ASSESSING ATTITUDES TOWARDS BEARS AND THEIR MANAGEMENT AT THE LOCAL AND GLOBAL SCALES

By

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ABSTRACT

As bear populations across the globe are increasing, bears and humans are being brought together more frequently and often into conflict. Because of this rise in human-bear conflicts, it is becoming more crucial to understand public attitudes towards bears and management interventions. Management methods vary in effectiveness and public support, further complicating the management of bears and other large carnivores. Without proper understanding of public attitudes towards bears and specific management actions, conflict can ensue between stakeholders and managers, leading to a dissolution in social trust and management support. To address this need, I conducted a quantitative study in two phases, (1) a meta-analysis examining public attitudes towards bears and their management and human-bear conflict from studies around the world and (2) an online survey of students at the University of Wisconsin-Stevens Point, as they will become the next stakeholders and policymakers. I sought to assess the local and global differences in public attitudes towards bears and their management and determine the factors associated with these trends, including personal experience with bears, socio-cultural influences, and stakeholder group membership. Globally, attitudes towards bears tended to be positive, with age, gender, education level, community type, knowledge of bears, and experiences with bears most frequently found to have significant effects on attitudes. Attitudes towards bears and towards specific management actions were also often impacted by region and species of bear. Lethal management, policy, relocation, and hunting were most regularly explored in management questionnaires. Support for interventions was often framed in a specific situational context (e.g., an attack versus a sighting), with many studies finding significant impacts of context on attitudes. Locally,

students were generally positive in their attitudes towards bears, and these results indicate significant differences in attitudes based on bear species, home college, gender, and the frequency of and type of experiences with bears. While the effects of gender, college, and frequency of experiences with bears were fairly minimal, I found substantial effects of experience type on attitudes towards bears. Further, I found that support for specific management actions differed based on attitudes towards bears themselves, in addition to home college, stakeholder group affiliation, gender, experiences with bears, and the human-bear conflict context. As in the meta-analysis, student support for more intensive management actions tended to increase with the severity of the human-bear conflict. Further supported by the findings of both the meta-analysis and survey, attitudes towards bears and their management held by members of the public can be quite complex and diverse, thus it is essential to consider the social, experiential, and contextual variables as potential drivers of attitudes. This thesis reinforces the importance of experience on attitudes, the need to consider the situational context when evaluating support for management actions, and potential points for broader public outreach and education to better inform the public of management actions.

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

Introduction

Across the globe, bear populations are increasing, inevitably bringing bears and humans closer together and often into conflict (Dressel et al., 2015). These conflicts can take different forms, including livestock and crop depredation, attacks on humans and pets, and damage to property, and are increasing in frequency due to human encroachment and loss of habitat because of development (Ambarli & Bilgin, 2008; Don Carlos et al., 2009; Zukowski & Ormsby, 2016). Historically, human-bear conflict primarily existed between livestock owners and farmers and bears due to depredation, but property damage and nuisance reports are becoming more frequent due to greater exposure to anthropogenic food sources and growing populations of both humans and bears (Don Carlos et al., 2009; Zukowski & Ormsby, 2016). Regional populations of bears once nearly or fully extirpated due to conflicts with farmers have been reestablished and are recovering in many areas of the globe after protective measures were taken (Ambarli & Bilgin, 2008; Dressel et al., 2015).

Presented with these additional challenges of weighing conflict and protection of bear populations, wildlife managers employ a variety of management intervention techniques. Public education initiatives, including community messaging campaigns and bear safety trainings, have been favored by managers (Gore et al., 2006; Johansson et al., 2016), as have interventions targeting and discouraging nuisance bear behaviors, such as electric fencing, hazing, and noise-deterrents (Ambarli & Bilgin, 2008; Don Carlos et al.,

2009). Relocation and destruction of repeatedly problematic bears are used, though more often as a last resort (Don Carlos et al., 2009). Compensation programs for farmers and livestock owners are employed in some regions as well (Zukowski & Ormsby, 2016). These interventions vary in effectiveness and public support, creating additional challenges for bear management and conflict reduction.

Literature Review

This section will review the pertinent literature from peer-reviewed and gray sources describing (1) the theoretical framework of this study, (2) the measurement of wildlife attitudes, (3) public attitudes and bear management, and (4) methodology applicable to this study.

Theoretical Framework

For the purpose of my thesis, I am defining an attitude as the positive, negative, or neutral evaluation of a particular idea, object, or organism. Often, attitudes are described in terms of three components: an affective component, a cognitive component, and a conative (behavioral) component (Ajzen, 1989; Manfredo, 2008). The affective component considers emotions toward the object of the attitude, the cognitive component relates to beliefs about the object of the attitude, and the conative component focuses on behaviors associated with the object of the attitude (Ajzen, 1989; Manfredo, 2008). Other approaches for defining attitudes also exist, such as the dual attitude model proposed by Wilson et al. (2000). This model proposes two attitude types: implicit attitudes, which are triggered automatically, and explicit attitudes, which are evaluative and require consideration of situational context (Wilson et al., 2000). Research on attitudes towards

wildlife typically focuses on measuring explicit attitudes, although measures for both exist (Manfredo, 2008; McIntrye & Milfont, 2016).

A second important concept in regard to attitudes is the cognitive hierarchy. In this model, values are considered to be drivers of attitudes, which in turn drive behaviors (Vaske and Donnelly, 1999). As described by Vaske and Donnelly (1999), values are "few in number," "slow to change," "central to beliefs," and "transcend situations" and therefore occur at the base of the hierarchy, while attitudes are "numerous," "faster to change," "peripheral," and "specific to situations" (Figure 1, pp. 525). Many studies have corroborated this model and the attitude-behavior connection (Ajzen, 1989; Vaske & Donnelly, 1999). Whittaker (2000) expands upon this hierarchy to illustrate both the horizontal and vertical structure of attitudes and underlying connections between each level of the hierarchy (Figure 2, pp. 26). The addition of the depth component demonstrates the importance of salient beliefs and evaluations for individual attitudes, norms, or value orientations, as the theory of reasoned action suggests attitude structure is an integration of salient beliefs about possible outcomes with an evaluation of those outcomes (Madden et al., 1992; Whittaker, 2000). This is further corroborated by the theory of planned behavior, an extension of the theory of reasoned action focused on behavioral intention, that theorizes that behavior is a function of salient beliefs related to behavior (Ajzen, 1989; Madden et al., 1992). Although there is strong support for a causal relationship between values and behaviors, debate does exist regarding a causal link between behaviors and attitudes. The cognitive hierarchy theory, the theory of reasoned action, and the theory of planned behavior all suggest that attitudes are the proximate cause of behavior, however the cognitive dissonance theory suggests that

behaviors reinforce attitudes (Festinger, 1962; Ajzen, 1989; Manfredo, 2008). The cognitive dissonance theory proposes that when attitudes, beliefs, or behaviors are inconsistent with each other, an individual will tend to seek a change to make them more consistent, thus they may change their attitudes or beliefs to better conform to their behavior (Festinger, 1962). For the purposes of my thesis, I will be primarily considering the cognitive hierarchy and its suggestion of beliefs driving attitudes driving behaviors as a theoretical base.

Finally, it is important to consider three principles when working with attitudes. First, attitudes tend to be consistent, but this is not always the case (Heberlein, 2012). Attitudes can be changed, given new information, such as new experiences or situations. Second, attitudes associated with direct experience tend to be more stable with more beliefs associated with them, and thus have a larger horizontal structure (Heberlein, 2012). As Ajzen (1989) suggests, direct experience can increase the information the person has, "increase evaluative consistency among beliefs," and/or "improve the prediction of behavior from attitudes" (pp. 259). Thus, understanding a person's direct experience with the attitude object can be an important tool in measuring attitudes and predicting behavior. Third, attitudes tied to identity tend to be stronger, as they are tied to emotions and can therefore be harder to change (Heberlein, 2012).

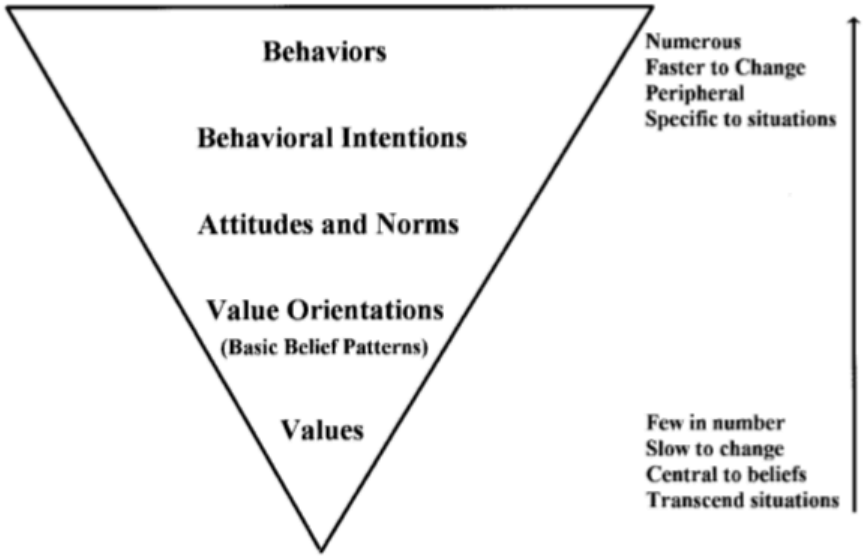

Figure 1. Cognitive Hierarchy Model from Vaske & Donnelly (1999).

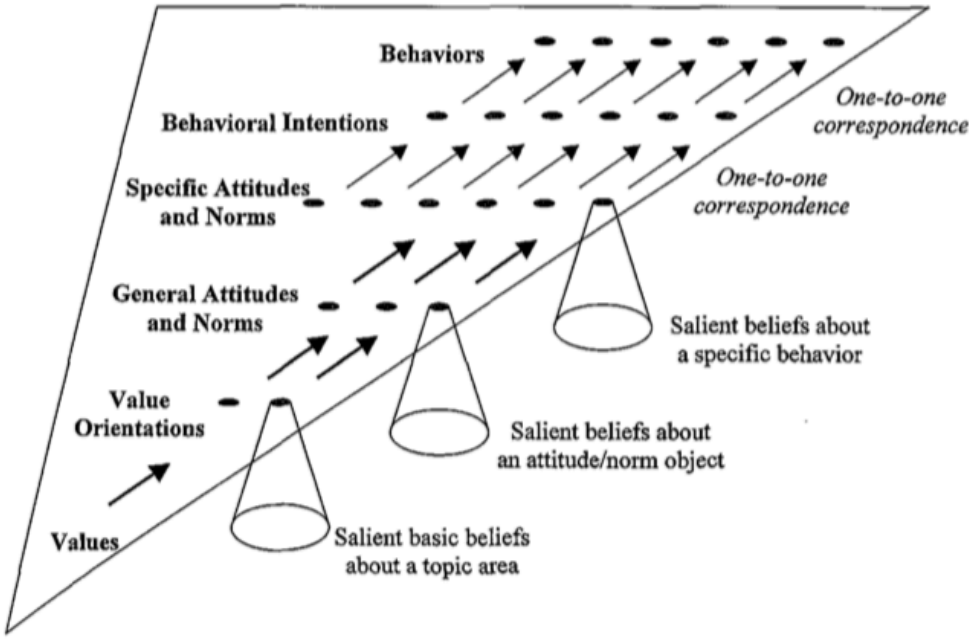

Figure 2. Alternative hierarchy model illustrating horizontal and vertical structure in addition to underlying connections from Whittaker (2000).

Measuring Attitudes towards Wildlife

Despite there being hundreds of scales for the measurement of environmental attitudes, fewer scales exist that are specific to wildlife, including the Animal Attitude Scale (AAS), the Wildlife Attitudes and Values Scale (WAVS), and Kellert's typology of basic attitudes towards animals. The AAS examines general attitudes towards the protection of animals, focusing on ethics and willingness to act, and uses a 20-item questionnaire to assess attitudes (Herzog et al., 2015). Although this scale has been adapted to other studies on human-animal interactions beyond animal welfare issues, this scale is less relevant to my research objectives as its use focuses on links between ethics and behaviors such as dietary choices and animal use. WAVS utilizes wildlife value categories to assess attitudes with 18 items rated on a 5-point summative scale (Purdy & Decker, 1989). Perhaps most well-known is the Kellert typology of basic attitudes towards animals. This typology defines nine orientations using 65 items, with variable numbers of items included for each attitude scale (Kellert, 1984). Both WAVS and the Kellert typology are more pertinent to my research objectives, as they are the more likely scales to be used in primary studies analyzed in the meta-analysis. However, none of the aforementioned scales informed my survey research objectives, as my survey was modeled after similar studies with the goal of comparison to past studies. Despite the development of these scales, other methodologies are often employed in the study of wildlife-related attitudes.

Much like for environmental attitude measures, many researchers choose to modify existing scales or create their own during questionnaire development for greater specificity to their study objectives. Because of this, normative beliefs and value

orientations are often evaluated in the measurement and prediction of wildlife-related attitudes and behaviors. The measurement of attitudes towards wildlife often involves consideration of values and value orientations, given the theoretical framework of the cognitive hierarchy. Because values are the base of the hierarchy, they precede both attitudes and behaviors and can be a strong predictor of attitudes and even behaviors (Fulton et al., 1996; Whittaker et al., 2006). Wildlife value orientations are multi-dimensional and often measured using multiple-item scales for each dimension (Fulton et al., 1996; Whittaker et al., 2006). The value orientations and scales are sometimes based on previously established scales, such as the New Ecological Paradigm (NEP) or Kellert's typology (Kellert, 1984; Dunlap et al., 2000). In this way, scale items can be phrased as belief statements measured on a Likert scale and analyzed using factor analysis to group the beliefs into value orientations (Fulton et al., 1996). Typically, two to three value orientation groups are established and evaluated against demographic variables to assess value-attitude-behavior trends, depending on the study objectives and questionnaire design. This measurement process can be applied to a broad range of wildlife-related issues, such as predicting voting behaviors or acceptability of management options. Whittaker et al. (2006) utilized value orientation measures to demonstrate the influence of value orientations on acceptability of management actions in a specific context, something that is of interest to my own thesis. Normative beliefs have also been used to determine the acceptability of management actions because they depend on situational context and are influenced by value orientations (Zinn et al., 1998). It is worth noting, however, that when developing unique scales and items to better reflect

research objectives, the reliability and validity of these scales should be assessed and reported (McIntyre & Milfont, 2016).

Public Attitudes and Bear Management

Given the cognitive hierarchy model and other attitude theories presented in earlier sections, understanding attitudes and their influences can allow for better understanding and predictions of stakeholder behaviors and the potential for conflict in a management setting. According to Heberlein (2012), attitudes play an integral role in the efficacy of the three fixes for environmental problems (e.g., environmental, structural, and cognitive) in addition to the ability to consider different fixes. For a technological fix to work, the proposed technology must align with public attitudes and values (Table 1). Both cognitive and structural fixes seek to change human behavior, and therefore require that attitudes are driving the behaviors, the fix is consistent with attitudes, and attitudes can be changed (Table 1). Because different management techniques can be regarded as fixes to the problems presented in the management of wildlife, this concept of the impacts of attitudes on the efficacy of fixes holds true and we must consider attitudes when developing and evaluating management actions.

Table 1. Attitudes and Environmental Fixes adapted from Heberlein (2012, Table 1.1).

	Technological	**Cognitive**	**Structural**
What Is Changed	Environment	Human behavior	Human behavior
How It Is Changed	Technology changes the environment	Education affects behavior	Structure of the situation affects behavior
How Attitudes Impact the Change	Technology must align with public attitudes and values	Behavior must be driven by attitudes; Attitudes must change	Structural changes must align with public attitudes and values

In more specific regard to the management of large carnivores, including bears, management is complicated by both strong positive and negative reactions of the public to management interventions (Frank et al., 2015). Attitudes towards bears and their management can differ quite strongly, depending on a variety of interacting socio-cultural factors, personal experience, and proximity to bear populations (Glikman et al., 2012; Dressel et al., 2015; Frank et al., 2015). Acceptance for different management interventions has been shown to be linked to attitudes towards bears themselves and the level of human-bear conflict experienced (Don Carlos et al., 2009; Dubois & Fraser, 2013). Frank et al. (2015) evaluated how attitudes and fear towards bears and wolves in Sweden affected public support for different management actions, finding that population caps and educational measures were preferred to personal protective measures, and that those with high fear of bears and wolves viewed management actions more positively. In Italy, Glikman et al. (2012) found that most residents residing near a national park held positive attitudes towards bears and wolves and favored continued protection of these species. In a community in Canada, attitudes towards bears were shown to have changed due to increased nuisance bear activity (Dubois & Fraser, 2013). Dubois and Fraser (2013) also found that local attitudes towards how problem bears should be managed were highly varied, although there was a trend towards favoring non-lethal management interventions. Understanding public attitudes and acceptance towards different management interventions is very important to the development of effective management policies and ensuring public support for those policies (Don Carlos et al., 2009; Frank et al., 2015).

