PERCEPTIONS OF BIRD WATCHING'S NEGATIVE ECOLOGICAL IMPACTS: STAKEHOLDER AND RECREATIONAL SPECIALIZATION COMPARISONS

A Thesis

by

LISA JEANE REZNICEK

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF MARINE RESOURCES MANAGEMENT

May 2012

Major Subject: Marine Resources Management

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Approved by:

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ABSTRACT

Perceptions of Bird Watching's Negative Ecological Impacts: Stakeholder and Recreational Specialization Comparisons. (May 2012)

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Co-Chair of Advisory Committee, Dr. W. vonZharen
Dr. F. Pearl

Birding, the act of observing birds in the outdoors, is a form of nature recreation and traditionally considered ecologically benign. Unfortunately, birders, in the pursuit of interactions with wild birds, can have negative impacts on birds and critical bird habitat. Often, competition for space or resources can create conflict among recreational users and bird conservation initiatives.

People involved in maintaining birding recreation as well as ecological conservation include stakeholders such as birders, birding guides, and natural resource managers. Comparisons of negative impact perceptions were investigated among birder specialization categories, and between birders and other stakeholders. This study is a comparative analysis of how birding's negative impacts are perceived by the people involved in recreation and conservation. Further examination of the recreational specialization theory as an indicator for birders' perceptions of birding's negative impacts was also conducted. The purpose of such comparisons is to gain an understanding of different stakeholder needs to better serve and utilize the resources available.

Justification for the study came from a series of structured interviews. Preliminary interviews with birding stakeholders identified perceived negative impacts from birding and conservation strategies to address those impacts. Separate on-site surveys, tailored for each of the three stakeholder groups, were conducted to assess

stakeholder perceptions of birding's negative impacts to the ecology of the Great Texas Coastal Birding Trail.

Survey results indicate that as birders progress in increased specialization, they more often perceive birding's negative ecological impacts. This means that the most intense birders recognize negative ecological impacts from birding more frequently than birders with less experience, investment, or lifestyle tendencies. Additional results indicate that birders, in general, perceive negative ecological impacts less frequently than bird managers and birding guides. These results are indicative of experience or education as a means to facilitate increased ecological awareness. Finally, all stakeholders supported education and outreach strategies for bird and bird habitat conservation. This study has provided scientific data analysis of birding's perceived negative impacts, as well as strategies for bird conservation. This work provides needed data on the human dimension of natural resource use conflicts for natural resource managers, who require better understanding of their constituents to accomplish recreational and conservation conflict management.

DEDICATION

This project is firstly dedicated to my friends and family for their love and support. Secondly, the project is meant for those who have helped me develop my career in environmental education and outdoor interpretation. Lastly, I dedicate this paper to others who wish to use the Marine Resource Management degree at Texas A&M University at Galveston to develop themselves academically and professionally.

ACKNOWLEDGEMENTS

There is a big note of gratitude to all the birding stakeholders who were willing to participate in the study and teach me about the world of birding. Although many people helped with the data collection, the faculty at Texas A&M at Galveston provided the academic support needed to develop, advance, and analyze the project. I would like to thank my committee co-chairs, Dr. vonZharen and Dr. Pearl, also my committee members, Dr. Knock and Prof. Bodson, for their guidance and support throughout the course of this research.

Thanks also go to my friends and colleagues and the department faculty and staff for making my time at Texas A&M University at Galveston a great experience. I also want to extend my gratitude to the Mooney Travel Grant, which provided the support for the data collection travel, and the National Association of Interpreters who funded the research, for the project's potential for contribution to the profession of interpretation.

Thanks to my ma and pa for their encouragement as well as to my special man-friend for his patience and love. Lastly, the project is a reflection of people who've led the way and given me examples to follow. They should be acknowledged for their contributions.

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CHAPTER I

INTRODUCTION

Identifying differences in perception of negative ecological impacts from birding can help managers balance natural resource and public use. This study was completed to compare negative ecological impact data from birding stakeholders and within-birding intensity levels. The area of study was the upper Texas coast and the data were gathered via two methods: interviews and surveys. The potential application of this study was to analyze perceptions of birding's negative ecological impacts to help monitor and mitigate such impacts and to promote bird and bird habitat conservation. This study presents data on how often birding is believed to be negatively affecting birds and bird habitat. It can be a tool to address those perceptions and initiate conservation enhancing both natural resource and recreational management.

Birds are important because of the many social, economic, and environmental benefits to humans, such as building a recreational community, income generated from bird watching festivals and conferences, or pollination (North American Bird Conservation Initiative [NABCI], 2011). Unfortunately, many studies have identified the global negative trends of bird populations and species richness (Sauer, 2003; NABCI, 2011). Loss of bird species is linked to habitat degradation, and therefore proper management of remaining natural resources is critical to bird's existence. In the United States, over thirty-six percent of the landscape is managed by hundreds of state agencies and primarily eight federal agencies. Figure 1 presents the percentate of birds in the U.S. depdendent on these multi-use managed public lands (NABCI, 2011). Bird management agencies (or those professional groups who are responsible for birds and their habitats, such as the USFWS) promote multiple-use of the habitat by groups such as birders to increase economic benefits. This use of habitat by both humans and non-human animals can create conflict as pressure is placed upon these critical public resources.

The thesis was written in the style of *Human Dimensions of Wildlife*.

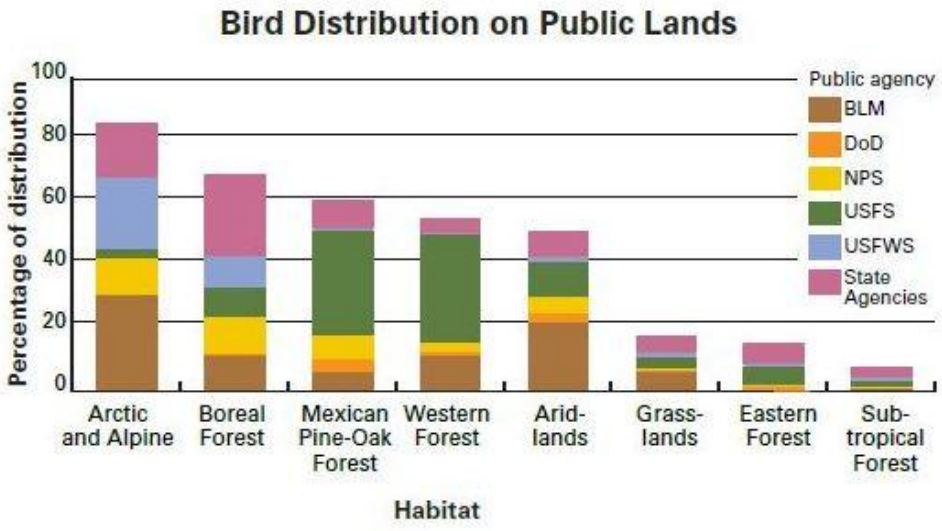

Figure 1: Bird Distribution. Percentage of U.S. bird species distribution dependent on public lands managed for multiple-uses, (NABCI, 2011)

Birders, birding guides, and bird managers (hereinafter referred to as birder stakeholders when referring to all three groups) help create, continue, and are responsible for the future trends of birding. Birding is fundamentally interaction with wildlife and is defined as the acts of observing, photographing, and studying birds in their natural habitat (Riley, 2003). Natural resource managers (hereinto referred to as bird managers) are professional supervisors and enforcers who promote and regulate recreation and natural resources. Birding guides are volunteers and professional leaders who conduct birding trips.

Birdwatchers, also known as birders, are the fastest growing group of recreationalists in the nation and in Texas (U.S. Fish and Wildlife Service [USFWS], 2009; U.S. Department of the Interior [DOI, USFWS] and U.S. Department of Commerce [USDOC], U.S. Census Bureau [USCB], 2006). Birders flock to locations of breeding, resting, roosting, nesting, foraging, and migrating birds to “capture” new species (i.e., observing, studying, identifying, and photographing) (Cordell et al., 2008).This activity is sometimes used in competition with other birders (Adams, Leifester, and Herron, 1997). A recent National Survey of Recreation and the

Environment found over 81million Americans viewed or photographed birds, a growth of 19.3% within a decade (Cordellet al., 2008).

Not all birders are alike, and there is a range of behavior and attitude variation. Participants vary in levels of experience, financial investment, and commitment to birding. This within-recreation progression scale, known as recreational specialization, includes a three-step progression from casual to committed (Scott, Ditton, Stoll, and Eubanks, 2005; Scott, and Chulwon, 1999; Scott and Shafer, 2001). Recreational specialization levels, or a continuum of participant behaviors and attitudinal indicators, have been compared in order to understand participants and plan for better recreational use and services.

Substantial scientific work on negative ecological impacts from recreation has mirrored dramatic increases in the use of wilderness in the past 40 years (International Union for Conservation of Nature[IUCN], 1967). Impacts are defined as effects of events and interactions related to wildlife that merit management (Riley, 2003). Negative ecological impacts, or those results of injury or damage to living and non-living environmental factors from birders, are a part of the birding experience. (Leung, Y., and Marion, J., 2000). The American Birding Association Principles of Birding Ethics (hereinafter referred to as the Principles of Birding Ethics) is a code of the national organization of birding, and serves as a standard for identifying negative ecological impacts from birding (Appendix A). The Principles of Birding Ethics are based upon a singular objective which states that everyone who enjoys birds and birding must always respect wildlife, its environment, and the rights of others (American Birding Association [ABA] , 2011). In any conflict of interest between birds and birders, the welfare of the birds and their environment comes first (ABA , 2011). As well, birders should be ever vigilant of the welfare of birds and their habitat above other benefits from birding, such as the satisfaction of observing, photographing, or researching a bird (ABA, 2011).

Birds are experiencing habitat alterations and negative impacts “from even the traditionally perceived” as benign sport of birding. Author, illustrator, and expert birder,

David Allen Sibley, acknowledges that even the act of observing birds has negative ecological impacts: “Fundamentally, birding disturbs birds. Everything we do has an impact on birds” (Sibley, 2012). The rapid growth and popularity of birding pushes people into remote habitats in search of these birds, creating closer and more extreme encounters that are altering bird physiology and behavior (Blumstein et al., 2005; Erwin, 1989; Koshak, 2007; Smith-Castro and Rodewald, 2009; Sekerciogul, 2002). Although traditionally considered non-consumptive and benign, birding can cause negative ecological impacts to birds and bird habitat, creating potential conflict for bird managers and birding guides who seek to provide for both recreational opportunities and resource conservation.

As an example of negative ecological impacts from birding, imagine a bright red cardinal on a spring morning, foraging for food and potential mates in a wooded area when he hears the loud call of a predator, the Eastern Screech Owl. Instinctual and defensive teamwork is triggered as the cardinal joins other birds to fly in and drive the predator from site. Puzzled and frantic that he can’t find the predator or drive it off. This cardinal’s heart is pounding from the quick flight, and he has used many calories to drive the predator away. The bird hopes to mob and crowd the source of such calling, but only finds a portable speaker blarring recordings of the owl call. The cardinal has lost valuable time and resources, while his territory, food, fledglings, and/or potential mates are unguarded from rivals and predators. The cardinal’s drive to mob the area can have lasting effects that cause negative physiological and behavioral responses from alterated patterns of reproduction, digestion, foraging, resting, and socializing (Bolduc, and Guillemette, 2003; Boyle and Samson, 1985; Burger and Gochfeld , 1991; Buger, 1994; Burger and Gochfeld, 1998; DeMauro, 1993; Erwin, 1989; Hulbert, 1990; Finney, Pearce-Higgins, and Yalden, 2005; Frid and Dill, 2002; Koshak, 2007). The cardinal chased this false predator to his detriment. During times of stress, these negative impacts can be exacerbated as these birds are tricked into interacting with humans through the use of calls and playbacks.

This example of a cardinal's mobbing behavior occurs when individuals in a species mob a predator by cooperatively attacking or harrassing it, usually driving the threat away (Lorenz, 1966). The trauma brought by the use of recorded calls from birders is based upon an instinctual mobbing behavior. In practice, the use of calls or playbacks in birding is a method to bring in the most bird diversity and abundance (Lorenz, 1966). This mobbing effect is used in the field of birding more frequently as digital devices become more readily available and easier to use. For example, the increasing use of phone applications to identify and playback bird calls and digital photography are two major trends which bring changes in the interactions humans have with birds (Watson, 2011). As regional, national, and transnational birding has increased, so has the degradation of sensitive bird populations.

It is the traditional status and definitions of birding by natural resource managers that makes them an interesting subject for negative ecological impact studies (Bolduc, and Guillemette, F. G., 2003; Boyle and Samson, 1985; Burger and Gochfeld 1991; Buger, 1994; Burger and Gochfeld, 1998; DeMauro, 1993; Erwin, 1989; Hulbert, 1990; Finney et al., 2005; Frid and Dill, 2002; Koshak, 2007). Despite its traditional "non-consumptive" approach, with birding there is still interaction with the natural environment which falls under the responsibility of natural resource managers, group leaders, or the individual to regulate their behavior and minimize negative impacts. There must be a consideration of the potential impacts to promote and retain the benefits of wildlife-viewing recreation: benefits to individuals, to communities, and to wildlife (Riley, 2003; Koshak, 2007).

Perceptions form the basis for actions. There are many studies that reflect a need for park managers to understand the ever-evolving motivations and perceptions of their users (e.g., Jacobson and Duffer, 1998; Sekerciogul, 2002; Glowinski, 2008; Krishnaswamy, 2010). For those who manage and monitor impacts from recreation, understanding human dimensions are critical to the success of wildlife management, facilitating an understanding of resource importance and cooperation amongst those who

use public lands. There is currently a lack of comparative studies identifying birdwatchers', bird managers', and guides' perceptions of these ecological impacts.

The prompt for this study was to increase understanding of the birding stakeholders to allow them to mitigate birding's negative ecological impacts. Understanding birding specializations' relationship with perceptions of negative ecological impacts is essential to begin addressing such impacts and creating appropriate conservation solutions. By completing a comparative study on perceptions of these impacts from birding along the upper portion of the Great Texas Coastal Birding Trail (GTCBT), professional bird managers and guides will be provided an additional tool for effectively managing people whom they serve.

This study explored perceptions of birding's negative ecological impacts along the Texas coast, a place of high bird diversity and birding recreational opportunities. There was a mixed methods approach to the research and analysis which incorporated baseline data from preliminary interviews and open-ended answers with statistical data from stakeholder surveys. Structured interviews in the spring and summer months of 2011 created a baseline of knowledge and confirmed stakeholder perceptions of impacts from birding. From the interview analysis, a survey was developed regarding the Principals of Birding and observations from participants on the frequency of. The survey questions were administered to stakeholders in December 2011 and January 2012, which targeted perceptions of birding's negative ecological impact and strategies of conservation. Study responses resulted in approximately twenty structured interviews and 250 anonymous surveys conducted on perceptions of birding ecological impacts from birders, birding guides, and bird managers along the upper Texas coast. This study provided the following:

- Scientific data to establish birder population demographics and specialization
- Data on the relationship of birder specialization and their perceptions of birding's negative ecological impacts
- Scientific data identifying differences in birders, birding guides, bird managers perception of birding impacts on birds and their habitat

- Definitions of shared conservation goals

To accomplish these objectives, research was conducted to determine how the different levels of birding specialization perceive the negative impacts to birds and their habitat similarly. Results indicated that birders' perceptions of negative impacts are related to levels of birding specialization. Secondly, survey data were compared to assess different perceptions of negative ecological impact from the various stakeholders of birding. Finally, this study assessed stakeholder perceptions on funding and promotion of bird and bird habitat conservation. The resulting data can be used by the stakeholders involved to manage and monitor impacts to birds and bird habitat, and create ways to increase conservation for continued use and preservation.

CHAPTER II

LITERATURE REVIEW

Birding

Birding is the act of observing, studying, identifying, and photographing birds in their native habitats (Cordell et al., 2008). A primary source of birding-related demographic data is the U.S. Fish and Wildlife Service's National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (USDIO, USFWS, USDOC, USCB, 2001). This survey has been conducted approximately every five years since 1955. The literature indicates that birders are middle aged, are more employed in professional occupations, are more highly educated, and have a higher household income than the general public (Applegate and Clark, 1987; Hvenegaard, 2002; Hvenegaard, Butler, and Krystofiak ,1989; Kellert, 1985). People are drawn to the aesthetics of birds, the availability of birds in all climates and times of day, and the interesting behavior of birds. The latest survey of birders in Texas found two million residents and 851,000 nonresidents, 16 years and older, observed wild birds and spent $1.3 billion in Texas (USDIO, USFWS, USDOC, USCB, 2001).

Birding as Nature Tourism

Humans' relationship with birds has historically been one of hunting, until popular trends of aesthetics and curiosity for the exotic items began to shift in the late 18th century (Moss, 2004). In the late 19th century, recorded bird species were becoming extinct which prompted the establishment of groups like the National Audubon Society and the Royal Society for the Protection of Birds (Moss, 2004). The first mention of observing, instead of collecting or eating birds, came from Edmund Selous, a British ornithologist, who wrote: "For myself, I must confess that I once belonged to this great, poor army of killers, But now that I have watched birds closely, the killing of them seems to me as something monstrous and horrible" (Selous, 1901). Advances in

technology increased the availability of optics, people began to lay down their guns and pick up a pair of binoculars to "collect" birds on their own, without harming them (Moss, 2004).

The U.S. Fish and Wildlife Service (USFWS) definition of birders' interaction with animals as non-consumptive has helped create the popular view that birders are not harming birds or bird habitat. Because there is no "taking" of the animal natural resource (like duck hunting in a wildlife management area), birding and other wildlife watching recreation are considered by many to be benign and "non-consumptive." Yet, when comparing birding to its history of hunting, researchers have found similarities. "In both [hunting and birding], the recreationalist invokes a personal skill and knowledge of wildlife behaviors and habitat affinities to reduce an individual animal to a form of a possession. In the one case, the bird ends up on the table; in the other it ends up on a checklist" (Applegate and Clark, 1987). McFarlane (1994) suggested advanced birders had motivations similar to advanced hunters in that each level of recreational intensity has specific goals of pursuing and "bagging" their prey.

Birders' "collections" have been extensive and useful to science, and many volunteer to observe birds for the joy of it, and without payment. A thorough review on the history and merits of volunteer ornithologists has previously been described (Greenwood, 2007). As a result of their dedication and willingness to volunteer for science and conservation efforts, birding has fostered a reputation as environmentally-friendly form of eco-tourism.

One example of birding can give insight into this traditional perception of environmentally-benign birders. Frank Chapman of the Audubon Society purposed a switch from a traditional Christmas bird hunt, to a bird counting or survey (Moss, 2004). In 1900, twenty-seven observers took part in the first Christmas Bird Count (CBC), which is now the largest volunteer bird census in the Western Hemisphere. The purpose of this international birding event is to increase bird population and conservation science. It is conducted throughout the Americas and involves over 70,000 participants at 2,000 sites annually.

Birding is often associated with conservation. An event that combines conservation and birding is the GTCBT, a state-run charity competition that raises funds for acquisition, maintenance, monitoring, and restoring local bird habitat. In a report by the sponsors, within 8 years, this popular competition raised over $450,000 for funding conservation (The Gulf Coast Bird Observatory [GCBO] and TPWD, 2006). Ornithology and conservation science have benefitted from the science from volunteer observations provided by birders from events such as this event, who participate because of their interest in conservation and/or for enjoyment (Adams, 1997; ABA, 2011; Boxall and McFarlane, 1993; Greenwood, 2007).

