared to entry levels. Additionally, these participants also reported engaging in more conservation-related behavior than during the entry surveys. Results from the current study suggest that both dolphin shows

and dolphin interaction programs can be an important part of a conservation education program within zoological facilities. Understanding the aspects of these types of programs that lead people to conservation action will help zoological facilities in meeting their goals.

ACKNOWLEDGMENTS

The author would like to thank his major advisor, Dr. Stan Kuczaj, and other dissertation committee members, Dr. Jill Mellen Dr. Tammy Greer, Dr. Virgil Zeigler-Hill and Dr. John Koeppel for their advice and support throughout the duration of this project. Special thanks go to Dr. Randall Wells, Dr. Jackie Ogden, Dr. Andy Stamper, Melinda Pruett-Jones, and Jane Davis for their support and help in getting the project started. I would also like to thank all of the initial reviewers of this project at each of the facilities for their helpful advice which improved this study.

Additionally, I would like to acknowledge the primary contacts at each of the institutions for all the information and their help in scheduling data collection for this project. This includes Dr. Kevin Willis, Diane Fusco, Rita Stacey, Jennifer McGee, Mark Gonka, Jodie Baker, Tom Granberry, Debbie Prevratil, Emma Gilbert, Patrick Berry, Doug Messinger and Sylvia Rickett. I would also like to thank all of the institutions and staff for their support and assistance throughout the duration of the project. Additionally, I would like to thank Jana Sarno for her support and encouragement throughout the duration of this project. Finally, I would like to thank my parents and friends for their continued support. Without them this project would not have been possible.

TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF ILLUSTRATIONS

Figure

CHAPTER I

INTRODUCTION

Atlantic bottlenose dolphins (*Tursiops truncatus*) are a species found throughout coastal and offshore waters. Although longitudinal studies have supplied valuable information on this species, there is still much to be learned about their complex social relationships, behavior and threats to their survival. Many of the threats to bottlenose dolphins are anthropogenic factors such as interactions with boats (Miller, Solangi, & Kuczaj, 2008), pollution or chemical runoff (Fair et al., 2007) and overfishing (Politi, Bearzi, & Airoldi, 2000). Educating the public about these threats could be a key component in management plans to help conserve this species. While there are many different ways to educate the public (e.g., books, videos, dolphin watching boat tours) about threats to dolphins and the environment in which they live, zoos and aquariums offer a unique opportunity to educate large audiences.

The world's first marine park, Marine Studios of Florida, was opened to the public in 1938 (Brown, 1999). This facility offered visitors the first opportunity to see dolphins within human care, and developed the first "show" where audiences could join in large numbers to witness these complex, social animals perform a series of behaviors. Since then, dolphin shows and interaction programs (dockside interactions or swim-with programs) have become common types of education programs with dolphins in zoos and aquariums. Dolphin shows are typically performed for a large audience where animals are trained to perform behaviors while information is presented to visitors about the natural history and conservation of dolphins and the marine environment. Similar to dolphin shows, participants of interaction programs are educated about dolphins and the

marine environment but are usually for a smaller audience. Interaction programs typically include a classroom portion followed by either a dockside or in-water interaction with the animals. Although the initial purpose of dolphin shows and interaction programs was likely for entertainment, changes in the missions of zoos and aquariums have placed a priority on conservation education. The goals of these programs are to entertain the visitors while educating them about dolphins and the marine environment.

While some believe dolphin shows and interaction programs within zoos and aquariums can benefit wild dolphins by educating visitors and inspiring them to conservation action, others question the true conservation value of these programs (Rose, Farinato, & Sherwin, 2006). It is estimated that over 143 million people will visit an accredited zoological institution in the United States each year (Falk, Reinhard, Vernon, Bronnenkant, Heimlich, & Deans, 2007). With the potential to educate such a diverse group of individuals (e.g., families, teachers and students) about wildlife, research and conservation it is important to determine the effectiveness of the different educational programs at these institutions. The goal of the current study was to examine the effects of dolphin shows and interaction programs on visitors' conservation-related knowledge, attitude and behavior. This was the first quantitative multi-institutional study examining the effects of these programs, and results should prove beneficial to institutions as they make informed conservation education program decisions.

CHAPTER II

REVIEW OF RELATED LITERATURE

Effects of Zoo and Aquarium Visits

One of the goals of zoological institutions is to engage visitors in meaningful and exciting experiences leading to changes in conservation-related knowledge, attitude and behavior. The most recent review of the literature demonstrated a lack of information on the effectiveness of zoos and aquariums in meeting this goal (Dierking, Burtnyk, Buchner, & Falk, 2002). Similarly, another review demonstrated that research on the impact of conservation messages in zoos and aquariums is in its infancy (Swanagan, 2000). Although the literature reviews have demonstrated that research in this area is lacking, recent information suggests an increasing trend in the number of research projects examining the impact of visits to zoos and aquariums (Falk et al., 2007). However, even with the recent increase in studies there is still much information needed on the effects of overall visits to zoological institutions and the effects of specific exhibits or programs on conservation-related knowledge, attitude and behavior.

Defining the Audience

In order to examine the effects of an overall visit to a zoo or aquarium or effects of a specific exhibit or program, it is important to examine previous experiences that can affect a visitor's conservation-related knowledge, attitude and behavior. Typically referred to as baseline studies, information is collected to assess visitors' incoming knowledge of, attitudes towards, and interest in conservation-related activities. This concept is similar to the "personal context" from a contextual model of learning developed for learning from an informal experience (Falk & Dierking, 2000). "Personal

context" was defined as personal characteristics that visitors bring to an informal learning experience including knowledge, interests and learning style preferences. From this information, visitors can be grouped or classified to help determine the impacts of a visit or specific exhibit or program.

In contrast to studies examining the effects of exhibits or visits to a zoo or aquarium, baseline information on visitors to zoos and aquariums have been documented in some detail. Past events or experiences with nature and zoological institutions have proven to shape a person's environmental concern, similar to the way other experiences can shape a person's development and interests (Holzer & Scott, 1997). Visits to zoos and aquariums during early childhood increase the likelihood of visiting zoological institutions later in life and also increase their interest in the educational benefits offered by these institutions compared to occasional zoo visitors (Holzer & Scott, 1997). Similarly, people with many outdoor experiences in early life result in a more favorable opinion towards the environment (Bixler, Floyd, & Hammitt, 2002) or a career decision to work in the field of conservation (Chawla, 1998).

Two studies conducted at Disney's Animal Kingdom (Dierking, Adelman, Ogden, Lehnhardt, Miller, & Mellen, 2004) and the National Aquarium in Baltimore (Adelman, Falk, & James, 2000) found that visitors were more knowledgeable, concerned, and involved in conservation-related issues than the general public. Participants were also considered to be well educated with a majority having attended some college. Given that previous knowledge and experiences can help influence the ability to learn new information within informal learning settings (Falk, 2005), visitors to zoos and aquariums should benefit from previous educational experiences.

Similarly, a study conducted by the Chicago Zoological Society and Lincoln Park Zoological Society (1993) suggested that visitors with higher income and more formal education felt more empowered to solve environmental problems than people who had lower incomes and less formal education. People with lower incomes and less formal education were also less likely to visit zoological institutions. In addition, people who reported participating in outdoor activities demonstrated more knowledge of conservation-related activities and conservation-related issues. This is similar to the reports of (Bixler, Floyd, & Hammitt, 2002) in that people with outdoor experiences early in life tend to have more favorable opinions towards the environment.

Other studies conducted examining baseline levels and demographics have concluded that visitors to zoos and aquariums seek out educational opportunities. Particularly those that provide information about nature and environmental problems, further their education, and help them to learn more about specific animals (Dunlap & Kellert, 1989; Hayward, 1995; Holzer & Scott, 1997). However, other studies have produced contrasting results where participants were more interested in an entertaining experience than an educational experience (Birney & Matamoros, 1995; Serrell, 1977). Differences between these studies could reflect geographic, educational background, or economic differences, but these differences clearly demonstrate the importance of defining and understanding the visitors' demographics in terms of previous knowledge, attitude and behavior. The ability for zoos and aquariums to effect conservation related knowledge, attitude and behavior could depend on the audience and developing programs based on the audience would be an important factor in meeting their goals.

A recent study conducted at twelve zoological institutions throughout the United States showed that although there are many different reasons people go to zoos and aquariums, most people fall into two main categories with distinct motivations (Falk et al., 2007). The first group includes visitors who are motivated primarily by social reasons and were referred to as "facilitators". Their goal was described as guiding others within their group for an education experience. The second group included visitors motivated to learn more through experiences within a zoological setting. The second group was referred to as "explorers" and visitors within this group were thought to be motivated out of curiosity. Other motivations, although these accounted for a much smaller proportion of the visiting audience, included seeking out a new or spiritual experience. Clearly, having an understanding of the previous experiences of visitors and their motivations for visiting zoological facilities can help determine the impacts of a visit on their conservation-related knowledge, attitude and behavior. Visitors of zoos and aquariums do not arrive *tabula rasa*, or as a blank slate, but arrive with previous knowledge, attitudes and experiences that can help us better understand the effects of visits to zoological institutions (Falk & Dierking, 2000).

Learning in a Zoological Setting

The process of learning that takes place within a zoo or aquarium is referred to as informal learning. The primary differences between informal learning and formal learning (e.g., primary education) are (a) educational goals in an informal learning setting are not defined for the visitors, (b) there is no one specified instructor, (c) the motivation to learn is from factors other than learning information for a test, (d) information is usually presented with little text, and (e) the information is presented without regard for

visitors' current level of formal education. Because of this, informal learning leads to a situation of free choice where visitors are free to choose which information they pay attention to and which of the staff members they engage in conversation. This is significant because any information that is learned results from their choices. The manner in which information is presented to the audience could be one of the primary influences on attention to specific information.

Studies investigating the effects of zoos and aquariums have shown that specific exhibits or programs can increase short-term knowledge. For example, an elephant demonstration at Zoo Atlanta was found to increase visitors' knowledge of elephants and their conservation (Swanagan, 2000). Similarly, visitors to a traveling rain forest exhibit showed a short-term increase in knowledge of rain forest issues immediately following the experience (Doering, 1992). Results also showed that the exhibit reinforced information for visitors with a previous knowledge of rain forest issues and introduced the issues to visitors with no prior knowledge.

Important information can be included on signage for exhibits, but a majority of visitors to these exhibits pay little or no attention to the information presented. For example, at one facility only 13% of the visitors to a tiger exhibit read the information on the sign in front of the exhibit (Churchman, 1985). Similarly, only 5% of all visitors stopped to read graphics at polar bear exhibits throughout six zoos in the northeastern United States (Johnston, 1998). Factors such as size of the letters, size of the sign, and figures or illustrations can increase the percentage of people who read signs and duration of time spent reading information (Bitgood, Patterson, & Benefield, 1986). However, the

knowledge gained from information presented within graphic displays is minimal unless an interactive component is added (Arndt, Screven, Benusa, & Bishop, 1993).

Interactive exhibits, increased animal activity and animal shows hold audience attention longer than graphic displays (Altman, 1998; Bitgood et al., 1986; Jackson, 1994; Swanagan, 1993; 2000). While increasing duration of time at an exhibit can increase the opportunities to learn information, this does not guarantee visitors are retaining the information presented. Nonetheless, duration of time spent at exhibits positively correlates with learning in museums (Falk, 1983). However, duration of time at exhibits can correlate positively with number of people in their group, number of people at the exhibit and time of day (Bitgood et al., 1986).

In addition to the effects of specific exhibits, some research has focused on the effects of overall visits to zoos and aquariums on conservation-related knowledge. The conservation impact study at the National Aquarium in Baltimore demonstrated both a short-term increase in conservation-related knowledge, and retention of information learned several months following the visit (Adelman, Falk, & James, 2000). The information that was retained by visitors was related to the specific exhibit elements (e.g., dolphin show, rain forest exhibit) in which information was obtained. Visitors could also identify conservation as the overall theme of the aquarium which was central to the mission of this institution. This study is one example of examining both the effects of an overall experience and the long-term effects.

To date, most studies within zoos and aquariums have focused on the short-term effects of specific exhibits and programs. Few studies have focused on the long-term retention of knowledge gained from these experiences likely due to the cost and difficulty

in conducting longitudinal studies. From the studies conducted it is clear that certain exhibits, programs and overall visits can have an effect on short-term conservation-related knowledge. However, more information is needed to understand the effects of these experiences on the long-term retention.