Methodology

A two-scale approach was adopted for this research, integrating a global meta-analysis with a local web-based survey to study attitudes towards bears and their management. The meta-analytic approach involves a review and analysis of the results of prior studies to compare and draw inferences from them (Cooper et al., 2009; Card, 2012; Dressel et al., 2015). Such an approach expands upon the results of single studies and seeks to evaluate larger trends or associations and can be an important tool in furthering the scientific body of knowledge (Card, 2012; Dressel et al., 2015). This is achieved through the calculation of effect sizes for the relationships between the variables of interest and then pooling and comparing these effect sizes to determine the actual direction and magnitude of the effect (Cooper et al., 2009; Card, 2012). Because effect sizes can vary between studies, moderator analyses are used to determine what specific study characteristics account for those differences in effect sizes (Cooper et al., 2009; Card, 2012). There are several criticisms to meta-analyses which must be appropriately addressed through proper design, including the file drawer problem (e.g., unpublished literature being tucked away in a researcher's desk drawer and not otherwise available), inclusion of studies with different methodologies, and concern about primary literature quality (Cooper et al., 2009; Card, 2012; Dressel et al., 2015). Johansson et al. (2016) stresses the importance of a thorough literature search, through the use of a clearly defined protocol, exhaustive keyword list, and development of a Boolean search string. The meta-analytic framework presented by Dressel et al. (2015) is especially applicable to this study, as it was built to assess attitudes towards bears and wolves in Europe. The authors outlined appropriate methods for searching for and screening literature, creating

coding guidelines, extracting data and adjusting coding guidelines, re-coding of data, and establishing the final data set for analysis as the major phases of the meta-analysis (Dressel et al., 2015). Coding of studies should consider wording of questions from the preliminary literature and the creation of groups and categories can aid in this (Cooper et al., 2009; Card, 2012; Dressel et al., 2015).

Surveys are frequently used in attitude studies. Questionnaires must be carefully developed in order to accurately obtain information, with special care paid to appropriate question structuring and survey length (Rea & Parker, 2014). A variety of question structures are often employed in either a web-based or an in-person survey, including scaled response (Likert scale) and multiple choice, similar to several studies in this review (Bowman et al., 2001; Don Carlos et al., 2009; Glikman et al., 2012). Likert scale questions are particularly useful for attitudinal studies, especially when presented as a series of questions about the same theme that can be used to create a summated scale (Rea & Parker, 2014). Open-ended questions can be valuable for gathering qualitative data or for following up closed-ended questions where more elaboration may be needed (Rea & Parker, 2014).

Research Purpose and Objectives

Human-bear conflicts are becoming more common, therefore understanding public attitudes towards different management options and the factors underlying those attitudes is critical to mitigating these conflicts. The above cited articles emphasize the need for a synthesis of attitude studies to understand global trends in attitudes towards bears and management and will lend further support in the analysis of these trends. Surveys are a popular and effective method for collecting attitudinal data, and I designed

and conducted a survey to assess university student attitudes. This thesis utilized a meta-analytic approach to synthesize past literature for a better understanding of the global trends and associated factors of human-bear conflicts and public attitudes, in addition to a survey of university students at UWSP to evaluate these same factors on a local scale.

The purpose of this research is to inform management of bears and other large carnivores, especially in consideration to public attitudes, acceptance, and tolerance of bears and different management interventions. Public support is vital to the success of management programs, as strong disagreements between the public and management officials may cause the public to distrust and ignore policies and managers (Frank et al., 2015). Understanding global trends in public attitudes can help better predict how members of the public might react to certain management actions. University student attitudes are also important to understand, as these students will become future stakeholders and policymakers. Identifying areas of potential disagreement between these groups can help inform the future direction of management.

This research study was designed to meet two core objectives:

Objective 1 Synthesize and assess the global differences in public attitudes towards bears and their management and determine the factors associated with these trends, including personal experience with bears, socio-cultural influences, and stakeholder group membership.

Objective 2 Evaluate university student attitudes towards bears and their management and compare those attitudes to the meta-analysis results.

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CHAPTER II

GLOBAL TRENDS IN ATTITUDES TOWARDS BEARS AND THEIR MANAGEMENT: A META-ANALYTIC APPROACH

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Abstract: Increasing global bear populations and human-bear conflicts have made it more imperative to understand public attitudes towards bears and management interventions. Without the proper understanding of these attitudes, conflict can ensue between stakeholders and managers, leading to a dissolution in social trust and management support. A growing number of primary studies have been developed, but none have assessed attitude trends on a global scale. To address this need, we conducted a meta-analysis examining public attitudes towards bears and their management and human-bear conflict from studies around the world. We sought to assess the global differences in public attitudes towards bears and their management and determine the factors associated with these trends, including personal experience with bears, socio-cultural influences, and stakeholder group membership. Globally, attitudes towards bears tended to be positive, with age, gender, education level, community type, knowledge of bears, and experiences with bears most frequently found to have significant effects on attitudes. Lethal management, policy, relocation, and hunting were most frequently explored in management questionnaires. Support for interventions was often framed in a specific situational context, with many studies finding significant impacts of context on attitudes. Our findings reinforce the importance of demographic and experience variables on attitudes, the need to consider the situational context when evaluating support for management actions, and potential points for broader public outreach and education to better inform the public of different management actions. Further, our study emphasizes the need for future human dimensions research to go beyond the broader characterization of attitudes to understand the social, situational, and regional nuances of attitudes that are vital in the understanding and application of attitude research to policy decisions.

Key words: attitude, belief, bear, management, global, lethal, meta-analysis, non-lethal, perception, review, United States, worldwide

Across the globe, bear populations are on the rise. In many cases, these populations are expanding in range to areas that have not seen established populations in well over 50 years (Hristienko and McDonald 2007, Chapron et al. 2014). These expansions have been most frequently documented for American black bear (*Ursus americanus*) in North America and European and North American brown bear (*Ursus arctos*) populations, as these species have in particular been subject to recovery and expansion efforts (Ripple et al. 2014). However, habitat fragmentation and global trends towards urbanization contrast with these expansions, bringing people and bears in closer contact with one another (Messmer 2000, Ripple et al. 2014), often culminating in human-bear conflict (HBC).

HBC and its management vary across the globe, depending on the species and underlying context involved. Because HBC can be defined as a negative interaction between humans and bears or between humans about bears, we can further categorize HBC into four broader categories: depredation, safety, nuisance complaints and property damage, and stakeholder disagreements.

While each of these conflict types is seen globally, depredation conflicts are historically one of the most common grievances between humans and bears (Messmer 2000, Treves and Karanth 2003). Whether it is corn damage by American black in the United States or sheep attacks by brown bear in Norway, bear-caused damage to commodities and livelihoods is a long-standing problem. However, this is addressed

differently depending on the species, public perceptions and values, and manager preferences. Depredation management is further complicated by the protection status of different populations and species. Relocation and lethal management, including hunting and kill permits, are more frequently used to reduce agricultural damage in the United States, where most populations of American black bears are unprotected, but these options are not available for many other bear populations across the globe (Messmer 2000, Treves and Karanth 2003).

Education and awareness efforts have been used frequently to address safety concerns and nuisance reports, seeking to teach the public how to better coexist with newcomer bear populations. With large carnivores nearby human settlements, safety of humans and domestic animals is of concern. Because of safety concerns, many studies have sought to evaluate risk perceptions and fear of large carnivores, including bears (Gore et al. 2007, Frank et al. 2015, Johansson et al. 2016). However, attack frequency and risk perceptions vary across the globe. In India, the frequency of sloth bear (*Melursus ursinus*) attacks and damage reinforce negative perceptions of the species and increase perceived risks of the public (Rajpurohit and Krausman 2000, Debata et al. 2016). Sakurai et al. (2013) reported high levels of perceived risk and negative attitudes in residents in Hyogo Prefecture, Japan, with higher perceived risk correlated with lower acceptance of bears. In contrast, several studies in the United States indicate lower perceived risks from American black bears and also support a link between receiving information about bears and perceiving fewer risks and having higher acceptance (Gore et al. 2007, Lakes and Sharp 2015, Heneghan and Morse, 2018). Thus, these perceptions of risk shape the attitudes and tolerances of the public and can be quite impactful to

management decisions and public support. Nuisance complaints and reports of property damage are on the rise, most notably with American black bears in the United States (Hristienko and McDonald 2007). These reports are likely to continue to rise as bears move closer to human population centers and as humans encroach into bear habitat. Actions targeting nuisance bear behaviors and education initiatives tend to be preferred over lethal management, due to a generally wider level of public acceptance and support for these actions (Hristienko and McDonald 2007, Spencer et al. 2007).

People have strong positive and negative reactions to bears and how they are managed, leading to stakeholder disagreements and more complex management decision-making (Frank et al. 2015). Stakeholder disagreements are also becoming more frequent, especially over hunting methods and ethics (Hristienko and McDonald 2007). The diversification of the wildlife stakeholder base has expanded beyond more traditional groups such as hunters, farmers, and landowners to include members of the general public, recreational users of trails and parks, off-road vehicle users, and more. Because managers are no longer simply managing bear populations for their biological carrying capacity, this diversification of interests can further complicate management for a species' social or cultural carrying capacity. People differ in their tolerance for nuisance bear behavior and inconveniences experienced due to bears, but they also differ in their acceptance for various management actions. Attitudes towards bears vary and depend on a variety of interacting socio-cultural factors, experience with bears, and proximity to bear populations (Glikman et al. 2012, Dressel et al. 2015, Frank et al. 2015). Management attitudes are further influenced by attitudes towards bears themselves and the degree of HBC personally experienced (Don Carlos et al. 2009, Dubois and Fraser

2013). Because of these factors, there is a growing call for research into attitudes towards bears and their management in many countries throughout the globe.

This growing literature base has led to a large pool of data on attitudes towards bears and their management, with few studies attempting to go beyond comparison to a few other studies' findings to better understand potential patterns. Categorized under the umbrella of literature reviews, meta-analysis uses the results of prior studies to make comparisons and draw inferences, expanding upon the results of single studies to evaluate larger trends or associations (Cooper et al. 2009, Card 2012). The meta-analytic approach can be a powerful tool in furthering the scientific body of knowledge, however several concerns with this approach have been identified in the past. These concerns include underrepresentation of gray literature, inclusion of studies with different methodologies, and concern about primary literature quality, each of which we attempted to address in our study design (Cooper et al. 2009, Card 2012, Dressel et al. 2015). While the meta-analytic approach is quite common in other fields of study including medicine and psychology, it is relatively uncommon in wildlife or human dimensions studies, although a few studies have utilized this method in studying fear towards large carnivores and attitudes towards bears and wolves (Williams et al. 2002, Sakurai and Jacobson 2009, Dressel et al. 2015, Johansson et al. 2016). The meta-analytic framework presented by Dressel et al. (2015) is especially applicable to this study, as it was built to assess studies towards bears and wolves in Europe, both being carnivores facing polarizing public attitudes and tolerances. However, attitudes towards bears have not been assessed on a global scale to attempt to uncover regional trends and common predictors of attitudes.

Because of the mounting number of studies examining these attitudes around the globe and the lack of studies comparing attitudes and their influencers at a global scale, we sought to apply a meta-analytic approach to evaluate the global trends in attitudes towards bears and their management, as well as identify potential knowledge gaps and shortcomings in the published and unpublished literature.

Methods

Because of the complexities and variations of the meta-analytic design, we developed our approach through a review of several meta-analysis statistical handbooks, as well as previously published meta-analyses in similar fields (Williams et al. 2002, Cooper et al. 2009, Card 2012, Dressel et al. 2015, Johansson et al. 2016). Our approach was designed to be exhaustive and allow for additional refinement of the analysis tools (e.g., coding criteria, search protocol, statistical methods, etc.) based on the primary studies identified (Fig. 1).

Because the meta-analytic approach employs a rigorous literature search with analysis of effect sizes to understand broader trends, we began the process by developing a strict search protocol and coding process. We designed and conducted the search protocol to find as large of a pool of potential primary studies as possible. We utilized three databases: EBSCO (EBSCOHost), Web of Knowledge (Web of Science), and Google Scholar, in addition to seeking unpublished studies through web searches for relevant agency reports, conference proceedings, organization reports, dissertations/theses, and other sources. We also identified and contacted researchers, agencies, and organizations involved with bear management and research to uncover additional unpublished studies. To aid in our search, we used a keyword table containing

relevant keywords in conjunction with Boolean search strings to search the databases, making adjustments as appropriate (Table S1). We conducted the literature search from April to August 2018.

We defined coding criteria and inclusion and exclusion variables in order to determine which studies were included in our study pool and to appropriately code the data for analysis. We reviewed the articles identified in the literature search based on the inclusion and exclusion criteria and made adjustments to the search protocol and coding criteria as needed. We narrowed the focus of our meta-analysis to include only studies that examined attitudes or beliefs about bears (regardless of species) or the management of bears, or both. We excluded studies regarding captive bear populations and those targeting specific emotional responses to bears (e.g. fear), unless relevant attitude data was present. While we excluded other meta-analyses because they are not primary studies, we did consider studies analyzed or cited within them for inclusion. The primary studies had to utilize a quantitative framework for ease of comparison, and studies lacking the necessary information were excluded if the follow-up with study authors failed to produce the information. We continued the process of searching, coding, and criteria adjustment until no new studies were identified for inclusion in the meta-analysis. The pool of studies was then evaluated and coded using the finalized coding criteria. In cases where multiple publications or unpublished literature were based off of the same questionnaire, we grouped those using the same survey tool into companion sets for analysis. Thus, the results from the individual pieces of literature were combined so as to not duplicate findings based on the same survey. Conversely, some studies relied on

multiple questionnaires aimed at different respondent groups or species of bear, thus most analyses reflect the total number of questionnaires instead of pieces of literature.

Once the final dataset was established, we subdivided the studies by how attitudes were measured and which management interventions were considered. Due to the relative lack of reported effect sizes, as well as the variation in predictor variables evaluated, we chose to tabulate instances of significant or insignificant findings for variables of interest in lieu of mixed-effects modeling. We coded each effect on attitude as significantly positive, significantly negative, or not significant. We selected destruction attitudes as a focus due to the higher frequency of studies assessing lethal management attitudes. We also developed subsets focused on recovery attitudes and situational management. Because of this process of subset creation, not all studies were included in all datasets. We mapped study frequency and mean attitudes by country and U.S. state using 'rworldmap' and 'usmap' packages in R (South 2016, Di Lorenzo 2018).

Results

Study pool characteristics

After reviewing the 378 studies identified in the literature search, 142 were coded for final inclusion in the meta-analysis (Text S1). Of these studies, 119 were included in the pool for attitudes towards bears and 108 were included in the pool for attitudes towards bear management. Seventy-seven studies were identified as individual studies, with the remaining studies grouped as 24 sets of companion studies (e.g., studies based on the same survey). The majority of studies were from North America (n = 102; 72.34%), followed by 32 studies from Europe (22.70%), six studies from Asia (4.26%), and one global study (0.71%; Fig. 2-3).

Focal bear species. The focal bear species were the American black bear (46.63%) and brown bear (29.53%). Each of the eight species of bears were the focus of at least one included study. Thirty-three studies evaluated attitudes towards at least one additional species other than bears (17.10%), with wolves and other large carnivores being most common. The overwhelming majority (85.11%) of the bear species were long-established in the region, meaning there was evidence of occurrence for more than 30 years. More studies dealt with unprotected populations with established hunting seasons (45.75%) or fully protected populations (42.48%).

Additional Variables of Interest. Although a wide variety of independent variables were considered in the included studies, the most frequently collected variables were age (73.10%), gender (73.10%), education level (56.55%), stakeholder affiliation (49.66%), and community type (30.34%), however their effects on attitudes were not always the focus of analysis. In addition to measuring attitudes towards bears and bear management, the included studies frequently measured personal experience with bears (54.23%) and knowledge of bears (43.66%).

Study and Researcher Characteristics. The data were collected predominately through mail surveys (55.19%) and from 2000-2009 (51.05%). Telephone (15.58%) and in-person (11.69%) surveys were less frequently used, with the fewest studies employing online (8.44%), interview (6.49%), and mixed-methods (2.60%) approaches to data collection. Relatively few of the included studies were conducted prior to 1990 (7.00%). The studies were typically sourced from scientific journals (47.89%) and dissertations or theses (20.42%). Our search for gray literature was rather successful, with just over 36% of the final study pool being sourced from non-published literature. When looking at the

researchers conducting attitude studies, the majority of first authors were from the fields of human dimensions (49.30%) or natural sciences (38.73%) and were males (61.27%). Most studies were developed with the input from at least one social scientist or human dimensions researcher (62.14%). Just over 15% of the included studies utilized a social survey institution in the development and distribution of their questionnaires.

Studies focused on bears

A variety of different measures were used to assess attitudes towards bears. Fifty studies measured attitudes through respondents' desired population trend, 26 studies utilized wildlife value orientations, 29 studies assessed general feelings towards bears, and 23 studies used belief statement indices to assess attitudes, with several studies employing multiple measures. In total, 84 studies (80.77%) reported predominately positive attitudes towards bears, with 13 studies reporting neutral or mixed attitudes, and seven studies reporting predominately negative attitudes. Studies reporting neutral attitudes tended to focus on HBC or recovery of bear populations and varied in geographic ranges and bear species. Those reporting negative attitudes included studies from Canada, Japan, India, Albania, and Serbia, and often reported higher degrees of HBC and dealt with polar bears (*Ursus maritimus*) or sloth bears. Gender, age, community type, education level, hunting participation, and knowledge of bears were most frequently shown to impact attitudes (Table 1). Older respondents and those who had experienced damage or perceived higher risks from bears tended to be more negative in their attitudes (Table 1). Male respondents and those from urban backgrounds, of higher education levels, and with higher degrees of knowledge of bears tended to view

bears more positively (Table 1). However, gender, community type, and education level demonstrated a fair degree of variability in effect on attitudes across studies (Table 1).

