Indicators and Thresholds for Black Bear Viewing Proximity Preferences At Alligator River National Wildlife Refuge

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INDICATORS AND THRESHOLDS FOR BLACK BEAR VIEWING PROXIMITY
PREFERENCES AT ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

by

Meghan M. Roberts
B.S. May 2017, Old Dominion University

A Thesis Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE

PARK, RECREATION AND TOURISM STUDIES

OLD DOMINION UNIVERSITY
December 2019

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ABSTRACT

INDICATORS AND THRESHOLDS FOR BLACK BEAR VIEWING PROXIMITY PREFERENCES AT ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

Meghan M. Roberts
Old Dominion University, 2019
Director: Chris Zajchowski

Wildlife viewing has always been popular with outdoor enthusiasts, but managing proximity between wildlife viewers and wildlife continues to challenge managers. Few studies have explored the factors related to proximity between people and wildlife in protected areas. This research is designed to determine the public’s self-reported proximity norms for black bear viewing. Visitors to Alligator River National Wildlife Refuge (Alligator River NWR) in eastern North Carolina are currently able to participate in wildlife viewing in over 150,000-acres throughout the refuge, allowing them to observe a large, spatially-concentrated population of black bears; however, the distance between visitors and black bears during the interactions is often unclear and uncertain. Two indicators and thresholds questionnaires with varying photo panel orders were distributed to a total of 302 visitors at Alligator River National Wildlife Refuge in North Carolina to examine the acceptability of various distances and management actions for black bear viewing. Results show average minimum acceptability for black bear viewing is 38 yards for a single bear and 38 - 44 yards for a black bear sow with two cubs; photo panel viewing order influenced participants’ evaluations, illustrating the potential for priming to significantly affect proximity evaluations. Results also indicate the importance of further exploring the factors that impact proximity preferences, such as the number and age of bears. Additionally, observational research of visitors’ behaviors within human-wildlife interactions may aid managers in understanding visitors’ norms.
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CHAPTER I: INTRODUCTION

In the United States (U.S.), parks and protected areas provide the public with numerous opportunities to connect with nature. One primary experience desired by visitors to these places is wildlife encounters (Manfredo, 2008). For some, seeing wildlife in their natural habitats can be described as a life-altering event. Wildlife viewing has been shown to affect people’s opinions (Gore, Knuth, Curtis, & Shanahan, 2007), encourage conservation efforts (Herrero, Smith, DeBruyn, Gunther, & Matt, 2005), increase the level of satisfaction (Siemer & Decker, 2003), and grow an individual’s relationship with nature (Skibins, Powell, & Hallo, 2013).

Although wildlife viewing is important for visitors to experience, all human-wildlife interactions that occur may not be ideal. Interactions between humans and wildlife can potentially threaten wildlife populations (Errick, 2017). These interactions will only increase as participation in outdoor recreation, park visitation, and wildlife tourism increases (Liu & Shar, 2018; Lakes, 2014; Matheny, 2013; Errick, 2017). The U. S. National Parks Service (NPS) received 307 million visitors across all National Parks in 2015 and 330 million recreational visits in 2016, leading to an almost 8% increase in one year (Errick, 2017). In 2005, there were 34.8 million visitors to National Wildlife Refuges (NWRs), and, in 2014, visitation increased to approximately 47 million visitors, resulting in over 10 million additional visitors (Cooperative Alliance for Refuge Enhancement, 2014; Sexton, Dietsch, Don Carlos, Miller, Koontz, & Solomon, 2012). The National Wildlife Refuge System (NWRS) covers roughly 150 million acres (U.S. Fish and Wildlife Service, 2016), however, increasing visitor presence could have a negative effect on the wildlife these refuges are designed to protect.

These negative interactions with humans may come in many forms and have different effects on different species. Pre-arranged observations of wildlife are one of the more popular
methods of wildlife-related activities (Penteriania, del Mar Delgado, Pinchera, Naves, Fernández-Gil, Kojola, & Sahlen, 2016). In some locations, such as the protected areas in Alaska, wildlife tourists are ready to pay additional money to see brown bears (Penteriania et al., 2016). For both pre-arranged wildlife tours and individual users, this need to see a wild bear in its habitat has been known to cause ‘bear jams,’ defined as extended periods of time when bears are within view of roads, causing visitors to stop their vehicles in hopes of viewing the bear (Haroldson & Gunther, 2013). Additionally, regular human activity around wildlife can lead to the wildlife becoming human habituated, when an animal is familiar or used to people (Herrero et al., 2005). Overt reaction distance (ORD) is one indicator for how habituated wildlife are to people or to other wildlife and is the distance the wildlife is to a person (or other wildlife) when wildlife reacts either negatively or internally (Herrero et al., 2005; Smith, Herrero, & DeBruyn, 2005). A negative reaction would be for the animal to run away or show defensive behaviors; for example, for black bears this would consist of continuing eye contact, ears faced back, bulging the bottom lip, breathing heavily, clapping their jaws together, stomping the ground, and running toward the threat (Belant, Simek, & West, 2011; Smith, Herrero, & Debruyn, 2005). An internal reaction would be for the wild animal to have increased heart rate without outwardly displaying these negative reactions (Smith, Herrero, & Debruyn, 2005).

Wildlife viewing is often focused on large predators, such as bears, whose negative reactions may be hard to interpret, leading to potential risk for both the bear and wildlife viewers (Ordiz, Sæbø, Sahle’, Pedersen, Kindberg, & Swenson, 2013). This is particularly problematic in cases where humans put themselves in unnecessary risky situations (Penteriani et al., 2016). In some instances, those risky situations consist of people advancing towards wildlife...
within a proximity wildlife manager considered to be ‘too close,’ which, in turn, disrupts wildlife, threatening the person’s safety (National Park Service, 2017). This emphasizes the continued importance of determining proper ways for humans and wildlife to interact and various species-specific, population-specific, and unit level distances during these interactions (Ordiz et al., 2013; Verbos, Zajchowski, Brownlee, & Skibins, 2018).

Visitors to natural areas will often use the social setting to determine the acceptable behaviors for the area, using other visitors’ actions as a baseline for socially normative behaviors (Stewart & Cole, 2001; Anderson, Manning, Valliere, & Hallo, 2010; Hallo & Manning, 2010). While researchers have begun to explore visitors’ proximity preferences using a normative indicators and thresholds perspective (Miller & Freimund, 2018), there continues to be unresolved questions regarding the different proximity expectations in different natural areas (Kuentzel, Laven, Manning, & Valliere, 2008). Miller and Freimund (2018) studied visitors’ proximity norms for bison in Yellowstone National Park (Yellowstone), and discovered that the majority of visitors to Yellowstone think it is unacceptable to be near a bison at 36 yards or closer, regardless of the size of the group. They also conveyed that a small number of deviant visitors are likely accountable for the majority of the conflicts at Yellowstone between human and bison (Miller & Freimund, 2018). Despite this encouraging study, very few additional studies are available to assist managers and researchers in determining the role of proximity in the visitor’s experience (Verbos et al., 2018), and more studies are needed for this topic.

This study will expand the methods used by Miller and Freimund (2018) through studying reported proximity versus actual proximity between humans and the most disputed and perplexing, possibly-threatening, yet most sought-out, wild, omnivorous animal (Johansson Karlsson, Pedersen, & Flykt, 2012; Liu & Sharp, 2018; Ordiz et al., 2013) at Alligator River
National Wildlife Refuge (Alligator River): black bears. Alligator River was chosen for this study because it contains one of the most condensed population of black bears on the East Coast (U.S. Fish and Wildlife Service, 2014). This condensed population, coupled with the national trend of rising numbers of visitors to protected areas, will result in increased human-wildlife interactions. This accentuates the relevance of determining the normative proximity preferences for wildlife viewers seeking large predators, such as black bears. Although it is important to offer quality wildlife-viewing opportunities to the public for overall satisfaction (Skibins et al., 2012), indirect proximity management efforts may be disregarded by some visitors, resulting in harm to visitors or wildlife and, in the worst cases, human or wildlife casualties (Bernstein, 2015; NPS, 2016). Therefore, it continues to be important to investigate self-reported proximity norms and compare them to actual visitor-wildlife distances, both to manage specific populations at specific sites (e.g., Alligator River) and to increase managers’ knowledge of visitors’ congruence between their preferences and their behaviors.

We hope to build on the knowledge of proximity in wildlife viewing and understand perceived acceptable proximity between visitors and black bears at Alligator River. Due to a decrease in federal funding for protected areas (Cooperative Alliance for Refuge Enhancement, 2014), there are increasingly-limited resources to assist managers and researchers in identifying and determining visitors’ norms for proximity to wildlife (Miller & Freimund, 2018; Hallo & Manning, 2010; Hallo, Manning, & Stokowski, 2009). With this in mind, I hope to assist by offering constructive insights for managers overseeing protected areas with high human-black bear interactions.
CHAPTER II: LITERATURE REVIEW

NWRs offer amazing opportunities for wildlife viewing with their vast lands dedicated to the preservation of the environment and its natural inhabitants (Butcher, 2008; Threatened & Endangered Species, 2017). How a person views the wildlife species on the Refuges can result in different types of interactions, such as closer or farther distances between humans and wildlife (Kellert, Black, Rush, & Bath, 1996). A visitor’s behavior in natural areas, such as proximity decisions, can be understood through normative standards which are commonly-acceptable or unacceptable behaviors inside a specific social setting (Krymkowski, Manning, & Valliere, 2009; Kuentzel et al., 2008; Manning, 2007). Norms are frequently used in environmental social science to comprehend perceptions about specific experiential and resource conditions, such as proximity (Miller & Freimund, 2018; Vaske & Whittaker, 2004; Manning, 2011; Anderson et al., 2010; Hallo & Manning, 2010; Donnelly, Vaske, Whittaker, & Shelby, 2000; Vaske & Whittaker, 2004).