Impacts of Zoological Visits on Attitudes

Although attitude and attitude change have been studied in detail within psychology (Olson & Zanna, 1993; Petty, Wegener, & Fabrigar, 1997), there is little information on the effects of exhibits or overall zoological experiences on visitors' attitude. Petty, Priester, and Wegener (1994) defined attitude as a summary of evaluations of an object (e.g., person, issue, or position) along a dimension ranging from positive to negative. However, this definition is based on a cognitive approach and there is no universal agreed upon definition for the concept of attitude. Many different models have been proposed for examining attitude change and demonstrate the complexity and number of potential factors involved in attitude change.

Persuasion is the process of providing information to others, typically through written or spoken messages, resulting in attitude change (Olson & Zanna, 1993). Within the literature on persuasion, there are two main dual-process theories. The two main theories are the Elaboration Likelihood Model (Petty & Cacioppo, 1986) and the Heuristic Systematic Model (Chaiken, Liberman, & Eagly, 1989). Both of these models assume that individuals will process a message carefully when motivated and capable of doing so (Olson & Zanna, 1993). While there are many similarities between these models, the differences are apparent, especially when motivation is low for processing a message.

The Elaboration Likelihood Model of persuasion theorizes that the more motivated and able people are to assess an object (e.g., person, position.), the more likely they will evaluate all information available about the object (Petty et al., 1994). According to this model, motivation is a continuum ranging from low to high. When people are motivated, they are more likely to assess information and this will result in a reasoned, although potentially biased, attitude. When motivation is low, less information will be processed, however attitude change can occur from other processes that require less effort. Examples of processes leading to attitude change when motivation is low include classical conditioning or exposure effects (Petty & Wegener, 1998). Classical conditioning works by pairing a positive item with an idea or attitude. Exposure effects work through exposure without something being consciously perceived. These different routes to attitude change are referred to as the peripheral route, compared to the central route when motivation is high. Changes in attitude that result from high effort are thought to be stronger and longer lasting than when effort is low (Petty et al., 1994).

The Heuristic Systematic Model of persuasion is similar to the Elaboration Likelihood Model when subjects are motivated. Chaiken et al. (1989) theorized that when people are motivated they will use a systematic process to evaluate information to arrive at a particular attitude. One of the differences between the two models is the utilization of mental shortcuts or heuristics. Heuristic processing is thought to take place in situations when people are not motivated or not able to use effortful thinking about the contents of a message. This heuristic processing involves using mental shortcuts to arrive at a particular attitude (Chaiken et al., 1989). For example, a person might change their attitude about a particular topic if the individual presenting the information to them is

perceived as an expert on the topic. If the person is considered an expert then the message is perceived as correct. While this process requires less effort, it can lead to error when forming attitudes about a particular object, idea or person. Both models provide a framework for examining persuasion and attitude change, and suggest there are many variables (e.g., message, context) that need to be taken into consideration when examining this topic.

Throughout the literature, persuasion variables have typically been categorized into four groups (Petty & Wegener, 1998). These categories include source (e.g., credibility, attractiveness), message (e.g., relevance, quality, pro/counter attitudinal), recipient (e.g., previous knowledge, demographics), and context (e.g., distraction, audience reactions, repetition of message). While most of the variables that have been studied show effects when motivation and effort is low, there have been some instances when these variables affect persuasion when motivation and effort is high (Petty & Wegener, 1998). However, most of these variables have been examined independently and future research will need to examine the combined effects of these variables to determine their role in effecting attitude change and help further explain the complexity of this topic.

Many of the above persuasion variables may play a key role in fostering a positive attitude towards animals. For example, a study conducted at the Birmingham Zoo found that educational level, gender, leisure reading about animals and self rated knowledge about zoo animals were all strongly associated with the degree to which individuals believed animals were worth conserving (Bitgood, 1992). Specifically, people who were highly educated, who engaged in leisure reading about animals, and who rated

themselves higher in terms of knowledge of animals were more likely to have positive attitudes about conserving wildlife. Results from this study provide an example of recipient variables that can have an impact on outcomes of a zoo or aquarium visit.

The results from a study at the Pocono Environmental Education Center examining the effectiveness of different types of wildlife education programs on visitors' attitudes towards snakes provides an example of important message and context variables (Morgan & Gramann, 1989). Attitudes towards snakes were more positive after positive modeling and direct contact with the animals. Simply presenting information about snakes or allowing visitors to see snakes did not have the same effects as modeling appropriate behavior towards the animals and allowing direct contact (Morgan & Gramann, 1989).

The importance of the message and context of exhibits within a zoological setting is demonstrated by work examining the "naturalness" of the exhibits. In one study, slides were presented to college students in three types of settings: (a) natural, (b) semi-natural, and (c) caged (Rhoades & Goldsworthy, 1979). The findings suggested that displaying animals within a more naturalistic environment could enhance visitors' appreciation of wildlife and conservation efforts. Similarly, it was found that free-ranging exhibits with primates could help promote the appreciation of conserving wild animals more so than exhibiting primates in cages (Price, Ashmore, & McGivern, 1994).

Research investigating shows or programs within zoological institutions has also shown the ability to create a positive attitude towards wildlife conservation. Swanagan (2000) examined the differences between an active and passive experience with elephants. Visitors with a more active experience expressed a greater interest in elephant

conservation than those with a passive experience. These results were similar to the results examining a birds of prey show conducted by Yerke and Burns (1991). In this study, attitude toward the importance of personal action in protecting wildlife increased from pre-show scores to post-show scores.

While some studies have shown the ability to increase appreciation towards wildlife and wildlife conservation (e.g., Meyers et al., 2004; Swanagan, 2000), most visitors unfortunately return to baseline levels three months or longer following their visit (Dierking, Burtnyk, Buchner, & Falk, 2002). Although interactive or non-passive exhibits and programs provide an experience that creates a positive appreciation for wildlife and wildlife conservation, there is still information needed on the long-term effects of these programs in promoting positive attitudes towards wildlife and wildlife conservation. Understanding the source, message, recipient and context variables that contribute to a greater appreciation of wildlife and wildlife conservation both short and long-term will help in achieving the goals of inspiring visitors to conservation action.

Impacts of Zoological Visits on Conservation-Related Behavior

Although the links between knowledge, attitude, and behavior are limited, there is some evidence that large changes in attitude can result in a change in behavior (Hines, Hungerford, & Tomera, 1986). One of the common goals among zoological institutions is determining the best methods to inspire visitors to conservation action. Over the years, many educators have used simplistic models relying on an increase in knowledge to potentially change behavior (Oreg & Katz-Gerro, 2006). However, current evidence suggests that programs targeting values and attitudes might be more appropriate (Oreg &

Katz-Gerro, 2006) even though many studies have found only a moderate link between attitude and behavior (Hines et al., 1986).

One of the theories most commonly used in reference to conservation-related behavior is Ajzen's (1985) Theory of Planned Behavior. This theory is based on Fishbein and Ajzen's (1975) original Theory of Reasoned Action. According to the Theory of Planned Behavior, the predictors of behavior are behavioral intentions. The precursors for behavioral intentions include attitude toward the behavior, perceptions of social norms regarding the behavior, and perception of behavioral control (Ajzen, 1985). Importantly, the results from Oreg and Katz-Gerro (2006) suggest that attitudes toward the behavior are an important precursor to conservation-related behavior. Specifically, the results showed that attitudes related to concern for the environment, perceived threat and perceived behavioral control were all significant predictors of behaviors including recycling and donating money (Oreg & Katz-Gerro, 2006). These behaviors that were measured are similar to many studies examining conservation-related behavior within zoological institutions. Recycling and donating money to conservation are rather simple behaviors and understanding attitudes towards more complex behaviors could provide greater insight into this process. Determining the process and variables important in changing a person's attitude that can lead to conservation-related behavior is an important next step.

Specific exhibits or programs within zoological institutions can increase interest in participating in conservation-related activities (Dierking et al., 2004). However, interest in participating in conservation-related activities often returns to baseline levels two or three months after the visit (Adelman et al., 2000; Dierking et al., 2004; Dotzour

et al., 2002). For example, a long-term study conducted at the National Aquarium in Baltimore found that visitors had an initial interest in conservation-related activities which lasted up to six to eight weeks after the visit (Adelman et al., 2000). However, the long-term evaluation also revealed that there was very little increase in conservation action reported by visitors.

In a similar study conducted at Conservation Station at Disney's Animal Kingdom, visitors were examined before, directly after and two to three months following their experience (Dierking et al., 2004). Results were similar to those from the National Aquarium in Baltimore in that overall interest and participation in conservation-related activities did not persist during the long-term follow-up. Utilizing the Prochaska Model of Behavioral Change (Prochaska, DiClemente, & Norcross, 1992) to examine conservation-related behavior, there was great variability observed for visitors' incoming level of conservation-related action which affected the outcomes from the study. Specific findings included that people with lower incoming conservation-related behavioral intentions were more likely to show increases in conservation-related interest, but only during the short-term assessment (Dierking et al., 2004). While overall the model was useful in examining behavior change, the authors suggested the model would need to be further modified due to the complexity of conservation-related behavior.

Overall, there are many models for behavioral change that can be used to examine the effects of visits to zoological institutions or specific exhibits or programs within these facilities. However, due to the complexity of conservation-related behavior most of these models will need to be modified to be able to detect changes based on these experiences. With the goal of inspiring visitors to conservation action, it is clear that understanding the

previous knowledge, attitudes and behavioral intentions of visitors will be important in meeting this goal to help conserve species throughout the world.

Atlantic Bottlenose Dolphin Education Programs

Barney, Mintzes, and Yen (2005) demonstrated that bottlenose dolphins are a poorly understood species. Potentially harmful behaviors towards this species, such as feeding dolphins in the wild, are widespread by the general public. Given that Atlantic bottlenose dolphins are a species commonly found exhibited in zoos and aquariums, there is a unique opportunity to educate the public about threats to this species. Dolphin shows and interaction programs (swim-with programs) are the most common forms of education programs with bottlenose dolphins. While some studies have begun to examine the effects of such programs, there is little information available on the short and long-term effects of these programs on visitors' conservation-related knowledge, attitude and behavior.

Roper Starch (1998) reported that visitors to facilities of the Alliance of Marine Mammal Parks and Aquariums indicated their experience had some degree of impact on their knowledge and appreciation of animals. This study examined one or two institutions from each of four different geographic locations (Northeast, South, Midwest, West) throughout the United States. Importantly, visitors who had a chance to interact with marine mammals reported a greater impact on their knowledge and appreciation of the animals. However, little is known about the individual effects of the programs or exhibits at these institutions. Moreover, reporting that an experience is educational does not demonstrate retention of knowledge gained from the experience.

Studies examining the specific education programs with bottlenose dolphins have been limited in scope. Most of these studies have utilized small sample sizes and qualitative measures which may result in experimenter bias. For example, one study conducted interviews with fourteen participants from various interaction programs around the world with both dolphins in zoological facilities and in the wild (Curtin, 2006). Participants were selected using a "purposive sampling method" by advertising on a university website. Although the results showed nearly all participants experienced cognitive dissonance, this was possibly a result of the selection methods. The cognitive dissonance that was observed was due to participants enjoying the experience with a general feeling that the animals should not be within human care. People experiencing cognitive dissonance after such a program would probably more likely volunteer to participate in such a research project. Additionally, the results showed that participants did find entertainment and enjoyment during their experience (Curtin, 2006).

Another study focusing on perceptions of dolphins was conducted by the New York Wildlife Conservation Society (Sickler, Fraser, Gruber, Boyle, Reiss, & Webler, 2006). This study examined perceptions of dolphins and dolphin exhibits by surveying the dolphin research community and the general public. Results from the dolphin research community suggested that dolphin exhibits should focus on making connections between dolphins within zoos and aquariums and dolphins in the wild. Additionally, the research community thought dolphin intelligence and communication should be highlighted and were concerned about the misconceptions and anthropomorphism surrounding dolphins. Information gained from the general public suggested that a majority of the respondents had a generally positive attitude towards dolphins.

Participants that had attended dolphin shows were more likely to remember "tricks", training and physical ability rather than the cognitive abilities of the animals. However, interviews were only conducted with 48 participants and the information collected was interpreted by the experimenter, which could result in experimenter bias. While this study provides some insight into the perceptions of dolphins and the effects of some programs, more information is clearly needed.

With the challenges facing dolphins throughout the world (e.g., boat interactions, pollution) it is important to gain a better understanding of the effects of dolphin shows and interaction programs as tools for educating the public. The goal of the current study is to examine the effects of dolphin shows and interaction programs on visitors' conservation-related knowledge, attitude, and behavior. Little information is currently available on the effects of these programs and information that is available has mostly been through qualitative studies with small sample sizes. The current study is the first quantitative multi-institutional study examining the effects of these programs. Determining experiences that have long-term effects is critical to ensure the conservation of dolphins and the marine environment. Continued systematic evaluation of education programs is necessary to determine the full range of benefits from these programs. Outcomes from the current study will also allow for refinement of current programs and creation or refinement of education programs with other species.

