The Human Dimensions of Whooping Crane Conservation in Alabama

by

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Abstract

Whooping Cranes (*Grus americana*) were historically present throughout Alabama, including coastal and interior regions of the state. However, in the early part of the 20th century, habitat alteration and unregulated human harvest led to the near extinction of the species. Following numerous reintroduction techniques, Whooping Cranes have once again begun utilizing habitat in northern portions of Alabama. Despite intensive protection and management of the species, recent shooting incidents in this region have raised concern that such illegal take is hindering the success of the species. The potential for future human-crane conflicts highlights the need for social science approaches. We developed survey questionnaires to understand the human dimensions of Whooping Crane conservation in northern Alabama. We examined differences in crane awareness, knowledge, attitudes, and behavioral intentions among waterfowl hunters in Alabama using birding specialization. Specialization level was positively related to awareness, knowledge, and conservation attitudes. Waterfowl hunters with greater knowledge and favorable attitudes toward cranes were more likely to donate to a hypothetical crane conservation fund. Additionally, we identified the factors that best predict attitudes and behavioral intentions of local residents, waterfowl hunters, and birders. Specific variables that were common among all audiences were personal norms and emotional dispositions. Our findings can be used to inform outreach strategies in an effort to support conservation of the species.

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List of Abbreviations

ADCNR	Alabama Department of Conservation and Natural Resources
EMP	Eastern Migratory Population
ICF	International Crane Foundation
PCA	Principle Component Analysis
VBN	Value-Belief-Norm
WCEP	Whooping Crane Eastern Partnership
WTP	Willingness-To-Pay

Chapter 1: Introduction

INTRODUCTION

Whooping Cranes (*Grus americana*) were historically present throughout Alabama, including coastal and interior regions of the state. However, in the early part of the 20th century, habitat modification and unregulated human harvest led to the near expiration of the species. By 1941, only 15 individuals remained in the wild, all located on wintering grounds in Texas (Trick et al., 2001; Urbanek et al., 2015). Following numerous reintroduction techniques and the establishment of an eastern migratory population (EMP), Whooping Cranes have once again begun utilizing habitat in northern portions of Alabama. As of 2016, approximately one third of the cranes in the EMP were spotted wintering on Wheeler National Wildlife Refuge in Decatur, Alabama. Despite its remarkable recovery, the Whooping Crane still faces many threats to its existence, and recent shootings of cranes in northern Alabama and Georgia have raised concern that such illegal take is hindering recovery of the species (MacKenzie, 2011). As the population continues to grow, consequently, so does the potential for future human-crane conflict.

To fully interpret the relationship between humans and Whooping Cranes, a historical perspective is required. Records indicate that about 1,200 to 1,500 Whooping Cranes were likely in North American in the mid-1800s. However, by the early 1900s, the species was drastically reduced and had nearly disappeared from its historic breeding range in the north-central portion of the county (Trick et al., 2001). This decline was mostly the result of wetland habitat alteration, specimen collection, and increased hunting pressures. Allen (1952), who identified shootings as

a major cause of decline, discovered nearly 390 shooting records from 1722 to 1952. Because Whooping Cranes have a slow reproductive rate, these recorded shootings likely exceeded their reproductive rate, contributing to the near disappearance of the species in the 1940s (Miller et al., 1974).

The Whooping Crane is now considered one of North America's most well-known symbols of wildlife conservation success (Weitzman, 1993). Following protection under the Endangered Species Preservation Act (the forerunner of the Endangered Species Act) in 1967, the species has rebounded to approximately 600 individuals as a result of numerous recovery efforts, including reintroduction techniques and captive breeding programs, along with intense conservation initiatives. The EMP, which annually migrates from their breeding grounds in Wisconsin to wintering habitat as far south as Florida, was established to promote this continued recovery and safeguard against extinction (Trick et al., 2001).

The introduction of the EMP, a nonessential experimental population, was proposed in 1999 following the formation of the Whooping Crane Eastern Partnership (WCEP), a consortium of nine non-profit organizations and government agencies each contributing their resources to Whooping Crane conservation. The primary objective of the WCEP was to restore a self-sustaining migratory population to the eastern United States. Thus, in 2001, seven captive Whooping Cranes were transported to Wisconsin and successfully migrated to Florida with the guidance of an ultralight aircraft (Trick et al., 2001). A supplementary reintroduction technique, known as Direct Autumn Release, was tested in 2006 in which chicks are reared by costumed humans and then released with successfully migrating cranes. Due to the artificial nature of the ultralight aircraft, the United States Fish and Wildlife Service terminated the project in 2016. Direct Autumn Release is also currently under review for modification. Crane chicks in the EMP

will likely be raised by adults in captivity and released with older, experienced crane pairs to simulate a more natural experience (Daley, 2016).

Despite this enhanced protection and management, Whooping Cranes continue to be the victims of illegal human take. As of 2016, a total of 25 documented shooting instances have resulted in 33 Whooping Crane fatalities. This is particularly concerning for the EMP, as shootings account for nearly 20% of crane mortality in this population, which consists of about 100 cranes (Harrell & Bidwell, 2014). Shooting incidents in the EMP have been documented in Alabama, Georgia, Indiana, Kentucky, Michigan, and Wisconsin (MacKenzie, 2011; Mendenhall, 2014). Because cranes in this population typically utilize private property and more accessible landscapes, they are likely to induce human contact, increasing the potential for future shooting incidents. Thus, social science approaches aimed at understating public perception of Whooping Cranes are crucial for mitigating these issues and continuing the success of this species.

Successful species recovery often requires complementary strategies that seek to balance human well-being and the protection of natural resources (Manfredo et al. 2009; Heberlein, 2012; Kareiva & Marvier, 2012). Preservation of endangered species like, the Whooping Crane, is greatly enhanced by public support and commitment. Without adequate assessment of public opinion and involvement, conservation initiatives may face opposition and result in costly and unwanted political battles (Jacobson & McDuff, 1998). The success of projects designed to resolve human-wildlife conflicts may largely rest upon the understanding of stakeholder values, attitudes, and beliefs in the decision-making process (Messmer, 2000).

Furthermore, outreach interventions designed to capture the interest of the public are key to the conservation of a recovering species (Brewer, 2002). The goals of such interventions

typically include influencing psychological factors of the target audience, which are presumed to guide behavior. Thus, effective outreach necessitates an understanding of values, beliefs, norms, and attitudes of a diverse public, as these predispositions have a crucial effect on how new information is processed. Previous research has shown that effective outreach can help foster pro-conservation behaviors, improve public support for conservation initiatives, reduce wildlife poaching, improve compliance with regulations, and influence natural resource policy (Jacobson, 2010). Our research acquired this information by surveying targeted groups of Alabama residents, specifically those that live in close proximity to Whooping Crane wintering habitat.

LITERATURE REVIEW

The majority of species-specific human dimensions research has been conducted on large carnivores, such as black bears, wolves, coyotes, and other prevalent species (e.g., Kellert, 1994; Bright & Manfredo, 1996; Agee & Miller, 2009; Hayman et al., 2014; Sponarski et al., 2015). The main objectives of these studies were to determine which factors contribute to human-wildlife interactions and the acceptability of management actions. For example, Morzillo et al. (2009) assessed attitudes of residents in East Texas toward black bears and the potential establishment of a bear population in their region. The results indicated that sex, age, participation in wildlife-related recreation, and knowledge of bears contributed to more positive attitudes. The study also noted that lack of knowledge was the main source of uncertainty in respondent support for recolonization, suggesting that increased knowledge could potentially address existing concerns. Loyd and Miller (2010) conducted similar research to examine the factors that may influence preferences for lethal management of feral cats. By surveying homeowners in Illinois, the researchers concluded that community size, gender, education level,

negative experiences with cats, and wildlife value orientations were significant predictors of attitudes toward the management of feral cats. They also report that identifying the relationship between knowledge and attitudes is imperative for the creation of better informed management decisions.

Though popular media commonly proclaims that values directly influence attitudes and behaviors toward wildlife, evidence for this assertion is sparse. Due to their broad utility and abstract nature, values are not likely to explain specific cognitions and behaviors, and linking them together is challenging (Fulton et al., 1996; Whittaker et al., 2006). Alternatively, Fulton et al. (1996) showed that value orientations can act as determinants of attitudes, which in turn can help explain behavioral intentions toward wildlife. The researchers suggest that although value orientations may not directly predict specific behaviors, they can predict patterns of attitudes and behavioral intentions that may consequently influence behaviors. The findings of Loyd and Miller (2010) also demonstrate this relationship.

Due to the conceptualization of this value-attitude-behavior theory, many attitudinal studies have incorporated wildlife value orientations into their frameworks. For instance, Teel and Manfredo (2009) utilized value orientations to categorize stakeholders and assess differences in sociodemographic characteristics and attitudes toward wildlife among groups. By segmenting individuals into two main orientation types, the researchers reveled how value orientations can explain attitudinal and behavioral differences across a host of wildlife-related issues. They argue that their approach enhances the understanding of different wildlife-related interests among groups, which can prompt more adequate representation in the decision-making process and help alleviate potential social conflict. Wildlife value orientations have also been used to directly predict normative beliefs about the acceptability of management interventions, participation in

wildlife recreation activities, intentions to support the reintroduction of species, and emotional responses toward a species (Zinn et al. 1998; Hermann et al., 2013; Jacobs et al., 2014; Whittaker et al., 2014; Sponarski et al., 2015).

While most human dimensions research has been devoted to assessing attitudes toward familiar species and related management actions, the impacts of attitudes on rare or endangered species are typically underemphasized and not as well understood. These attitudes are presumably weaker and not well-established, implying the need for further examination (Perry-Hill et al., 2014). Hartel et al. (2015) investigated the influence of wildlife value orientations, emotions, past encounters, and demographics on public attitudes and behavioral intentions toward eastern box turtles, a rare species often impacted by anthropogenic activities. The researchers discovered that respondents had generally favorable attitudes toward the species, which were significantly guided by value orientations. Individuals with a more mutualistic value orientation toward wildlife and had previously encountered the species possessed more positive attitudes and were more likely to participate in pro-conservation behaviors. Reported fear of box turtles was also correlated with negative attitudes toward the species, indicating an interaction between emotions and other cognitive variables. These findings provide insight on how to frame appropriate outreach messaging for the species to increase support and awareness, as its conservation is highly dependent upon human behavior.

Social-psychological research involving human-wildlife conflict has also been conducted on other rare species. Perry-Hill et al. (2014) studied how individual behavioral intentions toward the hellbender salamander are influenced by specific attitudes toward the species and more general beliefs about wildlife. Similar to previous research, this study found that specific attitudes (i.e., attitudes toward hellbenders) are more consistent and stronger predictors of

individual behavior than basic wildlife beliefs. Following the theory of cognitive dissonance, the researchers posit that positive attitudes toward a species can predispose positive behavior, which may be useful for conservation efforts. It is important to note that this theory is not always applicable. For example, individuals in a recent study were shown to have favorable attitudes toward the critically endangered saiga antelope yet still indicated engagement in illegal hunting, a behavior that significantly threatens their survival (Kuhl et al., 2009). The results of this study, among others, suggest that positive conservation actions toward a resource are not necessarily informed by positive attitudes and that the relationship may be more complex than theorized (Ite, 1996; Martinez & Scicchitano, 1998; Holmes, 2003; Alexander, 2000).

Kellert (1993) emphasized that increased knowledge of a species also exerts an important influence on attitudes and behavioral intentions. Individuals who are more familiar with a species tend to have more positive attitudes toward that species (Prokop et al., 2008; Perry-Hill et al., 2014). Knowledge has also been associated with behaviors that are conducive to conservation. Ranchers in Canada with greater awareness and knowledge of species at risk were more likely to support their conservation (Henderson et al., 2014). A similar trend has been shown regarding other species of concern, such as leopards, desert tortoises, and hellbender salamanders (Vaske and Donnelly, 2007; Jhamvar-Shingote & Schuett, 2013; Perry-Hill et al., 2014). Moreover, knowledge has been positively related to affect, or feelings, toward the conservation of species, such as wolves and bears (Glikman & Vaske, 2011). However, the relationship between knowledge and attitudes toward a given species is not always inherently positive, as some studies have delivered contradictory results (Fishbein & Ajzen, 2010; Heberlein, 2012).

Additionally, norms have played a vital role in influencing attitudes and behavioral intentions toward wildlife species and other environmental concerns. For example, Vaske and

Donnelly (2007) examined the influence of ascription of responsibility, an activator of personal norms, on behavioral intentions toward desert tortoises. Individuals who ascribed a personal responsibility for their actions toward desert tortoises were more likely to participate in behaviors that benefit the species. Mayer et al. (2015) studied the effect of personal norms and ascription of responsibility on behavioral intentions of organisms-in-trade hobbyists and discovered a similar relationship. Norms have also been used to explore commitment to the protection of biodiversity, measure management alternatives, willingness to pay for park conservation, and intentions to perform pro-environmental behavior (Steg et al., 2005; Menzel & Bogeholz, 2010; López-Mosquera & Sánchez, 2012).

Some research has found that approximately 50% of the variation in behavioral intentions or behaviors can be explained by attitudinal and normative variables (Jacobs et al., 2012). Emotions, which are often understudied in human dimensions research, may account for some of the remaining variability (Jacobs et al., 2012). Previous research involving emotions have examined fear toward carnivore species (Davey et al., 1998; Kaltenborn et al., 2006; Johansson & Karlsson, 2011). Recent studies have also used emotional dispositions to explain normative beliefs, such as acceptability of management actions, related to human interactions with wolves, bears, and coyotes (Sponarski et al., 2015). Further investigation is needed to understand the relationship between emotional dispositions and other cognitions regarding wildlife species (Jacobs et al., 2012).

Because the wildlife constituency has broadened beyond the traditional "sportsman", it is critical that managers evaluate cognitive interactions of both consumptive (e.g. hunters) and non-consumptive (e.g. birders) wildlife recreationists (McFarlane & Boxall, 1996). Numerous studies stress that values, attitudes, and knowledge are dependent upon recreational experience. For

example, Tarrant et al. (1997) sought to assess moderating and mediating effects in the value-attitude linkage across four wildlife constituent groups: consumptive users, non-consumptive users, nonusers, and combined users. The results provided, to some extent, support for knowledge as an external moderating factor. Overall, birders exhibited more favorable attitudes toward wildlife species protection than individuals in the remaining three groups. Combination users also demonstrated higher levels of knowledge than any other group. Knowledge was found to only be a positive significant moderator for consumptive users, implying that individuals with higher levels of knowledge possess attitudes that are more consistent with their fundamental values.

