UNDERSTANDING HUMAN DISTURBANCE TO BIRDS AT THE INTERSECTION OF BIRDING AND BIRD PHOTOGRAPHY

by

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Dedicated to a former English teacher, for not only instructing me in high school but for providing me with valuable information about birds and birding; to my cohort of graduate students, for witnessing this process and keeping me sane; and to my friends in Canada, for reading this and helping me be a better scientist.

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ABSTRACT

Human disturbance to birds is a subject of concern for bird conservation. Bird recreationalists, such as birders and bird photographers, who actively seek out birds, are identified as a broad group of people that contribute to bird disturbance. There are few studies on birders' and bird photographers' perceptions and behaviors related to bird disturbance, and these studies have conflicting results. Furthermore, little research identifies why bird recreationalists engage in behavior that disturbs birds. Understanding perceptions and behavior related to bird disturbance and the context behind engaging in this behavior is important for creating comprehensive solutions for preventing disturbance to birds. The purpose of this thesis is to create a typology of bird recreationalists, based on whether they engage in birding or bird photography as primary activities; identify the socio-demographic characteristics among bird recreationalists that are connected to an increased likelihood to engage in behavior that disturbs birds; assess perceptions of blame for disturbance to birds; and identify how motivations, barriers, challenges and trade-offs are associated with following ethical birding and bird photography guidelines.

The thesis used an online survey and in-person interviews of birders and bird photographers in two Midwestern states in the U.S., Illinois and Indiana, to achieve these objectives. Three sub-groups of bird recreationalists were identified through the online survey: individuals who only engage in birding; individuals who primarily engage in birding and secondarily, bird photography; and individuals who primarily engage in bird photography and secondarily, birding. Our findings indicate that individuals who 1) are male, 2) only engage in birding, 3) maintain life lists, 4) have more birds on their life lists, 5) can identify more birds by sight, 6) have more years of experience or 7) have a higher level of achievement-oriented motivation are more likely to engage in potentially harmful behaviors to birds. Additionally, quantitative findings suggest that birders and bird photographers may not perceive themselves as main contributors to bird disturbance.

The qualitative portion of the research identifies multiple ethical birding and bird photography guidelines that recreationalists found challenging to follow that had both ecological (e.g., maintaining distance) and social (e.g., respectfully educating others) implications. Recreationalists identified listing, photographing and seeing birds as key motivations to breaking ethical guidelines. Barriers to following guidelines included apathy, ignorance and improper technology. Finally, recreationalists identified bad photography and missed experiences as major

trade-offs associated with following ethical guidelines. The concepts explored in this thesis research provide important management implications for natural resource managers and stakeholders in bird conservation and suggest a further need for examining bird recreationalists' decision-making around bird disturbance.

CHAPTER 1. INTRODUCTION

1.1 Thesis Overview

The objectives of this study are to characterize different types of bird recreationalists and determine whether they pose potential threats to birds and bird habitat. This study aims to understand what bird recreationalists are doing to harm birds, if they know that they're contributing to bird disturbance, and why they are engaging in unethical birding behaviors. The following research questions are derived from these objectives:

1. How do various groups of bird recreationalists differ in socio-demographic factors?
2. How are socio-demographic characteristics connected to an increase in bird/bird habitat disturbance among bird recreationalists?
3. To what extent do bird recreationalists believe that they contribute to bird disturbance?
4. How are motivations, barriers/challenges and trade-offs connected to engaging in unethical birding behaviors among bird recreationalists?

This thesis is divided into two substantive chapters: chapter 2 is a quantitative study that garners an understanding of 1) typologies of bird recreationalists based on their engagement in birding and/or bird photography; 2) socio-demographic characteristics of bird recreationalists connected to bird disturbance and 3) bird recreationalists' awareness of their role in disturbance to birds and bird habitat. Chapter 3 is a qualitative study that investigates bird recreationalists' perceived motivations, barriers/challenges and trade-offs connected to behaviors that harm birds and bird habitat.

1.2 Human Disturbance to Birds

Human disturbance to birds is a subject of concern for bird conservation. Although there are several definitions of human disturbance to wildlife and birds (e.g., Blanc et al., 2006; Boyle & Samson, 1985; Communities, 2000; Smit & Visser, 1993), Mengak et al (2019, p. 8) give a comprehensive definition:

> *"…human activity that causes individuals or groups of [birds] to alter their normal behavior, leading to an additional energy expenditure by the birds. It disrupts or prevents*

[birds] from effectively using important habitats and from conducting the activities of their annual cycle that would occur in the absence of humans."

The impacts of human disturbance on bird individuals, populations and habitats have been well investigated by researchers (Beale & Monaghan, 2004; Blanc et al., 2006; Bötsch et al., 2017; Boyle & Samson, 1985; Collins-Kreiner et al., 2013; Remacha et al., 2011; Slater et al., 2019; Smith-Castro & Rodewald, 2010; Steven et al., 2011; Veríssimo et al., 2013; D. M. Watson et al., 2019; Wilkins et al., 2017). Although initially, bird reactions to human disturbance can be as simple as flying away or increased vigilance, compounding instances of disturbance can have serious impacts to birds (Paine et al., 1998). Researchers have identified physiological (e.g., Romero & Romero, 2002; Silverin, 1986), behavioral (e.g., Bötsch et al., 2017; Remacha et al., 2011) and reproductive (e.g., Silverin, 1986; Steven et al., 2011) impacts on individual birds. For bird populations and habitat, a decrease in carrying capacity of a given habitat and a loss of biodiversity are identified as impacts (e.g., Blanc et al., 2006; Hill et al., 1997; Tuite et al., 1984).

Moreover, researchers have linked human disturbance to birds with outdoor recreationalists (Boyle & Samson, 1985; Vaske et al., 1983). Boyle and Samson (1985) assert that recreationalists can impact wildlife through habitat alteration, disturbance or direct mortality, with an emphasis on recreationalists who actively seek and approach wildlife such as wildlife viewers or photographers. They suggest that these recreationalists may be disruptive to wildlife, as wildlife encounters may be more frequent and of longer duration than encounters of other types of recreationalists (e.g., mountain bikers), and recreationalists may seek rare or unusual species. These species tend to be more sensitive to human disturbance due to their biology (Sekercioglu, 2003). Recreationalists that actively seek and approach birds can be grouped into a large, general group called bird recreationalists, which include birders and bird photographers (Slater et al., 2019). The U.S. Fish and Wildlife Service (USFWS) estimated that birders specifically accounted for about 46 million individuals in the United States in 2011, with about 18 million recreationalists leaving their homes to view birds (Carver, 2013). With this large number of recreationalists and their common goal of encountering birds, birding and bird photography have the potential to impact individual birds and bird populations (Sekercioglu, 2002). Although other anthropogenic problems affecting birds may be more severe (e.g., habitat loss, climate change, domestic cats), human disturbance to birds could only further the negative impacts to bird populations. Thus, a need arises for understanding how different bird recreationalists can disrupt the behaviors of birds.

1.3 Bird recreationalists

Bird recreationalists are a diverse group of individuals who watch and/or pursue birds as a recreational activity. They are diverse in how they engage with birds, whether it is watching them at a bird feeder in the backyard or through binoculars or cameras away from home. Hvenegaard (2011) summarizes three different types of bird recreationalists pulled from Oddie's (2014) classification: birdwatchers, birders and twitchers (note this only includes non-consumptive bird recreationalists). In addition to Hvenegaard's summarization, Slater et al. (2019) recognize another type of bird recreationalist that is relevant for this research: bird photographers. The focus of this study is primarily on birding and bird photography, so birders and bird photographers are both defined below (Table 1).

Table 1.1: Types of Bird recreationalists Taken from Hvenegaard's (2011) work

Type	Literature	Description
Birder	Carver, 2013; Oddie, 1995; Schaffner, 2009; Sekercioglu, 2002	Actively pursue birds for observation, identification and listing; committed; willing to leave home
Bird Photographer	Slater et al. 2019; Fung 2017	Motivated by documentation through photography, carry and use photography equipment, outings are intended for photography

1.4 Birders

Birders are committed recreationalists who actively seek birds for observation, identification and listing (Connell, 2009; Hvenegaard, 2011; Oddie, 1995; Schaffner, 2009). In the USFWS Birding addendum to the 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation, birders are loosely defined as individuals who have taken a trip at least one mile from their homes (Carver, 2013). They keep track of all the species of birds they identify throughout their lifetimes with a life list. Schaffer (2009) notes that birders can be competitive with listing, competing in events such as Big-Year Birding where birders dedicate a year to encounter and list as many birds as possible. In order to add new or rare species to a life list, birders may travel hundreds of miles or be willing to engage in other inconvenient behaviors (Cole & Scott, 1999; Kastner, 1988; Kaufman, 2000). The average birder tends to be middle-aged, female, white and has above average income and education (Carver, 2013; Stoll et al., 2006).

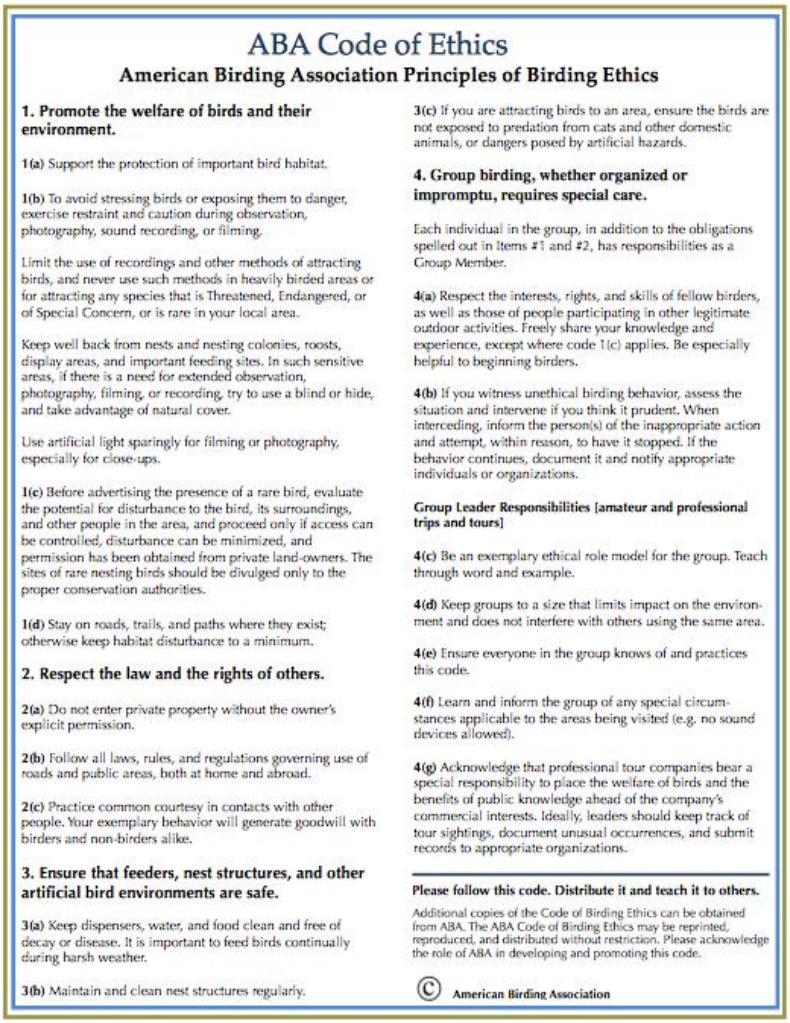
The large number of individuals participating in birding have an impact on local economies. Previous research has documented direct and indirect economic impacts of birding events and destinations to local economies (Carver, 2013; Kerlinger, 1993; Kerlinger & Brett, 1995; Kim et al., 1997; Kolstoe & Cameron, 2017; Sekercioglu, 2003). Sekercioglu (2003) explains that because birders are well educated and have higher than average income, they are likely to have higher awareness of nature and spend more money in pursuit of birds, making them an ideal ecotourist. Money spent by birders in pursuit of birds can be trip-related (e.g., transportation, lodging, food) or equipment-related (e.g., binoculars, cameras, field guides, etc.) (Carver, 2013). More recent research suggests that when birders are willing to travel further for birding, they tend to be more willing to pay for different types of birding trips and marginally willing to pay or marginally willing to pay more to see expected bird species at each destination (Kolstoe & Cameron, 2017).

In addition to having an impact on local economies, birders are stakeholders in bird conservation (Sekercioglu, 2002). Although some birders may be more conservation-oriented than others (McFarlane, 1994), birding as a recreational activity can involve visiting places other groups of recreationalists may not traditionally visit (e.g., superfund sites [Schaffner, 2009]). This behavior has led to the protection of unprotected areas where desired birding species exist (Sekercioglu, 2002, 2003), as drawing birders to an area can benefit local economies (Kerlinger & Brett, 1995). Birders as ecotourists also financially contribute to already protected lands, such as sanctuaries, parks and other public lands through visitation fees and paid tours. Contributing directly to these conservation organizations additionally supports environmental education (Kerlinger & Brett, 1995). Some birders contribute to game programs such as purchasing the Migratory Bird Hunting and Conservation Stamp (Shipley et al., 2019), which helps agencies purchase and protect wetland habitat. Birders may also contribute to nongame programs (Kerlinger, 1993) which can benefit not just bird species but other wildlife species that fall into this category. Because of these indirect and direct contributions to bird conservation, birders are an important group of stakeholders to consider in efforts made towards bird conservation as well as potential issues around disturbance to birds and bird habitat.

1.5 Birder Perceptions of Disturbance to Birds

Because of their active pursuit of birds (Sekercioglu 2002), birders have the potential to negatively impact birds and bird habitat. Although these impacts have been discussed (Booth et

al., 2011; Boxall & McFarlane, 1993; Collins-Kreiner et al., 2013; Radkovic et al., 2019; Reznicek, 2012; Sekercioglu, 2002), little research exploring birders' perceptions and behaviors related to disturbance to birds exists (Bireline, 2005; Reznicek, 2012; Weston et al., 2015). Reznicek (2012) compared the perceptions of bird disturbance between birders and other bird stakeholders around the Great Texas Coastal Birding Trail using a recreation specialization framework. Their results indicate that as birder specialization increases, birders are more often aware of negative impacts to birds from birding. Interestingly, birders also perceive negative impacts to birds less frequently than bird managers and birding guides (Reznicek 2012). Additionally, research conducted by Weston et al. (2015) suggests that birders who are more aware of these negative impacts to birds tend to adopt more strategies to mitigate disturbance and were more likely to agree that birders contribute to disturbance. Contradicting these findings, Bireline (2005) found that self-reported behaviors that negatively impacted birds increased as birder specialization increased, suggesting that more specialized birders are more likely to engage in harmful behaviors. Bireline also suggests that motivations, specifically achievement and competition, may be drivers for harmful behavior conducted by advanced birders. These conflicting results make for an unclear resolution about the



ABA Code of Ethics

American Birding Association Principles of Birding Ethics

1. Promote the welfare of birds and their environment.

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

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

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

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

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

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

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

2. Respect the law and the rights of others.

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

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

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

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

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

3(b) Maintain and clean nest structures regularly.

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

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

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

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

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

Group Leader Responsibilities [amateur and professional trips and tours]

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

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

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

4(f) Learn and inform the group of any special circumstances applicable to the areas being visited (e.g. no sound devices allowed).

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

Please follow this code. Distribute it and teach it to others.

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

Figure 1.1: American Birding Association's (ABA) Code of Ethics (2019)

relationship of awareness and behaviors related to bird disturbance among birders and indicate a need for further research in this area.

In this realm of study, there is little research assessing the usage, awareness and perceptions related to an important tool in preventing disturbance to birds: ethical birding guidelines. A set of guidelines recognized by some birding organizations (Reznicek, 2012) is that of the American Birding Association (ABA) – the Code of Ethics (Figure 1.1). The code of ethics consists of multiple sections of different types of guidelines including those related to promoting the welfare of birds and their environment; respecting the law and rights of others; keeping feeders, nest structures and other artificial bird environments safe; and group birding. Reznicek (2012) used the ABA code of conduct as a guide for constructing survey questions to understand birders' behaviors related to disturbance of birds. A better understanding of birders' perceptions of these ethics may be useful in preventing occurrences of bird disturbance from happening; hence, research exploring these guidelines is of importance.

1.6 Bird Photography

Although birding has primarily been an activity that uses binoculars or spotting scopes to view birds, advances in technology have changed traditional birding. Improvements in camera technology and accessibility have aided in the development of photography among bird recreationalists (Carver, 2013; Wee & Tsang, 2008). Bird photographers are a growing group of bird recreationalists (Slater et al., 2019) that are changing the face of birding. Unlike binoculars and spotting scopes, cameras are capable of documenting birds in their natural habitat and provide proof of bird sightings. Indeed, despite knowing less about bird behavior and ecology (Hanisch et al., 2019), Wee and Tsang (2008) note that bird photographers have helped advance scientists' understanding of birds by unconsciously documenting behaviors that birders may have failed to notice and report.

Despite these recent and salient changes in birding, there is little research on bird photographers and their demographics, motivations, attitudes and behaviors related to bird photography and/or birding (Cooper, 2017; Hvenegaard et al., 1989; Slater et al., 2019). Slater et al. (2019) more recently conducted a study to identify the motivations and attitudes regarding impacts of photography on birds, and photography related behaviors of bird photographers in Australia. Most of the respondents to their study were older (93% over 48), male, well-educated

and retired. Their research identified motivations among photographers for participating in photography, such as a desire to instill an appreciation of birds and document new or rare species. Their research did not identify income as a motivation, although bird photographers can profit from their photography. A particularly important finding from their research is that bird photographers believe that to some extent, disturbance to birds from bird photography is inevitable and trivial. This finding suggests that bird photographers may not be fully aware of the potential harm to birds from photography (Slater et al 2019).

Regarding the potential harm to birds from bird photography, Hvenegaard (2004) describes the potential for photography to have negative environmental impacts from photographers being too focused on achieving quality photos. These impacts could result from photographers encroaching too closely on sensitive species during important periods of their life (e.g., mating, migration). In addition to photographers potentially getting too close to subjects, the increasing numbers of nature photographers may contribute to potential negative impacts (Veríssimo et al., 2013). Some research has documented bird photographers going off-trail more frequently than non-photographers (Butler & Fenton, 1986), and other research notes that bird photographers may be stressing nesting birds more than traditional birders (Wee & Tsang, 2008). An increase in the occurrences of these practices due to increasing numbers or bird photographers is possible and potentially quite harmful.

Photography equipment serves as an important factor in understanding negative impacts to birds from bird photography. Although digital cameras have become more affordable in the last few decades, typically their magnification is less than that of binoculars or spotting scopes (Slater et al., 2019). Indeed, longer and more expensive focal lenses, which allow for more distance to be put between a wildlife subject and a photographer, are associated with less wildlife disturbance (Lott, 1992). If a photographer does not have this expensive equipment, they must physically move closer to wildlife subjects for higher quality photographs. This can be problematic, as encroaching too closely on birds and other wildlife subjects can be interpreted as dangerous (Huang et al., 2011). Because of this, bird photographers require a technique that gets them closer to birds without disturbing them. A study by Slater et al. (2019) investigates bird flight responses to different types of approaches by bird photographers. These approaches include a walking approach directly towards the birds with a camera, a crouching or crawling approach, and a flash photography approach, with a normal walking approach without a camera being the control technique. The

study found that birds respond earlier to all photography approaches than the normal walking approach, suggesting that birds can distinguish between photographers and walkers and that photographers may be interpreted as dangerous. These approaches do not help photographers get closer to birds (Slater et al., 2019).

Because of these potential negative impacts to birds and potential barriers in technology and photography technique, researchers have highlighted a need for an ethical code of conduct (Hvenegaard, 2004; Podduwage, 2016; Slater et al., 2019; Veríssimo et al., 2013). Indeed, there are few ethical codes of conduct or ethical guidelines specifically for bird photography that are as comprehensive as the American Birding Association's set of ethical birding guidelines (2019). Some wildlife or bird conservation organizations have tips on photographing wildlife and/or birds (e.g., the Audubon Society has tips for photographing birds). However, the North American Nature Photography Association (NANPA) based in Illinois has created a more general set of ethical guidelines (Figure 1.2) for nature photographers that covers similar ethical topics as the ABA ethical birding guidelines: environment (knowledge of photography subject and place), social (knowledge of rules and laws) and individual (expertise and responsibilities [Podduwage, 2016; *Principle of Ethical Field Practices*, 2019]). Similar to

NANPA

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PRINCIPLES OF ETHICAL FIELD PRACTICES

NANPA believes that following these practices promotes the well-being of the location, subject and photographer. Every place, plant, and animal, whether above or below water, is unique, and cumulative impacts occur over time. Therefore, one must always exercise good individual judgment. It is NANPA's belief that these principles will encourage all who participate in the enjoyment of nature to do so in a way that best promotes good stewardship of the resource.

ENVIRONMENTAL: KNOWLEDGE OF SUBJECT AND PLACE

Learn patterns of animal behavior.
So as not to interfere with animal life cycles.

Do not distress wildlife or their habitat.
Respect the routine needs of animals.

Use appropriate lenses to photograph wild animals.
If an animal shows stress, move back and use a longer lens.

Acquaint yourself with the fragility of the ecosystem.
Stay on trails that are intended to lessen impact.

Do not participate in or endorse the use of a live mammal as bait for photographic purposes.
Use of a live mammal as bait is unethical and can cause harm to predatory birds and animals.

Research your subject beforehand and avoid risking harm to capture an image.
For example, current research shows that baiting owls causes harmful habituation and should be avoided.

SOCIAL: KNOWLEDGE OF RULES AND LAWS

When appropriate, inform managers or other authorities of your presence and purpose.
Help minimize cumulative impacts and maintain safety.

Learn the rules and laws of the location.
If minimum distances exist for approaching wildlife, follow them.

In the absence of management authority, use good judgment.
Treat the wildlife, plants and places as if you were their guest.

Prepare yourself and your equipment for unexpected events.
Avoid exposing yourself and others to preventable mishaps.