CHAPTER III

METHODS

The current study was comprised of three separate experiments. The first experiment examined the effects of dolphin shows, the second experiment examined the effects of interaction programs, and the third experiment examined the effects of viewing dolphins in an aquarium type display compared to visitors who had not viewed dolphins. Additionally, information collected from participants of dolphin shows and interaction programs was used to examine the effects of previous experiences on entry levels of and changes in knowledge, attitude and behavior.

Participants

The participants of the study included adult visitors, over the age of 18, at six zoological institutions throughout the United States attending dolphin shows (n = 462) or dolphin interaction programs (n = 331). A subset of the sample from dolphin shows (n = 164) or interaction programs (n = 128) also participated in a follow-up survey approximately three months after the initial experience (M = 109.5 days; Range 90 to 159). Additionally, adult visitors at Disney's The Seas were randomly selected for visitors who had seen dolphins within the aquarium (n = 100) and a control group who did not view dolphins (n = 100). Table 1 includes the number of participants and success rate for each of the types of programs. The six institutions included the Minnesota Zoo (Apple Valley, MN), Brookfield Zoo (Brookfield, IL), Indianapolis Zoo (Indianapolis, IN), Texas State Aquarium (Corpus Christi, TX), Disney's The Seas (Lake Buena Vista, FL) and Dolphin Connection (Duck Key, FL). Four of the six facilities offered dolphin shows, and five of the six facilities offered dolphin interaction programs.

Table 1

Number of Participants and Success Rate throughout the Study

Participant Type	Pre/Post	Success Rate	Follow-Up	Success Rate
Dolphin Show	462	66.14%	164	52.22%
Interaction Program	331	97.69%	128	41.83%
Control	200	92.51%	-	-

Data Collection

Dolphin Shows

All data were collected between September 2007 and July 2008. Visitors attending dolphin shows were randomly selected to participate in a survey by choosing every n^{th} visitor. Information about the survey was discussed with all potential participants prior to data collection. This included an explanation that the survey was part of a research project being conducted by a graduate student from The University of Southern Mississippi. Additionally, participants were told that the survey was voluntary, and all personal information collected would remain confidential. All participants that declined to take the survey were recorded with the reason for declining to determine a success rate and ensure adequate sampling. All surveys at each institution were conducted using a clipboard with the survey questionnaire.

The survey consisted of a repeated measures design where participants were surveyed before (entry), directly after (exit) and approximately three months following (follow-up) their experience. Demographic information on gender, age, number of people with the participant, race/ethnicity, and educational background was collected from all participants (Appendix C). Additionally, information on the reason for attending or participating in the current show or program and past experiences with dolphin tours in

the wild, dolphin shows and dolphin interaction programs was recorded. The name, email address, phone number and information on the best time to contact the participant were collected to conduct follow-up surveys for all participants who provided consent. Follow-up surveys occurred approximately three months after participation either through a website or phone interviews depending on visitor preference and availability. Information collected during follow-up surveys was used to examine the long-term effects of these programs on the visitors' conservation-related knowledge, attitude and behavior.

The entry survey consisted of 48 Likert scale items related to conservation of dolphins and the marine environment (Appendix D). The exit survey and follow-up surveys consisted of exactly the same Likert scale items with five additional Likert scale items (Appendixes E and F). The 48 Likert scale items consisted of 10 questions to examine conservation-related knowledge, 17 questions to examine conservation-related attitude, and 21 questions to examine interest in conservation-related behaviors. Knowledge and attitude scale items were based on a five point scale with responses ranging from 1 (strongly disagree) to 5 (strongly agree). Behavioral scale items were also based on a five point scale ranging from 1 (not interested) to 5 (planning on doing). Additionally, the entry survey examined previous participation in 21 conservation-related behaviors during the previous three months and anytime in the past. The follow-up survey examined participation in 21 conservation-related behaviors during the three months between the exit survey and the follow-up survey. Survey questions were analyzed for document reading level and analysis resulted in a Flesh Kincaid Grade level of 7.52 with a Flesh Reading Ease level of 58.12.

Interaction Programs

Methods for the portion of the study examining the effects of interaction programs on conservation-related knowledge, attitude and behavior were identical to the methods utilized for examining dolphin shows except for selection of visitors for participation. Due to smaller attendance figures, all visitors participating in interaction programs were asked to participate in the survey. Participants who declined were also recorded with the reason for declining to determine a success rate and ensure adequate sampling.

Dolphin Viewing and Control Group

In addition to examining the effects of dolphin shows and education programs on conservation-related knowledge, attitude and behavior, a random selection of visitors were selected to examine effects of viewing dolphins using the entry survey questions (Appendix D). Participants were randomly selected by choosing the n^{th} visitor entering a cue line at one of the attractions at Disney's The Seas. Participants were grouped based on viewing or not viewing dolphins before completion of the survey. Information on previous experiences and reasons for visiting were also collected (Appendix C).

Survey Validation

Survey validation was conducted at The University of Southern Mississippi. Participants in the first round of survey validation included 63 undergraduate students over the age of 18 enrolled in psychology classes during the fall semester of 2006. Reliability analysis was conducted to examine properties of the measurement scales, and identify problem items to be removed from the questionnaire. The reliability analysis for the first round of survey validation for Likert scale items resulted in an alpha level of .876. Information gained from the first round of validation resulted in dropping open-

ended questions and changing and adding additional Likert scale items to decrease the length of time required to complete the survey. The second round of validation included 90 undergraduate students enrolled in psychology classes during the spring semester of 2007. Reliability for the final round of surveys for Likert scale items resulted in an alpha level of .934.

Data Analysis

All information collected was analyzed to examine the distribution of the data. Due to the positive skew in information collected on number of previous dolphin shows attended, the variable was coded to create a normally distributed variable (Table 2). Additionally, education level was also coded to create a dichotomous variable grouping people based on those who had received a college degree and those who had not. Demographic information was analyzed to determine the characteristics of the sample. Chi square tests of significance were used to examine differences between dolphin show/interaction program participants and dolphin viewing/control groups. Any negative Likert scale items (e.g., "Swimming with a dolphin in the wild is safe for you and the dolphin") were recoded to match positive responses by reversing the scale.

Table 2

Recoded Values for Number of Dolphin Shows Participants had Attended in the Past

Label	Value
0	No dolphin shows
1	1 dolphin show
2	2 to 4 dolphin shows
3	5 to 9 dolphin shows
4	More than 10 dolphin shows

A paired samples t-test was used to examine short-term changes in knowledge, attitude, and intended behavior between the entry survey and exit surveys for participants of both dolphin shows and interaction programs. A paired samples t-test was also used to examine long-term changes in knowledge, attitude, reported behavior and intended behavior between the entry survey and follow-up surveys for participants of both dolphin shows and interaction programs. Information collected from participants viewing dolphins on conservation-related knowledge, attitude and behavior was compared to participants of the control group who did not view dolphins using an independent samples t-test.

Multiple regression analysis was used to examine the effect of demographics (gender and education level), previous experiences and participant type (dolphin show or interaction program) on knowledge, attitude, recent behavior, behavior anytime in the past, and behavioral intentions recorded from the entry survey. Hierarchal multiple regression analyses were used to examine the effect of demographics, previous experiences, participant type, and entry levels of knowledge, attitude and behavioral intentions on short and long-term changes in knowledge, attitude, recent behavior and intended behavior. Simple slope tests as described by Aiken and West (1991) were used to follow-up any significant interactions found through regression analysis.

CHAPTER IV

RESULTS

Demographic information for participants of dolphin shows and interaction programs is presented in Table 3. Participants of both types of programs had a larger percentage of females, were more likely to be Caucasian, had attended at least some college, and were from the United States. The differences between the two participant types include age, race, visit reason and location. Participants of dolphin shows had a higher percentage of participants between the ages of 25 and 44, a higher percentage of people of Hispanic origin, a higher percentage were visiting for social or family reasons and only 3% were international visitors. Participants of interaction programs had a higher percentage of participants between the ages of 45 and 64, a higher percentage of Caucasian participants, were visiting for a new or unique experience, and had a higher percentage of international visitors compared to participants of dolphin shows. Table 4 includes the demographic information for participants that had viewed dolphins and the control group. There were no significant differences in demographic information between these two samples.

Table 3

Demographics for participants of dolphin shows and interaction programs

	Dolphin Show		Interaction Program		
	N	%	N	%	Chi Square
Gender					
Male	149	32%	109	33%	0.02
Female	311	68%	222	67%	
Age					
18-24	65	14%	41	12%	30.03**
25-34	153	34%	63	19%	
35-44	125	27%	92	28%	
45-54	63	14%	78	24%	
55-64	38	8%	42	13%	
65+	12	3%	13	4%	
Race					
White	368	81%	304	92%	24.28**
Asian	10	2%	7	2%	
African American	11	2%	3	1%	
Hispanic	57	13%	13	4%	
Other	10	2%	2	1%	
Educational Background					
Grade School	1	0%	3	1%	8.48
Some High School	10	2%	13	4%	
High School Graduate	57	12%	39	12%	
Some College	132	29%	80	24%	
College Graduate	144	31%	122	37%	
Technical School Graduate	26	6%	15	5%	
Some Graduate School	19	4%	10	3%	
Graduate Degree	70	15%	46	14%	
Visit Reason					
New/Unique Experience	55	12%	221	67%	334.81**
Family/Social Experience	354	77%	46	14%	
Learning Experience	27	6%	51	15%	
Other	23	5%	14	4%	
Location					
United States	447	97%	308	90%	17.33**
International	15	3%	36	10%	

Table 3 (continued).

	Dolphin Show		Interaction Program		
	N	%	N	%	Chi Square
Number of Dolphin Shows					
0	59	16%	62	23%	12.02*
1	68	18%	55	20%	
2	54	15%	48	18%	
3	49	13%	36	13%	
4	28	8%	14	5%	
5+	110	30%	55	20%	
Number of Interaction Programs					
0	424	92%	294	90%	8.29*
1	28	6%	25	7%	
2	7	2%	3	1%	
3+	1	1%	7	2%	

Note. * $p < 0.05$; ** $p < 0.01$

Table 4

Demographics for participants who viewed or did not view dolphins

	No Dolphin Viewing		Dolphin Viewing		
	N	%	N	%	Chi Square
Gender					
Male	42	42%	40	40%	1.13
Female	57	58%	60	60%	
Age					
18-24	5	5%	6	6%	0.93
25-34	28	28%	26	26%	
35-44	43	43%	46	46%	
45-54	11	11%	13	13%	
55-64	11	11%	8	8%	
65+	1	1%	1	1%	
Race					
White	87	87%	90	90%	3.05
Asian	4	4%	2	2%	
African American	1	1%	0	0%	
Hispanic	5	5%	7	7%	
Other	3	3%	1	1%	

Table 4 (continued).

	No Dolphin Viewing		Dolphin Viewing		
	N	%	N	%	Chi Square
Educational Background					
Grade School	0	0%	0	0%	10.02
Some High School	0	0%	2	2%	
High School Graduate	6	6%	6	6%	
Some College	20	21%	15	15%	
College Graduate	42	43%	38	38%	
Technical School Graduate	1	1%	6	6%	
Some Graduate School	7	7%	7	7%	
Graduate Degree	21	22%	26	26%	
Visit Reason					
New/Unique Experience	11	11%	13	13%	0.85
Family/Social Experience	81	83%	80	81%	
Learning Experience	4	4%	3	3%	
Other	2	2%	3	3%	
Location					
United States	92	95%	89	90%	0.52
International	5	5%	10	10%	
Number of Dolphin Shows					
0	19	19%	21	21%	3.84
1	14	14%	16	16%	
2	17	17%	18	18%	
3	14	14%	8	8%	
4	2	2%	6	6%	
5+	13	13%	13	13%	
Number of Interaction Programs					
0	86	86%	87	87%	2.77
1	8	8%	11	11%	
2	2	2%	0	0%	
3+	1	1%	2	2%	

Note. * $p < 0.05$; ** $p < 0.01$

Table 5 presents the results examining short-term and long-term changes in knowledge, attitude, behavioral intentions and reported behavior for participants of dolphin shows. There were significant short-term increases in conservation-related knowledge, attitude and behavioral intentions. However, attitudes and behavioral intentions returned to baseline levels three months following the shows. Knowledge and reported behavior three months following the shows were both significantly higher than what was reported during the entry survey.