Previous research identified the differences between wildlife watching, such as birding, and other forms of wildlife interaction, such as fishing and hunting. The Daigle, Hrubes, and Ajzen study showed that hunters, wildlife viewers, and outdoor recreationists differ greatly in their beliefs about the outcomes of their behaviors and their attitudes, subjective norms, and perceptions of behavioral control, as well as their wildlife-related values and values of life (2002). Another study compared consumptive uses of waterfowl hunters with non-consumptive bird watchers and showed the increased commitment of birdwatchers to their sport. A 1997 report indicated that Texas birders were highly committed to their pastime, spending almost 2.5 times the yearly amount of time and resources spent by the waterfowl hunters in pursuit of birds, months in the field, trips, miles traveled, habitats, states, and countries visited, and organizational memberships (Adams, 1997).

Being formerly defined as "nonconsumptive," may have led to birding's reputation for the birding as being 'benign' (DOI, USFWS, and USDOC, USCB, 2006). Birders are often associated with environmental consciousness, or conservation of natural resources, mainly because of their direct benefit and dedication to the sport of birding. A 1994 report examined birders and found their primary motivation was conservation (McFarlane, 1994). Because birding's previous non-consumptive definition, association with conservation organizations, and conservation motivations,

tradiational perceptions of birders as conservation-oriented may give a false impression of any determintal effects from birders to birds and bird habitat.

Birding Businesses and Growth

Birding is a form of recreation, bringing people to the outdoors to interact with birds at their own discretion. The economic benefits of birding in Texas make it a desirable business investment for many communities (TPWD, 2005). In 1999, birding resident and non-resident travelers on the central coast portion of the GCTBT devoted an average of 31 days per year viewing wildlife in the trail (Eubanks and Stoll, 1999). They spent an average of $78 per person per day while traveling, resulting in direct expenditure of $2,452 per person in 1999 (Eubanks and Stoll, 1999.) Birders visiting the Hummer/Bird Festival in Rockport, Texas, contributed $1.4 million in direct expenditures to the local economy in 1995 (Scott, 1995.) In a 2006 national survey, over $82 billion was generated by direct, indirect, and induced effects of expenditures associated with birding (USFWS, 2009).

Texas wildlife watchers, including birders, spent over $3.4 billion in and out of state on the trips and equipment, while 86% of those expenditures (see Fig. 2) went directly to places and people in the state of Texas (DOI, USFWS, and USDOC, USCB, 2006). In that same 2006 national survey, the Director of the USFWS remarked on wildlife watching's national importance as "vital" recreation for conservation: "wildlife-associated and vital recreation-activities such as hunting, fishing, and birding- provide significant financial support for wildlife conservation in our Nation's economy…" (DOI, USFWS, and USDOC, USCB, 2006, pg. 3).

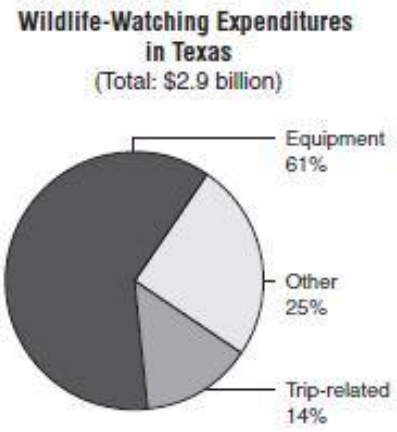

Figure 2: Revenue from Texas Birders. Wildlife-assoticated recreation revenues for Texas (DOI, USFWS, and USDOC, USCB, 2006).

Birders are hard to identify with certainty because birders are not registered or licensed and birding can be done anywhere at any time. While some wildlife related outdoor recreationalists are required to have permits and licenses for their interactions with animal natural resources, wildlife watchers are not. Birding is such a ubiquitous activity, much like walking for pleasure that a substantial portion of the U.S. population participant to some extent at one time or another. This ease and accessibility as well as the universal attraction of birding may be why birders are the fastest growing group of recreationalists in the nation and in Texas (USFWS, 2009; USDOI, USFWS, USDOC, USCB, 2006).

Birding Stakeholders

To maintain benefits from birding, and ensure the continuation of natural resources used in the sport, (i.e., birds and bird habitat) birders, birding guides, and bird managers will need to partner. This study is meant to bring together these birding stakeholders to understand potential impacts with birds and bird habitat and begin to correctly managing any potential negative impacts. The creation of revenues through birding has made it a symbol of Texas nature tourism (TPWD, 2005). Demographic research shows that on average, birders are educated, committed to the recreation, and

have above-average incomes (Cordell et al., 2008; Glowinski, 2008; Hvenegaard, Butler, and Krystofiak , 1989; Kellert, 1985).

As previously stated (Chapter I), those staff members in natural resource agencies, (bird managers) have a critical role in balancing recreation and conservation. Many bird management agencies and birding guides now recognize the growth and economic potential of this sport (Bouton and Frederick, 2003; Eubanks and Stoll, 1999; Glowinski, 2008; Hvenegaard, Butler, and Krystofiak, 1989; Riley, 2002; Scott and Thigpen, 2003; TPWD, 2005). Birding is promoted by natural resource agencies which create venues for observation or photography to draw in visitors, create places for natural resource interpretation, and benefit from park fees and business. The 2011 State of the Birds report found over 300 bird species rely upon America's public land, making management of this public land essential for successful conservation (NABCI, 2011).

Although many birders may lead trips or present, there are fewer individuals who identify themselves as birding guides. Birding guides are volunteers and professionals who conduct birding trips, and like bird managers, work to provide recreation and preserve resources for future use. There are key individuals within birding who take on leadership roles which may become models for the larger birding community. A 2006 report identifying leadership qualities amongst American Birding Association members found that almost 50% of their participants have led birding trips and about 40% have given presentation about birds (Lee and Scott, 2006).

Birding the Upper Texas Coast

There is a recorded 636 species of birds that occur in Texas, the highest diversity of any state (Reid, 1997, last updated 2011). Millions of migrating birds are dependent upon the Upper Texas coast for their successful migration around or across the Gulf of Mexico twice a year (Texas Parks and Wildlife Department [TPWD], 2004). This migration area is situated directly beneath the major convergence of flyways, creating this density of birding opportunities (Gauthreaux, Belser, and Welch, 2006). Because of the density and diversity of birds, there are large gatherings of birders along the upper

Texas coast. Many species hug the coastline on their way to South and Central America for the winter, thus making winter a time when birder opportunities are frequent and data can be collected. Figure 3 identifies the most birded counties in the state and illustrates the large clustering of birding activity along the Gulf Coast (Club, 2012). The Texas Ornithological Society (TOS) is a state-wide group of birders who exchange detailed listing information and birding experiences.

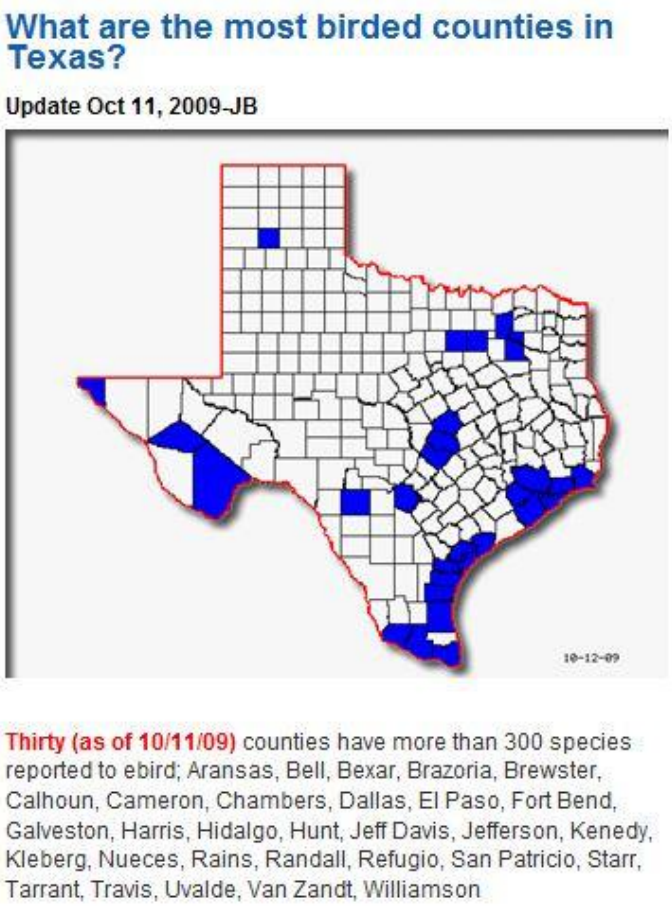

Figure 3: Most Birded Counties in Texas. This map from the Texas Ornithological Society shows almost half of the most birded counties in Texas (14 out of 30) are found on the coast. Source: (The Texas Century Club, 2012).

After a 1991 study showed that Texas was a top birding destination in the United States for ABA (ABA) members, TPWD began to develop public and private resources for a $1.5 million project to utilize bird sanctuaries and observation sites (Lindsay, 2003). This area is so important to birds and those individuals who are involved in the observing, photographing, and identifying them, that the first state-sponsored driving trail and map system, known as the GTCBT, was established in 2000 (TPWD; White, 2003). The wildlife trails of Texas promote sustainable economic development and build public support for conservation of wildlife and habitats (TPWD, 2004).

The GTCBT has been developed and managed by the state to help birders find the avian resources and to locate the significant number of species along the Texas coast, provide opportunities for conservation and economic development, and serve as an example for future initiatives (TPWD). Divided into three geographic sections, the 624-mile GTCBT was the first state-sponsored wildlife trail in the nation (Crable, 2001). Through a public process, GTCBT sites were nominated and chosen based upon the characteristics of possession of unique and rich bird experiences, open to the public, located within one hour driving distance of each other, and had local sponsors or partners to help with tourism infrastructure. The northern most section of the GTCBT, known as the Upper Texas Coast, is situated within the major migration flyway, and is a resting point for many returning neotropic birds. Twice annually, birds pass through this region to migrate in search of other birds, food, water, shelter and space. Figure 4 shows a map of the continent of North America and the four major flyway routes for bird migration. Texas coast is the major route of the central flyway for birds during their migration (Wisconsin Department of Natural Resources, 2012) .

Figure 4: Central Flyway. This map of the North American highlights the four major migratory bird flyways. Texas is within the large, central blue-green section, known as the Central Flyway. Source: Wisconsin Department of Natural Resources, 2012, website: http://dnr.wi.gov (website accesssed 3/1/12).

Recreational Specialization

The concept of recreational specialization provides a means for comprehending and actin upon the diversity of the birding social world. There are many studies that focus on different progressive stages of recreational development through the specialization framework established by Hobson Bryan (1977). Bryan introduced the recreational specialization construct to help researchers and practitioners understand and explore what he called "within-sport" variability. To uncover the variation within freshwater angling, Bryan first purposed the theory of recreational specialization as a continuum of behavior from the general to the particular, reflected by equipment and skills used in the sport and activity setting preferences. He theorized that along the specialization continuum, characteristic styles of participation reflect typical stages of involvement in which people progress the longer they participate in an activity. To establish this progression and classify his participants, Bryan added three measurements of specialization: skills and knowledge, equipment and techniques, and commitment to

the activity variables. Bryan identified four types of anglers along a continuum: occasional fishermen, generalists, technique specialists, and technique-setting specialists. Recreationalists' motivations, resource preferences, and attitudes about management practices were predicted to vary from one level of participation to another.

Bryan's original theory helped establish a subject area of research was able to use specialization as a means to compare within recreational characterizations. Various forms of conceptual foundations, measures, and statistical techniques have classified recreationalists into many levels using this specialization scale. While many believe there is a multidimensional construct measured with both behavior and attitudes, there still exists little agreement about how to characterize these measurements (Kuentzel and Heberlein, 2006; Lee and Scott , 2006; Scott, and Shafer, 2001). Bryan's dimensions of specialization (skills and knowledge, equipment and techniques, and commitment to the activity) have been labeled and measured in different ways. Behavioral indicators are a quantifiable means of measuring recreational specialization because they include such factors as "years of experience, frequency of participation, number of sites visited, monetary investments and distance traveled to participate in an activity" (Scott, and Shafer, 2001, pg. 323). For example, advanced specialization levels were measured to have more distance travelled and higher frequency of trips for birding (Scott & Thigpen, 2003).

Once the components of recreational specialization have been identified, the concept of grouping these levels of specializtion are the next area where researchers have often differed in their approach. Some researchers (Hvenegaard, 2002; McFarlane, 1994; McFarlane, 1996; Scott, 2003; Scott et al., 2005) have used statistical data testing called cluster analysis of behavior and attitudes to identify groups of specialization among birders. Cluster analysis divides data by seeking to identify a set of clusters which both minimize within-group variation and maximize between-group variation, or answering the question: which of these cases is most similar to each other and different from the others? This methodology does not assume that indicators of specialization co-

vary and is a potentially effective tool for identifying and describing classes of recreationists within a given leisure social world (Scott et al., 2005).

A simplified approach to recreational specialization can create a user-friendly tool for resource and recreational managers to identify types, market products, and services for different segments of users. Originally, Bryan created this specialization framework as an uncomplicated framework for understanding within-sport variability. He considered the scale or continuum to be an exploratory tool of anglers. To this end, this study of birder specialization hopes to simplify the approach and use previously reported processes for birding specialization to explore the variation of this recreation.

Birding Specialization

This recreation of watching birds does not create a homogenous group of birders. Birders have varying levels of knowledge, skill, interest, and satisfaction creating different degrees of intensity, or recreational specialization, in birding. For example, novice or beginner birders participate infrequently and display a variety of motivations when compared to advanced or expert birders, who are generally more frequent participants and have activity-specific motivations, (Scott et al., 2005). These birding specialization levels reflect a continuum of participant behaviors and attitudinal indicators.

Within-activity differences among outdoor recreationalists have been extensively used when studying characteristics of that recreation. Comparing birding data to this specialization format has been widely used (Bireline, 2005; Cole and Scott, 1999; Ditton, Loomis, and Choi, 1992; Eubanks, Stoll, and Ditton, 2004; Hvenegaard, 2002; Kuentzel and Heberlein, 2006; Lee and Scott, 2006; Maple, Eagles, and Rolfe, 2010; McFarlane, 1994; Scott et al., 2005; Scott, and Shafer, 2001; Scott, 2003, Applegate and Clark, 1987). The variations in identified birder groups follow the basic specialization continuum described by Bryan (1977), where participants range from general recreational interests to devoted interests in a specific activity. Table 1 is a chart of birder specialization measurements and scale classifications which supported the study.

Detailed descriptions of the literature are presented in the following pages to explain the recreational specialization model for this study.

Table 1: Recreational Specialization Summary. This table illustrates the previous methods of studying birder specialization. This study uses a combination of these methods to explore new comparisons of participants and their perceptions of negative ecological impacts from birding.

Author Information	**Sample Frame**	**Measurement of Specialization**	**Index/Classification of Respondents**
McFarlane (1994); (1996); & McFarlane and Boxall (1996)	787 birders in Alberta Canada	Three multi-item dimensions were use. 1. Past experience; 2. Economic commitment; 3. Centrality to lifestyle	Cluster analysis of index scores produced four types of birders: 1. Casual (43%); 2. Novice (38%); 3. Intermediate (12%); 4. Advanced (7%)
Cole and Scott (1999)	Members of the American Birding Association (ABA) and individuals who purchased a Texas Conservation Passport (TCP).	Respondents were compared in terms of different measures of behavioral involvement: 1. Skill of identifying birds 2. Frequency of participation 3. Yearly expenditures 4. Birding behaviors closest to home	Found membership to be an indicator of specialization 85% of the time. The two indicators found: 1. ABA members were 91% correctly identified as advanced 2. 75% of TCP holders were correctly classified as casual
Hvenegaard (2002)	137 Visitors to Doi Inthanon National Park (Thailand)	Two multi-item dimensions: 1. Economic commitment 2. Centrality to lifestyle	Cluster analysis of factor scores for the two dimensions produced three types of birders: 1. Advanced-experienced (10%) 2. Advanced-active (50%) 3. Novices (40%)
Scott and Thigpen (2003)	517 visitors to the 7th Annual Hummer/Bird Celebration (Texas)	Three multi-item dimensions: 1. Behavior 2. Skill 3. Commitment	Cluster analysis of six variables produced four types of birders: 1. Casual (35%) 2. Interested (42%) 3. Active (13%) 4. Skilled (10%)

Table 1: Continued

Eubanks, Stoll, and Ditton (2004)	Eight geographically dispersed birders used in previous studies.	Specialization levels were determined by: 1. Birding behavior and participation 2. Skill level 3. Self-categorization 4. Personal investment	Birders ranked themselves as: 1. Casual (38%) 2. Active (46%) 3. Committed (16%)
Scott et al. (2005)	1,259 Birders who traveled to the Platte River (Nebraska) for crane migration experience.	Two-multi-item approaches of: 1. Behavior 2. Skill 3. Commitment The self-classification measure had birdwatchers categorize themselves as: 1. Committed birder 2. Active birder 3. Casual birder	Factor analysis resulted in a single factor solution. Cluster analysis was used to create another multi-item indicator of specialization, and resulted in significance in relation to motivations.
Bireline (2005)	Participants from Florida birding events- a total of 184 interviews.	Specialization measures were constructed using: 1. Experience 2. Economic and equipment commitment 3. Centrality to lifestyle	Additively combining all measures from standardized scores: 1. Casual (40%) 2. Novice (30%) 3. Intermediate (20%) 4. Advanced (10%)
Lee and Scott (2006)	ABA members were use and 442 were tested	Three dimensions: 1. Behavior 2. Skill and knowledge 3. Behavioral and personal commitment	The model was tested for acceptance with a confirmatory factor analysis. No specialization index of birders was given.
Maple, Eagles, and Rolfe (2010)	386 questionnaires were recorded Point Pelee National Park (Canada)	Specialization levels differentiated using: 1. Self-reported skill level 2. Identification abilities	ANOVA or chi-square analysis into three specialization groups: 1. Beginner (34%) 2. Intermediate (37%) 3. Expert (29%)

Several birder studies have helped identify measurements and characteristics of the recreational specialization scale, and create a model research upon which this study is based. Birding specialization has been tested for differences in recreational motivation, participation, conservation involvement, demographics, potential impact

behaviors, benefits and costs, needs from park and resource management, and expenditures.

Bryan's original dimensions of specialization, (skills and knowledge, equipment and techniques, and commitment to the activity) have been labeled and measured in different ways. When considering studying the progressive scale of birder specialization, measuring tools to define that scale need to reflect the original measurements of Bryan. There were several studies, McFarlane (1994), Hvenegaard (2002), and Bireline (2005) which used experience, economic and equipment investment, as well as the centrality of birding to lifestyle. These measurements of specialization have been supported by research of birders from McFarlane (1994), Hvenegaard (2002), and Bireline (2005).

McFarlane (1994) examined birders in Alberta, Canada, and measured specialization in terms of respondents' past experience, centrality to lifestyle, and economic commitment. Using additive specialization indexes and then cluster analysis, four groups (casual, novice, intermediate, and advanced) were identified and found to differ in their motivations for birding. These results suggest that only a small fraction of participants (at least among birdwatchers) can truly be called "specialized" in the sense of achieving an elite status.