INDIVIDUAL: EXPERTISE AND RESPONSIBILITIES

Treat others courteously.
Ask before joining others already shooting in an area.

Tactfully inform others if you observe them in engaging in inappropriate or harmful behavior.
Many people unknowingly endanger themselves and animals.

Report inappropriate behavior to proper authorities.
Don't argue with those who don't care; report them.

Be a good role model, both as a photographer and a citizen.
Educate others by your actions; enhance their understanding.

Connecting the Nature Photography Community

Figure 1.2: North American Nature Photography Association's (NANPA) Principles of Ethical Field Practice (2019)

birders, an understanding of perceptions related to these guidelines may be useful in preventing bird disturbance from bird recreationalists.

1.7 Recreation Specialization Framework and Birding

Recreation specialization, a framework that classifies recreators on a continuum of specialization, has been widely studied with birding populations around the world. The framework is primarily used to understand people's participation in leisure and outdoor recreation. It theorizes that recreation participants can be placed on a spectrum from general interest and low involvement to specialized interest and high involvement based on individual behavioral and attitudinal indicators. The original framework is derived from the work of Bryan (1977, 1979). Through studying fishermen, Bryan identified measures for classifying individuals along a spectrum of behavior from general to specific: skills and knowledge, equipment and techniques, and commitment to the activity. In the context of birding, skills and knowledge can refer to an individual's ability to identify birds or how much they might know about birds. Equipment and techniques refer to owned equipment and various behaviors, including trip and equipment expenditure and number of days within a year dedicated to birding. Commitment to birding has traditionally been measured through gauging how much birding influences personal and behavioral commitments (Lee & Scott, 2004; Scott & Shafer, 2001), although some researchers also measure how centered birding is in an individual's life (centrality). In addition to Bryan's work, a plethora of research has applied recreation specialization framework to bird recreationalists internationally, some aiming to better understand the theory, motivations, birding preferences, demographics, involvement in conservation and birding practices (Cole & Scott, 1999; Eubanks Jr et al., 2004; Hvenegaard, 2002; Lee & Scott, 2004; Maple et al., 2010; McFarlane, 1994; Reznicek, 2012; Scott et al., 1999, 2005; Scott & Thigpen, 2003; Stoll et al., 2006; Vas, 2017).

The application of recreation specialization framework to birding has helped researchers gain a better understanding of the framework and the diverse birding community. For example, McFarlane (1994) found that different levels of specialization in birding can result in a goal orientation shift, where advanced birders were more motivated by achievement in birding than novice or intermediate birders, who were more motivated by contributing to conservation. Hvenegaard (2002) found that age, income and percentage male increased with specialization level as well as conservation involvement (although this was weakly related to specialization level). In

the context of bird disturbance, two studies attempted to predict engagement in unethical behavior using a recreation specialization framework (Birline, 2005; Reznicek, 2012). However, the results of these studies were conflicting, suggesting that 1) retesting of the recreation specialization framework in this context may be necessary or 2) recreation specialization may not be the best framework to fully understand and predict complex behavior related to bird disturbance.

1.8 Research Justification

Both traditional birding and bird photography can have negative impacts on birds and bird habitat. Because of these impacts, it is necessary to understand who among these recreationalists may be more likely to engage in these harmful behaviors and why. Particularly, it is necessary to understand which socio-demographic characteristics (e.g., maintenance of a life list, knowledge of birds, expenditure on equipment and travel, years of practice, gender, etc.) of bird recreationalists may relate to harmful behavior. Previous research in the area of perceptions, attitudes and behaviors related to bird disturbance by bird recreationalists used a recreation specialization framework to examine these concepts (Bireline, 2005; Reznicek, 2012), or the work focused on garnering a better understanding of understudied bird photographers (Slater et al., 2019; Watson, 2011; Wee & Tsang, 2008). This study incorporates dimensions of recreation specialization framework (motivations, centrality and commitment related to birding and bird photography) to understand differences in the different typologies of bird recreationalists, but due to conflicting results of previous studies on bird disturbance, this study does not fully implement traditional methods of the recreation specialization framework (i.e., bird recreationalists are not grouped by specialization). This work also aims to identify individual characteristics of recreationalists that make them more likely to engage in potentially harmful behaviors. Additionally, this study is one of few that includes bird photographers as key stakeholders in bird conservation.

It is important to gauge bird recreationalists' awareness of their role in disturbance to birds and what motivations and barriers may be connected to engaging in behavior that is harmful to birds. Although previous research has identified motivations related to the activities of birding and bird photography, most research does not focus explicitly on motivations related to bird disturbance (Bireline, 2005; Reznicek, 2012; Slater et al., 2019; Watson, 2011; Weston et al., 2015). There is some research that peripherally mentions barriers to preventing disturbance for bird photographers (Slater et al., 2019). The current research aims to connect birding and bird

photography motivations and barriers related to bird disturbance from the perspectives of bird recreationalists. Additionally, this research provides a better understanding of bird recreationalists and disturbance to birds for natural resource managers and bird stakeholders. Human dimensions research such as this has the potential to provide long-lasting, stakeholder-informed solutions to manage human-wildlife issues (Decker & Chase, 1997).

CHAPTER 2. A TYPOLOGY OF BIRD RECREATIONALISTS AND CHARACTERISTICS CONNECTED TO BIRD DISTURBANCE

2.1 Introduction

Bird recreationalists' impact on birds is an important topic of study, furthering efforts in bird conservation and researchers' understanding of human disturbance to birds. Although bird recreationalists represent a diverse group of individuals with varying levels of commitment, motivations, knowledge and behaviors related to the activity of pursuing birds (Eubanks Jr et al., 2004; Hvenegaard, 2002; Scott et al., 1999), subgroups that fall under this label are still understudied. In particular, bird recreationalists who engage in bird photography are severely understudied (Slater et al., 2019), despite the advances in camera technology and accessibility that occurred back in the first decade of the 21st century (Wee & Tsang, 2008). Photography has impacted the face of birding such that bird recreationalists can document bird sightings and behavior. In turn, these photos allow for other people to observe birds and their behaviors after the sighting occurs.

Bird recreationalists have been identified by multiple researchers as potential threats to birds (Boyle & Samson, 1985; Collins-Kreiner et al., 2013; Sekercioglu, 2002) and some research has explored birders' perceptions and behaviors related to bird disturbance and tangentially, environmental concern (Bireline, 2005; Glowinski & Moore, 2014; Reznicek, 2012; Schaffner, 2009; Weston et al., 2015). Despite bird photographers being identified as potential threats to birds (Hvenegaard, 2004), bird photographers' perceptions and behaviors related to bird disturbance are still understudied with only one study truly exploring these variables (Slater et al., 2019). This is an important area of research, particularly because bird photographers may not share the same knowledge of birds that birders have and thus may unknowingly contribute to disturbance of birds and bird habitat (Wee & Tsang, 2008). When asked about bird disturbance, bird photographers perceive it to be inevitable and trivial (Slater et al., 2019), accepting that it will happen.

Despite bird photographers using techniques to get closer to birds while minimizing potential harm to birds, some bird species still interpret this technique as dangerous (Slater et al., 2019). In addition to modifying behavior, bird photographers may also modify existing environment to get better photos of birds. Although birders have been extensively studied through a recreation specialization framework that has been applied as a means to understand how specialization may

predict engaging in behaviors that disturb birds (Bireline, 2005; Reznicek, 2012), this framework has not been applied to bird photographers in any area of research. The framework serves as a means to explain how specialization varies based on an individual's commitment, behaviors, attitudes and knowledge related to a recreation activity (Bryan, 1977) and has the potential to help researchers better understand more specific behaviors such as those related to bird disturbance.

The current chapter of this thesis aims to create a typology of bird recreationalists based on birding and bird photography and assess differences in socio-demographic characteristics between the resulting groups of recreationalists. Additionally, using dimensions of the recreation specialization framework (i.e., motivations, centrality and commitment related to birding or bird photography) and other demographics, this study aims to understand connections between an increase in disturbance to birds and socio-demographic variables of bird recreationalists. These results will help build a preliminary profile of which bird recreationalists may be more likely to disturb birds. Finally, this chapter aims to gauge bird recreationalists' awareness of their role in bird disturbance and how bird recreationalist groups may differ in awareness. The following research questions and hypotheses will be investigated in this chapter:

1. How do various groups of bird recreationalists differ in socio-demographic characteristics?
    a. Hypothesis 1a: recreationalists who identify birding as their bird-related recreational activity will know more about birds than recreationalists who identify bird photography as their primary activity (Slater et al., 2019; Wee & Tsang, 2008).
    b. Hypothesis 1b: birders and primary birders will both spend less money than both photographers and primary photographers on equipment (Slater et al., 2019; Wee & Tsang, 2008).
    c. Hypothesis 1c: the sample of primary photographers will be composed of more males (Slater et al., 2019), whereas birders and primary birders will be composed of more females.
2. How are socio-demographic characteristics connected to an increase in bird/bird habitat disturbance among bird recreationalists?
    a. Hypothesis 2: bird photography, lower levels of knowledge of birds, achievement-oriented motivations will be connected to an increase in bird disturbance among bird recreationalists (Bireline, 2005; McFarlane, 1994; Reznicek, 2012; Slater et al., 2019; Wee & Tsang, 2008; Weston et al., 2015).

3. To what extent do bird recreationalists believe that they contribute to bird disturbance?
    a. Hypothesis 3: recreationalists who bird as a primary activity will be more likely to perceive themselves as contributors to bird disturbance than recreationalists who photograph birds as a primary activity (Slater et al., 2019; Weston et al., 2015).

2.2 Methods

2.2.1 Survey Participants

This study was conducted in two Midwestern states in the U.S., Illinois and Indiana. Convenience sampling of birding and nature photography groups was used to gather participants for an online survey, as random sampling methods were not feasible for this research due to a lack of birding and bird photography records. To recruit bird recreationalists, local chapters of the National Audubon Society (e.g., Wabash Valley Audubon Society) and independent Audubon Society groups (e.g., Indiana Audubon Society) in both Illinois and Indiana were contacted about distributing the online survey to their birder and bird photographer members. To recruit more bird photographers, social media groups (i.e., closed Facebook groups) were contacted by researchers about distributing the online survey to their members. For all consenting social media groups, researchers created announcements or social media posts about the survey. Prior to contacting groups about disseminating the survey among their members, the survey was pilot tested on graduate students in the Department of Forestry and Natural Resources at Purdue University where study authors were employed. Similar to participants, graduate students in the department may have an appreciation of birds or engage in birding or bird photography. In May of 2019, 12 groups were contacted about participating in the survey, and by the end of September 2019, members of 10 groups had participated in the survey. Table 2.1 displays the number of participants who responded to the survey by group.

Table 2.1: Participating Birding and Nature Photography Groups

Group	**Participants (N)**
Central Illinois Photographic Society (Facebook)	12
Chicago Audubon	10
Birding in Indiana (Facebook)	27
Illinois Wildlife Photography (Facebook)	9
Indiana Audubon	132

Table 2.1 continued

Indiana Nature and Wildlife Photography (Facebook)	6
McHenry Audubon	17
Springfield Audubon	3
Sycamore Audubon	11
Wabash Valley Audubon	18

2.2.2 Survey Development

The survey (see Appendix A) consisted of multiple sections. In the first section, participants were identified as birders or bird photographers based on if they liked to watch birds and/or photograph nature and their behaviors related to leaving their homes to see birds and/or photograph nature. Participants who identified themselves as a participant of both birding and nature photography were given the option to identify which activity was their primary activity. Later, these participants were given the option to answer questions related to their secondary activity. Although data on participants' secondary activity were collected, only data on their primary activity were utilized in later analyses. Participants only viewed questions related to their identified activity, birding or nature photography.

Questions were developed to gauge participant motivations, knowledge, centrality, commitment, behaviors and attitudes related to their affiliated activity. Some questions were used or modified from existing birding literature (see Table 2.2). Question types included closed (single and multiple response), numeric, and Likert (see Appendix A).

Table 2.2: Survey Questions Modified from Existing Literature

Survey Question	**References**	**Purpose**	**Justification**
"Approximately how much money have you invested in equipment to [watch birds] [photograph nature]?" (ACBD_Q4a; ACNP_Q4a); "Approximately how much money do you spend each year to [watch birds] [photograph nature], not including equipment (e.g., travel, lodging)?" (ACBD_Q4b; ACNP_Q4b)	Bryan, 1977	Expenditure for birding/bird photography is a form of behavior	Expenditures can indirectly reflect commitment to birding and/or bird photography.
"Approximately how many years have been [watching birds] [photographing nature]?" (ACBD_Q3; ACNP_Q3)	Lee and Scott, 2004	Years of practice in birding/bird photography	The number of years of practice can indicate experience.

Table 2.2 continued

"Please indicate your level of disagreement or agreement with the following statements regarding your motivations to watch birds/photograph nature" with stem "I [watch birds] [take photographs]…" (ACBD_Q5; ACNP_Q5)	McFarlane, 1994; Scott et al., 2005	Motivations to participate in birding/bird photography	Motivations in part characterize why recreators partake in their associate activity and could play a role in unethical behaviors.
"Please indicate your level of disagreement or agreement with the following statements regarding your feelings about watching birds/photographing nature." (ACBD_Q6; ACNP_Q6)	Kim et al., 1997	Commitment/centrality of birding/bird photograph to participant's life	Commitment, or centrality is a factor that indicates how serious one is about an activity, such that the more one is committed to an activity, the more serious they are about the activity (Stebbins, 1992)
"Please indicate the likelihood that you would use the following techniques while [watching birds] [photographing nature]." (ACBD_Q8; ACNP_Q8)	Reznicek, 2012	Likelihood of using various birding practices	Reznicek used this question to measure respondents' frequency of using potentially harmful or safe birding practices. We modified the scale of this question to measure likelihood as a means to understand potential behavior.
"Do you maintain a 'life list' of birds?" "Approximately how many birds are on your life list?" (KNOW_Q3a; KNOW_Q3b)	Reznicek 2012	Maintenance of Life List and experience	The Life List is an important aspect of measuring commitment of a bird recreationalist.
"Approximately how many birds in the U.S. can you identify by sight/sound on your own?" (KNOW_Q1; KNOW_Q2)	Lee & Scott, 2004	Knowledge of birds	Bird identification is one aspect of measuring participants' knowledge of birds and can demonstrate differences in knowledge between recreator groups.

2.2.3 Analysis

To confirm that the correct datatype fit with the corresponding responses, the dataset was cleaned using a combination of R (v.1.2.1335) and Microsoft Excel (v. 16.0.6742.2048). Then, R was used to calculate descriptive statistics and conduct other statistical analyses. Surveys were considered complete if respondents answered at least one question after the recreationalist identification section of the survey. Completion rates thus vary by question. Pairwise deletion was used to remove missing data in every analysis, so the number of observations varies in each analysis.

To create a typology of bird recreationalists, a series of questions were asked at the beginning of the survey to gauge respondents' participation in birding and bird photography. From those questions, respondents were categorized as only birders (referred to as "birders" throughout this thesis) from answering yes to Q1a-Q1b ("Do you like to watch birds?" and "Do you leave your home to watch birds?") and no to Q2a or Q2b ("Do you take photos of nature?" and "Do you leave your home for the purpose of photographing nature?") (n=56); only photographers from answering no to Q1a or Q1b and yes to Q2a-Q2b (n=2); primary birders who photograph birds from answering yes to Q1a-Q2b and selecting "Birding" for Q3 (n=112); and primary photographers who participate in birding and bird photography from answering yes to Q1a-Q2b and selecting "Nature photography" for Q3 (n=55). Only photographers were excluded from analyses due to the low response rate. Although the survey asked questions focusing broadly on nature photography, all participants were able to indicate their specific interest in bird photography. Participants were thus considered bird recreationalists (and more specifically, bird photographers) if they had at least some interest in photographing birds; participants who were not interested in bird photography were excluded from later analyses.

After establishing groups of bird recreationalists, descriptive statistics were calculated for various socio-demographic variables including gender, age, education, years of experience, expenditure on equipment and yearly travel, number of birds identified by sight and sound, maintenance of a life list and number of birds on said life list. Once descriptive statistics were calculated, further analyses were used to determine differences in socio-demographic variables between bird recreationalist groups. After confirming that the variables of interest were not normally distributed between the groups of bird recreationalists (using the Shapiro Wilk test for normality), differences between recreationalist groups were tested using the Kruskal-Wallis test.

If the results of the Kruskal-Wallis test were significant, the Wilcoxon Ranked Sum test was used for pairwise testing between groups with Bonferroni correction to account for potential Type I errors. For comparing how bird recreationalists ranked different recreation groups based on their perceived impacts on bird and bird habitat disturbance, the Pearson's Chi-Square test with the Yates continuity correction method was used to determine existing differences between the rankings of all bird recreationalist groups. If these Chi-Square test results were significant, this same test was used to determine exactly how recreationalist groups differed from each other. Because of the smaller sample size, margins for significance were expanding to include all results less than 0.1 (Dahiru, 2008).

To determine if any socio-demographic characteristics influence the likelihood to engage in harmful or harm-reducing behaviors, multiple binary variables were created for exploratory testing based on previous studies (see Table 4). These variables in part were chosen for this analysis based on previous literature suggesting their potential impacts on behavior, although some were chosen based on the results from the typologies. These binary constructs of variables were chosen for analyses due to the smaller sample size yielded from the online survey, which limited the type of analyses that could be conducted. The Kruskal-Wallis test was used to determine significant differences between variable responses for each behavior.

Table 2.3: Socio-demographic Characteristics of Interest

Variable	**Method of construct**	**Source of idea**
Primary Activity	1 = bird photography, 0 = birding	Current study's typology results
Maintenance of a Life List	1 = yes responses, 0 = no and I don't know responses	Glowinski & Moore, 2014; McFarlane et al., 1998; Schaffner, 2009
Number of birds on Life List	Divided into two groups based on dataset's median (302); 1 > median, 0 ≤ median	
Number of birds identified by sight	Divided into two groups based on dataset's median (150); 1 > median, 0 ≤ median	Current study's typology results
Gender	1 = female, 0 = male	Cooper & Smith, 2010, Scott et al., 1999

Table 2.3 continued

Achievement-oriented motivations	Participants' responses (on a scale of 1 to 5, where 1=strongly disagree and 5=strongly agree) to select statements from the question *"Please indicate your level of disagreement or agreement with the following statements regarding your motivation to watch birds/photograph nature"* were compounded and split into two groups based on the median (13), associated with achievement-oriented statements "To [see birds] [photograph nature] I have not seen before," "To improve my [bird observation] [photography] skills" and "To see [as many birds] [as much nature] as possible"); 1 > median, 0 ≤ median	Bireline, 2005; McFarlane, 1994; statements adapted from Scott et al., 2005
Number of years practicing birding/bird photography	Divided into two groups based on dataset's median (15); 1 = > median, 0 = ≤ median	Bireline, 2005; Reznicek, 2012

2.3 Results

2.3.1 Demographics

The total number of surveys completed was 213, with 56 people identifying as birders; 104 respondents identifying as primarily birders that also participate in nature photography; 51 respondents identifying as primarily nature photographers that also participate in birding; and 2 respondents identifying as only nature photographers. Table 2.4 details the process of achieving these numbers. Because the focus of this study is on bird recreationalists, the 2 respondents who identified as only photographers were not included in the analyses. For all bird recreationalist groups, most respondents were female. Most birders, primary birders and primary photographers had at least some college education, although both birders and primary birders were more educated than primary photographers ($p<0.1$ and $p<0.001$, respectively; see Table 2.5). The mean age for birders was 54.5 ± 19.5 SD years; for primary birders, 54.9 ± 14.4 SD years; and for primary photographers was 57.5 ± 14.5 SD years. The mean number of years of experience for birders was

22.6 ± 16.6 SD years; for primary birders, 23.7±17.9 SD years; and for primary photographers, 17.5±15.3 SD years.

Table 2.4: Typology Identification

Survey Question	**Yes**	**No**	**Total**
Q0. Do you live in Illinois or Indiana?	99.6%	0.4%	226
Q1a. Do you like to watch birds?	99.6%	0.4%	225
Q1b. Do you leave your home to watch birds?	99.6%	0.4%	224
Q2a. Do you take photos of nature?	88.4%	11.6%	225
Q2b. Do you leave your home for the purpose of photographing nature?	84.9%	15.1%	199
Q3. You indicated that you watch birds and photograph nature. Which do you consider to be your primary activity?	112 (67.1%) – birding 55 (32.9%) - photography		

Table 2.5: The distribution of demographic characteristics among birders, primary birders and primary photographers, and associated differences between the groups.

Demographic Variables	All	Only birders	Primary birders	Primary photographers	P-value (Kruskal-Wallis Test)	P-value (Wilcoxon pairwise comparison)
Gender (n)	191	51	92	48		
Male (%)	37.7	29.4	41.3	39.6	0.357	NA
Female (%)	62.3	70.6	58.7	60.4		
Education (n)	193	51	94	48		
Some formal schooling (%)	0.5	0	0	2.1		
High school diploma/GED (%)	7.3	3.9	5.3	14.5		B-PB: 0.860
Some college (%)	15.0	21.6	8.5	18.8	**<0.005**	**B-PP: <0.1**
2-year college degree (%)	6.2	2.0	7.4	8.3		**PB-PP: <0.001**
4-year college degree (%)	34.2	33.3	32.0	37.5		
Graduate degree (%)	37.8	39.2	46.8	18.8		
Age in years (n)	192	50	94	48		
Mean	55.4	54.5	54.9	57.5		
Standard deviation	15.8	19.5	14.4	14.5	0.667	NA
Median	59	55.5	58.5	60		
Range	18-85	18-85	24-80	24-83		
Years of birding/photography experience (n)*	205	55	102	48		
Mean	21.9	22.6	23.7	17.5		
Standard deviation	17.1	16.6	17.9	15.3	0.162	NA
Median	15	20	19	11.5		
Range	1-70	1.5-65	1-70	2-65		

Notes: *Survey question adapted from the following literature: Lee & Scott, 2004.