Table 5

Results on short and long-term effects of dolphins shows

	Entry		Exit/Follow-up			
	M	SE	M	SE	df	*T*
Short-Term						
Knowledge	4.19	0.02	4.23	0.02	461	-2.73**
Attitude	3.79	0.02	3.81	0.03	461	-2.05*
Behavioral Intentions	3.08	0.03	3.29	0.04	461	-11.23**
Long-Term						
Knowledge	4.29	0.04	4.38	0.04	136	-2.56*
Attitude	3.91	0.04	3.89	0.04	136	0.74
Reported Behavior	0.37	0.01	0.40	0.01	163	-2.37*
Behavioral Intentions	3.34	0.06	3.40	0.06	116	-1.27

Note. * $p < 0.05$; ** $p < 0.01$

Results examining short-term and long-term changes in knowledge, attitude, behavioral intentions and reported behavior for participants of interaction programs is summarized in Table 6. Knowledge, attitude and behavioral intentions all increased significantly in the short-term and remained at significantly higher levels during the follow-up when compared to entry survey levels. Additionally, reported behavior was also significantly higher during the follow-up when compared to entry levels.

Table 6

Results on short and long-term effects of interaction programs

	Entry		Exit/Follow-up			
	M	SE	M	SE	df	*T*
Short-Term						
Knowledge	4.28	0.02	4.52	0.02	314	-12.12**
Attitude	3.93	0.03	4.11	0.03	314	-12.33**
Behavioral Intentions	3.29	0.04	3.65	0.04	276	-13.84**
Long-Term						
Knowledge	4.29	0.03	4.58	0.03	125	-8.10**
Attitude	4.01	0.04	4.07	0.04	125	-2.10*
Reported Behavior	0.33	0.02	0.40	0.02	127	-4.44**
Behavioral Intentions	3.35	0.05	3.52	0.05	114	-3.13**

Note. * $p < 0.05$; ** $p < 0.01$

Overall, participants of both dolphin shows and interaction programs scored these programs as entertaining and educational (Table 7). Participants also indicated that these programs increased their interest in learning more about and caring for dolphins and the marine environment. However, only participants of interaction programs agreed that the program was one of the best experiences of their life.

Table 7

Means and standard error for ranks on dolphin shows and interaction programs

	Dolphin Show		Interaction Program	
Statement	M	SE	M	SE
This experience was entertaining	4.59	0.03	4.89	0.02
This experience was educational	4.44	0.03	4.87	0.02
This experience increased my interest in learning more about dolphins and the ocean	3.99	0.04	4.65	0.04
This experience increased my caring for dolphins and the ocean	4.01	0.04	4.65	0.03
This was one of the best experiences of my life	3.19	0.05	4.39	0.04

A comparison of people who had viewed dolphins with those who had not viewed dolphins revealed no significant differences in conservation-related knowledge, attitude, reported behavior or behavioral intentions. The results are presented in Table 8.

Table 8

Results on comparisons between people who had or had not viewed dolphins

	No Dolphin Viewing		Dolphin Viewing			
Measure	M	SE	M	SE	Df	*T*
Knowledge	3.71	0.03	3.72	0.03	198	-0.28
Attitude	2.89	0.03	2.88	0.03	198	0.20
Previous Anytime Behavior	1.91	0.01	1.90	0.01	198	0.09
Previous Recent Behavior	1.56	0.02	1.56	0.01	198	0.60
Behavioral Intentions	2.76	0.05	2.79	0.05	198	-0.39

Note. * $p < 0.05$; ** $p < 0.01$

Table 9 presents the descriptive statistics and correlations for entry, exit and follow-up levels of knowledge, attitude, behavior and behavioral intentions and predictor variables including education level, number of dolphin shows attended in the past and participation in an interaction program in the past. Entry, exit and predictor variables are based on the entire sample (N = 777). Follow-up variables are based on that portion of the sample (N = 292).

Table 9

Descriptive statistics and correlations for dependent and predictor variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Entry Knowledge	-														
2. Entry Attitude	0.57**	-													
3. Entry Recent Behavior	0.14**	0.18**	-												
4. Entry Anytime Behavior	0.24**	0.30**	0.56**	-											
5. Entry Behavioral Intentions	0.32**	0.52**	0.24**	0.35**	-										
6. Exit Knowledge	0.66**	0.49**	0.09*	0.18**	0.32**	-									
7. Exit Attitude	0.49**	0.85**	0.16**	0.25**	0.52**	0.60**	-								
8. Exit Behavioral Intentions	0.33**	0.55**	0.25**	0.33**	0.84**	0.38**	0.59**	-							
9. Follow-up Knowledge	0.45**	0.46**	0.04	0.07	0.22**	0.65**	0.55**	0.27**	-						
10. Follow-up Attitude	0.41**	0.75**	0.12	0.16*	0.40**	0.46**	0.79**	0.45**	0.66**	-					
11. Follow-up Recent Behavior	0.03	0.17**	0.39**	0.36**	0.27**	0.02	0.15*	0.32**	0.11	0.18**	-				
12. Follow-up Behavioral Intentions	0.23**	0.47**	0.20**	0.33**	0.56**	0.28**	0.48**	0.55**	0.34**	0.55**	0.48**	-			
13. Education Level	0.14**	0.00	0.07	0.19**	0.05	0.10**	0.02	0.02	0.08	-0.01	0.03	0.02	-		
14. Number Dolphin Shows	0.12**	0.09*	0.16**	0.28**	0.11**	0.05	0.09*	0.07	0.00	0.05	0.03	-0.02	0.09*	-	
15. Interaction Program	0.12**	0.12**	0.04	0.14**	0.07	0.08*	0.12**	0.07	0.05	0.13*	0.00	0.02	0.00	0.10*	-
M	4.22	3.84	0.35	0.55	3.16	4.35	3.93	3.42	4.48	3.98	0.40	3.48	0.57	1.81	0.09
SD	0.42	0.47	0.17	0.20	0.72	0.45	0.53	0.74	0.40	0.48	0.18	0.63	0.50	1.24	0.29

Note. * $p < 0.05$; ** $p < 0.01$

The relationship between entry scores and previous experiences was examined using multiple regression analysis. In earlier models, previous experiences at institutions or on dolphin watching boat trips were included. However, there were no significant relationships observed and these variables were removed from further analyses to create a simpler model. The results from the regression analysis are presented in Table 10. The model examined was a significant predictor for entry levels of knowledge, attitude, recent behavior, anytime behavior and behavioral intentions. Females' entry scores were higher for knowledge, attitude and behavioral intentions. Level of education completed was a significant predictor of knowledge and behavior that had been done anytime in the past. Number of dolphin shows attended in the past was a significant predictor for all variables. Attending interaction programs in the past was a significant predictor for all variables except for recent conservation-related behavior and participants attending interaction programs had higher entry level scores on knowledge, attitude, and behavioral intentions.

Table 10

Regression analysis examining previous experiences

Predictor Variables	Knowledge B	Attitude B	Recent Behavior B	Anytime Behavior B	Behavioral Intentions β
Gender	-0.14**	-0.20**	-0.01	0.00	-0.14**
Education Level	0.12**	0.00	0.07	0.17**	0.02
Number Dolphin Shows	0.10*	0.08*	0.14**	0.26**	0.11**
Interaction Program	0.10*	0.14**	0.03	0.11**	0.09*
Participant Type	0.14**	0.18**	-0.05	0.05	0.15**
	$R^2 = 0.08$**	$R^2 = 0.11$**	$R^2 = 0.03$**	$R^2 = 0.12$**	$R^2 = 0.06$**

Note. * $p < 0.05$; ** $p < 0.01$

Results from the hierarchal multiple regression analysis for short-term changes in knowledge, attitude and behavioral intentions are summarized in Table 11. Significant predictors of short-term change in knowledge included previous levels of knowledge, attitude, and behavioral intentions. Additionally, participant type and an interaction between previous levels of knowledge and participant type were also significant. Predicted values for the significant interaction are shown in Figure 1. Significant predictors of short-term change in conservation-related attitude included previous attitude and behavioral intention levels and participant type. Significant predictors of short-term behavioral intentions included previous attitude and behavioral intention levels, and participant type. Additionally there were two significant interactions between previous behavioral intentions and participant type and number of dolphin shows previously attended and previous levels of knowledge. Figures 2 and 3 display the predicted values for these significant interactions.

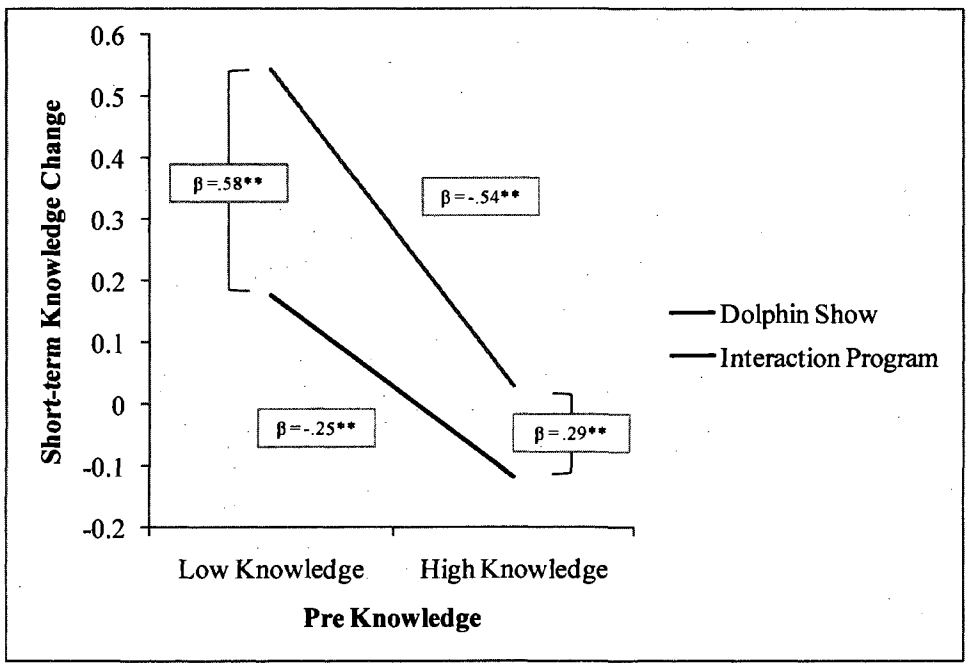


Figure 1. Interaction between previous levels of knowledge and participant type

Note. * $p < 0.05$; ** $p < 0.01$

Table 11

Results from the hierarchal multiple regression analysis for short-term change

		Δ Knowledge			Δ Attitude			Δ Behavioral Intentions		
Step	Predictor Variables	R^2	ΔR^2	B	R^2	ΔR^2	B	R^2	ΔR^2	β
1	Pre Knowledge	0.17**	0.17**	-0.48**	0.04**	0.04**	0.06	0.09**	0.09**	-0.01
	Pre Attitude			0.15**			-0.22**			0.25**
	Pre Behavioral Intentions			0.10*			0.18**			-0.36**
	Pre Recent Behavior			-0.03			-0.02			0.08
2	Gender	0.28**	0.11**	-0.07	0.13**	0.09**	-0.07	0.14**	0.05**	-0.02
	Education Level			0.01			0.02			-0.03
	Number Dolphin Shows			0.00			0.04			-0.04
	Interaction Program			-0.00			0.01			-0.02
	Participant Type			0.34**			0.31**			0.22**
3	Pre Knowledge x Participant Type	0.30**	0.02	-0.18**	0.13**	0.00	-0.08	0.15**	0.01	-0.02
	Pre Attitude x Participant Type			0.03			0.04			0.09
	Pre Behavioral Intentions x Participant Type			0.06			-0.01			-0.13*
	Pre Recent Behavior x Participant Type			-0.11			-0.09			-0.01
4	# Dolphin Shows x Pre Knowledge	0.30**	0.01	0.01	0.14**	0.01	-0.01	0.16**	0.01	0.10*
	# Dolphin Shows x Pre Attitude			-0.08			0.03			-0.04
	# Dolphin Shows x Pre Behavioral Intentions			-0.04			-0.02			0.02
	# Dolphin Shows x Pre Recent Behavior			-0.01			0.01			0.03
	Interaction Program x Pre Knowledge			-0.02			0.03			0.03
	Interaction Program x Pre Attitude			0.04			-0.01			-0.05
	Interaction Program x Pre Behavioral Intentions			0.02			-0.02			0.03
	Interaction Program x Pre Recent Behavior			0.04			-0.01			-0.02