When assessing mean attitudes by country and region, North Americans and Scandinavians were shown to view bears the most positively (Fig. 4). Very few regions demonstrated predominately negative attitudes towards bears, although portions of Asia and Central Europe did have clusters of negative attitudes (Fig. 4). Our dataset included studies from 20 countries, with the majority represented by singular studies (Fig. 2). Exceptions to this were the United States (n = 92), Canada (n = 13), Norway (n = 12), Sweden (n = 4), Japan (n = 4), Italy (n = 3), Latvia (n = 2), and Lithuania (n = 2). Attitude data for several other countries with past or present bear populations were found, however these studies were excluded from analysis due to failure to meet the inclusion criteria, with qualitative methodology and publication language being the most common reasons for exclusion.

Because of the high volume of studies from the United States, additional attitude mapping was performed by state. Of the 28 U.S. states included in our dataset that an average attitude towards bears could be determined, 25 reported predominately positive attitudes towards bears, with the remaining three reporting slightly less positive or neutral attitudes (Fig. 5). These three states tended to be the focus of a greater number of studies and often assessed bear nuisance attitudes or recovery attitudes. Texas (n = 9), New York (n = 9), Montana (n = 8), and Mississippi (n = 8) had the highest frequency of studies and publications in the dataset (Fig. 3). We did not uncover attitude data for several U.S. states (n = 7) with established American black bear populations (Fig. 5).

Studies focused on bear management

The included studies measured over 20 different management actions, spanning from human-centric interventions, such as public ordinances, to intensive bear management techniques, such as lethal control. The most commonly assessed actions in the bear management study pool were destruction of the bear (43.52%), bear-oriented policies (e.g., population caps; 39.81%), relocation (38.89%), and hunting (36.11%). Human-oriented policies (e.g., public ordinances; 24.07%), education and information initiatives (21.30%), and hazing of the bear (21.30%) were also frequently evaluated in studies assessing management attitudes. Less than 1% of the studies addressed tax credits, industry regulations, and eradication in the management of bears. A small subset of studies (n = 19) included measures of social trust, desired roles of the public and agencies in management, and/or perceptions of agency performance.

Attitudes toward lethal management. Lethal management was considered by 42 studies or companion sets. The lethal actions considered varied by study, although hunting attitudes, destruction of nuisance bears, and depredation permits were often included. Lethal management was most frequently assessed by North American studies, with 31 studies or companion sets from the United States and 5 studies from Canada. Hunting and lethal management support was infrequently evaluated outside of the North America, although these actions were considered in questionnaires used in Croatia, France, Slovakia, Latvia, and Norway. Support for hunting, especially in the United States, tended to be fairly positive, but lethal management support was more varied and was generally not preferred except in cases of high severity of encounter or damage, amongst those who experience damage or live closer to bear populations. Rural

populations and farmers were frequently found to be in support of lethal management actions to control bear populations and nuisance problems. Many of these studies also considered alternative management interventions beyond lethal management, such as relocation or monitoring. Protection was often considered in questionnaires focused on brown bears and other protected populations, especially in Europe.

Situational management attitudes. Fourteen studies or study sets evaluated attitudes towards management based on proposed scenarios. Lethal actions were compared across scenarios for all studies in the subset (n = 14), although education, relocation, hazing, and taking no action were also frequently assessed. In cases where respondents were further grouped for comparison, gender, hunting participation, and community type were often analyzed for differences. Significant differences based on these respondent groups were found in 11 studies, with differences being most pronounced for lethal management, and less pronounced for education and relocation. Situational context was found to be significant in 13 studies. The most notable trends were that lethal management support increased with encounter frequency and severity and that support for leaving the bear alone/monitoring/no action decreased with the severity and frequency of the encounter. Support for education and non-lethal management tended to be high regardless of context.

Recolonization and recovery support. Fifteen studies or study sets evaluated attitudes towards recolonization and recovery efforts for bears. These efforts largely focused on recovery of brown bears in both Europe and the western United States or recovery of Louisiana black bears (*Ursus americanus luteolus*) in the southern United States, with one study assessing support for giant panda (*Ailuropoda melanoleuca*)

recovery in China. Recovery was predominately supported (80.00%), with three studies reporting mixed or negative attitudes. Gender, age, and education level were most frequently explored (all n = 9), with older respondents tending to view recovery more negatively (n = 6), and the effects of gender and educational level being more mixed or insignificant. Significant differences based on region were reported in over 26% of the studies. Community type was assessed in seven studies and was also varied, although more studies indicated positive effects of an urban background on recovery attitudes.

Discussion

We sought to identify and evaluate global trends in attitudes towards bears and their management, and our meta-analysis is one of the first in attempting to synthesize attitudes towards bears on this scale. Our results demonstrate strong trends in significant effects of age, hunting participation, and knowledge of respondents, with more mixed effects of gender, community type, and education. Attitudes towards bears were largely positive, and the primary studies included in our analysis evaluated public attitudes towards a wide variety of management actions. Our meta-analysis emphasizes the continued need to assess socio-demographic, experiential, and contextual drivers of attitudes, especially in regions lacking such data, as well as the varying efficacy of different predictors of attitudes.

While generally positive in attitudes, regional pockets of negative attitudes exist. These negative attitudes most likely stem from a greater degree of experience with bears. Members of the public exposed to negative impacts from bears and other large carnivores tend to be more negative (Kellert 1994, Rodgers and Pienaar 2018). These clusters also tended to be in regions where attacks are more common and bears pose a particular threat

to human safety, such as with sloth bears in India and polar bears in Canada. While support for bears' existence on the landscape is high, local recovery efforts should continue to be evaluated, as support may change as bears increase in numbers and expand in range (Williams et al. 2002, Dressel et al. 2015). Based on the regional differences presented here, species of bear influence attitudes, as was found in a review of studies in Japan (Sakurai and Jacobson 2009).

Acceptance of different management actions, especially lethal management, is also likely being influenced to some extent by regional differences and protection status of different bear species. While hunting is generally supported for American black bears in the United States and Canada, most brown bear populations are regionally or nationally protected throughout the world, as are several other species of bear (Kellert 1994, Ripple et al. 2014). Thus, people may be less willing to agree with the killing of bears under most circumstances when they are a protected species. However, lethal management support has also been shown to be linked to situational context, a finding supported by other studies on large carnivores, including alligators and cougars (Manfredo et al. 1998, Hayman et al. 2014). Thus, consideration of region- and context-specific variables may be integral in assessing attitudes towards specific management interventions.

Our findings on the relationships between sociodemographic variables and attitudes are supported by similar meta-analysis studies on bears and wolves (Williams et al. 2002, Dressel et al. 2015). Williams et al. (2002) found trends in older respondents and respondents from rural backgrounds to be more negative in their attitudes towards wolves and wolf reintroduction, while those with higher education levels tended to be

more positive. High age most often correlated with negative attitudes and higher education and knowledge most often correlated with positive attitudes in a similar meta-analysis on European attitudes towards bears and wolves (Dressel et al. 2015). Likewise, gender demonstrated a higher degree in variability in its relationship with attitudes (Williams et al. 2002, Dressel et al. 2015). While these findings demonstrate the significance of socioeconomic factors on attitudes towards bears, they should not be regarded as the sole drivers of those attitudes. Thus, studies should continue to explore a variety of social, experiential, and contextual factors when assessing attitudes towards bears and other large carnivores.

Our study was not without its challenges, several of which lend important insights to future studies on attitudes towards bears and wildlife and their management. While the meta-analytic process can be a valuable tool for assessing wider trends and effects across studies, we found its application to be rather limited in the field of human dimensions. The meta-analytic design relies on comparisons made possible through identical methodological procedures, however in our case, study design was complicated by a number of factors, including question wording, included questions, and measurement methods. Furthermore, effect sizes are still widely underreported in this field, and the way results are presented can vary based on publication type and the author's writing style. We echo the findings of Dressel et al. (2015) that there was "little consistency in the conceptualization and measurement of attitudes toward large carnivores" within our survey pool (Dressel et al. 2015:573). While demographic information was collected in many of the included surveys, few studies reported the effects of these demographics on attitudes. Likewise, stakeholder groups were inconsistently and infrequently considered,

when social identity has been shown to be a strong predictor of attitudes and tolerance towards large carnivores (Naughton-Treves et al. 2003). While there are a mounting number of studies in the field of human dimensions of natural resources, there still remains a small percentage that are considering multiple social, demographic, experience, and contextual factors in the evaluation of attitudes.

The study of attitudes towards bears and their management is no longer a new and emerging field, as our analysis includes studies dating back to the 1970s, yet there still remains a great deal of variability in measurement constructs considered. Many studies have emphasized the need for the consideration of a variety of factors including socioeconomic, experience, and context variables when evaluating attitudes, and we reiterate that sentiment (Bruskotter and Wilson 2014, Dressel et al. 2015, Rodgers and Pienaar 2018). It is worth noting that many of the studies included in our meta-analysis sought to characterize attitudes and not necessarily evaluate attitude differences or drivers. This broader characterization overlooks the nuances that can be important to understanding how the public truly feels about bears and how they are managed, especially given a specific socioeconomic or situational context. While a great deal of work has been done in attempting to unravel the complexities of attitudes towards wildlife, there is still more work to be done. Continued study of attitudes towards bears and their management across different temporal, spatial, and social scales will only strengthen our understanding of how bears and people can coexist on the landscape.

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Supplemental material

Table S1. Full keyword database used in literature search, organized by category. The keywords were combined using Boolean search strings.

Text S1. Full citations of primary studies included in the meta-analytic review. Studies are listed alphabetically, except when grouped with companion articles where appropriate.

Tables and figures

Fig. 1. Meta-analytic process diagram.

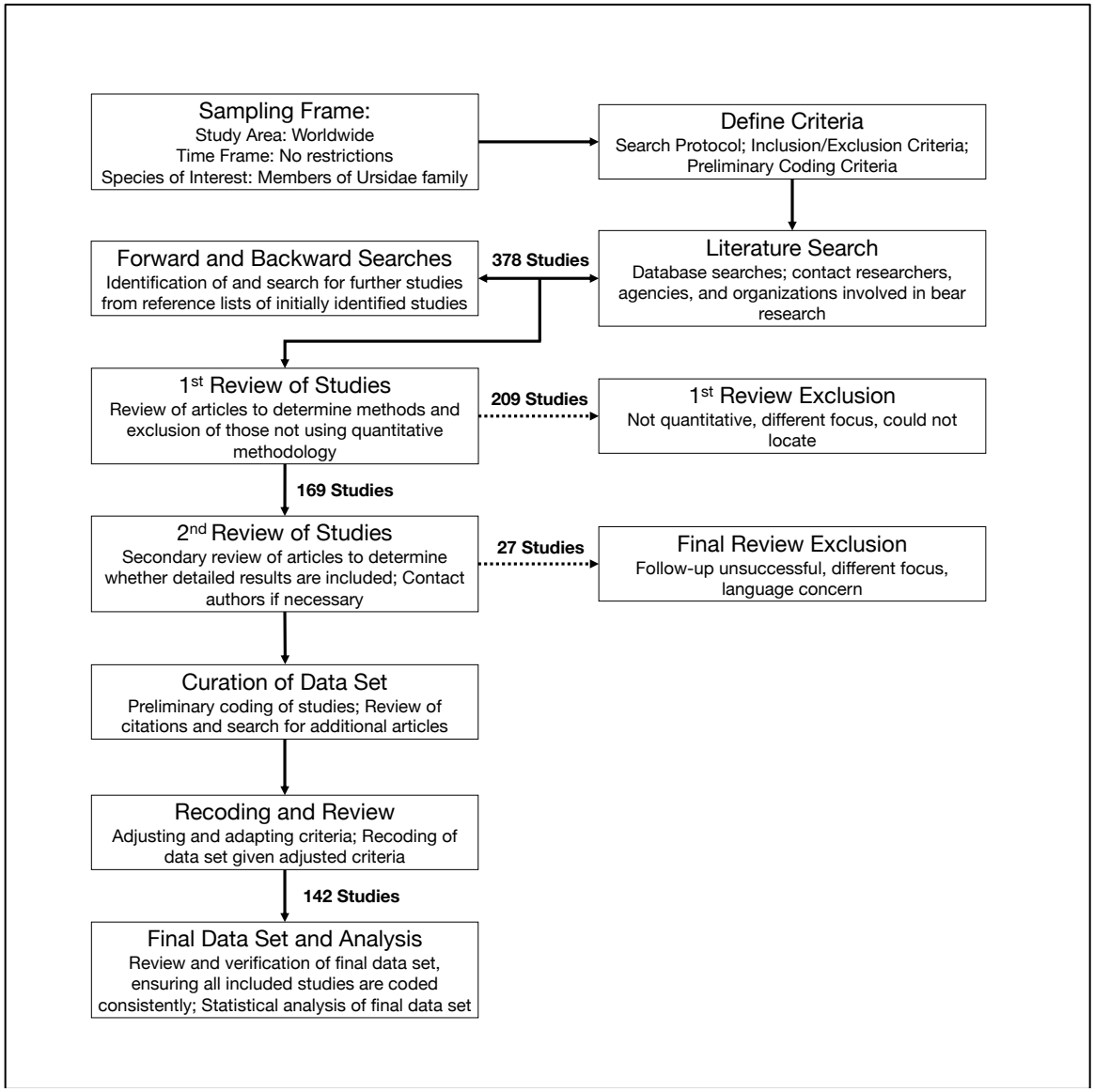
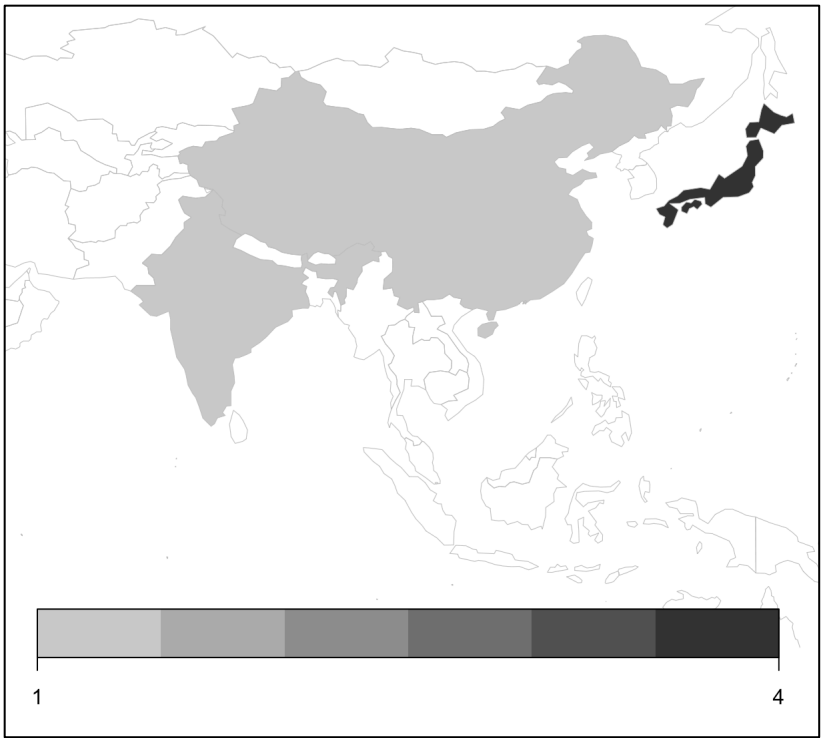


Fig. 2. Map of surveys conducted on attitudes towards bears and their management in a) Europe, b) Asia, and c) North America.

a)



b)

c)

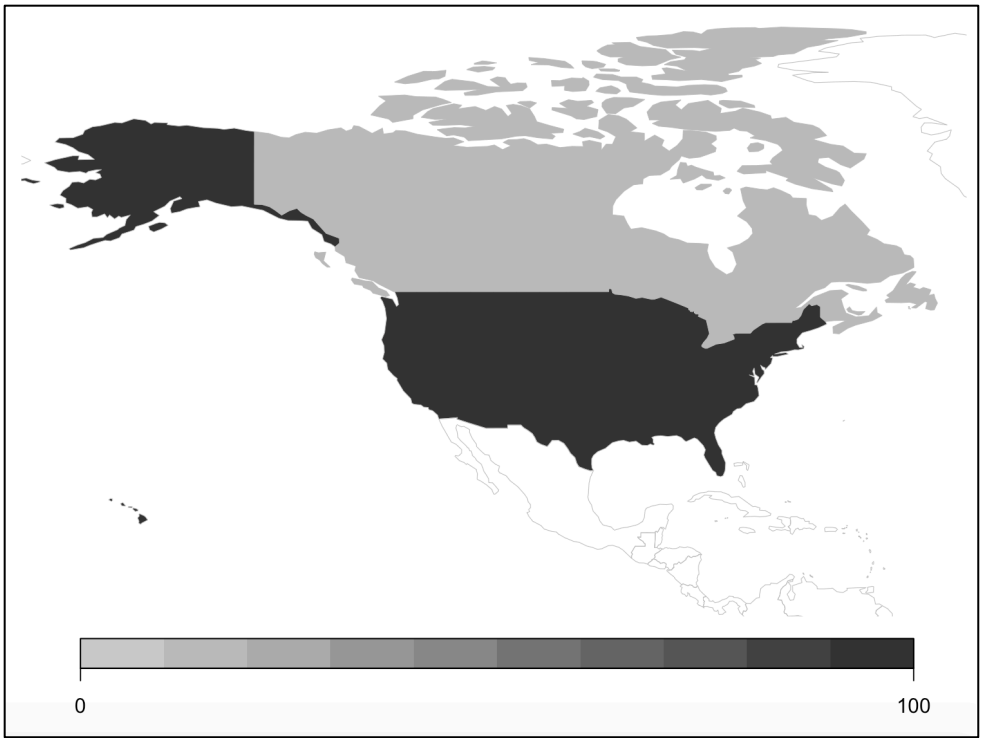


Fig. 3. Map of surveys conducted on attitudes towards bears and their management by state in the United States.