Another study involving similar types of recreationists examined the link between outdoor experiences and conservation behaviors (Cooper et al., 2015). The researchers compared self-reported behaviors of hunters, birders, hunter-birders, and non-nature-based recreationists. Both hunters and birders were nearly five times more likely than non-recreationists to engage in pro-environmental behaviors, such as donating to support conservation efforts, advocating for wildlife recreation, improving wildlife habitat, and participating in local conservation-oriented groups. An additive effect was shown for hunter-birders, as they had the greatest likelihood of participating in all mentioned behaviors. Their research builds upon previous studies that emphasize the importance of outdoor experiences in influencing values, emotional affinity, and pro-environmental behaviors toward nature. The results also suggest that hunters and birders may have more similar beliefs and behavioral intentions than formerly recognized and that recreation participation may actually transcend sociodemographic variables (McFarlane & Boxall, 1996; Adams et al., 1997).

Other research involving stakeholders have demonstrated the influence of specialization on conservation involvement. Recreation specialization is typically conceptualized by a progression in behavior, skill and knowledge, and commitment to an activity (Scott & Shafer, 2001; Lee & Scott, 2004). This theory hypothesizes that recreationists move along a continuum from novice to expert over time, and concern for resource conservation increases as an individual becomes more involved in a resource-oriented activity. Bryan (1977), for example, showed how anglers' attitudes shifted from catching fish to concern for fish conservation as their specialization increased. Specialization has also been positively correlated with conservation and conservation contributions in other outdoor recreation groups, such as birders and hunters (Hvenegaard, 2002). Furthermore, Hammitt et al. (1989) noted that as an individual becomes more specialized in an activity, they possess more information to formulate more specific attitudes regarding that activity. Thus, cognitive structures that promote attitudes and preferences should be more elaborately assimilated in specialized users.

A recent study by Bernacchi et al. (2015) demonstrated the effectiveness of engaging these various types of stakeholder groups in decisional communication about wildlife. Specifically, they studied the potential for involving residents of coastal Texas in the implementation of community-based conservation for the wintering population of Whooping Cranes. By interviewing 35 residents who expressed interest in crane conservation, the researchers determined that active stakeholders are eager to be involved with management initiatives due to the charismatic and economic values attributed to Whooping Cranes. They suggest that this approach can also be applied to other communities that recognize their interdependence with a particular wildlife species by fostering enthusiasm and empowerment in local stakeholders. However, caveats exist in their research, such as the analysis of a region that

highly values and appreciates Whooping Cranes. These findings cannot be generalized to areas that may not possess the same cultural connection, and, therefore, may not be indicative of actual public perceptions.

Bowker and Stoll (1988) examined the economic value of Whooping Cranes and the associated willingness-to-pay (WTP) for the species. The researchers applied a contingent valuation method to approximate the non-consumptive benefits of this endangered species, a nonmarket resource. They administered a survey to users of the Aransas National Wildlife Refuge, which hosts wintering Whooping Cranes, and nonusers of the refuge, including residents of Texas and four major metropolitan areas across the United States. Participants were presented with a hypothetical situation in which a policy change could result in the cessation of public funding allocated to support the conservation of Whooping Cranes. All participants were randomly assigned an offer to contribute annually to a trust fund to ensure the species' protection. They were then asked to respond dichotomously, representing an acceptance or rejection of the offer. Results indicated that income and wildlife-oriented organization membership best predicted the likelihood of accepting an offer, and the mean WTP for the resource ranged from $21 to $149. These results can be used to determine the expected value individuals place on Whooping Cranes and how much they are willing to contribute to their continued conservation.

RESEARCH OBJECTIVES

The overarching goal of this research was to provide an inclusive understanding of how different stakeholders in Alabama perceive Whooping Cranes. To address this goal, we had four specific research objectives:

1. Assess current awareness and knowledge of Whooping Cranes among Alabama residents;
2. Examine differences in crane awareness, knowledge, attitudes, and behavioral intentions among waterfowl hunters in Alabama using birding specialization;
3. Develop a theoretical framework to determine the factors that predict attitudes and behavioral intentions of local residents, waterfowl hunters, and birders toward the conservation of Whooping Cranes; and
4. Identify outreach strategies for locals, waterfowl hunters, and birders regarding the conservation of Whooping Cranes.

To address these objectives, we prepared two separate chapters for journal submission. In Chapter 2, we used the specialization framework and the cognitive hierarchy to explore differences in perceptions, attitudes, and behavioral intentions of waterfowl hunters in Alabama by segmenting them based on their level of involvement in birdwatching. This chapter has been formatted and submitted as a manuscript to *Human Dimensions of Wildlife* for publication. In Chapter 3, we examined the factors that best predict attitudes and behavioral intentions of local residents, waterfowl hunters, and birders in an effort to identify outreach strategies for Whooping Crane conservation. Chapter 4 synthesizes the key findings and implications of each chapter and provides suggestions for future research related to Whooping Cranes. This chapter is followed by two appendices that contain detailed methodology and survey design and the survey questionnaire.

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Chapter 2: Perceptions of Whooping Cranes among waterfowl hunters in Alabama: Using specialization, awareness, knowledge, and attitudes to understand conservation behavior

ABSTRACT

A central component of successful wildlife conservation is the understanding of public perceptions toward a species. Using data from an online survey of waterfowl hunters, we used birding specialization to examine differences in awareness and knowledge of and attitudes toward Whooping Cranes in Alabama. We investigated if these variables and/or birding specialization influenced participation in conservation behaviors. Specialization level was positively related to awareness, knowledge, and conservation attitudes. Respondents with greater knowledge and favorable attitudes toward cranes were more likely to donate to a hypothetical crane conservation fund, and expert birders were more likely to belong to a birding organization than novice or intermediate birders. Our research expands upon existing birding specialization literature by incorporating cognitive variables specific to Whooping Cranes. These findings suggest that enhancing knowledge regarding Whooping Crane conservation may be an advantageous strategy for promoting conservation and positive behaviors toward the species.

INTRODUCTION

Successful species recovery often requires complementary strategies that seek to balance human well-being and the protection of natural resources (Manfredo, Vaske, Brown, Decker, & Duke 2009; Heberlein, 2012; Kareiva & Marvier, 2012). Furthermore, preservation of endangered species is greatly enhanced by public support and commitment. Without adequate assessment of public opinion and involvement, conservation initiatives involving such species may face harsh opposition and result in costly and unwanted political battles (Jacobson & McDuff, 1998), whereas success of projects designed to resolve human-wildlife conflicts may largely rest upon the understanding of stakeholder values, attitudes, beliefs, and behavioral intentions (Messmer, 2000). As attitudes and behaviors may differ among groups of stakeholders, successful wildlife conservation necessitates the consideration of a diverse public (Messmer, 2000; Riley et al., 2002; Teel & Manfredo, 2009). Social science research can accomplish this by identifying varying interests of the general public, special interests groups (e.g., hunters), and other nontraditional constituents, such as non-consumptive wildlife recreationists (Bath, 1998).

One species that has both a strong conservation need and that stakeholders may have differing views on is the Whooping Crane (*Grus americana*). Whooping Cranes were historically present throughout the United States, including coastal and interior regions of Alabama. However, in the early part of the 20th century, habitat alteration and unregulated human harvest led to the near extinction of the species. By 1941, only 15 individuals remained in the wild, all located on wintering grounds in Texas (Trick, Smith, Stehn, & Walker, 2001; Urbanek & Lewis, 2015). Following numerous reintroduction techniques and the establishment of an eastern

migratory population, Whooping Cranes have once again begun utilizing habitat in the southeastern United States.

Despite enhanced protection and management, the Whooping Crane still faces many threats to its existence. These threats primarily include habitat destruction, predation by carnivores, collisions with manmade infrastructure, low genetic diversity, and illegal human harvest (Urbanek & Lewis, 2015). In particular, recent shootings of cranes in the eastern migratory population have raised concern that such illegal take is hindering recovery of the species (MacKenzie, 2011). As the population continues to grow and utilizes more accessible lands, consequently, so does the potential for future human-crane conflict. Thus, social science approaches aimed at understanding public perception of Whooping Cranes are crucial for mitigating conflict and continuing the success of this species.

Though typically viewed as different groups, frameworks segregating non-consumptive and consumptive recreationists may not be particularly useful when comparing attitudes and conservation behaviors (Cooper, Larson, Dayer, Stedman, & Decker, 2015). In fact, some studies have demonstrated abounding similarities between birders and hunters, including a common investment in preserving wildlife habitat and protecting ecosystems (Daigle et al., 2002; U.S. Fish and Wildlife Service, 2013). Our research uses the specialization framework and the cognitive hierarchy to explore differences in perceptions, attitudes, and behavioral intentions of waterfowl hunters in Alabama by segmenting them based on their level of involvement in a non-consumptive wildlife activity (i.e., birdwatching). Hereafter, our sample of waterfowl hunters will be referred to as "birders" according to their level of specialization.

Birders, which are categorized by their commitment to observing and identifying avian species, constitute one of the largest groups of eco-tourists across the globe (U.S. Fish and

Wildlife Service, 2013). In the United States alone, there are approximately 47 million birders, who spend an estimated total of $15 billion on trips and over $26 billion on birding equipment annually (U.S. Fish and Wildlife Service, 2013). Unlike hunters and anglers, birders are not required to contribute to conservation efforts through license purchasing. Instead, this group of recreationists participates in conservation primarily through monetary donations and memberships in wildlife-related conservation organizations. Previous research has suggested that active birdwatching encourages increased awareness, understanding, and concern for natural resources (McFarlane & Boxall, 1996; Cooper et al., 2015). Thus, we hypothesize that the most engaged and active birders (i.e., experts) will be more aware of Whooping Cranes, knowledgeable about Whooping Crane attributes, hold more favorable attitudes toward Whooping Crane conservation and, therefore, be more likely to engage in conservation behaviors.

Theoretical Framework

As with many wildlife recreationist groups, birders are a heterogeneous assemblage of users and are often grouped according to different sub-populations, including recreation specialization (Hvenegaard, 2002). Recreation specialization is typically conceptualized by a progression in behavior, skill and knowledge, and commitment to an activity (Scott & Shafer, 2001; Lee & Scott, 2004). This theory hypothesizes that recreationists move along a continuum from novice to expert over time, and concern for resource conservation increases as an individual becomes more involved in a resource-oriented activity. Bryan (1977), for example, showed how anglers' attitudes shifted from catching fish to concern for fish conservation as their specialization level increased. Specialization frameworks have also been developed for a variety

of other outdoor recreationists, including hunters, hikers, and canoeists, and have been used to assess participant motivations, conservation involvement, influences of socialization, and demographics (Kuentzel & Heberlein, 1992; McFarlane, 1994; McFarlane & Boxall, 1996; Hvenegaard, 2002). Common components used to differentiate specialization levels in these studies have included past experience, centrality to lifestyle, and economic commitment (Kuentzel & McDonald, 1992; McFarlane, 1994; McFarlane, 1996; McFarlane & Boxall, 1996; Hvenegaard, 2002).

Specialization has been positively correlated with conservation involvement in birders (Hvenegaard, 2002). Kellert (1985) suggested that experienced birders are more likely to belong to conservation organizations than less experienced birders. This finding was supported by McFarlane and Boxall (1996), who discovered that participation in conservation activities increased with specialization. Cooper et al. (2015) found a similar trend by comparing self-reported behaviors of hunters, birders, hunter-birders, and non-nature-based recreationists. Hunter-birders were nearly five times more likely than non-recreationists to engage in pro-environmental behaviors, such as donating to support conservation efforts, advocating for wildlife recreation, improving wildlife habitat, and participating in local conservation-oriented groups. Their research builds upon previous studies that emphasize the importance of outdoor experiences in influencing values, emotional affinity, and pro-environmental behaviors toward nature. Furthermore, Hammitt et al. (1989) noted that as an individual becomes more specialized in an activity, they possess more information to formulate more specific attitudes regarding that activity. Thus, cognitive structures that promote attitudes and preferences should be more elaborately assimilated in specialized users.

The cognitive hierarchy approach indicates that individual behavior and behavioral intentions are influenced by a series of general values leading to more specific attitudes and beliefs. Values, which serve as the foundation of this hierarchy, represent fundamental cognitions and create a basis for explaining differences in attitudes towards wildlife and a variety of wildlife-related issues (Fulton, Manfredo, & Lipscomb, 1996). Due to their broad utility and abstract nature, values are not likely to explain specific cognitions and behaviors (Fulton et al., 1996; Whittaker, Vaske, & Manfredo, 2006). Beliefs reflect individual thoughts about a specific object or issue and can help describe the evolution of positions toward those issues from broad values. Attitudes, which are influenced by basic beliefs, refer to the favorable or unfavorable evaluation of an entity or object and are typically derived from both affective and cognitive components (Vaske & Donnelly, 1999). Unlike fundamental values, attitudes are transitional in nature and may more easily be informed by conservation interventions (Teel & Manfredo, 2009). Attitudes can also vary considerably depending on situational context and targets and have been shown to directly influence behavior.

In the value-attitude-behavior literature, it is generally assumed that a stronger relationship will exist between variables if there is direct correspondence between them in terms of object, action, context, or time. For example, Whittaker et al. (2006) found that general beliefs about wildlife had a greater influence on general management actions than actions targeted at a specific species. A similar theoretical approach developed by Ajzen and Fishbien (1977) indicates that behavioral intentions are influenced by attitudes toward that behavior rather than attitudes about the specific object. Following this theory, we propose a similar approach in which attitudes toward a resource can act as a proxy for attitudes toward resource-related behavior. This relatively uncommon approach was demonstrated by Perry-Hill et al. (2014), who found that

specific attitudes toward a species are consistent and strong predictors of individual behavior and can serve as a close substitute for behavior-specific attitudes. The researchers also posit that positive attitudes toward a species can predispose positive behavior, which may be useful for conservation efforts.

Although not traditionally incorporated into cognitive frameworks, awareness and knowledge of species also exerts an important influence on behavior (Kellert, 1993). For instance, Henderson et al. (2014) explored the willingness of ranchers in Canada to support species at risk. They discovered that awareness, knowledge, and positive attitudes were indicative of willingness to support conservation for species at risk. Jhamvar-Shingote and Schuett (2013) also suggested that knowledge provides a unique contribution to predicting behavior toward conservation of a species, along with attitudes and beliefs. Our research also examines the link between awareness, knowledge, and behavioral intentions of birders.

Using a combination of recreation specialization and the cognitive hierarchy approach, the goal of our research was to compare perceptions and attitudes towards Whooping Cranes among waterfowl hunters in Alabama. We aim to build upon existing specialization literature by applying birding specialization to a unique sampling frame of waterfowl hunters. The three core objectives of this research were to: (1) segment waterfowl hunters in Alabama into birding specialization levels; (2) identify differences in crane awareness, knowledge, and attitudes among specialization levels; and; (3) determine if birding specialization and/or cognitive variables influence conservation behavioral intentions regarding Whooping Cranes.