In the following sections, I will discuss visitors’ interest in wildlife viewing, such as popular species to view, the outcomes of viewing wildlife, and how those outcomes are acquired. I will then discuss the impacts on wildlife and the impacts on visitors while viewing the wildlife. After that, I will discuss the current knowledge regarding proximity between visitors and wildlife while visitors are engaged in wildlife viewing. Finally, the social norms of proximity will be discussed and explained.

Human Interest in Wildlife Viewing

Visitors to natural areas are greatly motivated by the desire to interact with wildlife (Lemelin & Smale, 2005; Duffus & Dearden, 1990). Visitor interest in viewing and interacting with wildlife is a result of a variety of factors, such as attitudes, values, and motivations (Duffus
Visitors to protected areas are often interested in viewing diverse species, including large or rare wildlife, educational opportunities that provide information about the wildlife viewed, as well as the experiential immersion in specific environments (Moscardo, & Saltzer, 2004). The public participating in wildlife viewing is often keen on observing large mammals in the wild, a preference which has been shown across a variety of protected areas (Ballantyne, Packer, & Sutherland, 2011; Lindsey, Alexander, Mills, Romañach, & Woodroffe, 2007; Seneviratna, & Perera, 2013). For example, in one study focused on wildlife viewers in Great Smoky Mountains National Park, participants were satisfied with the viewing experience when they saw diverse populations of wildlife, such as black bears and white-tailed deer, took photos of wildlife, and if their expected numbers of wildlife matched the actual numbers of wildlife viewed (Hammitt, Dulin, & Wells, 1993).

Certain species garner more interest than others. Visitors highly value the preservation of black bear populations in protected areas (Liu, Bradley, & Sharp, 2018). Positive psychological and emotional outcomes when viewing wildlife include a visitor’s sense of fulfillment during bear-focused recreation (Siemer & Decker, 2003) and an increase in visitor’s connection to nature (Skibins, Powell, & Hallo, 2013). Positive behaviors toward black bears are often attributed to visitors’ previous knowledge and education acquired of the species’ various roles in the ecosystem (Glikman, Vaske, Bath, Ciucci, & Boitani., 2012; Lowery, Morse, & Steury, 2012), which can be acquired by programs offered by the parks and protected areas.

Experiential opportunities offered by parks and protected areas, such as educational programs or wildlife tours, have been shown to affect people in a variety of ways (Ballantyne, et al., 2011). A wealth of studies show that wildlife tourism, such as bird watching, whale watching, or educational wildlife viewing programs and tours offered by protected areas, can
influence visitors positively through their education about natural areas, encouraging conservational behavior, and shape visitors’ attitudes and decisions while visiting the protected areas (Ballantyne, Packer, & Sutherland, 2011; Ballantyne & Packer, 2009; Ballantyne, Packer, Hughes, & Dierking, 2007; Lee & Moscardo, 2005). That said, the stability of these program effects has been debated. Marley and colleagues (2017) suggest wildlife management strategies coupled with educational programs can reduce human-wildlife conflicts in urban areas, while Gore and colleges (2006) state educational programming has only a temporary influence on visitor’s behavior. Stern (2000) also suggests conservation attitudes do not necessarily align with attitudes toward environmental protection. Thus, there is still considerable debate as to whether or not they contribute to visitor’s attitudes and behaviors towards wildlife (Glikman et al., 2012; Lowery et al. 2012), such as visitors’ actions with proximity to black bears.

**Negative Impacts on Wildlife**

Visitors interact with wildlife in many different contexts, which can result in a variety of positive and negative impacts on the wildlife (Siemer & Decker, 2003). Conflicts between humans and bears often stem from humans leaving food in accessible areas, such as non-bear-proof trash cans, which can then lead to food habituated bears; food habituation can result in negative interactions with bears, such as damaging property, harming people, and resulting in the (sometimes lethal) removal of bears (Nevin & Gilbert 2005; Siemer & Decker, 2003). Whether food or human-habituated, habituated wildlife are often the ones seen by the public and are extremely popular for wildlife viewers because they remain within view of humans (Herrero et al., 2005). The closer proximity habituated wild mammals are to the public, the more likely visitors may be to engage in unmindful or careless actions, such as coaxing wildlife with food,
which further results in food-habituated animals, or trying to approach the animal, which results in the animal showing defensive behavior (Herrero et al., 2005).

Leaving food within reach or using food to lure grizzly bears at Yellowstone was the root of many human-bear conflicts in the 1960s (Haroldson & Gunther, 2013). When garbage was not properly disposed and use to lure in bears, humans were often injured and the damage to property was the highest (Haroldson & Gunther, 2013). Research now indicates that those safety concerns during the 1960s lasted until 1980s, when the use of bear safety products increased and bears subsequently were no longer able to access human food (Herrero et al., 2005). In most situations it took people about ten to twenty years to alter their behavior and follow bear policies, this change was mainly motivated because of major misfortune caused by bears (Peine, 2001).

Negative bear encounters have dwindled in North American except in areas where garbage and food are still regularly accessible to bears (Herrero, 2002). Human-bear conflicts now mainly involve property damage and livestock damage (Siemer & Decker, 2003). Although human-bear conflicts have dwindled since the 1960, surveys have shown twenty states have documented increased human-bear conflicts (Hristienko & McDonald, 2007), which could possibly indicate a resurgence in human-bear conflicts.

In addition to food-habituation, humans can impact wildlife through their presence and actions in an area (Ciuti, Muhly, Paton, McDevitt, Musiani, & Boyce, 2012). Wild animals’ behaviors have altered due to human activity, such as wolves choosing breeding dens based on where highly populated human areas are located (Theuerkauf, Rouys & Jedrzejewski 2003) and bears choosing to relax in thicker vegetation when people are close by hiking (Ordiz Støen, Delibes, & Swenson, 2011). Humans actions, such as the different types of outdoor recreation performed in an area or wildlife tours, have been known to impact wildlife (Ciuti et al., 2012),
such as wildlife driving tours. Recreation with minimal anthropogenic noise has been shown to have less impact on wildlife, but recreation that produces more anthropogenic noise, such as motorized vehicle use, has more of an impact on wildlife (Ciuti et al., 2012). Managers of wildlife areas use a variety of approaches to lessen possible human-wildlife interactions causing disruptions to wildlife, such as closing off the area to the public or limiting human access during peak times for the wildlife to allow scavenging, breeding, or raising young (Coleman, Schwartz, Gunther, & Creel, 2013). For example, scheduled bear management areas, where managers do not allow visitors in certain areas based on sensitive times for grizzly bears, are common in Yellowstone and many protected area contexts (Coleman et al, 2013). Unfortunately, even with all of the precautions and limits set by management, the wildlife viewing offered may not be enough for some people. Moscardo and Saltzer (2004) revealed people are able to get more out of their visit to natural areas if they have the chance to physically view and approach larger wildlife, so this determination for proximity could lead to problematic behaviors.

**Negative Impacts on People**

Wildlife viewing can have a tremendous and lasting positive effect on the wildlife viewers (Gore, Knuth, Curtis, & Shanahan, 2007). Most visitors seeking to view wildlife, such as black bears, are excited for the opportunity, however, research studies have recorded negative impacts from past personnel experiences with black bears, such as damages towards property, negative encounters, or heightened perceived risk (Kellert, 1994; Siemer & Decker, 2003; Gore, Knuth, Curtis, & Shanahan, 2007). Previous research has shown the level of understanding and the information acquired about a species can negatively alter a person’s character, opinions, and preservation mindfulness, resulting in different types of encounters (Gore, Knuth, Curtis, & Shanahan, 2007). For example, visitors who interact with wildlife may have negative physical,
mental, and emotional outcomes (Kubo & Shoji, 2013). Negative physical outcomes would include damage to property (Siemer & Decker, 2003) and injuries (Nevin & Gilbert 2005). Psychological impacts are possibly the most extensive category, which highlights the many outcomes, including negative outcomes, that occur during interactions between visitors and wildlife (Siemer & Decker, 2003; Skibins, Powell, & Hallo, 2013). Negative psychological outcomes include perceived risk of injury (Siemer & Decker, 2003).

Psychological negative impacts can extend to visitors’ level of perceived risk, even when the actual risk is low (Siemer & Decker, 2013). Siemer and Decker (2013) share that even though human injuries associated with bears are incredibly low, visitor’s perceived risk for the safety of visitors should be included in managing wildlife viewing opportunities. Agee and Miller (2009) determined the bigger the perceived threat was to the visitors, the greater the visitors backed the manager’s harsher techniques of relocating and euthanizing bears. Wildlife tourists’ actual risk can increase while viewing large wildlife depending on the proximity between the human and bear (Coleman et al, 2013), as well as due to circumstances involved in the interaction, such as if the animal is protective of their young (Coleman et al, 2013).

**Proximity**

The obligation for protected area staff to detect, observe, and manage wildlife viewers has only increased as the public demand for wildlife viewing has amplified (Cline, Sexton, and Stewart, 2007). The increasing pressure by the public to view and interact with wild animals has created a large variety of wildlife-related activities for the public (Semeniuk, Haider, Cooper, & Rothley, 2010). Klein (1993) illustrated photographing wildlife was found to be the most disturbing activity in Darling National Wildlife Refuge, due to the high possibility of the photographers exiting their vehicles so they are able to get to a closer to the wildlife for...
photographs. Similarly, Burger (1995) documented that wildlife photographers and birdwatchers often get close to birds that are nesting, brooding, or scavenging, within close proximity, causing the animals to move to different locales or desert their nests altogether. Holmes, Giese, and Kriwoken’s (2005) study determined royal penguins will react to visitors most slight actions, such as approaching them within close proximity or kneeling down, which stresses the importance of visitors keeping their distance and avoiding abrupt movements. Regardless of wildlife’s reactions, studies have shown visitors to protected areas still want to get close to wildlife (National Park Service, 2017), sometimes causing conflict (Taylor & Knight, 2003).