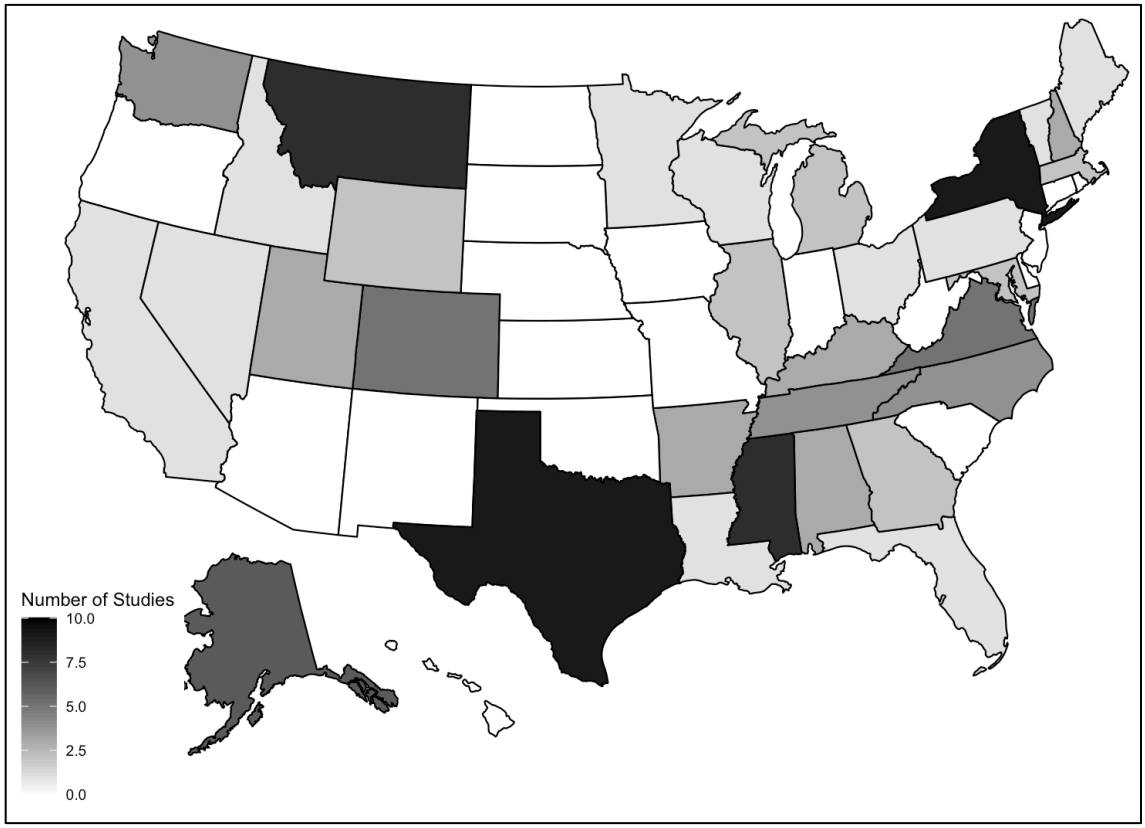
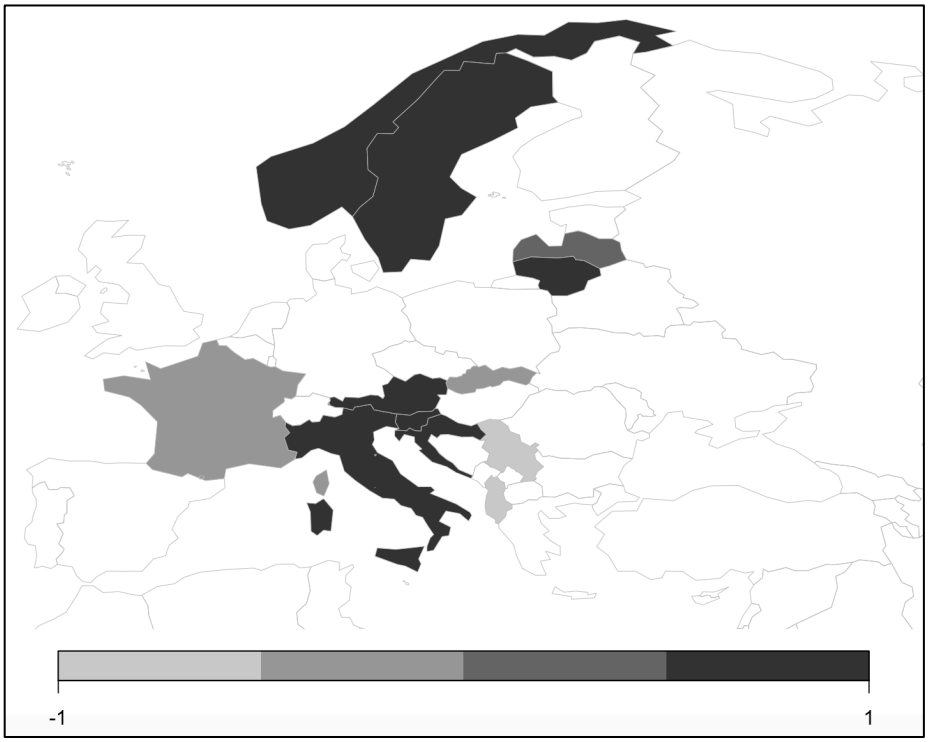


Fig. 4. Map of average attitudes towards bears in a) Europe, b) Asia, and c) North America. Predominately positive attitudes reported were coded as +1, with predominately negative attitudes coded as -1.

a)



b)

c)

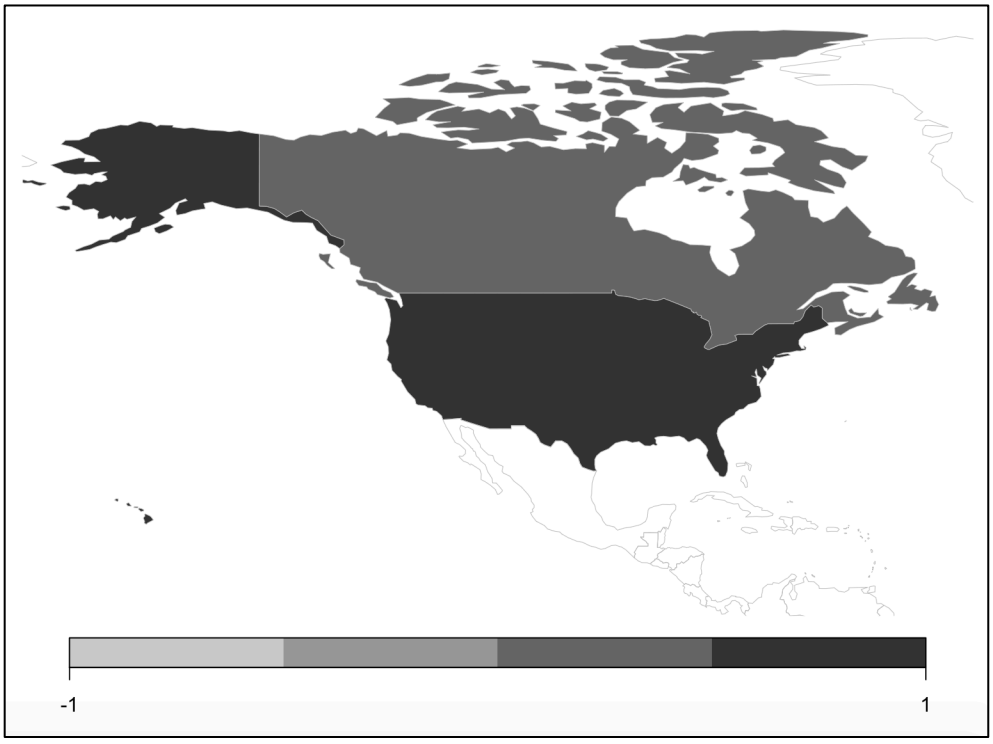


Fig. 5. Map of average attitudes towards bears by state in the United States. Predominately positive attitudes reported were coded as +1, with predominately negative attitudes coded as -1.

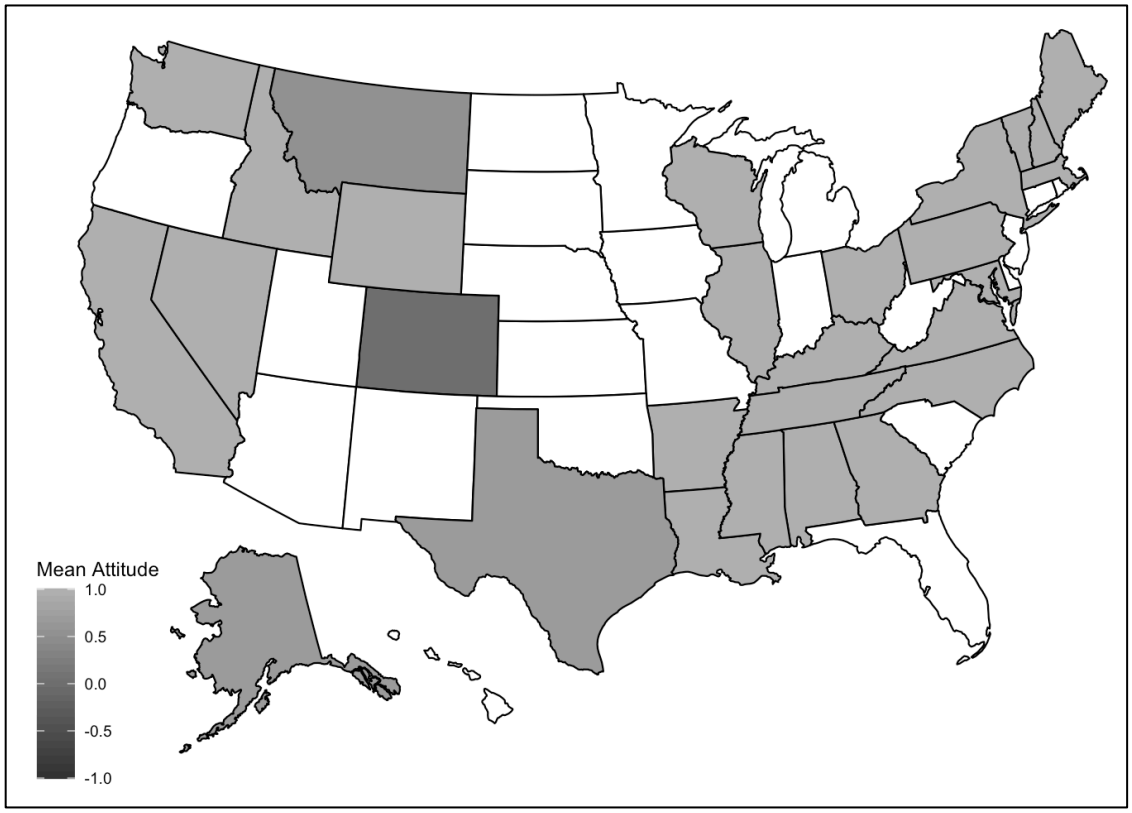


Table 1. Number and percentage of surveys reporting significantly positive, significantly negative, or insignificant effects of socio-demographic variables and positive attitudes towards bears.

Variable	Significant Positive Effect (%)[a]	Significant Negative Effect (%)	Not Significant (%)	Total Surveys (%)[b]
male	21 (70)	0 (0)	9 (30)	30 (25)
older age	3 (10)	26 (87)	1 (3)	30 (25)
urban	14 (64)	1 (5)	7 (32)	22 (18)
high education level	12 (57)	1 (5)	8 (38)	21 (18)
participation in nature-based activities	7 (35)	5 (25)	8 (40)	20 (17)
hunter	11(58)	3 (16)	5 (26)	19 (16)
high knowledge	18 (95)	0 (0)	1 (5)	19 (16)
experienced negative impacts	0 (0)	15 (83)	3 (17)	18 (15)
seen bear	8 (57)	1 (7)	5 (36)	14 (12)
high perceived risk/worry	0 (0)	13 (100)	0 (0)	13 (11)

[a] Percentages may not add up to 100% due to rounding.

[b] Percent of total number of surveys focused on attitudes towards bears (n = 119).

CHAPTER III

UNDERSTANDING CONFLICT IN BLACK BEAR MANAGEMENT ATTITUDES AMONG FUTURE STAKEHOLDERS: A SURVEY OF UNIVERSITY STUDENTS IN WISCONSIN

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Understanding conflict in black bear management attitudes among future stakeholders: a survey of university students in Wisconsin

As human-bear conflict (HBC) increases, bear management is further complicated by variations in effectiveness and public support for different management actions. However, a failure to consider attitudes towards these actions can lead to conflict between stakeholders and managers. To better understand the attitudes of future stakeholders and policymakers, we conducted a survey of undergraduate and graduate students at the University of Wisconsin-Stevens Point (UWSP). UWSP students tended to favor education and relocation as management tools, with education creating the least potential for conflict. Destruction of the bear is more favorable as HBC escalates, but remains fairly controversial. Our findings support differences in support for management actions based on gender, stakeholder group affiliation, home college, experience level, community type, and situational context. This research further reinforces the importance of social, experiential, and contextual variables to understanding differences in bear management attitudes.

Keywords: American black bear, attitude, conflict, management, stakeholder, student, university

Introduction

With growing and expanding bear populations across Europe and North America, human communities are faced with new challenges due to bear impacts. The midwestern United States is not immune to these impacts, as American black bears (*Ursus americanus)* and other large carnivores are returning to areas where they have long been absent (Hristienko & McDonald, 2007). Although black bear presence in the state of Wisconsin is not a new phenomenon, the population is certainly increasing and spreading to new regions, bringing bears and people into closer contact (Petchenik et al., 2018). While these expansions are largely creating positive impacts on the ecosystem and human communities, living in proximity to large carnivores is not without its challenges

(Messmer, 2000; Treves & Karanth, 2003). As bear and human populations come closer together, conflict is likely to ensue, especially in areas adapting to newly reestablished bear populations (Hristienko & McDonald, 2007; Southwick, 2007).

Human-bear conflicts can take many different forms and can vary in definition. For the purposes of our study, we define human-bear conflict as a negative interaction between humans and bears or between humans about bears. These conflicts can be considered in four broader categories: depredation, attacks, property damage and/or nuisance complaints, and stakeholder disagreements. Depredation includes both livestock and crop depredation and was historically the primary conflict between bears and humans (Treves & Karanth, 2003; Southwick, 2007). Attacks on humans and pets are another concern and have been a focus of many studies on fear and other emotional responses to bears and other large carnivores (Røskaft et al., 2003; Johansson & Karlsson, 2011; Johansson et al., 2012). Property damage and nuisance reports are on the rise as bears move closer to human communities and these commonly include raiding of trash cans and bird feeders and damage to sheds where food and other attractants are stored (Southwick, 2007). Additionally, stakeholder disagreements on what to do to manage bear and other wildlife populations are common (Chase et al., 2002; McFarlane et al., 2007; Madden & McQuinn, 2014). The management of bears and other large carnivores is complicated by both strong positive and negative reactions of the public to management interventions, for example specific hunting methods (Manfredo, 2008; Frank et al., 2015; Johansson et al., 2016). When a disparity arises between the biological carrying capacity and social carrying capacity, as is often the case, managers are tasked with maintaining the delicate balance between the two.