METHODS

Sampling

In collaboration with the Alabama Department of Conservation and Natural Resources (ADCNR), we administered an online survey to subscribers of Waterfowl Tips and Management, a statewide e-mail listserve of managed by ADCNR. The listserve consists of individuals who identify as waterfowl hunters in Alabama. The initial e-mail was sent on June 22, 2016 by ADCNR to a mailing list of approximately 4,000 recipients, with one-week intervals between two courtesy reminders. The survey consisted of 64 questions pertaining to awareness and knowledge of and attitudes toward the conservation and poaching of Whooping Cranes, as well as birding specialization and behavioral items. The survey was designed following a modified version of the Tailored Design Method (Dillman & Smyth, 2009). Participants were instructed via e-mail to complete the survey using Qualtrics online survey software.

Recreation Specialization

To measure birding specialization of our respondents, we used 11 variables representing skill and knowledge, centrality to lifestyle, and economic commitment, which are frequently found in specialization literature (McFarlane & Boxall, 1996; Hvenegaard, 2002; Lee & Scott, 2004). Variables were standardized to a mean of zero and a standard deviation of one. Principle component analysis with varimax rotation was performed to identify specialization components, and components with an eigenvalue of one or more were extracted. Items with a minimum factor loading of 0.4 were retained (Peterson, 2000). Consistency and reliability of the components was confirmed using Cronbach's alpha reliability analysis. Component scores were then utilized in a TwoStep clustering procedure to identify birding specialization clusters. Following the self-

classification measure proposed by Scott et al. (2005), we allowed respondents who identified as novice birders to bypass the specific birding specialization items, and thus were not included in the cluster analysis. According to their results, this method performs similarly to other multi-item approaches. Demographic attributes used to describe specialization levels included age, gender, education, income, and ethnicity. Previous research has demonstrated that these variables are associated with progression among specialization levels (Hvenegaard, 2002).

Cognitive Variables

We examined three cognitive variables (i.e. awareness, knowledge, and attitudes) to determine differences among specialization levels and identify which variables predict conservation behavior (Jhamvar-Shingote & Schuett, 2013; Henderson et al., 2014; Perry-Hilly et al., 2014). Awareness was measured by asking respondents if they were aware that Whooping Cranes winter in Alabama. Knowledge was assessed using nine statements concerning physical characteristics, population status, and basic life history of Whooping Cranes (Table 2.1). Respondents were asked to either agree or disagree with these statements, and correct answers were summed to obtain a final knowledge score ranging from 0 to 9. A multi-item composite scale was created to measure attitudes toward the conservation of Whooping Cranes. The scale was constructed by averaging respondent level of agreement toward six statements representing favorable attitudes toward crane conservation (Table 2.1). Awareness and attitudes were measured on a unipolar 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) with a neutral midpoint. Internal consistencies of the knowledge and attitude scales were tested using Cronbach's alpha (Table 2.1).

Conservation behavior was measured indirectly by participation in wildlife-related activities. The two variables we examined were memberships in a birding or other conservation-oriented organization and willingness to donate to a hypothetical annual Whooping Crane conservation fund (i.e. "Are you a member of any birdwatching or other conservation organizations" and "If a fund was established for Whooping Crane conservation in your area, would you be willing to donate on a yearly basis?). Respondents were also asked to indicate an open-ended hypothetical donation amount. Both items were constructed using a dichotomous scale with answer choices of Yes or No.

Statistical Analysis

Statistical analyses for this study were performed using IBM SPSS Statistics 23. We examined differences in awareness, knowledge, and attitudes among specialization levels using one-way Analysis of Variance (ANOVA) and Tukey's Honestly Significant Difference post-hoc test. We developed four binary logistic regression models to assess whether specialization or cognitive factors predict the likelihood of performing conservation behaviors. The independent variables in our regression models were: (1) specialization level; and (2) awareness, knowledge, and conservation attitudes. The conservation behaviors, which acted as the dichotomous dependent variables in our models, were (1) membership in a birding or other conservation organization and (2) willingness to donate to a crane conservation fund. We used contingency tables to explore differences in demographic attributes between specialization levels, and we considered a p-value of < 0.05 to be significant for all analyses.

RESULTS

Based on reports supplied by ADCNR, we were able to determine how many e-mails were opened and the number of times the survey link was accessed. The initial e-mail was opened by 1,114 recipients, and the survey link was clicked 196 times. The reminder e-mails were opened by 1,072 and 851 recipients, with 150 and 95 survey link clicks, respectively. Overall, we received a total of 284 completed surveys. We were unable to determine an exact response rate, due to our survey distribution method, as overlap exists between the individuals that opened each mailing. If we use the largest recipient opening (1,114) and assume that no more than 10% (111) new recipients opened the 2nd and 3rd e-mails (1,225), we can infer an estimated response rate of approximately 23%. We were unable to conduct a non-response bias check, as the listserve and corresponding e-mail addresses were managed directly by ADCNR.

Recreation Specialization

Only 222 responses were used in the specialization analysis due to missing values in the data. The Kaiser-Meyer-Olkin measure of sampling adequacy of 0.756 was considered acceptable, and Bartlett's test of sphericity confirmed that the original correlation matrix was not an identity matrix. The PCA produced three axes that explained approximately 64% of the total variance (Table 2.2). The three components were interpreted as birding skill and knowledge, centrality to lifestyle, and economic commitment. Cronbach's alpha reliability analysis of each component yielded acceptable levels similar to other models (α = 0.68, 0.78, 0.85, respectively).

Self-identified novice birders represented approximately 40% (N = 89) of the classified respondents and were not considered in the specialization analyses. The cluster analysis revealed two levels of birding specialization (Table 2.3). Intermediate birders, which described slightly

more than half of our respondents (54%, N = 119), had lower scores on every component compared to expert birders, which comprised only a small set of individuals (6.3%, N = 14). Expert birders spent substantially more days birding in the last year, had more advanced bird identification skills, and invested more money into the activity than intermediate birders (Table 2.4). Economic commitment was the most important predictor of cluster membership, followed by skill and knowledge and finally centrality to lifestyle.

Nearly 65% of expert birders had an annual household income of $100,000 or more, while only 41% of intermediate and 24% of novice birders had annual incomes in that range (Table 2.5). All expert birders possessed an AB degree or higher, compared to 65% of intermediate and 58% of novice birders. Specialization level was unrelated to age or ethnicity. The average age of our respondents was 52 years (SD = 12.72), 93% identified as white/Caucasian, and 88% were male (Table 2.5).

Cognitive Variables

Personal awareness of Whooping Cranes was low and relatively well distributed for all respondents, with nearly 50% indicating they were not aware of cranes in Alabama prior to the survey. However, awareness increased with birding specialization (Table 2.6). Specifically, respondents in the expert birding group were significantly more aware of wintering cranes (M = 4.00) than respondents in the novice birding groups (M = 2.98). Awareness of intermediate birders was also significantly higher (M = 3.41) than novice birders; only 41% of novice birders specified personal awareness.

The internal reliability of the crane knowledge scale was demonstrated by a Cronbach's alpha value of 0.83. Approximately 15% of our respondents received a "high" knowledge score

of 7 or more, indicating considerably low knowledge of Whooping Cranes. Similar to awareness, knowledge of cranes was significantly different between all birding groups, and the number of correct knowledge statements was positively correlated with specialization (Table 2.6). Approximately 21% of novice birders received a knowledge score of 0, with over half receiving a score of 2 or less (M = 2.79). Intermediate birders had an average knowledge score of about 4, and the majority of respondents in this category received a score of 4 or less. On average, respondents in the expert birding group answered twice as many statements correctly (M = 6.29) as novice birders. Nearly 80% of expert birders received a knowledge score of 6 or more.

The conservation attitude scale was considered extremely reliable with a Cronbach's alpha value of 0.91. The majority of our respondents had favorable attitudes toward the conservation of Whooping Cranes. Approximately 80% of respondents either agreed or strongly agreed with all attitude statements. While our results suggest attitudes are significantly different between intermediate and expert specialization levels, we believe these results may not be practically significant, as all birding groups had positive conservation attitudes (Table 2.6).

Conservation Behaviors

More than one-third of all respondents (37%) were willing to donate some dollar amount to a hypothetical fund for Whooping Crane conservation, with an average donation of $26.21 per person (excluding outliers). Mean donation amounts for novice, intermediate, and expert birding groups were $22.40, $27.92, and $32.14, respectively. Binary logistic regression results indicated that birding specialization alone was unrelated to willingness to donate to crane conservation. However, when cognitive variables were considered, knowledge and conservation attitudes predicted conservation involvement (Table 2.7). Individuals with favorable attitudes toward the

conservation of cranes were 2.55 times more likely to make a monetary donation. Individuals who were more knowledge about Whooping Cranes were also more likely to participate in this form of conservation behavior.

Only 19% of respondents belonged to a birdwatching or other conservation organization. Birding specialization was a significant predictor for organization membership (Table 2.7). After converting the odds ratios into percentages for clearer interpretation (*OR/OR*-1), novice birders were 97.1% less likely to belong to an organization than expert birders, while intermediate birders were 88.3% less likely to be a member than expert birders. Cognitive variables (i.e., awareness, knowledge, and attitudes) were unrelated to organization membership.

DISCUSSION

Our recreation specialization model was similar to models used in previous studies of birders, and our variables closely resembled those described by Lee and Scott (2004). We incorporated the use of a self-classification measure for novice birders, which appeared to be reliable based on comparisons between specialization levels and previously documented trends. The cluster analysis produced two levels of specialization, which included intermediate and expert birders, and expert birders were identified due to their high scores on all three specialization components. This finding may be attributed to their higher level of education and income, which promotes knowledge and the ability to economically invest in the activity.

Compared to non-recreationists, previous research suggests that birders tend to be older, more educated, and have a higher household income (e.g., Hvenegaard, 2002; Scott & Thigpen, 2003; U.S. Fish and Wildlife Service, 2013). Demographic trends in this study were partially supported by previous research, as education and income were positively correlated with

specialization level. Gender was also associated with specialization. Expert birders were comprised of a higher percentage of female respondents than both novice and intermediate birding groups. This trend is mirrored in recent studies that show a larger percent of female participants in birdwatching (Scott & Thigpen, 2003; U.S. Fish and Wildlife Service, 2013). Age was not a relevant factor for differentiating between specialization levels. While these demographics are somewhat characteristic of birders, the results for gender and ethnicity are more representative of hunters, who are predominantly white males. Demographic comparisons may be limited due to our sample of waterfowl hunters.

Our research expands upon the specialization framework by incorporating perceptions specific to Whooping Cranes. Recreation specialization is typically utilized to determine differences in participant motivations, preferences, and conservation involvement. We extended this methodology to examine differences in crane awareness, knowledge, and conservation attitudes. Kellert (1985) proposed that active birders may possess an increased understanding, awareness, and concern for natural resources. This claim was revealed in our results, as expert birders indicated more awareness, knowledge, and favorable attitudes towards cranes than the less-specialized birding groups. This finding is particularly important for the conservation of Whooping Cranes, as familiarity of endangered species has been associated with more conservation-oriented behavior (Perry-Hill et al., 2014).

Conservation behaviors among birders in our study were notably lower than other studies of wildlife recreationists. Only 36% of our entire sample indicated willingness to donate annually to crane conservation, and only 19% specified membership in a birding or conservation organization. These results are surprising, considering our sample consisted of individuals interested in waterfowl hunting, a group that is well-known for engaging in similar rates of

conservation involvement as birders (Cooper et al., 2015). Perhaps little saliency exists among our respondents due to low previous knowledge of Whooping Cranes. Despite this low participation, conservation involvement (i.e. membership) increased with specialization level, providing some support for the resource consumption to conservation progression suggested by Bryan (1977). However, specialization level did not predict hypothetical donations to Whooping Crane conservation. Conversely, knowledge and conservation attitudes were significantly associated with monetary conservation donations, but not organization membership.

While operationally different from the theoretical proposition outlined by Ajzen and Fishbein (1977), our results coincide with those reported by Perry-Hill et al. (2014). Specific attitudes toward the conservation of Whooping Cranes had a significant relationship with a conservation behavior related directly to the species. The concept of specificity can also be applied to the association between birding specialization and membership in a birding organization. These findings suggest that wildlife-specific attitudes can potentially serve as a proxy for attitudes about a specific behavior, which may be useful for wildlife managers who are unable to fully explore behaviors toward wildlife.

Study Limitations

While our findings provide further insight into birdwatching, it is important to note several caveats. First, our relatively low response rate may indicate a biased sample, as respondents were predominately highly educated and affluent white males, indicating that our results are not representative of the general population. Because of the uniqueness of our sampling frame of waterfowl hunters, generalizations should be made with caution. Second, we measured self-reported behavioral intentions, which have been demonstrated to directly predict

behaviors, but this relationship is typically weaker for behaviors that are infrequent (Perry-Hill et al., 2014), such as an annual donation to a conservation fund. In other words, our approach to investigating donation levels may not have adequately represented the stakeholder's actual interest in financially supporting cranes. Furthermore, there may also be other factors that prevent an individual from behaving as intended, including personal budget constraints or lack of familiarity. As a result, respondents may have provided uninformed opinions instead of fully formulated beliefs or attitudes due to low familiarity of Whooping Cranes in the state.

Conservation Implications

Our findings imply that specialized birders are more knowledgeable and have more favorable attitudes toward Whooping Cranes than less specialized birders. Fostering a link between these subgroups may increase appreciation of the species in less experienced birders. Active birders might also serve as role models by exposing peers in their community to knowledge of certain issues and contribution mechanisms that supplement conservation efforts (McFarlane and Boxall, 1996). For example, expert birders in Alabama may be able to generate additional support for Whooping Cranes by emphasizing their value and importance in the community. Although conservation attitudes significantly differed between specialization levels, respondents generally had favorable attitudes toward Whooping Cranes, despite low awareness and knowledge of the species. This finding presents a unique opportunity for conservation efforts. Focusing outreach strategies on developing positive attitudes toward the species may result in behaviors that promote conservation. As increasing knowledge has also been shown to generate more positive attitudes toward a species (Kellert, 1994; Bath, 1998), identifying

weaknesses in that knowledge can produce more targeted educational programs by determining which weaknesses are directly linked to attitudes.

As interactions between humans and Whooping Cranes become more likely in Alabama, an understanding of public perceptions is essential for their continued success. The conservation of this species hinges upon encouraging attitudes that do not evoke negative behaviors, and without public support, these behaviors may become more prominent. Future research could examine why respondents may or may not participate in certain behaviors and what other variables may contribute to an individual's perception of Whooping Cranes. Investigating the viewpoints of residents where larger and more well-established populations of Whooping Cranes reside (i.e., Texas and Wisconsin) may aid in outreach efforts, as well as provide insight on how to increase awareness for this endangered species.

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Table 2.1. Knowledge and conservation attitude scales.