Note. * $p < 0.05$; ** $p < 0.01$

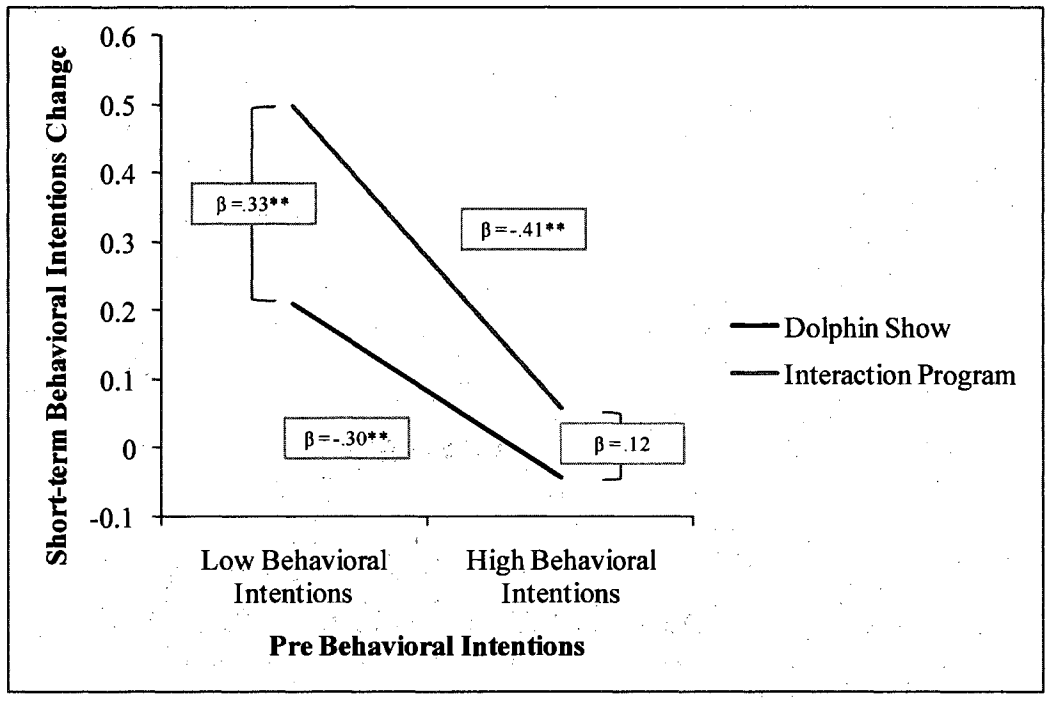


Figure 2. Interaction between previous behavioral intentions and participant type when predicting short-term changes in behavioral intentions

Note. * $p < 0.05$; ** $p < 0.01$

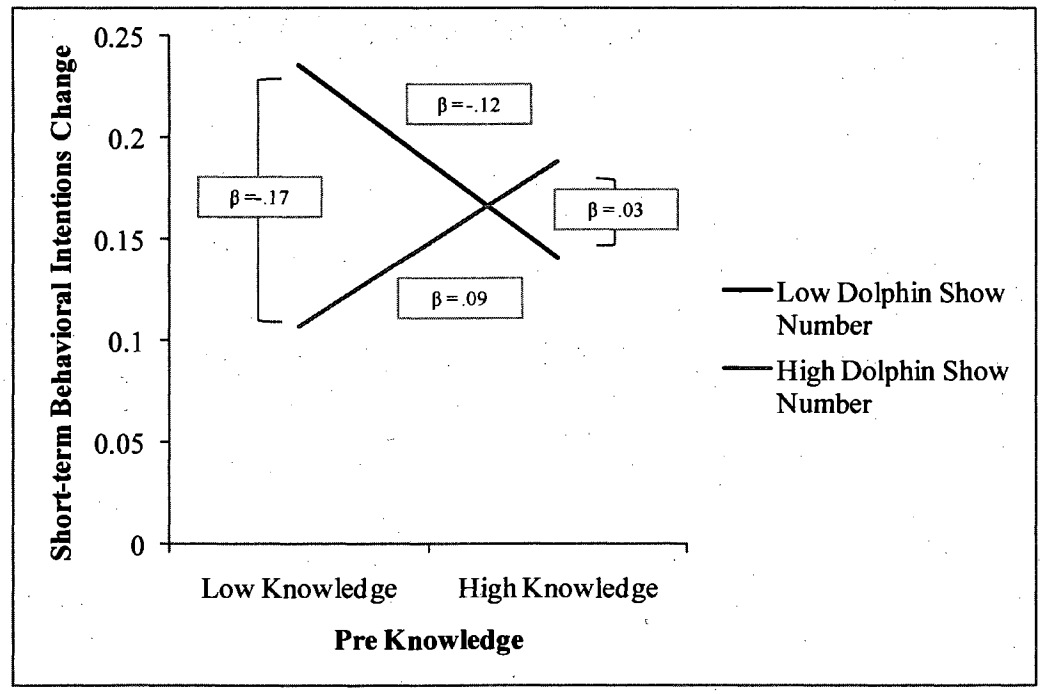


Figure 3. Interaction between previous levels of knowledge and number of dolphin shows previously attended when predicting short-term changes in behavioral intentions

Note. * $p < 0.05$; ** $p < 0.01$

Results from the hierarchal multiple regression examining long-term changes in knowledge, attitude, reported behavior and behavioral intentions are summarized in Table 12. Significant predictors of long-term change in knowledge included previous knowledge and attitudes, and participant type. Long-term change in attitudes were predicted by previous attitudes, gender, participant type and an interaction between previous attitudes and number of dolphin shows previously attended. Figure 4 shows the predicted values for this interaction. Previous recent behavior was the only significant predictor of changes in reported behavior. Previous behavioral intentions and attitudes and an interaction between previous knowledge and number of dolphin shows previously attended were significant predictors of long-term change in behavioral intentions. The predicted values for the interaction between previous knowledge and number of dolphin shows previously attended are shown in Figure 5.

Table 12

Results from the hierarchal multiple regression analysis for long-term change

		LT Δ Knowledge			LT Δ Attitude			LT Δ Behavior			LT Δ Behavioral Intentions		
Step	Predictor Variables	R^2	ΔR^2	B	R^2	ΔR^2	β	R^2	ΔR^2	B	R^2	ΔR^2	B
1	Pre Knowledge	0.30**	0.30**	-0.66**	0.09**	0.09**	-0.06	0.236**	0.236**	-0.05	0.28**	0.28**	-0.04
	Pre Attitude			0.29**			-0.27**			0.06			0.33**
	Pre Behavioral Intentions			0.01			0.10			0.14			-0.62**
	Pre Recent Behavior			-0.09			-0.09			-0.49**			0.04
2	Gender	0.38**	0.08**	-0.04	0.18**	0.09**	-0.23**	0.246**	0.010	0.06	0.29**	0.01	-0.06
	Education Level			0.06			-0.01			0.01			-0.04
	Number Dolphin Shows			0.01			0.05			0.02			0.00
	Interaction Program			0.03			0.05			0.01			0.01
	Participant Type			0.29**			0.23**			0.08			0.06
3	Knowledge x Participant Type	0.39**	0.01	-0.15	0.19**	0.01	0.01	0.255**	0.010	0.04	0.29**	0.00	0.03
	Attitude x Participant Type			-0.01			-0.07			0.02			-0.04
	Behavioral Intentions x Participant Type			0.02			-0.07			-0.13			-0.06
	Recent Behavior x Participant Type			-0.04			0.12			0.14			-0.02
4	# Dolphin Shows x Knowledge	0.42**	0.03	0.06	0.23**	0.04	0.18	0.283**	0.027	0.15	0.33**	0.04	0.20*
	# Dolphin Shows x Attitude			-0.18			-0.25**			-0.10			-0.17
	# Dolphin Shows x Behavioral Intentions			0.05			0.12			0.08			0.07
	# Dolphin Shows x Recent Behavior			0.08			-0.05			-0.10			-0.29
	Interaction Program x Knowledge			0.02			-0.10			0.07			-0.03
	Interaction Program x Attitude			-0.07			-0.03			-0.01			-0.01
	Interaction Program x Behavioral Intentions			0.07			0.04			-0.13			-0.08
	Interaction Program x Recent Behavior			0.19			0.15			0.26			0.22

Note. * $p < 0.05$; ** $p < 0.01$; LT = Long-term

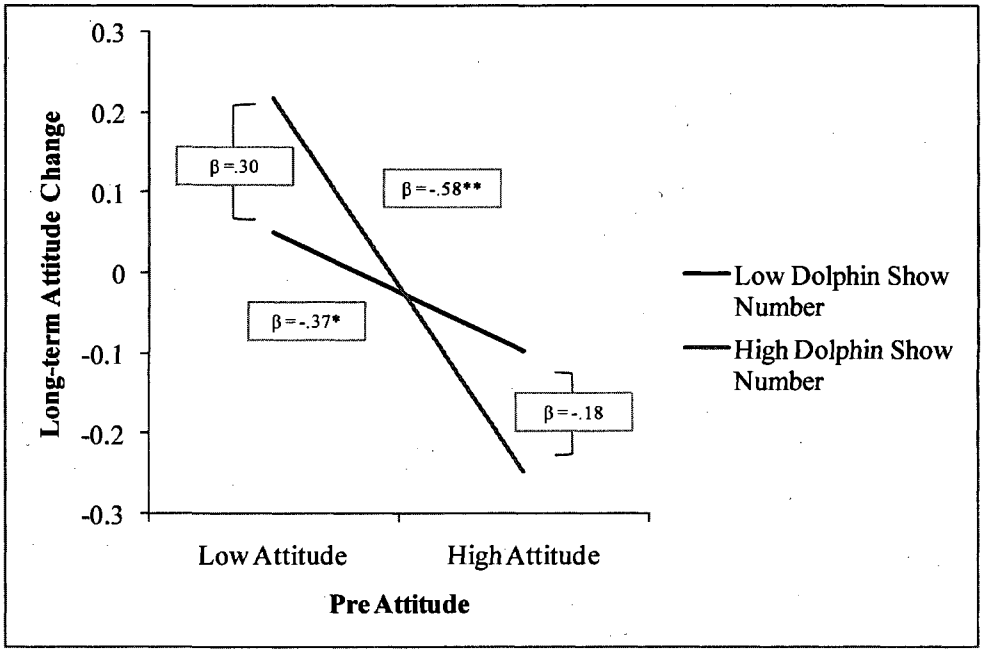


Figure 4. Interaction between previous attitudes and number of dolphin shows previously attended when predicting long-term changes in attitudes

Note. * $p < 0.05$; ** $p < 0.01$

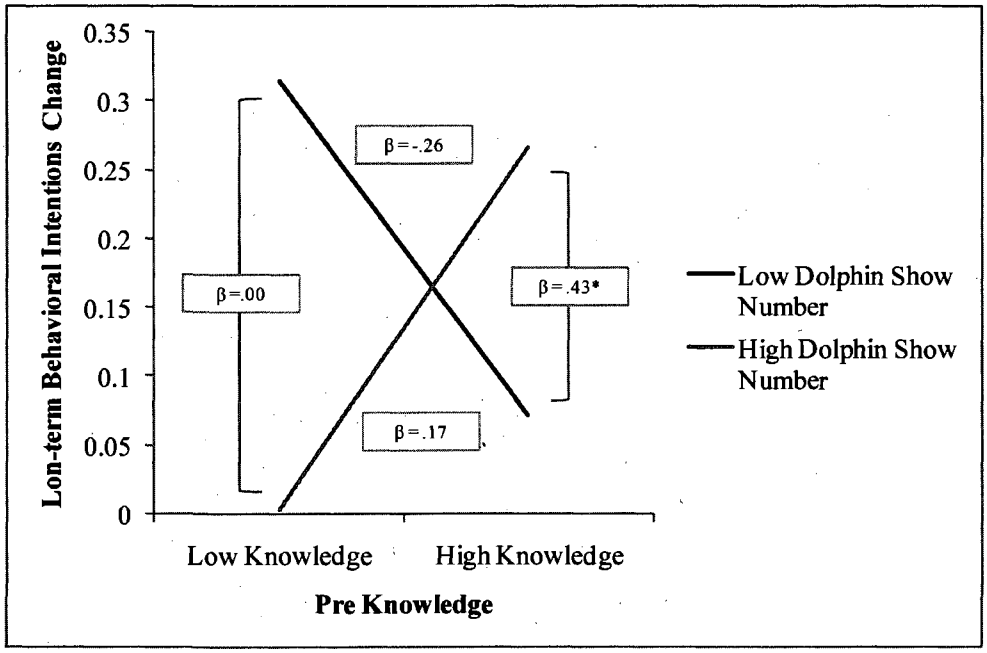


Figure 5. Interaction between previous levels of knowledge and number of dolphin shows previously attended when predicting long-term changes in behavioral intentions

Note. * $p < 0.05$; ** $p < 0.01$

Based on the results from the regression models examining short and long-term change in knowledge, attitude and behavior a final model was run to examine long-term predictors of behavior change. Results from the hierarchal multiple regression examining long-term predictors of behavior change are presented in Table 13. The only significant predictor of reported behavior change was long-term changes in behavioral intentions. Long-term changes in knowledge and attitude were not significant.