In 2002, a research study was conducted to test conservation involvement, demographics, and motivation changes among specialization levels of birders (Hvenegaard, 2002). Hvenegaard, like McFarlane, used cluster analysis to test economic commitment and centrality to lifestyle, in which he found a significant relationship between specialization level and demographics of birders. The results indicated that age, income, and percentage of the population being male, increased with the recreational intensity level (Hvenegaard, 2002). In addition, the cluster analysis produced a positive but weak correlation recorded between specialization levels and conservation involvement (Hvenegaard, 2002).

Additional research has shown birding specialization to have an association with different perceptions of ecological impacts (Bireline, 2005). Bireline completed his study at Florida birding festivals and tested the variation among four levels of

specialization to self-reported potential impact behaviors. He focused on negative impacts that were defined by the birders (i.e., Principles of Birding Ethics) and previous scientific research on birding impacts (Bireline, 2005). The birders' data were tested as an additive specialization index against impact behaviors using an analysis of variances test (ANOVA), which supported an advanced birder belief that the perceived benefits of observing birds outweigh the perceived liabilities of birders' actions (Bireline, 2005).

Research on the scaling of birding specialization needs to be comparable and easy to understand; therefore, three levels of specialization are used in this study. The use of three groups ("casual" or low, "active" or medium, and "committed" or high recreation specialization) has a distinct advantage: it allows the results to be more easily compared with the results of other studies (Maple et al., 2010). Additional research by Hvenegaard (2002) and Maple et al. (2010) helped support the three level scaling chosen for this study.

In 2010, Maple et al. began applying the variation in birder specialization to natural resource and park management. Three specialization levels were defined in a Chi-square test which established beginner or novice birders as distinct from the other levels. The beginner group displayed variation from the other specialized levels in birding trip expenditures, activities, motivations, and requirements from the natural resource and park management (Maple et al., 2010).

Scott, Ditton, Stoll, and Eubanks completed birder specialization research in 2005 to explore self-classification relative to two-item measurements (Scott et al., 2005). A commonly used definition for specialization classification scales was developed during this 2005 work. The research performed in this study utilized the specialization level descriptions in the Scott et al. study. In a combiniation of frequently used specialization indexing terms, Scott et al. divided birders in three groups:

1. Committed birders are people who *generally* are willing to travel on short notice to see a rare bird, who subscribes to a number of birding magazines (such as *Birding*) that specialize in the identification of birds, and places where they may be seen, who lead field trips or seminars for local birding

clubs, who keep a detailed life list as well as a daily journal, who purchase increasing amounts of equipment to aid in attracting, recording, and seeing birds, and for whom birding is a primary outdoor activity.

2. Active birders are people who g*enerally* travel infrequently away from home specifically to bird, who may or may not belong to a local birding club, who subscribe to general interest bird magazines (such as *Wild Bird* or *Birdwatcher's Digest*), who participate in but do not lead local field trips or seminars, who keeps a general list of birds seen, and for whom birding is an important but not exclusive outdoor activity.
3. A casual birder is a person who *generally* bird incidentally to other travel and outdoor interests, who may belong to a formal birding organization, who may read an article on birds in a local newspaper but does not subscribe to birding magazines, who does not keep a life list, and for whom birding is an enjoyable yet inconsistent outdoor activity.

Once participants in Scott et al.'s study self-categorized themselves, a confirmatory factor analysis concluded that this high, medium, and low (or committed, active, and casual) specialization was strongly related to the other measurements. Simply stated, Scott et al.'s study supported the theory that participants were strongly aware of their own level of birding. The progressive breakdown of these categories for specialization scaling helped to formulate the model for this study, since it was successful in describing these scales for Scott et al. in 2005.

Dimensional variables used in this study to define specialization include experiences, economic commitment, and centrality to lifestyle (McFarlane, 1994; Hvenegaard, 2002; Cole and Scott, 1999; Bireline, 2005; Wellman, Roggenbuck, and Smith, 1982). Once data from birders had been obtained, cluster analysis evaluated three stages of intensity. A model of birding specialization is given in Figure 5.

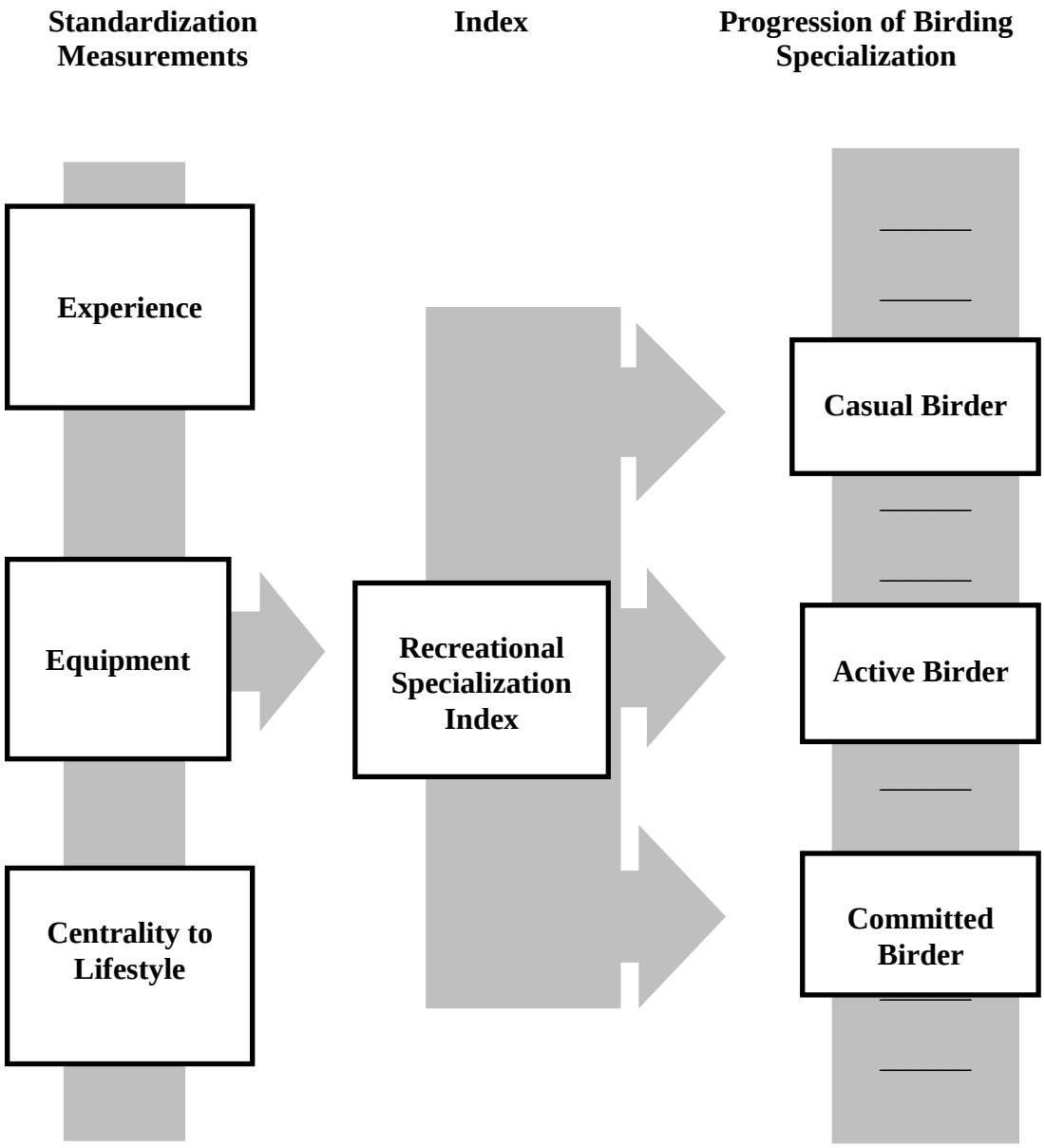

Figure 5: Model of Specialization Recreation. This diagram is a theoretical model for the study's method of finding birder specialization. The model is based upon previous research. The recreational specialization dimensions are based upon McFarlane, 1994; Bireline, 2005, and the specialization scaling labels are based upon Scott et al. 2005

Negative Ecological Impact Perceptions

Bird species richness and populations are in decline. U.S. public lands are managed to mitigate human-induced impacts, such as habitat loss, and lessen the stressors to the remaining bird populations (NABCI, 2011). Birders are interested in diverse bird species, and view population declines as a diminishment in the recreational value of birding (Stoll, Ditton, and Eubanks, 2006). Therefore, management needs to strengthen the remaining bird populations and bird habitat by monitoring, understanding motivations for, and mitigating negative ecological impacts upon birds and bird habitat. To manage negative impacts, understanding attitudes can help effectively address the cause of such actions. To define perceptions of negative impacts and help conserve birds and bird habitat, it is useful to explore the need for such research and the purpose of perceptional data.

A USFWS report on the economics of birding began with an introduction of an event that brought money to the piney woods area of Louisiana and Arkansas for a glimpse at a rare bird. In 2002, a media event took place in the swamps of Louisiana as expert birders, natural resource managers, and enthusiasts gathered to verify a claim of a very rare sighting. The ivory-billed woodpecker, a bird last seen in 1943 and considered extinct, was reportedly seen by a credible turkey hunter. The high-profile search that ensued from the opportunity to have this one-of-a-kind observation has generated a growing awareness of the impact of humans and the decline of birds (USFWS, 2009). As with other resources, the value of a bird rises as its scarcity increasing.

A U.S. Geological Service report, which surveyed data from thirty-five years (1966-2001) tracked "significant negative trend estimates" for almost twenty-five percent of U.S. bird populations (Sauer, 2003). In the U.S., more than 1,000 different species of birds exist, of which 251 are federally threatened, endangered, or of conservation concern (NABCI, 2011). The notion that the impacts from humans should be at most minimal may be one reason why a large body of literature has focused on identifying impacts people have on wildlife (Baines and Richardson, 2007; Beale and Monaghan, 2004; Blumstein et al., 2005; Bolduc, and Guillemette, , 2003; Pelletier,

2006; Burger and Gochfeld, 1998; Burger J., 1993). Boyle and Samson, after reviewing 166 articles on the effects of non-consumptive outdoor recreation on wildlife, concluded that in 81% of the reviewed studies, humans were negatively impacting wildlife (Boyle and Samson, 1985).

Outdoor recreation has the potential to disturb wildlife resulting in impacts to animals' behavior and fitness, and avoidance of otherwise suitable habitat (Taylor and Knight, 2003). Koshak compiled an annotated bibliography of non-consumptive outdoor recreation impacts on birds and summarized that because of the shared benefits and responsibilities it is imperative for stakeholders to consider potential impacts (Koshak, 2007) . Steven, Pickering, and Castley reviewed 69 recreation ecology papers that examined the effects of recreation on birds and found that 88% of the papers reported negative impacts including changes in physiology, behavior, abundance, and reproductive health (Steven et al., 2011). Even those groups that enjoy birds in their habitat have an impact upon them (Beale and Monaghan, 2004; Borgman, 2011; Burger and Gochfeld, 1998; Burger, Jeitner, Clark, and Niles, 2004; Smith-Castro and Rodewald, 2009).

In 2002, Riley wrote about the essence of wildlife management being distilled into managing wildlife-related impacts: "which are significant effects of events or interactions involving humans and wildlife, wildlife management interventions, or stakeholders" (Riley, 2002, pg. 586). Public land agencies promote birding as a way to increase conservation awareness in the public while receiving participation and financial support. To accommodate and attract birders, parks build structures, trails, parking lots and roads, and other amenities that may compromise the balance of conservation for that space (Ceballos-Lascruian, 1996; Kazmierow, Hickling, and Booth, 2000; Kenchington, 1989).

Birding Impacts

Birders interacting with birds in their natural environments may contribute to the overall decline of birds and bird habitat, compounding any negative impacts from other

human stressors. Although traditionally considered non-consumptive and benign, birding can cause negative ecological impacts to birds and bird habitat, creating potential conflict for bird managers and birding guides who seek to provide both recreational opportunities and resource conservation. One researcher put it: "Negative impacts on wilderness are an inevitable consequence of recreation," (Leung, 2000, pg. 23).

Birding has been shown to cause of negative ecological impacts to birds and bird habitats (Hill, Hockin, Price, Tucker, Morris, and Treweek, 1997; Koshak, 2007). Birding has negative impacts that may outweigh the social and economic benefits (Boxall and McFarlane, 1993; Burger and Gochfeld, 1995; Caissie, 2002; Cordell and Herbert, 2002; Eubanks and Stoll, 1999; Glowinski, 2008; Hvenegaard, 1989; Kellert, 1985; Mathis and Matisoff, 2004; Sekerciogul, 2002; Stoll et al., 2006; USFWS, 2009).

In a 2011, Borgmann published a literature review of human disturbance of waterbirds, 50 scientific articles found that in "86% of the report's human-caused disturbances" impacted the studied species (Borgmann, 2011, pg 1). Altered behavior from boating and walking were shown to alter waterbird behavior, diverting time and energy from other essential behaviors such as feeding (Borgmann, 2011). For example, flushing may result in birds altering their behavior or physiological responses to stimuli. In Delware Bay, shorebirds were flushed repeatedly by birders almost 60% of the time, resulting in nest predation and abandonment, behavior modification, foraging disturbance, and even regurgitation (Burger et al., 2004). The zeal of birders can result in increased nest predation and abandonment; birder-related pollution and habitat destruction; increased disturbance of rare and/or threatened birds; and other anthropogenic stressors (Pelletier, 2006; Burger and Gochfeld, 1998).

The benefits of competition and the excitement of birding can outweigh the financial, physical, or social costs. For example, a 2011 movie called "The Big Year" details the all-consuming and ruthless yearlong quest of three male birders for supremacy in a birding competition (Frankel, 2011). This film parody portrays extreme or advanced birders' quests by foot, bicycle, helicopter, and rental car across North America, fueled by the desire to answer the question: Who will identify the most birds?

Analogous to this comedy, previous studies have shown more as birders' advance in behavior and attitudinal intensity, birders displayed motivations to maximize the benefits, requiring single-minded determination and perseverance (Bryan, 1977; Cole and Scott, 1999; Hvenegaard , 2002; Lee and Scott, 2006 ; Lee and Scott, 2004).

Competitive birding has a goal to rack up or "tick" off the largest number of seen birds (Moss, 2004). Sometimes, this competition is based upon listing the observed species, generally within a given parameter and confirmed by other birders. Lists become a means of comparing their birding experiences with other birders, based upon skill, time involved, distances traveled, bird variety, or difficulty of finding the bird for example. These records are generally known as a birder's checklist and can be based by formal rules or personal preference, can be public or private, and have increasingly been recorded electronically (Watson, 2011). Through the use of a checklist, birders can work toward a goal or actively seek out and "hunt" rare or extra limital birds in remote locations. Boyle and Samson describe how some birders pursue and impact birds by pursuing them for birding competitive checklists (Boyle and Samson, 1985). The competition and use of checklists for birding may override any birder's ecological consciousness in the pursuit of identification of the most birds (Bireline, 2005; Sekerciogul, 2002; Vaske, Graefe, and Kuss, 1983).

A previously discussed study in 2005 reported the relationships between specialized birders and their self-reported impact behaviors (Bireline, 2005). Specific self-reported potential impact behaviors increased as the specialization continuum went from general to the specialized, and thus seemed to support a belief that the perceived benefits of observing birds takes precedence over the perceived liabilities of birders' actions (Bireline, 2005). On several occasions, intermediate and advanced birders, who might be expected to behave with the most concern for the environment, carried out a greater number of potential impact behaviors (Bireline, 2005).

Regardless of its traditional "harmless and non-consumptive" status, research on negative ecological impacts from birding could change the image of this recreation from benign to malignant (Bireline, 2005; Boyle and Samson, 1985; Burger and Gochfeld,

1995; Koshak, 2007). It is critical to identify perceptions of these ecological impacts from birders, birding guides, and bird managers to understand stakeholder communication, participation, and partnerships. Despite this need, there is currently a lack of comparative studies identifying birders', birding guides', and bird managers' perceptions of these ecological impacts. The extent to which birds are negatively impacted is not examined in this study, but the perceptions of the impacts of different stakeholders within birding are tested and compared.

Human Dimensions of Birding Impacts

This study is intended to be useful for management of wildlife and birding to mitigate impacts to birds and bird habitat while ensuring a continued, shared use of public lands and resources. "Human dimensions," a term coined about 1970, concerns what people perceive and do about wildlife and wildlife management, and why they think and do that (Jacobson and Duffer, , 1998). Thus, researchers in human dimensions look to the social sciences for theories concerning peoples' values, beliefs, attitudes, standards of behavior, and motivations. They then use social science concepts to formulate studies that capture and explain human values, beliefs, etc. as they apply to wildlife. Knowledge gained from these studies, in essence, gives the public a voice in wildlife management decisions.

There are many studies that reflect a need for bird management to understand the ever-evolving motivations and perceptions of their users (e.g., Jacobson and Duffer, 1998; Sekerciogul, 2002; Glowinski, 2008; Krishnaswamy, 2010). Human dimensions are critical to the success of wildlife management, facilitating an understanding of resource importance and of those who use public lands. For example, minimizing bird disturbance and flushing will improve the quality of birding and may increase bird abundance and species richness, benefiting both the park manager and birder (Gutzwiller 1995; Fernandez-Juricic, Jimenez, and Lucas, 2000). Knowledge of birders' perceptions and beliefs regarding their effects on wildlife may assist bird managers in encouraging positive visitor behaviors around wildlife, (Taylor and Knight, 2003). A 1995 report by

Burger et al. examined strategies for bird management, using perceptions of managers and birders for bird conservation. Results indicated that managers should be mindful of the various bird responses to human intrusion, and thus understanding of these human dimensional factors, careful planning, and enforcement can create a situation where birds and birders can exist without undue disturbance to the birds (Burger and Gochfeld, 1995).

Few studies have examined how recreationalists perceive their effects on wildlife, although this has implications for their interactions with wildlife. In a recent study of ecological impacts, birders perceived others, not themselves, with recorded birding negative ecological impacts (Adams, 1997). It is important to identify perceptions of ecological impacts of birders for the shared benefits of this recreational tourism to the environment and the animals that inhabit it. Perceptions of negative ecological impacts from birding were assessed in this study to gauge understanding and views on these actions. Birders are an economically-important and growing user group, but there is a recorded prevailing opinion that these birders are not given a voice in the management of their recreation, nor able to effectively help management conserve birds and their habitat (Shaw, and King, 1980). Site managers can use specialization and perception information to manage resources and influence the specialization process to achieve desired management goals.

Effective management of public lands is partially based upon the human dimensions of wildlife and critical to the long-term conservation of birds as well as use of the space by birders. When human-wildlife interactions are of concern for park management, research has shown public satisfaction is related to wildlife manager's ability to incorporate stakeholder concerns into the decision-making process, and their reassessment processes (Decker and Chase, 1997). Successful management of birder impact is possible (Burger et al., 2004; Carney and Sydeman, 1999). There are many studies which acknowledge a difference between stakeholders and their perceptions of environmental or ecological impacts (Martin, McCool, and Lucas, 1989; Taylor and Knight, 2003; Kazmierow et al., 2000). The benefits of human dimension studies in natural

resource management, such as this study on perceptions of birding activities' impact, include better, more informed decisions, durable and sustainable solutions, and encouraging compliance with management decisions. From the literature review of birding, recreational specialization, and negative ecological impact perceptions, the study was able to base its methods.