	Statement	Item correlation	Cronbach's alpha
Knowledge			0.83
	Approximately how tall are adult Whooping Cranes?	0.46	
	Adult Whooping Cranes have a red patch on their foreheads	0.60	
	Whooping Cranes have black wing tips	0.56	
	Whooping Cranes usually mate for life	0.54	
	The Whooping Crane is the most endangered crane in North America	0.62	
	The Whooping Crane population in Alabama is the largest wintering group outside of Texas	0.39	
	Whooping Cranes live an average of 24-30 years in the wild	0.55	
	The Whooping Crane population was reduced to about 20 birds	0.52	
	Whooping Cranes exist today because of considerable effort from humans working to prevent their extinction	0.52	
Attitudes			0.91
	I would enjoy seeing Whooping Cranes	0.71	
	I enjoy knowing that Whooping Cranes exist in Alabama, even if I never see one	0.76	
	Whooping Cranes are an important part of our ecosystem	0.71	
	Whooping Cranes should be conserved for future generations	0.83	
	Conservation areas should be managed to ensure the survival of Whooping Cranes	0.77	
	Whooping Cranes are one more thing that makes Alabama special	0.79	

Table 2.2. Factor loadings of variables used to measure birding specialization.

	Principle components		
Specialization variable	Skill and Knowledge	Centrality to Lifestyle	Economic Commitment
Number of birds identified by sound[a]	0.83	0.14	0.08
Number of birds identified by sight[a]	0.79	0.13	-0.01
Subjective level of skill[b]	0.58	-0.07	0.26
Favorite recreation activity[c]	0.16	0.82	0.17
Important part of identity[c]	0.18	0.78	0.20
Plan free time around birdwatching[c]	0.01	0.76	0.34
Years spent birdwatching[a]	-0.06	0.61	0.21
Total days spent birdwatching in last 12 months[a]	0.03	0.51	-0.05
Birding festivals attended with the last 12 months[a]	0.14	0.15	0.91
Money invested in birdwatching equipment[a]	0.01	0.21	0.82
Birding festivals attended within lifetime[a]	0.29	0.25	0.82
Eigenvalue	1.35	4.01	1.58
Percent variance	12.23	36.46	14.37
Cronbach's alpha (total = 0.81)	0.68	0.78	0.85

[a] Measured on an open-ended scale

[b] Self-rated birding skill level: 1 = Intermediate, 2 = Expert

[c] Measured on a 5-point unipolar Likert scale: 1 = Strongly disagree to 5 = Strongly agree

Table 2.3. Mean component scores for birding specialization levels.

	Specialization Level		Statistics[a]	
Specialization component	Intermediate	Expert	*F*	*P*
Skill and knowledge	-0.16	1.34	24.73	<.001
Centrality to lifestyle	-0.14	1.16	46.81	<.001
Economic commitment	-0.18	1.49	35.19	<.001

[a] Degrees of freedom = 1

Table 2.4. Differences in variables among birding specialization levels.

		Specialization Level		Statistics[a]	
Specialization Variable	Mean	Intermediate	Expert	*F*	*P*
Number of birds identified by sound	22.90	15.99	56.79	44.26	<.001
Number of birds identified by sight	51.88	35.69	170.00	30.43	<.001
Subjective level of skill	1.13	1.09	1.43	13.82	<.001
Favorite recreation activity	2.00	1.86	3.07	30.44	<.001
Important part of identity	2.61	2.47	3.79	27.82	<.001
Plan free time around birdwatching	1.83	1.66	2.93	35.72	<.001
Years spent birdwatching	14.60	12.74	35.00	17.35	<.001
Total days spent birdwatching in last 12 months	9.41	3.29	41.14	18.15	<.001
Birding festivals attended with the last 12 months	0.13	0.03	1.00	85.78	<.001
Money invested in birdwatching equipment ($USD)	493	289	2279	37.86	<.001
Birding festivals attended within lifetime	1.31	0.28	10.43	126.45	<.001

[a] Degrees of freedom = 1

Table 2.5. Demographics of birding specialization levels.

Variable		Specialization Level			Statistics		
		Novice	Intermediate	Expert	X^2/F	*df*	*P*
Age	*Mean (SD)*	49 (11.68)	53 (13.67)	52 (12.51)	1.55	2	.216
Gender (%)	Male	80.5	96.2	78.6	12.69	2	.002
	Female	19.5	3.8	21.4			
Education (%)	No secondary education	41.7	35.3	0.0	8.94	2	.011
	College education or more	58.3	64.7	100			
Income (%)	Less than $25,000	4.8	2.1	0.0	14.40	8	.072
	$25,000 - $49,999	15.9	11.3	7.1			
	$50,000 - $74,999	33.3	22.7	0.0			
	$75,000 - $99,999	22.2	22.7	28.6			
	$100,000 or more	23.8	41.2	64.3			
Ethnicity (%)	American Indian	1.3	2.8	0.0	10.25	8	.418
	Black/African American	1.3	0.0	0.0			
	Latino	2.7	0.0	0.0			
	Asian	1.3	0.0	0.0			
	White/Caucasian	88.0	94.3	100.0			

Table 2.6. Differences in cognitive variables and conservation behaviors among birding specialization levels.

	Specialization Level			Statistics		
Variable	Novice *Mean (SD)*	Intermediate *Mean (SD)*	Expert *Mean (SD)*	X^2/F	*df*	*P*
Crane Awareness[a, e]	2.98[b] (1.19)	3.41[c] (1.25)	4.00[c] (1.36)	5.78	2	.004
Crane Knowledge[a, f]	2.79[b] (2.40)	3.83[c] (2.47)	6.29[d] (2.37)	13.96	2	<.001
Conservation Attitudes[a, g]	4.22[b] (0.59)	4.13[b] (0.65)	4.70[c] (0.33)	5.65	2	.004
Willingness to donate to crane conservation fund (%)	36.1	33.3	61.5	3.95	2	.139
Member of a birding or conservation organization (%)	6.7	22.7	71.4	34.22	2	<.001

[a] Any two means that do not have the same superscript are significantly different according to Tukey's HSD.

[e] Measured on a 5-point unipolar Likert scale: 1 = Strongly disagree to 5 = Strongly agree

[f] Additive scale from 0 – 9

[g] Multi-item composite scale; measured on a 5-point unipolar Likert scale: 1 = Strongly disagree to 5 = Strongly agree

Table 2.7. Binary logistic regression models examining which factors predict conservation behavior.

		Donation to Crane Conservation			Organization Membership		
		β	SE	OR	β	SE	OR
Model 1,2:							
	Intercept	0.47	0.57	NA	0.92	0.59	NA
	Novice[a]	-1.041	0.62	0.35	-3.54	0.72	0.03*
	Intermediate[a]	-1.163	0.61	0.31	-2.14	0.63	0.12*
Model 3,4:							
	Intercept	-5.53	1.36	NA	-4.89	1.45	NA
	Awareness	0.10	0.14	1.11	0.13	0.15	1.14
	Knowledge	0.15	0.08	1.16*	0.14	0.08	1.16
	Attitudes	0.94	0.31	2.55*	0.57	0.33	1.76

[a] Dummy variable for birding specialization level relative to expert birders
Nagelkerke R^2: Model 1 = .03; Model 2 =.18; Model 3 = .20; Model 4 = .10
*$p < 0.05$

Chapter 3: Using theory to communicate to different audiences about Whooping Crane conservation in Alabama

ABSTRACT

Effective outreach of an endangered species often requires an understanding of human dimensions information, as such factors are presumed to guide pro-conservation behavior. To provide a foundation for outreach communication strategies regarding Whooping Crane conservation in Alabama, we administered surveys to local residents, waterfowl hunters, and birders. Using constructs from the cognitive hierarchy and the value-belief-norm theory, we developed a theoretical framework to identify the best predictors of attitudes and behavioral intentions toward Whooping Cranes. Regression analyses revealed that a combination of constructs from both frameworks in addition to knowledge and emotional dispositions, directly predict attitudes and behavioral intentions toward Whooping Cranes. Specific variables that were common among all audiences were personal norms and emotional dispositions. We suggest that using a more complete theoretical framework may better explain perceptions toward an endangered species across different constituencies. Our findings can be used to inform outreach strategies in an effort to support conservation of the species.

INTRODUCTION

The Whooping Crane (*Grus americana*) is considered one of North America's most well-known symbols of wildlife conservation success (Weitzman, 1993). In the early 1940s, the species was drastically reduced to 15 individuals in the wild, all located on wintering grounds on the coast of Texas. This decline was primarily associated with wetland habitat alteration, specimen collection, and increased hunting pressures (Trick et al., 2001; Urbanek et al., 2015). Following numerous recovery efforts, including reintroduction initiatives and captive breeding programs, the species has redounded to approximately 600 individuals at present (Urbanek et al., 2015). The last and only natural, self-sustaining population of Whooping Cranes migrates from Wood Buffalo National Park in Canada to wintering habitat on Aransas National Wildlife Refuge in Texas. The eastern migratory population (EMP), which annually migrates from Wisconsin to as far south as Florida, was established in 2001 to promote recovery and safeguard against extinction (Trick et al., 2001). During their migration, a sizable number of cranes in this reintroduced population utilize wintering habitat on and around Wheeler National Wildlife Refuge in northern Alabama.

Despite intensive conservation of the species, the Whooping Crane continues to be the victim of illegal human harvest. This threat is particularly concerning for the EMP, as shootings account for nearly 20% of crane mortality in this population, which consists of approximately 100 cranes (Harrell & Bidwell, 2014). Shooting incidents in the EMP have been documented in Alabama, Georgia, Indiana, Kentucky, Michigan, and Wisconsin (MacKenzie, 2011; Mendenhall, 2014). Because cranes in this population often inhabit accessible landscapes, they are more likely to come into conflict with humans. Thus, a baseline understanding of public

perceptions of Whooping Cranes is crucial for preventing future shooting incidents and promoting recovery of the species.

Outreach interventions designed to capture the interest of the public are key to the conservation of a recovering species (Brewer, 2002). The goals of such interventions typically include influencing psychological factors of the target audience, which are presumed to guide behavior. Previous research has shown that effective outreach can help foster pro-conservation behaviors, improve public support for conservation initiatives, reduce wildlife poaching, improve compliance with regulations, and influence natural resource policy (Jacobson, 2010). Despite these findings, many outreach programs are unidirectional, excluding collaboration with the target audience. As a result, outreach is often shaped by intuition and scientific communication. Assumptions are made about how a nonscientific public assimilates information into their mental frameworks, and the public is perceived as a homogenous group rather than a diverse collection of people (Varner, 2014). This misconception persuades managers to design universal messages that contain only factual information, failing to include material based on psychological theory that promotes pro-conservation behavior (Jacobson, 2010). Outreach can be improved by ascertaining an understanding of values, beliefs, norms, and attitudes of a diverse public, as these predispositions have a crucial effect on how new information is processed. This understanding is important for promoting relevancy and a commitment to the sustainability of an outreach program (Varner, 2014).

The purpose of this research was to provide a foundation for outreach communication strategies regarding Whooping Crane conservation in Alabama for three different constituencies (i.e., locals, waterfowl hunters, and birders). The two main objectives of this research were to: (1) develop a theoretical framework to identify the best predictors of attitudes and behavioral

intentions of each audience toward the conservation of Whooping Cranes; and (2) examine the preferred sources of communication of each audience. We then discuss how our findings can be used to inform outreach interventions in an effort to support conservation of the species.

Theoretical Framework

We developed a framework for outreach interventions based on behavioral theory and issues specific to Whooping Cranes (Figure 3.1). Constructs in our framework were identified from previous attitudinal and behavioral studies toward wildlife and other environmental issues (e.g., Whittaker et al., 2006; Vaske & Donnelly, 2007; López-Mosquera & Sánchez, 2012; Mayer et al., 2015; Sponarski et al., 2015). Similar to previous research by Mayer et al. (2015), we integrated constructs from two different theories. In particular, we applied the cognitive hierarchy and the value-belief-norm theory (VBN) to examine relationships between constructs and to determine the most important predictors of attitudes and behavioral intentions toward Whooping Cranes. Both of these theories have proven successful in increasing the variance explained when predicting behaviors in an environmental context. We examined their combined effect in the context of an endangered species.

The cognitive hierarchy approach suggests that behavioral intentions and behaviors are influenced by a collection of values, value orientations, beliefs, attitudes, and norms (Fulton et al., 1996). These constructs are theorized to build upon each other and increase in specificity, with general values forming the foundation (Vaske & Donnelly, 1999). Components of the cognitive hierarchy have been used to predict acceptability of wildlife management actions, understand the diversity of conservation-related interests, assess wildland preservation voting intentions, and examine attitudes toward issues concerning wildlife (Vaske & Donnelly, 1999;

Whittaker et al, 2006; Teel & Manfredo, 2009). The VBN theory, which contains many parallel constructs to the cognitive hierarchy, posits that individual values influence a set of beliefs that antecede personal norms. These beliefs consist of three main components: awareness of consequences, ascription of responsibility, and an ecological worldview. Ascription of responsibility, in turn, leads to the activation of a personal norm, which directly predicts behavioral intention (Stern et al., 1999). The VBN theory has been applied in an environmental context to explore commitment to the protection of biodiversity, measure management alternatives, willingness to pay for park conservation, and intentions to perform pro-environmental behavior (Steg et al., 2005; Menzel & Bogeholz, 2010; López-Mosquera & Sánchez, 2012; Mayer et al., 2015).

Our framework not only examines the direct effect of all of these constructs on attitudes and behavioral intentions, but also the paths between them (Figure 3.1). We included all constructs of the cognitive hierarchy, ascription of responsibility and personal norms from the VBN theory, and knowledge and emotional dispositions as additional variables. We suggest that combining these theories and constructs will produce a more robust and complete theoretical framework that will better explain the underlying cognitions of our respondents. Like the cognitive hierarchy, our framework increases in specificity, beginning with general knowledge of cranes and wildlife value orientations, followed by more specific internal constructs.

METHODS

Sampling

To understand various perceptions of Whooping Cranes in Alabama, we administered survey questionnaires to three different populations (i.e. locals, waterfowl hunters, and birders).

All survey materials and instruments were approved by the Auburn University Institutional Review Board. The local survey was mailed in October 2015 to a random sample of 1,500 residents from Madison, Morgan, and Limestone counties in Alabama. These counties were selected due to their proximity to Wheeler National Wildlife Refuge and the ongoing Whooping Crane outreach efforts. The survey consisted of 50 questions and was designed to acquire a baseline understanding of the human dimensions of Whooping Crane conservation. The survey was administered using a modified version of the Tailored Design Method (Dillman, 2009), which entails four contacts made with survey recipients over an eight-week timeframe. Our first contact with recipients consisted of a survey packet, which included the survey itself, a pre-stamped and addressed return envelope, an Alabama Whooping Crane bumper sticker, and an information letter detailing the goals of the research and informing recipients of their participant rights. Two weeks following the initial mailing, all recipients were sent a reminder postcard. A final contact, which included another information letter and additional instruction on how to complete the survey online using Qualtrics survey software, was sent to all non-respondents two weeks after the reminder poster. Following the completion of the third mailing, we conducted non-response bias check phone calls to a subset of 100 non-respondents.