Human-wildlife conflicts are mainly caused by visitors approaching wildlife, often at a distance wildlife managers consider to be too close (National Park Service, 2017). As Taylor & Knight (2003) illustrate in their study of wildlife responses to recreation and visitor’s perceptions, roughly fifty percent of visitors believed they were not having any impacts on the surrounding wildlife, but the visitors were getting closer to wildlife, approaching the wildlife within a closer distance than the wildlife tolerated in the experimental trials (Taylor & Knight, 2003). Visitors approaching wildlife within close distances have the potential to be considered as a threat or a predator, which could provoke a fight or flight reaction from the wildlife, possibly creating conflicts, similar to how the wild animal would react to a natural threat (Frid & Dill, 2002). More encouragingly, Miller & Feimund (2018) discovered that a majority of visitors at Yellowstone stay as far away from bison as 36 yards, while the Park’s recommended distance is a minimum of 25 yards away from bison. The authors determined that the bison-human conflicts are most likely caused by a minor population of rogue and daring visitors (Miller & Feimund, 2017). These human-wildlife interactions could disturb the wildlife resulting in impacts to the wildlife and viewers alike.
Visitors disturbing wildlife can have lasting impacts on wildlife behavior and possibly the wild animal’s population, along with adding pressure to carnivores’ roles in the environment (Ritchie & Johnson 2009). Moen and colleagues (2012) conducted a study on bear-human encounters in Scandinavia and their findings determined the majority of the bears fled once humans were encountered, and none of the bears showed signs of aggression towards humans. Ordiz and colleagues (2013) approached brown bears discovering that the bears avoided humans altogether and the bears traveled 26% more after the encounter than they did in the previous weeks. The behavior of Scandinavian brown bears has been known to be disturbed particularly when visitors were detected by the bear within close proximity (Ordiz et al. 2011; Moen et al. 2012). These interactions and disturbances to this particular set of wildlife may not extend to other wildlife-human interactions and distances. Visitors’ proximity to wildlife fluctuated due to the type of animal, wildlife behavior, and management actions (Zinn, Manfredo, Vaske, & Wittmann, 1998). How a person views the wildlife species can result in the different types of interactions and experiences (Kellert, et al., 1996).

For wildlife viewers, the distance a visitor is to a wild animal has been known to be an essential contributor to the person’s quality of experience in the natural areas (Verbos et al., 2018). In their study of encounters with giant pandas in Chengdu, China, Cong and colleagues (2014) documented the closer a visitor is to the giant pandas, the higher they report their quality of the experience. This is supported by additional work with Denali National Park and Preserve visitors, where one of the experiential factors, proximity, is a factor in the satisfaction of visitors (Anderson, et al., 2010; Hallo & Manning, 2010; Verbos et al., 2018). In Hammitt and colleague’s (1993) study of wildlife viewing quality in the Great Smoky Mountains National Park, visitors reported the longer they are within close proximity of the wildlife, the better the
experience. The inevitable consequence of these experiences is an increase in undesirable human-wildlife interactions (Takahata, Nielsen, Takii, & Izumiyama, 2014). These interactions, which in many cases involve a large wild animal, can be fatal for both the wildlife and humans (Takahata, Nielsen, Takii, & Izumiyama, 2014). These interactions and wildlife viewing experiences are also affected by the different proximity standards for different areas.

Protected areas have different proximity standards, most often based on the protected area’s location and species density. For example, Verbos and colleagues (2018) studied wildlife viewing proximity for Denali National Park & Preserve in Alaska and determined visitors to coastal protected areas were able to approach grizzly bears within a closer distance than the protected areas farther inland with a lower concentration of grizzly bears. This resulted in dramatically different wildlife viewing experiences. It is difficult to define the proximity a person can get to a bear safely, but the National Park Service (2017) suggests to not approach the bear beyond its physical reaction limits. It is advised to stay farther away from the animals beyond the distance it will physically react to the public because the animal may have internal reactions that no one can see but is still costing the animal energy (Herrero et al., 2005). Bears becoming tolerant of visitors, such as becoming habituated to humans, has encouraged the expansion of procedures for viewing bears in the wild (Herrero et al., 2005), which has led to research focused on another aspect of human-wildlife interactions, social norms.

Social Norms

Although originally focused on crowding in protected areas, normative standards have been used to address an assortment of problems that influence the quality of peoples’ experiences in the outdoors (Anderson et al., 2010). Normative standards illuminate the social phenomenon of labeling some acts as acceptable and others as immoral, unwelcome, or unacceptable (Scultz,
Social norms were established in the field of social psychology (Jackson, 1966), and have been used extensively in outdoor recreation to study visitors’ views and understandings of crowding, actions of other visitors, the desired state of natural resource, and expectations of managers (Vaske & Whittaker, 2004). The normative standards method has been used in a variety of outdoor recreation research studies for over 30 years (Kuentzel, et al., 2008).

There have been a wealth of theoretical frameworks that have used social norms in protected areas. Bernath and Roschewitz’s (2008) used the Theory of Planned Behavior, which involves subjective social norms, to determine visitor’s inclination to pay to use protected areas at the Zurich city forests. Han’s (2016) study used the Norm Activation Model to study visitor’s judgment on environmentally accountable conference attendance. Bentz and colleagues (2016) used the Limits of Acceptable Change with the Wildlife Tourism Model for sustaining tourism with marine wildlife along with using indicators and thresholds such as visitor’s perception. In this research study, I will also use the indicators and thresholds approach to social norms (see Manning, 2011).

The indicators and thresholds approach to social norms represents visitors’ perceptions of desired experiential and resource conditions (Miller & Freimund, 2018). Indicators and thresholds have been used to determine the value of elements within visitors’ experiences while attending the various study areas in past research studies. These studies include Heywood’s (2011) study on standard approaches and social norms in parks and recreation. This study uses indicators such as visitor’s quality of experience through the visitor’s level of acceptability of the amount of visitors in the area (Heywood, 2011). Anderson and colleague’s (2010) study on normative standards for wildlife viewing in Lake Umbagog National Wildlife Refuge in New Hampshire and Denali National Park and Preserve in Alaska also used an indicators and
thresholds approach. The authors’ research focused on major influences on the visitor experience for wildlife viewing, such as wait time to see wildlife, number of other visitors, and noise pollution (Anderson, et al., 2010). They also provided clear goals for managers to assist in creating the kind of desired wildlife viewing opportunities. Miller and Freimund (2018) used social norms method to study acceptable distance-related human–wildlife interactions, such as how acceptable different distances are to wildlife. Miller and Freimund (2018) also used visual based methods in their research study of proximity.

Visual-based replications of encounters have become more popular with outdoor recreation studies (Krymkowski, Manning, & Valliere, 2009). Visual-based approaches use photographs to show numbers of visitors in a given place during encounters and have commonly proved more valid approaches than using written presentations of information (Kuentzel et al., 2008). Researchers propose that visual-based approaches permit the collecting of delicate factors of visitor experiences, such as crowding and wildlife viewing (Manning & Freimund, 2004; Miller & Freimund, 2018). A stronger norm intensity, agreement, and managing reliability were determined when participants taking the survey were able to see the number of individuals in the photograph during the interaction with wildlife (Kuentzel, et al., 2008). Miller and Freimund (2018) used visual-based norms by administering surveys to participants that contained pictures of different groupings of visitors within different distances of bison. This visual based method will be used in this study at Alligator River NWR along with indicators and thresholds for bear viewing, such as proximity to the black bears being viewed. Subjective norms are often intertwined in these types of studies because visitors’ responses on surveys can be impacted by what others believe is acceptable. That said, when this type of self-report method is introduced, participants may not be completely truthful with what they believe is acceptable behavior in the
surveys (Bowles, 2008; Haidt, 2007). In other words, participants could alter their self-reported behaviors. This is because of the perceived implications of completing a survey, such as other participants judging them (Agnew, et al., 2009; Bowles, 2008; Haidt, 2007).

**Self-Reports**

Gathering dependable evaluations of unlawful behaviors can be difficult because participants in a study may be reluctant to answer honestly to questions that could be traced back to them (Agnew, et al., 2009; Gavin, Solomon, & Blank, 2010; John, Edwards-Jones, Gibbons, & Jones, 2010). In the social sciences, psychologists have determined when people state their choices and opinions in survey research, individuals are often motivated by ethical deliberations and emotions (Bowles, 2008; Haidt, 2007). Early research conducted on the subject of crime and punishment proposed that individuals may perform unethical actions due to external cost–benefit analysis, and any resulting deceitful behavior is the result of evaluating the possibility of the gain produced from the lie, contrary to the possibility of getting discovered and evaluating the scale of the possible price of their actions (Becker, 1968). These types of behaviors could also be portrayed in research studies in terms of how participants fill out their surveys.

Most individuals who participate in research studies want to answer the questions in a way that depicts them in a positive matter, looking as virtuous as possible (Moorman, & Podsakoff, 1992). This can cause participants to not be entirely truthful regarding the perceived undesirable actions performed by the participant to the researchers and exaggerate the perceived appropriate behaviors (Moorman, & Podsakoff, 1992). Some studies have gone as far as to propose, participant’s personal contribution in illegal action can be determined by the participant’s attitude and subjective evaluations of the other participant’s actions (Petróczy, 2008). Other aspects found in research studies that can alter people’s acceptable behavior
includes positive reinforcement in people’s choices (Vohs and Schooler, 2007), darker
surroundings enhances the feeling of concealment in the area increases dishonest behaviors
(Zhong, Bohns and Gino, 2010), and doubt of real-life activities grow the possibility of altering
the system to their advantage (Schweitzer and Hsee, 2002). Unfortunately, there are very few
research studies that go in depth on the value of these types of behaviors and how the indicators
could be associated to the participant’s actual quantity of behavior (Petróczy, 2011).