Because of the complexities of human-bear conflicts, managers have developed many different methods for managing bear populations. These include management interventions targeted to help reduce conflicts, including education, population control, and deterrents, as well as to help mitigate conflicts after they have occurred, including hazing, relocation, and destruction of problem bears (Treves & Karanth, 2003; Hristienko & McDonald, 2007). These interventions vary in effectiveness and public support, further complicating management decisions (Messmer, 2000; Frank et al., 2015). Studies have shown that managers tend to favor education initiatives and interventions targeting nuisance bear behavior, only using relocation and destruction as a last resort (Hristienko & McDonald, 2007; Spencer et al., 2007). Despite the widespread use of relocation by bear managers in North America, relatively few agencies feel that this method is effective in managing conflict (Spencer et al., 2007). Regulated hunting seasons have been implemented in many states with established and growing bear populations, but as with other lethal management options, these are not always met with public support (Loker & Decker, 1995; Southwick, 2007). While education can be an effective tool when used in conjunction with other strategies, it does not by itself lead to long-term behavioral changes in the public (Dietsch et al., 2018). While once largely determined by agency expertise, bear managers are increasingly turning to public involvement processes to shape effective management strategies that better align with public support (Johnson et al., 1993; Messmer, 2000; Chase et al., 2002; Treves et al., 2006).

The growing call to engage and include the public in wildlife management has led to greater emphasis on understanding public attitudes towards wildlife and management actions (Zinn et al., 1998; Teel et al., 2002; Don Carlos et al., 2009). The link between

attitudes and behavior has been well-established (Ajzen, 1989; Vaske & Donnelly 1999; Manfredo, 2008). Attitudes can be understood as a positive, negative, or neutral evaluation of a particular idea, object, or organism and are often described in terms of three components: an affective component, a cognitive component, and a conative (behavioral) component (Ajzen, 1989; Manfredo, 2008). The affective component considers the emotions toward the object of the attitude, the cognitive component relates to beliefs about the object of the attitude, and the conative component focuses on behaviors associated with the object of the attitude (Ajzen, 1989; Manfredo, 2008). Building further upon this theory is the cognitive hierarchy, in which values are considered to be drivers of attitudes, which in turn drive behaviors (Vaske & Donnelly, 1999). Understanding trends in how the attitudes of the general public and stakeholder groups towards specific management actions allows managers to develop and implement more effective and accepted management plans (Teel et al., 2002; McFarlane et al., 2007; Don Carlos et al., 2009).

Attitudes towards bears and their management can differ quite strongly, depending on a variety of interacting socio-cultural factors, personal experience, and proximity to bear populations (Glikman et al., 2012; Dressel et al., 2015; Frank et al., 2015). Acceptance for different management interventions has been shown to be linked to attitudes towards bears themselves and the level of human-bear conflict experienced (Don Carlos et al., 2009; Dubois & Fraser, 2013). While the general public often favors non-lethal management over lethal management, lethal management tends to gain support with increasing severity of human-bear conflict, such as repeat offenses or an attack on a person or pet (Reiter et al., 1999; Petchenik et al., 2018). In situations where specific

management actions may threaten local livelihoods, conflict among stakeholders and managers may ensue, further indicating a need to utilize participatory management processes (Treves et al., 2006; Madden & McQuinn, 2014). Failure to consider the public, their needs, their opinions, and their objectives can lead to a dissolution of trust in management and can even result in referendums limiting management options (Lautenschlager & Bowyer, 1985; Minnis, 1998). Thus, understanding public attitudes and acceptance towards different management interventions is very important to the development of effective management policies and ensuring public support for those policies (Johnson et al., 1993; Messmer, 2000; Don Carlos et al., 2009).

Public support is vital to the success of management programs, as strong disagreements between the public and management officials may cause the public to distrust and ignore policies and managers (Frank et al., 2015; Johnson et al., 1993). Understanding trends in public attitudes can help better predict how members of the public might react to certain management actions (Zinn et al., 1998). University student attitudes are also important to understand, as these students will become future stakeholders and policymakers. Identifying areas of potential disagreement between these groups can help inform the future direction of management. Given this, we sought to evaluate university student attitudes towards black bear management, potential determinants of these attitudes, and the potential for conflict amongst future stakeholders at the University of Wisconsin-Stevens Point.

Study Area

The University of Wisconsin-Stevens Point (UWSP) is a mid-size public university located in Stevens Point, Wisconsin. During the 2017-2018 academic year, 8,109 students were enrolled in undergraduate and graduate programs at the university

(University of Wisconsin-Stevens Point, 2017). UWSP offers programs within four main colleges: Letters and Science, Natural Resources, Professional Studies, and Fine Arts and Communication. Stevens Point is a small city home to roughly 26,000 people, located in Portage County in the central part of the state. Black bears are present in Portage County and are expanding their range across the state (Wisconsin Department of Natural Resources, 2019). Given the established bear population and current range expansion, UWSP presented a good opportunity to evaluate student attitudes towards black bear management.

Methods

We sampled the undergraduate and graduate student population at UWSP from March through May 2018. We assessed attitudes through responses to proposed scenario questions and collected information on personal experiences with bears and participant demographics including major, gender, and stakeholder group membership. We largely developed the questionnaire from established measures in previous studies (Don Carlos et al., 2009; Glikman et al., 2012; Dubois & Fraser, 2014; Dressel et al., 2015; Frank et al., 2015). We utilized Qualtrics to build our web-based survey (Qualtrics, 2018). The survey and distribution methods were approved by the University's Institutional Review Board (Protocol #17-18.037) prior to distribution.

Five questions assessed participant experience with bears, including "Have you ever seen a bear within close proximity to where you live?" and "Have you ever seen the tracks of a bear within close proximity to where you live?" We utilized four of these questions to construct an index of student experience level with bears (bear near home, sign near home, bear in wild, sign in wild). We coded each response so that 0 = "no,

never", 1 = "yes, a few times", and 2 = "yes, several times" and then summed the scores to create the index. Thus, our experience index ranged from 0-8, where 0-2 indicated a low experience level, 3-5 indicated a moderate experience level, and 6-8 indicated a high experience level with bears. The fifth experience question asked students to rate their experiences with bears in general on a 7-point Likert scale, where -3 = "very negative" and +3 = "very positive."

Six questions assessed attitudes towards management actions, including support for different types of management (e.g. "Providing education about living with bears for local residents," "Frightening/hazing of problem bears," etc.) and support for management actions given different scenarios (e.g. bear in neighborhood, bear eating garbage/bird seed, bear suspected of harming a pet, etc.). Each of these questions was rated on a 7-point Likert scale in which -3 = "strongly unsupportive" and +3 = "strongly supportive."

Seven demographic questions were used to determine participant stakeholder affiliation, major, gender, home state, class standing, community type, and home college. For stakeholder affiliation, we asked students to self-identify as a hunter, farmer, and/or landowner, or write-in an additional category if they felt it applied. Because these groups are not necessarily mutually exclusive, we did not make comparisons between stakeholder groups, only between respondents identifying as that group or not (e.g., hunters versus non-hunters). We primarily used closed-ended questions, including Likert scale and multiple-choice questions. Additional questions concerning attitudes towards bears were asked but were not included in this analysis.

All students enrolled at UWSP at the time of the survey were sent the survey by email through the Registrar's Office, as is University policy for email distribution of surveys on campus. We sent a total of three emails at two-week intervals with varied messages and an anonymous survey link in order to improve response rates. We compared response rates by college affiliation and gender, as these could be most easily compared to available enrollment data to assess bias and to determine the necessity of weighting.

We analyzed the gathered data quantitatively to evaluate student attitudes bear management and the factors affecting those attitudes. We excluded surveys that were largely incomplete or that skipped responses to key attitude and demographic questions from analysis, as these were deemed unusable. We measured all of the management questions on a 7-point Likert scale (rescored from -3 to +3) and the variables of interest for analysis in this study were gender, college, the urban-rural scale, hunting participation, farming participation, and experience level (Table 1). We did not weight survey responses for the management attitude analysis. We assessed non-response bias in our survey using Kruskal-Wallis tests to compare the distributions of responses for participants responding after the first, second, and third email communications. Potential for Conflict Indices (PCI_2) were deemed most appropriate for assessing the differences in student support ratings for the management actions across situations, as PCI_2 allows for the graphic display of level of conflict, dispersion, and central tendency (Vaske et al., 2010). The PCI_2 score can range from 0, representing the lowest degree of conflict and a 100% distribution on a singular value on the scale, to 1, representing the highest degree of conflict and a 50/50 distribution of responses on the two poles of the scale. We

calculated the PCI_2 scores and performed difference tests using the downloadable *Potential for Conflict Index version 2.0* workbook available from the PCI_2 website (Vaske, 2014). All PCI_2 workbook calculations were performed in Microsoft Excel for Mac, Version 16.20. We also used Kruskal-Wallis and Mann-Whitney U tests to asses group differences across the conflict scenarios using in IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., 2017). All statistical tests were conducted at an alpha level of 0.05.

Results

Respondent Characteristics

Overall, 870 of the 8,109 enrolled students responded to the survey (10.7%). After removing unusable surveys from the response pool, we were left with 704 usable surveys (8.7%). In our assessment of non-response bias, we found no significant differences between participant responses to management or demographic questions based on how many email reminders they received (all $p > 0.05$). Our respondents were predominately female (61.9%) and from either the College of Natural Resources (CNR; 33.7%) or College of Letters of Science (CLS; 32.7%) (Table 1). The majority of respondents described their background as either from a city (37.0%) or rural (35.6%). With the exception of graduate students, which make up a relatively small percentage of enrolled students at UWSP, older students responded at a higher percentage than younger students.

When asked about their experience with bears, the majority of respondents had never seen a bear (66.2%) or bear sign (69.6%) in close proximity to where they live. However, most had seen a bear (69.0%) or bear sign (64.4%) in the wild at least once.

Thirty-eight percent of respondents identified as a hunter, 36.9% identified as a landowner, and 16.9% identified as a farmer or rancher. Although there were many write-in responses, the only other category that could be developed was non-consumptive users, although this was a relatively low percentage of the respondent pool (3.6%). Given this, only the original three stakeholder groups were retained for analysis.

PCI_2 Findings

In general, human-centric management actions, such as education and use of bear spray, were more highly supported by and created less conflict among students than bear-centric actions, such as hazing and destruction of the bear (Figure 1). With the exception of hazing and destruction, all means were positive, indicating student support for these actions ($\bar{x}$ = 0.42 – 2.24; Hazing $\bar{x}$ = -0.28; Destruction $\bar{x}$ = -0.74). In the full sample, the levels of conflict were relatively low, with PCI_2 scores ranging from 0.03 (safety education) to 0.32 (destruction) and hazing and destruction had similar levels of conflict (PCI_2 = 0.31 and 0.32, respectively; Figure 1).

Additionally, we found that college, experience, and gender may be associated with management attitudes and that the severity of the conflict can impact attitudes towards specific actions. In consideration to attitudes regarding destruction across three scenarios (an aggressive bear in the neighborhood, a bear in the neighborhood, and the general attitude towards destruction), significant differences in conflict were found based on gender, college, and experience with bears (Figure 2). Male respondents tended to support destruction of the bear more strongly than female respondents across all three scenarios presented, but they tended to have higher PCI_2 scores than female respondents (Figure 2a). Respondents that were students in the CNR tended to be more supportive of

destruction than respondents in the other colleges (Figure 2b). When comparing respondents' attitudes by their level of experience encountering bears and bear sign, those with higher experience scores also supported destruction more strongly, especially as conflict increased (Figure 2c). For male respondents, CNR students, and respondents with high levels of experience with bears, mean attitude scores for destruction of a bear in an aggressive bear scenario were slightly positive ($\bar{x}$ = 0.25, 0.16, and 0.53, respectively; Figure 2).

Group Differences

Students differed in their management attitudes based on gender, stakeholder group affiliation, home college, experience level, and community type, all of which had minimal to typical effects on attitude differences (Tables 2-7). Males more strongly supported destruction of the bear than females across all scenarios (η = 0.251 – 0.328; Table 2). Male students were more supportive of hazing in the lower severity encounters and were less supportive of capture and release of the bear on site in higher severity encounters than female students.

While differences were found between hunters and non-hunters and farmers and non-farmers, we failed to detect significant differences in attitudes based on being a landowner or not (Tables 3 and 4). Hunters were more supportive of hazing and destruction across all encounter scenarios with the exception of hazing in the aggressive bear encounter than non-hunters (η = 0.100 – 0.198 and 0.166 – 0.332, respectively). Non-hunters were slightly more supportive of monitoring the situation when bears were found breaking into homes and in an aggressive bear scenario than hunters (η = 0.132 and 0.139, respectively). Farmers and non-farmers most often differed in their attitudes

towards relocation and destruction (η = 0.051 – 0.143 and 0.106 – 0.14, respectively). Farmers were more negative towards relocation and more positive towards destruction than non-farmers. When a bear was suspected of harming a pet in the neighborhood and when an aggressive bear was in the neighborhood, non-farmers were slightly less supportive of monitoring the situation than farmers.

CNR students viewed hazing and destruction significantly more favorably than the other colleges across all five scenarios (η = 0.134 – 0.263; Table 5). When a bear was found breaking into homes in the neighborhood, CNR students were less supportive of capture and release than other students. Education was also viewed differently when a bear was suspected of harming a pet in the neighborhood, with CNR and College of Fine Arts and Communication (CFAC) students showing stronger support than the other colleges.

In general, respondents with more experience with bears viewed destruction more positively and capture and release and relocation more negatively. Attitudes toward destruction of the bear were significantly different across all five scenarios, with high experience respondents more strongly supporting destruction (η = 0.117 – 0.207). Hazing attitudes differed for the two lowest-conflict scenarios (bear in neighborhood and bear eating attractants), with respondents with greater experience with bears supporting hazing more strongly than lower experience respondents (η = 0.109 and 0.128, respectively). Capture and release was also viewed most negatively by those with moderate levels of bear experience in the two highest-conflict scenarios.

When a bear was found in the neighborhood, urban residents were in stronger support of capture and release of the bear onsite and relocation of the bear to another area

than rural residents (Table 7). Destruction attitudes differed across the urban index for the aggressive bear and breaking into homes scenarios, with support increasing with a more urban background. Students from a city were slightly more positive in their attitude towards monitoring the situation, and equally supportive of relocation as students from a town when a bear was suspected of harming a pet in a neighborhood.

Discussion

We sought to identify the attitudes and their associated factors of university students in regard to specific bear management actions across five scenarios of increasing human-bear conflict. The results presented here indicate significant differences in support for management actions can differ based on demographic variables such as gender, home college affiliation, and growing up in an urban versus rural setting, stakeholder group membership, experience with bears, and the conflict context. These results further support past findings in the literature, but also emphasize important recommendations for bear managers moving forward.

In line with previous research (Teel et al., 2002; Palmer et al., 2011; Dressel et al., 2014; Petchenik et al., 2018), we found that gender, college membership, stakeholder group affiliation, experience with bears, and urban-rural background can impact attitudes towards management actions, as evidenced both in the PCI_2 and the group-difference analyses. These findings further stress the importance of the consideration of the socio-demographic dimensions by wildlife managers when shaping policy. Additionally, our survey targeted a rather unique and often overlooked study population in that college students comprised of the entire study population. Despite comprising the future stakeholders in wildlife management, college students are not frequently captured in

statewide or nationwide survey samples. For example, the 2018 survey on attitudes towards black bears and their management in Wisconsin indicated a skew towards participants aged 55 years or older, with most regions reporting only 9-18% of the survey sample as aged 35 or younger (Petchenik et al., 2018). Given this, our findings add to the small pool of studies seeking to understand the management attitudes of future stakeholders.

Gender differences were prevalent and patterned, as males more frequently demonstrated stronger support for hazing and destructions than females. This finding of male respondents more strongly supporting lethal management is well-documented in the literature (Teel et al., 2002; Agee & Miller, 2009; Palmer et al., 2011). Agee and Miller (2009) found gender to be the prevailing predictor in support for lethal management, with women being more likely to oppose lethal management than men. Even with increasing severity of human-bear conflict, women may be less likely to support lethal management (Palmer et al., 2011). Non-lethal management generally garners more support from both genders (Agee & Miller, 2009; Palmer et al., 2011). We found that both genders were strongly supportive of non-lethal management, with support for educational efforts being particularly high. This further supports education measures as a popular management tool, but it is most effective when used as one part of a multi-faceted bear management program (Dietsch et al., 2018). While at lower encounter severity levels, male and female respondents differed less in their support of capture and release and monitoring the situation, greater disparities emerged as the human-bear conflict scenario increased in severity. Thus, context may amplify these differences between male and female students (Palmer et al., 2011).

College membership in our study was used as a proxy for academic majors, which can be further extrapolated and understood as general interests in consideration to both education and career paths. Given this, finding that CNR students differed in their attitudes toward different management actions would be expected, since natural resources majors would likely have a better understanding of not only the management actions themselves, but also their wider implications, than students within other colleges. This may suggest the need for better education or exposure of other groups not as well-versed in natural resources to bear issues. CNR students responded disproportionately to the other colleges, as they made up the highest percentage of respondents when they are not the largest college on campus. This likely ties back to their interest in the topic, as natural resources majors could be assumed to be more invested in a wildlife-oriented survey than non-natural resource majors. Beyond our study, this has implications in survey response rates for wildlife surveys: those who are most interested or invested in the subject of the survey, may be most likely to take the time to respond.