2.3.2 Knowledge and experience

Bird recreationalists were asked how much money they spend on equipment (in total) and yearly travel related to birding and photography. On average, birders indicated that they spent $1,665.0 ± 1,467.7 SD on equipment and $1,143.0 ± 1,460.1 SD on yearly travel (Table 2.6). Primary birders indicated that on average, they spent $2,554.9 ± 2,498.7 SD on equipment and $1,933.0 ± 2,148.7 SD on year travel. Primary photographers indicated that on average, they spent $4,562.0±3,456.6 SD on equipment and $1,699.3±1,849.5 SD on yearly travel. Primary photographers spent more money than birders and primary birders on equipment ($p<0.001$), and birders spent less money on yearly travel than primary birders and primary photographers did (respectively, $p<0.1$; $p<0.05$)

Bird recreationalists were asked to indicate how many birds they can identify by sight and sound. On average, birders indicated that they could identify 255.4 ± 189.3 SD birds by sight and 85.3 ± 92.6 SD birds by sound. Primary birders indicated that on average they could identify 273.1 ± 220.6 SD birds by sight and 103.2 ± 121.9 SD birds by sound. Primary photographers indicated that on average they could identify 116.8 ± 152.2 SD birds by sight and 41.56 ± 65.9 SD birds by sound. In both cases, birders and primary birders can identify more birds by sight and sound ($p<0.001$ for both) than primary photographers ($p<0.001$ for both; Table 2.6).

In addition to asking bird recreationalists about bird identification, they were asked about maintaining a life list and to indicate the number of birds on their life list. Most birders (75.9%, n=41) and primary birders (79.4%, n=81) maintained life lists, whereas most primary photographers (72.0%, n=36) did not ($p<0.001$ for both primary photographers vs. birders and primary photographers vs. primary birders; Table 2.6). Likewise, birders who had life lists had more birds on their lists than photographers who had life lists ($p<0.01$; mean for birders = 522.9±620.3 birds; mean for photographers = 204.8±136.3 birds; Table 2.6).

Table 2.6: The distribution of birding and photography-specific characteristics among birders, primary birders and primary photographers, and associated differences between the groups.

Variable	All	Birders	Primary birders	Primary photographers	P-value (Kruskal-Wallis test)	P-value (Wilcoxon pairwise comparison)
Equipment expenditure in USD (n)	208	55	103	50	**<0.001**	**B-PP: <0.001** **PB-PP: <0.001**
Mean	2,812.0	1,665.0	2554.9	4,582.0		
Standard deviation	2,752.3	1,467.7	2498.7	3,456.6		
Median	1,958	1,255	1507	3,958		
Range	28-10,000	28-6,000	70-10,000	378-10,000		
Yearly travel expenditure in USD (n)	198	53	99	46	**<0.05**	**B-PB: <0.1** **B-PP: <0.05**
Mean	1,661.3	1,143.0	1,933.0	1,699.3		
Standard deviation	1,933.5	1,460.1	2,148.7	1,849.5		
Median	1,000	521	1,050	1,090		
Range	0-10,000	78-7,097	28-10,000	0-10,000		
Number of birds identified by sight (n)	202	51	101	50	**<0.001**	**B-PP: <0.001** **PB-PP: <0.001**
Mean	227.8	255.4	273.1	116.8		
Standard deviation	207.6	189.3	220.6	152.2		
Median	150	200.0	200.0	50.0		
Range	10-980	20-800	25-980	10-900		
Number of birds identified by sound (n)	202	51	101	50	**<0.001**	**B-PP: <0.001** **PB-PP: <0.001**
Mean	82.7	85.3	103.2	41.56		
Standard deviation	105.6	92.6	121.9	65.9		
Median	30	50.0	50	20.0		
Range	1-700	4-400	5-700	1-300		
Maintain a Life List (n)	206	54	102	50	**<0.001**	**B-PP: <0.001** **PB-PP: <0.001**
Yes (%)	66.0	75.9	79.4	28.0		
No (%)	34.0	24.1	20.6	72.0		

Table 2.6 continued

Number of birds on life list (n)	131	39	78	14		
Mean	488.9	453.5	557.6	204.8		
Standard deviation	595.7	392.0	707.2	136.3	**<0.05**	**B-PP: <0.01**
Median	302	300	338	200.5		
Range	5-3,850	50-1,990	5-3,850	15-400		

Notes: Survey questions adapted from the following literature: Bryan, 1977; Lee & Scott, 2004; and Reznicek, 2012.

2.3.3 Motivations, Centrality and Commitment

Bird recreationalists were asked to rank their level of agreement for a series of statements about their motivations, centrality (how central birding or bird photography is to an individual's life) and commitment for their associated primary activity. A five-point scale of agreement was used for ranking all the statements related to motivations, centrality and commitment, where 1=strongly disagree 5=strongly agree and 3=neither agree nor disagree. The mean ranking of the statements showed neither agreement or disagreement, or some agreement with the statements except for two statements ("For my job" and "For hunting"). The highest ranked statement for birders, primary birds and primary photographers was "To enjoy nature" (M=4.7, 4.8 and 4.8, respectively for each group; Table 2.7). The statements were assessed to determine if recreationalist groups ranked them differently from each other. There were differences in ranking for four statements. For the statement "To see [as many birds] [as much nature] as possible," primary photographers ranked this statement higher than birders and primary birders, ($p<0.05$ and $p<0.001$, respectively). For the statement "To do something creative," primary photographers ranked this statement higher than primary birders and birders ($p<0.001$ and $p<0.001$, respectively). For the statement "To be alone," primary photographers ranked this higher than primary birders ($p<0.05$). Finally, for the statement "For family recreation," primary birders ranked this statement higher than primary photographers ($p<0.05$).

The centrality statements were adapted from the work of Kim et al. (1997). Generally, the means of these statements varied from disagree to neither agree nor disagree, with the highest ranked statement being "I would rather [watch birds] [photograph nature] than do anything else" (M=3.2, 3.5 and 3.6 respectively for birders, primary birders and primary photographers; Table 2.8). The lowest ranked statements were "Because of [watching birds] [photographing nature], I do not have much time to participate in other leisure activities" for birders and primary birders (M=2.1 and 2.1, respectively) and "If I stopped [watching birds] [photographing nature], I would probably lose touch with a lot of my friends" for primary photographers (M=2.1). There were two statements that bird recreationalist groups ranked differently from each other. For "I would rather [watch birds] [photograph nature] than do anything else," primary photographers ranked this statement higher than birders ($p<0.05$). For "Others would probably say that I spend too much time [watching birds] [photographing nature]," primary birders ranked this statement higher than birders ($p<0.1$).

Table 2.7: Mean rankings and differences between bird recreationalists' motivations related to birding or bird photography.

Statement	Birder		Primary birder		Primary photographer		P-value (Kruskal-Wallis)	P-value (pairwise Wilcoxon)
	n	***M***	***n***	***M***	***n***	***M***		
To enjoy nature.	55	4.7	104	4.8	51	4.8	0.611	NA
To be outdoors.	55	4.5	104	4.6	51	4.5	0.937	NA
To [see birds] [photograph nature] I have not seen before.	55	4.4	104	4.6	50	4.6	0.257	NA
To get away from the demands of life.	55	4	103	4.2	51	4.2	0.132	NA
To improve my [bird observation] [photography] skills.	55	4.2	104	4.4	51	4.2	0.186	NA
To see [as many birds] [as much nature] as possible.	55	3.8	104	4.1	51	4.5	**<0.001**	**B-PB: <0.1** **B-PP: <0.001** **PB-PP: <0.05**
To do something creative.	55	3.3	104	3.7	51	4.4	**<0.001**	B-PB: 0.110 **B-PP: <0.001** **PB-PP: <0.001**
To be alone.	55	3	104	3.1	50	3.5	**<0.1**	B-PB: 1.000 **B-PP: <0.1** PB-PP: 0.204
For my job.	55	1.9	104	1.7	50	2	0.289	NA
For family recreation.	55	3.2	104	3.4	50	2.9	**<0.05**	B-PB: 0.544 B-PP: 0.447 **PB-PP: <0.05**
For hunting.	55	1.3	104	1.3	50	1.4	0.694	NA
To interact with other people who [watch birds] [photograph nature].	55	3.4	104	3.4	51	3.1	0.102	NA

Notes: Survey question: "Please indicate your level of disagreement or agreement with the following statements regarding your motivations to watch birds/photograph nature" with stem "I [watch birds] [take photographs]…" Adapted from McFarlane, 1994 and Scott et al., 2005. Question and statements rephrased based on respondents' recreator type (as indicated with brackets).
Scale: 1=strongly disagree, 2=disagree, 3=neither, 4=agree, 5=strongly agree

Table 2.8: Mean rankings and differences in centrality to birding and/or bird photography between bird recreationalists.

Statement	Birder		Primary birder		Primary photographer		P-value (Kruskal-Wallis)	P-value (pairwise Wilcoxon)
	n	***M***	***n***	***M***	***n***	***M***		
I would rather [watch birds] [photograph nature] than do anything else.	55	3.2	104	3.5	51	3.6	**<0.05**	B-PB: 0.176 **B-PP: <0.05** PB-PP: 0.746
Other leisure activities don't interest me as much as [watching birds] [photographing nature].	55	3.2	104	3.4	51	3.5	0.206	NA
I find that a lot of my life is organized around [watching birds] [photographing nature].	54	3.1	104	3.3	51	3.2	0.447	NA
Others would probably say that I spend too much time [watching birds] [photographing nature].	55	2.6	103	3.0	51	2.7	**<0.1**	**B-PB: <0.1** B-PP: 1.000 PB-PP: 0.548
Most of my friends are in some way connected with [watching birds] [photographing nature].	55	2.5	102	2.5	51	2.4	0.657	NA
If I stopped [watching birds] [photographing nature], I would probably lose touch with a lot of my friends.	55	2.2	103	2.2	51	2.1	0.865	NA
If I could not [watch birds] [photograph nature], I am not sure what I would do.	55	2.5	104	2.5	51	2.5	0.981	NA
Because of [watching birds] [photographing nature], I do not have much time to participate in other leisure activities.	55	2.1	104	2.1	51	2.2	0.983	NA

Note: survey question: "Please indicate your level of disagreement or agreement with the following statements regarding your feelings about watching birds/photographing nature." Adapted from Kim et al., 1997. Question and statements rephrased based on respondents' recreator type (as indicated with brackets).
Scale: 1=strongly disagree, 2=disagree, 3=neither, 4=agree, 5=strongly agree

The next statements on commitment were created to gauge bird recreationalists' willingness to subject themselves to various conditions for birding or bird photography. Generally, the mean rankings of the statements ranged from disagree to agree. The highest ranked statement for all recreationalist groups was "Wait up to 30 minutes outside in perfect weather conditions" (M=4.2, 4.5, and 4.3 for birders, primary birders and primary photographers, respectively; Table 2.9), with birders having two other statements ranked at the same magnitude ("Hike up to 2 miles on-trail" and "Travel up to 2 hours by car"). The lowest ranked statement for all recreators was "Hike more than 2 miles off-trail" (M=2.9, 3.3, and 2.7 for birders, primary birders and primary photographers, respectively). Recreationalist groups differed in ranking on three statements. For "Hike up to 2 miles on-trail," primary birders ranked this statement higher than primary photographers ($p<0.01$). Additionally, for "Hike 2 up to miles off-trail," primary birders ranked this statement higher than primary photographers ($p<0.1$). Finally, for "Hike more than 2 miles off-trail," primary birders ranked this statement higher than primary photographers ($p<0.05$).

Table 2.9: Mean rankings and differences in commitment to birding and/or bird photography between bird recreationalists.

Statement	Birder		Primary birder		Primary photographer		P-value (Kruskal-Wallis)	P-value (pairwise Wilcoxon)
	n	***M***	***n***	***M***	***n***	***M***		
Wait up to 30 minutes outside in perfect weather conditions.	54	4.2	104	4.5	51	4.3	0.105	NA
Wait up to 1 hour outside in perfect weather conditions.	54	4.0	104	4.2	51	4.0	0.466	NA
Wait outside in the cold.	55	3.9	104	4.1	51	3.9	0.253	NA
Wait outside in the heat.	54	3.7	104	4.0	51	3.8	0.266	NA
Stay up late at night.	55	3.6	102	3.8	51	3.5	0.313	NA
Get up early in the morning.	55	4.1	104	4.2	51	4.2	0.500	NA
Hike up to 2 miles on-trail.	55	4.2	102	4.4	50	3.9	**<0.01**	B-PB: 0.121 B-PP: 0.731 **PB-PP: <0.01**
Hike up to 2 miles off-trail.	54	3.2	104	3.5	51	3.0	**<0.05**	B-PB: 0.333 B-PP: 1.000 **PB-PP: <0.1**
Hike more than 2 miles on-trail.	54	3.8	104	4.0	51	3.6	0.101	NA
Hike more than 2 miles off-trail.	55	2.9	103	3.3	51	2.7	**<0.05**	B-PB: 0.134 B-PP: 1.000 **PB-PP: <0.05**
Travel up to 2 hours by car.	55	4.2	104	4.3	51	4.2	0.491	NA
Travel more than 2 hours by car.	55	3.8	104	3.9	51	3.9	0.671	NA

Note: survey question: "Please indicate your level of disagreement or agreement with the following statements" with the stem "In order to [observe birds] [photograph nature], I am willing to…" Question and statements rephrased based on respondents' recreator type (as indicated with brackets).
Scale: 1=strongly disagree, 2=disagree, 3=neither, 4=agree, 5=strongly agree

2.3.4 Socio-Demographic Characteristics and Behavior

Bird recreationalists were asked to rank the likelihood of engaging in various harmful or harm-reducing behaviors related to birding and bird photography. This series of behaviors, or techniques, was adapted from Reznicek's (2012) work. The mean level of rankings for the behaviors varied greatly (Table 2.10). The highest ranked behavior for all recreationalist groups was "Using an observation deck" (M=4.2, 4.2 and 3.8 for birders, primary birders and primary photographers, respectively). The lowest ranked behaviors for birders were "Spotlighting" and "Using flash photography" (M=1.4 for both). Primary birders also ranked "Spotlighting" the lowest (M=1.5). Primary photographers ranked both "Flushing (intentional)" and "Spotlighting" the lowest of behaviors (M=1.4 for both). Recreationalist groups ranked 4 of the behaviors differently from each other. For "Feeding or offering a water source," "Using vocalization calls (e.g., pishing or whistles)," and "Using call playback (e.g., stereo, phone)," primary photographers ranked these statements lower than birders and primary birders ($p<0.001$ and $p<0.001$; $p<0.001$and $p<0.001$; $p<0.05$ and $p<0.05$, respectively). Finally, for the harm-reducing behavior "Using an observation deck," primary photographers ranked this statement lower than primary birders ($p<0.05$).

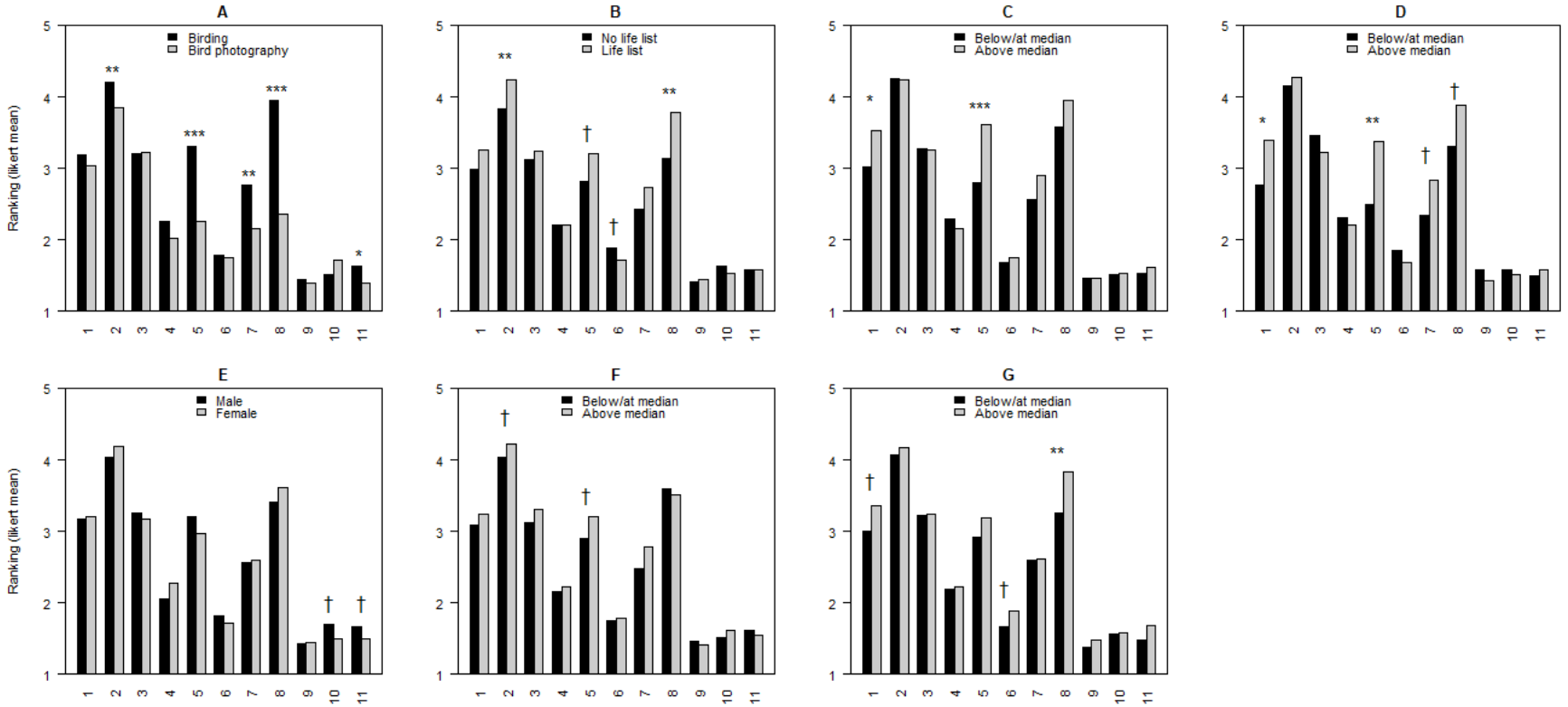
Multiple socio-demographic characteristics were tested against these harmful or harm-reducing behaviors to determine if characteristics were associated with likelihoods to engage in certain behaviors. Testing of these binary characteristics resulted in some similar trends (Figure 2.1). Individuals who indicated that birding was their only or primary activity were more likely to offer food/water to birds ($p<0.001$), use vocalization calls ($p<0.001$) and call playback to call birds ($p<0.01$), intentionally flush birds ($p<0.05$), and use an observation deck ($p<0.01$) than individuals who indicated that bird photography was their primary activity. Regarding variables related to the life list, individuals who maintained a life list were more likely to engage in a few harmful and harm-reducing behaviors than those who did not maintain a life list, including feeding or offering water/food ($p<0.01$), using vocalizations to call birds ($p<0.1$) and using an observation deck ($p<0.01$). Those who did not maintain life lists were more likely to use instrument calls ($p<0.1$) than those who did maintain life lists. Additionally, individuals with more than the median number of birds on their life lists were more likely to use vocalizations to call birds ($p<0.001$) and use a viewing blind ($p<0.05$) than those who had at or below the median number of birds on their life lists.

Relating to birding and bird photography knowledge, experience, motivations and gender, individuals who could identify more than the median number of birds by sight were more likely to feed or offer water/food to birds ($p<0.1$), use vocalizations to call birds ($p<0.01$), use call playback to call birds ($p<0.1$), and use a viewing blind ($p<0.05$) than individuals who could identify at or below the median number of birds by sight. Individuals who had more than the median number of years of experience with birding and/or bird photography were more likely to feed or offer food/water to birds ($p<0.01$), use instrument calls to call birds ($p<01$), and use a viewing blind ($p<0.1$) than individuals who had at or less than the median number of years of experience. Regarding achievement-oriented motivations, individuals who had more than the median achievement score were more likely to use vocalizations to call birds ($p<0.1$) and use an observation deck ($p<0.1$) than individuals who had at or below the median achievement score. Finally, men were more likely than women to intentionally flush birds ($p<0.1$) and use flash photography ($p<0.1$) on birds.

Table 2.10: Mean rankings and differences in likelihoods to engage in birding and bird photography techniques between bird recreationalists.

Statement	Birder		Primary birder		Primary photographer		P-value (Kruskal-Wallis)	P-value (pairwise Wilcoxon)
	n	***M***	***n***	***M***	***n***	***M***		
Feeding or offering a water source.	54	4.0	102	3.9	51	2.3	**<0.001**	B-PB: 1.000 **B-PP: <0.001** **PB-PP: <0.001**
Using vocalization calls (e.g., pishing or whistles).	55	3.5	103	3.2	51	2.3	**<0.001**	B-PB: 1.000 **B-PP: <0.001** **PB-PP: <0.001**
Using instrument calls (e.g., duck, turkey).	54	1.6	103	1.9	51	1.8	0.509	NA
Using call playback (e.g., stereo, phone).	54	2.8	102	2.7	51	2.2	**<0.05**	B-PB: 1.000 **B-PP: <0.05** **PB-PP: <0.05**
Using or wearing attractive colors.	55	2.2	102	2.3	51	2.0	0.398	NA
Flushing (intentional).	55	1.6	103	1.7	51	1.4	0.105	NA
Spotlighting.	55	1.4	103	1.5	51	1.4	0.827	NA
Using flash photography.	54	1.4	103	1.6	51	1.7	0.142	NA
Using a viewing blind.	55	3.1	103	3.2	51	3.0	0.658	NA
Hiding in vegetation.	55	3.1	103	3.3	51	3.2	0.644	NA
Using an observation deck.	54	4.2	102	4.2	51	3.8	**<0.05**	B-PB: 1.000 B-PP: 0.160 **PB-PP: <0.05**

Note: Survey question: "Please indicate the likelihood that you would use the following techniques while [watching birds] [photographing nature]." Adapted from Reznicek, 2012. Question and statements rephrased based on respondents' recreator type (as indicated with brackets).
Scale: 1=very unlikely, 2=unlikely, 3=neither, 4=likely, 5=very likely



Notes: survey question: "Please indicate the likelihood that you would use the following techniques while [watching birds] [photographing nature]." Question and statements rephrased based on respondents' recreator type (as indicated with brackets).
Scale: 1=very unlikely, 2=unlikely, 3=neither, 4=likely, 5=very likely; † = p<.1; * = p<.05; ** = p<.01; *** = p<.001
Behaviors labelled from least harmful (using a viewing blind) to most harmful (flushing) on x-axis.
1 – Using a viewing blind; 2 – Using an observation deck; 3 – Hiding in vegetation 4 – Using or wearing attractive colors; 5 – Using vocalizations (e.g., pishing, whistles) 6 – Using instruments to call (e.g., duck, turkey); 7 – Using call playback; 8 – Feeding or offering water; 9 – Spotlighting; 10 – Using flash photography; 11 – Flushing (intentional).