Table 13

Results from hierarchal multiple regression examining behavior change

		Behavior Change		
Step	Predictor Variables	R^2	ΔR^2	B
1	LT Knowledge Change	.06**	.06**	0.01
	LT Attitude Change			0.04
	LT Behavioral Intentions Change			0.22**
2	LT Knowledge x LT Attitude	.08**	0.02	0.04
	LT Knowledge x LT Behavioral Intentions			0.11
	LT Attitude x LT Behavioral Intentions			0.03

Note. * $p < 0.05$; ** $p < 0.01$; LT = Long-term

CHAPTER V

DISCUSSION

With the prevalence of dolphin shows and interaction programs in zoos and aquariums, and the mission of all such programs to educate their visitors, it is important to determine the effectiveness of these programs on changing visitor's conservation-related knowledge, attitude and behavior. Although there are many different ways to educate people about dolphins and the marine environment, zoological institutions offer a unique tool for educating numerous groups of people. Given that many of the threats to dolphins are related to humans such as interactions with boats (Miller et al., 2008), pollution or chemical runoff (Fair et al., 2007) and overfishing (Politi et al., 2000), educating the public about these issues could be a key component in management plans to help conserve this species.

Results from participants of dolphin shows demonstrate that these programs have a short-term impact on conservation-related knowledge, attitude and intended behavior. Follow-up results suggest that attitudes and behavioral intentions return to baseline levels three months following the show. However, knowledge of dolphins and the marine environment remained significantly higher when compared to entry levels. Additionally, participants reported engaging in more conservation-related behaviors three months following the show compared to the three months before the show. Combining these results with the results from the regression analysis on entry levels of knowledge, attitude, reported behavior and behavioral intentions, it appears dolphin shows can be an important component of conservation education within zoos and aquariums. Since the number of dolphin shows attended was a significant predictor of all attributes related to

conservation of dolphins and the marine environment, repeat visits to these types of programs may be important in creating long-term sustainable behavior. Since attitudes and behavioral intentions both returned to baseline levels during the follow-up surveys, having repeat experiences with these types of programs may produce long-term change.

Overall, it was found that participants of this study have positive attitudes towards dolphins and the marine environment similar to the findings of (Sickler et al., 2006). However, the increases in knowledge, and changes in behavior are quite different from the value of these programs that Sickler et al. (2006) had suggested. While increasing knowledge about dolphins' cognitive abilities would be an important aspect of educating people about dolphins, increasing conservation-related knowledge and changing peoples' conservation-related behavior is an aspect that should not be overlooked. Similar to many of the previous studies examining educational effectiveness of zoo exhibits (e.g., Swanagan, 1993), dolphin shows have the ability to increase knowledge, attitudes and behavioral intentions in the short-term. However, there was also a long-term sustained increase in knowledge with reported changes in conservation-related behavior. The differences could be attributed to the duration of dolphin shows, or the atmosphere created through the performance. Based on the results from the control (viewing dolphins versus not viewing dolphins), there were no differences in knowledge, attitudes or behavioral intentions for people who had viewed dolphin compared to participants who had not viewed dolphins. It is unlikely that just having the ability to see dolphins during a show is the reason for the changes observed in dolphin show participants.

Previous research has shown that duration of time spent at exhibits positively correlates with learning (Falk, 1983). It is possible that the approximate twenty minute

duration of dolphin shows is the difference between the current results and results from studies examining the effects of other types of programs. Alternatively, information being presented in the form of an entertaining show could be the reason for the sustained increases in knowledge and reported change in behavior. Participants of dolphin shows had scored the shows 4.6 out of 5.0 in terms of being an entertaining experience, consistent with previous results that interactive exhibits, increased animal activity and animal shows can hold audiences longer than graphic displays (Altman, 1998; Bitgood et al., 1986; Jackson, 1994; Swanagan, 1993; 2000). While the exact reason for the differences in the short and long-term changes observed for participants of dolphin shows compared to results from previous studies on many different zoo exhibits cannot be identified, it appears these programs can be an important part of a conservation education program within a zoo or aquarium.

Similar to the results for dolphin show participants, participants of interaction programs had a short-term increase in conservation-related knowledge, attitude and intended behavior. However, all three of these attributes were significantly higher three months following the programs when compared to entry levels. Participants also reported engaging in more conservation-related behaviors three months following the program compared to the three months before the program. Similar to participants of dolphin shows, participants of interaction programs were usually offered the opportunity to see dolphins perform unique behaviors. In addition, these programs were about an hour or longer in duration and participants received the added benefit of interacting with a dolphin either in the water or on the side of the exhibit. These differences between the programs could represent the differences between the results for the two types of

programs in the long-term changes in attitude and behavioral intentions. However, the differences observed could be due to demographic or other factors.

Alternative explanations for the differences in results between participants of dolphin shows and participants of interaction programs could be the participants themselves. Analysis of demographic information revealed differences in age, race, reason for visiting, geographic location, number of dolphin shows attended in the past, and number of interaction programs attended in the past. Any of these factors could be potential reasons for the differences seen between dolphin shows and interaction programs. Additionally, there is an additional cost associated with participating in interaction programs. Paying for these programs may provide a reason for people to pay attention or be interested in learning more about the animals and what they can do to help conserve dolphins and the marine environment. Although information was not collected, the difference in price between dolphin shows and interaction programs could mean there is a difference in socioeconomic status between participant types. While there are many possible reasons for the differences observed between the effects of these different programs, it is clear both types of programs can be an effective part of a conservation education program within a zoological institution.

Results from the regression analysis on entry levels of knowledge, attitude, reported behavior, and behavioral intentions suggest that while interaction programs have a long-term effect for knowledge, attitude and behavioral intentions, behavior will eventually return to baseline levels. While participation in interaction programs in the past was a predictor of conservation-related behavior anytime in the past, it was not a predictor of recent conservation-related behavior. Similar to dolphin shows it could be

assumed that repetition would be important in sustaining conservation-related behavior. However, information from the current study suggests that people are less likely to be repeat participants of interaction programs compared to dolphin shows. This is likely due to the cost associated with participating in these programs.

The results from the hierarchal multiple regression analysis on short-term and long-term changes suggests that participants' entry levels of knowledge, attitude, reported behavior and behavioral intentions are some of the main predictors of change. First, short-term changes in knowledge were predicted by previous attitudes, behavioral intentions and an inverse of previous knowledge. Long-term changes in knowledge were predicted by previous attitudes and an inverse of previous knowledge. This suggests that people with lower levels of knowledge entering these types of programs, and people with more positive attitudes towards dolphins and the marine environment and who are interested in helping conserve these species are more likely to retain information presented in these programs. However, some participants scored high on many of the attributes which could cause a ceiling effect not allowing for change in these same attributes.

Predictors of short-term changes in attitudes towards dolphins and the marine environment included previous behavioral intentions and an inverse of previous attitudes. Predictors for long-term changes in attitudes included an inverse in previous attitude and an interaction between number of dolphin shows attended in the past with previous attitudes. People who had attended more dolphin shows in the past with lower attitudes showed the largest long-term change in attitudes towards dolphins and the marine environment. Thinking about repetition of experience, it is likely that people with lower

attitudes who have attended similar type experiences in the past are going to have the largest changes in attitudes. Determining ways to get people to attend dolphin shows and interaction programs on a regular basis could increase attitudes towards the conservation of dolphins and the marine environment.

Short-term changes in behavioral intentions were predicted by previous attitudes and an inverse of previous behavioral intentions. Long-term changes in behavioral intentions were predicted by previous attitudes, an inverse of previous behavioral intentions and an interaction between previous knowledge and number of dolphin shows attended. The interaction suggests that people with higher levels of previous knowledge who have attended more dolphin shows will show the largest change in behavioral intentions. Similar to the results for long-term change in attitudes, it appears that repetition of similar type programs with high previous knowledge can lead to changes in behavioral intentions. However, reported changes in behavior during the follow-up were only predicted by an inverse of previous recent behavior. This suggests that if people are not already involved in many of the behaviors, these types of programs can influence people to change their behavior. Based on the results from short and long-term changes in knowledge, attitudes and behavioral intentions, it appears repetition of experiences like dolphin shows and interaction programs can help increase attitudes towards dolphins and the marine environment. This will lead to increase in interest to learn more, or retain more information about what they can do to help dolphins and the marine environment.

Research has shown that the links between knowledge, attitude, and behavior are limited (Hines et al., 1986). However, there is some evidence that large changes in attitude can result in a change in behavior (Hines et al., 1986). The current results from

the regression analysis suggest that changes in attitude can lead to a change in knowledge. However, changes in behavior were only related to an inverse in previous recent behavior and long-term changes in behavioral intentions. Although current evidence suggests that programs targeting values and attitudes might be appropriate for changing behavior (Oreg & Katz-Gerro, 2006), knowledge on how to change behavior, or what behavior to change may be equally important. Changing people's attitudes towards a topic might lead to an interest on how to change behavior or what behaviors are important to change.

It is important to note that although significant, the percentage of variance explained by the regression models was low. This is likely due to the complexity of the topic of research and complexity of people's lives. Although dolphin shows and interaction programs are longer in duration than most people spend in front of a typical zoological exhibit, it is only a small time period within their lives. Expecting to permanently change someone's behavior with a twenty minute or hour and a half program is an ambitious goal. However, these programs clearly show some ability to make a difference and should be considered an important aspect of conservation education programs within a zoological facility. Determining ways to increase repetition of these types of experiences, could increase the likelihood that these institutions are meeting their goals of inspiring people to conservation action.

Based on the results from the current study, it is recommended that future research examine the components of education programs such as dolphin shows or interaction programs that increase knowledge, attitude and behavior. Altering the length of the programs, proximity to the animals, and information contained within the programs

would be advisable next steps in gaining a better understanding on the components of these programs that change conservation-related knowledge, attitude and behavior. Future research could also examine if similar types of programs would add benefit for helping to educate visitors about other species. Only through continued research will we better understand the effects of zoological exhibits and programs on effecting conservation-related knowledge, attitude and behavior.

APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL FORM

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

118 College Drive #5147
Hattiesburg, MS 39406-0001
Tel: 601.266.6820
Fax: 601.266.5509
www.usm.edu/irb

July 18, 2008

To: Lance Miller
200 Foxgate Avenue, #14D
Hattiesburg,, MS 39402

From: Betty Ann Morgan
IRB Administrator

PROTOCOL NUMBER: 27080608

PROJECT TITLE: Atlantic Bottlenose Dolphin Education Programs: Benefits for Conservation Education

The period of approval for the above referenced protocol is 08/06/07 to 08/05/08. Institutional Review Board (IRB) approval to conduct research on this project ends with the expiration of this period of approval.

If you plan to continue research on this project, please complete the enclosed Human Subjects Review Form and indicate in the appropriate blank that the project is a Renewal or Continuation. Return this form, along with a copy of the protocol, to the Institutional Review Board, 118 College Drive #5147, Hattiesburg, MS 39406-0001.

Should there be proposed changes in the project, please complete the enclosed form and indicate in the appropriate blank that the project classifies as a Change to a Previously Approved Project. Please return the Human Subjects Review Form along with a memo describing the proposed changes and a copy of the protocol to the address stated above.

Though the project has already completed the IRB approval process, to renew or change the project the appropriate signatures by the Principal Investigator, Advisor (if applicable), and Department Chair are required.

You will be notified when the renewed or changed project has completed the IRB approval process.

If you have any questions regarding the IRB process, please contact the IRB Office by phone at 601-266-6820 or by email at Betty.Morgan@usm.edu.