Demographics were also shown to have impacts on behavior when completing
questionnaires. In social-ecological research, Hayman and colleagues (2014) discovered that age
was significant in their findings, such as older individuals were more probable to report
undesirable encounters with alligators. Along with demographic aspects of a participant,
Hayman and colleagues (2014) also determined that the reporting of undesirable encounters with
alligators was associated to behaviors regarding the specific species, and people that have
increased negative views of alligators and sensed their high probability of these encounters, were
more prone to report the alligator.

In regard to bear-specific findings, Howe et al. (2010) documented visitors’ increased
reporting of human–bear conflicts because of controversial management decisions, instead of
human performance being a result of shifts in bear behavior. Wilbur and colleges (2018)
discovered that the more threatening the encounters are between humans and the wild animal, the
larger the impact was to a person’s reporting behavior. This is the case when the threat is
associated to a person’s wellbeing and harm (Wilbur et al., 2018). Visitors who are repeatedly
experiencing human-bear encounters and exposed to bears, also influences their reports of
encounters (Naughton-Treves & Treves 2005). Conversely, Siemer and colleagues (2009), found
that nonthreatening encounters between humans and black bears decreased the possibility of reporting encounters.

Visitor reports of negative encounters between humans and bears multiplied around the 1990s (International Association of Fish and Wildlife Agencies [IAFWA], 2005) and again in the early 2000s (Poulin et al. 2003). These negative reports could lead to decreased public support for the preservation of black bears, if these negative encounters with bears are not properly dealt with by the agencies (IAFWA, 2005). To avoid decreased public support, managers and researchers use the reports of negative encounters to assess the efficiency of management efforts for bears (Witmer & Whittaker, 2001, Gore et al., 2006, Hristienko & McDonald 2004). These management efforts are geared specifically towards decreasing conflict by building the management plans on the public’s reporting data (Witmer & Whittaker 2001, Gore et al., 2006, Hristienko & McDonald 2004). An adequate way to measure and study reports by the public, is through comparing self-reported normative standards to observed proximity during wildlife viewing at ARNWR.

**Research Questions**

This review of literature leads to the following questions that guide this study:

- What are Alligator River visitors’ thresholds for acceptable wildlife viewing proximity to black bears?
- How are visitors’ thresholds influenced by number of bears depicted in photographs?
- How does the order of viewing photo panels influence visitors’ thresholds?
CHAPTER III: METHODOLOGY

The purpose of this study is to compare visitor’s perceived and self-reported acceptable proximity to black bears at Alligator River in order to better understand human and black bear interactions and the reliability of self-report questionnaire data. This study compares visitors’ proximity choices when viewing black bears at Alligator River National Wildlife Refuge

Design

This study used normative standards for assessing perceived acceptable behaviors. We studied samples of visitors using a stratified randomized probability sampling schedule (e.g., Creswell, 2002) throughout the months of June and July (Figure 1). The sample was studied through surveys distributed to the public at a stationary location (Alligator River Gateway Center). Surveys were conducted with systematic sampling, so selection bias is not likely and each participant will complete the survey, so there is not a chance of practice effect (Creswell, 2002). Every fourth sampling day, surveys will take a four day break and resume for four day.

Limitations

Limitations included the participants not honestly answering the survey, however, this is accounted for in the comparative design. The participants could have also self-reported their actions in a biased manner, such as using selective memory or elaborating answers (Donaldson & Grant-Vallone, 2002).
### Study area

The study was conducted at Alligator River NWR in North Carolina. The Refuge is located along the coastal plain of North Carolina covering over 150,000 acres of land (Alligator River National Wildlife Refuge, 2018). It is known for having one of the most condensed population of black bears on the east coast (Alligator River National Wildlife Refuge, 2018). The Refuge is open to the public for hiking, biking, wildlife viewing, and/or canoeing. Many of the

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**Figure 1.** Data collection schedule: June & July 2019
visitors who are interested in seeing black bears drive around the refuge on gravel or dirt roads in the publicly accessible areas. Black bears are known to thrive here, due to the abundance of crops provided by the farm fields on the Refuge, and the Refuge acting as a sanctuary for the bears from hunters (Alligator River National Wildlife Refuge, 2018).

Figure 2 below is a map of Alligator River NWR. The green dot in the top right corner across the Croatan Sound from Alligator River, on the island of Manteo, is where the visitors center is located and is known as the Gateway Center. This is where the surveys were distributed to willing participants.

![Figure 2](Google Maps screen shot of Alligator River NWR Manns Harbor, NC and the visitor center in Manteo, NC).
Measures

The purpose of these surveys is to understand the public’s perceived proximity to black bears at Alligator River. Through the survey conducted at the Gateway Visitor Center, we will collect data on the public’s perceived proximity to black bears. The survey will consist of visual-based approaches. The visual based social norm method consists of pictures with a variety of different people in the pictures and the distances the people are from the black bears also vary. These photos will be attained by researchers traveling to Alligator River and photographing researchers and black bear on the Refuge. Researchers will then use photoshop to place themselves within different distances of the black bears on the refuge in the photos. These photos will be placed on the survey and the public will be asked a variety of questions based on proximity of the people in the photos.

Procedures

I used the equation: Necessary Sample Size = (Z-score)² * StdDev*(1-StdDev) / (margin of error)² to determine the sample size and the number needed for this survey (Creative Research System, 2012). This was based on the number of visitors from last year during the times the researchers will be collecting data. In June there were 2,608 visitors and in July there were 3,897 visitors to Alligator River NWR visitors center. The larger population number of the two months were used for the equation with the margin of error in the equation as 6 concluding to 250 total sample size needed for each survey for the two months of data collection (Creative Research System, 2012). Data collection will cease once 250 questionnaires have been collected and observations of visitor distances documented.
Visitors to Alligator River NWR Visitors Center will be intercepted by trained university researchers and asked if they would complete a survey. At the stationary location, researchers will distribute the survey to participants consisting of visual-based norms questionnaires with pictures for the participants to distinguish acceptable distances for the public interacting with black bears. The researchers will conduct observations by traveling around the Refuge collecting actual distances the public is from black bears with the use of a rangefinder. A rangefinder is used to determine the distance between two objects. Researchers will observe from a distance of at least 50 yards (U.S. Department of Interior, 2018). If the black bears are any closer than 50 yards, then the researchers are to stay in their vehicles. The researchers will not indicate they are conducting a survey on visitors’ proximity behavior. This approach will prevent skewness from the visitor’s answers due to panic from the participant performing unethically on the Refuge. Researchers will use an observation sheet shown in figure 3 to document the interactions between humans and black bears during observations.

The larger population number of visitors from June and July of last year (3,897) was used in the equation: Necessary Sample Size = (Z-score)^2 * StdDev*(1-StdDev) / (margin of error)^6 to determine the sample size needed for this survey (Creative Research System, 2012). There was a margin error of 6 in the equation concluding to 250 total sample size needed for data collection (Creative Research System, 2012). Data collection ceased once 300 questionnaires were collected allowing a cushion for error.

Visitors to Alligator River NWR Visitors Center were intercepted by trained university researchers and asked if they would complete a survey. At the Gateway Center, researchers distributed the survey to participants consisting of visual-based norms questionnaires with
pictures for the participants to distinguish acceptable distances for the public interacting with black bears.

Analytic Approach

The researcher was trained on the survey questions, how to approach visitors, and what to say to visitors so nothing was given away to avoid skewness of the survey. The researcher frequently checked and review their work through the entire process to avoid bias and mistakes. This increased reliability of the work. The researchers analyzing the findings were trained on the statistical analyses used in SPSS 25. They calculated Potential for Conflict Index 2 (PCI2) values for crystallization (Marin, Newman, Manning, Vaske, & Stack, 2011), mean scores for normative responses at specific condition classes. (PCI2 was created to measure and visually gauge the level of agreement concerning a conflict between humans and wildlife (Heneghan & Morse, 2019).

Researchers used SPSS 22.0 and created a social norm curve for research questions on the survey. Researchers calculated the norm crystallization, also called the level of agreement for visitors’ proximity to black bears, by using PCI2. (Vaske, Beaman, Barreto, & Shelby, 2010). The crystallization was depicted by the bubbles show in the graph. The smaller the bubble the more agreement there was in the sample and a large bubble indicates more disagreement and less agreement among the sample for that question.
CHAPTER IV: FULL MANUSCRIPT

JOURNAL: SOCIETY & NATURAL RESOURCES

Abstract

Human-wildlife interactions in protected areas are complex, and visitor preference for close proximity to wildlife continues to challenge managers. Two indicators and thresholds questionnaires with varying photo panel orders were distributed to a total of 302 visitors at Alligator River National Wildlife Refuge in North Carolina to examine the acceptability of various distances and management actions for black bear viewing. Results show average minimum acceptability for black bear viewing is 38 yards for a single bear and 38 - 44 yards for a black bear sow with two cubs; photo panel viewing order influenced participants’ evaluations, illustrating the potential for priming to significantly affect proximity evaluations. Results indicate the importance of further exploring the factors that impact proximity preferences, such as the number and age of bears and visitors’ distances to personal vehicles. Additionally, observational research of visitors’ behaviors within human-wildlife interactions may aid managers in understanding visitors’ norms.