To target specific groups that may have an interest in Whooping Cranes, we administered online surveys to waterfowl hunters and birders in Alabama. Waterfowl hunters were contacted through a statewide e-mail list serve managed by the Alabama Department of Conservation and Natural Resources (ADCNR), which contains individuals who identify as waterfowl hunters in the state. The first e-mail of the waterfowl hunter survey was sent in June 2016 to approximately 4,000 recipients, with one-week intervals between two courtesy reminders. A similar method was employed to distribute the survey to birders in Alabama. The initial e-mail of the birder

survey was sent in November 2016 to multiple listserves containing members of the Alabama Ornithological Society, North Alabama Birding Society, ALbirds, and the Tennessee Valley Audubon Society. Approximately 1,000 birders received the survey. Participants in both online surveys were contacted via e-mail and provided a link to the survey questionnaire that was administered using Qualtrics

Respondents

For the local survey, we received a total of 178 completed surveys, yielding a final response rate of approximately 13%. Non-response bias check phone calls indicated no statistical difference between respondents and non-respondents on five survey items. Based on ADCNR e-mail reports, we were able to determine how many e-mails containing the waterfowl hunter survey were opened and the number of times the survey link was accessed. The initial e-mail was opened by 1,114 recipients, and the survey link was clicked 196 times. The reminder e-mails were opened by 1,072 and 851 recipients with 150 and 95 survey link clicks, respectively. Overall, we received a total of 284 completed surveys. We were unable to determine an exact response rate due to our survey distribution method, as overlap exists between the individuals that opened each mailing. If we use the largest recipient opening (1,114) and assume that no more than 10% (111) new recipients opened the 2nd and 3rd e-mails (1,225), we can infer an estimated response rate of approximately 23%.

The birder survey was administered via e-mail to several birding organizations in Alabama, and we received a total of 98 completed surveys. Due to outdated listserves and inactive e-mail addresses, we were unable to determine how many surveys were actually

received by participants. Thus, we can only infer a conservative response rate of approximately 10%.

The average respondent age was similar among locals, waterfowl hunters, and birders (58, 52, and 62, respectively). Respondents of the local and waterfowl hunter surveys were predominantly male, while the birder survey had a more equal representation of gender. The majority of all respondents were white, college educated, and had annual household incomes greater than $75,000 (Table 3.1).

Measurement

To ascertain a baseline understanding of respondent awareness, we asked respondents if they were aware that Whooping Cranes winter in Alabama prior to receiving the survey. We also assessed their opinions about the awareness of their friends and people in North Alabama. These items were measured on a unipolar 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) with a neutral midpoint (Table 3.2).

Knowledge was assessed using five statements concerning physical characteristics, population status, and basic life history of Whooping Cranes. Respondents were asked to either agree or disagree with these statements, and correct answers were summed to obtain a final knowledge score ranging from 0 to 5. Wildlife values orientations were measured using a modified version of the scale described by Fulton et al. (1996). A total of 14 items were used to represent 4 wildlife belief dimensions: (1) caring beliefs, (2) appropriate use beliefs, (3) social affiliation beliefs, and (4) hunting beliefs. Caring and social affiliation beliefs corresponded to a mutualism orientation, while appropriate use and hunting beliefs described a domination orientation. Multi-item composite scales was created to measure attitudes and emotional

dispositions toward the conservation of Whooping Cranes. Ascription of responsibility, personal norms, emotional dispositions, and attitudes were all measured on unipolar 5-point Likert scales, ranging from 1 (strongly disagree) to 5 (strongly agree) with a neutral midpoint. Internal consistencies of the multi-item composite scales were tested using Cronbach's alpha reliability analysis (Table 3.3, Table 3.4).

Behavioral intention was measured by asking respondents "If a fund was established Whooping Crane conservation in your area, would you be willing to donate on a yearly basis?" Responses were measured on a dichotomous scale with answer choices of Yes or No. Respondents were also asked to indicate an open-ended hypothetical donation amount.

Additionally, all three surveys included items related specifically to outreach. We asked respondents where they had encountered information about Whooping Cranes, with 15 different answer choices based on outreach campaign efforts. We also asked respondents to indicate their most preferred forms of communication, including sources not previously utilized during outreach efforts.

Statistical Analysis

Statistical analyses for this study were performed using IBM SPSS Statistics 23. To reduce wildlife beliefs items into belief dimensions, we conducted two principle component analyses (PCA) with varimax rotation. The first PCA examined whether the 14 belief items loaded onto 4 belief dimensions (Table 3.5). Based on these components, we averaged corresponding items and created a mean rating for each dimension. The second PCA examined how the 4 belief dimensions loaded onto a single domination-mutualism value orientation component (Table 3.6). We reverse coded the two domination dimensions and averaged them

with the mutualism dimensions to create a domination-mutualism scale. For both analyses, items were standardized to a mean of zero and a standard deviation of one. Components with an eigenvalue of one or more were extracted, and items with a minimum factors loading of 0.4 were retained. Consistency and reliability of all components were confirmed using Cronbach's alpha reliability analysis. Descriptive statistics, such as mean and standard deviation, were calculated for wildlife value orientations in addition to all other variables of interest (Table 3.7).

We used linear regressions to examine relationships between wildlife value orientations, knowledge, ascription of responsibility, personal norms, emotional dispositions, and attitudes. Additionally, we used binary logistic regressions to determine the effects of these variables on behavioral intention. We then included all variables from these models that significantly influenced attitudes and behavioral intentions into fully integrated models to determine the best predictors. We suggest techniques for outreach interventions based on the results of these models and the sources indicated by respondents.

RESULTS

Framework Relationships

All proposed relationships between the independent variables were significant for locals. The majority of relationships were significant for waterfowl hunters, excluding the personal norm – behavioral intention relationship. Birders showed a slightly different trend, as only 14 of the 20 examined relationships were significant. The strengths of these relationships differed among all audiences, but similar patterns were shown in their respective results (Table 3.8). Due to the amount of proposed paths in our framework, only results that explain more than 10% of the variance are presented.

A number of significant relationships were common among all audiences (Table 3.8). Wildlife value orientations had a significant, positive effect on emotional dispositions. Respondents with a more mutualistic value orientation reported more favorable emotional responses toward the species. Emotional dispositions were positively related to personal norms. Respondents with favorable emotional responses toward the species reported stronger personal norms. Attitudes were influenced by wildlife value orientations, ascription of responsibility, personal norms, and emotional dispositions. These findings suggest that respondents with a more mutualistic value orientation, stronger personal norms and sense of responsibility toward conservation, and favorable emotional responses have more favorable attitudes toward the species. Additionally, wildlife value orientations, emotional dispositions, and attitudes directly predicted behavioral intention. Respondents who have a more mutualistic value orientation toward wildlife and favorable emotional responses and attitudes toward Whooping Cranes were more likely to donate to a hypothetical crane conservation fund.

Some relationships were only represented by two audiences (Table 3.8). For instance, ascription of responsibility directly influenced the personal norms and behavioral intentions of both locals and waterfowl hunters. Respondents of these two surveys with a high ascription of responsibility reported stronger personal norms toward conservation and were more likely to donate to a hypothetical conservation fund. Additionally, emotional dispositions of locals and waterfowl hunters influenced ascription of responsibility; respondents with favorable emotional responses toward seeing a Whooping Crane indicated a higher ascription of responsibility, or moral obligation to conserve the species.

A few relationships were unique to a specific audience (Table 3.8). In particular, the knowledge of waterfowl hunters influenced emotional dispositions, attitudes, and behavioral

intentions. Waterfowl hunters with more knowledge of Whooping Cranes had more favorable emotional responses and attitudes toward the species and were more likely to donate to a hypothetical crane conservation fund.

Fully Integrated Models

Models used to predict attitudes toward the conservation of Whooping Cranes differed between all audiences (Table 3.9). Personal norms and emotional dispositions were significant predictors of attitudes of locals, waterfowl hunters, and birders. For models used to predict behavioral intentions, there was not a common predictor among the three audiences (Table 3.9). In addition to personal norms and emotional dispositions, ascription of responsibility and wildlife value orientations significantly predicted local's attitudes toward Whooping Cranes in the full model and explained approximately 58% of the variation in attitudes. Ascription of responsibility also influenced behavioral intention of locals, with approximately 30% of the variation in behavioral intentions being explained by this model. Respondents who reported a high ascription of responsibility were more than twice as likely to donate to a hypothetical crane conservation fund.

Similar to locals, waterfowl hunters' emotional dispositions, ascription of responsibility, and personal norms had direct effects on attitudes in the full model, which explained 60% of the variation in attitudes. Knowledge also directly influenced attitudes of this audience. Behavioral intentions of waterfowl hunters were influenced by wildlife value orientations, ascription of responsibility, and attitudes. Respondents with a high ascription of responsibility and a more mutualistic value orientation were about twice as likely to donate to a hypothetical conservation fund, and respondents with favorable attitudes toward Whooping Cranes were nearly four times

as likely to donate. This model explained approximately 33% of the variation in behavioral intentions.

For the birding sample, Whooping Crane conservation attitudes were directly influenced by wildlife value orientations, personal norms, and emotional dispositions. About 40% of the variation in their attitudes was explained by this model. None of the proposed variables significantly influenced behavioral intentions of birders, and the model explained only 22% of the variation.

Sources of Communication

The majority of locals, waterfowl hunters, and birders indicated that they encountered information about Whooping Cranes at Wheeler National Wildlife Refuge and by word of mouth (Table 3.10). Information conveyed through television was encountered by more locals and waterfowl hunters than birders, and information online was encountered more by waterfowl hunters and birders. The Festival of the Cranes was an important source of information for locals and birders. Birders also encountered information directly from the International Crane Foundation (ICF) staff at local events and presentations. Other reported communication sources among the audiences were billboards, radio, magazines, and social media

Social media was a preferred communication method of all three audiences. Locals and waterfowl hunters also preferred radio and television public service announcements. These popular methods of communication were not commonly mentioned among birders. Waterfowl hunters and birders had a strong preference for direct communication from ADCNR or birding groups via e-mail or newsletters, and websites were preferred by both locals and birders (Table 3.11).

DISCUSSION

This study demonstrates that positive attitudes and pro-conservation behavioral intentions toward Whooping Cranes are partially explained by constructs included in the cognitive hierarchy and the VBN theory in addition to knowledge and emotional dispositions. Our findings support most of the proposed relationships in both theories and are similar to results of other studies involving these constructs. We suggest that integrating constructs from multiple theoretical frameworks may better explain attitudes and behavioral intentions toward an endangered species across different constituencies. Specifically, we demonstrate how the constructs in this more complete framework can be used to drive outreach strategies for Whooping Cranes.

Our results indicate that wildlife value orientations influence emotional dispositions, attitudes, and behavioral intentions of locals, waterfowl hunters, and birders. A more mutualistic value orientation produced more favorable emotional responses toward the species. This finding supports an assertion by Hartel et al. (2015) and Sponarski et al. (2015) that general beliefs may influence emotional dispositions toward wildlife, and provides evidence for exploring interrelationships between affective and cognitive constructs. Respondents with a more mutualistic value orientation also reported more favorable attitudes toward Whooping Crane conservation. The relationship between wildlife value orientations and attitudes has been studied extensively in the human dimensions literature, and our research supports this association (Fulton et al., 1996; Vaske & Donnelly, 1999; Teel & Manfredo, 2009; Hartel et al., 2015). Lastly, respondents with a more mutualistic value orientation were more likely to donate to a hypothetical Whooping Crane conservation fund. Following other behavioral studies involving

wildlife, our results suggest that wildlife value orientations have a direct effect on behavioral intention, and the relationship is not always mediated through attitudes and norms (Whittaker et al., 2006; Jacobs et al., 2014; Hermann et al., 2015).

Conversely, knowledge of Whooping Cranes only influenced cognitive and affective components of waterfowl hunters. For this audience, higher knowledge of cranes was positively related to emotional dispositions, attitudes, and behavioral intentions toward crane conservation, which is similar to the relationship between knowledge of and positive feelings toward large carnivores, such as wolves and bears (Glikman and Vaske 2011). One explanation for this finding may be that waterfowl hunters, who are traditionally conservationists, may be more inclined to have favorable predispositions toward Whooping Cranes if they are knowledgeable about the species.

Ascription of responsibility influenced attitudes of all audiences, suggesting that a higher ascription of responsibility produces more favorable attitudes toward the species. Furthermore, ascription of responsibility influenced personal norms and behavioral intentions of locals and waterfowl hunters. Respondents in these audiences who ascribe a personal responsibility for conservation reported stronger personal norms and were more likely to donate to crane conservation. This result coincides with the relationship proposed in the VBN theory and mirrors multiple studies involving pro-conservation behavior such as recycling, proper disposal of aquatic invasive species, and willingness to pay for park conservation (Guagnano et al., 1995; Bamberg & Schmidt, 2003; López-Mosquera & Sánchez, 2012; Mayer et al., 2015;). Birders exhibited less variation in personal norms and behavioral intentions, which may explain why responsibility was not a significant predictor of these variables.

Personal norms also directly influenced attitudes of all audiences. Personal norms are typically considered parallel constructs to attitudes (Vaske, 2008). Our research examined the link between these constructs and found a significant relationship. Respondents with stronger personal norms toward conservation had more favorable attitudes toward the species. It should be noted that personal norms did not strongly predict behavioral intentions, which is a common result of normative studies. Instead, ascription of responsibility, which is considered an activator of personal norms, had a direct effect on behavioral intentions.

Emotional dispositions had direct effects on personal norms, attitudes, and behavioral intentions of all audiences. Emotional dispositions in a wildlife context are typically used to examine normative beliefs, or acceptability of wildlife management actions (Jacobs et al., 2014; Sponarski et al., 2015). We assessed their effect on personal norms toward the conservation of an endangered species and discovered a significant relationship. More favorable emotional responses toward Whooping Cranes were positively related to personal norms. Emotional disposition was also positively related to favorable conservation attitudes and behavioral intentions, which confirms an assumption made by Jacobs et al. (2012) that emotions play an important role in formation of cognitive and behavioral constructs. For locals and waterfowl hunters, emotional dispositions influenced ascription of responsibility. Although the effect of ascription of responsibility on emotions has been examined in an environmental context (Han, 2014), the reverse effect has not garnered much attention. We determined that a more favorable emotional response toward seeing a Whooping Crane produced a higher ascription of responsibility for the species. This relationship was not demonstrated by birders, which may be due to an existing concern for the species by this audience.

Lastly, attitudes towards the conservation of Whooping Cranes predicted behavioral intentions toward the species. Locals, waterfowl hunters, and birders with favorable conservation attitudes were more likely to donate to a hypothetical crane conservation fund. This finding is consistent with studies that use the cognitive hierarchy and other attitudinal studies on threatened species, such as eastern box turtles and hellbender salamanders (Perry-Hill et al., 2014; Hartel et al., 2015).