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL FORM

The University of Southern Mississippi
Institutional Review Board
118 College Drive #5147
Hattiesburg, MS 39406-0001
Tel: 601.266.6820
Fax: 601.266.5509
www.usm.edu/irb

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **27080608**
PROJECT TITLE: **Atlantic Bottlenose Dolphin Education Programs: Benefits for Conservation Education**
PROPOSED PROJECT DATES: **09/01/07 to 08/01/09**
PROJECT TYPE: **New Project**
PRINCIPAL INVESTIGATORS: **Lance Joseph Miller**
COLLEGE/DIVISION: **College of Education & Psychology**
DEPARTMENT: **Psychology**
FUNDING AGENCY: **N/A**
HSPRC COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **08/06/07 to 08/05/08**

Lawrence A. Hosman, Ph.D.
HSPRC Chair

8-16-07
Date

APPENDIX C

DEMOGRAPHIC AND PREVIOUS EXPERIENCE SURVEY

Please mark or note the appropriate response to each of the following items:

Gender: ☐ Male ☐ Female

Age: ☐ 18-24 ☐ 25-34 ☐ 35-44 ☐ 45-54 ☐ 55-64 ☐ 65+

Race/Ethnicity: ☐ White ☐ Asian ☐ African American ☐ Hispanic ☐ Other ____________

Educational Background: ☐ Grade School ☐ Some High School ☐ High School Graduate ☐ Some College ☐ College Graduate ☐ Technical School Graduate ☐ Some Graduate School ☐ Graduate Degree

Have you visited this institution before today? ☐ Yes ☐ No How many times? __________
When was the last time you visited here? __________

Have you been to a dolphin show before? ☐ Yes ☐ No
How many times? __________ Where? ____________________
When was the last time? __________

Have you participated in a dolphin interaction/swim program before? ☐ Yes ☐ No
How many times? __________ Where? ____________________
When was the last time? __________

Have you participated in a dolphin watching boat tour before? ☐ Yes ☐ No
How many times? __________ Where? ____________________
When was the last time? __________

Which of the following best describes why you decided to come here today?
☐ New/Unique Experience ☐ Family/Social Experience ☐ Learning Experience ☐ Other ____________

How many people including yourself are in your group today? __________

How many people from the previous question are below the age of 18? __________

Where are you from? (City/State or Country)
__________ / __________

If you would be willing to help participate in a follow-up survey in approximately 3 months, please provide information for us to contact you. Please note that all information will be kept completely confidential. Once again thank you for your help, the information you are providing will help us better understand your experience.

Name ____________________
Email ____________________
Phone ____________________

Best Time to Contact:
☐ 8am – 11am
☐ 11am – 1pm
☐ 1pm – 5pm
☐ 5pm – 7pm
☐ 7pm – 9pm
☐ Other: __________

APPENDIX D

ENTRY SURVEY

Thank you for taking the time to complete this survey. The information you are sharing with us is really valuable and we appreciate your help.

Please circle the number (1-5) that represents how much you disagree or agree with each of the following statements

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Dolphins are an intelligent and complex species	1	2	3	4	5
Feeding and/or interacting with a dolphin in the wild could be harmful for the animal	1	2	3	4	5
People that live near the coast (for example Florida, Georgia or South Carolina) can effect the waters where dolphins live	1	2	3	4	5
I care about the well-being of dolphins in a zoo or aquarium	1	2	3	4	5
Humans and dolphins depend on some of the same resources	1	2	3	4	5
Dolphins do not need to be protected from humans	1	2	3	4	5
Humans have the right to modify the oceans to suit their needs	1	2	3	4	5
I would be willing to decrease my standard of living to protect the oceans	1	2	3	4	5
Human ingenuity will ensure that we do not make the oceans unlivable	1	2	3	4	5
People that live away from the coast (for example Illinois, Arizona or North Dakota) can effect the waters where dolphins live	1	2	3	4	5
I would be willing to pay much higher prices for common household items to protect the oceans	1	2	3	4	5
I have an emotional connection to dolphins in the wild	1	2	3	4	5
Humans were meant to rule over the oceans	1	2	3	4	5
Dolphins are just another animal	1	2	3	4	5
I have an emotional connection to dolphins in a zoo or aquarium	1	2	3	4	5
It is illegal to feed a dolphin in the wild	1	2	3	4	5
Dolphins have as much right as humans to exist	1	2	3	4	5
Humans will eventually learn enough about the ocean to be able to control it	1	2	3	4	5
I care about the well-being of dolphins in the wild	1	2	3	4	5
Marine debris in the ocean is not a serious problem	1	2	3	4	5
It is too difficult for someone like me to help protect the oceans	1	2	3	4	5
Humans are severely abusing the oceans	1	2	3	4	5
I would be willing to pay much higher taxes to protect the oceans	1	2	3	4	5
When humans interfere with the ocean it often has disastrous consequences	1	2	3	4	5
Overfishing is a serious problem that can affect dolphins	1	2	3	4	5
There is no point in doing what I can for the oceans unless others do the same	1	2	3	4	5
Swimming with a dolphin in the wild is safe for you and the dolphin	1	2	3	4	5

Please circle ("y" for yes or "n" for no) in the first two boxes if you have done the following activities in the past 3 months or anytime in the past *and* circle the number (1-5) that corresponds to your intended future involvement in these activities.

Activity	Done in the Past 3 Months	Done Anytime in the Past	Not Interested in Doing	-	Thinking About Doing	-	Planning On Doing
Become a member of a marine environmental organization	Y N	Y N	1	2	3	4	5
Buy or check out a book from the library about dolphins	Y N	Y N	1	2	3	4	5
Buy or check out a book from the library about the oceans	Y N	Y N	1	2	3	4	5
Contact a state or government agency to get information about the oceans	Y N	Y N	1	2	3	4	5
Donate money to a marine conservation organization	Y N	Y N	1	2	3	4	5
Donate money to help conserve wild dolphins	Y N	Y N	1	2	3	4	5
Point out behavior to friends that could harm the marine environment	Y N	Y N	1	2	3	4	5
Feed a dolphin in the wild	Y N	Y N	1	2	3	4	5
Recycle plastic grocery bags	Y N	Y N	1	2	3	4	5
Purchase products that are marine environmentally friendly	Y N	Y N	1	2	3	4	5
Spend time in nature viewing wild dolphins	Y N	Y N	1	2	3	4	5
Sort glass or aluminum cans for recycling	Y N	Y N	1	2	3	4	5
Use chemical insecticides or pesticides	Y N	Y N	1	2	3	4	5
Talk with friends about marine environmental problems	Y N	Y N	1	2	3	4	5
Visit a zoo or aquarium	Y N	Y N	1	2	3	4	5
Use fertilizers in the yard	Y N	Y N	1	2	3	4	5
Vote for political candidates based on marine environmental issues	Y N	Y N	1	2	3	4	5
Volunteer for a marine conservation organization	Y N	Y N	1	2	3	4	5
Watch a television show about the oceans	Y N	Y N	1	2	3	4	5
Watch a television show about dolphins	Y N	Y N	1	2	3	4	5
Write a letter to politicians about marine environmental issues	Y N	Y N	1	2	3	4	5

APPENDIX E

EXIT SURVEY

After your experience today, we are interested if any of your thoughts or ideas have changed. Once again thank you for your assistance in completing the survey.

Please circle the number (1-5) that represents how much you disagree or agree with each of the following statements

Statement	Stongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Dolphins are an intelligent and complex species	1	2	3	4	5
Feeding and/or interacting with a dolphin in the wild could be harmful for the animal	1	2	3	4	5
People that live near the coast (for example Florida, Georgia or South Carolina) can affect the waters where dolphins live	1	2	3	4	5
I care about the well-being of dolphins in a zoo or aquarium	1	2	3	4	5
Humans and dolphins depend on some of the same resources	1	2	3	4	5
Dolphins do not need to be protected from humans	1	2	3	4	5
Humans have the right to modify the oceans to suit their needs	1	2	3	4	5
I would be willing to decrease my standard of living to protect the oceans	1	2	3	4	5
Human ingenuity will ensure that we do not make the oceans unlivable	1	2	3	4	5
People that live away from the coast (for example Illinois, Arizona, or North Dakota) can affect the waters where dolphins live	1	2	3	4	5
I would be willing to pay much higher prices for common household items to protect the oceans	1	2	3	4	5
I have an emotional connection to dolphins in the wild	1	2	3	4	5
Humans were meant to rule over the oceans	1	2	3	4	5
Dolphins are just another animal	1	2	3	4	5
I have an emotional connection to dolphins in a zoo or aquarium	1	2	3	4	5
It is illegal to feed a dolphin in the wild	1	2	3	4	5
Dolphins have as much right as humans to exist	1	2	3	4	5
Humans will eventually learn enough about the ocean to be able to control it	1	2	3	4	5
I care about the well-being of dolphins in the wild	1	2	3	4	5
Marine debris in the ocean is not a serious problem	1	2	3	4	5
It is too difficult for someone like me to help protect the oceans	1	2	3	4	5
Humans are severely abusing the oceans	1	2	3	4	5
I would be willing to pay much higher taxes to protect the oceans	1	2	3	4	5
When humans interfere with the ocean it often has disastrous consequences	1	2	3	4	5
Overfishing is a serious problem that can affect dolphins	1	2	3	4	5
There is no point in doing what I can for the oceans unless others do the same	1	2	3	4	5
Swimming with a dolphin in the wild is safe for you and the dolphin	1	2	3	4	5

Please circle the number (1-5) that corresponds to your intended future involvement in each of these activities.

Activity	Not Interested in Doing	-	Thinking About Doing	-	Planning On Doing
Become a member of a marine environmental organization	1	2	3	4	5
Buy or check out a book from the library about dolphins	1	2	3	4	5
Buy or check out a book from the library about the oceans	1	2	3	4	5
Contact a state or government agency to get information about the oceans	1	2	3	4	5
Donate money to a marine conservation organization	1	2	3	4	5
Donate money to help conserve wild dolphins	1	2	3	4	5
Point out behavior to friends that could harm the marine environment	1	2	3	4	5
Feed a dolphin in the wild	1	2	3	4	5
Recycle plastic grocery bags	1	2	3	4	5
Purchase products that are marine environmentally friendly	1	2	3	4	5
Spend time in nature viewing wild dolphins	1	2	3	4	5
Sort glass or aluminum cans for recycling	1	2	3	4	5
Use chemical insecticides or pesticides	1	2	3	4	5
Talk with friends about marine environmental problems	1	2	3	4	5
Visit a zoo or aquarium	1	2	3	4	5
Use fertilizers in the yard	1	2	3	4	5
Vote for political candidates based on marine environmental issues	1	2	3	4	5
Volunteer for a marine conservation organization	1	2	3	4	5
Watch a television show about the oceans	1	2	3	4	5
Watch a television show about dolphins	1	2	3	4	5
Write a letter to politicians about marine environmental issues	1	2	3	4	5

Please circle the number (1-5) that represents how much you disagree or agree with each of the following statements

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
This experience was entertaining	1	2	3	4	5
This experience was educational	1	2	3	4	5
This experience increased my interest in learning more about dolphins and the ocean	1	2	3	4	5
This experience increased my caring for dolphins and the ocean	1	2	3	4	5
This was one of the best experiences of my life	1	2	3	4	5

Thank you for your time in helping with this survey. We are interested if any of your thoughts or ideas have changed since your experience.

Please circle the number (1-5) that represents how much you agree or disagree with each of the following statements

Statement	Stongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Dolphins are an intelligent and complex species	1	2	3	4	5
Feeding and or interacting with a dolphin in the wild could be harmful for the animal	1	2	3	4	5
People that live near the coast (for example Florida, Georgia or South Carolina) can affect the waters where dolphins live	1	2	3	4	5
I care about the well-being of dolphins in a zoo or aquarium	1	2	3	4	5
Humans and dolphins depend on some of the same resources	1	2	3	4	5
Dolphins do not need to be protected from humans	1	2	3	4	5
Humans have the right to modify the oceans to suit their needs	1	2	3	4	5
I would be willing to decrease my standard of living to protect the oceans	1	2	3	4	5
Human ingenuity will insure that we do not make the oceans unlivable	1	2	3	4	5
People that live away from the coast (for example Illinois, Arizona, or North Dakota) can affect the waters where dolphins live	1	2	3	4	5
I would be willing to pay much higher prices for common household items to protect the oceans	1	2	3	4	5
I have an emotional connection to dolphins in the wild	1	2	3	4	5
Humans were meant to rule over the oceans	1	2	3	4	5
Dolphins are just another animal	1	2	3	4	5
I have an emotional connection to dolphins in a zoo or aquarium	1	2	3	4	5
It is illegal to feed a dolphin in the wild	1	2	3	4	5
Dolphins have as much right as humans to exist	1	2	3	4	5
Humans will eventually learn enough about the ocean to be able to control it	1	2	3	4	5
I care about the well-being of dolphins in the wild	1	2	3	4	5
Marine debris in the ocean is not a serious problem	1	2	3	4	5
It is too difficult for someone like me to help the protect the oceans	1	2	3	4	5
Humans are severely abusing the oceans	1	2	3	4	5
I would be willing to pay much higher taxes to protect the oceans	1	2	3	4	5
When humans interfere with the ocean it often has disastrous consequences	1	2	3	4	5
Overfishing is a serious problem that can affect dolphins	1	2	3	4	5
There is no point in doing what I can for the oceans unless others do the same	1	2	3	4	5
Swimming with a dolphin in the wild is safe for you and the dolphin	1	2	3	4	5

Please circle ("y" for yes or "n" for no) in the first box if you have done the following activities in the past 3 months and circle the number (1-5) that corresponds to your intended future involvement in these activities.