Keywords: Proximity, distance, social norms, wildlife, black bear, acceptability
Introduction

One primary experience desired by visitors to natural areas is wildlife encounters (Manfredo, 2008). Across a range of protected areas worldwide, visitors seek out large mammals, known as “charismatic megafauna,” (Ballantyne, Packer, & Sutherland, 2011; Senevirathna, & Perera, 2013). The African “big five” (elephants, buffalo, rhinos, lions, and leopards) play a fundamental role in drawing in the majority of visitors and funds to protected areas in South Africa, such as Kruger National Park (Lindsey et al., 2007), while the Alaskan big five – grizzly bears, caribou, moose, wolves, and elk – serves a similar purpose on the North American continent (Skibins, Powell, Hallo, 2013). This worldwide preference for charismatic megafauna viewing often combines with other desired experiences. As Hammitt and colleagues (1993) illustrated, wildlife viewers in Great Smoky Mountains National Park, USA were satisfied with their viewing experiences when they saw diverse populations of wildlife, such as black bears and white-tailed deer, at close proximities, took photos of wildlife, and if their expected numbers of wildlife matched the actual numbers of wildlife viewed.

Despite visitors’ interest in viewing charismatic megafauna in protected areas, their presence can lead to negative impacts (Siemer & Decker, 2003). Wild animals’ behaviors have altered due to human activity, such as wolves choosing breeding dens based on where highly populated human areas are located (Theuerkauf, Rouys & Jedrzejewski 2003), bears choosing to relax in thicker vegetation when people are close by hiking (Ordizet al. 2011), or humans leaving food in accessible areas, such as non-bear-proof trashcans, which can then lead to “food conditioned” wildlife (Gunther, Wilmot, Cain, Wyman, Reinertson, & Amanda, 2018). Humans actions, such as the different types of outdoor recreation performed in an area or wildlife tours, have been known to impact wildlife (Ciuti et al., 2012). Wildlife may respond to increased human activity, such as human habituation, bringing them in increasingly, closer proximity to
humans (Gunther et al., 2018). Responses largely depend on the specific species and characteristics of management environments (Cerri, Martinelli, & Bertolino, 2019). Specifically, Scandinavian brown bears have been known to be disturbed particularly when visitors were detected by the bear within proximity - between 69 - 47 m (226- 154 ft.), sometimes as close as 13m (43ft.; Moen et al., 2012). Conversely, grizzly bears in coastal Alaskan environments may be less responsive to human presence as a result of stable, endemic food sources, bear-to-bear, and bear-to-human habitation (Herrero et al, 2005).

To reduce the potential impact of visitation on wildlife, protected areas managers use a variety of approaches to decrease negative human-wildlife interactions that could disrupt wildlife, such as closing off the area to the public or limiting human access during peak times for the wildlife to allow scavenging, breeding, or raising young (Coleman, 2013). Scheduled bear management areas, where managers do not allow visitors in certain areas based on sensitive times for grizzly bears, are common in Yellowstone and many protected area contexts (Coleman et al., 2013). Park and protected area managers also often recommend or regulate specific distances for visitors to remain from wildlife (i.e., 75 yards), however, it is difficult to define a “safe” or “acceptable” distance between a visitor from wildlife (National Park Service, 2017). The U.S. National Park Service (2017) suggests to not approach black bears beyond their physical reaction limits denoted by a variety of behavioral cues, such as showing teeth, snarling, and clapping teeth. However, given the difficulty of cue recognition for visitors, mangers advise visitors to stay farther away from wildlife, beyond the distance it will physically react to the public, particularly because wildlife may have internal reactions (elevated heart rate) that are not visible and that expend crucial energy resources (Herrero et al., 2005).
In certain protected areas, there may be an absence of specific distance regulations or a lack of funding appropriated by federal or state governments to enable visitor monitoring and direct distance enforcement. In these cases, visitors are largely left to their own devices and may create their own subjective, socially informed “norms” for acceptable distances from wildlife during viewing. As Cerri and colleagues (2019) share, knowledge of these norms allows managers to understand if there are problematic expectations for close proximity to wildlife and then craft behavioral interventions based off of these norms to guide future human-wildlife interactions. In this study, we explore one such setting, Alligator River National Wildlife Refuge (Alligator River) in eastern North Carolina, USA, where visitors are currently able to participate in wildlife viewing in over 150,000-acres throughout the refuge, allowing them to observe a large, spatially-concentrated population of black bears (*Ursus Americanus*). Alligator River contains one of the largest populations of black bears in the southeastern United States (U.S. Fish and Wildlife Service, 2018). This condensed population, coupled with the national trend of rising numbers of visitors to protected areas (Fefer, Urioste-Stone, Daigle, & Silka, 2016), will result in increased human-wildlife interactions. This accentuates the need to determine the normative proximity preferences for wildlife viewers seeking black bears at Alligator River. The Refuge staff and biologists do not have a regulation for acceptable distance from black bears and inform visitors to stay as far from the black bears to the animal’s overt reaction distance (i.e., visible signs of stress; Alligator River National Wildlife refuge, 2018) (Bonnie W. Strawser, personal communication, June 12, 2019). The distance between wildlife tourists and black bears at Alligator River is often unclear and uncertain, however, Rangers have observed visitors in dangerously close proximity to wildlife, as well as wildlife harassment (USFWS, 2018), providing the justification for this research.
Wildlife Viewing Proximity

The distance between visitors and wildlife has been shown to be an essential contributor to high quality wildlife viewing experiences in natural areas (Verbos, et al., 2018). The closer visitors are to wildlife, generally, the higher they report their quality of experience (Cong Wu, Morrison, Shu, & Wang 2014; Verbos, et al., 2018). In addition to distance, time spent within a desired distance has also been reported to contribute to satisfaction in wildlife viewing. Hammitt and colleague’s (1993) reported that the longer visitors at Great Smokey Mountains National Park were within close proximity of the wildlife, the better they rated their experience.

Human-wildlife conflicts are mainly caused by visitors approaching wildlife, often at a distance wildlife managers consider to be too close. As Taylor & Knight (2003) illustrated at Antelope Island State Park, Utah, roughly fifty percent of visitors believed they were not having any impacts on the surrounding wildlife but were approaching wildlife within a closer distance than the wildlife tolerated. More encouragingly, Miller and Feimund (2018) discovered that the majority of visitors at Yellowstone National Park, USA believe that is appropriate to stay approximately 36 yards from bison, while the Park’s recommended distance is a minimum of 25 yards away from bison. The authors determined that the bison-human conflicts are most likely caused by a minor population of rogue and daring visitors (Miller & Feimund, 2018).

The need for protected area staff to manage distance of wildlife from wildlife viewers has only increased as the public demand for wildlife viewing has amplified (Gunther et al., 2018). And, while a variety of traditional, managed wildlife-related activities are available for the public, such as guided wildlife tours (Ballantyne, Packer, & Sutherland, 2011), the increased accessibility of photography through low cost personal cell-phones and advances in video technology have been suggested as an additional factors in visitors getting too close to wildlife.
As early as 1993, Klein illustrated photographing wildlife was found to be the most disturbing activity in Darling National Wildlife Refuge in Sanibel, Florida due to the high possibility of the photographers exiting their vehicles so they can get closer to the wildlife for photographs. Similarly, Burger (1995) documented that wildlife photographers and birdwatchers often get close to birds that are nesting, brooding, or scavenging, causing the animals to move to different locales or desert their nests altogether.

To manage these interactions, protected areas have different proximity standards based on a variety of factors, such as; species, seasons, population densities and habituation (Nevin & Gilbert, 2005). Managers of natural areas often establish and regulate human-wildlife distances built on information produced by recent research (Hammitt, Cole, & Monz, 2015). Verbos and colleagues (2018) share that visitors to coastal Alaskan protected areas approach grizzly bears within a closer distance than protected areas inland with lower population densities of grizzly bears due to higher bear population densities in coastal areas, bountiful food sources and regular human interaction. These differences across locations result in dramatically different wildlife viewing experiences: a visitor to coastal protected areas such as Katmai National Park & Preserve can get up to 46 meters (151 ft) from grizzly bears, but visitors to protected areas more inland have to stay in their cars to accomplish those distances (Verbos et al., 2018). Smith, Herrero, and DeBruyn determined that the concentration of the bear population contributes to a bear’s overt reaction distance. They discovered that the increase of brown bear population in Alaska, USA, then there was a reduction of the brown bear’s overt reaction distance, therefor there is less likely for human-brown bear interactions (Smith, Herrero, and DeBruyn, 2005).
Social Norms

In certain protected area settings, there may not be specific distance regulations or recommendations, leading visitors to create their own informal rules or “social norms” for wildlife viewing proximity. Social norms have been used to understand the shared acceptability for specific resource conditions and visitor behaviors across a range of protected area settings (Anderson, Manning, Valliere, & Hallo, 2010). Social norms illuminate the social phenomenon of labeling some conditions and actions as acceptable and others as immoral, unwelcome, or unacceptable (Scultz, 2002). Social norms were first established in the field of social psychology (Jackson, 1965), and there have since been a wealth of theoretical frameworks that have used social norms in protected areas and environmental psychology. Daigle, Hrubes, and Ajzen, (2002) used the Theory of Planned Behavior to understand hunters’, wildlife viewers’, and other outdoor recreationists’ behaviors and attitudes towards wildlife. Manfredo and Dayer (2010) similarly used the cognitive hierarchy theory of human behavior for research to be used to steer research of human behavior and explore human–wildlife conflicts. Bentz and colleagues (2016) used the Limits of Acceptable Change with the Wildlife Tourism Model for sustaining tourism with marine wildlife, along with using indicators and thresholds such as visitor’s perception. In this research study, we use the indicators and thresholds approach to social norms following Jackson’s (1965) return potential model, while focusing on social sanctions related to acceptable behavior (Heywood, 2011).