Outreach Implications

Emotional disposition and personal norms remained significant predictors of attitudes of all audiences in the full models. Ascription of responsibility influenced attitudes and behavioral intentions of locals and waterfowl hunters. Additionally, attitudes of waterfowl hunters were influenced by knowledge of cranes. Mutualistic value orientations played an important role in the attitudes of locals and birders, as well as the behavioral intentions of waterfowl hunters. Behavioral intentions of waterfowl hunters were also strongly influenced by conservation attitudes. Lastly, none of the proposed variables predicted behavioral intentions of birders. While understanding the influence of wildlife value orientations on attitudes and behavioral intentions is important for long-term outreach goals, our recommendations focus on constructs that are more easily influenced or changed.

These findings have important implications for outreach strategies targeted at influencing attitudes and behavioral intentions toward Whooping Cranes. Outreach messaging is often rooted in factual information aimed at increasing knowledge, with the underlying assumption that a knowledge deficit is to blame for negative perceptions of an issue or species (Varner, 2014). Though this belief is intuitive and appealing, there is growing evidence that an increase in

knowledge does not always result in more favorable attitudes (Lehr et al., 2007; Ho et al. 2008; Varner, 2014). Instead, messaging that promotes personal relevance may be a more powerful and engaging tool for a broad audience. For example, we suggest that outreach strategies should focus on appealing to a personal expectation to conserve Whooping Cranes by emphasizing how citizens can become involved in conservation efforts. Emotions can also be used to foster a personal connection with the species through messages that incorporate excitement, pride, or sense of awe at the rare opportunity to see Whooping Cranes in Alabama.

It should be noted that different audiences may require different outreach strategies (Table 3.12). For instance, ascription of responsibility was a determinant of attitudes and behavioral intentions of locals and waterfowl hunters. For these audiences, outreach should focus on fostering personal obligations and responsibility for the conservation of Whooping Cranes. Specific messages should reinforce this theme by holding citizens responsible for their involvement in conservation efforts and encouraging others in their community to participate. While knowledge influenced attitudes of waterfowl hunters, the effects of ascription of responsibility, personal norms, and emotional dispositions were stronger. Messages should primarily focus on these constructs but may also incorporate factual information, such as the species' dramatic decline and current endangered status (e.g., "There are only 400 Whooping Cranes left in the wild, so we must ensure their survival"). Messages that promote positive attitudes are especially important for waterfowl hunters, as attitudes significantly influenced behavioral intention.

The behavioral intentions of birders were not found to be influenced by any of our proposed variables in fully integrated model. This finding may be a result of existing awareness of and concern for Whooping Cranes. However, continued outreach is important for this

audience to remain engaged in conservation efforts. Such efforts for continued engagement could be species status updates and volunteer opportunities.

When developing outreach strategies, managers should consider where respondents have already encountered information about Whooping Cranes. Wheeler National Wildlife Refuge has proven a vital asset in distributing information about this species to all audiences. This resource could be utilized in outreach efforts by installing exhibits that showcase Whooping Cranes and advertise the Whooping Crane viewing opportunities, which may foster a personal connection with the species and, thereby, promote stronger, and more favorable emotions, norms, and attitudes. Word of mouth was also an important source of information. Creating the standard, or norm, that Whooping Cranes should be protected and conserved could trigger group dynamics where citizens actively and openly advocate for the species.

Furthermore, preferred sources of communication should be considered when delivering outreach messaging. For example, social media was a common preferred source among all audiences. Based on our results, messages targeting personal norms and emotional dispositions should be delivered through social media platforms to reach a broad audience. Public service announcements were mentioned by both locals and waterfowl hunters. Messages intended for these two audiences should be broadcasted via local radio and television channels and should be multifaceted to target the psychological factors that influence their attitudes and behavioral intentions, such as ascription of responsibility, personal norms, or emotional dispositions. Waterfowl hunters indicated a preference to receive information about Whooping Cranes directly from ADCNR. In addition to the previously mentioned variables, knowledge also influenced attitudes of waterfowl hunters. To specifically reach waterfowl hunters, managers should coordinate with ADCNR to deliver outreach messages that promote knowledge retention, appeal

to emotions, and create a personal responsibility and expectation to conserve the species. A similar method may be applied to birders, as this audience preferred to receive information via birding organizations or listserves.

Study Limitations

Several limitations exist in this study and should be considered when interpreting our results. First, the relatively low response rate of our local survey may indicate a biased sample, as respondents were predominately older and educated white males, indicating that our results are not representative of the general population. In addition, the results of the waterfowl hunter and birder surveys can only be generalized to these targeted audiences in Alabama. Second, we measured self-reported behavioral intentions, which have been demonstrated to directly predict behaviors, but this relationship is typically weaker for behaviors that are infrequent (Perry-Hill et al., 2014), such as an annual donation to a conservation fund. In other words, our approach to investigating donation levels may not have adequately represented the stakeholder's actual interest in financially supporting cranes. Furthermore, there may also be other factors that prevent an individual from behaving as intended, including personal budget constraints or lack of familiarity. As a result, respondents may have provided uninformed opinions instead of fully formulated beliefs or attitudes due to low familiarity of Whooping Cranes in the state.

CONCLUSIONS

The results of this study have both theoretical and conservation outreach implications. Our findings support most of the theorized relationships in both the VBN theory and cognitive hierarchy and reinforce the integration of multiple theoretical frameworks. We found that a

combination of constructs from both frameworks in addition to knowledge and emotional dispositions best predicted attitudes and behavioral intentions toward the conservation of Whooping Cranes across all audiences. Furthermore, we demonstrated direct relationships across frameworks that are often understudied or not yet examined (e.g., ascription of responsibility → attitudes; emotional disposition → ascription of responsibility). Our study suggests that using a more inclusive model that contains all of our measured constructs may best explain perceptions toward an endangered species, such as the Whooping Crane.

Related to conservation outreach, our findings suggest strategies to influence attitudes and behavioral intentions toward Whooping Crane conservation. To increase the effectiveness of outreach messaging, we identified psychological factors of locals, waterfowl hunters, and birders that should produce more favorable attitudes toward the species and increase the likelihood of donating to crane conservation. Specifically, we suggest that messages targeted at diverse audiences should activate moral obligations and promote positive emotions toward the species. We also recommend strategies that are appropriate for each of our surveyed audiences and their most preferred sources of communication.

Understanding the unique effect of theoretical constructs on attitudes and behavioral intentions of locals, waterfowl hunters, and birders may lead to more effective outreach strategies, which can promote personal relevancy, enthusiasm, and support for the Whooping Cranes. If these strategies are successful, they can help foster pro-conservation behaviors, improve public support for conservation initiatives, and reduce the threat of poaching in Alabama. Future research should use our complete framework to explore human dimensions relationships for other endangered species or different populations of Whooping Cranes.

Furthermore, attitudes and behavioral intentions toward the poaching of Whooping Cranes should also be examined to understand why these incidents may be occurring.

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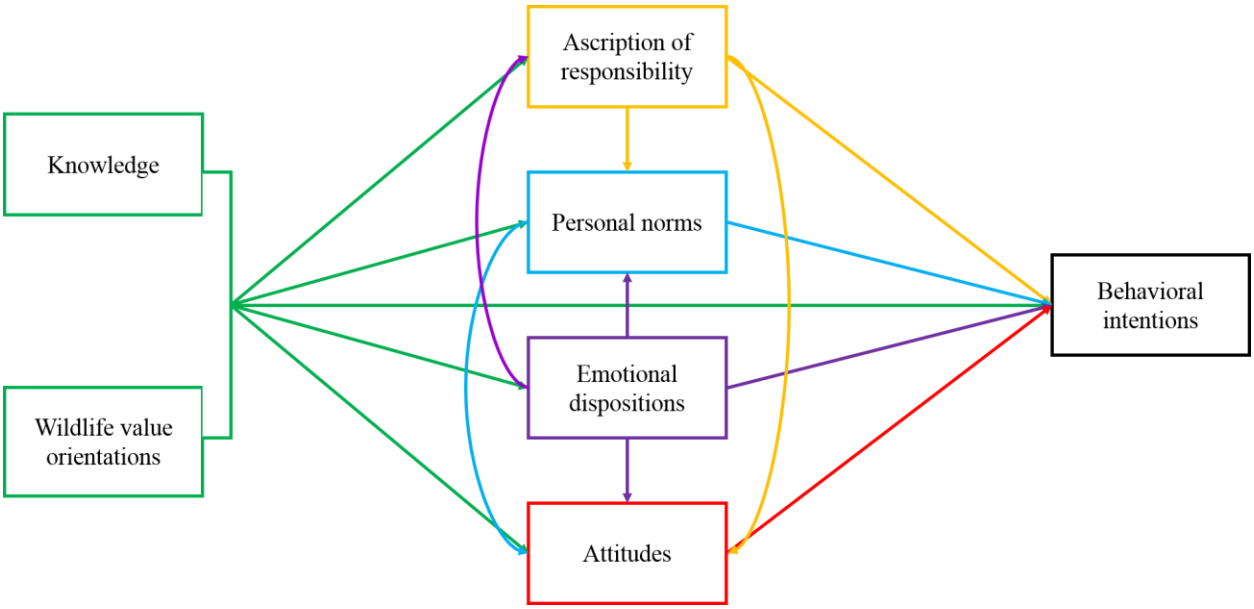

Figure 3.1. Theoretical framework based on the cognitive hierarchy and VBN theory as applied to Whooping Cranes.

Table 3.1. Demographics of survey respondents.

Variable		Locals (n=178)	Waterfowl Hunters (n=284)	Birders (n=98)
Age	Mean (SD)	58 (14.74)	52 (12.72)	62 (16.58)
Gender (%)				
	Male	64.8	88.4	53.5
	Female	35.2	11.6	46.5
Education (%)				
	Less than high school	4.7	1.0	.0
	High school diploma or GED	9.3	9.1	.0
	Some college	18.0	26.8	7.2
	Associate's degree	9.3	11.0	1.2
	Bachelor's degree	32.6	32.1	36.1
	Graduate or professional degree	26.2	20.1	55.4
Income (%)				
	Less than $25,000	17.3	3.2	1.3
	$25,000 - $49,999	17.3	12.1	19.2
	$50,000 - $74,999	15.4	24.2	20.5
	$75,000 - $99,999	17.9	21.6	17.9
	$100,000 or more	32.1	38.9	41.0
Ethnicity (%)				
	American Indian	5.2	2.3	.0
	Black/African American	4.0	.5	.0
	White/Caucasian	86.2	93.0	97.6
	Other	4.5	4.2	2.4

Table 3.2. Awareness of Whooping Cranes among survey respondents.

Crane Awareness[a]	Locals	Waterfowl Hunters	Birders
Myself	3.00 (1.35)	3.31 (1.25)	4.58 (.87)
My friends	2.72 (1.00)	2.80 (.98)	3.44 (1.08)
People in Alabama	2.66 (1.00)	2.69 (.87)	2.69 (.97)

[a] Measured on a 5-point unipolar Likert scale: 1 = Strongly disagree to 5 = Strongly agree

Table 3.3. Conservation attitude scales of each audience.

Attitude statement[a]	Item correlation		
	Locals	Waterfowl Hunters	Birders
I would enjoy seeing Whooping Cranes	.75	.71	.49
I enjoy knowing that Whooping Cranes exist in Alabama, even if I never see one	.80	.76	.37
Whooping Cranes are an important part of our ecosystem	.66	.68	.49
Whooping Cranes should be conserved for future generations	.86	.82	.72
Conservation areas should be managed to ensure the survival of Whooping Cranes	.84	.74	.65
Cronbach's alpha	**.91**	**.89**	**.74**

[a] Measured on a 5-point unipolar Likert scale: 1 = Strongly disagree to 5 = Strongly agree

Table 3.4. Emotional disposition scale of each audience.

Emotional disposition statement[a]	Item correlation		
		Waterfowl	
	Locals	Hunters	Birders
I would feel excited if I were to see a Whooping Crane	.80	.79	.62
I would feel proud if I were to see a Whooping Crane	.79	.78	.69
I would feel a sense of awe if I were to see a Whooping Crane	.76	.76	.72
Cronbach's alpha	**.89**	**.89**	**.79**

[a] Measured on a 5-point unipolar Likert scale: 1 = Strongly disagree to 5 = Strongly agree

Table 3.5. PCA results for wildlife value orientations after varimax rotation.

Wildlife value orientations, belief dimensions, belief items	Factor loadings		
	Locals	Waterfowl Hunters	Birders
Domination (α)	**.80**	**.70**	**.79**
Appropriate use (α)	**.74**	**.71**	**.69**
Humans should manage wild animal populations so that humans benefit	.86	.85	.79
The needs of humans should take priority over fish and wildlife populations	.79	.66	.67
Fish and wildlife are on earth primarily for people to use	.60	.69	.59
Hunting (α)	**.82**	**.72**	**.84**
We should strive for a world where there's an abundance of fish and wildlife for hunting and fishing	.85	.83	.82
People who want to hunt should be provided the opportunity to do so	.81	.72	.88
It is not cruel to hunt wildlife	.79	.80	.84
Mutualism (α)	**.86**	**.85**	**.85**
Caring (α)	**.92**	**.88**	**.92**
I take great comfort in the relationship I have with animals	.92	.86	.90
I feel a strong bond with animals	.91	.88	.93
I value the sense of companionship I receive from animals	.91	.87	.90
Social affiliation (α)	**.87**	**.84**	**.86**
I view all living things as part of one big family	.80	.83	.87
We should strive for a world where humans and fish and wildlife can live side by side without fear	.77	.77	.85
Wildlife are like my family and I want to protect them	.76	.80	.73
Animals should have rights similar to humans	.76	.77	.65
I care about wildlife as much as I do other important issues in my life	.74	.56	.61

Table 3.6. PCA results for wildlife value orientation continuum scale.

	Factor loadings		
Wildlife value orientation and belief dimensions	Locals[a]	Waterfowl Hunters[b]	Birders[c]
Domination – mutualism value orientation			
Appropriate use[a]	.74	.80	.80
Hunting[a]	.72	.50	.71
Caring	.54	.64	.49
Social affiliation	.79	.80	.84
Cronbach's alpha	.65	.64	.66
Eigenvalue	1.97	1.93	2.09
Percent variance	49.32	48.16	52.21

[a] Belief dimensions were reverse coded prior to the PCA.

Table 3.7. Mean and standard deviation of theoretical constructs.

Variable	Locals	Waterfowl Hunters	Birders
Wildlife value orientation[a]	2.64 (.63)	2.44 (.69)	3.08 (.64)
Knowledge[b]	1.73 (1.60)	1.44 (1.50)	2.93 (1.26)
Ascription of responsibility[c]	3.72 (.82)	3.90 (.74)	4.30 (.62)
Personal norms[c]	3.71 (.94)	3.89 (.86)	4.54 (.58)
Emotional dispositions[d]	3.94 (.72)	3.91 (.73)	4.51 (.59)
Attitudes[d]	4.19 (.60)	4.21 (.61)	4.66 (.41)
Behavioral intentions (% Yes)	34	36	73

[a] Domination-mutualism continuum; 3 = mid-point, high scores = mutualism
[b] Derived from the following items: The Whooping Crane is the tallest flying North American bird; Whooping Cranes mate for life; The Whooping Crane is the most endangered crane in North America; The Whooping Crane population in Alabama is the largest wintering group outside of Texas; Whooping Cranes live an average of 24-30 years in the wild.
[c] Measured on a 5-point unipolar Likert scale: 1 = Strongly disagree to 5 = Strongly agree
[d] Multi-item composite scale; measured on a 5-point unipolar Likert scale: 1 = Strongly disagree to 5 = Strongly agree

Table 3.8. Regression results of proposed relationships in theoretical framework.