Experience with bears and other large carnivores has been shown to impact attitudes in many studies, and our findings were no exception (Siemer et al., 2009; Dressel et al., 2014; Petchenik et al., 2018). We found that support for destruction increased with experience level, a finding supported by another recent survey across the state of Wisconsin (Petchenik et al., 2018). While seemingly intuitive, those who have more frequently seen bears or bear sign have likely seen or experienced negative impacts of bears as well, whether those impacts are manifested as fear or worry, property or crop damage, or an encounter causing personal injury. This is not to say that all experiences were negative for those respondents, but that their experience has likely led them to a

better understanding of bears and their impacts (Siemer et al., 2009). Those with a higher degree of experience with bears may have been involved in incidents requiring agency response such as hazing, relocation, or receiving information, and therefore may better understand and/or support these practices due to their perceived effectiveness. Siemer et al. (2009) found that non-negative experiences with bears are linked to certain behaviors, such as contacting a wildlife agency during an encounter. Because trends in support for specific management actions changed given context of particular situations, it may be reasonable to assume that greater experience with bears impacts perceived appropriateness of different management actions in a given situation.

Fewer differences and patterns in differences were found in the stakeholder group and urban index analyses, indicating these may not impact student attitudes as heavily in our study. Hunters tended to support lethal management more than non-hunters in our study, although hunting participation has been shown to have varying effects in other studies (Teel et al., 2002; Agee & Miller, 2009; Palmer et al., 2011). College students may be still forming an individual identity separate from that of their family, thus fewer differences may be noticeable between groups at this age. Additionally, students who did not strongly identify with a particular stakeholder group may have left the question blank even if they hunt occasionally or grew up on a farm. In consideration to the urban index, the phrasing of the question may have been interpreted differently depending on the respondent. While population sizes were provided to guide respondents to selecting the best match along the urban-rural index, some students may have responded either in reference to their current living situation as opposed to where they grew up, or in a manner that based on their own perception of their hometown size.

The public may be misinformed or unaware about certain management actions. Attitudes towards hazing and destruction were often similar, indicating that the public may not fully understand the implications of each of these actions. Lethal actions tend to have low public support, as they bring up ethical or other concerns for many people (Loker & Decker, 1995). Support for lethal actions tends to increase in severe human-bear encounters, such as in cases of personal injury, but it is still largely viewed as an absolute last resort. This low level of support is not likely to increase, especially as a shift in wildlife values continues from traditionalist to mutualist orientations (Manfredo, 2008). While the students may simply be unsupportive of both hazing and destruction, it is also possible that students may not fully understand the differences between these two actions if they are unfamiliar with the methods employed by each. Hazing is a non-lethal action employing a variety of methods (e.g., bean bag shotguns, loud noises, dogs, etc.) to aversively condition a bear from returning to a specific location. This can be a highly effective management tool but may be perceived as cruel or be otherwise misunderstood by the public without better education and outreach efforts and should be coupled with community education to remove anthropogenic attractants (Spencer et al., 2007; Mazur, 2010). Additionally, relocation was often supported, when this does not necessarily address the root of the conflict and can therefore be ineffective (Hristienko & McDonald, 2007). A small part of this may be due to the common use of relocation in Wisconsin to address corn depredation, with a relatively high degree of success (Petchenik et al., 2018). Relocation as a concept is easy for the public to understand, and could be seen as more clearly non-lethal, garnering higher support, however its effectiveness is limited to specific scenarios (Spencer et al., 2007; Agee & Miller, 2009). Another interesting

finding was the high support for bear spray, considering the numerous restrictions regulating its use in the state of Wisconsin, including a ban on full strength bear spray. Again, this is a well understood method of personal protection, but the legal barriers may be unknown to the general public. Although college students may not be representative of the current knowledge of the populace, as future stakeholders, our findings demonstrate potential gaps in knowledge that should be addressed in agency communications to the public.

As mentioned previously, the impacts of context on management attitudes cannot be overlooked. Attitudes can change depending on a variety of factors, including the severity of the encounter. Management actions that would be deemed unacceptable in a low conflict scenario may be more highly supported in a severe encounter, such as an attack. Our findings in regard to context implications are supported by previous studies (Zinn et al., 1998; Koval & Mertig, 2004; Decker et al., 2006; Agee & Miller, 2009). Palmer et al. (2009) found increased support for destruction of the bear in situations where human safety is threatened. Likewise, break-ins and aggressive bear scenarios increased support for intensive management actions, such as relocation and destruction (Don Carlos et al., 2009). As Decker et al. (2006) emphasized in their study on grizzly bear and wolf management attitudes in Alaska, considerations to who is being affected and in what way they are being affected must be made when making management decisions. Thus, management policies should be adaptable to the situation and effective interventions for common conflict scenarios should be identified and used when appropriate.

Conclusions

Understanding bear management attitudes can be quite complex, as there are many interacting factors, such as experience with bears, situational context, and socio-demographic variables. Given this, it is increasingly important for managers to recognize these complexities and seek ways to engage and better understand their public constituents. Public participatory processes can increase the feeling of control by the public, strengthen trust in agency management, and shape more effective and better supported management policies that meet both public and agency objectives. More regular and widespread use of public surveys is one way to better understand attitudes towards wildlife, management policies, and management effectiveness, and many agencies are already taking advantage of this effective tool. Understanding the general demographic profile of a community living in proximity to bears and other large carnivores can help managers better assess potential concerns of and disagreement between members of the public. Continued agency outreach efforts will not only improve public opinion towards the agency but may also improve public understanding of agency actions in particular human-bear conflict contexts. Our study further emphasizes the need for expanding wildlife agency public engagement efforts, as this will better inform the management of bears and other large carnivores given a particular socio-demographic context.

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Tables and Figures

Table 1. Variables of interest for analysis and respondent demographics.

Variable	Category	%[a]
Gender	Female	61.9
	Male	36.8
	Other	1.3
College	Natural Resources (CNR)	33.7
	Letters and Science (CLS)	32.7
	Professional Studies (CPS)	22.5
	Fine Arts and Communication (CFAC)	8.9
	Undecided	2.2
Class Standing	Freshman	17.1
	Sophomore	20.1
	Junior	24.4
	Senior	31.8
	Graduate	6.6
Urban Index (Community Type)	Farm or ranch	9.4
	Rural setting, not farm or ranch	26.2
	Small town or village (< 5,000)	18.4
	Large town (5,000 – 9,999)	8.9
	Small city or suburb (10,000 – 50,000)	25.5
	Large City (> 50,000)	11.5
Stakeholder Affiliation	Hunter	38.5
	Farmer/Rancher	16.9
	Landowner	36.9
Experience	Has seen bear in wild	69.0
	Has seen bear sign in wild	64.4
	Has seen bear near home	33.8
	Has seen bear sign near home	30.4

[a]Percentages reported may not add up to 100% due to rounding.

Table 2. Significant Kruskal-Wallis test comparisons by respondent gender for differences in support for bear management actions in five proposed human-bear conflicts.

Encounter Scenario/ Management Action[a]	**Male** ***Mdn***[b]	**Female** ***Mdn***	**Other** ***Mdn***	**H**	**p**	***η***
Bear in neighborhood						
Scare (Haze)	0.37	-0.40	-0.67	15.438	**< 0.001**	**0.165**
Education	2.29	2.48	2.60	8.589	**0.014**	**0.120**
Destroy	-1.85	-2.42	-1.75	34.444	**< 0.001**	**0.251**
Bear found eating garbage or bird seed from bird feeders in neighborhood						
Scare (Haze)	0.86	-0.04	0.00	22.201	**< 0.001**	**0.200**
Destroy	-1.75	-2.43	-2.00	40.881	**< 0.001**	**0.274**
Bear found breaking into homes in neighborhood						
Leave & Monitor	-1.44	-1.12	-1.25	6.417	**0.040**	**0.101**
Capture & Release	-0.52	0.00	-1.50	7.175	**0.028**	**0.108**
Destroy	0.12	-2.01	-0.50	57.784	**< 0.001**	**0.328**
Bear suspected of harming a pet in neighborhood						
Destroy	-0.10	-1.97	-2.00	50.73	**< 0.001**	**0.307**
Aggressive bear in neighborhood						
Capture & Release	-1.23	-0.60	1.33	13.238	**0.001**	**0.152**
Destroy	0.80	-1.39	-1.25	51.351	**< 0.001**	**0.309**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table 3. Significant Mann-Whitney U test comparisons by hunting participation for differences in support for bear management actions in five proposed human-bear conflicts.

Encounter Scenario/ Management Action[a]	Non-hunter *Mdn*[b]	Hunter *Mdn*	Total N	M-W-U	p	r
Bear in neighborhood						
Scare (Haze)	-0.47	-0.07	438	29074.5	**< 0.001**	**0.195**
Destroy	-2.38	-2.05	440	28364.0	**< 0.001**	**0.166**
Bear found eating garbage or bird seed from bird feeders in neighborhood						
Scare (Haze)	-0.02	0.85	440	29043.5	**< 0.001**	**0.184**
Destroy	-2.37	-2.03	440	28656.5	**< 0.001**	**0.177**
Bear found breaking into homes in neighborhood						
Leave & Monitor	-1.05	-1.44	439	20314.0	**0.006**	**-0.132**
Scare (Haze)	0.54	1.14	437	26494.0	**0.027**	**0.106**
Destroy	-2.00	-0.27	437	31628.5	**< 0.001**	**0.296**
Bear suspected of harming a pet in neighborhood						
Scare (Haze)	0.51	1.11	439	26638.0	**0.036**	**0.100**
Destroy	-1.86	-0.52	438	30786.5	**< 0.001**	**0.259**
Aggressive bear in neighborhood						
Leave & Monitor	-0.99	-1.54	437	19922.0	**0.004**	**-0.139**
Destroy	-1.43	0.69	437	32672.0	**< 0.001**	**0.332**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table 4. Significant Mann-Whitney U test comparisons of farmers and non-farmers for differences in support for bear management actions in five proposed human-bear conflicts.

Encounter Scenario/ Management Action[a]	**Non-farmer *Mdn***[b]	**Farmer *Mdn***	**Total N**	**M-W-U**	**p**	**r**
Bear in neighborhood						
Destroy	-2.27	-2.03	440	19857.5	**0.026**	**0.106**
Bear found eating garbage or bird seed from bird feeders in neighborhood						
Relocate	1.51	1.06	439	14742.0	**0.019**	**-0.112**
Destroy	-2.27	-1.88	440	20671.5	**0.003**	**0.142**
Bear found breaking into homes in neighborhood						
Relocate	2.20	1.82	435	14032.5	**0.003**	**-0.143**
Destroy	-1.48	-0.50	437	20579.0	**0.003**	**0.142**
Bear suspected of harming a pet in neighborhood						
Leave & Monitor	-1.08	-0.52	438	19662.0	**0.038**	**0.099**
Relocate	2.09	1.61	438	14354.5	**0.005**	**-0.133**
Destroy	-1.48	-0.50	438	20332.0	**0.007**	**0.128**
Aggressive bear in neighborhood						
Leave & Monitor	-1.41	-0.98	437	19893.5	**0.019**	**0.112**
Relocate	2.24	1.73	437	14193.0	**0.003**	**-0.140**
Destroy	-0.64	0.30	437	20122.5	**0.011**	**0.121**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table 5. Significant Kruskal-Wallis test comparisons by respondent's home college for differences in support for bear management actions in five proposed human-bear conflicts.

Encounter Scenario/ Management Action[a]	**CLS** ***Mdn***[b,c]	**CNR** ***Mdn***	**CPS** ***Mdn***	**CFAC** ***Mdn***	**UN** ***Mdn***	**H**	**p**	***η***
Bear in neighborhood								
Scare (Haze)	-0.59	0.68	-0.39	-0.65	0.00	39.37	**< 0.001**	**0.251**
Destroy	-2.36	-2.03	-2.30	-2.43	-1.83	15.62	**0.029**	**0.134**
Bear found eating garbage or bird seed from bird feeders in neighborhood								
Scare (Haze)	-0.09	1.22	-0.21	-0.38	0.33	48.62	**< 0.001**	**0.283**
Destroy	-2.39	-1.96	-2.33	-2.45	-1.67	21.99	**0.003**	**0.173**
Bear found breaking into homes in neighborhood								
Scare (Haze)	0.61	1.35	0.49	0.88	1.13	16.59	**0.020**	**0.142**
Capture & Release	0.05	-0.75	0.07	-0.05	-1.00	16.21	**0.023**	**0.139**
Destroy	-2.04	-0.16	-1.81	-2.00	0.00	42.49	**< 0.001**	**0.263**
Bear suspected of harming a pet in neighborhood								
Scare (Haze)	0.42	1.28	0.57	0.60	1.50	18.02	**0.012**	**0.151**
Education	2.50	2.60	2.33	2.52	2.10	15.38	**0.031**	**0.133**
Destroy	-1.90	-0.59	-1.71	-1.84	-0.25	25.23	**0.001**	**0.191**
Aggressive bear in neighborhood								
Scare (Haze)	0.00	1.08	0.50	0.47	1.25	16.36	**0.022**	**0.140**
Destroy	-1.56	0.51	-0.86	-1.15	-0.14	31.59	**< 0.001**	**0.220**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents;

Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]CLS = College of Letters and Science; CNR = College of Natural Resources; CPS = College of Professional Studies; CFAC = College of Fine Arts and Communication; UN = Undecided

[c]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table 6. Significant Kruskal-Wallis test comparisons by experience level with bears and bear sign for differences in support for bear management actions in five proposed human-bear conflicts.

Encounter Scenario/ Management Action[a]	**Low** ***Mdn***[b]	**Moderate** ***Mdn***	**High** ***Mdn***	**H**	**p**	***η***
Bear in neighborhood						
Leave & Monitor	1.96	2.18	2.20	9.394	**0.024**	**0.117**
Scare (Haze)	-0.27	-0.11	0.43	8.304	**0.040**	**0.109**
Relocate	1.36	1.08	1.37	7.859	**0.049**	**0.105**
Destroy	-2.27	-2.35	-1.88	9.405	**0.024**	**0.117**
Bear found eating garbage or bird seed from bird feeders in neighborhood						
Scare (Haze)	0.07	0.39	1.04	10.812	**0.013**	**0.128**
Destroy	-2.30	-2.30	-1.88	9.375	**0.025**	**0.117**
Bear found breaking into homes in neighborhood						
Relocate	2.26	1.98	2.18	7.993	**0.046**	**0.106**
Destroy	-1.69	-1.61	-0.10	16.260	**0.001**	**0.164**
Bear suspected of harming a pet in neighborhood						
Capture & Release	-0.33	-0.12	-0.96	9.412	**0.024**	**0.118**
Destroy	-1.70	-1.44	-0.40	15.960	**0.001**	**0.162**
Aggressive bear in neighborhood						
Capture & Release	-0.77	-0.51	-1.41	12.262	**0.007**	**0.139**
Destroy	-1.18	-0.49	0.96	24.878	**< 0.001**	**0.207**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table 7. Significant Kruskal-Wallis test comparisons by urban index for differences in support for bear management actions in five proposed human-bear conflicts.

Encounter Scenario/ Management Action[a]	**RF** ***Mdn*** [b,c]	**RNF** ***Mdn***	**ST** ***Mdn***	**LT** ***Mdn***	**SC** ***Mdn***	**LC** ***Mdn***	**H**	**p**	***η***
Bear in neighborhood									
Capture & Release	-0.26	0.25	0.96	0.55	0.41	0.16	22.951	**< 0.001**	**0.190**
Relocate	1.11	1.12	1.45	1.19	1.50	1.00	11.361	**0.045**	**0.118**
Bear found breaking into homes in neighborhood									
Destroy	-0.82	-1.12	-1.43	-1.73	-1.78	-1.75	11.944	**0.036**	**0.123**
Bear suspected of harming a pet in neighborhood									
Leave & Monitor	-0.39	-1.10	-0.89	-0.47	-1.15	-0.80	10.189	**0.070**	**0.108**
Relocate	1.47	1.91	2.15	2.16	2.22	1.80	17.189	**0.004**	**0.158**
Aggressive bear in neighborhood									
Destroy	0.00	0.09	-0.40	-1.14	-1.24	-1.64	15.467	**0.009**	**0.148**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]RF = Rural, farm or ranch; RNF = Rural, not farm or ranch; ST = Small town; LT = Large town; SC = Small city; LC = Large city

[c]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Figure 1. Potential for Conflict Index for UWSP students' support for various management actions in general. Scores adjacent to each bubble indicate the mean level of support, followed by the PCI (e.g., mean; PCI). Bubble size represents the degree of potential for conflict (e.g., lower conflict is indicated by a smaller bubble). The center of the bubble corresponds to the mean level of support for an action, scaling from +3 = strongly supportive to -3 = strongly unsupportive.