Indicators and thresholds have been used extensively in outdoor recreation to study visitors’ views and understandings of crowding, actions of other visitors, the desired state of natural resources, and expectations of managers (Vaske & Whittaker, 2004). Researchers regularly display these evaluative perceptions on what is known as a social norm curve (e.g.,
Price, Blacketer, & Brownlee, 2018). The y-axis of the norm curve is a ranking of the various conditions depicted, often measured using ‘acceptability,’ and the x-axis shows the array of different conditions of any specific indicator (i.e. different distances between visitors and black bears). When the curve line crosses the neutral line, that is the point of minimum acceptability, also known as the threshold and for acceptable conditions. The peak of the curve line signifies preferred circumstances, and the area underneath the neutral line indicates unacceptable conditions (Manning, 2010).

The normative standards method has been used in a variety of outdoor recreation research studies for over 30 years (Kuentzel, Laven, Manning, & Valliere, 2008). The indicators and thresholds approach represents visitors’ perceptions of desired experiential and resource conditions, and can also be applied to acceptable behaviors. Anderson and colleague’s (2010) study on normative standards for wildlife viewing in Lake Umbagog National Wildlife Refuge in New Hampshire and Denali National Park and Preserve in Alaska also used an indicators and thresholds approach. The authors’ research focused on major influences on the visitor experience for wildlife viewing, such as wait time to see wildlife, number of other visitors, and noise pollution (Anderson et al., 2010). More recently, Miller and Freimund (2018) and Cerri and colleagues (2019) used social norms method to study acceptable distance-related human–wildlife interactions, such as how acceptable different distances people are from wildlife.

Both Miller and Freimund (2018) and Cerri and colleagues (2019) used visual-based methods to depict different proximity conditions. Visual-based replications of different levels of impact or different resource conditions have become popular with indicators and thresholds outdoor recreation studies (Gibson, Newman, Lawson, Fristrup, Benfield, Bell, & Nurse, 2014). Visual-based approaches use photographs to show a range of conditions regarding specific
indicators of quality and have commonly proven more valid than using written presentations of information (Kuentzel et al., 2008). Researchers propose that visual-based approaches permit the gathering of delicate factors of visitor experiences, such as crowding and wildlife viewing (Miller & Freimund, 2018), while reducing the cognitive burden on participants (Cerri et al., 2019).

**Self-Reports Biases**

A visual method was used in this study at Alligator River to understand acceptable distances from black bears being viewed, however, visitors’ perceptions of acceptable proximities may be subject to certain biases. The order photos are presented to participants in a survey, showing a variety of conditions, has the potential for bias results in visual based studies (Gibson et al., 2014). While other scholars have found conflicting results (Cribbs, Sharp & Brownlee, 2019), when using these methods researchers should be mindful of the possible bias outcomes in regard to the order of the photo panel and range effect bias (Gibson et al., 2014). In this study, we controlled for the potential bias of order effect by: 1) randomizing photo presentation, using Qualtrics random photo presentation feature, and 2) by providing two different questionnaires with two different photo panel orders (i.e., pictures of one single black bear sow viewed first then pictures of one sow with two cubs vs. pictures of one sow with two cubs first followed pictures of a single black bear sow) (Table 1). In short, in this study we were interested in seeing if visitors responded differently based on which photo panel they viewed first (one single black bear sow vs. one sow with two cubs).
Table 1

Photo order manipulation in Alligator River survey design.

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>One Black Bear</th>
<th>One Black Bear and Two Cubs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>75, 50, 25, 15 yards (Viewing Order Randomly Assigned)</td>
<td>75, 50, 25, 15 yards (Viewing Order Randomly Assigned)</td>
</tr>
<tr>
<td>B</td>
<td>One Black Bear and Two Cubs</td>
<td>One Black Bear</td>
</tr>
<tr>
<td></td>
<td>75, 50, 25, 15 yards (Viewing Order Randomly Assigned)</td>
<td>75, 50, 25, 15 yards (Viewing Order Randomly Assigned)</td>
</tr>
</tbody>
</table>

Research Questions

This review of literature leads to the following questions that guide this study:

• What are Alligator River visitors’ thresholds for acceptable wildlife viewing proximity to black bears?

• How are visitors’ thresholds influenced by number of bears depicted in photographs?

• How does the order of viewing photo panels influence visitors’ thresholds?

Methods

Study area

The Alligator River is located within the Albemarle-Pamlico watershed on the coastal plain of North Carolina (NC) and covers over 150,000 acres (Figure 1; U.S. FWS, 2019). The Refuge is open to the public for hiking, biking, wildlife viewing, and canoeing, and is regionally known for having one of the largest populations of black bears in the southeastern United States (U.S. Fish and Wildlife Service, 2018). Visitors’ center staff and volunteers regularly refer visitors interested in viewing black bears to the Refuges’ wildlife drive, comprised of a network
of gravel or dirt roads in publicly accessible areas. Black bears are known to thrive in these areas, due to the abundance of crops provided by the farm fields on the Refuge, and restrictions on black bear hunting (Alligator River National Wildlife Refuge, 2018). Farmers growing crops on Refuge lands are required to leave twenty percent of their crops, specifically to sustain the wildlife on the Refuge (Alligator River National Wildlife Refuge, 2014).

![Map of Alligator River and National Wildlife Refuges Visitor Center](image)

**Figure 1.** a) Alligator River and the National Wildlife Refuges Visitor Center; b) the Alligator River wildlife drive is indicated in bold red and common black bear viewing located are indicated by pink shading; c) wildlife photographers 15 yards from one black bear sow and two cubs in June 2019. Source: U.S. Fish and Wildlife Services (a & b); Authors, 2019.

**Instrument**

In Summer 2018, the lead author worked as an intern for Alligator River, where she gathered observational data focused on visitor interactions with black bears. This data and iterative conversations with managers provided the basis for the development of the quantitative
The questionnaire contained items ascertaining the acceptability of different distances of visitors from black bears, as well as different evaluative thresholds (i.e. officials should take action, you feel concerned for your own safety, and the closest distance you would get to the black bear to take a picture). Two different questionnaires and randomization of photos within photo panels addressed the possibility of photo order bias (Gibson, et al., 2014). Additionally, the questionnaire also included two items for past-visitation history, two items for previous wildlife viewing experience, as well as demographic categories aligned with the U.S. Census Bureau.

After review by Alligator River managers, the authors acquired a Special Use Permit, approval from their University’s Institutional Review Board, and permission to sample at the National Wildlife Refuges Visitors’ Center (Visitors’ Center). Questionnaires were distributed over 31 days at the Visitors’ Center in Manteo, NC in June and July of 2019. Questionnaire distribution occurred between the hours of 9 AM and 4 PM and was stratified by day of the week in order to account for potential variability in visitor type (Creswell, 2002).

At the Visitors’ Center, researchers distributed the questionnaire supported by a photo panel containing pictures for the participants to distinguish between different distances depicting the public interacting with black bears. This method has been previously used in wildlife proximity studies (e.g., Cerri et al., 2019; Miller & Freimind, 2018). In order to understand visitor’s social norms for black bear viewing distances (as opposed to institutional norms; see Heywood, 2011), pictures were designed similarly to the method used by Cerri et al. (2019) to place the survey respondent as part of a viewing group. Photos depicting different distances were attained by researchers traveling to Alligator River and photographing researchers and a visible landmark (food cooler), which was moved to replicate different distances (i.e., 15 yards from
researchers). The distances in the photos were chosen to replicate distances used by Miller and Freimund (i.e., 25 and 50 yards, 2018), as well as an extra 75 yard distance for our study due to the viewing opportunities at farther distances at Alligator River; we altered the 5 yard distance used by Miller and Freimund (2018) due to the potential additional dangers of close proximity to black bears (Rogers, 2018). Photos of bears were taken during separate sightings. Distances were calculated using a Nikon Aculon 6 x 20 6.0° laser range finder. Researchers then used Adobe Photoshop CC 2018 to place themselves within different distances from the black bears in the photos.

Analysis

The researchers used SPSS 25 and Potential for Conflict Index (PCI2) version 2.0 workbook for Microsoft Excel to analyze questionnaire results. They calculated PCI2 values for crystallization, or the level of agreement (Marin et al, 2011), surrounding mean scores for normative responses at specific condition classes. PCI2 was created to measure and visually gauge the level of agreement concerning a conflict between humans and wildlife (Heneghan & Morse, 2019). PCI2 scores range from 0 to 1. For example, if all respondents answer in agreement then the PCI2 score will result in a “0,” indicating no possibility for conflict surrounding the specific item measured; however, if the respondents disagree, they will have some number greater than 0 up to 1, which indicates the highest possibility for conflict. The results of each item are depicted on the social norm curve as spheres, the larger the sphere signifies increased probability for conflicts (Heneghan & Morse, 2019). Additionally, independent sample t-tests were conducted to control for potential demographic differences.
between respondents on the two questionnaires, as well as to assess the effect of photo panel order presentation.

<table>
<thead>
<tr>
<th>Photo 1</th>
<th>One Sow</th>
<th>One Sow with two cubs</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Yards</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Photo 2</th>
<th><img src="image3.png" alt="Image" /></th>
<th><img src="image4.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>25 Yards</td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Photo 3</th>
<th><img src="image7.png" alt="Image" /></th>
<th><img src="image8.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>50 yards</td>
<td><img src="image9.png" alt="Image" /></td>
<td><img src="image10.png" alt="Image" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Photo 4</th>
<th><img src="image11.png" alt="Image" /></th>
<th><img src="image12.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>75 yards</td>
<td><img src="image13.png" alt="Image" /></td>
<td><img src="image14.png" alt="Image" /></td>
</tr>
</tbody>
</table>

*Figure 2.* Photo panels depicting different distances from black bears at Alligator River.
Results

Description of the sample

We intercepted 417 visitors at the Visitors’ Center and 304 elected to participate, yielding a 72.9% response rate with no observed patterns of non-response bias. After data cleaning for statistical outliers, we reduced the sample to 302 participants. The sample included males (43.8%) and females (53.9%), with some participants not identifying their gender. Participants’ ages ranged from 18-87 with a median age of 46 years old. Most respondents identified as white/Caucasian (91%), while American Indian/Alaskan Native comprised 3.7% of the sample. Approximately 97% were residents of the United States and 80.4% of the sample resided outside of North Carolina. Annual, household income illustrated a normal distribution, with 24.8% of participants earned between $100,000.00 and $149,000.00, and level of education trended toward the completion of a four-year college degree (37.5%) or graduate degree (22.4%).