Hypotheses

The basic question of the study focused on assessing how often stakeholders were aware of birding's negative ecological impacts. This study was conducted based on the following hypotheses:

1. Birders' perception of negative ecological impact is not significantly related to their specialization level of birding.
2. There is a significant difference between birders' and bird managers' perceptions of negative ecological impact from birders.
3. There is a significant difference between birders' and birding guides' perceptions of negative ecological impact from birding.

CHAPTER III

METHODS

Study Approach

The study gathered data in two ways for analysis: 1) preliminary interviews in the spring and summer months of 2011; and 2) stakeholder surveys administered in December 2011 and January 2012. A variety of data collection methods were used, following a social science research process called the mixed method approach. A key feature of mixed methodology used in this study is a method pluralism or eclecticism, which frequently results in superior research (compared to "monomethod" research) (Johnson and Onwuegbuzie, 2004).

Social sciencists use a mixed method approach because it capitalizes upon the success and range of combining qualitative and quantitative research for a holistic and more applicable result (Sandelowski, 2000). This study approach to designing and conducting research is important because it reflects the mixed methodology of social and biological science emphasized in natural resource management (Johnson and Onwuegbuzie, 2004; Burger and Gochfeld, 1995; Decker and Chase, 1997; Jacobson and Duffer, 1998; Kazmierow et al., 2000; Wellman et al., 1982) Mixed-methodology processes have been previously useful for birder and birding studies (Kazmierow et al., 2000; Tashakkori and Teddlie, 1998).

Although direct ethnographic information was documented, it was only used as personal justification for the study, and thus was not recorded or analyzed for this study. These data collection methods were conducted with birders, bird guides, and bird managers along the upper half of Great Texas Coastal Birding Trail (GTCBT), the first wildlife viewing trail in the nation (TPWD). Selection and development of stakeholder contacts, as well as establishment for the study began with in-depth interviews and participant observation.

Study Duration and Geographic Area

The timeline for the study began in the spring of 2011 with ethnographic observation and preliminary research review. For simplification, Figure 6 explain the timeline of the study.

Figure 6: Study Timeline. This graphic explains the mixed method approach to data collection and the study timeline.

The geographic range of the data collection of the study included the upper portion of the Great Texas Birding Trail (GTCBT) and focused on sites and events with the highest number of birding stakeholders who could participate in the study. Figure 7 is a map of Texas counties involved in the GTCBT and another from the TPWD As previously discussed (Chapter II, Literature Review), this area is a portion of the central flyway, which hosts millions of birds in their annual migrations. The GTCBT is one of five state-designated systems of trails, and it identifies sites and resources for birding. These trails provide economic incentives for landowners and communities to conserve habitats while providing recreational opportunities for the traveling public (TPWD). Birding sites actively managed for birding were selected based upon the level of birding activity present, organized birding field trips, and availability of survey participants. For example, the Matagorda Christmas Bird Count was included because of its high number of birder, birding guide, and bird manager participation (almost 26% of the total birder participation).

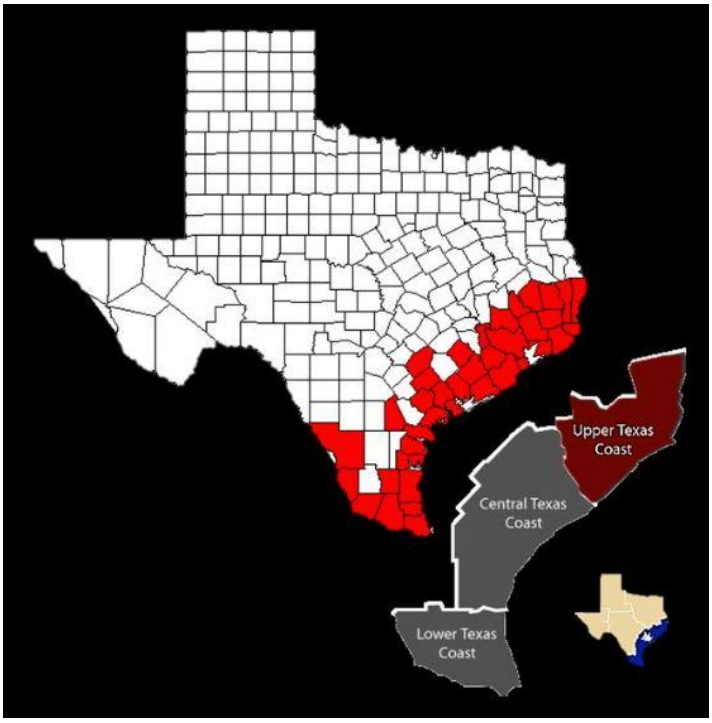

Figure 7: Upper Texas Coast Birding Map. This figure shows both a larger Texas map with the GTCBT counties and outlines of the sections of the GTCBT (with the Upper Texas Coast in dark red). Source: Texas Parks and Wildlife Department, 2012, website: http://dnr.wi.gov (website accesssed 11/6/11).

Participants

As previously stated, three stakeholder groups were involved in this study: birders, birding guides, and bird managers. Minors, ages seventeen and younger, were not interviewed or surveyed in compliance with the Regulations for Protecting Research Subjects, CFR 46. In the spring and summer seasons of 2011, the one-on-one, structured interviews were conducted with birding stakeholders. The purpose of the interviews was to introduce the need for this research and begin defining negative ecological impacts from birding stakeholders while establishing contacts. Key individuals amongst birding guides and bird managers in the upper Texas coast were identified and asked to participate in an interview. If consent was given, the structured interview began, and notes were taken and later transcribed. Snowballing or referral method of sampling was

conducted, with participants suggesting others who are interested in birds and bird habitat conservation.

During the winter of 2011 and into 2012, surveys were administered to large groups of birders. To obtain a sample, birding and naturalists groups, bird guides, bird managers, and organizers were contacted to find events, sites, or meetings where clusters of birders could be found. Cluster sampling was used in this study because this method addresses large groups for possible participation. Effective use of the cluster sampling allowed all participants to be grouped for the survey orientation, participation, and completed survey retrieval. Due to the expanse of the range of birders and birding activities, the use of cluster sampling minimized travel and increased participation, as opposed to individual sampling methods. Cluster sampling for birders is appropriate because most people act out their lives in more or less natural groups, or 'clusters' (Bernard, 2006).

To increase participation and accurate data, surveys were requested before or after the main activity or event, and allowed to be returned in the mail for convenience. Orientation and request for participation was completed by group presentation which outlined the verbal consent and study information (Appendixes D and E) which included need for data, inclusion criteria for each stakeholder survey, and the logistical process for getting, taking, and returning a survey. The surveys were anonymous in order to protect the identity of participants and minimize social coercion from reporting unethical birding.

To understand the perceptions of impact from birding, targeted groups were those who would have the ability to change these behaviors for increased bird and bird habitat conservation. Potential participants were asked to identify a stakeholder classification (from the list below) and participate in the study through the specific survey for that stakeholder group. The following describes the stakeholder categories, presented to participants:

- Birder participants must be in the field for the primary purpose of observing, studying, identifying, and photographing birds in their native habitats. The study

does not address the "back yard" birder who doesn't visit sites for birding. All birders will have gone birding or have interest in birding along the Upper Texas Coast (UTC) portion of the Great Texas Coastal Birding Trail (GTCBT).

- Birding guides are group leaders who focus on birding activities and sites. All bird guides conduct tours within the UTC portion of the GTCBT.
- Bird managers are professionals who manage birding resources, and are the "top-level administrators" at their site. All selected bird managers conduct business that includes recreationalists and birders within the UTC portion of the GTCBT.

Birders have a much higher population than birding guides and bird managers, and thus birders were expected to have the largest stakeholder group participation. The population of birders and birding guides in general is not easily identified because birding and bird guiding are not licensed activities, few programs are designed specifically for or by them, and their activities do not require specialized recreation areas or facilities. The surveys were administered during the off-peak period, and so fewer guides were expected. Additionally, there is no one listing of guides, and many people who led trips identified themselves a "birder" before they'd consider themselves as a guide. Those that guide or led trips for birders are specialized birders in that they are responsible for having information on locations and identification of birds. Birding guides were identified at these birding events, sites, or meetings. Bird managers were located by using the GTCBT pamphlet as well as internet information which contains information about birding sites. Bird managers were identified for this study through a review of the GTCBT site information. For the coastal birding trails, descriptions of each site and bird management contact information was used to identify bird managers.

Structured Interview Methods

Previous studies on specialization and negative ecological impacts developed a structured interview format, whose answers guided the development of the initial birder survey (Wellman et al., 1982; Bireline, 2005). The objective of the interviews was to

focus on assessing perceptions of birding negative impacts and ways to increase bird and bird habitat conservation (see Appendix B). Structured interviews were preliminary to the survey method because of the added benefit of non-written responses to questions such as body language, tone, and demeanor. Interviews have the potential to overcome poor response rates of surveys (Austin, 1981); they provide exploration of attitudes, values, beliefs and motives (Richardson, Dohrenwend, and Klein, 1965; Smith, 1975); they can facilitate comparability by ensuring all questions are answered; and they ensure that the respondent is not getting assistance with any answers from others (Bailey, 1987). Particularly, structured interviews with formal, written guidelines were used in this study to build a reliable, comparable qualitative data set (Bernard, 2006).

Interviews with birders, birding guides, and bird managers interested in increasing bird and bird habitat conservation set a baseline of understanding from which the survey could be constructed. Much as a previous study on specialization by Wellman et al. used structured interviews to establish definitions, the interviews with birding stakeholders established knowledge of the perceptional extent of impacts, birding's importance to the area, and general ideas of increasing conservation (Wellman et al., 1982). Stakeholders were contacted in person or via the phone to describe the study and its purpose, and then were asked for their consent to be interviewed.

Survey Instruments

Three distinct surveys were designed to test the relationships of birding impact perceptions among different specialization scales of birders, but also to understand differences between birders, birding guides, and bird managers. Accordingly, the birder survey questions gathered information on birder specialization information (from bird participants only) and all stakeholders' perceptions of negative ecological impacts from birding. Birder specialization questions were based upon the previously discussed study model (see Figure 5) (McFarlane, 1994; Bireline, 2005; and Scott et al., 2005).

To avoid a reluctance to admit to perceptions of negative ecological impacts in a "Yes or No" format, the questions were designed to show intensity or frequency and

provide a fuller range of answers. In order to begin mitigation of any perceived negative effects, all participants were asked to identify methods for increasing bird and bird habitat conservation and funding sources for such conservation. Not all survey questions asked are represented in the analysis in this study. Additional questions on positive social and ecological impacts were not analyzed but requested of participants to prevent bias of the data, and to engage the participants' full birding experience.

Perceptions of negative ecological impact questions were similar for all surveys but were associated with the stakeholder's (birder, guide, or manager) role in birding practices. Survey questions on negative ecological impacts were constructed using information combined from interviews, the Principles of Birding Ethics, as well as previous research on birding impacts (Bireline, 2005; Bolduc and Guillemette, , 2003; Boyle and Samson, 1985; Burger and Gochfeld ,1991; Buger, 1994; Burger and Gochfeld, 1998; DeMauro, 1993; Erwin, 1989; Hulbert, 1990; Finney et al., 2005; Frid and Dill, 2002; Koshak, 2007; Pelletier, 2006; Smith-Castro and Rodewald, 2009; Sekerciogul, 2002; ABA, 2011).

All negative impact perception questions were rated on a five-point Likert scale for frequency, whose code is discussed in the Statistical Analysis section. Figure 8 is an example of a compound-survey question asked, targeting a frequency response of four impacts, so if negative impact results were reported "always," that question received a low numeric score.

How often does your birding result in the following?					
	N=Never	R=Rarely	S=Sometimes	F=Frequently	A=Always
Litter or waste dumpling	N	R	S	F	A
Vegetation disturbance	N	R	S	F	A
Calling or Whistling	N	R	S	F	A
Playbacks or recordings	N	R	S	F	A
Capture or collecting	N	R	S	F	A

Figure 8: Example Survey Question. This figure is an example survey question regarding negative ecological impacts and the progressive Likert-type scaling answers.

The negative ecological impacts were derived from two sources: birders themselves and via research on recreational impacts from birding. Birders within the American Birding Association have a well-known list of ethical guidelines for birders to follow. Twenty-two perceptions of negative ecological impact variables (listed in Table 2) were defined by the Principles of Birding Ethics (ABA, 2011) and include:

- driving or walking off-trail
- attracting birds through:
    - use of food/water
    - use of vocalizations
    - use of instrument calls
    - use of audio recordings

    - use or wearing attractive colors
- disturbing nests and vegetation
- approaching or flushing birds
- use of flash photography
- entering private property
- littering in the field
- urinating and/or defecating in the field

Beyond the defined birding impacts that negatively affect birds and bird habitat, preliminary interviews and several studies indicated that birders are having an effect. Additional negative impact perception questions which were based upon these interviews and previous research (Baines and Richardson, 2007; Beale and Monaghan, 2004; Blumstein et al., 2005; Bolduc and Guillemette, 2003; Borgmann, 2011; Kenow et al., 2003; Pelletier, 2006; Burger and Gochfeld ,1998; Burger, 1993; Boyle and Samson, 1985; Koshak, 2007; Steven et al., 2011) were also asked, and include:

- vehicle and vessel use in birding habitat
- capturing birds
- limiting interactions with birds

Table 2: Negative Ecological Impact Items. This table shows the 22 items mentioned in previous birding impact research and the Principles of Birding Ethics. These items were used to construct survey questions to target frequency perceptions of negative ecological impact on a five-point Likert-type scale.

Birding's Negative Ecological Impact Items (Variable Name)
1.Method of birding- car (Var VEHICLE) [a]
2. Method of birding- boat (Var VESSEL) [a]
3. Method of birding- off-trail walking (Var OFFTRAIL) [a]
4. Method of birding- off-road vehicle (Var OFFRD) [a]
5. Use of food and/or water (Var FOODWATER) [a]
6. Use of vocalization calls (Var INSTRUMENTS) [a]
7. Use of instrument calls (Var CALLS) [a]
8. Use of audio recording (Var AUDIO) [a]
9. Use of attractive colors (Var ATTRACTCLOTHS) [a]
10. Disturbing vegetation (Var DISTVEG) [a]
11. Nest disturbance (Var DISTNEST) [a]
12. Approach birds (Var APPROACH) [a]
13. Flush birds (Var FLUSH) [a]
14. Use flash photography or video with artificial lighting (Var FLASH) [a]
15. Entering private property (Var PRIVATE) [a]
16. Litter in the field (Var LITTER) [a]
17. Urinate or defecate in the field (Var URINATE) [a]
18. Perceived birding result of litter or waste dumping (Var LITTERWASTE) [a]
19. Perceived birding result of vegetation disturbance (Var VEGEDIST) [a]
20. Perceived birding result of calling or whistling (Var CALLING) [a]
21. Perceived birding result of playbacks or recordings (Var PLAYBACKS) [a]
22. Perceived birding result of capture or collecting (Var CAPTURE) [a]

[a] Measured on 0-4 continuous scale, frequency measured from never to always.

Variations within birding were analyzed for a relationship with these twenty-two impact items. In the birding survey, birders were asked questions regarding their intensity of birding using recreational specialization. A twenty-item specialization index was created to analyze birder participants' recreational intensity level (Table 3). Questions were based upon previous research and separated into three dimensions targeted to gather data on birding experience (9 items), equipment and economic

commitment (8 items), and the centrality of birding to lifestyle (3 items) (Bireline, 2005; Bryan, 1979; McFarlane, 1994; Wellman et al., 1982).

Table 3: Birder Specialization Items. Table 4 shows the items used to construct a birder specialization index and the dimensional reliability (Cronbach alpha test score) of those items.

Specialization index dimension and variable items	**Cronbach Alpha**
Experience	**.756**
1.Years of birding (Var YEARS) [b]	
2.Frequency of birding experience- past week (Var PTWEEK) [d]	
3. Frequency of birding experience- past month (Var PTMNTH) [d]	
4. Frequency of birding experience- past year (Var PTYR) [d]	
5. Reported identification of bird species by sight (Var SIGHT)[d]	
6. Reported identification of bird species by ear (Var EAR) [d]	
7. Self-ranking birding experience (Var EXPRNC) [d]	
8. Number of birds on life list (Var LIST) [d]	
Equipment and Economic Commitment	**.593**
1. Ownership of binoculars (Var BINOCS) [c]	
2. Ownership of field guide books (Var GUIDE) [c]	
3. Ownership of spotting scope (Var SCOPE) [c]	
4. Ownership of camera (Var CAMERA) [c]	
5. Ownership of camera lens (Var LENS) [c]	
6. Ownership of birding magazine subscription (Var SUBSCRIPTIONS) [c]	
7. Ownership of birding apps on your phone (Var APPS) [c]	
8. Ownership of birding organization membership (Var MEMBERSHIP) [c]	
9. Ownership of birding site pass (Var PASS) [c]	
Centrality to Lifestyle	**.557**
1. Typical distance traveled for birding on the GTCBT (Var TYPDIST) [d]	
2. Farthest distance traveled for birding on the GTCBT (Var FRTHDIST) [d]	
3. Maintenance of a life list (Var MAINLIST)[*]	

[a] **Scale reliability: Cronbach's alpha= .635**

[*] *Var MAINLIST eliminated from testing because of low Cronbach's alpha score.*

[b] Measured on 0-4 continuous scale, from less than 1 year to more than 10 years.

[c] Measured by yes/no variable

[d] Measured on an open-ended question

[e] Measured dimensionally on a five-point Likert scale. Exclusive answers range from never to always.

Table 3 provides a section for a test (Cronbach's alpha) to be discussed in following subsections, but it refers to the reliability of the questions asked. The questions of specialization were tested with the Cronbach's alpha, and were omitted from specialization when the analysis resulted in less strong reliability.

To identify key characteristics of participants, basic demographic information was requested from all stakeholders including age, years of birding experience, and education level. Birding guides and bird managers were also questioned about their experiences with birders along the GTCBT in the past month to identify frequency of interaction with and perceptions of birding impacts. Additional data on employment were incorporated into the birding guide and bird manager surveys (i.e., "Do you get paid for your stakeholder position in birding?").

Two open-ended questions were used in the survey to gather a portion of the qualitative data regarding participant perceptions of conservation strategies. Open-ended questions identified participants' ideas about conservation of birds and bird habitat, and funding available for that conservation. An additional question regarding their preference for a birder fee was also requested in a "Yes or No" format.

Data Analysis

There were two major analyses used to combine two forms of data collected for this study: qualitative and quantitative. The qualitative data were open-ended answers evaluated for frequency patterns, and were specifically used with interviews and with conservation strategies from the survey. The second data set, from the survey questions on specialization and negative ecological impacts, was coded numerically and required statistical analysis for application.

Open-ended Answer Analysis

To gain a quantitative approach when analyzing qualitative data (such as birding interviews), basic statistical analysis 'quantitized' or converted the qualitative data into

numerical values for easy comparisons. Open-ended answers from the interviews and the survey were transcribed and coded by topic to establish how frequently these topics occurred. For example, when analyzing the interviews or open-ended answers from surveys, variables such as calls and playbacks were classified as a negative impact perception, and coded into a number of how many times they were discussed or written.

Interviews were examined for negative ecological impacts from birding and submitted strategies for increasing bird and bird habitat conservation. Once the interviews were transcribed, topics of interest (such as negative ecological impacts from birding) were analyzed for the frequency in which they occur in other interviews. Transcribed interviews were coded into numerical data based upon targeted topic frequency.