Figure 2.1: Comparing how respondent recreation type (A), maintenance of a Life List (B), number of birds on a Life List (C), number of birds identified by sight (D), gender (E), achievement as a motivation (F), number of years practicing birding/bird photography (G) influence the likelihood to engage in various behaviors.

2.3.5 Perceived Blame and Awareness

Bird recreationalists were asked to choose from a list of recreation groups and rank the top three recreation groups that contribute to bird disturbance in order of most to least disturbing to birds and bird habitat (Table 2.11). For birders, the top three ranked groups from 1-3 were mountain bikers, photographers, and hunters (63.3%, 57.1% and 55.1%, respectively). The top three ranked groups for primary birders were mountain bikers, hunters and photographers (58.5%, 55.3% and 48.9%, respectively). The top three ranked groups for primary photographers were hunters, mountain bikers, and hikers/walkers (65.2%, 56.5% and 45.7%, respectively). Ranking placement of recreation groups (i.e., whether groups were ranked 1, 2 or 3) did not disclose any differences in how different groups of bird recreationalists ranked these groups. However, when comparing whether a recreation group was ranked or not ranked (i.e., placement of ranking does not matter), there were three differences in ranking. A larger proportion of primary birders (29.8%; $p<0.05$) ranked fishers/anglers as a top three recreation group that contributes to bird disturbance than birders did (12.2%). Additionally, a larger proportion of primary photographers (45.7%; $p<0.05$) ranked hikers/walkers as a top three recreation group than birders did (20.4%). Finally, a larger proportion of birders (57.1%; $p<0.05$) ranked photographers as a top three recreation group than primary photographers did (34.8%).

In addition to comparing how bird recreationalist groups ranked recreation groups based on blame for disturbance to birds, differences in how they ranked birdwatchers compared to photographers were assessed to determine if groups perceived one group differently from the other (Table 2.11). Birders ranked their own (i.e., birdwatchers; 30.6%) significantly differently from photographers (57.1%; $p<0.05$), such that more birders ranked photographers as a top contributor to bird disturbance. Primary birders likewise ranked birdwatchers (21.3%) and photographers (48.9%) differently ($p<0.001$), with more of them ranking photographers as a top contributor to bird disturbance. However, how primary photographers ranked these groups was not significantly different (birdwatchers: 21.7%; photographers: 34.8%).

Table 2.11: Differences between bird recreationalists' ranking of recreation groups based on perceived contribution to disturbance of birds/bird habitat.

Recreation group	% of individuals who ranked the associated recreation groups as a top-3 group			P-value (comparing all groups)	P-value (comparing two groups at a time)
	Birder (N=49)	Primary birder (N=94)	Primary photographer (N=46)		
Birdwatchers	30.6	21.3	21.7	0.429	NA
Fishers/anglers	12.2	29.8	21.7	**<0.1**	**B-PB: <0.05** B-PP: 0.924 PB-PP: 0.646
Hikers/walkers	20.4	31.9	45.7	**<0.05**	B-PB: 0.208 **B-PP: <0.05** PB-PP: 0.162
Hunters	55.1	55.3	65.2	0.492	NA
Kayakers/canoers	14.3	8.5	4.3	0.233	NA
Mountain bikers	63.3	58.5	56.5	0.783	NA
Road bikers	22.4	29.8	41.3	0.133	NA
Photographers	57.1	48.9	34.8	**<0.01**	B-PB: 0.450 **B-PP: <0.05** PB-PP: 0.161
P-value (comparing in-group ranking of Birdwatchers and Photographers)	**<0.05**	**<0.001**	0.247	NA	NA

Note: survey question: "In your opinion, what three recreation groups cause the most disturbance to birds and bird habitat? Please rank the following recreation groups from most to least disturbing by clicking and dragging the listed items into the box on the right." The Pearson's chi-square test for independence was used with Yates continuity correction to determine differences between rankings.

2.4 Discussion

2.4.1 Demographic Characteristics

Overall, each group of bird recreationalists were similar in gender composition, age and years of birding or photography experience. The one demographic variable where the groups differed statistically was education (between birders and primary photographers, and primary birders and primary photographers). However, all bird recreationalist groups were highly educated, which is consistent with previous studies on birders. Likewise, there were more women who participated in this survey than men, which is consistent with more recent literature (Carver, 2013). Our findings that more women than men participate in bird photography is not consistent with

recent literature on bird photographers (Slater et al., 2019) and does not support part of hypothesis 1c, although this may be attributed to women in general showing more willingness to participate in online surveys (Smith, 2008). The mean age of bird recreationalists who took the survey is 55.4 (see table 2.5), which is a similar finding to previous studies on birders (Carver, 2013).

2.4.2 Sociological Characteristics and Typologies

Within bird recreationalist groups, expenditure on equipment and yearly travel varied by group. Primary photographers spent more than both birders and primary birders on equipment, which supports hypothesis 1b. Although there is no previous research to compare this data to, photography equipment (i.e., camera bodies, lenses, tripods, etc.) can be expensive, particularly if individuals are investing in quality and durable equipment (e.g., lenses with more magnification [Excell, 2011]). It is important to note that binoculars and spotting scopes can also be expensive depending on the quality of the product. Although the distribution of equipment expenditure for birders was not different from primary birders, the highest value of expenditure for birders was $6,000 compared to $10,000 for primary birders and primary photographers. This may be due to birders not investing in the same caliber of photography equipment that primary birders and primary photographers might invest in, if they choose to invest at all, as they did not identify bird photography as an activity they engaged in.

Expenditure on yearly travel was less for birders than both primary birders and primary photographers, also supporting the first hypothesis. Higher expenditures on yearly travel can suggest more willingness to see and/or photograph birds (Kolstoe & Cameron, 2017). In this case, these differences in expenditure behavior suggest more of a willingness to spend money to encounter birds among primary birders and primary photographers than birders.

An important component of understanding bird recreationalists' knowledge of birds is accounting for their abilities to identify birds by sight and sound. Our results indicate that for both sight and sound, primary photographers can identify fewer birds than birders and primary birders, suggesting that they may be less knowledgeable about birds and supporting hypothesis 1a. This is supported by previous literature (Slater et al., 2019; Wee & Tsang, 2008). Previous studies also suggest that the level of knowledge of bird recreationalists is associated with specialization of the individuals, such that more specialized birders may be more knowledgeable about birds (Bryan, 1977; Scott et al., 1999). This information may be useful in distinguishing between harmful

behaviors that result from a lack of awareness and apathy. However, because recreation specialization is not well studied within communities of bird photographers, it is hard to draw substantiated conclusions about recreation specialization's association with knowledge of birds for bird photographers. Fewer primary photographers maintained life lists than birders and primary birders, with those maintaining life lists having fewer birds on their life list than birders and primary birders. Life lists serve the purpose of keeping track of bird species seen throughout one's life and in the past has been associated with birding (Hvenegaard, 2011), although it is also associated with bird photography.

Although this study did not categorize respondents using recreation specialization framework, exploring motivations, centrality and commitment is still important for understanding differences between individuals who engage in birding and individuals who engage in bird photography. Importantly, primary photographers ranked the motivation "To be alone" higher than both birders and primary birders and the motivation "For family recreation" lower than those two groups. This suggests that bird photography is potentially a more solitary activity, whereas birding is potentially more social. Regarding birding and family recreation, a more recent study identified family and couple-oriented sub-populations of birders (Vas, 2017). Although agreement with the motivation "For family recreation" was relatively neutral as was agreement with the motivation "To be alone," noting these dynamics in the context of disturbance to birds is important since groups can potentially have more negative impacts on birds and bird habitat (Collins-Kreiner et al., 2013; Remacha et al., 2011).

Additional differences in ranking included "To see [as many birds] [as much nature] as possible" and "To do something creative" with primary photographers ranking these statements higher than other recreationalist groups. Pertaining to "To do something creative," photography as an activity is also considered a form of art. Quality, unique and creative photos of birds can be shared online with fellow recreationalists and submitted to nature photography contests to be judged on technical quality and artistic merit (e.g., the Audubon Society's annual photography contest). Thus, creativity may be an important aspect to bird photography. As for the statement "To see [as many birds] [as much nature] as possible," this statement is related to achievement-oriented motivations (McFarlane, 1994). These motivations may relate to lower levels of conservation-oriented motivations and more engagement in harmful behavior to birds (Bireline, 2005; McFarlane, 1994; Schaffner, 2009).

Bird recreationalists did not rank centrality statements relatively high on the scale of agreement compared to previous studies (Lee & Scott, 2004). Initially, this finding indicates that birding or bird photography may not be regarded as the most central life interest for this particular sample, such that they engage in alternative activities and may not make all family and career decisions in light of birding and/or bird photography (Scott & Shafer, 2001). Further research is needed to draw substantiated conclusions. Additionally, it is interesting to note that birders ranked two statements at lower levels than the other groups of recreationalists. It suggests that engaging in photography may be an indicator of higher levels of centrality for bird recreationalists.

2.4.3 Characteristics Connected to Harmful and Harm-Reducing Behavior

This study is the first that identifies individual socio-demographic characteristics associated with an increased likelihood to engage in both behaviors that could harm or reduce harm to birds, as previous studies tend to analyze disturbance with a recreation specialization index (Bireline, 2005; Reznicek, 2012). Behaviors that could be potentially harmful to birds include using call playback, vocalizations, or instruments to call birds, using or wearing attractive colors, spotlighting, using flash photography, feeding or offering water and hiding in vegetation. Behaviors that reduce potential harm to birds include using an observation deck or viewing blind.

Our findings indicate that individuals who 1) are male, 2) engage in birding, 3) maintain life lists, 4) have more birds on their life lists, 5) can identify more birds by sight, 6) have more years of experience, or 7) have a higher level of achievement-oriented motivation are more likely to engage in potentially harmful behaviors to birds than recreationalists who do not fit this description. These results partially support the second hypothesis of this chapter: achievement-oriented motivation, maintenance of a life list and higher numbers of birds on said list, and gender are connected to an increase in bird disturbance. However, more knowledge of birds and photography are not. Considering these results in the context of socio-demographic characteristic differences between the typologies provides more insight to this profile: bird recreationalists that engaged in birding as their only or primary activity are more likely to maintain a life list, more likely to have more birds on their life list, more likely to be able to identify more birds by sight, and had higher levels of agreement with one achievement-oriented motivation than primary photographers. All these results indirectly suggest that birders may be more likely to engage in harmful behaviors than bird photographers. Importantly, these results could be due to the lack of

individuals who only engage in bird photography. Including these individuals in future work may alter the current findings.

Equally as important, a similar profile can be constructed for recreationalists who are more likely to engage in harm-reducing behavior. Interestingly, our results indicate that individuals 1) who bird, 2) maintain a life list, 3) have more birds on their life lists, 4) can identify a higher number of birds by sight, or 5) have a higher level of achievement-oriented motivation than the sample median are more likely to engage in harm-reducing behaviors. This profile differs slightly from the previous one, as gender made no difference in likelihoods to engage in harm-reducing behaviors, nor did number of years of experience in birding or bird photography. Again, these results indirectly suggest that birders are more likely to engage in harm-reducing behaviors than bird photographers. This may also indirectly indicate that birders are more informed about bird disturbance than bird photographers.

These results and partial rejection of the second hypothesis in the context of previous research are both supported and conflicting. For example, some research has indicated that higher levels of achievement-oriented motivation may be associated with more self-reported harmful behaviors (Bireline, 2005), which supports parts of this study's results. Yet, other research indicates that birders will be more likely to change their behavior to reduce harm to birds if they perceive that their activity disturbs birds (Weston et al., 2015). Other research also indicates that as recreation specialization increases in birders, so do levels of awareness of the negative impact of birding (Reznicek, 2012). Research on bird photography suggests that photographers may not be as knowledgeable about birds (Hanisch et al., 2019; Wee & Tsang, 2008) but believe bird disturbance is inevitable and trivial (Slater et al., 2019). This latter attitude could make them more prone to engaging in behaviors harmful to birds. However, our results indirectly suggest that birders are more aware of the negative impacts of birding (by being more likely to engage in harm-reducing behaviors) *yet* are also more likely to engage in harmful behaviors than bird photographers. This finding may be due to factors such as convenience (e.g., observation decks are easy to utilize if they are accessible) or effort required to engage in a behavior (e.g., calling a bird with whistles or pishing can require little effort). Likewise, having awareness of an issue may not impact an individual's behavior as strongly as other sociological variables not tested for in this portion of the study (such as individual goals, social and individual norms, values, motivations associated with breaking guidelines, practicing only photography, etc.).

Although these results serve the purpose of providing some context for which bird recreationalists may be more likely to contribute to bird disturbance, this field requires further research to substantiate these results. Finding means to engage individuals who only engage in bird photography would help provide more context to who contributes to bird disturbance and may refute some of the findings in this research. Additionally, this research collected information about report behavior rather than directly observed behavior. This field would benefit from direct observations of bird recreationalists' behavior to confirm these connections. Finally, the application of other social science frameworks to predict behavior could aid in isolating variables associated with the findings above.

2.4.4 Differences in Perceived Blame

In a 2015 study, birders did not associate blame for bird disturbance with themselves (Weston et al., 2015). For all bird recreationalist groups in this study, birdwatchers (the group that more broadly represents birders and birdwatchers) were indeed not ranked as one of the top three recreation groups contributing to bird disturbance. However, both birders and primary birders ranked photographers in one of the top three groups (primary photographers ranked photographers as 5th). Additionally, both more birders and primary birders ranked photographers as a top three recreation group compared to birdwatchers. Primary photographers in this sample do not have the same knowledge about birds as birders and primary birds do; logically, other recreation groups likely do not either, which could contribute to unintentional bird disturbance. Yet, results on socio-demographic characteristics connected with disturbance to birds suggest that characteristics more associated with birding (e.g., life list maintenance, number of birds on life list and number of birds identified by sight) are connected with an increased likelihood in engaging in behaviors that negatively impact birds. These two results suggest there is a discrepancy about one's perceived and reported likelihood to contribute to bird disturbance among bird recreationalists who engage more in birding than bird photography. This implication does not support the third hypothesis of this study, as it indicates that individuals who bird as their only or primary activity do not perceive themselves as responsible as other recreating groups. Bird photographers do not perceive themselves as the most responsible either. This result of assigning blame to other recreation groups is not uncommon; upon being surveyed on effects of recreation on wildlife, back country users

tended to blame other user groups for stressing wildlife rather than considering their role in the issue (Taylor & Knight, 2003).

This discrepancy in beliefs and behaviors, while requiring further research, has important implications. First, if more bird recreationalists assign blame to other recreation groups before assessing their own contribution to bird disturbance, it suggests that they may not perceive their behaviors as harmful. Second, drawing from this suggestion, if bird recreationalists do not perceive their behaviors as harmful, they may not be willing to change their behaviors (Weston et al., 2015). How the role of awareness of ethical codes of conduct interacts with this discrepancy could be an important research topic, as increasing awareness of these ethics may contribute to behavior change. Although to fully understand this phenomenon, motivations to engage in harmful behaviors will also provide important context.

2.4.5 Conclusive Remarks

The results of this quantitative chapter of the study reiterate important findings of previous research but are also unique in nature. The study supports that bird recreationalists are a diverse group of individuals in terms of socio-demographic characteristics (Carver, 2013; Eubanks Jr et al., 2004; Scott et al., 1999); that variables related to achievement and competition (i.e., maintenance of a life list, number of birds on life list, achievement-oriented motivations) are connected to an increased likelihood to engage in behaviors that disturb birds (Bireline, 2005; Glowinski & Moore, 2014); and that recreationalists whose primary activity is birding (rather than bird photography) may be aware of the various harmful behaviors but do not perceive themselves as a main source of bird disturbance (Weston et al., 2015). The study also supports the previous finding that bird photographers may be less knowledgeable about birds than birders (Hanisch et al., 2019; Slater et al., 2019; Wee & Tsang, 2008).

The study also identifies variables connected to an increased likelihood to engage in behaviors that disturb birds, including gender, number of birds identified by sight, number of years of practice in birding or bird photography, and primary activity (birding versus bird photography). Interestingly, most of these variables (with the exclusion of gender and number of years of practice) are also connected with an increased likelihood to engage in harm-reducing behaviors. This implies that bird recreationalists who fall under this description, namely birders and primary

birders, may be aware of the potential consequences to birds from certain behaviors yet engage in harmful behaviors, nevertheless. However, in order to confirm this, further research is needed.

Through examining bird recreationalists' perceptions on individual recreation groups' contributions to disturbance of birds and bird habitats, this study identified a potential discrepancy in behavior and beliefs of bird recreationalists. Individuals who identified birding as their primary activity (i.e., birders and primary birders) did not rank themselves as one of the top three groups that disturb birds (birders ranked birdwatchers as 5th; primary birders ranked birdwatchers as 7th). Although primary photographers did not rank themselves as one of the top three groups (primary photographers ranked themselves as 5th), other results of this study suggest that birders may be more prone to engaging in behavior that harms birds and bird habitat. These conflicting beliefs and indirect behaviors have been reported in other research (e.g., Weston et al., 2015), although future research in this area is necessary to confirm and assess this discrepancy.

2.4.6 Limitations

This study utilizes aspects of the recreation specialization framework, which has been widely used by researchers for various recreation groups. However, this study also uses this framework uniquely by isolating its dimensions for significance testing. Part of this rationale is the smaller sample size, which is due to limitations from the convenience sampling used to gather participants. Thus, the results of this study are binary. Statistical testing in this chapter did not account for confounding effects of other variables or potential mediating or moderating relationships. Future work in this area should aim for larger sample sizes in order to use statistical methods such as logistic, multinomial or ordinal regression models, which will aid in a achieving a better understanding of the directionality and interactions of the tested variables.

It may be helpful to use another method of sampling, as convenience sampling proved to be difficult in gathering a large and random sample of bird recreationalists. For this thesis, the sampling method was useful for identifying birding and bird photography groups that could aid in future work (e.g., Indiana Audubon Society). However, many members of the participating groups did not respond to the online survey. Social media groups (e.g., Indiana Nature and Wildlife Photography Facebook group) in particular had few responses from participants, and group administrators had limited means of aiding researchers in the distribution of the online survey. This method of sampling is likewise, inherently biased in who chooses to respond. However,

random sampling with this population of individuals would be extremely difficult to achieve, based on the limited information we have about existing bird recreationalists and their associated experiences. Although convenience sampling does have its limitations and may not be representative of the whole population, the results provided from this research still hold important implications and ultimately are better than no findings at all.

In addition to increasing the sample size, it may be important to assess other variables more directly related to bird photography. For example, in order to assess how specialized a bird photographer is, variables such as the number of times a photographer shares bird photographs on social media within a month and number of cameras owned may be more relevant to the activity than asking about maintenance of a life list. Ideally, aspects of the recreation specialization framework can be modified to better fit the activity of bird photography in order to better grasp how bird photographers interact with birds.

It is also important to note that the survey was advertised as a survey on ethical birding and bird photography. Inherently, the respondents who took the survey are biased and may already be interested in this specific topic. Thus, individuals who may not be as aware of birding and bird photography ethics may not be represented in this sample as well as individual attitudes about ethics. Future work may consider utilizing methods that minimize this bias to grasp a more comprehensive understanding of this field.

CHAPTER 3. MOTIVATIONS, BARRIERS, CHALLENGES AND TRADE-OFFS CONNECTED TO BIRDING AND BIRD PHOTOGRAPHY ETHICAL GUIDELINES

3.1 Introduction

Characteristics of bird recreationalists connected to disturbance of birds and bird habitat were identified in the quantitative results, as well as awareness of bird recreationalists' roles in disturbance to birds. These results are useful in identifying types of bird recreationalists that may be more likely to engage in behavior that is harmful to birds. However, to better aid natural resource managers and bird stakeholders in finding sustainable solutions to preventing bird disturbance, it is important to also understand other factors that go into decision making. Applying social marketing approaches to understand behavior and decision making in the context of human disturbance to birds can be helpful in developing solutions to this problem (Maibach, 1993). These include motivations behind bird recreationalists' harmful behaviors (Bireline, 2005; Reznicek, 2012), potential barriers individuals face that may compel them to engage in harmful behaviors; trade-offs associated with adhering to guidelines; and formal birding and/or nature photography guidelines that are challenging to follow.