	Locals			Waterfowl Hunters			Birders		
Relationship[a]	β/OR	SE	R^2	β/OR	SE	R^2	β/OR	SE	R^2
Knowledge → AR	.09	.04	.03*	.07	.03	.02*	-.01	.05	.00
Knowledge → attitudes	.07	.03	.04*	.15	.03	.13***	.00	.03	.00
Knowledge → behavioral intention[b]	1.38	.10	.08**	1.48	.10	.10***	.85	.23	.01
Knowledge → emotional dispositions	.07	.03	.03*	.15	.03	.10***	-.10	.05	.05*
Knowledge → personal norms	.10	.04	.03*	.10	.04	.03**	.01	.05	.00
WVO → AR	.37	.10	.08***	.34	.08	.07***	.29	.10	.08**
WVO → attitude	.41	.07	.18***	.37	.06	.12***	.28	.06	.18***
WVO → behavioral intention	2.99	.29	.13***	3.57	.29	.15***	3.09	.45	.12*
WVO → emotional dispositions	.53	.08	.19***	.54	.07	.19***	.34	.10	.12***
WVO → personal norms	.23	.11	.02*	.30	.10	.04**	.22	.10	.05**
AR → attitudes	.40	.05	.29***	.34	.05	.19***	.23	.07	.12***
AR → behavioral intention[b]	3.57	.28	.20***	2.59	.24	.12***	1.52	.41	.02
AR → personal norms	.36	.08	.10***	.40	.07	.13***	.28	.09	.09**
Personal norms → attitude	.29	.04	.21***	.35	.04	.24***	.30	.07	.18***
Personal norms → behavioral intention[b]	1.87	.19	.09***	1.26	.18	.012	1.25	.44	.01
Emotional dispositions → AR	.43	.08	.14***	.39	.06	.15***	.27	.11	.07*
Emotional dispositions → attitude	.57	.05	.49***	.51	.04	.36***	.32	.06	.21***
Emotional dispositions → behavioral intention[b]	3.20	.27	.16***	2.84	.23	.15***	3.10	.48	.11*
Emotional dispositions → personal norm	.57	.09	.19***	.40	.07	.11***	.32	.10	.10***
Attitudes → behavioral intention[b]	4.40	.35	.17***	3.79	.30	.15***	6.66	.68	.15**

[a] AR = ascription of responsibility; WVO = wildlife value orientation

[b] Results of logistic regression are presented in odds ratios

*** p < .001; ** p < .01; * p <.05

Table 3.9. Fully integrated linear and logistic regression models.

	Locals		Waterfowl Hunters		Birders	
Variable	Attitudes	Behavioral Intentions[a]	Attitudes	Behavioral Intentions[a]	Attitudes	Behavioral Intentions[a]
	R^2 = .58	**R^2 = .31**	**R^2 = .60**	**R^2 = .33**	**R^2 = .38**	**R^2 = .22**
WVO	.13 (.06)*	1.74 (.35)	.09 (.05)	2.27 (.33)*	.17 (.06)**	2.07 (.55)
Knowledge	.01 (.02)	1.24 (.12)	.08 (.02)***	1.26 (.12)	.03 (.03)	.90 (.26)
AR	.18 (.04)***	2.06 (.32)*	.13 (.04)***	1.83 (.28)*	.09 (.06)	1.05 (.52)
Personal norms	.09 (.04)*	1.28 (.22)	.13 (.03)***	0.77 (.25)	.16 (.07)*	.59 (.58)
Emotional dispositions	.36 (.05)***	1.98 (.37)	.36 (.04)***	0.91 (.35)	.19 (.07)**	1.85 (.58)
Attitudes		.95 (.50)		3.71 (.50)**		3.26 (.90)

[a] Results of logistic regression are presented in odds ratios

*** p < .001; ** p < .01; * p <.05

Table 3.10. Number of respondents that encountered Whooping Crane information at each outreach campaign source.

Source of information	Locals	Waterfowl Hunters	Birders
Wheeler National Wildlife Refuge	93	53	70
Word of mouth	38	69	57
Billboard	33	22	21
Television	32	29	7
Radio	26	33	21
Magazines	26	26	21
Festival of the Cranes	25	14	27
Social media	23	30	22
Websites	8	26	21
Whooping Crane Red Ale	5	5	7
Presentations by ICF	5	7	32
“I give a whoop!” campaign	3	4	16
Tables at Baumhower’s Restaurants	2	6	0
Tables at community events	2	5	17
Classroom visits by ICF	0	3	4

Table 3.11. Top five preferred methods of communication of each audience.

Locals	Waterfowl Hunters	Birders
TV PSA	ADCNR	E-mail
Social media	E-mail	Social media
Radio PSA	Magazines (Outdoor Alabama)	Birding listserves
Billboards	Radio & TV PSA	Websites
Websites	Social media	Wheeler National Wildlife Refuge

Table 3.12. Summary of the best predictors of attitudes and behavioral intentions of each audience and their preferred sources of communication.

Audience	Variable	Source
Locals	Ascription of responsibility Personal norms Emotional dispositions	TV PSA Social media Radio PSA Billboards Websites
Waterfowl Hunters	Ascription of responsibility Personal norms Knowledge Emotional dispositions	ADCNR E-mail Magazines Radio & TV PSA Social media
Birders	Personal norms Emotional dispositions	E-mail Social media Birding listserves Websites Wheeler National Wildlife Refuge

Chapter 4: Conclusions

The primary objective of this thesis was to ascertain a basic understanding of the human dimensions of Whooping Crane conservation in Alabama. Although the Whooping Crane is considered a national symbol of wildlife conservation success in the United States, little research has been conducted on stakeholder perceptions and behavioral intentions toward the species. As the population of wintering Whooping Cranes in northern Alabama continues to grow, this information remains essential to the success of the species. Our research aimed to address this gap of knowledge by assessing the human dimensions of multiple stakeholder groups in Alabama.

The results presented in Chapter 2 demonstrate that, despite low awareness and knowledge of the species, waterfowl hunters had generally positive attitudes toward the conservation of Whooping Cranes. By building upon the existing specialization framework, we determined a positive relationship between these three variables and birding specialization level of waterfowl hunters. Additionally, respondents with higher knowledge and favorable attitudes were more likely to participate in pro-conservation behaviors toward cranes. These results suggest that future outreach targeted at waterfowl hunters should focus on increasing crane knowledge and promoting positive attitudes toward the species. Encouraging more specialized birding groups to advocate for Whooping Cranes by highlighting their value and importance in the community may also be an advantageous strategy for increasing regard of the species.

In Chapter 3, we demonstrated the use of a more complete theoretical framework to predict attitudes and behavioral intentions toward the conservation of Whooping Cranes. Our inclusive framework included a combination of constructs from the cognitive hierarchy and VBN theory in addition to knowledge and emotional dispositions. Attitudes of local residents, waterfowl hunters, and birders were significantly influenced by personal norms and emotional dispositions, which are often excluded in human dimensions research. Furthermore, ascription of responsibility influenced behavioral intentions of locals and waterfowl hunters. Along with results from the previous chapter, these findings provide wildlife managers with a better understanding of how to improve public perceptions toward Whooping Cranes. Creating broad messages that activate personal expectations and promote positive emotions toward the species may increase the effectiveness of outreach efforts. Specific messages may also be designed based on the unique findings of each audience and their preferred sources of communication. If these strategies are successful, they may promote appreciation of and support for the species within communities in northern Alabama, which may ultimately reduce the threat of poaching in the state.

While our research provides insight into the perceptions of Whooping Cranes in Alabama, it is important to note several caveats. First, our findings can only be generalized to specific stakeholder populations in Alabama and may not be representative of other regions where Whooping Cranes are found. Second, we measured self-reported behavioral intentions as a proxy of actual behavior. Behavioral intentions have been demonstrated to directly predict behavior, but this relationship is typically weaker for behaviors that are infrequent (Perry-Hill et al., 2014). In other words, our approach to investigating donation levels may not have adequately represented the stakeholder's actual interest in financially supporting cranes. Furthermore, there

may also be other factors that prevent an individual from behaving as intended, including personal budget constraints or lack of familiarity. As a result, respondents may have provided uninformed opinions instead of fully formulated beliefs or attitudes due to low familiarity of Whooping Cranes in the state.

Future research could use our framework to explore human dimensions relationships for other endangered species or different populations of Whooping Cranes. Investigating the viewpoints of residents where larger and more well-established populations of Whooping Cranes reside (i.e., Texas and Wisconsin) may provide insight on how to promote conservation of the species. Future studies could also measure additional behavioral intentions by incorporating items pertaining to acceptability of management actions and support for conservation policy related to Whooping Cranes. Furthermore, attitudes and behavioral intentions toward poaching of Whooping Cranes should also be examined to understand why these incidents may be occurring.

Appendix I: Detailed Survey Methods

SURVEY ADMINISTRATION

We administered three survey questionnaires to three different populations in Alabama: proximate residents of Wheeler National Wildlife Refuge; registered waterfowl hunters; and bird watchers. All survey materials and instruments were approved by the Auburn University Institutional Review Board.

To assess potential influences of a communication campaign to raise Whooping Crane awareness, an initial residential survey was mailed in October 2015 to a random sample of 1,500 residents from Madison, Morgan, and Limestone counties in Alabama. These counties were selected due to their proximity to Wheeler National Wildlife Refuge and the ongoing Whooping Crane outreach efforts. The survey was administered using a modified version of the Tailored Design Method (Dillman, 2009), which entails four contacts made with survey recipients over an eight-week timeframe. Our first contact with recipients consisted of a survey packet, which included the survey itself, a pre-stamped and addressed return envelope, an Alabama Whooping Crane bumper sticker, and information letter detailing the goals of the research and informing recipients of their participant rights. Two weeks following the initial mailing, all recipients were sent a reminder postcard. A final contact, which included another information letter and additional instructions on how to complete the survey online using Qualtrics survey software, was sent to all non-respondents two weeks after the reminder postcard. Following the completion of the third mailing, we conducted non-response bias check phone calls to a subset of 100 non-respondents.

We then administered online surveys to waterfowl hunters and birders in Alabama. Waterfowl hunters were contacted through a statewide e-mail list serve managed by the Alabama

Department of Conservation and Natural Resources (ADCNR), which contains individuals who identify as waterfowl hunters in the state. The first e-mail of the waterfowl hunter survey was sent in June 2016 to approximately 4,000 recipients, with one-week intervals between two courtesy reminders. A similar method was employed to distribute the survey to birders in Alabama. The initial e-mail of the birder survey was sent in November 2016 to multiple list serves containing members of the Alabama Ornithological Society, North Alabama Birding Society, ALbirds, and the Tennessee Valley Audubon Society. A rough estimate of 1,000 birders received the survey. Participants in both online surveys were instructed via e-mail to complete the survey using Qualtrics

SURVEY CONTENT AND DESIGN

The residential survey was designed to acquire a baseline understanding of respondent demographics, awareness, knowledge, values, norms, emotional dispositions, attitudes, and behavioral intentions regarding the conservation of Whooping Cranes and where they may have encountered information about the species. Several survey items were similar to questions used by other research projects to allow for data comparisons.

The first portion of the survey contained questions about the communities of our respondents and their relationships with wildlife and animals. Questions in this section also assessed respondent awareness and knowledge of Whooping Cranes and encompassed a large water bird identification exercise. The next section contained questions related to their general attitudes towards wildlife and hunting of wildlife, including their own participation in hunting. The following sections, and the largest portion of the survey, assessed specific attitudes toward the conservation and poaching of Whooping Cranes. Questions in these sections were aimed at

identifying who respondents believe support conservation efforts and which entities they believe are responsible for keeping Whooping Cranes safe from poaching incidents. Emotional dispositions were also gauged in this portion of the survey, as well as how respondents would respond to a known poaching incident. The final two sections of the survey gathered data on which news sources respondents primarily use, where they have received previous information on Whooping Cranes, benefits of Whooping Cranes to their community, and general demographic characteristics. The waterfowl hunter and birder surveys were identical and contained most of the original questions from the residential survey. An additional section was included to measure birding specialization.

REFERENCES

Dillman, D., & Smyth, J. (2009). Internet, mail, and mixed-mode surveys: the tailored design method. (3rd ed.). Hoboken, N.J.: Wiley & Sons.

2015 Alabama Whooping Crane Survey

Understanding your views and attitudes towards Whooping Cranes
and other Alabama wildlife

Your opinions are very important to us!
Current knowledge of Whooping Cranes is <u>not</u> necessary!

A Study By:
The School of Forestry and Wildlife Sciences
Auburn University

Greetings!!

Whooping Cranes are endangered migratory birds that nearly went extinct in the 1940s. Today, the population is recovering and has around 400 individuals in the wild, of which approximately **36 winter in Alabama**. Whooping Cranes continue to face a number of problems and we are interested in your opinions on their conservation and the threats to their survival.

Your opinions are very important to us! Current knowledge of Whooping Cranes is <u>not</u> necessary!

Auburn University has partnered with The International Crane Foundation (ICF) and Alabama Department of Conservation and Natural Resources to gather information about your attitudes, concerns, and preferences to help guide the conservation of Alabama's Whooping Cranes.

The best way we have of learning about Alabama residents' feelings toward wildlife management is by asking a diverse group of citizens to share their thoughts and opinions. You are one of a small number of randomly selected residents who we are asking to complete this survey. The questions should take approximately 10-15 minutes to complete.

By taking a few minutes to share your experiences, you will be helping us to improve the conservation of Whooping Cranes and other wildlife species. We look forward to receiving your responses.