Surveys had several open-ended questions which addressed perception of bird and bird habitat conservation strategies. An additional "Yes or No" question asked about their willingness to pay for a potential birding permit, similar to hunting and fishing licenses. Qualitative data gathered from surveys resulted in several ways to increase bird and bird habitat conservation, and funding sources.

Statistical Analysis

Analysis of surveys was tested for support of this study's three hypotheses. In addition to the hypotheses, demographic information was tested for the average of each stakeholder group. All surveys gathered demographic data of education level completed, years birding, and age of participant. Information gathered from the surveys was compared using a variety of methods, but for non-numeric answers, a system of numerical coding of those answers was completed.

Data entry and data analysis were performed using the Statistical Package for the Social Sciences (SPSS) version 19. All statistics were evaluated at a 0.05 significance level. When the data was entered into SPSS, nominal and ordinal variables were recorded into numeric variables so they could be included in the analysis.

Perceptions of Negative Ecological Impact Analysis

Perceptions of negative ecological impact data were gathered from a five-point Likert scale of frequency from "Always" to "Never". To analyze and compare that data amongst the participants, the numeric coding of that data reflected their choice along the Likert scale (4= Never, 3=Rarely, 2=Sometimes, 1=Frequently, and 0= Always). As a result of this code, participants could receive a high perception of negative ecological impact perception score for this item by reporting that their birding "never" resulted in impacts.

Hypothesis 1 Analysis

Analysis methods examined relationships among perceptions of negative ecological impacts when compared to three levels of birder specialization (i.e., Hvenegaard, 2002; and Scott et al., 2005, Maple et al., 2010). Cronbach's alpha test was used to explore reliability of the analysis for each dimensional variable group (Cronbach, 1951). The Cronbach's alpha test analyzes whether the questions are related, and score ranges from 1.0 (which means the same question was asked twice) to 0.0 (which means that the questions were not asking the same thing). The reliability analysis of the Centrality to Lifestyle at first resulted in a lower score, but when the question, "Do you maintain a life list?" was omitted from specialization measurements and moved to the demographic results; it was raised to its present level (.6). Birder specialization questions were tested by dimensions, with.8 measure for Experience, .6 for Equipment, and .6 for Centrality to Lifestyle, (see Table 4). Overall, the Cronbach's alpha score was a .6, meaning an acceptable score, but less reliable.

Information from specialization was measured in many different scales, (i.e., continuous, open-ended, and binary data) and was coded numerically for comparison (see Table 4 for more detailed information). For example, when the questions for experience (such as "What is the number of years you've been birding?" or "How many times have you birded in the past week?") were combined, the data was transformed from nominal, ordinal, or continuous data into a numeric score. To standardize or

normalize the data from different scale systems, SPSS transcribed the scores into Z-scores. For example, since years of experience was scaled in years, but was combined with the recorded number of participant birding trips in the last week, the z-scores standardized the coded data for complete comparison. Z-scores have been useful in exploratory analysis addressing recreational specialization (Kerstetter, Confer, and Graefe, 2001).

In order to analyze different levels of birding intensity, all specialization data (which included experience, equipment, and centrality to lifestyle) were standardized (into z-scores), and averaged to give a mean specialization index score, reflective of the original Bryan analysis method (Bryan, 1977). Three indexes of specialization (casual, active, and committed) were segmented using cluster analysis, and frequencies of index z-scores were charted for comparison. K-Means cluster analysis tested the specialization variable and labeled it by the individual birder codes. The result of the cluster analysis identified each birder into one of three clusters (casual, active, and committed) which reflected the progressive specialization scaling. K-means cluster analysis has been successful in creating progressive indexes in birding (McFarlane, 1994; Hvenegaard, 2002; Scott, 2003; Scott et al., 2005).

To answer Hypothesis 1 or the presence of a relationship between birder specialization and perceptions of birding's negative ecological impact, each participant's scores for specialization and perceptions of impact were averaged. The SPSS software compared these two birder characteristics by using a one-way analysis of variance (ANOVA) test. Clusters of birders and their individual averaged negative ecological impact perception score were tested so that the averaged impact scores were the dependent variable, and the cluster groups were the independent factor. When there was a statistically significant relationship among the clusters, Least-Significant Differences (LSD) post-hoc testing was performed to understand where and how these clusters are different or related. The LSD post-hoc testing identifies differences amongst the mean scores of each scale of birder specialization.

Hypotheses 2 and 3 Analysis

To compare stakeholders' perceptions of birding's negative ecological impact, averaged stakeholder scores were examined. By reviewing the average scores, generalizations were made about stakeholders' perceptions of impact. An additional analysis was tested through the SPSS program to understand statistically significant differences between birders, birding guides, and bird managers (Hypotheses 2 and 3). Each participant's impact variable scores were averaged and coded with an identifier for birders, birding guides, or bird managers. Through two independent T-tests, birders' impact scores were then tested against those of birding guides and bird managers separately.

Analysis Review

The data analysis in this study carried out the primary objectives and identified demographic information about birder participants. Interviews and open ended answers helped to build rapport with participants, then later, to create a basis for the study and identify management practices of impacts. As seen in the next chapter, demographic results were by and large similar to previous research on birders. The hypotheses were analyzed and, although most of the results supported the hypotheses, there were unanticipated results from the specialization analysis. Lastly, the results for purposed conservation strategies for bird and bird habitat will be discussed along with participant ideas of financial support for such conservation.

CHAPTER IV
RESULTS

Interview Results

The initial interviews were conducted to gauge participation, need, and definitions for the survey. Prior to constructing the survey, interviews were conducted with members of all three stakeholder groups. There were nine negative ecological impacts that stakeholders discussed, but it should also be noted that all interviews conducted (18) noted some positive social, ecological, or economic impacts from birding. A total of twenty-two negative ecological impacts were noted during the interviews, with calls and playbacks being noted most frequently (23%; seen in Table 4). The interviews resulted in several types of impacts that had been found in both scientific literature on birding impacts as well as the Principles of Birding Ethics; yet there was one impact that was not previously mentioned in the literature or the Principles of Birding Ethics and that was the e use of laser pointers. Laser pointers were mentioned once as being used by guides to identify birds in their habitat to large groups. The person who mentioned lasers thought they could have negative impacts to the bird's eye and subsequent vision.

Table 4: Negative Ecological Impacts from Interviews. This table illustrates the interview analysis for frequent answers regarding negative ecological impacts from birding. These interviews were conducted with birders, birding guides, and bird managers.

Negative Ecological Impacts from Birding	**Frequency**	**Percentage of Responses**
Calls and playbacks	5	23%
Vegetation disturbance	4	18%
Not respecting others	2	9%
Lack of appropriate group size	2	9%
Trespassing on private property	2	9%
Flushing	2	9%
Littering	2	9%
Disturbing nests	2	9%
Laser pointers disturbing birds	1	5%
TOTAL	22	100%

Survey Response

The majority of the surveys were distributed at large birding events and meetings of birding organizations. Additional requests for birding guides and bird managers to participate in the survey were made in person and through email. There were 243 surveys returned from 443 surveys requested from all possible participants (or a survey response rate of 55%).

Birders made up the largest section of stakeholders, with 213 surveys completed and returned out of an original set of 382 administered. A summary of responses from the birders by event is shown in Table 5. The largest number of birder surveys was

gathered from the annual birding survey events, with Matagorda Island CBC being the most responsive event. For those who chose to return the survey afterwards, their study site was unknown, and they are listed in the "other" section of Table 5.

Table 5: Birder Response. Table 5 shows the location of the birder participant surveys. If the survey was returned at the participants' convenience and the location could not be assigned, then it was labeled as "Other". At the bottom of this table, the total number of distributed and returned birder surveys is listed.

Location	**Frequency**	**Percentage (%)**
1. Christmas Bird Counts	116	54%
a. San Bernard	14	
b. Brazos Bend	13	
c. Freeport	23	
d. Matagorda Island	30	
e. Galveston	6	
f. Bolivar	19	
g. Old River	6	
h. Brazoria	0	
i. Buffalo Bayou	5	
2. Audubon meetings and trips	43	21%
a. Houston Audubon meetings	17	
b. Armand Bayou Nature Center Survey	5	
c. Galveston-Houston Audubon meeting	18	
d. Golden Triangle Audubon meeting	3	
3. Houston Ornithological Group meeting	27	12.50%
4. Other (mailed in, emailed, or handed to administer)	27	12.50%
Total Birder Participants	213	100%
Total Birder Surveys Distributed	382	56%

A smaller portion of birding guide and bird manager participants reflects a smaller number in the study population when compared to the number of birders. Bird managers and birding guides were contacted via phone and email to gain participation. Once bird managers consented, then surveys were administered to 33 individuals, with 20 completed and returned (response rate of 60%). As a result of a limited population, a small number of birding guides participate. There were 17 birding guides' surveys distributed and 10 were returned completed (response rate of 59%).

Demographics

To compare the participants with other previous studies on birding, this study performed an analysis of demographic information was taken. Results of the demographic analysis (Table 6) of birders suggested that the interview participants were similar in age, education level, and maintenance of a life list to recorded birder studies (Adams, 1997; Eubanks, Stoll, and Ditton, 2004; Hvenegaard, 2002, Bireline, 2005). The full range of age measured was eighteen to eighty-nine, but the mean age of the birder respondents was fifty years old. Birders, on average, had at least a bachelor's degree. The average birder participant had been birding for five to ten years, and 60% of birders maintained a life list (an average of 666 birds on their list.)

Birding guides had an average age of fifty-three; 60% were not paid to guide; and most had been a guide for five to ten years. The birding guides, on average, held at least a bachelor's degree. Participating birding guides averaged one trip with birders within a month of the survey.

Bird manager respondents had an average age of forty-three, had between five to ten years of experience in their management position, and at least a bachelor's degree. Participating birding managers had the most recorded interactions with birding in the past month as opposed to other stakeholders. Bird managers averaged seven interactions with birders at their management sites within a month of the survey.

Table 6: Demographic Summary. This table gives an explanation of the averaged demographic information from all stakeholders for an overview of participation.

Stakeholder	Age	Education Level	Employment in birding	Years With Birding	Past month birding experience	Birding List	Number of Birds Listed
Birder	50	Bachelor's Degree	N/A	5-10 years	4	60% yes	666
Birding Guide	53	Bachelor's Degree	40% yes	5-10 years	1		
Bird Manager	43	Bachelor's Degree	100% yes	5-10 years	7		

Perceived Birding Negative Ecological Impacts

There were two major questions of focus for this study: do birders perceive their own negative ecological impacts differently as they change in level of specialization; and do other stakeholders – bird guides and bird managers - perceive birder impacts in the same way? Analysis determined that specialization and stakeholder groups perceive birding's negative ecological impacts differently, but not as expected.

Surveys tested perceptions of negative ecological impacts through twenty-two, five-point Likert-scaled questions. Appendix F shows a detailed frequency distributions for perceptions of birding's negative ecological impact using the Likert-type scale described in Chapter III (4= 'Never', 3='Rarely', 2='Sometimes', 1='Frequently', 0= Always). According to this code, the higher the score (4), the less impacts were perceived. On average and using the Likert scale categories, all stakeholders perceived negative ecological impacts from birding "rarely" or "sometimes" (at a mean score of 2.76 for all participants' perceived impact data). All perceptional data is listed by stakeholder in Appendix F, but is also shown in (see Figure 9). Figure 9 is a graph listing averaged perceptional scores along the five-point Likert scale for overall comparison of survey data.

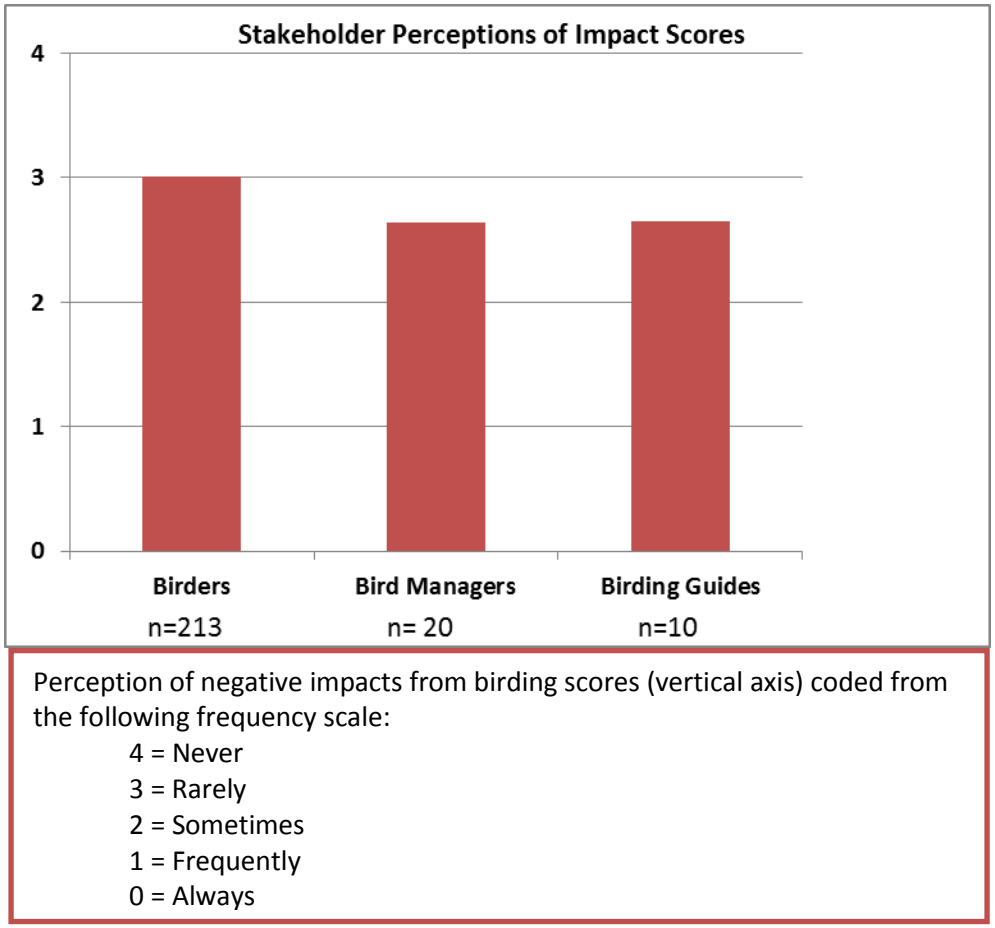

Figure 9: Perceptions of Impact Scores. This graph describes the average results of the stakeholder survey regarding perceptions of negative ecological impacts from birding. The vertical axis scale correspondes to the Likert-type scaling o averaged stakeholder perceptional scores along frequency scale.

In general, participants reported low perceptions of negative ecological impacts from birding behavior. Birding guides had the highest frequency of perceived negative ecological impact scores - 50% of the time (or 11/22 answers on Appendix F, with an overall impact score of 2.65). Yet, the managers' mean score for all perceptions is highest in perception overall (averaged score for managers is 2.64, seen in Appendix F). Birders had the lowest frequency of perceived impacts from birding (mean score for all 213 birders is 3.01, Appendix F). Closer examination of the statistical differences among individual stakeholder participants is discussed in the following sub-sections.

Hypothesis 1: Comparing Perceptions of Birder Specialization Levels

Hypothesis 1 stated that various intensity or specialization levels were not related to perceptions of birding's negative ecological impacts. To support this hypothesis, K-means cluster analysis identified each birder participant as one of the three levels of specialization, defined as casual, active, and committed (Scott et al., 2005). Those specialization levels were tested by establishing statistically significant differences, and then defining those differences based upon the calculated means of perceived impacts.

Birder specialization frequency distributions are found in Table 7. As seen in that table, the theory that fewer highly specialized (committed) participants in a recreational activity is supported by Bryan's theory (Bryan, 1979). Only 10 birders were classified as committed (5% of total birder participants). Eighty four birders were classified as active (39%); and 119 birders were classified as casual (56%). The frequency distribution of the three specialization levels of birders is pictured in Figure 10.

Table 7: Birder Cluster Frequency. Table 7 is a graph of birder specialization cluster frequencies. Out of the total 213 birder surveys received and clustered, this table shows the number and percentage of those participants.

Cases in each specialization scale			Percentage (%)
Cluster	Committed	10	5%
	Active	84	39%
	Casual	119	56%
Valid		213	100%
Missing		0	0%

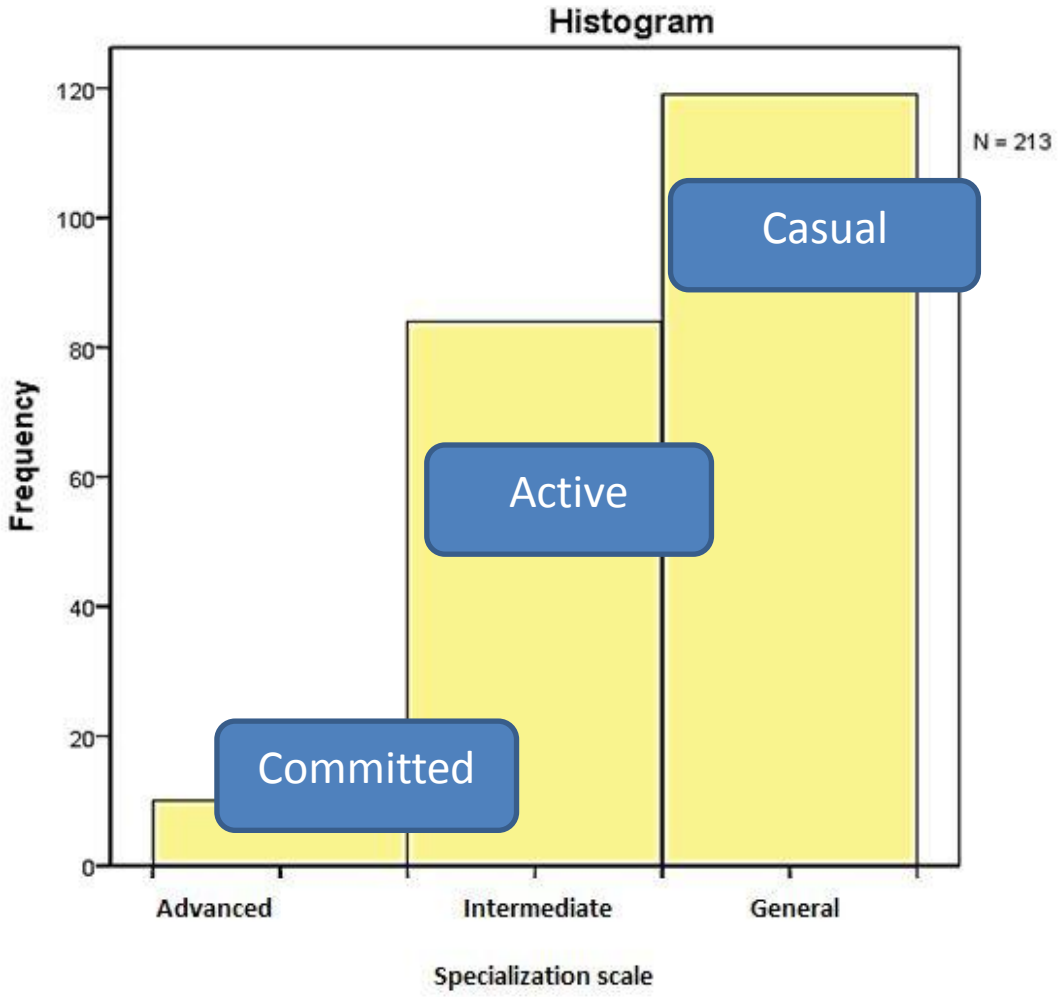

Figure 10: Cluster Histogram. This figure shows a histogram of birder specialization cluster frequencies.