Activity	Done in the Past 3 Months	Not Interested in Doing	-	Thinking About Doing	-	Planning On Doing
Become a member of a marine environmental organization	Y N	1	2	3	4	5
Buy or check out a book from the library about dolphins	Y N	1	2	3	4	5
Buy or check out a book from the library about the oceans	Y N	1	2	3	4	5
Contact a state or government agency to get information about the oceans	Y N	1	2	3	4	5
Donate money to a marine conservation organization	Y N	1	2	3	4	5
Donate money to help conserve wild dolphins	Y N	1	2	3	4	5
Point out behavior to friends that could harm the marine environment	Y N	1	2	3	4	5
Feed a dolphin in the wild	Y N	1	2	3	4	5
Recycle plastic grocery bags	Y N	1	2	3	4	5
Purchase products that are marine environmentally friendly	Y N	1	2	3	4	5
Spend time in nature viewing wild dolphins	Y N	1	2	3	4	5
Sort glass or aluminum cans for recycling	Y N	1	2	3	4	5
Use chemical insecticides or pesticides	Y N	1	2	3	4	5
Talk with friends about marine environmental problems	Y N	1	2	3	4	5
Visit a zoo or aquarium	Y N	1	2	3	4	5
Use fertilizers in the yard	Y N	1	2	3	4	5
Vote for political candidates based on marine environmental issues	Y N	1	2	3	4	5
Volunteer for a marine conservation organization	Y N	1	2	3	4	5
Watch a television show about the oceans	Y N	1	2	3	4	5
Watch a television show about dolphins	Y N	1	2	3	4	5
Write a letter to politicians about marine environmental issues	Y N	1	2	3	4	5

Please circle the number (1-5) that represents how much you agree or disagree with each of the following statements

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
This experience was entertaining	1	2	3	4	5
The experience was educational	1	2	3	4	5
This experience increased my interest in learning more about dolphins and the ocean	1	2	3	4	5
This experience increased my caring for dolphins and the ocean	1	2	3	4	5
This was one of the best experiences of my life	1	2	3	4	5

REFERENCES

Adelman, L., Falk, J. H., & James, S. (2000). Assessing the National Aquarium in Baltimore's impact on visitors' conservation knowledge, attitudes and behavior. *Curator , 43* (1), 33-61.

Aiken, L., & West, S. (1991). *Multiple Regression: Testing and Interpreting Interactions.* London, UK: Sage Publications, Inc.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl, & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11-39). New York: Springer-Verlag.

Altman, J. (1998). Animal activity and visitor learning at the zoo. *Anthrozoos , 11*, 12-21.

Altmann, J. (1974). Observational study of behavior: sampling methods. *Behaviour , 49*, 227-267.

Arndt, M., Screven, C., Benusa, D., & Bishop, T. (1993). Behavior and learning in a zoo environment under different signage conditions. In *Visitor Studies: Theory, Research, and Practice, Volume 5* (pp. 245-251). Jacksonville, AL: Visitor Studies Association.

Barney, E., Mintzes, J., & Yen, C. (2005). Assessing knowledge, attitudes and behavior towards charismatic megafauna: The case of dolphins. *Journal of Environmental Education , 36* (2), 41-55.

Birney, B., & Matamoros, Y. (1995). A baseline study of visitors' perceptions of zoo animals, national parks, and management issues: Simon Bolivar Zoo. *Annual Conference Proccedings of the American Association of Zoological Parks and Aquariums* (pp. 44-49). Silver Spring, MD: American Association of Zoological

Parks and Aquariums.

Bitgood, S. (1992). The impact of a zoo visit on attitudes: A preliminary report on interaction effects. *Visitor Behavior , 7* (3), 7-10.

Bitgood, S., Patterson, D., & Benefield, A. (1986). Understanding your visitors: Ten factors that influence visitor behavior. *American Association of Zoological Parks and Aquriums 1986 Annual Conference Proceedings* (pp. 726-743). Minneapolis, MN: American Association of Zoological Parks and Aquariums.

Bixler, R., Floyd, M., & Hammitt, W. (2002). Environmental socialization: Quatitative tests of the childhood play hypothesis. *Environment and Behavior , 34* (6), 795-818.

Brown, S. (1999). Ethical considerations in marine mammal management. *Journal of the American Veterinary Medical Association , 214* (8), 1175-1177.

Chicago Zoological Society & Lincoln Park Zoological Society (1993). *Conservation-related perceptions, attitudes, and behavior of adult visitors and non-visitors to Brookfield Zoo and Lincoln Park Zoo.* Chicago, IL: Chicago Zoological Society and Lincoln Park Zoological Society.

Chawla, L. (1998). Significant life experiences revisited: A review of research on sources of environmetnal sensitivity. *Environmental Education Research , 4* (4), 369-383.

Chaiken, S., Liberman, A., & Eagly, A. H. (1989). Heuristic and systematic information processing within and beyond the persuasion context. In J. S. Uleman, & J. A. Bargh (Eds.), *Unintended thought* (pp. 212-252). New York: Guilford Press.

Churchman, D. (1985). How and what do recreational visitors learn at zoos? *Annual Proceedings of the American Association of Zoological Parks and Aquariums* (pp.

160-176). Silver Spring, MD: American Association of Zoological Parks and Aquariums.

Curtin, S. (2006). Swimming with dolphins: A phenomenological exploration of tourist recollections. *International Journal of Tourism Research , 8* (4), 301-315.

Dierking, L. D., Burtnyk, K., Buchner, K. S., & Falk, J. H. (2002). *Visitor learning in zoos and aquariums: A literature review.* Silver Spring, MD: American Zoo and Aquarium Association.

Dierking, L., Adelman, L., Ogden, J., Lehnhardt, K., Miller, L., & Mellen, J. (2004). Using a behavior change model to document the long-term impact of visits to Disney's Animal Kingdom: A study investigating intended conservation action. *Curator , 47* (3), 322-343.

Doering, Z. (1992, March/April). Environmental impact. *Museum News* , 50-52.

Dotzour, A., Houston, C., Manubay, G., Schulz, K., & Smith, J. C. (2002). *Crossing the bog of habits: An evaluation of an exhibit's effectiveness in promoting environmentally responsible behaviors.* Unpublished master's thesis: University of Michigan.

Dunlap, J., & Kellert, S. (1989). *Informal learning at the zoo: A study of attitude and knoweldge impacts.* Philadelphia, PA: Zoological Society of Philadelphia.

Fair, P. A., Mitchum, G., Hulsey, T. C., Adams, J., Zolman, E., McFee, W., et al. (2007). Polybrominated Diphenyl Ethers (PBDEs) in Blubber of Free-Ranging Bottlenose Dolphins (Tursiops truncatus) from two Southeast Atlantic Estuarine Areas. *Archives of Environmental Contamination and Toxicology , 53* (3), 483-494.

Falk, J. (2005). Free-choice environmental learning: Framing the discussion.

Environmental Education Research, *11* (3), 265-280.

Falk, J. (1983). Time and behavior as predictors of learning. *Science Education*, *67* (2), 267-276.

Falk, J., & Dierking, L. (2000). *Learning From Museums: Visitor Experiences and the Making of Meaning.* New York: AltaMira Press.

Falk, J., Reinhard, E., Vernon, C., Bronnenkant, K., Heimlich, J., & Deans, N. (2007). *Why Zoos & Aquariums Matter:Assessing the Impact of a Visit to a Zoo or Aquarium.* Silver Spring, MD: Association of Zoos & Aquariums.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Frohoff, T., & Packard, J. (1995). Human interactions with free-ranging and captive bottlenose dolphins. *Anthrozoos*, *8* (1), 44-53.

Hayward, J. (1995). *Conservation baseline: Visitor research for the Monterey Bay Aquarium.* Northampton, MA: People, Places, & Design Research.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1986). Analysis and synthesis of research on responsible environmental behavior: a meta-analysis. *Journal of Environmental Education*, *18*, 1-8.

Holzer, D., & Scott, D. (1997). The long-lasting effects of early zoo visits. *Curator*, *40*, 255-257.

Jackson, D. M. (1994). Animal activity and presence of docent interaction: visitor behavior at Zoo Atlanta. *Visitor Behavior*, *9* (1), 16.

Johnston, R. (1998). Exogenous factors and visitor behavior: a regression analysis of exhibit viewing time. *Environment and Behavior*, *30* (3), 322-347.

Meyers, O. E., Saunders, C. D., & Birjulin, A. B. (2004). Emotional dimensions of watching zoo animals: An experience sampling study building on insights from psycholgy. *Curator , 47* (3), 299-321.

Miller, L. J., Solangi, M., & Kuczaj, S. A. (2008). Immediate Response of Atlantic Bottlenose Dolphins to High-Speed Personal Watercraft in the Mississippi Sound. *Journal of the Marine Biological Association of the United Kingdom, 88*, 1139-1143.

Morgan, J., & Gramann, J. (1989). Predicting effectiveness of wildlife education programs: A study of students' attitudes and knowledge towards snakes. *Wildlife Society Bulletin , 17*, 501-509.

Olson, J. M., & Zanna, M. P. (1993). Attitudes and attitude change. *Annual Review of Psychology , 44*, 117-154.

Oreg, S., & Katz-Gerro, T. (2006). Predicting proenvironmental behavior cross-nationally: Values, the Theory of Planned Behavior, and Value-Belief-Norm Theory. *Environment and Behavior , 38*, 462-483.

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. *Advanced Experimental Social Psychology , 19*, 123-205.

Petty, R. E., Priester, J. R., & Wagener, D. T. (1994). Cognitive processes in attitude change. In R. S. Wyer, & T. K. Srull (Eds.), *Handbook of Social Cognition* (2nd Edition ed., pp. 69-142). Hillsdale, NJ: Erlbaum.

Petty, R. E., Wegener, D. T., & Fabrigar, L. R. (1997). Attitudes and attitude change. *Annual Review of Psychology , 48*, 609-647.

Petty, R., & Wegener, D. (1998). Attitude change: Multiple roles for persuasion

variables. In D. Gilbert, S. Fiske, & G. Lindzey (Eds.), *The Handbook of Social Psychology* (pp. 323-390). New York: McGraw-Hill.

Politi, E., Bearzi, G., & Airoldi, S. (2000). Evidence for malnutrition in bottlenose dolphins photoidentified in the eastern Ionian Sea. *European Research on Cetaceans , 14*, 234-236.

Price, E., Ashmore, L., & McGivern, A. (1994). Reactions of zoo visitors to free-ranging monkeys. *Zoo Biology , 13*, 355-373.

Prochaska, J., DiClemente, C., & Norcross, J. (1992). In search of how people change: Applications to addictive behavior. *American Psychologist , 47* (9), 1102-1114.

Rhoades, D., & Goldsworthy, R. (1979). The effects of zoo environments on public attitudes towards endangered wildlife. *Internation Journal of Environmental Studies , 13*, 283-287.

Roper Starch (1998). Marine mammal study. Prepared for Alliance of Marine Mammal Parks and Aquariums. 13pp.

Rose, N., Farinato, R., & Sherwin, S. (2006). *The case against marine mammals in captivity.* Washington, DC: The Humane Society of the United States.

Serrell, B. (1977). Survey of visitor attitudes and awareness at an aquarium. *Curator , 20* (1), 48-52.

Sickler, J., Fraser, J., Gruber, S., Boyle, P., Reiss, D., & Webler, T. (2006). *Thinking about dolphins thinking, understanding the impact of social narratives on public acceptance of cognitive science research.* New York: Wildlife Conservation Society.

Swanagan, J. (1993). *An assessment of factors influencing zoo visitors' conservation*

attitudes and behavior. Unpublished master's thesis: Georgia Institute of Technology, Atlanta, GA.

Swanagan, J. S. (2000). Factors influencing zoo visitors' conservation attitude and behavior. *Journal of Environmental Education , 31* (4), 26-31.

Yerke, R., & Burns, A. (1991). Measuring the impact of animal shows on visitor attitudes. *Annual Conference Proceedings of the American Association of Zoological Parks and Aquariums* (pp. 532-539). San Diego, California: American Assoication of Zoological Parks and Aquariums.