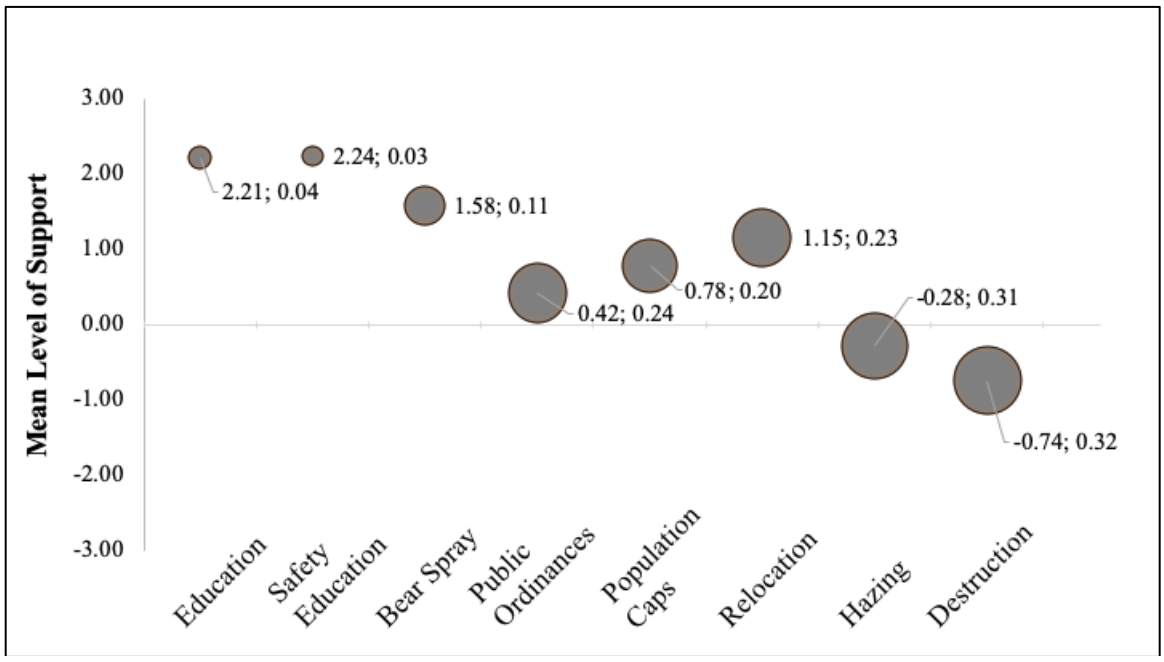
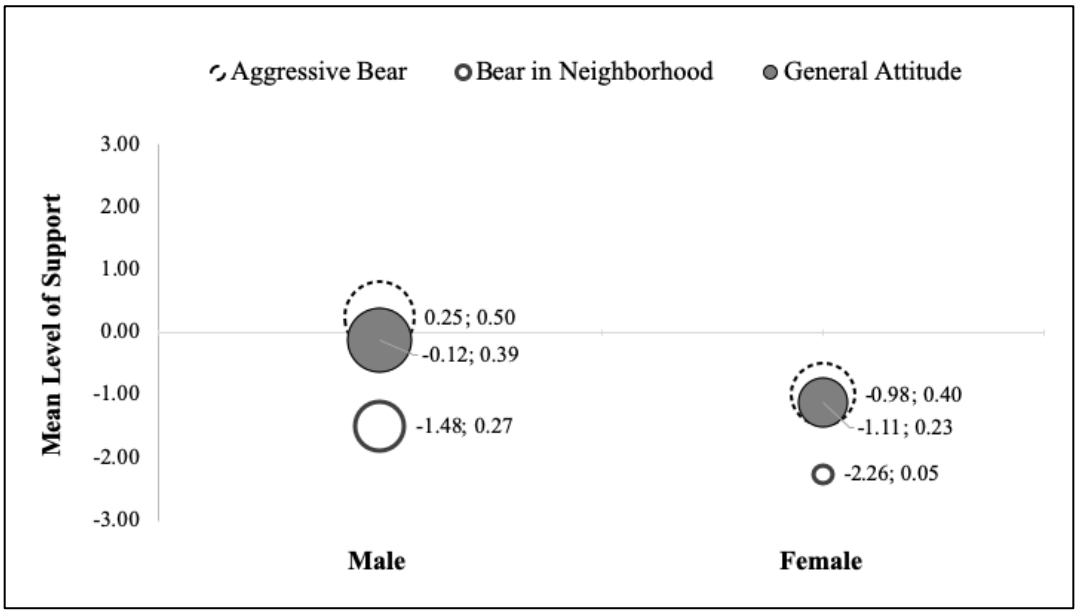
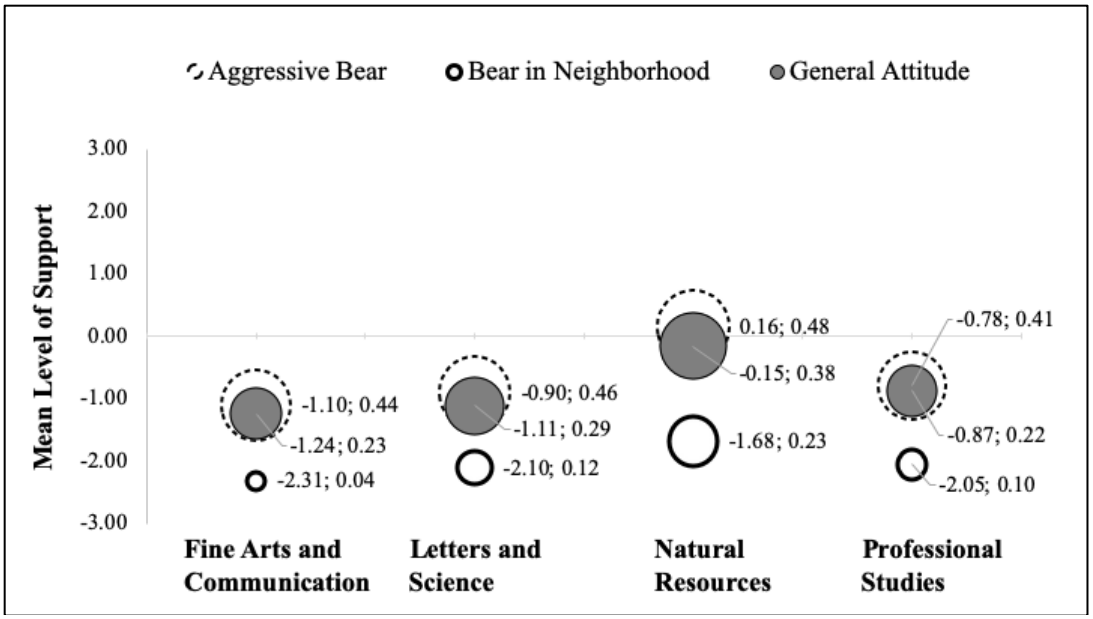


Figure 2. Potential for Conflict Index for UWSP students' support for destruction of the bear based on (a) gender, (b) college affiliation, and (c) experience level in three bear encounter scenarios (e.g., aggressive bear, bear in neighborhood, and general attitude towards destruction). Scores adjacent to each bubble indicate the mean level of support, followed by the PCI (e.g., mean; PCI). Bubble size represents the degree of potential for conflict (e.g., lower conflict is indicated by a smaller bubble). The center of the bubble corresponds to the mean level of support for an action, scaling from +3 = strongly supportive to -3 = strongly unsupportive.

a)



b)


Aggressive Bear
Bear in Neighborhood
General Attitude
Mean Level of Support
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-1.10; 0.44
-1.24; 0.23
-2.31; 0.04
-0.90; 0.46
-1.11; 0.29
-2.10; 0.12
0.16; 0.48
-0.15; 0.38
-1.68; 0.23
-0.78; 0.41
-0.87; 0.22
-2.05; 0.10
Fine Arts and Communication
Letters and Science
Natural Resources
Professional Studies

c)


Aggressive Bear
Bear in Neighborhood
General Attitude
Mean Level of Support
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-0.83; 0.43
-0.97; 0.25
-2.05; 0.10
-0.42; 0.47
-0.70; 0.34
-2.04; 0.15
0.53; 0.53
0.16; 0.44
-1.38; 0.32
Low Experience
Moderate Experience
High Experience

CHAPTER IV

SITUATIONAL AND DEMOGRAPHIC IMPACTS ON UNIVERSITY STUDENT ATTITUDES TOWARDS BLACK BEARS AND THEIR MANAGEMENT

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Abstract

Attitudes towards bears play an important role in the understanding of public support for specific management actions for bears, however few studies have attempted to evaluate the attitudes of future stakeholders. Given this, we surveyed university students at the University of Wisconsin-Stevens Point (UWSP) to better understand the attitudes of future stakeholders in the state. UWSP students were widely positive in their attitudes towards bears, with differences based on bear species, home college, gender, and the frequency of and type of experiences with bears. Our findings lend further support to the link between attitudes towards bears and attitudes towards specific management actions. Our results demonstrate that experience can be a strong influencer of attitudes, attitudes towards bears should be considered when determining support for management actions, and context should not be overlooked when assessing public attitudes.

Keywords

black bear, attitude, management, stakeholder, university student

Introduction

In the past few decades, there has been a growing call from researchers for wildlife managers to find better ways to engage the public in decision-making efforts as the pool of stakeholders continues to diversify (Bath, 1998). Numerous studies have concluded that managers must take the broader public into account when setting policies, as without public support, these policies may fail to be effective (Bath, 1998; Whittaker et al., 2001; Chase et al., 2002; Koval & Mertig, 2004). Once cautionary tales of wildlife management by referendum have now become more prevalent, especially in bear management issues (Loker & Decker, 1995; Minnis, 1998; Siemer et al., 2007). Furthermore, the increasing emphasis on the shift in wildlife values across America from traditionalist to mutualist brings with it a shift in the public's relationship with wildlife agencies and their attitudes towards appropriate wildlife management (Manfredo, 2008). In more specific regard to the management of large carnivores, management is complicated by both strong positive and negative reactions of the public to management interventions (Frank et al., 2015). Failure to take the public's attitudes, needs, and objectives into account can lead to a loss of trust in wildlife managers, and even to a reduction of management tools through referendums.

Public engagement by wildlife managers is not a new concept. Agencies have long had a strong relationship with traditional stakeholder groups, such as hunters and landowners, but this agency-client model is changing as new, non-consumptive stakeholders emerge, including hikers, birdwatchers, and wildlife photographers (Bath, 1998; Manfredo, 2008). Participatory decision-making processes are growing in popularity, employing various methods to actively involve stakeholders in the policy-

shaping process (Bath, 1998; Chase et al., 2002; Siemer et al., 2007). A growing number of agencies are also now turning to public surveys to better understand perceptions of the broader public. Surveys are not a new tool for wildlife agencies to understand their constituencies, as they have long been used to measure hunter and angler attitudes and gain important insight into perceived fish and wildlife population statuses to supplement biological and harvest data (Ryan et al., 2009). Agencies can use public surveys to better understand the demographic profile of their constituency, their attitudes toward and experiences with wildlife, their views on specific policies and their effectiveness, and even their trust in and shared values with the wildlife agency in their state. This knowledge can be used to create more effective management policies, as well as programs that better serve the public.

Measuring attitudes is often at the root of agency and research surveys, as there is great support for the link between attitudes and behavior, especially within the cognitive hierarchy framework (Ajzen, 1989; Vaske & Donnelly, 1999; Manfredo, 2008). An attitude can be defined as a positive, negative, or neutral evaluation of a particular idea, object, or organism, and can be further described by three components: an affective component, a cognitive component, and a conative (behavioral) component (Ajzen, 1989; Manfredo, 2008). Combined, these components encompass the emotions, beliefs, and behaviors associated with the formation of the attitude toward the object of the attitude (Ajzen, 1989; Manfredo, 2008). Attitudes tend to be consistent and are stronger when tied to direct experience and a person's identity (Heberlein, 2012). Research on attitudes towards wildlife typically focuses on measuring explicit attitudes, which are evaluative and require consideration of situational context (Wilson et al., 2000; Manfredo, 2008).

The cognitive hierarchy theory presents an expansion of attitude theory, in which values drive attitudes, which in turn drive behaviors (Vaske & Donnelly, 1999). Given this, agreement to belief statements measured on a Likert scale is often used in the determination of wildlife attitudes, and normative beliefs have also been used to determine the acceptability of management actions because they depend on situational context and are influenced by value orientations (Zinn et al., 1998).

Because of the increasing conflict between large carnivores and humans, there have been many surveys on public attitudes towards carnivores and their management. Members of the public differ in their feelings about the proximity of wildlife, including bears, to their homes, frequency of wildlife sightings, and frequency of damage and other nuisances. These attitudes can be impacted by direct experience, awareness and knowledge, gender, age, and other factors. Experiences with bears have most often been shown to be influential in predicting attitudes towards bears and other large carnivores, especially direct negative experiences such as depredation or an attack on a pet (Kretser et al., 2009; Sakurai & Jacobson, 2011; Rodgers & Pienaar, 2018). While gender can play an important role in wildlife attitudes and behaviors (Kellert, 1994; Zinn & Pierce, 2002; Wilbur et al., 2018), its influence has been shown to vary in significance in other studies (Kretser et al., 2009; Siemer et al., 2009; Rodgers & Pienaar, 2018). Age has also been found to have varying effects on attitudes and tolerance from younger respondents having more positive attitudes towards bears (Campbell & Lancaster, 2010; Heneghan & Morse, 2018) to younger respondents being less tolerant of bears (Campbell, 2013). Many studies indicate that bear knowledge is an important influencer of attitudes (Dressel et al., 2015; Heneghan & Morse, 2018), although the actual influence can again vary (Kellert,

1994). In the Midwest, several studies have further supported these psychological and demographic determinants of attitudes towards bears, as well as have indicated generally positive attitudes towards black bears (Zajac et al., 2012; Smith et al., 2014; Petchenik et al., 2018). In Ohio, perceived risks and benefits were found to decrease and increase acceptance of black bears, respectively (Zajac et al., 2012). A study in Illinois found greater support for protection and population increases of black bears, with participant gender, stakeholder group affiliation, and age impacting perceived risks and acceptance (Smith et al., 2014). Petchenik et al. (2018) found that the Wisconsin public generally views black bears positively, tolerates sightings and slight nuisances, and is willing to live near bears.

Understanding attitudes toward bears and their management allows managers to develop policies that are more strongly supported by the public. Attitudes towards bears further impacts attitudes towards specific management practices (Don Carlos et al., 2009). Positive attitudes towards bears and other large carnivores can foster a stronger desire to protect and conserve them (Glikman et al., 2012). On the other hand, negative attitudes towards bears and coyotes, often strengthened by frequent, negative experiences or inflammatory media portrayal, can lead to calls for eradication (Sakurai & Jacobson, 2011; Alexander & Quinn, 2012). Management attitudes can also depend on conflict and other experiences (Dubois & Fraser, 2013), as well as context, as was the case for hunting and other management policies for grizzly bears and wolves in Alaska (Decker et al., 2006) and in a community in Colorado where support of lethal management for bears increased in severe conflict scenarios (Don Carlos et al., 2009). Thus, measuring attitudes towards bears and their management, as well as determining the relative importance of

factors such as experience, context, and demographics, can better allow managers to predict public support for policies and include the public in their management considerations.

While many wildlife attitude studies target current stakeholder views, very few have evaluated future stakeholder views, with the exception of studies focused on children's attitudes towards wildlife. Because attitudes towards bears play such an important role in the understanding of public support for specific management actions for bears, and because university student attitudes are relevant as they are future stakeholders and policymakers, we developed a study focused on university student attitudes. In our study, we sought to identify and evaluate university student attitudes towards bears and how those attitudes impact management attitudes at the University of Wisconsin-Stevens Point. To this end, we predicted that (1) student major, personal experience with bears, gender, and community type would impact their attitudes towards bears, (2) students affiliated with a stakeholder group (e.g. farmer/rancher, hunter, landowner, etc.) would be more likely to hold similar attitudes to members of that group, and (3) student attitudes towards bears themselves would impact their attitudes towards specific management actions.

Methods

We sampled the undergraduate and graduate student population at the University of Wisconsin-Stevens Point (UWSP), a mid-sized public university in Stevens Point, Wisconsin. Given its location, UWSP is within the expanding range of the American black bear in the state. We developed and conducted our anonymous, web-based survey using Qualtrics from March through May 2018 (Qualtrics, 2018). The survey included

questions on support for management actions given a proposed management scenario, belief statements, demographics, and experience, largely developed from established measures in previous studies (Don Carlos et al., 2009; Glikman et al., 2012; Dubois & Fraser, 2014; Dressel et al., 2015; Frank et al., 2015). All students enrolled at UWSP at the time of the survey were sent the survey by email through the Registrar's Office, as is policy for email distribution of surveys on campus. A total of three emails were sent at two-week intervals with varied messages in order to improve response rates. Response rates were compared by college affiliation and gender, as these could be most easily compared to available enrollment data to assess bias and to determine the necessity of weighting. We assessed non-response bias in our survey using Kruskal-Wallis tests to compare the distributions of responses for participants responding after the first, second, and third email communications. The survey and distribution methods were approved by the University's Institutional Review Board (Protocol #17-18.037) prior to distribution.

Participant experience with bears was measured using four questions to assess frequency and proximity of experience (bear near home, sign near home, bear in wild, sign in wild). These responses were coded so that 0 = "no, never", 1 = "yes, a few times", and 2 = "yes, several times." These were then summed to create an experience index from 0-8, where 0-2 indicated a low experience level, 3-5 indicated a moderate experience level, and 6-8 indicated a high experience level with bears.

Attitudes towards bears were evaluated both in response to three multiple choice questions about their feelings towards different bear species, as well as through responses to eleven belief statements, using a seven-point Likert scale (-3 = extremely negative/strongly disagree and +3 = extremely positive/strongly agree, respectively).