Once birders were separated into their specialization levels, those levels were identified with their corresponding negative ecological impact scores through the ANOVA testing and found to be significant (Table 8). The most important result of the ANOVA table is recorded in the last column, circled for clarification. The analysis of variance (Table 8) test showed a significant difference between clusters or levels of birder specialization and their perceptions of negative ecological impact ($p = .001$).

To explain where the differences are the most significant, the LSD post-hoc test was performed amongst the three levels of specialization and their negative ecological

impact scores. The critical interpretive section is the column labeled “Mean Differences” which is cirlced to facilitating reading (Table 9). In summary, this mean difference collumn subtracts averaged scores among each stakeholder group from the column labeled “(I) clusters” and second column, “(J) clusters”. Mean scores were scored low when birders recorded negative impacts from birding more frequently. When examining Table 9, the lowest mean differences are found in the first row. Therefore, committed birders had the most frequent perceptions of impact.

Table 8: ANOVA Analysis. Table 8 describes the ANOVA test which defined the statistical significance difference between specialization clusters, shown in the last column. (Significance tested at the .05 level.)

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.72	2	.86	6.85	.001
Within Groups	26.33	210	.12		
Total	28.05	212			

Table 9: LSD Analysis. The Least Significant Difference test results given in Table 9 identify specific differences between the mean (or average) of each clusters' birding negative impact perception score.

Least Significant Difference: Multiple Comparisons

(I) clusters	(J) clusters	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Committed	Active	-.19	.11	.09	-.43	.03
	Casual	-.33*	.11	.00	-.56	-.10
Active	Committed	.19	.11	.09	-.03	.43
	Casual	-.14*	.05	.00	-.24	-.04
Casual	Committed	.33*	.11	.00	.10	.56
	Active	.14*	.05	.00	.04	.24

*. The mean difference is significant at the 0.05 level.

Hypothesis 2: Comparing Perceptions of Birders and Bird Managers

It was hypothesized based upon previous comparisons, that birders and bird managers would be different in their perceptions of negative ecological impacts of birders (Martin et al., 1989; Needham and Rollings, 2005; Vistad, 2003). The motivations and attitudes of these two stakeholders have been reported to be distinct, therefore their perceptions weren't expected to be similar (Needham and Rollings, 2005). The comparison between the surveyed perceptions of twenty-two birding impacts validated the Hypothesis 2, and there was a statistically significant difference between birders and bird managers ($p = 0.000$; circled in Table 10).

Table 10: Independent T-Test of Hyposthesis 2. This table illustrates the results of an independent T-test which defines the statistical significance of difference between the average score of birding's perceived negative impact from birder and bird manager participants.

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Diff.**	**Std. Error Difference**	**95% Confidence Interval of the Difference Lower**	**Upper**
Equal variances assumed	.515	.474	-22.75	221	.000	-2.70	.11	-2.93	-2.46
Equal variances not assumed			-19.08	9.58	.000	-2.70	.14	-3.02	-2.38

The individual T-tests averaged stakeholder negative ecological impacts from birders' and bird managers' perceptions of impact and resulted in twelve cases of statistically significant difference. Between the birders and the managers, a 54% differnce was noted between the frequency of percieved impacts (12 differences noted out of 22 impact variables tested).

Table 11 lists the twelve stastitically significant different impact variables in order of significance. The top five impact variables all contain a definitive p-value of zero, with managers having lower mean values. The interpretation of these impact scoreresults suggest that managers had higher frequency of perceived impact from birders than birders did of themselves. There were ten impact perceptions that were similar for both birders and bird managers (or 45% of the time, these two groups agree on impact perceptions).

Table 11: Chart of Significantly Different Impacts: Hypothesis 2. Table 11 shows mean birder and bird manager answers to questions on birding's negative ecological impacts. The differences in perceived negative impacts between birders and bird managers has resulted in statistical significance for the following twelve ecological impact items.

SPSS 19 software Independent T-tests		**BIRDER**	**MANAGER**	**Sig. (p<.05)**
Perception of Negative Ecological Impact	**Code**	**Mean**	**Mean**	**T-test Sig. (2-tailed)**
When do you practice disturbing vegetation on the GTCBT?	DISTVEG	3.1	1.9	0
When do you practice nest disturbance on the GTCBT?	DISTNEST	3.8	1.9	0
Frequency of entering private property without permission?	PRIVATE	3.7	2.9	0
Littering in the field?	LITTER	4.0	2.4	0
Frequency of litter or waste from birding?	LITTTER WASTE	4.0	2.9	0
How often do you go off road to observe or photograph birds?	OFFRD	2.9	3.9	0.001
When birding, how often do you use instrument calls to attract birds to you?	CALLS	2.9	1.9	0.001
Frequency of vegetation disturbance?	VEGEDIST	3.2	2.6	0.001
When birding, how often do you use vocalization calls to attract birds to you?	INSTRUMENTS	3.7	3.1	0.003
Frequency of flash photography or video with artificial lighting?	FLASH	3.7	2.9	0.003
How often do you go off trail to observe or photograph birds?	OFFTRAIL	1.8	2.5	0.004
How often do you use a car or vehicle to observe or photograph birds?	VEHICLE	1.1	1.6	0.018

Hypothesis 3: Comparing Perceptions of Birders and Birding Guides

Birders and bird guides were expected to differ in their perceptions of birders' negative ecological impact because of the potential financial incentives for guiding as a profession and the difference in motivations between them (Martin et al., 1989). This expectation was not supported by the demographic information recorded from the surveys as discussed earlier. A majority (60%) of responding birding guides were volunteers. When group average impact scores were tested for birders and birding guides, there was a statistically significant differnce (p = 0.000; circled in Table 12). In Table 12, the independent T-test results support a difference in perceptions.

Table 12: Independent T-Test of Hyposthesis 3. This table illustrates the results of an independent T-test which defines the statistical significance of difference between the average score of birding's perceived negative impact from birder and birding guide participants.

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Difference	Lower	Upper
Equal variances assumed	.51	.47	-22.75	22	.000	-2.70	.11	-2.93	-2.46
Equal variances not assumed			-19.08	9.58	.000	-2.70	.14	-3.02	-2.38

Table 13 displays all statistically different impact scores for birders' and birding guides' perceptions of negative ecological impacts from birding. When examining the independent variable means (Table 13), birders and birding guides show significant differences on only four items (CALLS, LITTERWASTE, URNIATE, FLASH), or a total of 18% of the variables. On all statistically significant negative ecological impact

perceptions, guides reported lower perception values, meaning birding guides were perceiving these four impacts as frequently or more frequently than birders were.. Overall impact perceptions were statistically significant in these four cases, but it is important to note that there were eighteen items where the perceptions between birders and birding guides were not significantly different (or 82% of the time, these groups had similar perceptions.)

Table 13: Chart of Significantly Different Impacts: Hypothesis 3. Table 13 shows mean birder and birding guide answers to questions on birding's negative ecological impacts. The differences in perceived negative impacts between birders and bird managers has resulted in statistical significance for the following four ecological impact items.

SPSS 19 software Independent T-tests		**BIRDER**	**GUIDE**	**Sig. (p<.05)**
Perception of Negative Ecological Impact	**Code**	**Mean**	**Mean**	**T-test Sig. (2-tailed)**
When birding, how often do you use instrument calls to attract birds to you?	CALLS	2.9	1.2	0.00
Frequency of litter or waste from birding?	LITTTER WASTE	4.0	3.8	0.009
Urinating or defecating in the field when facilities are not available?	URINATE	2.7	1.9	0.035
Frequency of flash photography or video with artificial lighting?	FLASH	3.7	3.1	0.038

Conservation Strategies

In the interviews with stakeholders, conservation strategies were assessed and analyzed for frequency. In the subsequent surveys given to birding stakeholders, information regarding conservation strategies and funding opportunities available was sought through open-ended questions. To measure participant support for increasing

conservation, birders and birding guides were queried using a "willingness to pay" question in a "Yes or No" format.

Interview Conservation Strategies

Prior to the survey, questions regarding management of birders were assessed from all stakeholders interviewed. When discussing solutions to increase bird and bird habitat conservation in these interviews (Table 18), there were eleven strategies recorded from all stakeholders. The most frequent answer noted (50% of the answers recorded) for increasing bird and habitat conservation placed the responsibility on the birders in the field.

Table 14: Conservation Strategies from Interview. This table shows the interview frequency analysis of discussed strategies for increasing bird and bird habitat conservation.

Strategies recorded	**Frequency**	**Percentage of Responses**
Birders self-regulate	5	46%
Limit playbacks and calls	2	18%
Education	2	18%
Bird guide regulations	1	9%
Respect for others	1	9%
TOTAL	11	100%

Five stakeholder interviews noted that birders would be able to monitor and regulate any impacts, and thus increase conservation efforts. Specifically, this responsibility of birders for increasing bird and bird habitat conservation was noted in several conversations with birders, birding guides, and bird managers. For example, a

nationally renowned bird guide, ornithologist, and author, John Dunn expressed this thought bluntly: "If someone gets out of line, then an experienced birder will often point to a resolution to maintain an understood level of respect for the bird, the environment, and other birders" (Dunn, personal communication, April 11, 2011).

A bird manager at a GTCBT site dismissed any birder impacts to the area and his management of such actions. The manager stated: “Bird watchers police themselves and are very cognizant of impacts from people. We simply do not have the man-power to patrol the entire area” (Rashall, personal communication, July 22, 2011). Even a birder who was interviewed was recorded as saying that birders are most often the regulators when it comes to negative impacts to birds and bird habitat. This birder recounted a narrative about a popular birding site filled with people crowding a barricaded nesting site. When a man climbed over a barrier to get a picture of the nest, it was the other birders who corrected his actions and who also went further in asking him to leave (Belyea, personal communication, March 29, 2011).

Survey Conservation Strategies

Results from the open-ended section of the survey noted 132 strategies for increasing bird and bird habitat conservation, with “education and outreach” being the most frequent (20%, Table 15). Examples of “education and outreach” strategies were included if the terms “education,” “programs,” “inform,” “increased awareness,” or “public service announcements” were present. In addition to education and outreach ideas, direct actions to habitat were also among the major management conservation approaches discussed. The direct actions provided by participants included: “planting natives and reducing alien species” and “planting more bird-attracting plants” (14% for both of these topics).

Table 15: Conservation Strategies from Survey. This table shows a frequency analysis of all surveys for open-ended answers regarding strategies for bird and habitat conservation.

Strategy recorded	**Frequency**	**Percentage of responses**
Education, outreach	27	20%
Cooperative land stewardship	18	14%
Plant natives, reduce alien species	18	14%
Fundraising	17	13%
Adding attractive bird plants	14	11%
Reduce municipal mowing and lawn care protocol change	11	8%
Acquire land for conservation	10	8%
Limit access	6	5%
Volunteerism	5	4%
Reduce development	3	2%
Politics	2	1%
Enforcement	1	1%
TOTAL	**132**	**100%**

In the surveys, when asked about funding ideas or sources for bird and bird habitat conservation (Table 16), respondents had less to say (91 references noted), but included nine more categories of answers with "grants" being the top suggestion (22% of the recorded answers). Any reference to finding grants or federal funding opportunities was categorized into the "grants" suggestions. Although less frequently mentioned, two individual funding support options were recorded. Additional funding sources included "birding permit/stamp/fee" and "individual donations."

Table 16: Survey Funding Strategies. Table 16 is the frequency analysis of all surveyed answers regarding funding for bird and habitat conservation. These funding types recorded are general topics resulting from the open-ended answers.

Funding type recorded	**Frequency**	**Percentage of responses**
Grants	20	22%
Birding permit/stamp/fees	19	21%
Individual donations	18	20%
Tax break incentives	9	10%
Corporate or industry	7	7%
Use of taxes	6	7%
Encouraging bird business	6	7%
Fundraising events	4	4%
Reducing municipal overhead-less mowing, get volunteer help	2	2%
TOTAL	**91**	**100%**

Surveyed Willingness to Pay for Conservation

In the survey, birders were asked about their potential support for a birder fee, and many birders were open to the idea. A strong 75% (157 out of 207 answered) of the birders surveyed said that they would be willing to pay a fee similar to a fishing or hunting license. Although the willingness to pay question was in a "Yes or No" format, many participants wrote in the margins of the survey about this choice. For example, several survey respondents requested additional information about the requirements and the use of such funds as a condition of their answer. Most of those who wrote additional notes on this fee question also answered the question; and several birders (17) did not answer this question but requested more information. In agreement with the average birder, surveyed birding guides were asked a similar question regarding their willingness to pay for a birding guide certificate, with over half (56%) willing to pay.

Results Summary

Conservation summaries from the preliminary interviews and the subsequent surveys resulted in perceptions that birders are often self-regulating negative ecological impacts in the field, and that there is a desire from stakeholders to increase education and outreach as a means to reduce such impacts. When discussing funding options for increased conservation of birds and bird habitat, the top resource listed was grants, followed closely by individual donations and birder fees or licenses. These results indicate that recreational participants (who in this study were represented by birders and birding guides) are willing to support stewardship actions and funding conservation. In the next section, the application of these results will be examined. Birders' perceptions of their negative ecological impacts are significantly different than those who are guiding trips and managing natural and recreational interests.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Coastal areas are increasingly under pressure from tourists of all types (Kenchington, 1989), and this pressure will continue to grow in coastal areas adjacent to heavily populated regions such as the Upper Texas Coast. The Gulf Coast of Texas has many birding sites and local naturalist and birding organizations, as well as high populations and diversity of birds. For agencies which hope to utilize the growing popularity of birding and Texas' diverse avian resources, such as TPWD or US Fish and Wildlife Service, this study indicates areas of difference in awareness of negative ecological impacts. Human dimensions of wildlife management can be used to effectively address such human-wildlife challenges by increasing understanding, communication, and cooperation among all stakeholders.

There were interesting results from the broad question of perception of negative ecological impacts from birding. These results are indicative of experience or education as a means to facilitate increased ecological awareness. From these results, birding managers can begin to identify ways stakeholders and levels of specialization differ in their assessments and evaluation of negative ecological impacts. This knowledge can help initiate appropriate communication and mitigation of these negative ecological impacts. Because birders, birding guides, and bird managers have shown various perceptions of impact, it is recommended that managers consider these differences when balancing responsibilities to natural resource preservation and recreational use. As birding grows, interactions between humans and wildlife will also increase, and this study supported the theory that stakeholders perceive potential conflict from recreational impacts, but perhaps not all in the same way.

Through an analysis of targeted data from interviews and surveys from different stakeholders and specialization levels, this study has resulted in both supported and unsupported hypothises. There was support for the study from structured interviews,

which identified the presence of perceived negative ecological impacts from birding and strategies for conservation. Even though birders have traditionally been labelled as "nonconsumptive," there were many interviews which reported perceptions of birders negatively impacting the environments in which they were pursuing their activity.

Once the need for the study was established through interview results, three distinct surveys were administered to birding stakeholders targeting frequencies of perceived negative impacts from birding. The frequency scaling was converted and mean scores for stakeholders were compared. As a result of surveyed perceptions, participants believe negative ecological impacts to be occurring "Rarely" to "Sometimes" on the five-point Likert scale used in the survey (or a perception score of 2.76). Therefore, on average, stakeholders in the survey perceived birding impacts only sometimes or rarely when birding along the Upper Texas Coast.

Hypothesis 1 was not supported by the survey results. The results from comparitive testing revealed a surprising relationship between specialization and perceived negative impacts from birding. Although this study did not explore the full relationship between recreational specialization and perceived negative impacts from birding, a few conclusions may be made based upon informal previous research.This relationship could be the outcome of benefits received from intense birding overshadowing the bird and environmental ethics by the birder. The study results do correspond with outcomes from 2006 reasearch from Lee and Scott, who examined the costs and benefits of recreational specialization. They found as birders progress in specialization, they begin to overlook costs for the benefits experienced (Lee and Scott, 2006). If further exploration of this relationship was tested, perhaps the results would incidate that the excitement and thrill of "capturing" rare birds for one's birding checklist outweigh birding environmental ethics. Birders may perceive negative impacts from birding less frequently because of an internal bias, reported in previous research by Adams (Adams, 1997). Similarly, Adams found that birders may blame others for their perceive impacts, and not from themselves.

Another speculation upon this progressive relationship found in birding specialization and impact perceptions could be a matter of perspective and experience. If the most intense, or specialized birders are perceiving more impacts, it could be because they are in the field more, or have a broader understanding and therefore are more likely to judge recreational activities as having impacts. This theory could be similar to the results from the perceptional comparisons of the other stakeholders to birders (Hypothesis 2 and 3.) Because birding guides and bird managers may be in the field or at specific places over a longer period of time, increased perceptions of impact could reflect an increased sensitivity to negative impacts.

When birders were contrasted to bird managers, results supported a difference between their perceptions of birding's negative ecological impact. The perceptions of birding impacts were statistically different in over 50% of the variables, resulting in an overall perceptional differences. These results conclude that managers had a higher frequency of perceived impacts from birding than birders.

These results could show a difference between birders and managers because managers are responsible for monitoring and mitigating negative impacts to natural resources. Results support the assumption that they might have a more keen awareness of resources than birders. Not only do bird managers assess negative impacts from user groups (such as birders), but they have a larger view since they are at one place over a long period of time. Even if a birder only went to one location to bird, they are probably not at that spot as frequently as someone who works at that site. Therefore, the differences seen between bird managers and birders may be do to their difference experiences with locations.

It was estimated in Hypothesis 3 that because of birding guides potential to have financial incentives to identify birds in the field, results from the independent T-test would show a difference between guides and birders. Although significantly different overall, when assessing the perceptions of impacts from birders and birding guides, there was not conclusive evidence of difference for 82% of the impact variables. Demographic

information from birding guides showed that guides were volunteering 60% of the time, which would decreased the financial incentives for this group.

The majority of items perceived by birders and birding guides were similar in many cases (82%). When conducting the survey, there was an observed merging of these two groups in many respects, and the guides volunteerism reflected a post-survey conclusion that guides could be a subsection of committed, or highly intense birders.

Limitations and Suggestions for Future Research

Since this was a descriptive study, all impacts were measured with the same five-point Likert scale. There is a subjective quality to this rating system. Kazmierow, Hickling, and Booth referred to this subjectivity in assessing what constitutes a negative ecological impact (Kazmierow et al., 2000). However, any interaction with wildlife could be considered as an impact. This study did not target information regarding the degree of impact, only frequency. For example, the surveyed participants were asked about their perceived birding practices. The recorded information reflected how often an impact occurred and not the degree of any negative impacts. An additional study focusing on measuring those impacts, could potentially explore correlations between actual impacts and specialization.

This study could benefit from temporal and spatial extensions. The interviews and surveys took place over a year, with the surveys conducted in December 2011, and January 2012, an off-peak birding season. Although research and preliminary observations were begun the spring of 2011, one limitation of this study was the low number of guides present for the survey. Many guides and leaders are present during the spring because of the annual migration and density of birds and birders in the area at that time. The winter months are not considered the peak season for birding tours to this area, but the study was conducted to correspond with the Christmas Birding Count. As a result of focusing on this event, many guides may have been elsewhere. Ideally, subsequent research should include an extended period for the survey collection throughout an entire year.