Some of these factors have been well researched in the broader context of conservation. For example, research has identified motivations for conserving nature (e.g., Dearborn & Kark, 2010) and motivations for non-compliance with conservation rules (e.g., Kahler & Gore, 2012; Oyanedel et al., 2020). Researchers have applied different socio-psychological frameworks to understand how different types of motivations impact different aspects of conservation. For example, researchers used self-determination theory (Ryan & Deci, 2000) to understand how conservation policy tools for protected areas foster intrinsic and extrinsic motivation and whether or not projects designed to foster different types of motivation had different socioeconomic and ecological outcomes (Cetas & Yasué, 2017). In a study on non-compliance, researchers used an adaptation of forest law compliance framework (Ramcilovic-Suominen & Epstein, 2012) to understand what types of motivations – instrumental, normative or legitimacy-based – drive both compliance and non-compliance with fishing regulations in Chile (Oyanedel et al., 2020). Understanding the driving motivations behind non-compliance with conservation rules, or in the context of this study, birding and bird photography guidelines, can help provide more

understanding of why non-compliance happens. Trade-offs additionally have been researched in the context of conservation (e.g., Hirsch et al., 2011; Maes et al., 2012; McShane et al., 2011). Trade-offs in the context of this study can be defined as losses associated with following birding and bird photography guidelines. More broadly, trade-offs can be defined as losses associated with conservation initiatives. Identifying trade-offs in conservation initiatives is important for thinking and communicating transparently about conservation to stakeholders (McShane et al., 2011) and for helping decision makers navigate difficult choices related to conservation (Brechin et al., 2003). In the context of bird conservation, identifying trade-offs associated with following birding and bird photography guidelines can additionally help researches better understand the decisions made by bird recreationalists.

Little research has explored these factors in decision making around ethical birding and bird photography guidelines. Yet, these guidelines or 'codes of conduct' are emphasized as means for raising awareness about bird disturbance among bird recreationalists (Hvenegaard, 2004; Podduwage, 2016). In terms of motivations and photography, the motivation to achieve quality photographs of wildlife subjects may be so strong that it compels recreationalists to engage in behavior that has negative environmental impacts (Hvenegaard, 2004). A finding from Bireline's (2005) work implies that achievement-oriented motivation and competition may contribute to recreationalists engaging in harmful behavior. However, there is no research on barriers or trade-offs associated with following these guidelines or perceived challenging guidelines. Thus, there is a qualitative component to this study to gauge an understanding of these factors.

For this chapter, respondents in the quantitative chapter were interviewed about challenges, motivation, barriers and trade-offs related to ethical birding and bird photography guidelines. Participants indicated some level of interest in participating in interviews as part of the online survey in the quantitative chapter; hence, there is inherent bias in these results.

3.1.1 Research Objectives and Questions

The objectives of this research were to identify bird recreationalists' motivations to breaking guidelines, barriers to following guidelines and trade-offs associated with following guidelines. This chapter aims to answer the following question:

1. How are motivations, barriers/challenges and trade-offs connected to engaging in unethical birding behaviors among bird recreationalists?

3.2 Methods

This research consisted of 18 semi-structured interviews with survey respondents who indicated some level of interest in being interviewed; thus, voluntary sampling was used to recruit interviewees. Once the researcher conducting interviews felt that information from interviewees was no longer novel (i.e., their perspectives had already been captured multiple times in the interview process and data saturation was reached), date collection stopped. Over the course of February 2019, these individuals were interviewed (i.e., after the data for the quantitative chapter was collected). Of the 70 individuals who were contacted over email about being interviewed, 18 agreed to participate in the interviews. Participants included various bird recreationalists, included birders (n=9), bird photographers (n=5) and individuals who participate on both birding and bird photography (n=4). It is important to note that despite these terms, all individuals participated in birding on some level. Interviews were conducted in person in a public setting (i.e., coffee shops, libraries, etc.) throughout both Illinois and Indiana. The same researcher conducted all interviews.

3.2.1 Interview guide

The purpose of the interviews was to assess awareness related to birding/photography guidelines, identify motivations and barriers related to following guidelines and understand perceptions of blame associated with bird and bird habitat disturbance. Interview questions targeted these objectives and additionally gathered information about interviewees' birding and/or bird photography experiences and demographics. For the purpose of these interviews, participants were shown formal guidelines from a birding organization, the American Birding Association (2019), and from a nature photography organization, the North American Nature Photography Association (2019). Although the formal guidelines served as guides for defining ethical and unethical behaviors, some questions were specifically about these sets of guidelines, including participants' awareness and perceptions of these guidelines (see Appendix B).

3.2.2 Coding Framework

Once interview data was collected, interviews were transcribed using the company TranscribeMe or by the same researcher who conducted the interviews. Transcriptions were then analyzed using thematic coding to identify broad themes. An initial coding framework was

developed through an initial reading of the transcripts and refined through the intercoder reliability process. To reduce researcher bias, two researchers separately coded 4 of the 18 transcripts to ensure that the coding framework was being used consistently. Three rounds of coding were conducted, during which the coding framework was modified through discussion of individual interpretations and usages of the codes. The first of the three rounds with one interview was used to discuss coding styles without analyzing the coding for agreement. For each round, reconciled coding was left out of analyses for agreement to not inflate the agreement value. After these three rounds, an average Cohen's kappa of 0.78 was reached. The Cohen's Kappa coefficient was used as a measure of the intercoder reliability (Cohen, 1960) where any value over 0.7 indicates agreement between coders (Gardner, 1995). The main researcher then coded the remaining transcriptions using the finalized coding framework (see Appendix C).

3.3 Results and Discussion

3.3.1 Demographics

At the beginning of each interview, interviewees self-identified as birders and/or bird photographers. Half of the interviewees were female (n=9). Most of the interviewees indicated that they lived in a suburban area (n=11), with less living in rural or urban areas (n=4 and n=3 respectively). All participants were white. The mean age of participants was 54.9 ± 15.3 SD years, ranging from the age of 18 to 85. Individuals had a wide range of number of years of experience in birding and/or photography, ranging between 3 and 55 years.

3.3.2 Challenging guidelines

Although ethical guidelines serve the purpose of protecting birds and bird habitat from harm, some may be more challenging to follow than others. Identifying practices that pose as challenging for bird recreationalists to follow can help natural resource managers and bird stakeholders better understand bird disturbance from bird recreationalists and find means to make these practices less challenging. Later results on motivations and barriers related to following ethical guidelines will give more context to understanding these challenging guidelines themes. Bird recreationalists identified a variety of birding and/or photography guidelines that posed as challenging to follow, including group settings, maintaining distance, preventing general stress, using recordings,

respectfully educating others, respecting private property, and staying on-trail. Several of these have ecological implications (e.g., maintaining distance) while some have social implications (e.g., respectfully educating others). One salient theme among both birders and bird photographers was the difficulty to maintain proper distance from birds. For example:

> *"I've noticed with new birders especially they want to get real close. They're like, 'Oh.' They get excited and they're like, 'Oh, I want to go get it.' And it's like sometimes you got to tell them, no, we can't get any closer than this. [birder]*

One bird photographer noted that getting as close as possible to birds is essential for photography:

> *"Keeping distance, without any doubt. And I want to get as close as I can. Why? Because I get more detail in any given picture the closer I get. The less I have to crop. If you have to crop, you lose detail. That's just part of digital photography." [bird photographer]*

Although this broad theme has not been previously identified in research as challenging for birders or bird photographers, research on bird photography notes that bird photographers typically have to push boundaries with birds because their equipment may not have the same level of magnification that binoculars or spotting scopes may have (Lott, 1992; Slater et al., 2019), although this certainly is not the case for all photography equipment. Additionally, as the one bird photographer above notes, technical aspects of photography may require getting closer in order to fill the frame of a shot, even if the technology itself is adequate for the activity. Regardless of how close an individual may need to get to a bird for photography purposes or otherwise, some birds perceive approaches by birders and bird photographers as dangerous (Slater et al 2019) and thus stressful.

In addition to this guideline, other identified challenging guidelines with ecological implications include preventing general stress, using recordings and staying on-trail. Staying on-trail is important for the conservation of bird habitat, as compounding instances of going off-trail can result in the formation of social trails or the trampling of vegetation and detract from the available habitat and carrying capacity of the current habitat (Blanc et al., 2006). Although some research suggests otherwise (Watson et al., 2019), the use of recordings (i.e., call playback) particularly during critical life periods such as migration or mating have the potential to stress already exhausted birds or pull parent birds away from their nests, leaving their young vulnerable.

Preventing these ecological consequences must come from making these guidelines less challenging to follow, or potentially changing social norms.

Bird recreationalists discussed how preventing general stress was a challenge in their birding or bird photography. For example:

> *"…whenever you go—especially if you're walking around, you automatically distress the animal. So I mean that's—90% of the time the way you see stuff is if you're walking through and it is flushed from the bushes." [bird photographer]*

> *"…that's probably the hardest one because you're trying to achieve something by photographing them and not always do you know if you're putting any stress on them."[bird photographer]*

The first bird photographer describes the inevitability of stressing birds through the presence of humans in their habitat. The aspect of inevitable distress echoes Slater et al.'s (2019) research with bird recreationalists: bird photographers from their study believed bird disturbance was inevitable in their practice yet trivial. This perception, although important to acknowledge while practicing birding and bird photography, could potentially play a role in apathy related to following guidelines, particularly if recreationalists believe that bird disturbance is trivial in addition to inevitable. The second bird photographer notes that preventing general stress is difficult because they are not always aware of the signs of bird disturbance. They imply that knowing more about bird behavior and stress signals could be helpful in preventing stress. Indeed, awareness of these signals may help recreationalists know when to modify their behavior to minimize bird disturbance (Weston et al., 2015).

Many birders and bird photographers also commented on the difficulty of educating fellow recreators on ethical guidelines when in the field. Respectfully educating fellow recreators when they engage in potentially harmful behavior is one of the guidelines from the American Birding Association's (2019) set of birding guidelines. Raising awareness about ethical guidelines and bird disturbance is also a suggested need for bird recreationalists according to some researchers (Hvenegaard, 2004; Podduwage, 2016). For some, the challenge is related to personal safety:

> *"…because I'm alone a lot when I'm hiking and it's a big risk to tell somebody that they're doing something that they shouldn't be doing. It may not end well; you never know. People are unpredictable." [birder]*

For others, the challenge is related to how fellow recreationalists are informed and the feedback that educating recreationalists received:

> *"I think my behavior was breaking the rules because I wasn't courteous. I wasn't nice. I was mad. And when you get asked several times to do something that I know you're not doing right and you know it's not right, you need to stop. Well, I tend to get a little forceful, and I wanted them to stop, period. So I really wasn't nice, and I was probably the one being called the asshole, but in the end, I was right, and they were doing something that I really feel strongly about, and I don't like it." [bird photographer]*

Both personal safety and how fellow recreationalists are informed of guidelines can play a role in conflict between the informer and informed. In the case of personal safety, the interviewee inferred that confronting unethical bird recreationalists could be associated with trading off personal safety, and thus they assessed the action as risky. Regarding how information is communicated, the communication style of educating someone who may be harming birds can impact how individuals receive and process this information, such that uncivil styles may negatively impact communicator credibility and decrease learning (Myers, 2002; Thorson et al., 2010; Yuan et al., 2019). Compounding instances of uncivil communication towards multiple egregious individuals could result in social consequences for bird recreationalists and ecological consequences for birds and bird habitat.

Another guideline many birders and bird photographers noted as challenging was respecting private property. Particularly in states with limited public lands, bird sightings can occur on private property. Trespassing of bird recreationalists on private property is not uncommon (Bireline, 2005), but it is illegal. With differing and incompatible goals, conflict between birders and private landowners may occur (Jacob & Schreyer, 1980), which may have varying social implications and consequences. Recreationalists noted the difficulty of not trespassing on private properties:

"I didn't even think of it, so I was basically on private property going after this owl and it became very, became very apparent to me right away that that was the wrong thing to do. And I honestly was, it was an honest mistake. There was no sign up…" [bird photographer]

"…Well, it was hard when someone had a bird that they didn't want you to come on their property. So I mean, you park out in front of their house and try and see back at their feeder, and they open the door and say, 'You know, you could take my picture if you wanted to,' because they think you're looking at them." [birder]

The first of these accounts describes unintentional trespassing, whereas the second account more details disrespecting landowner's privacy. Regardless of intent, there is the potential for trespassing to create social tensions between landowners and bird recreationalists. In some cases, law enforcement may get involved. It could benefit landowners to have better signage communicating private property. This challenge could also be alleviated if bird recreationalists were more aware of where public boundaries meet private boundaries. These solutions could prevent potential trespassing from bird recreationalists, although more work may be necessary to target individuals who choose to ignore the laws against trespassing on private property.

In most cases, both birders and bird photographers identified the same challenging themes. Some themes were only identified by one of the two bird recreationalists (e.g., only bird photographers identified general stress as a specific challenge). Using the example of preventing general stress, it is important to note that although this may imply that only bird photographers perceive general stress as a challenge, it is more likely that interviewed birders just did not identify this perceived challenge. These challenges have the potential to impact all groups of bird recreationalists.

3.3.3 Motivations to break guidelines

Identifying motivations behind breaking guidelines and engaging in behaviors that are harmful to birds and bird habitat is essential in understanding why certain behaviors occur among bird recreationalists. Often, goals of seeing, listing and/or photographing birds are associated with bird recreationalists. Achieving these goals and collecting an external reward, whether it is listing or photographing birds, can serve as a guiding force in any behavior associated with birding and/or

bird photography. This relates to intrinsic and extrinsic motivations, where intrinsic motivations are self-determined and typically based on personal interests or values. Contrasting this, extrinsic motivations are driven by a separable outcome or external pressure (Ryan & Deci, 2000). Fulfilling goals, such as listing a certain rare bird, can result in bird recreationalists gaining prestige within the birding and/or bird photography communities (Schaffner, 2009), which can be categorized as an extrinsic motivation. In this study, bird recreationalists identified various motivations that might compel them or other recreationalists to break ethical birding and photography guidelines, including competition, group settings, helping birds, identifying birds, listing birds, money, photographing birds, prioritizing one's own experience and seeing birds. Although few recreationalists cited money as a motivation to breaking guidelines, gaining money for encountering birds is an excellent example of an incentive that may extrinsically motivate bird recreationalists to break guidelines. Money or income has been previously identified as an important extrinsic motivation for non-compliance with conservation rules (e.g., wildlife poaching; Kahler & Gore, 2012). Logically, integrating more photography-oriented participants into future work might better highlight the existence of this motivation for breaking guidelines among bird recreationalists.

Many birders and bird photographers referenced photographing birds and seeing birds as main motivations to breaking guidelines. For example:

> *"If it's something that I really wanted to see, it would definitely bend me a little bit more towards being like, 'Okay. Maybe I'll just take a couple of steps into this farmer's field or something like that.'" [birder]*

> *"Too many people, photographers, just to get the good shot, they get too close. And then you don't get a shot at all." [bird photographer]*

In addition to photographing and seeing birds, listing birds is another motivation that recreationalists touched on:

> *"If I were to be a very avid lister, getting it on my list over keeping the guidelines might cause me to break it…" [birder]*

> *"…then there's also those who are just, their egos in there, and they kind of know they*

shouldn't probably but they want to be able to count that bird or they want that photograph so they're willing to get too close." [birder]

Bird recreationalists described being motivated by external rewards, being able to see, list or photograph birds, which are important components of birding and bird photography. These motivations are also associated with the dimension of achievement (McFarlane, 1994). Previous research suggests that as an individual's emphasis on achievement increases, their level of environmental concern decreases (Glowinski & Moore, 2014). In the context bird disturbance, this finding about achievement related motivations pushing individuals to engage in harmful behavior upholds previous findings.

Listing, photographing and seeing birds can all be tied to competition with other recreationalists as a motivation to break ethical birding and photography guidelines. Competition is considered an important component of birding and bird photography, such that birding events based on identifying as many birds as possible in time frames as small as 24 hours (e.g., the World Series of Birding hosting by New Jersey Audubon) or as large as a year (e.g., Big Year Birding) exist. For bird photographers, the National Audubon Society, National Geographic and other major photography organizations hold large competitions for the best bird photographs. Competition is likewise common enough for birding to be considered a sport by some researchers (Schaffner, 2009). One birder noted how listing birds can become competitive, comparing birding to the popular game Pokémon Go:

"[the tropical kingbird] was slowly dying, but even then people just came there and kept on following it around, taking pictures of it. And the thing was super ratty. It didn't look very pretty at all, but people were still coming there because it was a tropical kingbird, not because they thought it was super neat. So in that instance, it almost becomes more of a game rather than appreciation, because I do know there is some competitive people that keep lists. They try and vie for the best list… some of them almost treat it like-- do you know what the game Pokémon is? They almost treat it like Pokémon where like, 'Oh. I got to see them all. Let's see how many species I can get in a day.'" [birder]

This birder comments on competition is such a strong motivation for some bird recreationalists that they fail to notice the deteriorating state of the bird they are seeking in this particular example.

They also note that the appreciation of the bird itself is not a motivation in this case, suggesting that some bird recreationalists engage in their activities purely for the sake of competition. Research supports this statement, suggesting that competition may push individuals to carry out more harmful behaviors in order to list or photograph birds (Bireline, 2005). Additionally, Schaffner (2009) notes within their research on birding in degraded environmental conditions that competition related to birding can overshadow environmental concern. Although this attitude is applicable for Schaffner's work on birding in superfund sites, landfills and sewage ponds, our finding of competition as a potential motivation to engage in harmful behavior to birds suggests that competition within the context of disturbance to birds needs to be further studied to understand this relationship.

Bird recreationalists commented on how other recreationalists may break guidelines by prioritizing their experiences, whether it is seeing, listing or photographing birds, over the well-being of birds and/or the experiences of other recreationalists. For example:

> *"...I think the reason people break rules and do things is because they have placed a value upon the outcome that is in some way greater than the value of the bird living its life. So that person's experience, to them, is more important than the bird itself. And in many ways, that's a total lack of appreciation." [bird photographer]*

> *"There's one guy at [location] who hogs the worm feeder. He parks his van right in front of it, and then he's got these huge legs. And the feeder's only a few feet away, and I'm like, 'Dude, if you back up a little bit so other people can see the feeder.'" [birder]*

The bird photographer here perceives that some recreationalists place value on something that outweighs the value of the experiences of birds but also other recreationalists. It is important to consider how this may tie into seeing, listing and photographing birds as well as competitive birding and bird photography. Bird recreationalists do place value in encountering bird such that they actively pursue them (Carver, 2013; Connell, 2009; Sekercioglu, 2002); in situations where birds are rare and/or endangered, bird recreationalists may do whatever it takes to encounter that bird (Booth et al., 2011).

Tangential to some recreationalists prioritizing their experiences over that of other recreationalists, some interviewees commented on the gatekeeping of birds. Generally,

gatekeeping is defined as the process of controlling or mediating information as it moves through a forum (Barzilai-Nahon, 2008). In sociology literature, this can be associated with power-dynamics, where those who are 'gated' depend on 'gatekeepers' for meaningful resources, as gatekeepers construct the social reality (Barzilai-Nahon, 2009; Lewin, 1947). In the context of birding and bird photography, gatekeeping can be associated with withholding information about the location of birds, specifically rare and/or endangered birds. One individual who engages in both birding and bird photography commented:

> *"If I see some people walking on a trail and I happen to know that there was a prothonotary warbler nest, I wouldn't point it out to them. I don't do that unless they have binoculars; if they have binoculars and I know they're birders. If they're anybody else, I'd just leave it… I don't want anybody else to know or to see what I see because I don't want them to mess with it…"*

This photographer notes that they withhold information about bird locations from non-birders for the purpose of protecting birds. Although commentary on gatekeeping was not originally included in analysis of the interview data, gatekeeping of birds could result in conflict between different groups of people because individuals may be excluded based on the equipment that they carry. This concept requires further research, as it may be an indicator of how aspects of birding and bird photography culture may impact unethical behavior as well as power dynamics within the field.

Group settings was a motivation that birders identified. Under group settings, where there are at least two individuals (i.e., tours, birding with friends), bird recreationalists may be willing to engage in behavior they might not otherwise so that everyone involved can encounter birds (opposed to gatekeeping of birds). One birder describes this motivation as a means for giving other recreationalists the opportunity to encounter birds:

> *"…if I got a group of 20 school kids, and we might have the next future conservations here, I might pop out a tape and get them a chance to get them to see this really cool bird, and that creates that spark. Then the benefits of that real tiny disturbance for that bird, I think are far worth it. And so I even kind of play a little weighing game in winter when I don't do something if I look at what the potential benefits are of that and that comparative risk." [birder]*

The birder above feels that it is important to expose individuals to birds in order to grow their interest in bird conservation, suggesting that trading off bird disturbance for exposing groups to birds is worth the consequences. Indeed, more exposure to and higher levels of appreciation of nature can be linked to more pro-environmental behaviors (Alcock et al., 2020). Although, this motivation implies that there are instances unrelated to science and research where disturbance of birds has a benefit to bird populations. It may be important to assess risk perceptions similar to this among bird recreationalists, as some individuals may use this to decided what course of action to take when encountering birds.

3.3.4 Barriers to following guidelines

Bird recreationalists identified a few barriers to following guidelines, including apathy, ignorance and technology. Barriers surrounding adherence to guidelines are important components of this study, as minimizing them can help prevent birds from potential harm. Apathy in this context is described by bird recreationalists as an attitude held by individuals who may not care about the potential harm to birds from breaking guidelines. Ignorance includes recreationalists who may not be aware of the guidelines and/or the harm that may come to birds from breaking them. Technology references lacking the proper photography equipment to safely photograph birds, which is more specific to bird photographers. Bird recreationalists cited apathy in the following examples:

> *"In altering the bird's behavior, i.e., the bird taking off and flying away, and some of that is ignorance, and some it's just, 'I don't care… they're probably aware that what they're doing is wrong, but they go ahead and do it anyways for whatever reason." [birder]*

Interestingly, one recreationalist notes that this attitude may be exhibited by more "professional" recreationalists:

> *"If someone puts a photograph where they've been baiting something… some people will react to that. Some photographers are just, they say, 'So what?' Again, that tends to be the professionals." [bird photographer]*

Both recreationalists suggest that apathetic recreationalists may be aware that their behaviors negatively impact birds, yet choose to engage in these behaviors, nevertheless. This attitude may

relate to motivations regarding extrinsic incentives, such as listing, seeing and/or photographing birds, or competition. Trading off bird disturbance for prestige within the birding community may result in this seemingly apathetic attitude towards disturbance, as the reward of behaviors that allow individuals to achieve their goals may be more valued than the well-being of birds (Ryan & Deci, 2000; Stern, 2018). Likewise, some recreationalists may consider disturbance inevitable and trivial (Slater et al., 2019), which may contribute to this attitude of apathy. Logically, it would be important to study the influence of other social factors on this particular attitude to gain an understanding of how it manifests itself within birding a bird photography.