Sincerely,

Dr. Wayde Morse
Associate Professor and Researcher
School of Forestry and Wildlife Sciences
Auburn University, Auburn, AL

Lizzie Condon
International Crane Foundation
Baraboo, WI

You, Your County, and Whooping Cranes

1. How many years have you lived in your county of residence?

years

2. In what type of community do you currently live?

- ○ Rural (Less than 1,000 people)
- ○ Small town (1,001 - 5,000 people)
- ○ Medium town (5,001 - 10,000 people)
- ○ Large town (10,001 - 25,000 people)
- ○ Small city (25,001 - 50,000 people)
- ○ Larger city (More than 50,000 people)

3. Do you enjoy wildlife viewing?

○ Yes ○ No

4. Do you have a birdfeeder at your home for small bird viewing?

○ Yes ○ No

5. Please indicate how strongly you agree or disagree with the following statements regarding <u>your relationship with animals</u>. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I value the sense of companionship I receive from animals	○	○	○	○	○
I feel a strong emotional bond with animals	○	○	○	○	○
I take great comfort in the relationship I have with animals	○	○	○	○	○
I care about animals as much as I do other people	○	○	○	○	○

6. Have you ever seen a Whooping Crane in Alabama?

○ Yes ○ No ○ Unsure

7. Have you ever been to the Wheeler National Wildlife Refuge near Decatur, AL?

○ Yes ○ No

8. Have you ever attended the Festival of the Cranes held in Decatur, AL?

○ Yes ○ No

9. Are you a member of any birdwatching or other conservation organizations? Please tell us which organizations.

○ Yes [ ] ○ No

10. Please indicate how strongly you agree or disagree with the following statements regarding <u>public awareness that Whooping Cranes spend the winter</u> in North Alabama. *(Please select one circle per line)*

	1	**2**	**3**	**4**	**5**
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
People in Alabama are generally aware cranes winter here	○	○	○	○	○
My friends are generally aware cranes winter here	○	○	○	○	○
I was aware cranes winter here (prior to this survey)	○	○	○	○	○

Please answer the following statements about Whooping Cranes based on <u>what you already know</u>.

11. The Whooping Crane is the tallest flying North American bird.

○ Agree ○ Disagree ○ Don't Know

12. Whooping Cranes usually mate for life.

○ Agree ○ Disagree ○ Don't Know

13. The Whooping Crane is the most endangered Crane in North America.

○ Agree ○ Disagree ○ Don't Know

14. The Whooping Crane population in Alabama is the largest wintering group outside of Texas.

○ Agree ○ Disagree ○ Don't Know

15. Whooping Cranes live an average of 24-30 years in the wild.

○ Agree ○ Disagree ○ Don't Know

16. Please indicate how strongly you agree or disagree with the following statements regarding <u>which factors influence Whooping Crane survival</u>. *(Please select one circle per line)*

	1	**2**	**3**	**4**	**5**
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Limited wetland habitat	○	○	○	○	○
Accidental shooting by people	○	○	○	○	○
Intentional shooting by people	○	○	○	○	○
Collisions with powerlines	○	○	○	○	○
Wildlife trafficking	○	○	○	○	○

Your Views and Experiences with Wildlife and the Outdoors

17. We are interested in understanding your general views about wildlife and the outdoors. Below are statements <u>representing very different views</u> that people may have <u>concerning wildlife</u>. Please indicate how strongly you agree or disagree with the following statements. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Humans should manage wild animal populations so that humans benefit	○	○	○	○	○
The needs of humans should take priority over fish and wildlife populations	○	○	○	○	○
It is acceptable for people to kill wildlife if they think it poses a threat *to their life*	○	○	○	○	○
It is acceptable for people to kill wildlife if they think it poses a threat *to their property*	○	○	○	○	○
It is acceptable to use fish and wildlife *in research* even if it may harm or kill some animals	○	○	○	○	○
Fish and wildlife are on earth primarily for people to use	○	○	○	○	○
We should strive for a world where humans and fish and wildlife can live side by side without fear	○	○	○	○	○
I view all living things as part of one big family	○	○	○	○	○
Animals should have rights similar to humans	○	○	○	○	○
Wildlife are like my family and I want to protect them	○	○	○	○	○
I care about wildlife as much as I do other important issues in my life	○	○	○	○	○
It would be more rewarding to me to help with wildlife management projects rather than human civic projects	○	○	○	○	○

18. Below are statements <u>representing very different views</u> that people may have <u>concerning hunting of wildlife</u>. Please indicate how strongly you agree or disagree with the following statements. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We should strive for a world where there's an abundance of fish and wildlife for hunting and fishing	○	○	○	○	○
It is *not* cruel to hunt wildlife	○	○	○	○	○
People who want to hunt should be provided the opportunity to do so	○	○	○	○	○

19. Have you hunted in the state of Alabama in the past 2 years?

○ Yes ○ No

If you answered '**No**,' please skip to question 21.

20. Please select the type of species that you hunt. *(Please select all that apply)*

○ White-tailed Deer ○ Turkey ○ Feral Hogs

○ Quail/Doves ○ Waterfowl ○ Alligators

○ Squirrels/Rabbits ○ Predators (coyotes, bobcats, foxes)

Birdwatching and You

21. Which best describes your skill in identifying bird species?

- ○ Novice (please skip to question #31)
- ○ Intermediate
- ○ Expert

22. Without the aid of a printed or electronic field guide, approximately <u>how many</u> birds can you identify <u>by sight</u>?

# of birds

23. Without aid, approximately <u>how many</u> birds can you identify <u>by sound</u>?

# of birds

24. Indicate your level of agreement with the following statements <u>about *birdwatching*</u>.
(Please select one circle per line)

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Birding is an important part of my identity	○	○	○	○	○
I would rather birdwatch than any other recreation	○	○	○	○	○
I plan my free time around birdwatching	○	○	○	○	○

25. How many years have you been birdwatching?

years

26. Approximately how <u>many total days</u> did you spend on birdwatching trips within the last 12 months?

days

27. How many <u>birdwatching festivals</u> did you attend in the last <u>12 months</u>?

# of birding festivals

28. Approximately how many birdwatching festivals have you attended in <u>your lifetime</u>?

# of birding festivals

29. How many birds are on your <u>Life List</u> of birds have you seen?

# of birds

○ I do not keep a Life List of birds I have seen.

30. Approximately how much <u>total money</u> do you currently have invested specifically in birdwatching <u>equipment</u>? (i.e. binoculars, scopes, tri-pod, field guides, cameras, specialty clothes, pack, phone apps, etc.)

$

Your Beliefs and Attitudes about Whooping Cranes

31. Please indicate how strongly you agree or disagree with the following <u>statements about Whooping Cranes</u>. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I would enjoy seeing Whooping Cranes	○	○	○	○	○
I enjoy knowing that Whooping Cranes exist in Alabama, even if I never see one	○	○	○	○	○
Whooping Cranes are an important part of our ecosystem	○	○	○	○	○
Whooping Cranes should be conserved for future generations	○	○	○	○	○
Conservation areas should be managed to ensure the survival of Whooping Cranes	○	○	○	○	○

32. Please indicate how strongly you agree or disagree with the following statements regarding who <u>supports Whooping Crane conservation</u> in North Alabama. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
People in Alabama	○	○	○	○	○
Licensed **hunters**	○	○	○	○	○
My **friends**	○	○	○	○	○
Myself	○	○	○	○	○

33. <u>I know how to support</u> the conservation of Whooping Cranes.

○ Yes ○ No

34. If you were <u>to see (or have seen) a Whooping Crane</u>, please indicate how strongly you would agree or disagree with the following statements. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I would feel excited	○	○	○	○	○
I would feel proud	○	○	○	○	○
I would feel a sense of awe	○	○	○	○	○
I would feel indifferent	○	○	○	○	○

35. Please indicate how strongly you agree or disagree with the following statements regarding <u>who is responsible for the conservation of Whooping Cranes</u>. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The Federal Government	○	○	○	○	○
The Alabama State Government	○	○	○	○	○
Private donors	○	○	○	○	○
Licensed hunters	○	○	○	○	○
Individual citizens like me	○	○	○	○	○

Poaching of Whooping Cranes

Hunting, through the purchase of a hunting license, provides funds and personnel for conservation, management, and the protection of wildlife in Alabama.
Poaching is the illegal harvest of wildlife.

36. Please indicate how strongly you agree or disagree with the following statements about poaching of wildlife in general and poaching of Whooping Cranes. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Poaching of Wildlife in General					
Wildlife poaching is stealing	○	○	○	○	○
Wildlife poaching is immoral	○	○	○	○	○
Wildlife poachers should be punished under the law	○	○	○	○	○
People who report poaching of wildlife should be rewarded	○	○	○	○	○
Poaching of Whooping Cranes					
Whooping Crane poaching is immoral	○	○	○	○	○
Whooping Crane poachers should be punished under the law	○	○	○	○	○
Poaching can have a significant impact on the survival of the Alabama Whooping Crane population	○	○	○	○	○
Poaching is not a problem if only a few Whooping Cranes are shot each year	○	○	○	○	○
People who report poaching of Whooping Cranes should be rewarded	○	○	○	○	○
I am not concerned about whether or not Whooping Cranes are poached	○	○	○	○	○

37. Please indicate how strongly you agree or disagree with the following statements regarding <u>who is against poaching of Whooping Cranes</u>. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
People in Alabama	○	○	○	○	○
My **friends**	○	○	○	○	○
Licensed **hunters**	○	○	○	○	○
Myself	○	○	○	○	○

38. Please indicate how strongly you agree or disagree with the following statements regarding <u>who would support legal penalties for poaching of Whooping Cranes</u>. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
People in Alabama	○	○	○	○	○
My **friends**	○	○	○	○	○
Licensed **hunters**	○	○	○	○	○
Myself	○	○	○	○	○

39. What would you consider a sufficient penalty for poaching of a Whooping Crane in Alabama?

○ Fines: How much? $_____

○ Jail: How long? _____

○ Other: _____

40. If you were to <u>hear that a Whooping Crane was shot</u>, please indicate how strongly you would agree or disagree with the following statements. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I would feel angry	○	○	○	○	○
I would feel sad	○	○	○	○	○
I would feel distressed	○	○	○	○	○

41. Please indicate how strongly you agree or disagree with the following statements regarding <u>who is responsible for stopping poaching of Whooping Cranes</u>. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The Federal Government	○	○	○	○	○
The Alabama State Government	○	○	○	○	○
Private donors	○	○	○	○	○
Licensed hunters	○	○	○	○	○
Individual citizens like me	○	○	○	○	○
Non-profit organizations	○	○	○	○	○

42. There are reasons an individual might not be inclined to report a poacher. Please indicate how strongly you agree or disagree with the following statements regarding <u>what might *negatively* influence *your* decision to report a Whooping Crane poaching incident</u>. *(Please select one circle per line)*

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
My fear of reprisal	○	○	○	○	○
My concern about remaining anonymous	○	○	○	○	○
It is not my responsibility	○	○	○	○	○
What my friends might think if I reported it	○	○	○	○	○
Not sure who to call	○	○	○	○	○
Not certain if it is a Whooping Crane	○	○	○	○	○
Not familiar with current laws	○	○	○	○	○

43. Suppose you saw, heard, or learned about someone else poaching a Whooping Crane. Please indicate your <u>hypothetical response</u> regarding who you might report it to. *You could either report it anonymously or by giving your name – whichever would make you more likely to report the incident. (Please select one circle per line)*

	1	2	3	4	5
	Very Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Very Likely
Report it to the US Fish and Wildlife Service	○	○	○	○	○
Report it to the Wheeler National Wildlife Refuge	○	○	○	○	○
Report it to the Alabama Wildlife and Freshwater Fisheries Division	○	○	○	○	○
Report it to Operation Game Watch	○	○	○	○	○
Report it to the local police or country sheriff	○	○	○	○	○
Tell a friend or family member	○	○	○	○	○

44. Overall, how likely would you be to report a Whooping Crane poacher to <u>any agency/official</u> mentioned above? _____% *(0% is least likely - 100% is most likely)*

45. Have you heard of Operation Game Watch, a reward program designed to stop fish and game law violators in Alabama?

○ Yes ○ No

Information on Whooping Cranes

46. Please indicate the source of any outreach messaging about Whooping Cranes you have seen or heard. *(Please select all that apply)*

- ○ Radio public service announcements
- ○ Roadside billboards
- ○ TV public service announcements
- ○ Tables at community events
- ○ Classroom visit by International Crane Foundation staff
- ○ Presentation by International Crane Foundation staff
- ○ "I give a whoop!" pledge
- ○ Social media (circle all that apply: Facebook, Twitter, Instagram)
- ○ Website(s): _____
- ○ Festival of the Cranes
- ○ Whooping Crane Red Ale
- ○ Table tents at Baumhower's restaurants
- ○ Wheeler National Wildlife Refuge
- ○ Magazine articles
- ○ Word of mouth

47. What is the best way to communicate information <u>to you</u> about Whooping Cranes? Please tell us which of the above or other sources is best for you.

48. Please indicate any specific outreach messages you have seen or heard (on the left). Then, please <u>rate</u> the messages according to how much you like them (even if you have not heard them before).

		1 ◄	2	3	4	5 ►
I have seen or heard		Do not like		Neutral		Like a lot
○	"I give a whoop (*about the conservation of Whooping Cranes)*!"	○	○	○	○	○
○	"Give Whooping Cranes a sweet home Alabama welcome!"	○	○	○	○	○
○	"We are lucky that Whooping Cranes have chosen Alabama as their winter home."	○	○	○	○	○
○	"There are only 400 Whooping Cranes left in the wild, so we must ensure their survival."	○	○	○	○	○

49. Please indicate how important you feel the following <u>benefits of having a Whooping Crane population</u> are to North Alabama. *(Please select one circle per line)*

	1	2	3	4	5
	Not Important At All	Unimportant	Neither Important nor Unimportant	Important	Very Important
Sense of pride in the conservation of Whooping Cranes	○	○	○	○	○
Benefits to the local economy from visitors to Wheeler National Wildlife Refuge	○	○	○	○	○
Benefits to the local economy from visitors to the **Festival of the Cranes** held in January	○	○	○	○	○
Alabamians have a chance to see something most people in America do not	○	○	○	○	○
Our children will get to experience something we did not as kids	○	○	○	○	○

50. If a fund was established for Whooping Crane conservation in your area, would you be willing to donate on a <u>yearly basis</u>?

○ Yes How much? $_____

○ No

Demographics

51. In what year were you born? 19__

52. What is your gender? ○ Female ○ Male

53. Including yourself, how many people live in your house? people

54. What is your ethnicity?

- ○ American Indian
- ○ Asian
- ○ Black/African American
- ○ White/Caucasian
- ○ Latino
- ○ Other

55. What is your highest degree or level of school completed?

- ○ Did not complete high school
- ○ High School Diploma or GED
- ○ Some college, but no degree
- ○ Associate's degree
- ○ Bachelor's degree
- ○ Graduate or professional degree
- ○ Other

56. What is your marital status?

- ○ Single
- ○ Married
- ○ Divorced
- ○ Widowed
- ○ Other

57. Please select the circle that corresponds to your household income for 2015. This information is used to understand opinions across income groups.

- ○ Less than $14,999
- ○ $15,000 - $19,999
- ○ $20,000 - $24,999
- ○ $25,000 - $34,999
- ○ $35,000 - $49,999
- ○ $50,000 - $74,999
- ○ $75,000 - $99,999
- ○ $100,000 - $149,999
- ○ $150,000 or more

Please fold this survey in half and return it to the School of Forestry and Wildlife Sciences at

THANK YOU FOR PARTICIPATING IN THIS STUDY!

Your answers to this survey will provide us with useful information