Future research should include a broader range of specialized participation. Because the largest gatherings of birders focused on organizational meetings, birding surveys, and field events, more general birders could have been omitted. For example, when assessing the average number of birds listed on birder's life lists, it's rather high (666) and could reflect a higher level of specialization within the participants. Future research could include a wider array of specialized birders included in this study if the events and sampling method incorporated backyard birders and more casual birding events such as general naturalists and outdoor enthusiast meetings, conferences, or trips. Birders tested for the study comprise a rather 'advanced' group of birders. Because the survey sites were focused on large groups, organizational meetings, and birder events, 'beginner' birders may not attend (Scott, 2003). Hence, an extension of this study could be inclusion of other events and more general nature meetings where a larger diversity of 'beginner' or casual birders might attend. The results of the specialization analysis grouped the participating bird into diverse and hierarchical progressive stages, which is supported by previous literature (Bryan, 1979). Similar to Bryan's original results, the latest birder specialization research indicates that fewer individuals are participating at the highest levels of intensity (McFarlane, 1994; Hvenegaard, 2002; Bireline, 2005).

Another issue of importance was the reliability of the specialization scores when compared to previous research. Relatively low Cronbach's alpha testing scores were the result of tested reliability for the dimensional questions in each of the surveys (which ranged from .75 to .55). Birder survey dimensions (such as specialization dimensions of experience, equipment, and centrality of lifestyle) had very different Cronbach alpha scores when compared to previous research (Bireline, 2005). By explaining questions more thoroughly, future birder specialization surveys could collection a greater explanation of the questions may have produced the desired reliability.

A review of the results from research on birding has shown there are negative ecological impacts from this recreational activity; yet bird guides and managers will have to provide answers to future conflict between conservation and recreation. To build upon this study, future research could include a combination of perceptual and actual

impact comparisons between stakeholders, analysis extensions to positive impacts from birding, and even examinations of economic and social impacts.

Conclusions

The significance of this study could mean better, more informed decisions. Birding has the potential to benefit the stakeholders and bird species because of its unique partnership of conservation and recreation. This study has provided evidence of observed negative impacts and participant sponsorship of conservation initiatives. On average, birders, guides, and park managers who participated in this study are aware of these potential negative ecological impacts from birding. Many are interested in financially supporting conservation and have suggested increasing communication about such impacts. As with similar efforts in bird conservation, individuals within birding often financially support such environmental causes (ABA, 2011; Boxall and McFarlane, 1993).

This study was completed to be a tool for natural resource managers to make informed decisions about the participants and their perceptions of human-wildlife conflicts. By comparing perceptions of negative impacts, this study has provided specific points of difference between stakeholders and birding specialization levels. Identified differences can now be addressed and help managers balance the processes of bird and bird habitat conservation.

REFERENCES

Adams, C. E., Leifester, J.A., and Herron, J. S. C. (1997). Understanding wildlife constituents: birders and waterfowl hunters. *Wildlife Society Bulletin 25* (3), 653-660.

American Birding Association, Inc. (2011). *Principles of Birding Ethics.* Retrieved January 23, 2012, from ABA Code of Ethics: http://www.aba.org/about/ethics.html

Applegate, J.E., and Clark, K.E. (1987). Satisfaction level of birdwatchers: An observation on the consumptive-nonconsumptive continuum. *Leisure Sciences 9* (2),129-134.

Austin, E. (1981). *Guidelines for the Developing of Continuing Education Offerings for Nurses.* New York: Appleton-Century-Crofts.

Bailey, K. (1987). *Methods of Social Research 3rd edn.* New York: The Free Press.

Baines, D.and Richardson, M. (2007). An experimental assessment of the potential effects of human disturbance on Black Grouse, Tetrao tetrix, in the North Pennines, England. *Ibis 149 (*Supp. 1*)*, 56-64.

Beale, C.M., and Monaghan, P. (2004). Behavioral responses to human disturbance: A matter of choice? *Animal Behavior 68* (5), 1065-1069.

Bernard, R. (2006). *Research Methods in Anthropology: Qualitative and quantitative approaches. 4th edn.* Oxford: AltaMira Press.

Bireline, H. R. (2005). *Recreation specialization and reports of potential impact behaviros among birders attending birding festivals.* University of Florida. Gainesville, Florida, USA.

Blumstein, D.T., Fernandez-Juricic, E., Zolhner, P. A., and Garity, S.C. , D. F.-J. (2005). Inter-specific variation in avian responses to human disturbances. . *Journal of Applied Ecology, 42* (5), 943-953.

Bolduc and Guillemette (2003). Human disturbance and nesting success of Common Eiders: interactions between visitors and gulls. *Biological Conservation 110* (1), 77-83.

Borgmann, K.L. (2011) A review of human disturbance impacts on waterbirds. Tiburon, California: National Audubon Society- Report on Human Impacts to Birds, 1-23.

Bouton, S.N., and Frederick, P.C. (2003). Stakeholders' perceptions of a wading bird coloring as a community resources in the Brazilian Pantanal. *Conservation Biology 17* (1), 297-306.

Boxall, P.C.and McFarlane, B.L. (1993). Human dimensions of Christmas Bird Counts: implications for nonconsumptive wildlife recreation programs. *Wildlife Society Bulletin 21* (4), 390-396.

Boyle, S.A., and Samson, F.B. (1985). Nonconsumptive outdoor recreation: an annotated bibliography of human-wildlife interactions. *Wildlife Society Bulletin 13* (2), 110-116.

Bryan, H. (1977). Leisure value systems and recreational specialization: the case of trout fishermen. *Journal of Leisure Research 9*, 174-187.

Bryan, H. (1979). *Conflict in the great outdoors.* Gadsden, AL, University of Alabama: Bureau of Public Administration, Sociologial Study No. 4, University of Alabama Press, 98.

Burger, J. (1980). Least Tern Populations in Coastal New Jersey USA: Monitoring and Management of a regionally endangered species. *Journal of Coastal Research 5(*4), 801-811.

Burger, J. (1991). Human activity influence and diurnal and nocturnal foraging of Sanderlings (Calidris alba). *Condor 93* (2), 259-265.

Burger, J. (1993). Shorebird squeeze. *Natural History102* (5), 8-12.

Buger, J. (1994). The effects of human disturbance on foraging behavior and habitat use in Piping Plover. *Estuaries 17*(3), 695-701.

Burger, J., and Gochfeld, M. (1991). Human distance and birds- tolerance and response distances of resident and migrant species in India. *Environmental Conservation 18* (2), 158-165.

Burger, J., and Gochfeld, M (1998). Effects of ecotourists on bird behavior at Loxahatchee National Wildlife Refuge, Florida. *Environmental Conservation 25*, 13-21.

Burger, J., Gochfeld, M., Niles, L. (1995). Ecotourism and birds in coastal New Jersey: Contrasting responses of birds, tourists, and managers. *Environmental Conservation 22(1)*, 56-65.

Burger, J., Jeitner, C., Clark, K., and Niles, L.J. (2004). The effect of human activities on migrant shorebirds: successful adaptive management. *Environmental Conservation 31*(4), 283-288.

Caissie, L. T. (2002). The social world of birding: a creation of community. *Papers Presented at the Tenth Canadian Congress on Leisure Research.* Edmonton, Alberta, Canada: Canadian Association for Leisure Studies.

Carney, K.M., and Sydeman, W.J. (1999). A review of human disturbance effects on nesting colonial waterbirds. *Waterbirds 22*, 68-79.

Ceballos-Lascruian, H. (1996). *Tourism, Ecotourism and Protected Areas.* Gland, Switzerland: IUCN Publication Services Unit.

Cole, J., and Scott, D. (1999). Segmenting Participation in Wildlife Watching: A comparison of casual wildlife watchers and serious birders. *Human Dimensions of Wildlife 4* (4), 44-61.

Cordell, H.K., and Herbert, N.G. (2002). The popularity of birding is still growing. *Birding 34*, 54-59.

Cordell, K. H., Eubanks, T. L., Betz, C. J., Green, G. T., Stephens, B., Mou, S. (2008). *IRIS- The Internet Reserach Information Series.* Athens, Georgia: USDA Forest Service's Southern Research Station.

Crable, A. (2001, March 20). Birding for dollars: state's first wildlife driving trail could boost eco-tourist economy here. *Lancaster New Era*, pp. C3.

Daigle, J.J., Hrubes, D., and Ajzen, I. (2002). A comparative study of beliefs, attitudes, and values among hunters, wildlife viewers, and other outdoor recreationalists. *Human Dimensions of Wildlife 7*, 1-19.

Decker, D.J., and Chase, L.C. (1997). Human Dimensions of Living with Wildlife: A Management Challenge for the 21st Century. *Wildlife Society Bulletin 25* (4), 788-795.

DeMauro, M. (1993). Colonial nesting bird responses to visitor use at Lake Renwick Heron Rookery. *Illinois Natural Areas Journal 13* (1), 4-9.

Ditton, R.B., Loomis, D.K., and Choi, S. (1992). Recreation specialization: Re-conceptualization from. *Journal of Leisure Research 24*, 33-51.

Driver, B. (1985). Specifying what is produced by management of wildlife by public agencies. *Leisure Sciences 7* (3), 281-295.

Erwin, R. (1989). Responses to human intruders by birds nesting in colonies: experimental results and management guidelines. *Colonial Waterbirds 12* (1), 104-108.

Eubanks, T., and Stoll, J. (1999). *Avitourism in Texas: Two Studies of Birders in Texas and Their Potential Support for the Proposed World Birding Center.* Austin, Texas: Texas Parks and Wildlife Contract No. 44467.

Eubanks Jr., T.L., Stoll, J.R., and Ditton, R.B. (2004). Understanding the diversity of eight birder sub-populations: socio-demographic characteristics, motivations, expeditures and net benefits. *Journal of Ecotourism 3* (3), 151-172.

Fernandez-Juricic, E., Jimenez, M.D., and Lucas, E. (2001). Alert distances as an alternative measure of bird tolerance to human disturbance: implications for park design. *Environmental Conservation 28 (3)*, 263-269.

Finney, SK, Pearce-Higgins, JW, & Yalden, DW (2005). The effect of recreational disturbance on an upland breeding bird, the Golden Plover (Pluvialis apricaria). *Biological Conservation 121 (1)*, 53-63.

Frankel, D. (Director). (2011). *The Big Year* [Motion Picture]. USA: Fox.

Frid, A., and Dill, L. (2002). Human-caused disturbance stimuli as a form of predation risk. *Conservation Ecology 6 (1)*, Art. No. 11.

Gauthreaux, S. A. Jr., Belser, C. G., and Welch, C. M. (2006). *Atmospheric Trajectories and Spring Migration Across the Gulf of Mexico.* Clemson, South Carolina: Clemson University.

Glowinski, S. L. (2008). Birdwatching, Ecotourism, and Economic Development: A Review of the Evidence. *Applied Research in Economic Development 5* (3), 65-77.

Gulf Coast Bird Observatory and Texas Parks and Wildlife Department. (2006) Conservation cash prize money project funding 1997-2005. Austin, Texas: Texas Parks and Wildlife Report PWD BK W7000-1180.

Hill, D., Hockin, D., Price, D., Tucker, G., Morris, R., and Treweek, J. (1997). Bird disturbance: improving the quality and utility of disturbance research. *Journal of Applied Ecology 34* (2), 275-288.

Hulbert, I. (1990). The response of Ruddy Shelduck Tadorna ferrufinea to tourists activities Royal Chitwan National Park of Nepal. *Biological Conservation 52* (2), 113-123.

Hvenegaard, G. (2002). Birder specialization differences in conservation involvement, demographics,. *Human Dimensions of Wildlife 7*, 21-36.

Hvenegaard, G.T., Butler, J.R., and Krystofiak, D.K. (1989). Economic values of birding at Point Pelee National Park, Canada. *Wildlife Society Bulletin 17* (4), 526-531.

IUCN. (1967). Towards a new relationship of man and nature in temerate lands. Part I: Ecological impact of recreation and tourism upon Temperate Environments. *IUNC- The World Conservation Union* (p. 287). Lucerne, Switzerland: IUCN Publications New Series No. 7.

Jacobson, S.K., and Duffer, M.D. (1998). Training Idiot Savants: The Lack of Human Dimensions in Conservation Biology. *Conservation Biology 12 (2), p 263-267*.

Johnson, R.B., and Onwuegbuzie, A.J. (2004). Mixed methods research: a research paradigm whose time has come. *Educational Researcher 33* (7), 14-26.

Kazmierow, B., Hickling, G., and Booth, K (2000). Ecological and human dimensions of tourism-related wildlife disturbance: White herons at waitangiroto, New Zealand. *Human Dimensions of Wildlife 5* (2), 1-14.

Kellert, S. (1985). Birdwatching in American Society. *Liesure Science 7* (3), 343-360.

Kenchington, R. (1989). Tourism in the Galapagos Islands: the dilema of conservation. *Environmental Conservation 16*, 227-232.

Kenow, K.P., Korschgen, C.E., Nissen, J.M., Elfessi, A., and Steinbach, R. (2003). A voluntary program to curtail boat disturbance to waterfowl during migration. *Waterbirds 26 (1)*, 77-87.

Kerstetter, D., Confer, J.J., and Graefe, A. R. (2001). As exploration of the specialization concept within the context of heritage tourism. *Journal of Travel Research 39* (3), 267-274.

Koshak, D. C. (2007). *The impacts of wildlife viewing and related non-consumtive outdoor recreation activities on avian populations: An annotated bibliography.* Denver, Colorado: Colorado Division of Wildlife.

Krishnaswamy, A. (2010). Strategies and tools for effective public participation in natural resources management. Paper presented at the *Human Dimensions of Natural Resources Management Conference: Columbia Mountains Intsitute of Applied Ecology*, Revelstoke, British Coloumbia, Canada.

Kuentzel, W.F., and Heberlein, T.A. (2006). From novice to expert? A panel study of specialization. *Journal of Leisure Research 38* (4), 496-512.

Lee, J., and Scott, D. (2004). Measuring Birding Specialization: A Confirmatory Factor Analysis. *Leisure Sciences, 26* (3), 245-260.

Lee, J., and Scott, D. (2006). For Better or Worse? A Structural Model of the Benefits and Costs Associated with Recreational Specialization . *Liesure Sciences 28* (1), 17-38.

Leung, Y., and Marion, J. (2000). Recreational impacts and management in wilderness: a state-of-knowledge review. *Wilderness science inthe a time of change*

conference (pp. 23-27). Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Montain Research Station.

Lindsay, M. *The Great Texas Coastal Birding Trail: A Tool for Avitourism*. Retrieved February 19, 2012, from http://www.birds. Methuen Publishing cornell.edu/pifcapemay/lindsay.htm

Lorenz, K. (1966). *On Aggression.* London, England: Methuen Publishing.

Maple, L.C., Eagles, P.F., and Rolfe, H. (2010). Birdwatchers' spceialization characteristics and national park tourism planning. *Journal of Ecotourism 9* (3), 219-238.

Martin, S. R., McCool, S. F., and Lucas, R. C. (1989). Wilderness Campsite Impacts: Do Managers and Visitors See Them the Same? *Environmental Management 13* (5), 623-629.

Mathis, M. and Matisoff, D. (2004). *A characteriszation of ecotourism in the Rio Grande Vally.* Houston: Houston Advanced Research Center.

McFarlane, B. (1994). Specialization and motivations of birdwatchers. *Wildlife Society Bulletin 22* (3), 361-370.

Moss, S. (2004). *A Bird In The Bush: A Social History of Birdwatching.* London, England: Aurum Press.

Needham, M.D., and Rollings, R.B. (2005). Interest group standards for recreation and tourism impacts at ski areas in the summer. *Tourism Management 26* (1), 1-13.

North American Bird Conservation Initiative, U. C. (NABCI, 2011). *The State of the Birds 2011 Report on Public Lands and Waters.* Washington, D.C.: U.S. Department of Interior.

Pelletier, F. (2006). Effects of tourist activities on ungulate behaviors in a mountain protected area. *Journal of Mountain Ecology 8*, 15-19.

Reid, M. (1997, updated 2011). *Website: http://www.texasbirds.org/tbrc/statelst.htm* . Texas Ornithological Society .

Richardson, S.A., Dohrenwend, B.S., and Klein, D. (1965). *Interviewing.* New York: Basic Books.

Riley, S. J. (2002). The Essence of Wildlife Management. *Wildlife Society Bulletin 30* (2), 585-593.

Riley, S. S. (2003). Adaptive impact management: An integrative approach to wildlife management. *Human Dimensions of Wildlife 8* (2), 81-95.

Sandelowski, M. (2000). Combining qualitative and quantitative sampling, data collection, and analysis techniques in mix-method studies. *Research in Nursing & Health, 23*, 246-255.

Sauer, J. R. (2003). *The North American Breeding Bird Survey, Results and Analysis 1966-2001.* Laurel, Maryland: USGS Patuxent Wildlife Research Center.

Scott, D., and Shafer, C.S. (2001). Recreational specialization: A critical look at the construct. *Journal of Leisure Research 33* (3), 319-343.

Scott, D., and Thigpen, J. (2003). Understanding the birder as tourist: Segmenting visitors to the Texas. *Human Dimensions of Wildlife 8* (3), 199-218.

Scott, D. and Chulwon, K. (1999). Motivations and Commitments among Participants in the Great Texas Birding Classic. *Human Dimensions of Wildlife 4* (1), 50-67.

Scott, D., Ditton, R. B., Stoll, J. R., and Eubanks, T. L.Jr. (2005). Measuring specialization among birders: utility of a self-classification measure. *Human Dimensions of Wildlife 10* (1), 53-74.

Sekerciogul, C. H. (2002). Impacts of birdwatching on human and avian communities. *Environmental Conservation 29* (3), 282-289.

Shaw, W.W., and King, D.A. (1980). Wildlife management and non-hunting wildlife enthusiasts. *Transactions of the North American Wildlife and Natural Resource Conference, 45th*, (pp. 219-225).

Sibley, D. A. (2012). *The Proper Use of Playbacks in Birding: Sibley's Guides*. Retrieved January 31, 2012, from Sibley's Guides: http://www.sibleyguides.com/2011/04/the-proper-use-of-playback-in-birding/

Smith, H. (1975). *Strategies of Social Research: Methodological Imagination.* London, Enlgand: Prentice Hall International.

Smith-Castro, J. R. and Rodewald, A. D. (2009). Behavioral responses of nesting birds to human. *Journal of Field Ornithology 81* (2), 130-138.

Steven, R., Pickering, C., and Castley, J. G. (2011). A review of the impacts of nature based recreation on birds. *Journal of Environmental Management 92* (10), 2287-2294.

Stoll, J., Ditton, R., and Eubanks, T. (2006). Platte River Birding in the Spring Migration: Humans, Value, and Unique Ecological Resources. *Human Dimensions of Wildlife 11* (4), 241-254.

Tashakkori, A., and Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches.* Thousand Oaks, California: Sage Publishing.

Taylor, A. R., and Knight, R. L. (2003). Wildlife responses to recreation and associated visitor perceptions. *Ecological Applications 13* (4), 951-963.

Texas Parks and Wildlife Department (TPWD, 2004). *Discover the Wildlife of Texas!* Retrieved January 21, 2012, from http://www.tpwd.state.tx.us/huntwild/wildlife/wildlife-trails/

Texas Parks and Wildlife Department (TPWD, 2005). *Introduction to Birdwatching* [Brochure]. Austin, TX: Texas Parks and Wildlife Department.