Contrary to citing apathy of more extrinsically motivated bird recreationalists, some interviewed recreationalists also cited ignorance or a lack of awareness as a potential barrier to following guidelines. For example:

> *"But I think you have to know, you have to know there are consequences. Some people may not even think if they're not informed." [birder]*

> *"In general, most people are ignorant. They're not aware of it." [bird photographer]*

A lack of awareness about birding guidelines may explain some disturbance of birds by bird recreationalists (Hvenegaard, 2004). If recreationalists are unaware of guidelines and/or bird ecology, then they may not recognize when a bird is showing signals of disturbance. For example, bird photographers typically know less than birders about bird behavior and ecology, such that they may not understand the behaviors of birds that they document (Wee & Tsang, 2008). This barrier will be important to alleviate for those bird recreationalists who are unaware, as it may result in a change of individual behavior.

Technology as a barrier, or a lack thereof, is cited in reference to photography and photographers – no birders cited this barrier. Limitations of camera technology can compel photographers to move closer to bird subjects in order to gain quality photos (Hvenegaard, 2004; Lott, 1992). Additionally, although there are special techniques used by bird photographers to approach birds, these approaches may still be interpreted as dangerous by birds (Huang et al., 2011; Slater et al., 2019). Not owning the proper technology therefore may result in harmful behaviors. For example:

"...you know it could be somebody with a cell phone it doesn't necessarily have to be a birder with a big long lens, it could be somebody with a cell phone that sees something in the distance and it's like well I'm going to go over here no matter what." [bird photographer]

"I mean, when you get to the level that I've been at, you're aware of all those, but for people like my cousin who don't do that and they have a point and shoot that, oh, hey, a deer walks out in front of them. What are they going to do? They're going to get as close as they can because they don't have the equipment to do what I do, so they're going to encroach upon wildlife." [bird photographer]

The second bird photographer here indicates that bird photographers with less expertise may be a subgroup of bird photographers that don't own the proper photography equipment and thus may be more likely to encroach on bird subjects. In accordance with the recreation specialization framework, owning specialized and/or more equipment can be associated with more specialized and experienced recreationalists (Bryan, 1977). Thus, under this framework, more specialized and experienced bird photographers may own more photography equipment than those who are less specialized and experienced, although further research is needed to confirm this. The behaviors of less experienced bird photographers theoretically may be impacted by this barrier.

3.3.5 Trade-offs Associated with Guidelines

In order to comprehensively understand motivations and barriers related to breaking birding and bird photography guidelines, interviewees were asked to identify trade-offs associated with adhering to guidelines. Trade-offs in this context are consequences or losses associated with decision making that protects birds and bird habitat from potential harm (e.g., following guidelines). Assessing trade-offs within the context of motivations and barriers may contribute to an understanding of recreationalists' decision making that impacts birds. Bird recreationalists identified trade-offs associated with following guidelines, including bad photos and missed experiences.

Bad photography is a significant trade-off to consider, particularly because for recreationalists involved in bird photography, quality photos are typically an achievement that

recreationalists desire to take from the activity. For example, one bird photographer noted that *"there are going to be times where you could cheat and get a better shot,"* suggesting that recreationalists may break guidelines in order to achieve this goal. Similarly, missed experiences in terms of missing identification, seeing and photographing birds were considered significant trade-offs. One birder remarked that *"if you want to see a bird [and] you play a tape, you're breaking the ethics… you don't get to see that bird [if] you don't play the tape,"* suggesting that some bird sightings depend on breaking guidelines and by following them, recreationalists may miss out on these sightings.

The identified trade-off of missed experiences suggests that for some egregious guideline breaking recreationalists, there may be an associated fear of missing out on something. In psychology, the fear of missing out (FoMO) is studied in the context of social media and usually younger audiences (i.e., young adults; e.g., Blackwell et al., 2017; Przybylski et al., 2013). In one social media study applying the framework of self-determination theory, FoMO was linked to higher levels of social media engagement and lower levels of need satisfaction and life satisfaction (Przybylski et al., 2013). Although these findings are in the context of social media and young adults, this phenomenon could be applied to birding and bird photography as competitive and elite recreation activities. Because birders and bird photographers' are more frequently communicating about birds via online settings such as eBird, Facebook and email listservs (Watson, 2011), FoMO associated with social media could certainly impact bird recreationalists. It could serve as an underlying factor in decision making around breaking or adhering to ethical guidelines. Studying this phenomenon in a recreation setting could help tease out interactions among motivations, barriers, trade-offs and decision making.

When accounting for the inherent bias of the bird recreationalists who participated in these interviews, it is unsurprising that multiple recreationalists commented on their perceived lack of trade-offs associated with adhering to guidelines. This perspective suggests that this sample of bird recreationalists is generally aware of the potential consequences to birds from certain behaviors and that they are willing to trade off listing, photography or seeing birds in order to follow the guidelines and minimize disturbance. It may be important to understand underlying variables associated with this perspective for future research, as identifying them could aid in influencing the behavior of more egregious bird recreationalists.

Additionally, considering these trade-offs in light of identified motivations for breaking guidelines, some recreationalists may weigh the losses associated with following guidelines less than that of being able to document a bird sighting via list or photograph. Perhaps some recreationalists interpret these trade-offs as factors preventing them from pulling ahead in competitive listing or photography. Regardless of recreationalists' motivations, adhering to guidelines can prevent individuals from achieving their goals in a timely manner. Thus, ignoring guidelines and "cheating" can be a solution and shortcut to achieving goals. Future research should further examine the effect of perceived trade-offs to confirm this notion.

3.3.6 Implications

The challenges, motivations, barriers and trade-offs associated with ethical birding and bird photography guidelines that bird recreationalists identified in these interviews have salient implications connected to them. First, interviewees described several motivations to breaking guidelines that relate to achievement and competition (e.g., listing, photography and seeing birds, competition, prioritizing personal experiences). Considering these motivations and the barrier of apathy together as dimensions that impact each other, the resulting profile is that of a bird recreationalist who may be so motivated to achieve documenting a bird that they are apathetic about the potential consequences of their behavior. It could be suggested that the bird recreationalist places a higher value on the personal gain of their actions than the well-being of the bird (i.e., the trade-off of not being able to fulfill their goal of listing, photographing or seeing birds is large enough to disregard birding or bird photography ethics). This implication requires the application of social theory to understand this decision making among bird recreationalists. Theories exploring intrinsic and extrinsic motivations, risk perceptions, and work identifying perceived social and personal norms among bird recreationalists could provide insight to this decision making (Ajzen, 1991; Maslow, 1958; Ryan & Deci, 2000; Stern, 2018). For bird conservation professionals and organizations, these implications could mean finding creative solutions that minimize harm to birds while helping bird recreationalists achieve their goals.

Second, bird recreationalists described multiple guidelines that they perceived as challenging ranging from issues that could directly impact birds (e.g., staying on-trail or maintaining a proper distance from birds) or indirectly (e.g., respectfully educating other recreators on ethics, respecting private property, gatekeeping of information about birds). Although this study

largely focuses on negative ecological impacts from breaking guidelines, it is important to additionally note the potential for social consequences to arise, particularly in instances where individuals may have different values and beliefs related to bird disturbance. Conflict between individuals or groups of like-minded individuals occurs when respected goals clash with each other in various ways (Dahrendorf, 1959; Jacob & Schreyer, 1980). Conflict among bird recreationalists may occur around these guidelines or bird disturbance, as well as between bird recreationalists and other groups of people. Alleviating conflict between natural resources user groups can prevent more costly or political problems from arising (Jacob & Schreyer, 1980). Finding means of making both bird and human oriented guidelines less challenging to follow can highly benefit bird recreationalists and bird conservation. For example, bird conservationists or land managers could invest in viewing blinds for properties to allow bird recreationalists to safely watch and/or photograph birds without encroaching on their space. In response to interviewees identifying respectfully educating other recreationalists about birds and bird disturbance as a challenging guideline to follow, organizations that work directly with bird recreationalists (e.g., National Audubon Society, American Birding Association) could create protocols for intervening and educating individuals in situations when they are disturbing birds.

Finally, demographic representation of these interviews must be considered as well as the inherent topic of research that participants agreed to discuss. Acknowledged in the previous chapter, there is an inherent bias in the interview participants, as they were made aware of the interview subject before consenting to participate in the study. It is likely that because of this, individuals who may not be as aware of ethical birding and bird photography guidelines did not participate in this study, as well as individuals who may have negative perceptions about the guidelines. Additionally, all of the bird recreationalists who participated in this study were white. The USFWS found that around 93% of individuals participating in birding were white in 2011 (Carver, 2013), which suggests that a minority of birders identify as some other race. The nature of the topic of these interviews is a sensitive one that may disproportionately affect different groups of people. A recent event highlights these different experiences: in May of 2020 in New York City, a Black birder named Christian Cooper attempted to notify Amy Cooper (no relation), a white woman, that she was breaking a park rule by letting her dog off leash. She responded by calling the police and embellishing the situation such that Christian Cooper could have been unjustly arrested (Sarah Maslin Nir, 2020). This event known as the Central Park birdwatching incident led

to multiple Black birders coming forth with the racism they experience in the outdoors. This example highlights the potential dangers and discrimination that Black people face when trying to correct someone's behavior that might harm birds. These experiences need to be encompassed in future research to not only prevent disturbance to birds but aid in making the outdoors safe, accessible and inclusive for all people.

This research ultimately is the first to provide insight into bird recreationalists' perceptions and behaviors related to existing codes of ethics published by the American Birding Association (2019) and the North American Nature Photography Association (2019). Utilizing tools such as these sets of formal guidelines, which are extremely comprehensive on the potential social and ecological consequences from individual misconduct, may be useful for future work in understanding perceptions about disturbance to birds. For this chapter, the sets of guidelines served as points of discussion for interview participants where they could cite specific guidelines to give context to their answers for interview questions. It may be helpful for future work in this field to ask individuals about their awareness of existing guidelines and if so, which guidelines they refer to in order to understand which sets are most commonly using in the birding and bird photography communities.

3.4 Thematic Coding Examples

Table 3.1: Thematic Coding: Challenging Guidelines

Theme	Birder Examples	Bird Photographer Examples
Group settings: any reference to having difficulty following guidelines while in group settings.	It's really not, I don't feel like the ones that involve the welfare of the wildlife, but when you get into like say through ABA's keep groups to a size that limits impacts, make sure everyone knows in the group knows practices, learn and inform the group specials, because if you're out and you observe someone doing something that is unethical, that gets to be tricky. (10) And I do lead so group leader responsibility, it becomes interesting when you're tasked with seeing a certain number of birds or certain birds and you've got to make the ethical decision of, am I going to disturb the bird if we go see them? And I've run into this issue before. (3)	So I don't do any group stuff, so I imagine leading a group could be a challenge. (8)
Maintaining distance: any reference of struggling to maintain distance or getting too close to birds.	I've noticed with new birders especially the want to get real close. They're like, "Oh." They get excited and they're like, "Oh, I want to go get." And it's like sometimes you got to tell them, no, we can't get any closer than this. So that I know even sometimes now I get that urge to like I just want to get a little closer [laughter]. So I think that's one I've learned over the years to just not get too close and stay back and try not to disturb the bird. Which can be hard especially if a bird-- some birds are really spooky and they just flush immediately. (18)	Keeping distance, without any doubt. And I want to get as close as I can. Why? Because I get more detail in any given picture the closer I get. The less I have to crop. If you have to crop, you lose detail. That's just part of digital photography. So the objective is to get as close as you can to get close enough where you don't bother them. But at the same time, in your desire to get close, you're exposing yourself to their vision so you're making them get used to you not hurting them, which is a dangerous thing because somebody with a gun that's going to hunt them is going to teach them a different lesson. So yeah, that's probably the hardest one that I have to deal with. (5)

Table 3.1 continued

Preventing general stress: any reference to preventing stress to birds as challenging with no other specific guideline cited.	NA	I mean, like I said, whenever you go—especially if you're walking around, you automatically distress the animal. So I mean that's—90% of the time the way you see stuff is if you're walking through and it is flushed from the bushes. That's [inaudible] number one. I mean it stresses them. So every single time I go out it happens, that I stress the animal. (4) I mean that's probably the hardest one because you're trying to achieve something by photographing them and not always do you know if you're putting any stress on them. (16)
Recordings: any reference to challenges around using recordings.	There have been instances where I may have used a little bit excessive playback, but I have stopped doing that since. (14) For us, obviously the recordings, knowing how close is too close when it comes to stressing birds are probably one of the more difficult ones, because I think they're the ones that are most open for interpretation. (1)	NA
Respectfully educating others: anytime someone says that it may be difficult to approach/call out others when they're breaking guidelines/disturbing birds.	Now, I have been a couple of times with very avid listers playing recordings that they shouldn't have played. So I broke the rule by group thing, I guess [laughter]. I didn't speak up and say, "No I'm going to walk away [inaudible]." They were willing to do it; I was willing to be there, so. (7)	For me a challenge would be seeing somebody doing something inappropriate and - what's it say? - tactfully inform them. That'd be a challenge for me [laughter]. (8)

Table 3.1 continued

Respecting private property: any reference to trespassing on private property, whether intentional or unintentional.	Well, it was hard when someone had a bird that they didn't want you to come on their property. So I mean, you park out in front of their house and try and see back at their feeder, and they open the door and say, "You know, you could take my picture if you wanted to," because they think you're looking at them [laughter]. (12) Are you respecting the rights-- when you're pointing big lenses at peoples' houses [inaudible] among their social media and guess what the number one complaint is with property? Other than parking in front of their houses, it's people pointing big lenses at my house all the time. You're invading my privacy. (3)	I didn't even think of it, so I was basically on private property going after this owl and it became very, became very apparent to me right away that that was the wrong thing to do. And I honestly was, it was an honest mistake. There was no sign up, like some farmers have signs up like "no trespassing" and then you see it, you go Ok, but out there, They have nothing, because they're probably like, they don't realize like well these people are up here for snowy owls. (17)
Staying on-trail: any reference to staying on-trail as challenging.	Maybe staying on the trails. There's a lot of trails that [inaudible] that look like there's a trail, but then you start going down, and it's like, "What trail [laughter]?" So maybe staying on the trail, I don't know. (11) I would say, so if you're out in a field, for instance, some guidelines tell you, specifically, stay on trail. Sometimes, if I'm checking habitat, let's say there's a group of pine trees or something, and there isn't any trail near it, and I want to go to look and see if there's any owls in there, that would be, I guess, an example of not necessarily following guidelines. Another thing would be destroying habitat, and it's not something that is-- it's not something that may be intentional. It's probably something more circumstantial. You step off a trail or something, and you're not familiar with botany, and you step a plant that-- I guess you could say that's one of the downsides of not following that. Obviously, interrupting the habitat for birds. (15)	NA

Table 3.1 continued

Other	…guess I can think of-- the most difficult situations is when you do find yourself that you have seen a rare bird, right? And trying to decide what to do as a member of a birding community where you know how much your friends would love to see that bird... Yeah, probably for me, I would think that's the most challenging one because it's weighing that-- knowing how much joy it would give my favorite birding partner to be able to see that, and also thinking to yourself, "It's very small. It's very limited. It won't be that much more disturbance than me having already seen this bird." (9)	I would say if there is one about not helping, I would say that's probably going to be one of my worst. (6)

Table 3.2 : Thematic Coding: Motivations Related to Breaking Guidelines

Motivation	**Birding**	**Bird photography**
Competition: any reference to individuals breaking guidelines for competition, whether it is the best photo or life lister, etc.	Whereas a birder, some of them almost treat it like—do you know what the game Pokemon is? They almost treat it like Pokemon where like, "Oh. I got to see them all. Let's see how many species I can get in a day." (14)	And I know that there's probably some pretty unethical birders out there that are just in it for the competition… There's guys that just want to set records and they don't really—but I think inherently, most birders do care. (6) Because getting that photograph is more important than anything else to them. Their ego or something drives them that they want that spectacular shot that everybody says, "Oh, you're the best." (16)
Group settings: any reference to being motivated to break guidelines for group settings.	And so I try to put it all in the context of comparative risk. And so if I am out birding and I'm in an area, say these wetlands that I know is a Virginia rail, and I went and go play a call, I'll listen for him. I don't see him or I don't hear him or well, if I got a group of 20 school kids, and we might have the next future conservations here, I might pop out a tape and get them a chance to get them to see this really cool bird, and that creates that spark. Then the benefits of that real tiny disturbance for that bird, I think are far worth it. And so I even kind of play a little weighing game in winter when I don't do something if I look at what the potential benefits are of that and that comparative risk. (1) I notice that some groups, if they're a group that really likes to not commercialize it but have guided walks, or they're a page that specifically report stuff, sometimes those people can either intentionally flush birds to allow people to see them, or they were a bird that might not have necessarily should have been reported. (14)	NA

Table 3.2 continued

Helping birds: any reference to individuals being motivated to break guidelines to help birds.	Yeah, I would say if I saw a bird that I—say I saw a bird, an owl or sandhill crane or something like that, and I thought there was something wrong with it, then I would try to get closer. Number one, to see how it reacts to me getting closer. Number two, to see if I can see any obvious signs of problems. (15)	And then, I've rescued birds that I came across before because they were going to die otherwise. (6) So did I break the guidelines? Maybe in those situations. But I was more trying to figure out what was going on than—I had already gotten all the photographs I wanted or needed. (16)
Identifying birds: any reference to individuals breaking guidelines to identify birds.	Birding involves a lot more flushing birds to get them to come out of their habitats so that way, you can identify them more easily. (14) I, the thing that would bring me closest is if I was birding somewhere and I heard the call of a bird that's like not supposed to be here, or I saw a bird and it's like oh my gosh that's supposed to be on the west coast or something, I might find myself pursuing it more to get a documented photograph because no one's I mean if you say it it's not going to, it's not that I want to be in the books for having seen it, it would be, I want to show that we had a whatever here. (10)	Well, in my work with the International Crane Foundation, sometimes it's imperative that we ID a bird. And then under those circumstances, I would probably possibly get closer than the guidelines would say to get a photograph of the bands. More than half of the birds—all of them are banded, but more than half of them, the radios or transmitters aren't working. So you have to get closer to ID them. (8)
Listing birds: any reference to individuals breaking guidelines to list birds.	If I were to be a very avid lister, getting it on my list over keeping the guidelines might cause me to break it, so. (7) I'm just trying to think of—say a flamingo shows up at Goose Pond next summer, but it's obviously very stressed. It's getting attacked by raptors. It's not having a good time and then on top of that, millions of birders show up and are constantly hounding it. They're seriously degrading Goose Pond. They're not respecting the hunters that are there, then it becomes less about the actual flamingo itself and more just checking a box or getting those photos. (14)	When we went on the bird watching thing, it was not uncommon for the people to clap loudly to try to flush the birds out of the bushes. So I was a little bit surprised that they did that, but anyway. I guess I haven't—and I guess in the online people talking about it, bird photographers are much more likely to not disturb the animal than bird watchers, because the bird watcher records the sighting as their whatever. (4)

Table 3.2 continued

Money: any reference to individuals breaking guidelines for money.	Especially photographers that are trying to sell photography, that nature photography. I mean, it makes me very hesitant to even look at things like that at art shows without knowing, "To get that owl photo, did they [inaudible] out?" (9) Paid guiding I can understand why it could be an issue because people are paying you hundreds or thousands of dollars to see birds, and they've traveled far away. They want to see it at almost any cost, and that probably adds a little more pressure to potentially play a tape. And I've been to some areas where I've seen guides breaking rules in the idea that the clients want these things, and it might depend on their paycheck or tips if they don't deliver. (3)	Large quantities of money. I mean, if your photos are only being shown in your house, like looking at prints and stuff, I mean there's-- I mean, there's no payoff for doing this thing. So I mean, short of a million dollars-- I mean, I don't think this-- I don't know. (4)

Table 3.2 continued

Photographing birds: any reference to individuals breaking guidelines to photograph birds.	I would say I would probably give them more the benefit of the doubt than I would—a photographer wants to get a picture, and that's their only goal. And it's not true of all photographers, but if you had to look at what is the goal of a birder versus what is the goal of a photographer, [inaudible] they would probably describe it, so they would probably be less [inaudible]. (15) And I've not done that very much but I've probably done it a couple of times. I know I probably stressed out a Ruby-crowned Kinglet because I was trying to get a picture of it. (13) To get the photograph at all costs. And I guess I've just seen more reports about people that have gone overboard to get the photograph and should have left things alone. (7)	They're going to do whatever they think is right for them at the moment. And to use it for getting a photograph? One of the photographers actually submitted one of his photographs to—I don't know if it was National Geographic or—it was some big-name magazine. And he won first place, and they put it on the cover. And I'm thinking, "You got your pictures. You got your first-place prize. You could brag about it. But now that bird is going to go back up to the arctic, maybe, or it's going to stay there and wait for more food, but nobody's going to feed it anymore because—" (16) Too many people, photographers, just to get the good shot, they get too close. And then you don't get a shot at all. (8) So the photographer in me says, "Let's go get the shot." This is where the birding side and the photographer side clash, and you really want to get the shot, but maybe your opportunity does not provide enough chances to do that. Others I have seen, I've seen them bait, I've seen them trap, and I really don't agree with that. Now, getting close, I see it every year. I see it about every fifth to sixth time I get out that people have gotten way too close, especially when whoopers are around. They fly with the sandhills a lot, and people know, and people tend to get too close for their comfort. (5)