Out of the visitors sampled, 30.3% had not visited Alligator River within the last year (12 months) and 52.4% had visited Alligator River for a total of one year or less. 63.6% of participants were primarily interested in wildlife viewing opportunities at Alligator River and 24.6% were primarily interested in walking and hiking opportunities. When asked how often participants intentionally participated in wildlife viewing on vacation, the majority of visitors selected often (28.4%) or very often (27%). The majority of the visitors are not first-time wildlife viewers: 84.5% had seen other large wildlife in natural areas, and 66% had previously seen black bears.

Results of t-tests indicated that age, income, and education did not differ significantly across the two questionnaires administered with different photo orders (p > 0.05; Table 2). Furthermore, visitors’ past use history at Alligator River—measured by assessing the number of
visits in the year and total years—did not differ significantly across the two questionnaires. Additionally, independent samples *t*-tests were used to assess for the potential for photo panel order to influence participant responses across the two questionnaires: responses for the single black bear photo panel did not differ significantly (*p* > .05), however, there were significant differences at all proximity conditions between those who saw the photo panel depicting the black bear sow with cubs first, compared to those who saw the photo panel depicting distances from the black bear sow with cubs after first seeing the photo panel with the single black bear (Table 3).

**One Black Bear Proximity Norms**

In the social norm curve, the proximity preferences for humans and one black bear sow are depicted at each distance. Mean acceptability ratings are rated using a 7-point Likert-scale depicted on the y axis. The size of the sphere for each mean value indicates the level of agreement within the sample for each proximity depicted. Agreement is measured using the PCI<sup>2</sup> statistic. For example, the value for 15 yards (PCI<sup>2</sup> = .11), indicates strong consensus that this distance is unacceptable for viewing a single black bear. The third viewing condition has the least consensus of all conditions depicted (PCI<sup>2</sup> = .36), however, there is more agreement than disagreement that this is a slightly acceptable distance for viewing one black bear. Through examining the ratio relationships at each distance, it is evident that the average minimum acceptability for black bear viewing perceived by the sample is 38 yards.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Questionnaire A ( (n = 153) )</th>
<th>Questionnaire B ( (n = 152) )</th>
<th>( t )-value</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>M 46.97771 (16.59261)</td>
<td>M 45.0876 (17.01404)</td>
<td>.920</td>
<td>.358</td>
</tr>
<tr>
<td>Income</td>
<td>M 4.6240 (1.794454)</td>
<td>M 5.0382 (1.91915)</td>
<td>-1.781</td>
<td>.076</td>
</tr>
<tr>
<td>School</td>
<td>M 5.3699 (1.34051)</td>
<td>M 5.4342 (1.34051)</td>
<td>-.408</td>
<td>.684</td>
</tr>
<tr>
<td>Time per year</td>
<td>M 1.5625 (4.40076)</td>
<td>M 1.8733 (5.51544)</td>
<td>-.533</td>
<td>.595</td>
</tr>
<tr>
<td>Total years</td>
<td>M 1.7163 (3.50780)</td>
<td>M 2.3758 (5.88915)</td>
<td>-1.151</td>
<td>.251</td>
</tr>
</tbody>
</table>

Note: Income and school are ranked on a Likert scale and correspond to specific ranges (i.e., $50,000 – 74,999)
Table 3

Results of t-test, PCI2 values and descriptive statistics for photo order by questionnaire type

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>A</th>
<th>B</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Variable</td>
<td>( n = 153 )</td>
<td>( n = 152 )</td>
<td></td>
</tr>
<tr>
<td>One Sow (15 yards)</td>
<td>M PCI(^2)</td>
<td>1.5586 (.13)</td>
<td>1.4228 (0.9)</td>
<td>1.092</td>
</tr>
<tr>
<td>One Sow (25 yards)</td>
<td>M PCI(^2)</td>
<td>2.4041 (.24)</td>
<td>2.4371 (.22)</td>
<td>-.187</td>
</tr>
<tr>
<td>One Sow (50 yards)</td>
<td>M PCI(^2)</td>
<td>4.2877 (.32)</td>
<td>4.6040 (.39)</td>
<td>-1.597</td>
</tr>
<tr>
<td>One Sow (75 yards)</td>
<td>M PCI(^2)</td>
<td>5.5616 (.18)</td>
<td>5.7351 (.27)</td>
<td>-.979</td>
</tr>
<tr>
<td>One Sow &amp; two cubs (15 yards)</td>
<td>M PCI(^2)</td>
<td>1.1690 (.14)</td>
<td>1.5667 (.07)</td>
<td>-3.483</td>
</tr>
<tr>
<td>One Sow &amp; two cubs (25 yards)</td>
<td>M PCI(^2)</td>
<td>1.7113 (.24)</td>
<td>2.3200 (.13)</td>
<td>-3.815</td>
</tr>
<tr>
<td>One Sow &amp; two cubs (50 yards)</td>
<td>M PCI(^2)</td>
<td>3.7801 (.36)</td>
<td>4.4570 (.49)</td>
<td>-3.083</td>
</tr>
<tr>
<td>One Sow &amp; two cubs (75 yards)</td>
<td>M PCI(^2)</td>
<td>5.0972 (.26)</td>
<td>5.5200 (.36)</td>
<td>-2.143</td>
</tr>
</tbody>
</table>
**Figure. 3.** Comparing questionnaire A & B social norm curve for single black bear proximity acceptability. Visitors assessed the acceptable proximity to a single black bear across the four photographs using a 7-point Likert-scale ranging from −3 (highly unacceptable) to +3 (highly acceptable). The size of the bubble signifies the norm crystallization using PCI\(_2\), or the level of visitor’s agreement concerning the acceptability of the photograph.

**Sow with Cubs Proximity Norms**

As the \(t\)-test results illustrate, the acceptable proximity between visitors and one black bear sow with two cubs was influenced by the order in which respondents viewed photo panels (Figure 4). Respondents of questionnaire A viewed a randomized photo panel of a single black bear first and then a randomized photo panel of one black bear sow with two cubs second. Respondents receiving questionnaire B viewed the two photo panels in the opposite order. The
darker gray norm curve depicts the survey where the sample viewed the single black bear photo panel first and then was followed by the black bear sow with two cubs. The lighter gray norm curve depicts the opposite order. Through examining the ratio relationships at each distance, it is evident that when the sample viewed three bears first (questionnaire B), they responded with the average minimum acceptability for black bear viewing as 38 yards. When the sample viewed three bears second on the questionnaire A, first viewing a photo panel depicting a single black bear, the sample responded with the average minimum acceptability for viewing as 44 yards for a black bear sow with two cubs. For both questionnaires, the third viewing condition has the least consensus over all conditions depicted with (PCI$_2$ = .35) for seeing the photo panel of three bears first and (PCI$_2$ = .49) for seeing the photo panel with three bears second. In sum, it is shown that there is more agreement when the visitors viewed the three bears first in the questionnaire B than second in the questionnaire A.
Figure 4. The social norm curves for the acceptability of proximity for two surveys in different orders. Viewing the single black bear photo panels first followed by a single sow with two cubs (dark gray). Then in the reverse order; viewing a single sow with cub’s photo panel first followed by a single black bear photo panel (light gray). Visitors assessed the acceptable proximity to a single black bear across the four photographs using a 7-point Likert-scale ranging from −3 (highly unacceptable) to +3 (highly acceptable). The size of the bubble signifies the norm crystallization using PCI², or the level of visitor’s agreement concerning the acceptability of the photograph.

Discussion

This study expands on existing research using visual-based social norm methods to assess proximity preferences in wildlife viewing (e.g., Cerri et al., 2019; Miller & Freimund, 2018) to aid managers and researchers to understand visitors’ preferences during human-wildlife interactions with black bears at Alligator River. Visitors’ responses indicate that they find most distances under 38 yards unacceptable in both the simulated viewing of black bear cubs with one
sow and in a condition depicting one bear. That said, the sample was more cautious with a single sow and cubs when they viewed photos depicting a single black bear first (questionnaire A). There was a significant difference between questionnaire responses indicating the presented order of photo panels (i.e., pictures of one sow first) influences participants’ evaluations. The depiction of specific distances within each photo panel (i.e., 75 yards, 25 yards) was controlled through randomization of photo order, so this effect of questionnaire type appears to be based on how many bears were viewed in the initial condition. There are a variety of theoretical possibilities that may explain this nuance in survey results.

First, these results could be due to a “priming” effect (OECD, 2017). A priming effect occurs when the participant has an unconscious recollection occurring allowing the participant to have accessibility to a memory (OECD, 2017). The priming effect occurs during two phases; when the participant is exposed to a stimulus and when the participant reacts (OECD, 2017). In this study, visitors who viewed the sow with cubs first did not have a different distance evaluation for single bear in the next photo panel, but visitors who viewed the single black bear did have a different distance evaluation when they viewed sow with cubs first. In questionnaire A, visitors showed more concern about distance in the photo panel with three bears, recommending farther distances than when they were primed with one sow with two cubs photo panel first. Our findings build on previous work on priming, such as Morehouse and colleagues study (2017) on the effects of priming on evaluations of wildlife tourism attractions. The authors found that the sample chose positive wildlife tourism attractions after being primed by messaging to reflect the possible effects of wildlife tourism attraction on wildlife preservation and health (Morehouse, D’Cruze, & Macdonald, 2017). These findings correspond with this
study by showing the influence priming can have on pro-conservation behaviors towards wildlife.