Texas Parks and Wildlife Department. (TPWD, 2011). *Great Texas Coastal Birding Trail - Upper Texas Coast (UTC).* Retrieved November 16, 2011 from Texas Parks and Wildlife Department: http://www.tpwd.state.tx.us/huntwild/wildlife/wildlifetrails/coastal/upper

U.S. Department of Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bereau. (DOI, USFWS, USDOC, USCB, 2006). *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation-Texas.* Shepherdstown, West Virginia: U.S. Department of Interior.

U.S. Fish and Wildlife Service. (USFWS, 2009). *Birding in the United States: A Demographic and Economic Analysis.* Arlington, Viginia: U.S. Department of the Economy.

Vaske, J.J., Graefe, A.R., and Kuss, F.R. (1983). Recreation impacts: a synthesis of ecological and social research. *Transactions of the 48th North American Wildlife and Natural Resource Conference, 48*, (pp. 96-107).

Vistad, O. (2003). Expereience and management of recreational impact on the ground- a study among visitors and managers. *Journal for Nature Conservation 11*, 363-369.

Watson, G. P. (2011). Field birding and digital ojbects: immaterial technology and their implications for one practice of comine to know the more-than-human. *Environmental Education Research 17* (6), 789-799.

Wellman, J.D., Roggenbuck, J.W., and Smith, C.A. (1982). Recreation specialization and norms of depreciative behaior among canoeists. *Journal of Leisure Research 14* (4), 323-340.

Wisconsin Department of Natural Resources. (WDNR, 2012). Central Flyway figure. *Waterfowl Rule Process*. Retrieved March 1, 2012 from http://dnr.wi.gov/topic/WildlifeHabitat/waterfowlrules.html

APPENDIX A

AMERICAN BIRDING

American Birding Association Principles of Birding Ethics

Everyone who enjoys birds and birding must always respect wildlife, its environment, and the rights of others. In any conflict of interest between birds and birders, the welfare of the birds and their environment comes first.

Code of Birding Ethics

1. Promote the welfare of birds and their environment.

1 (a) Support the protection of important bird habitat.

1 (b) To avoid stressing birds or exposing them to danger, exercise restraint and caution during observation, photography, sound recording, or filming.

Limit the use of recordings and other methods of attracting birds, and never use such methods in heavily birded areas or for attracting any species that is Threatened, Endangered, or of Special Concern, or is rare in your local area.

Keep well back from nests and nesting colonies, roosts, display areas, and important feeding sites. In such sensitive areas, if there is a need for extended observation, photography, filming, or recording, try to use a blind or hide, and take advantage of natural cover.

Use artificial light sparingly for filming or photography, especially for close-ups.

1 (c) Before advertising the presence of a rare bird, evaluate the potential for disturbance to the bird, its surroundings, and other people in the area, and proceed only if access can be controlled, disturbance can be minimized, and permission has been obtained from private land-owners. The sites of rare nesting birds should be divulged only to the proper conservation authorities.

1 (d) Stay on roads, trails, and paths where they exist; otherwise keep habitat disturbance to a minimum.

2. Respect the law and the rights of others.

2 (a) Do not enter private property without the owner's explicit permission.

2 (b) Follow all laws, rules, and regulations governing use of roads and public areas, both at home and abroad.

2 (c) Practice common courtesy in contacts with other people. Your exemplary behavior will generate goodwill with birders and non-birders alike.

3. Ensure that feeders, nest structures, and other artificial bird environments are safe.

3 (a) Keep dispensers, water, and food clean and free of decay or disease. It is important to feed birds continually during harsh weather.

3 (b) Maintain and clean nest structures regularly.

3 (c) If you are attracting birds to an area, ensure the birds are not exposed to predation from cats and other domestic animals, or dangers posed by artificial hazards.

4. Group birding, whether organized or impromptu, requires special care.

Each individual in the group, in addition to the obligations spelled out in Items #1 and #2, has responsibilities as a Group Member.

4 (a) Respect the interests, rights, and skills of fellow birders, as well as those of people participating in other legitimate outdoor activities. Freely share your knowledge and experience, except where code 1(c) applies. Be especially helpful to beginning birders.

4 (b) If you witness unethical birding behavior, assess the situation and intervene if you think it prudent. When interceding, inform the person(s) of the inappropriate action and attempt, within reason, to have it stopped. If the behavior continues, document it and notify appropriate individuals or organizations.

Group Leader Responsibilities [amateur and professional trips and tours].

4 (c) Be an exemplary ethical role model for the group. Teach through word and example.

4 (d) Keep groups to a size that limits impact on the environ-ment and does not interfere with others using the same area.

4 (e) Ensure everyone in the group knows of and practices this code.

4 (f) Learn and inform the group of any special circumstances applicable to the areas being visited (eg, no tape recorders allowed).

4 (g) Acknowledge that professional tour companies bear a special responsibility to place the welfare of birds and the benefits of public knowledge ahead of the company's commercial interests. Ideally, leaders should keep track of tour sightings, document unusual occurrences, and submit records to appropriate organizations.

Please follow this code—distribute it and teach it to others.

Additional copies of the Code of Birding Ethics can be obtained from ABA. The ABA Code of Birding Ethics may be reprinted, reproduced, and distributed without restriction. Please acknowledge the role of ABA in developing and promoting this code.

APPENDIX B

STRUCTURED INTERVIEW

Interviewee: **Contact Information:**

Duration of interview: **Date:** **Setting**:

Introduce Principle Investigator:

State clearly:
"You are being invited to take part in a research study being conducted by Texas A&M University. I am here to gather your opinions on birding and any impacts it may have. What the investigator finds out from this study may help other people define the birding community using the GTCBT and increase benefits of bird and bird habitat management."

State Purpose of Study/Interview:

The purpose of the interview is to assess birding stakeholder knowledge and understanding of bird and bird habitat impacts along the GTCBT. Questions about birding negative ecological impacts and the importance of bird and bird habitat conservation will be asked. Finally, the interview will help determine what strategies, if any, stakeholders believe will increase bird and bird habitat conservation and funding sources for such conservation.

Gain Consent to Participate in Study.

State clearly:
"Your participation in this study is completely voluntary. If you decide to not participate there will be no penalty to you, and you will not lose any benefit you would normally have. You may change your mind about participating at any time with no effect to you. Your responses will be identified with you personally. You may choose to answer or not answer any of the questions. If you agree to these terms, and you are fully informed of your rights as a participant, please give me your oral consent to administer the interview."

Begin Interview and Recording:

1. Describe your involvement in birding in the Upper Texas Coast? (stakeholder group)
    a. Probe for additional contacts in this stakeholder group.
2. Can you describe birding in the Upper Texas Coast area, including locations, people, tours, organizations, and management sites?
    a. Gather information of additional contacts and locations in other stakeholder groups
    b. Explore information on management of birders.
3. Tell me about birders.
    a. Have the participant describe birders (attitudes, physical appearances, common behaviors)
    b. Focus on demographic information
    c. Identify birder gatherings or events
4. Are there negative impacts from birding to birds and habitat?
    a. Probe for birder actions that negatively affect birds and bird habitat
5. Can you think of methods for managers or supervising organizations to increase bird and bird habitat in the Upper Texas Coast?
6. What sources of funding would be available to help increase bird and bird habitat conservation?

Conclude Interview with Principle Investigator Contact Information:

Additional information or any questions can be directed to

LisaJeaneReznicek75@gmail.com.

APPENDIX C

SURVEY VERBAL CONSENT

Project Title: Perceptions in Birding Impacts: Birders, Birding Guides, and Bird Managers

Verbal Script for Consent:

"You are being invited to take part in a research study being conducted by Texas A&M University. I am here to gather your opinions on birding and any impacts it may have.
.
Your participation in this study is completely voluntary. If you decide to not participate there will be no penalty to you, and you will not lose any benefit you would normally have. An information sheet outlining the purpose and requirements of the study, emphasis on voluntary participation, and contact information for the researcher are available to you for reference.

The things that you will be doing have no more risk than you would come across in everyday life. There is no direct benefit to you by being in this study. What the researcher finds out from this study may help other people define the birding community using the GTCBT and increase benefits of bird and bird habitat management.

You may change your mind about participating at any time with no effect to you.
If you decide to participate, please do not write your name on the survey.
Your responses will not be identified with you personally.
You may choose to answer or not answer any of the questions.

If you agree to these terms, and you are fully informed of your rights as a subject, please give me your oral consent to administer the survey by completing one or listening to the survey questions and responding."

APPENDIX D

SURVEY INFORMATION SHEET

October 24, 2011
Dear Participant,
I am a candidate for a Masters in Marine Resource Management at Texas A&M University at Galveston, and I am conducting a study of perceptions on impacts from birding. The objective of this research project is to attempt to understand the birder community and your observations on birding impacts. Through your participation, I eventually hope to communicate the human dimensions associated with birding, add scientific data on the comparison of bird managers', birding guides' , and birders' perceptions, as well as define the community of birders through, for example, an analysis on demographics, recreational use behaviors, and potential activities' impacts along the Upper Texas Coast. Enclosed with this letter is a brief survey that asks a variety of questions about your perceptions on birding in the area. I am asking you to look over the survey and, if you choose to do so, complete the survey and give it back to me.
Your participation in this study is completely voluntary, and there will be no penalty to you, and you will not lose any benefit you would normally have. If you choose to participate, do not write your name on the questionnaire. I do not need to know who you are and no one will know whether you participated in this study. Your responses will not be identified with you personally.
I hope you will take a few minutes to complete this survey. Without the help of people like you, research on birding could not be conducted. Your participation is voluntary and there is no penalty if you do not participate.
If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me at [redacted] or at LisaJeaneReznicek75@gmail.com. If you have any questions about your rights as a research subject, you may contact the Texas A&M University Institutional Review Board (IRB) by phone at (979)458-0467, or by email at irb@tamu.edu.

Sincerely,

Lisa Jeane Reznicek
Lisa J Reznicek, Graduate Candidate
Department of Marine Sciences
Texas A&M University at Galveston

APPENDIX E

BIRDER SURVEY

Home zip code:_____Present Location:_____Date:_____

Please answer the following questions anonymously and return. Participants for this survey should be adults who bird the Great Texas Coastal Birding Trail in the upper coast region.

1. How many years have you been birding?

Less than 1 year	1-5 years	5-10 years	+10 years

2. Do you maintain a life list? Yes No

a. If so, what is the number of birds on your life list? _____

3. Do you own any of the following equipment used for enhancing birding?

Binoculars	Yes	No
Field guide books	Yes	No
Spotting scope	Yes	No
Camera	Yes	No
Camera Lens	Yes	No
Birding magazine subscription	Yes	No
Birding apps on your phone	Yes	No
Birding organization membership	Yes	No
Birding site pass	Yes	No

4. How many times have you been away from your household and participated in birding outings or trips along the Great Texas Coastal Birding Trail (with sole purpose of observing and photographing birds in their natural setting)?

A. In the past week _____
B. In the past month _____
C. In the past year _____

5. What is the typical distance you travel (one-way) for the sole purpose of participating in birding activities along the Great Texas Coastal Birding Trail? _____ miles

6. What is the farthest distance you have traveled (one-way) for the sole purpose of participating in birding along the Great Texas Coastal Birding Trail?_____ miles

7. Which of the following best describes your bird outings?
   a. I rarely participate in birding outings
   b. I participate in birding outings but don't have particular sites that I visit
   c. I participate in birding outings anywhere and everywhere possible
   d. I participate in birding outings and have favorite sites I visit

8. Without a field guide, approximately how many bird species can you identify by sight? _____

9. Without a reference, approximately how many bird species can you identify by ear? _____

10. On a scale of 1-10, how do you rank your birding experience (1= no experience, 10=expert)? _____ 1 2 3 4 5 6 7 8 9 10

11. When are any of the following associated with your birding experiences?

	N=Never	R=Rarely	S=Sometimes	F=Frequently	A=Always
Individual birding	N	R	S	F	A
Family or group trips	N	R	S	F	A
Tours or guided trips	N	R	S	F	A
Research	N	R	S	F	A
Education or instruction	N	R	S	F	A
Philanthropy or conservation	N	R	S	F	A
Festivals or large events	N	R	S	F	A

12. When birding, how often do you use the following methods to observe or photograph birds?

N=Never	R=Rar	S=Sometimes	F=Frequently	A=Always

		ely			
A car/vehicle	N	R	S	F	A
A boat/vessel	N	R	S	F	A
Bike	N	R	S	F	A
Walking (trails, boardwalks)	N	R	S	F	A
Off-trail walking	N	R	S	F	A
Bird blind	N	R	S	F	A
Observation deck	N	R	S	F	A
Off-road vehicle (no roads)	N	R	S	F	A
Other_____ _____	N	R	S	F	A

13. When birding, how often do you use the following techniques to attract birds to you?

	N=Never	R=Rarely	S=Sometimes	F=Frequently	A=Always
Food and/or water (in the field)	N	R	S	F	A
Vocalization calls (pishing, whistles)	N	R	S	F	A
Instrument call (duck, turkey)	N	R	S	F	A
Audio recordings (from stereo, phone, etc.)	N	R	S	F	A
Use or wear attractive colors	N	R	S	F	A
Limit group size (< 5 people)	N	R	S	F	A
Other:_____	N	R	S	F	A

14. When do you practice the following birding behavior on the GTCBT?

	N=Never	R=Rarely	S=Sometimes	F=Frequently	A=Always
Being quiet	N	R	S	F	A
Appropriate clothing	N	R	S	F	A
Appropriate group size	N	R	S	F	A
Disturbing vegetation	N	R	S	F	A
Nest disturbance	N	R	S	F	A
Following posted signs and rules	N	R	S	F	A
Limiting interaction with birds	N	R	S	F	A
Carpooling to site	N	R	S	F	A

15. How often are you involved in the following birding practices?

	N=Never	R=Rarely	S=Sometimes	F=Frequently	A=Always
Respect skills and rights of others	N	R	S	F	A
Pay site entrance fees for birding	N	R	S	F	A
Inform others of observations or species identification	N	R	S	F	A
Use social networking sites for birding	N	R	S	F	A

Volunteer in citizen science for bird conservation	N	R	S	F	A
Attempt to stop unethical birding	N	R	S	F	A
Volunteer for bird habitat conservation	N	R	S	F	A
Informing others of site rules and regulations	N	R	S	F	A

16. How often do you use the following techniques when telling others of a rare or unusual bird sighting?

	N=Never	R=Rarely	S=Sometimes	F=Frequently	A=Always
Evaluate potential for disturbance to bird	N	R	S	F	A
Evaluate potential for disturbance to bird habitat	N	R	S	F	A
Evaluate potential for disturbance to other people	N	R	S	F	A
Proceed with announcement if there exists permission to access area	N	R	S	F	A

17. When birding the GTCBT, how often do you do the following?

	N=Never	R=Rarely	S=Sometimes	F=Frequently	A=Always
Flush birds (accidentally or deliberately)	N	R	S	F	A

Approach birds	N	R	S	F	A
Use flash photography or video with artificial lighting	N	R	S	F	A
Enter private property without permission (accidentally or deliberately)	N	R	S	F	A
Litter in the field (accidentally or deliberately)	N	R	S	F	A
Urinate and/or defecate in the field when facilities are not available	N	R	S	F	A

18. How often do your birding activities on the GTCBT result in the following?

	N=Never	R=Rarely	S=Sometimes	F=Frequently	A=Always
Litter or waste dumping	N	R	S	F	A
Vegetation disturbance	N	R	S	F	A
Calling or whistling	N	R	S	F	A
Playbacks or recordings	N	R	S	F	A
Capture or collecting	N	R	S	F	A

19. Education Completed:

High school	Bachelors	Masters	Doctorates

20. Age:

18-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+

21. Would you be willing pay a fee for a birding permit similar to fishing or hunting permit?

Yes No

22. Can you recommend any ways to increase bird habitat?

_____

_____

_____

23. Do you have ideas of funding sources for your recommended ways to increase bird habitat?

_____

_____

_____

Notes:_____

_____

_____

APPENDIX F

FREQUENCY DISTRIBUTIONS OF STAKEHOLDER PERCEPTIONS OF NEGATIVE ECOLOGICAL IMPACTS

NEI Scale Coding: (4= 'Never', 3='Rarely', 2='Sometimes', 1='Frequently', 0= Always)

	Birder			Bird Manager			Birding Guide		
Variable Code	**N**	**Mean**	**Std. Deviation**	**N**	**Mean**	**Std. Deviation**	**N**	**Mean**	**Std. Deviation**
VEHICLE	**213**	1.11	0.72	**20**	1.6	0.82	**10**	0.7	0.82
VESSEL	**213**	2.73	0.86	**20**	2.45	0.75	**10**	2.2	1.31
OFFTRAIL	**213**	1.83	0.87	**20**	2.5	0.88	**10**	2.2	1.41
OFFRD	**213**	3.38	0.87	**20**	3.85	0.48	**10**	3	1.24
FOODWATER	**213**	2.85	1.2	**20**	2.65	1.69	**10**	2.4	1.26
CALLS	**213**	2.07	1.21	**20**	1.9	0.78	**10**	1.2	1.22
INSTRUMENTS	**213**	3.69	0.66	**20**	3.05	0.82	**10**	3.4	1.07
AUDIO	**213**	2.85	1.08	**20**	2.8	0.69	**10**	2.3	1.25
ATTRACTCLOTHS	**213**	3.2	1.09	**20**	3.05	0.68	**10**	2.8	1.22
DISTVEG	**213**	3.376	1.02	**20**	2.15	1.22	**10**	3	1.24
DISTNEST	**213**	3.79	0.83	**20**	1.95	1.53	**10**	3.8	0.63
FLUSHING	**211**	2.17	0.88	**20**	2.2	1.10	**10**	2.4	1.17

NEI Scale Coding: (4= 'Never', 3='Rarely', 2='Sometimes', 1='Frequently', 0= Always)									
	Birder			**Bird Manager**			**Birding Guide**		
APPROACH	**211**	2.04	0.95	**20**	2.15	1.18	**10**	3.9	0.31
FLASH	**211**	3.69	0.70	**20**	2.9	0.96	**10**	2.7	1.15
PRIVATE	**211**	3.69	0.59	**20**	2.75	1.25	**10**	2.9	1.19
LITTER	**211**	3.92	0.35	**20**	2.35	0.93	**10**	1.8	0.91
URINATE	**211**	2.71	1.08	**20**	2.9	1.20	**10**	1.7	1.05
LITTTERWASTE	**211**	3.97	0.17	**20**	2.85	1.03	**10**	3.1	1.28
VEGEDIST	**211**	3.18	0.65	**20**	2.55	0.99	**10**	3.6	0.69
CALLING	**211**	2.9	1.03	**20**	2.8	0.69	**10**	3.6	0.69
PLAYBACKS	**211**	3.03	0.97	**20**	3	0.64	**10**	1.9	0.99
CAPTURE	**211**	3.94	0.32	**20**	3.65	0.48	**10**	3.8	0.42
		3.01			**2.64**			**2.65**	

VITA

Lisa Jeane Reznicek received her Bachelor of Fine Arts degree in sculpture, and her Bachelor of Science in anthropology from The University of Houston, both in 2004. She entered into non-profit and environmental professions to develop a career in experiential environmental education and interpretation. In 2009, Lisa entered the Master of Marine Resource Management degree at Texas A&M University at Galveston. Her research interests include outdoor recreation and conservation management. She plans to publish an article on her research findings and pursue a career in the National Park Service. Ms. Reznicek may be reached at her email: LisaJeaneReznicek75@gmail.com or you may reach the Marine Science Department of Texas A&M at Galveston by mailing 200 Seawolf Parkway, Galveston, TX 77553.