Table 3.2 continued

Prioritizing experience: any reference to individuals breaking guidelines in order to place their experience over the well-being of birds.	And we have pulled in right when two photographers pulled in, and we get out and start walking the road to watch the feeders, and they decide to walk up the driveway, and basically walk probably less than 10 feet from the feeders. And they walk in, and every bird flushes away, and they're standing there with their lenses ready to capture birds. And we're out on the road going, "Well, what the hell. We can't see anything now. You flushed them all away. Why do you even need to be that close? You have these big giant cameras on you." And that was just a—I think they had this thought, "Oh. They're just feeder birds. They're going to come back, and I'm in position." But you're not aware of all these other bird watchers that were there trying to enjoy the same thing too. And so a lot of our group left grumbling about these photographers, and whether they were just completely I to their behavior, or whether it was an actual ethics violation. (1)	I guess very much—I think the reason people break rules and do things is because they have placed a value upon the outcome that is in some way greater than the value of the bird living its life. So that person's experience, to them, is more important than the bird itself. And in many ways, that's a total lack of appreciation. (4)
Seeing birds: any reference to individuals breaking guidelines to see birds.	I remember I have flushed some birds before that I didn't really feel I should have just because I wanted to get closer to get a better look at them. (14) If it's something that I really wanted to see, it would definitely bend me a little bit more towards being like, "Okay. Maybe I'll just take a couple of steps into this farmer's field or something like that." (18) Well I think, for instance, seeing a bird. The fact that you've been looking hard for a bird and haven't been able to find it is where you run into the urge to do something different than what you normally do in hunting for a bird. But I think, for me, it's most impactful when I've been working really hard to find a bird and I can't find it. Or you've employed all of your normal procedures that all fall well within these guidelines and you still haven't found the bird. That's when the ethical dilemma rears its head. (3)	I've seen birders do things that are just-- the Lake County Forest Preserves here, there's signs all over, "Stay on the trail." I've seen birders walking off trails and not just three or four feet, a couple of hundred feet to get closer to a wetland area just to see what's there. And then by the time they get there, half of what's there has already flown away because they've got disturbed. (16)

Table 3.2 continued

Other	I mean, I think the closest I would come into that issue is of knowing a really good friend would like you to see that bird and wanting to tell them about it. (9)	No, because I think their motive, our motive, as photographers has always better bigger you know, we saw this, we saw"¦ it's like "I caught a fish that was this big"• well show it to us. With photography and birding, you can do that. (17)

Table 3.3: Thematic Coding: Barriers Related to Adhering to Guidelines

Barrier	Birding	Bird photography
Ignorance: any reference to ignorance or lack of awareness as a barrier to following guidelines.	It's the same thing that I would say people, when they're starting out birding, [inaudible] whatever. Everybody makes mistakes. And I would probably say more so their mistakes are out of ignorance where-- and it's not all photographers, but I feel more so with photographers. (15) But I think you have to know, you have to know there are consequences. Some people may not even think if they're not informed. (10)	Well, in my experience, the people that break the rules the most are just touristy type people who are just not knowledgeable of what's going on. The lady with the cell phone is a prime example. Down at Muscatatuck, I almost always photograph out of my car. The car acts like a blind. You get out of the car-- and frequently, people will stop when they see me photographing something and the first thing they do is jump out of the car and off that wildlife goes. So it's just ignorance of the [inaudible]. (8) In general, most people are ignorant. They're not aware of it. (16)
Apathy: any reference to apathy towards guidelines or bird disturbance as a barrier.	In altering the bird's behavior, i.e., the bird taking off and flying away, and some of that is ignorance, and some it's just, "I don't care" … I guess people are probably aware-- they're probably aware that what they're doing is wrong, but they go ahead and do it anyways for whatever reason. (15)	If someone puts a photograph where they've been baiting something. Some people will react to that. Some photographers are just, they say, "So what?" Again, that tends to be the professionals. (8)
Technology: any reference of improper equipment or technology as a barrier.	So because if you only have a 300 milimeter lens, you might be willing to do some things to get closer in order to get that photo. (10) People who are photographers, wildlife photographers, who like to take pictures of birds, it can be a bigger concern, and specifically people who are bird photographers. There are people who don't carry optics with them frequently, the camera vision optics, I've had issues with them, with some of those people... (3)	I mean, when you get to the level that I've been at, you're aware of all those, but for people like my cousin who don't do that and they have a point and shoot that, oh, hey, a deer walks out in front of them. What are they going to do? They're going to get as close as they can because they don't have the equipment to do what I do, so they're going to encroach upon wildlife. (5) But I do think the photography aspect is, and you know it could be somebody with a cell phone it doesn't necessarily have to be a birder with a big long lens, it could be somebody with a cell phone that sees something in the distance and it's like well I'm going to go over here no matter what. (17)
Other	I definitely think that since there're so many birders that are photographers, that just having this out there isn't enough, and I'd like to see more of the photography ethics shared alongside them, because the birding one really doesn't do anything for photography. (1)	Don't stress the birds, blah, blah, blah. And that's twelve items down the list. Because at the beginning of the list there's-- this is the number. This list of birds has been seen in the area. And these birds are of particular interest and this is where they are. This is how we're going to get there. This is when we're going to do it. And at some point down the line, but we need to remember not to scare away the animals so that someone else can see them. And I mean, that is not rule number one or the thing that is most present in people's minds I guess, so. (4)

Table 3.4: Thematic Coding: Trade-offs Associated with Adhering to Guidelines

Trade-offs	**Birding**	**Bird photography**
Bad photos: any reference to getting poor quality photos as the result of following guidelines.	And you get crappy documentary photos because you're too far away. (3)	I mean, there are going to be times where you could cheat and get a better shot. (6)
Missed experiences: any reference to missing out on encountering birds (including identifying, listing, photography and seeing birds).	I mean, if you want to see a bird that happens to be under that classification, then I guess if you play a tape, you're breaking the ethics. And then if you don't get to see that bird because you don't play the tape, yeah. (1) I think that just when I'm birding, I don't always get the identification of birds down, and I guess that's part of birding. I mean, I've gone places looking for specific birds and not seen them, and that's part of birding too. (15)	I'm sure I've missed some photographs that I could have gotten if I'd gotten closer. (8) But I don't know. I don't know that-- you might not be able-- you might not see something that you want to see if you follow guidelines. (13)
No associated trade-offs: an explicit reference to having no trade-offs associated with following guidelines.	Oh, yeah. No. Then I'd have to try a different way or something if I can't get a picture. Yeah. So no. It's [inaudible] just suffer [laughter]. (11)	No. I don't think so. I don't think so. (16)
Other	It might mean just less easy access to the correct type of habitat. It might also just be-- I'd say definitely just in general, access to certain areas, because a lot of good habitat is on private property. (14)	NA

CHAPTER 4. MAIN FINDINGS AND GENERAL CONCLUSION

4.1 Discussion

The findings of both the quantitative and qualitative studies illustrate the importance of utilizing mixed methods in human dimensions research (Driscoll et al., 2007). The quantitative portion of this study entailed of methods used by previous studies (i.e., the application of the recreation specialization framework to bird recreationalists and their perceptions of blame for bird disturbance) and methods novel to this particular niche of research (i.e., exploring both birding and bird photography and testing individual socio-demographic characteristics for connections with increased bird disturbance in order to confirm previous research on bird recreationalists and draw newfound conclusions). Complementing the quantitative portion of this study, the qualitative portion entails of a novel exploration of bird recreationalists' perceptions of birding and bird photography ethical guidelines. Together, the findings from utilizing mixed methods create a thorough image of 1) how bird recreationalists who engage in birding and/or bird photography differ in socio-demographic characteristics, 2) who of these recreationalists may be more likely to engage in behaviors that disturb birds, 3) who bird recreationalists perceive are responsible for bird and bird habitat disturbance and 4) why bird recreationalists might engage in behaviors that harm birds and break ethical birding and bird photography guidelines.

The quantitative portion of the study found differences in socio-demographic characteristics between birders, birders who also engage in bird photography, and bird photographers who engage in birding. Demographically, these groups are similar to each other with the caveat of bird photographers having less education than other bird recreationalists. These findings suggest that bird photographers may not be as knowledgeable about birds as other bird recreationalists and generally, do not engage in as much listing of birds. This plays an important role in assessing the connection of individual socio-demographic characteristics to an increase in bird disturbance: findings indicate that individuals who engage in birding, list birds and are knowledgeable about birds are more likely to engage in behaviors that can potentially harm birds and harm-reducing behaviors than other participants of this study. Additionally, bird recreationalists who bird as their only or primary activity perceived bird photographers as one of the top three recreation groups responsible for bird disturbance, whereas bird photographers did not perceive themselves or

birdwatchers as one of the top three groups. These perceptions and assessment of socio-demographic variables suggest that there may be a discrepancy in behavior and perceptions of bird recreationalists who bird as their only or primary activity, although this finding requires further investigation.

The qualitative portion of this study identifies perceived challenges, motivations, barriers and trade-offs connected to ethical birding and bird photography guidelines. Although various challenging guidelines were identified by bird recreationalists, the implications of this can be consolidated into two categories: ecological and social. Some guidelines identified as challenging (e.g., maintaining a proper distance from birds) could result in negative ecological impacts to birds, whereas others (e.g., respectfully educating other recreators) could result in social conflict or consequences. Generally, the motivations associated with breaking guidelines that were identified by bird recreationalists may be related to achievement-oriented motivations derived from previous recreation specialization research (McFarlane, 1994) and the quantitative chapter of this study. Identified barriers related to adhering to guidelines highlighted a lack of awareness of guidelines among bird recreationalists, improper photography technology among bird photographers, and the important and understudied attitude of apathy for the guidelines among recreationalists. Bad photography and missed experiences were major identified trade-offs by bird recreationalists, although many interviewees stated that they did not personally perceive or experience major consequences for adhering to guidelines.

Findings from the qualitative chapter provide context for the findings from the quantitative chapter. Identified motivations (e.g., listing, photographing and seeing birds, competition) support the connection between higher levels of achievement-oriented motivations, maintenance of a life list and increased likelihoods to engage in behavior harmful to birds among bird recreationalists. Barriers such as apathy towards guidelines (despite potential awareness of the consequences) likewise can provide an explanation for why the characteristics connected to an increased likelihood to engage in harmful behaviors also is connected to an increased likelihood to engage in harm-reducing behaviors. The identified trade-offs also provide context for the decision-making process of bird recreationalists, suggesting that individuals with certain characteristics may see more value in the outcome that benefits them (i.e., listing, photographing or seeing birds) than the well-being of the birds. In order to confirm these potential associations and dynamics among bird recreationalists, further research is necessary.

The results of this research have implications for natural resource managers and conservationists. First, by distinguishing similarities and differences between individuals who bird as a primary activity and individuals who photograph birds as a primary activity, natural resource managers could better tailor information and activities hosted by said managers to better encompass these types of recreationalists. This could be important from a funding stance, both for the maintenance of managed properties and bird conservation, since both many public and private properties lean heavily on visitor and tour fees. Second, in understanding behavior related to bird disturbance, who is more likely to disturb birds and what characteristics may influence individual behavior, the work that natural resource managers conduct to prevent bird disturbance is better informed. Third, identifying birding and bird photography guidelines that bird recreationalists find challenging to adhere to can help organizations find means to address these specific challenges. For example, with preventing general stress to birds and maintaining appropriate distances from birds, natural resource managers that work with visitors could specifically add structures that allow visitors to view birds without getting too close to them and causing stress, such as viewing decks or viewing blinds. Fourth, in understanding motivations related to breaking guidelines, and barriers and trade-offs associated with following guidelines, natural resource managers can work to ensure that bird recreationalists can fulfill their goals associated with these motivations (e.g., listing, photographing and seeing birds) and overcome more general barriers to following guidelines. By providing opportunities to see birds through safe and controlled settings (e.g., tours, viewing decks), natural resource managers can exercise some control over bird disturbance from bird recreationalists and minimize potential trade-offs. Finally, tangential to these results, because bird recreationalists are stakeholders in bird conservation, natural resource managers could benefit from working directly with bird recreationalists to co-produce sustainable solutions that prevent disturbance to birds from all types of recreationalists.

4.2 Future research

From the above thesis research stems multiple dimensions of potential research topics. First, bird disturbance through the lenses of birders and bird photographers could be better understood through the application of social theory to birding and bird photography social norms and culture. Some of the few studies on birders' perceptions and behaviors related to bird disturbance apply a recreation specialization framework to understand bird disturbance (Bireline, 2005; Reznicek,

2012), which serves a purpose of identifying recreationalists that may be more prone to disturbing birds. This thesis research goes beyond this by using a social marketing approach to identify challenges, motivations, barriers and trade-offs related to following birding and bird photography guidelines.

However, this preliminary work needs to be followed up with more extensive research on the context behind decision-making around bird disturbance. This can better inform sustainable solutions for bird disturbance. For example, although raising awareness about bird disturbance and ethical guidelines may impact the behavior of some individuals, whose values, beliefs, and attitudes may make them more susceptible to using new information to inform decision making, this is not a one-size-fits-all solution. The qualitative results of the current research identified the attitude of apathy towards bird disturbance and ethical guidelines that prevents some recreationalists from following ethical guidelines, which is characterized by some level of awareness. Simply raising awareness will not necessarily change the behavior of someone who is apathetic towards bird disturbance. In addition to raising awareness, finding other means to preventing bird disturbance is necessary, which may relate to better understanding the social norms of birding and bird photography communities.

Importantly, bird photography as a recreational activity remains to be understudied (Slater et al., 2019). Bird photography is growing in participation numbers, with many similarities to and differences from birding. Already, some research shows that birds and other wildlife can distinguish photographers from other recreationalists and interpret their behaviors as dangerous (Huang et al., 2011; Slater et al., 2019). However, research has yet to really grasp who bird photographers are and their overall relationship with birds. Although this research begins to explore that, there is still much to learn about the individuals who engage in this activity. Future research should focus on gaining a better understanding of bird photography communities, in addition to concepts mentioned previously around decision-making.

Although this work focuses on bird recreationalists and bird disturbance, there is a potential for this framework to be used in research on different recreation groups and their adverse impacts to different components of the environment. For example, applying aspects of this research to visitor recreation and usage of social trails in national parks and/or other public lands could help natural resource managers better control visitor behavior. In particular, using a social marketing

approach to understand the context behind human disturbance to nature may be useful in combination with either directly or indirectly observing behavior of recreationalists.

Finally, some of the sampling limitations from this research can be addressed in future research. Although convenience sampling yielded a smaller sample size in this instance, working with larger birding and bird photography organizations such as the American Birding Association could help achieve larger sample sizes. Additionally, future surveys to this population would benefit from being short and concise, which may aid in sample size and response rates. Garnering a sample that is more representative of the population may be more difficult to achieve. Sampling across multiple regions of a country (in the case of the U.S., multiple states) could capture regional variance in perceptions and behaviors of bird recreationalists. A quota sampling framework could be constructed based on previous work to account for proportions of specific variables in a population, although this method is a type of non-probability sampling with its own limitations. Ultimately, some of the limitations of convenience sampling can be addressed, however it may be impossible to get a sample of bird recreationalists that is fully representative of the population.

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APPENDIX A: ONLINE SURVEY

Birdwatcher and Nature Photographer Survey

INTRO_statement Survey of Illinois and Indiana Birdwatchers and Nature Photographers

Hello,

Researchers at Purdue University are investigating common field practices of Illinois and Indiana birdwatchers and nature photographers with an emphasis of field practices around birds. Your insights are important, as they will help us develop future conservation strategies for birds. Your participation is voluntary, and the information you provide will be kept confidential. In order to participate in this survey, you must be 18 or older

Unless otherwise instructed, please check the selection that best describes your situation or opinion. The survey should take approximately 15-20 minutes to complete. We recommend responding to this survey on a computer rather than a mobile device.

Please read each question carefully. If you have any questions about the survey, please contact Brennan Radulski at bradulsk@purdue.edu.

Thank you in advance for your help!

INTRO_Q0 Do you live in Illinois or Indiana?

- ❍ Yes (1)
- ❍ No (0)

If respondent selects "No" for INTRO_Q0, they will skip to "additional_comments" block.

INTRO_Q1a Do you like to watch birds?

- ❍ Yes (1)
- ❍ No (0)

Display: If respondent selected "Yes" for INTRO_Q1a, INTRO_Q1b would display.

INTRO_Q1b Do you leave your home to watch birds?

- ❍ Yes (1)
- ❍ No (0)

INTRO_Q2a Do you take photos of nature?

- ❍ Yes (1)
- ❍ No (0)

Display: If respondent selected "Yes" for INTRO_Q2a, INTRO_Q2b would display.

INTRO_Q2b Do you leave your home for the purpose of photographing nature?

- ❍ Yes (1)
- ❍ No (0)

Display: If respondent selected "Yes" for INTRO_Q1a to INTRO_Q2b, then INTRO_Q3 would display.

INTRO_Q3 You indicated that you watch birds and photograph nature. Which do you consider your primary activity?

- ❍ Watching birds (1)
- ❍ Photographing nature (2)

Survey flow for three possible outcomes of qualifier questions.

Option 1: Doesn't qualify to take survey - If respondent selected "No" for INTRO_Q0, or selected "No" for INTRO_Q1a or selected "No" for INTRO_Q1b and selected "No" for INTRO_Q2b or selected "No" for INTRO_Q2b Skip to "Thank you" block.

Option 2: Birder - If respondent selected "Yes" for INTRO_Q1a and "Yes" for INTRO_Q1b and "No" for either INTRO_Q2a or INTRO_Q2b, or "Yes" for INTRO_Q1a for INTRO_Q2b and "Birding" for INTRO_Q3, skip to the "ACBD" block.

Option 3: Nature Photographer - If respondent selected "Yes" for INTRO_Q2a and "Yes" for INTRO_Q2b and "No" for either INTRO_Q1a or INTRO_Q1b, or "Yes" to INTRO_Q1a to INTRO_Q2b and "Nature Photography" for INTRO_Q3, skip to the "ACNP" block.

ACBD – Activity Birdwatching

ACBD_intro Birdwatching This section contains questions about your birdwatching behaviors. All of these questions are relative to watching birds outside of your home, unless explicitly stated. For each question, please choose the options that best represent your experiences and practices.

ACBD_Q1 Do you consider yourself a 'birder'?

- ❍ Yes (1)
- ❍ No (0)
- ❍ I don't know (9)

ACBD_Q2 Approximately how often do you watch birds in the following areas?

	Never (0)	Once a year (1)	Once a month (2)	Once a week (3)	More than once a week (4)
Your home (1)	❍	❍	❍	❍	❍
Public lands (2)	❍	❍	❍	❍	❍
Private lands (not including your home) (3)	❍	❍	❍	❍	❍

ACBD_Q3 Approximately how many years have you been watching birds?

ACBD_Q4a Approximately how much money have you invested in equipment to watch birds?

0 1000200030004000500060007000800090010000

$0 ()	

ACBD_Q4b Approximately how much money do you spend each year to watch birds, not including equipment (e.g., travel, lodging)?

0 1000200030004000500060007000800090010000

$0 ()	

ACBD_Q5 Please indicate your level of disagreement or agreement with the following statements regarding your motivations to watch birds.

I watch birds...

	Strongly disagree (1)	**Disagree (2)**	**Neither agree nor disagree (3)**	**Agree (4)**	**Strongly agree (5)**
...to enjoy nature. (1)	❍	❍	❍	❍	❍
...to be outdoors. (2)	❍	❍	❍	❍	❍
...to see birds I have not seen before. (3)	❍	❍	❍	❍	❍
...to get away from the demands of life. (4)	❍	❍	❍	❍	❍
...to improve my bird observation skills. (5)	❍	❍	❍	❍	❍
...to see as many birds as possible. (6)	❍	❍	❍	❍	❍
...to do something creative. (7)	❍	❍	❍	❍	❍
...to be alone. (8)	❍	❍	❍	❍	❍
...for my job. (9)	❍	❍	❍	❍	❍
...for family recreation. (10)	❍	❍	❍	❍	❍
...for hunting. (11)	❍	❍	❍	❍	❍
...to interact with other people who watch birds. (12)	❍	❍	❍	❍	❍

ACBD_Q6 Please indicate your level of disagreement or agreement with the following statements regarding your feelings about watching birds.

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
I would rather watch birds than do anything else. (1)	❍	❍	❍	❍	❍
Other leisure activities don't interest me as much as watching birds. (2)	❍	❍	❍	❍	❍
I find that a lot of my life is organized around watching birds. (3)	❍	❍	❍	❍	❍
Others would probably say that I spend too much time watching birds. (4)	❍	❍	❍	❍	❍
Most of my friends are in some way connected with watching birds. (5)	❍	❍	❍	❍	❍
If I stopped watching birds, I would probably lose touch with a lot of my friends. (6)	❍	❍	❍	❍	❍
If I could not watch birds, I am not sure what I would do. (7)	❍	❍	❍	❍	❍
Because of watching birds, I do not have much time to participate in other leisure activities. (8)	❍	❍	❍	❍	❍

ACBD_Q7 Please indicate your level of disagreement or agreement with the following statements.

In order to observe birds, I am willing to...

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
...wait up to 30 minutes outside in perfect weather conditions. (1)	❍	❍	❍	❍	❍
...wait up to 1 hour outside in perfect weather conditions. (2)	❍	❍	❍	❍	❍
...wait outside in the cold. (3)	❍	❍	❍	❍	❍
...wait outside in the heat. (4)	❍	❍	❍	❍	❍
...stay up late at night. (5)	❍	❍	❍	❍	❍
...get up early in the morning. (6)	❍	❍	❍	❍	❍
...hike up to 2 miles on-trail. (7)	❍	❍	❍	❍	❍
...hike up to 2 miles off-trail. (8)	❍	❍	❍	❍	❍
...hike more than 2 miles on-trail. (9)	❍	❍	❍	❍	❍
...hike more than 2 miles off-trail. (10)	❍	❍	❍	❍	❍
...travel up to 2 hours by car. (11)	❍	❍	❍	❍	❍
...travel more than 2 hours by car. (12)	❍	❍	❍	❍	❍

ACBD_Q8 Please indicate the likelihood that you would use the following techniques while watching birds.