While it appears visitors’ responses were altered due to this photo panel order effect and priming, the resultant question is why? Our study aligns with the findings from Verbos and colleagues (2018), where the number of wild animals viewed, in our case black bears, influenced the visitor’s need for proximity. In line with other researchers (e.g., Rogers, 2019), we initially believed visitors would prefer to keep a further distance from a black bear sow with cubs due to the increase threat of the possible protective nature of a sow black bear towards her cubs. Through our control of photo order, we conclude that this was not the case. Specifically, it appears that when visitors view a single black bear first, it satisfies their need to see a bear. Verbos and colleagues (2018) refer to this as wildlife checklist behavior. In other words, once visitors “check off” seeing a bear, they may become more aware of the factors in the subsequent panel (i.e., cubs). So, the checklist may overpower visitors’ conscious responses, ethical concern for proximity to cubs, or even concerns regarding safety with a sow present. But their need to see a bear is satisfied, they may be more conservative in their viewing behaviors while viewing black bears.

The additional variable of past use history may also be part of the reason the photo order manipulation elicits different results. Most of the sample were first time visitors to Alligator River, so their norms may be less stable due to their newness to the environment (Manning, 2010). An individual who has been to Alligator River multiple times could have more solidified principles about what is acceptable proximity with black bears. This does not mean those visitors will be more safety conscious or that they will maintain a farther distance; but, those who have been to the Refuge before could be more confident in their distance preferences, while those who
have not been to the refuge will be more prone to manipulation in their thoughts about acceptable behavior.

These findings lead us to believe that future studies should look into additional aspects of black bear viewing, such as visitors’ proximity in vehicles versus out of vehicles due to the usage of the wildlife drive at Alligator River. Researchers should also explore the number or black bears and the number of visitors in photos to understand visitor’s perspective on diverse environments during a wildlife viewing experience. It would also benefit this line of inquiry to explore actual observations of visitor’s actual performed behaviors while interacting with wildlife. While the sample’s preference data is helpful, when visitors state their choices and opinions in survey research, individuals are often motivated by ethical deliberations and emotions (e.g. Bowles, 2008; Haidt, 2007). This could indicate that visitors’ preferences behaviors may not always line up with their actual behaviors. Unfortunately, there are very few research studies that go in-depth on the value of these types of behaviors in wildlife viewing contexts.

Finally, these results have a variety of management implications for Alligator River staff. Alligator River staff can provide the public with a variety of educational information and programs updated with the new information offered by this research, such as appropriate and acceptable distances to view black bears on the Refuge. To add to the education of visitors, the visitor center could educate the visitors on what the acceptable distance looks like giving them a visual to reference to (i.e. interpretation of 50 yard distance). Staff could also improve black bear viewing management on their wildlife drive by making visitor’s activity more predictable for the black bears on their wildlife drive, such as limiting visitors and allowing visitors only at certain times. With such a large and condensed population of black bears at Alligator River, managers
could look into acquiring a volunteer support, such as a “wildlife brigade” discussed by Gunther and colleges (2018) at Yellowstone and Grand Teton National Parks. Refuge volunteers could be identified with specific apparel (orange vests) and travel the Refuge, educating the visitors about acceptable distances from black bears. The information offered by this study can be used by managers to base Alligator River’s volunteer efforts to inform the public of acceptable distances to view black bears.

**Limitations**

Our study is not without potential limitations. Some limitations could include participants not honestly answering the survey, however, this is accounted for in the comparative design. The participants could have also visitors reported preferences of their actions in a biased manner, such as using selective memory or elaborating answers due to fear of getting into trouble (Donaldson & Grant-Vallone, 2002), or individuals only influenced by ethical deliberations and emotions (e.g. Bowles, 2008; Haidt, 2007). Collecting data during different seasons could affect data due to the different behaviors shown by black bears (i.e. mating, hibernation, etc.), or visitors’ previous knowledge and education acquired of the species’ could alter visitors opinions (Glikman et al., 2012; Lowery et al. 2012) resulting in altered responses on surveys. The visitors understanding of specific distances asked on the surveys could affect sample’s response could alter visitors’ responses due to them not realizing how close/far the specific distances actually are. Future studies with similar designs might do well to provide visitors with visual cues for specific distances (i.e., 50 yards) prior to them completing a questionnaire.
Conclusion

In this study, we assessed visitor perception of acceptable distances from the black bear population at Alligator River National Wildlife Refuge. By determining what visitors believed to be an “acceptable distance” from the black bear population, this study strengthened and reinforced the need for several conservation management techniques, such as distance regulations. In doing so, we provide information for designated wildlife areas, such as Alligator River National Refuge, to use up to date information to establish distances and potentially additional regulations for wildlife viewers. Management teams will be able to use this specific, up-to-date information to regulate interaction between the human population and the black bear population.
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1 These references occur in Chapters I-III, but are not used in Chapter IV.


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APPENDIX
BLACK BEAR VIEWING AT ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE VISITOR USE SURVEY
2019

For the purpose of this study, Alligator River National Wildlife Refuge refers to the area protected by the U.S. Fish and Wildlife Service located in East Lake, North Carolina. From here forward, the term "Alligator River" is used to refer to Alligator River National Wildlife Refuge. For the purpose of this study "black bears" refer to the American black bear (Ursus Americanus) found in Alligator River National Wildlife Refuge.

Section 1: Your Experience at Alligator River

1. Including today, how many times have you visited Alligator River during...
The last year (12 months)? ____ # of times

2. Including this year, approximately how many TOTAL YEARS have you visited Alligator River?

3. How often do you intentionally go wildlife viewing on vacation?
   Never  Rarely  Sometimes  Often  Very Often

4. Have you seen black bears in other parks/refuges/natural areas?
   Yes  No

5. Have you seen other large animals in other parks/refuges/natural areas?
   Yes  No

6. From the list of activities below, what is your PRIMARY TYPE of activity at Alligator River? (Select one)
   Other (Please specify)
   Walking/Hiking  Biking  Wildlife Viewing  Trail Running  Canoeing/Kayaking

7. From the list of activities below, what are ALL the activities you participated in at Alligator River? (Select all that apply)
   Other (Please specify)
   Walking/Hiking  Biking  Wildlife Viewing  Trail Running  Canoeing/Kayaking

8. On the scale below, 1 being not a priority and 7 being the highest priority, please rate how much of a priority it is for you to view black bears during your trip to Alligator River.

   1- Not a Priority  2- Low Priority  3- Somewhat Priority  4- Neutral Priority  5- Moderate Priority  6- High Priority  7- Highest Priority
Section 2: Photo Viewing

9. We would like to know your opinions about the acceptable distance for encountering black bears at Alligator River. Please review the photographs provided. Next please indicate the number that represents the ACCEPTABLE distance of visitors from the black bear in each of the four photographs. A rating of ‘Highly Unacceptable’ means the distance from the black bear displayed in the photograph is highly unacceptable, and ‘Highly Acceptable’ means the distance from the black bear displayed in the photograph is highly acceptable. (Select only one number per photo)
10. Choose all photos (if any) that display the conditions where Alligator River officials should take action because visitors are too close to the black bear?

- None of the photos display distances where Alligator River officials should take action because visitors are too close to the black bear.
11. Choose all photos (if any) that display the conditions where you would feel concerned for your own safety due to your distance from the black bear?

- [ ]
None of the photos displayed the distance where I would feel concerned for my own safety due to my distance from the black bear.

12. Which photo (if any) displays the closest distance you would get to the black bear to take a picture?

- ☐ None of the photos displayed the distance for ideal photography of the black bear.
13. Prior to coming to the visitor center, did you visit Alligator River today?
- ☐ Yes
- ☐ No

14. Did you see bears during your visit today?
- ☐ Yes
- ☐ No

15. Which photo (if any) most accurately displays your closest distance from the black bear(s) during your visit to Alligator River?
- ☐
16. We would like to know your opinions about the acceptable distance for encountering black bears at Alligator River. Please review the photographs provided. Next please indicate the number that represents the ACCEPTABLE distance of visitors from black bears in each of the four photographs. A rating of 'Highly Unacceptable' means the distance from the black bears displayed in the photograph is highly unacceptable, and 'Highly Acceptable' means the distance from the black bears displayed in the photograph is highly acceptable. (Select only one number per photo)
17. Choose all photos (if any) that display the conditions where Alligator River officials should take action because visitors are too close to black bears?

- None of the photos display distances where Alligator River officials should take action because visitors are too close to the black bears.
18. Choose all photos (if any) that display the conditions where you would feel concerned for your own safety due to your distance from black bears?

- None of the photos displayed where I would feel concerned for my own safety due to my distance from black bears.
19. Which photo (if any) displays the closest distance you would get to black bears to take a picture?
None of the photos displayed the distance for ideal photography of black bears.

Section 4: About You

20. What is your country of residence?

21. If you live in the United States, what is your zip code?

22. What year were you born?

23. What is your gender? (Please select one)

- Male
- Female
- Other

24. What is the highest level of school you have completed?

- Less than High School
- Some High School
- High School graduate
- Some college
- 2 year college degree
- 4 year college degree
- Graduate or Professional degree
- I do not wish to answer

25. What is your race?
American Indian or Alaska Native
Balck or African American
Hawaiian or Pacific Islander
Hispanic or Latino/Latina
White
Other
I do not wish to answer

26. Which category best describes your total household income in U.S. dollars during 2017 before taxes?
(please select one)

Less than $24,999
$25,000 to $34,999
$35,000 to $49,999
$50,000 to $74,000
$75,000 to $99,999
$100,000 to $149,999
$150,000 to $199,999
$200,000 or more
I do not wish to answer