	Very unlikely (1)	Unlikely (2)	Neither likely nor unlikely (3)	Likely (4)	Very likely (5)
Feeding or offering a water source (1)	❍	❍	❍	❍	❍
Using vocalization calls (e.g., pishing, whistles) (2)	❍	❍	❍	❍	❍
Using instrument calls (e.g., duck, turkey) (3)	❍	❍	❍	❍	❍
Using call playback (e.g., stereo, phone) (4)	❍	❍	❍	❍	❍
Using or wearing attractive colors (5)	❍	❍	❍	❍	❍
Flushing (intentional) (6)	❍	❍	❍	❍	❍
Spotlighting (7)	❍	❍	❍	❍	❍
Using flash photography (8)	❍	❍	❍	❍	❍
Using a viewing blind (9)	❍	❍	❍	❍	❍
Hiding in vegetation (10)	❍	❍	❍	❍	❍
Using an observation deck (11)	❍	❍	❍	❍	❍
Other (please specify): (12)	❍	❍	❍	❍	❍

Display:If respondent selected "Yes" for INTRO_Q1a through INTRO_Q2b, display BOTH_Q1. If respondent selected "Birding" for INTRO_Q3, display BOTH_Q1 with text identified with a "/" is relative to nature photography.

If respondent selected "Nature Photography" for INTRO_Q3, display BOTH_Q1 with text identified with a "/" is relative to birding.

BOTH_Q1 Would you also like to complete the same set of questions for ${e://Field/field10}? If you select no, you will proceed to the next set of questions.

- ❍ Yes (1)
- ❍ No (0)

ACNP – Activity Nature Photography

ACNP_intro Nature Photography

This section contains questions about your behaviors when photographing nature. All of these questions are relative to photographing nature outside of your home, unless explicitly stated. For each question, please choose the options that best represent your experiences and practices.

ACNP_Q1a Do you consider yourself a 'nature photographer'?

- ❍ Yes (1)
- ❍ No (0)
- ❍ I don't know (9)

ACNP_Q1b Please indicate your level of interest in photographing the following.

	Not at all interested (0)	Not very interested (1)	Somewhat interested (2)	Interested (3)	Very interested (4)
Animals (not birds) (1)	❍	❍	❍	❍	❍
Birds (2)	❍	❍	❍	❍	❍
Nature landscapes (3)	❍	❍	❍	❍	❍
Plants (4)	❍	❍	❍	❍	❍
Other (please specify): (5)	❍	❍	❍	❍	❍

ACNP_Q2 Approximately often do you photograph nature in the following areas?

	Never (0)	Once a year (1)	Once a month (2)	Once a week (3)	More than once a week (4)
Your home (1)	❍	❍	❍	❍	❍
Public lands (2)	❍	❍	❍	❍	❍
Private lands (not including your property) (3)	❍	❍	❍	❍	❍

ACNP_Q3 Approximately how many years have you been photographing nature?

ACNP_Q4a Approximately how much money have you invested in equipment to photograph nature?

0 10002000300040005000600070008000900010000

$0 ()	

ACNP_Q4b Approximately how much money do you spend each year to photograph nature, not including equipment (e.g., travel, lodging)?

0 10002000300040005000600070008000900010000

$0 ()	

ACNP_Q4c Approximately what percentage of your income do you get from photographing nature?

0 10 20 30 40 50 60 70 80 90 100

0% ()	

ACNP_Q5 Please indicate your level of disagreement or agreement with the following statements regarding your motivations to photograph nature.

I take photographs...

	Strongly disagree (1)	**Disagree (2)**	**Neither agree nor disagree (3)**	**Agree (4)**	**Strongly agree (5)**
...to enjoy nature. (1)	❍	❍	❍	❍	❍
...to be outdoors. (2)	❍	❍	❍	❍	❍
...to see nature I have not seen before. (3)	❍	❍	❍	❍	❍
...to get away from the demands of life. (4)	❍	❍	❍	❍	❍
...to improve my photography skills. (5)	❍	❍	❍	❍	❍
...to see as much nature as possible. (6)	❍	❍	❍	❍	❍
...to do something creative. (7)	❍	❍	❍	❍	❍
...to be alone. (8)	❍	❍	❍	❍	❍
...for my job. (9)	❍	❍	❍	❍	❍
...for family recreation. (10)	❍	❍	❍	❍	❍
...for hunting. (11)	❍	❍	❍	❍	❍
...to interact with other people who photograph nature. (12)	❍	❍	❍	❍	❍

ACNP_Q6 Please indicate your level of disagreement or agreement with the following statements regarding your feelings about photographing nature.

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
I would rather photograph nature than do anything else. (1)	❍	❍	❍	❍	❍
Other leisure activities don't interest me as much as photographing nature. (2)	❍	❍	❍	❍	❍
I find that a lot of my life is organized around photographing nature. (3)	❍	❍	❍	❍	❍
Others would probably say that I spend too much time photographing nature. (4)	❍	❍	❍	❍	❍
Most of my friends are in some way connected with photographing nature. (5)	❍	❍	❍	❍	❍
If I stopped photographing nature, I would probably lose touch with a lot of my friends. (6)	❍	❍	❍	❍	❍
If I could not photograph nature, I am not sure what I would do. (7)	❍	❍	❍	❍	❍
Because of photographing nature, I do not have much time to participate in other leisure activities. (8)	❍	❍	❍	❍	❍

ACNP_Q7 Please indicate your level of disagreement or agreement with the following statements.

In order to photograph birds, I am willing to...

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
...wait up to 30 minutes outside in perfect weather conditions. (1)	❍	❍	❍	❍	❍
...wait up to 1 hour outside in perfect weather conditions. (2)	❍	❍	❍	❍	❍
...wait outside in the cold. (3)	❍	❍	❍	❍	❍
...wait outside in the heat. (4)	❍	❍	❍	❍	❍
...stay up late at night. (5)	❍	❍	❍	❍	❍
...get up early in the morning. (6)	❍	❍	❍	❍	❍
...hike up to 2 miles on-trail. (7)	❍	❍	❍	❍	❍
...hike up to 2 miles off-trail. (8)	❍	❍	❍	❍	❍
...hike more than 2 miles on-trail. (9)	❍	❍	❍	❍	❍
...hike more than 2 miles off-trail. (10)	❍	❍	❍	❍	❍
...travel up to 2 hours by car. (11)	❍	❍	❍	❍	❍
...travel more than 2 hours by car. (12)	❍	❍	❍	❍	❍

ACNP_Q8 Please indicate the likelihood that you would use the following techniques while photographing nature.

	Very unlikely (1)	Unlikely (2)	Neither likely nor unlikely (3)	Likely (4)	Very likely (5)
Feeding or offering a water source (1)	❍	❍	❍	❍	❍
Using vocalization calls (e.g., pishing, whistles) (2)	❍	❍	❍	❍	❍
Using instrument calls (e.g., duck, turkey) (3)	❍	❍	❍	❍	❍
Using call playback (e.g., stereo, phone) (4)	❍	❍	❍	❍	❍
Using or wearing attractive colors (5)	❍	❍	❍	❍	❍
Flushing (intentional) (6)	❍	❍	❍	❍	❍
Spotlighting (7)	❍	❍	❍	❍	❍
Using flash photography (8)	❍	❍	❍	❍	❍
Using a viewing blind (9)	❍	❍	❍	❍	❍
Hiding in vegetation (10)	❍	❍	❍	❍	❍
Using an observation deck (11)	❍	❍	❍	❍	❍
Other (please specify): (12)	❍	❍	❍	❍	❍

KNOW – Knowledge about birds

KNOW_knowledge_intro Knowledge about bird

We are interested in understanding the range of experiences and knowledge that people have of birds. Please answer the following questions that best represent your current knowledge.

KNOW_Q1 Approximately how many birds in the U.S. can you identify by sight on your own?

KNOW_Q2 Approximately how many birds in the U.S. can you identify by sound on your own?

KNOW_Q3a Do you maintain a 'life list' of birds?

- ❍ Yes (1)
- ❍ No (0)
- ❍ I don't know (9)

Display: If respondent selects "Yes" for KNOW_Q3a, display KNOW_Q3b.

KNOW_Q3b Approximately how many birds are on your life list?

WCSC – Whooping Cranes Scenarios

WCSC_wc_intro Whooping Cranes

We are interested in whooping cranes. Please choose the options that best represent your practices and opinions.

WCSC_Q1 In the past 5 years, have you seen a whooping crane in the wild?

- ❍ Yes (please specify where): (1) _____
- ❍ No (0)
- ❍ I don't know (9)

WCSC_Q2 Please indicate your level of disagreement or agreement with the following statements regarding interactions with whooping cranes.

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
On foot, people should not be closer than 200 yards to a whooping crane. (1)	❍	❍	❍	❍	❍
In a car, people should not be closer than 100 yards to a whooping crane. (2)	❍	❍	❍	❍	❍
Any human activity that changes a whooping crane's behavior is a disturbance. (3)	❍	❍	❍	❍	❍
Any human activity that intentionally changes a whooping crane's behavior is harassment. (4)	❍	❍	❍	❍	❍
If a whooping crane is on my private property, I have the right to shoot it. (5)	❍	❍	❍	❍	❍

WCSC_situation_intro Situation-Based

This section contains questions that are based on hypothetical situations one might encounter while watching birds/photographing nature. We would like to know more about the actions you might take in the following hypothetical situations. Please choose the options that best represent the actions you might take.

WCSC_Q3 You are in a state park where going off-trail is restricted, and you hear the call of a bird that you have been hoping to see. The call is coming from off the trail that you are walking on, and you are unable to see the bird.

Please indicate the likelihood that you would take the following actions.

	Very unlikely (1)	Unlikely (2)	Neither likely nor unlikely (3)	Likely (4)	Very likely (5)
Leave the trail to find the bird (1)	❍	❍	❍	❍	❍
Post online about the bird (2)	❍	❍	❍	❍	❍
Call the bird to see if it will come closer to you (3)	❍	❍	❍	❍	❍
Put out food/water for the bird to see if it will come closer to you (4)	❍	❍	❍	❍	❍
Wait to see if the bird will come closer to you (5)	❍	❍	❍	❍	❍
Other (please specify): (6)	❍	❍	❍	❍	❍

WCSC_Q4 You are sitting on a bench near a pair of feeding whooping cranes. A large group of people arrive, causing the birds to stop feeding and stare at the crowd.

Please indicate the likelihood that you would take the following actions.

	Very unlikely (1)	Unlikely (2)	Neither likely nor unlikely (3)	Likely (4)	Very likely (5)
Leave the site (1)	❍	❍	❍	❍	❍
Join the group of people (2)	❍	❍	❍	❍	❍
Ask the group of people to be more quiet (3)	❍	❍	❍	❍	❍
Other (please specify): (4)	❍	❍	❍	❍	❍

WCSC_Q5 You are in a park with a friend, and your friend spots a rare bird. Your friend approaches the bird, causing it to fly to a tree further away from your friend. Your friend approaches again, causing the bird to fly further away again.

Please indicate the likelihood that you would take the following actions.

	Very unlikely (1)	Unlikely (2)	Neither likely nor unlikely (3)	Likely (4)	Very likely (5)
Ask your friend to leave the site with you (1)	❍	❍	❍	❍	❍
Post about the bird online (2)	❍	❍	❍	❍	❍
Call the bird to see if it will come closer to you (3)	❍	❍	❍	❍	❍
Put out food/water for the bird to see if it will come closer to you (4)	❍	❍	❍	❍	❍
Wait for the bird to come closer to you (5)	❍	❍	❍	❍	❍
Other (please specify): (6)	❍	❍	❍	❍	❍

WCSC_Q6 You just took photographs of a rare bird. This is the first time that the bird has been spotted in your state. It is known to be very sensitive to people.

Please indicate the likelihood that you would take the following actions.

	Very unlikely (1)	Unlikely (2)	Neither likely nor unlikely (3)	Likely (4)	Very likely (5)
Post both the location and photographs online within the first day of seeing the bird (1)	❍	❍	❍	❍	❍
Post only the location online within the first day of seeing the bird (2)	❍	❍	❍	❍	❍
Post only the photographs online within the first day of seeing the bird (3)	❍	❍	❍	❍	❍
Post both the location and photographs online after the bird has left the area (4)	❍	❍	❍	❍	❍
Post only the location online after the bird has left the area (5)	❍	❍	❍	❍	❍
Post only the photographs online after the bird has left the area (6)	❍	❍	❍	❍	❍

Don't post the location or photographs online (7)	❍	❍	❍	❍	❍
Other (please specify): (8)	❍	❍	❍	❍	❍

WCSC_Q7 In your opinion, what three recreation groups cause the most disturbance to birds and bird habitat? Please rank the following recreation groups from most to least disturbing by clicking and dragging the listed items into the box on the right.

Three recreation groups that cause the most disturbance to birds and bird habitat
_____ Birdwatchers (1)
_____ Fishers/anglers (2)
_____ Hikers/walkers (3)
_____ Hunters (4)
_____ Kayakers/canoers (5)
_____ Mountain bikers (6)
_____ Road bikers (7)
_____ Photographers (8)
_____ Other (please specify): (9)

WCSC_Q8 What do you consider to be the most unethical birdwatching practice for threatened or endangered bird species (please describe below)?

WCSC_Q9 What do you consider to be the most unethical photography practice for threatened or endangered bird species (please describe below)?

WCSC_Q10a Have you ever witnessed unethical behavior conducted by someone watching birds?

- ❍ Yes (1)
- ❍ No (0)
- ❍ I don't know if the behavior I witnessed was unethical (9)

Display: If respondent selects "Yes" or "I don't know" for WCSC_Q10a, display WCSC_Q10b.

WCSC_Q10b What did you witness, and what did you do in the situation (please describe below)?

WCSC_Q11a Have you ever witnessed unethical behavior conducted by someone photographing nature?

- ❍ Yes (1)
- ❍ No (0)
- ❍ I don't know if the behavior I witnessed was unethical (9)

Display: If respondent selects "Yes" or "I don't know" for WCSC_Q11a, display WCSC_Q11b.

WCSC_Q11b What did you witness, and what did you do in the situation (please describe below)?

DEMO_intro Demographic

DEMO_Q1 What is your gender?

DEMO_Q2 What is your zip code?

DEMO_Q3 What year were you born?

▼ 2001 (1) ... 1918 (84)

DEMO_Q4 What is the highest level of education you have completed?

- ❍ Some formal schooling (1)
- ❍ High school diploma/GED (2)
- ❍ Some college (3)
- ❍ 2-year college degree (4)
- ❍ 4-year college degree (5)
- ❍ Graduate degree (6)

DEMO_Q5 Which of the following sources do you use to communicate about rare bird sightings (check all that apply)?

- ☐ I don't use any of these sources (1)
- ☐ Facebook (2)
- ☐ Twitter (3)
- ☐ Instagram (4)
- ☐ eBird (5)
- ☐ Audubon Society Websites (6)
- ☐ Email listserv (7)
- ☐ Other (please specify): (8) _____

DEMO_Q6 Are you a member of any of the following groups (please check all that apply)?

- ☐ Audubon Society (1)
- ☐ American Birding Association (ABA) (2)
- ☐ Feeder Watch (3)
- ☐ North America Nature Photography Association (NANPA) (4)
- ☐ The Nature Conservancy (TNC) (5)

- ☐ Private land groups (please specify): (6)
- ☐ Friend groups of any public lands (please specify): (7)
- ☐ Facebook groups related to nature photography (please specify): (8)
- ☐ Facebook groups related to birding (please specify): (9)
- ☐ Other citizen science programs (please specify): (10)

DEMO_Q7 Would you be interested in being contacted for an interview about your experiences?

- ❍ Yes (1)
- ❍ Maybe (2)
- ❍ No (0)

Display: If respondent selects "Yes" or "Maybe" for DEMO_Q7, display DEMO_contact_info.

DEMO_contact_info Please enter the following:

- ❍ Name: (1) _____
- ❍ Email address: (2) _____
- ❍ Phone number: (3) _____

additional_comments Thank you for completing this survey! If you have any additional comments, thoughts, or questions about watching birds, photographing nature, whooping cranes, and/or the survey please write them below.

APPENDIX B: INTERVIEW GUIDE

Birder and Photographer Interview Guide
November 2019

Your participation in this interview is completely voluntary. Although findings will be shared in public reports and presentations, your individual responses will be kept completely confidential - meaning your name will not be linked in any way to comments you provide. You may skip any questions you do not wish to answer and you may stop the interview at any time.

Warm up - Involvement in birding/nature photography:

1. Could you describe your involvement in birding/nature photography?
    a. How many years have you been a birder/nature photographer?
    b. What birding/nature photography groups are you part of, including online and physical groups?
    c. How often do you go [birding] out to look for birds/go out to photograph nature?
    d. How serious of a birder/photographer do you think you are?
    e. How did you get into birding/photography?
2. Are you part of any conservation or environmental groups? Which ones?
3. What qualities do you think make a good birder/nature photographer?

Awareness/knowledge of Guidelines:

[read aloud] Many birding/photography groups have best practices or guidelines set in place to protect bird/wildlife subjects and their habitat from disturbance by people.

4. Previous to this interview, were you aware of some guidelines?
    a. What guidelines did you already know about?
5. How did you learn about the guidelines that you know?
    a. Did you learn from family, friends, groups/organizations?
    b. When in your birding/nature photography career did you learn about these guidelines?
6. How do guidelines vary between the groups that you are part of?

Perspectives of Guidelines

[show guidelines]

7. Would you say these guidelines are reasonable (do you agree with the guidelines)? Why/why not?

    a. How important is it to follow the guidelines?

[read aloud] Our survey data indicates that most birders/nature photographers have broken some of the guidelines at least once in their experiences.

8. How many times have you broken any guideline?
9. What might compel you to break guidelines?
    a. Are there trade-offs for being a guideline-abiding birder/nature photographer?
    b. What guidelines are challenging to follow?
10. How do other birders/photographers react when someone is caught breaking a guideline?
11. How much does it matter for the birds when a birder/nature photographer breaks guidelines?
12. What would it take to help birders/nature photographers adhere more often to the guidelines? (prompt if needed: technology, accountability, more knowledge about birds/wildlife…)
13. In general, what recreation group do you think breaks these guidelines the most? Explain.

14. Is there anything else you would like to share about birding/nature photography guidelines or protecting birds/wildlife subjects from human disturbance?

Demographics

I have a few demographic questions I would like to ask.

15. What is your age?
16. What is your gender?
17. How would you describe your racial or ethnic heritage?
18. Do you live in a rural, suburban or urban area?

APPENDIX C: QUALITATIVE CODING FRAMEWORK

The following coding framework focuses on the content discussed in this thesis.

1. Experience – in terms of years participating, recreator type, perceived seriousness
   - 1.1. Years – any reference to number of years birding and/or practicing photography; don't need to code the actual number, I'll pull this out
   - 1.2. Recreator type – code the whole response to the question "do you identify more as a birder or nature photographer?"
     - 1.2.1. Birder – any reference to being a birder; not exclusive from 1.2.2
     - 1.2.2. Nature photographer – any reference to being a nature photographer; not exclusive from 1.2.1
   - 1.3. Seriousness – any reference to how serious interviewee is about birding and/or photography; can be implicit references detailing expertise

2. Challenging guidelines – practices that are hard to follow for any reason (reasoning is not important here); code after-effect of breaking said guideline
   - 2.1. Maintaining distance – any reference to getting too close or acknowledging that keeping a distance is challenging
   - 2.2. Respecting private property – any reference to trespassing on private property, whether intentional or unintentional
   - 2.3. Respectfully educating others – anytime someone says that it may be difficult to approach/call out others when they're breaking guidelines/disturbing birds, e.g., "I don't always point out when people are doing something wrong," or "[it's difficult] being courteous to the others if I see people [who are breaking guidelines]"
   - 2.4. Group settings – any explicit reference to having difficulty following guidelines while in group settings
   - 2.5. Staying on-trail – any reference to staying on-trail as challenging
   - 2.6. Recordings – any reference to guidelines around recordings, playback as challenging
   - 2.7. Preventing general stress – any reference to preventing stress to birds as challenging with no specific guideline cited (i.e., not citing 2.1-2.6); includes flushing with no context as to why
   - 2.8. Other – anything else that is not 2.1-2.7

3. Motivations to breaking guideline – any incentivizing matter that might compel someone to break a guideline
   - 3.1. Identifying birds – any reference to getting a bird ID as a motivation for breaking a guideline
   - 3.2. Photographing birds – any reference to being able to photograph a bird, e.g., "it's the drive to get a shot"
   - 3.3. Listing bird – being able to add a bird to a life list
   - 3.4. Helping bird – any reference to helping a bird, e.g., breaking guidelines to help an injured bird
   - 3.5. Money – any reference to financial incentives

3.6. Prioritizing experience – any reference to recreators putting their experience over the welfare of the birds or other recreators viewing the birds, e.g., "[recreator group] kind of put themselves above everyone else and the birds."
3.7. Competition – any reference to individuals competing for something, whether it is the best photo or life lister, etc.
3.8. Seeing birds – any reference to seeing birds as a motivation to break guidelines
3.9. Group settings – any reference to breaking guidelines for groups; cannot have a reference to group settings being challenging or difficult
3.10. Other – any other motivation that is not listed in 3.1-3.9

4. Barriers – any explicit or implicit barriers to following guidelines, e.g., "ignorance" or "improper technology"

5. Trade-offs to abiding to guidelines
   5.1. Bad photos – any reference to getting poor photos because of following guidelines
   5.2. Identification – can't ID bird because of following guidelines
   5.3. Missed experiences – reference to missing out on seeing/photographing birds
   5.4. No associated trade-offs – explicit reference to having no trade-offs associated with abiding to guidelines
   5.5. Other – other associated trade-offs other than the above