Cronbach's alpha reliability analysis was used to assess the consistency of these belief statements to form the attitude index. Respondents were grouped into homogenous clusters using a K-means cluster analysis with a two-cluster solution, after evaluating one-, two-, three-, and four-cluster solutions. Based on the mean scores for the index statements, these clusters were best described as respondents with positive attitudes towards bears ("Positive") and respondents with mixed or negative attitudes towards bears ("Mixed/Negative"). We tested for differences in attitudes based on bear species using the Friedman test and post-hoc analysis using Wilcoxon signed-rank tests with a Bonferroni correction applied in IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., 2017).

To evaluate how differences in attitudes towards bears impact management attitudes, respondents were asked to rate their support of six different management actions across five scenarios. The management actions and scenarios chosen were based on similar studies by Don Carlos et al. (2009), Frank et al. (2011), and Heneghan (2016), and included actions such as education, hazing, relocation, and destruction, and scenarios such as a bear eating garbage or bird seed, a bear being suspected of harming a pet, and an aggressive bear in the neighborhood. Support was measured on a seven-point Likert scale (-3 = strongly unsupportive and +3 = strongly supportive) and was compared between the attitude clusters using Mann-Whitney U tests in IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., 2017).

Finally, seven demographic questions were used to determine participant stakeholder affiliation, major, gender, class standing, and residential status (Table 2). For stakeholder affiliation, students were asked to self-identify as a hunter, farmer, and/or

landowner, or write-in an additional category if they felt it applied. Due to few commonalities in the write-in responses, only the original three stakeholder groups were retained for analysis. Additionally, because these groups are not always mutually exclusive, comparisons were not made between groups, only between hunters and non-hunters, farmers and non-farmers, and landowners and non-landowners. The home college and department of the students were used as a proxy for student major, due to the high number of majors offered on campus. For analysis, only home college was considered, thus grouping respondents into the four main colleges at UWSP: Letters and Science (CLS), Natural Resources (CNR), Professional Studies (CPS), and Fine Arts and Communication (CFAC). Residential status was measured both through home state and community type growing up, but home state was not retained for analysis. The six community type categories were collapsed to "Rural" (farm or rural setting), "Town" (small or large), and "City" (small or large) for analysis. Differences in attitudes towards bears for each of these variables were assess using Kruskal-Wallis and Mann-Whitney U tests in IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., 2017). Additionally, logistic regression was performed in R using the "survey" package in order to determine which variables act as predictors for attitudes towards bears (Lumley, 2018). For the regression analyses, the dataset was weighted to adjust for response rates by the different colleges (Vaske, 2008). All effect sizes were calculated and interpreted according to Vaske (2008) and we used an alpha level of .05 for all statistical tests.

Results

Respondent Profile

Of the 8,109 students enrolled in the Spring of 2018, 870 responded to the survey (10.73%). We were left with 704 usable surveys (8.68%) after excluding surveys that were largely incomplete, although this final sample size differed for some analyses. In our assessment of non-response bias, we found no significant differences between participant responses to management or demographic questions based on how many email reminders they received (all $p > .05$). We did find one difference based on contact number for the attitude questions (all other $p > .05$), and this was for the distribution of responses for "there are no benefits to having bears near where I live" ($H = 6.247$, 2 d.f., $p = .044$). For this question, participants who responded after the third contact were in slightly higher agreement ($Mdn = -1.56$) than participants who responded after the first or second contact ($Mdn = -2.00$ and -1.81, respectively). Our respondents were predominately female (61.9%) and from either the College of Natural Resources (CNR; 33.7%) or College of Letters of Science (CLS; 32.7%). The majority of respondents described their background as either from a city (37.0%) or rural (35.6%). With the exception of graduate students, which make up a relatively small percentage of enrolled students at UWSP, older students (e.g., seniors and juniors) responded at a higher percentage than younger students (e.g., sophomores and freshmen).

When asked about their experience with bears, most had seen a bear (69.0%) or bear sign (64.4%) in the wild at least once, although, the majority of respondents had never seen a bear (66.2%) or bear sign (69.6%) near to where they live. Given this, the majority of students were categorized at a low level of experience with bears ($n = 409$;

58.3%), with 27.8% of students placed in the moderate level category (n = 195) and 14.0% identified as having a high experience level with bears (n = 98). More respondents identified as a hunter (38.5%) than any other stakeholder group, with 36.9% identifying as a landowner, and 16.9% identifying as a farmer or rancher.

Attitudes Towards Bears

Respondents were generally positive towards bears (M = 1.55), with mean attitudes being higher for black bears than grizzly bears (M = 1.52 and 1.25, respectively; Table 1). While relatively few students responded negatively about bear species in general (7.3%) and black bears in particular (8.4%), almost twice as many respondents felt negatively towards grizzly bears (15.8%; Table 1). There was a statistically significant difference in feelings towards bears based on species ($\chi^2(2) = 283.335$, $p < .001$), where feelings towards grizzly bears (Mdn = 1.52) were more negative than for both any species of bear (Mdn = 2.07; Z = -13.181, $p < .001$) and black bears (Mdn = 2.10; Z = -11.224, $p < .001$). When asked about how they felt about having bears in their region, the majority of students responded positively (66.2%; Table 1). Very few respondents reported having generally negative experiences with bears (5.4%), and most reported having generally positive experiences with bears (74.5%; Table 1).

In regard to the attitude index, respondents were similarly positive. Mean responses were the greatest for agreement that bears are an important part of the ecosystem (M = 2.39) and that learning to coexist with bears is important (M = 2.32; Table 2). Respondents disagreed most strongly that bears pose a threat to the safety of pets (M = -.13), although the mean level of agreement was slightly positive for the belief that bears pose a threat to the safety of humans (M = .42; Table 2). There were also

moderate levels of agreement for the beliefs that there are no benefits to bears living nearby (M = 1.67) and that bears living nearby are an inconvenience (M = 1.57; Table 2). The Cronbach's reliability analysis for the eleven belief items indicated a high degree of consistency in responses (alpha = .888), and the mean index score indicated slightly positive attitudes overall (M = 13.12, SD = 11.08; Table 2).

Group Attitude Differences

Differences by experience. For experiences with bears, we compared attitude index scores by both experience level and whether the experiences were perceived as positive, negative, or neutral. The results of the Kruskal-Wallis test were significant for experience level (H = 11.603, 3 d.f., p = .009, η = .117), and pairwise comparisons indicated that those with a moderate level of experience with bears were more negative in their attitudes (Mdn = 2.45) than those with a low level of experience with bears (Mdn = 2.73; U = 51.301, p = .022). The logistic regression analysis did not produce any models of strong predictive ability, however the variable that most frequently demonstrated significance in predicting attitude cluster membership was whether experiences with bears were positive, negative, neutral, or no experiences. Upon further exploration into differences between those groups, we found significant differences based on reported types of experiences with bears (H = 108.047, 3 d.f., p < .001, η = .447). Respondents that reported positive experiences with bears were more positive in their attitudes towards bears (Mdn = 1.55) than those reporting negative experiences (Mdn = -.09; U = -186.553, p < .001). Those with positive experiences were also significantly more positive in their attitudes towards bears than those with neutral experiences (Mdn = .73; U = -128.401, p <

.001) and those with no experiences with bears (*Mdn* = .64; *U* = -147.566, p < .001). The overall effect of experience type on attitude was substantial (η = .447).

Other differences. Significant differences were also detected for colleges and gender using Kruskal-Wallis tests (η = .184 and .089, respectively). In regard to home college of major, pairwise comparisons indicated differences between the CNR and CLS (*U* = 70.838, p = .004), as well as the CNR and CPS (*U* = -93.878, p < .001). CNR students were more negative in their attitudes towards bears (*Mdn* = 2.36) than both CLS (*Mdn* = 2.73) and CPS students (*Mdn* = 2.82). Significant differences were also found between male and female respondents (*U* = -38.733, p = .042), with female respondents being more positive in their attitudes towards bears (*Mdn* = 2.68) than male respondents (*Mdn* = 2.45).

No significant differences were detected for stakeholder groups, thus hunters and non-hunters, farmers and non-farmers, and landowners and non-landowners did not differ in their attitudes towards bears. We also failed to detect significant differences in attitude index scores based on the urban index or class standing.

Attitude Cluster Situational Management Differences

The Mann-Whitney U tests indicated several significant differences in management support between the positive and mixed/negative attitude clusters. Three main trends emerged across all five management scenarios: the positive attitude cluster supported monitoring and education more strongly and opposed destruction more strongly across every context (Tables 3 and 4). In consideration to the scenario of a bear in the neighborhood, relocation was also found to be significantly different between clusters (*U* = 37534.5, p = .030, r = .094), with a higher level of support from the

mixed/negative attitude cluster (*Mdn* = 1.42) than the positive attitude cluster (*Mdn* = 1.14; Table 3). No additional differences were detected in the context of a bear consuming attractants (Table 3). Significant differences were additionally found for hazing both when a bear was found breaking into homes in the neighborhood and when an aggressive bear was in the neighborhood (Table 4). We found that the positive attitude cluster was in stronger support of hazing (*Mdn* = 1.11 and .92, respectively) than the mixed/negative attitude cluster (*Mdn* = .57 and .13, respectively) in these contexts. Capture and release of the bear was significantly more strongly supported by the positive attitude cluster (*Mdn* = -.16) than the mixed/negative attitude cluster (*Mdn* = -.63) in the context of a bear harming a pet (Table 4). The effects for all of the significant differences detected indicate minimal to typical relationships (Tables 3 and 4).

Discussion

We sought to identify university student attitudes towards bears, their potential influencers, such as demographic variables, and their impacts on attitudes towards bear management interventions. Our results indicate significant differences in attitudes towards bears based on bear species, home college, gender, and the frequency of and type of experiences with bears. We also found additional support for attitudes towards bears impacting attitudes towards their management. These results reinforce three key implications for wildlife agencies. First, while we cannot completely overlook demographic variables when understanding attitudes regarding wildlife, other variables, such as experience with wildlife and perceptions of those experiences, may play a more influential role in the formation of attitudes. Second, understanding attitudes towards wildlife can be important in understanding and predicting support for different

management actions. Finally, situational context continues to be key in relation to attitudes towards specific management actions and a failure to recognize the impacts of situational context on public support could lead to a misunderstanding of support in a given scenario.

The American public is generally positive in their attitudes towards black bears, and our results further supported this trend (Kellert, 1994; Petchenik, 2018). While we did find some significant differences in attitudes towards bears based on demographic variables such as home college and gender, we failed to detect significant differences based on other variables of interest (e.g., stakeholder group affiliation, urban index, and class standing). These findings are not entirely surprising, as college students are likely still forming an individual identity (Torres et al., 2009), thus they may not strongly identify with more traditional hunter, landowner, and farmer attitudes. Despite the included population size guidelines to help categorize participants' community type, this question may have been misinterpreted with students responding based on their own perceptions of their hometown size or in regard to their current location. Likewise, the majority of college students are all relatively close in age, so class standing differences may not be as pronounced. Finding that CNR students differed in their attitudes from CPS and CLS students would be expected, as natural resource majors likely have a better understanding of bears and their impacts than the other majors. Our finding that CNR students were slightly more negative towards bears than their peers might seem surprising. However, given that all colleges had fairly high mean attitude scores, the effect of college was minimal on attitudes, thus other variables, such as experiences, may be impacting these attitude differences more. Gender differences have been found in

other studies (Kellert, 1994; Zinn & Pierce, 2002), and our results further support that differences can exist between the genders. Although the effect of gender on attitudes was found to be minimal in our study, we did detect a difference, contrary to Siemer et al. (2009) and Rodgers and Pienaar (2018). Differences in attitudes towards bears may have also been more difficult to detect based on demographic variables because the majority of respondents were positive in their attitudes towards bears, and very few were moderately to strongly negative in their attitudes.

While the effects of experience level on attitudes towards bears were minimal, the effects of experience type on attitudes were quite substantial. Our finding that respondents who have had negative experiences with bears tended to perceive bears more negatively is well corroborated in previous studies (Kretser et al., 2009; Sakurai and Jacobson, 2011). This further demonstrates the need for managers to not only understand the demographic profile of their respondents, but to also understand how wildlife impacts their constituency. While the public generally tolerates a low level of grievances due to wildlife (Kellert, 1994; Petchenik et al., 2018), this acceptance capacity can only extend so far (Chase et al., 2002). Frequency of encounters can affect attitudes, as seen in our study and others, but the types of experiences can be even more influential in attitudes. Experience plays an important role in attitude formation and can further strengthen attitudes (Heberlein, 2012), and our findings further support the idea that experiences with bears influence attitudes towards bears.

Our findings support our hypothesis that attitudes about bears in general influence attitudes towards specific management actions, and this is further corroborated by other studies (Don Carlos et al., 2009). We found that bear attitudes have minimal to typical

relationships with management attitudes, with similar findings by Don Carlos et al. (2009). While the general public tends to have a low level of support for lethal actions, those with negative feelings towards bears are often more supportive of lethal management, likely due to predispositions to have negative experiences with bears. Our findings present additional support for the impacts of situational context on attitudes, and this is most evident in both attitude clusters' increased support for lethal management with increasing human-bear encounter severity (Decker et al., 2006; Don Carlos et al., 2009; Heneghan, 2016).

As bear and human populations continue to grow closer together, conflict management will occur in an increasingly public arena. Given this, managers will be faced with new and additional challenges in mitigating conflict appropriately, both in accordance with proper techniques and in the eyes of the public. Attitudes towards wildlife and subsequent management support is increasingly complicated as the stakeholder base diversifies, but by incorporating public involvement processes in decision making, managers can better understand the public and their attitudes across situational contexts. To understand wildlife attitudes, we must go beyond demographic profiles and also consider experiences and context. While the incorporation of human dimensions research in wildlife policy decision making is not itself a silver bullet, recognition of the human component in management aides in the crafting of policies benefitting both wildlife and human communities.

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Tables

Table 1. Mean score and percentage of respondents by category for general attitude items.

Attitude Item	Category[a]	%[b]	Mean[c]
Feelings towards bears (any species)	Positive	80.1	1.55
	Neutral	12.7	
	Negative	7.3	
Feelings towards black bears	Positive	79.7	1.52
	Neutral	11.8	
	Negative	8.4	
Feelings towards brown (grizzly) bears	Positive	69.3	1.25
	Neutral	14.9	
	Negative	15.8	
Feelings towards bears in region	Positive	66.2	1.23
	Neutral	20.2	
	Negative	13.6	
Feelings towards general bear sighting experience	Positive	74.5	1.68
	Neutral	20.1	
	Negative	5.4	

[a]Collapsed from original 7-point bipolar scale from extremely positive to extremely negative.

[b]Percentages may not sum to 100.0% due to rounding.

[c]Evaluated on 7-point bipolar scale: -3 = extremely negative and +3 = extremely positive.

Table 2. Cronbach's alpha reliability analysis of items used in bear attitude index.

Scale Item[a]	Mean	Cronbach's alpha	alpha if deleted
I enjoy seeing bears near where I live.	1.04	0.888	0.871
I enjoy knowing that bears are around, even if I never see one.	1.34		0.873
Bears are an important part of the natural ecosystem.	2.39		0.884
Learning how to coexist with bears is important.	2.32		0.880
There are no benefits to having bears near where I live. [b]	1.67		0.878
Bears pose a threat to the safety of people. [b]	0.42		0.876
Bears pose a threat to the safety of pets. [b]	-0.13		0.880
Bears cause abundant damage to livestock. [b]	0.77		0.879
Bears cause abundant damage to crops. [b]	0.68		0.886
Having bears near where I live causes me to be fearful. [b]	1.06		0.876
Having bears near where I live is an inconvenience. [b]	1.57		0.873

[a]Evaluated on 7-point bipolar scale: -3 = strongly disagree and +3 = strongly agree.

[b]Item reverse-coded.

Table 3. Mann-Whitney U test comparisons of positive and mixed/negative attitude clusters for differences in support for bear management actions in low severity human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a,b]	**Positive Cluster *Mdn***	**Mixed/Negative Cluster *Mdn***	***U***	**p**	**r**
Bear in neighborhood					
Leave alone & monitor	2.38	1.40	18430.5	**< 0.001**	**-0.408**
Scare/Haze	-0.06	-0.14	33627.5	0.913	-0.005
Education	2.58	2.07	22005.5	**< 0.001**	**-0.316**
Capture & Release	0.45	0.34	32645.5	0.551	-0.026
Relocate	1.14	1.42	37534.5	**0.030**	**0.094**
Destroy	-2.42	-1.87	43187.5	**< 0.001**	**0.241**
Bear found eating garbage or bird seed from bird feeders in neighborhood					
Leave alone & monitor	1.86	0.84	22067.0	**< 0.001**	**-0.306**
Scare/Haze	0.47	0.19	31714.0	0.187	-0.057
Education	2.58	2.02	22207.0	**< 0.001**	**-0.318**
Capture & Release	0.39	0.09	30657.0	0.098	-0.072
Relocate	1.34	1.45	35765.5	0.247	0.050
Destroy	-2.41	-1.88	42557.5	**< 0.001**	**0.229**

[a]Leave alone & monitor = Leaving the bear alone and monitoring the situation; Scare/Haze = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table 4. Mann-Whitney U test comparisons of positive and mixed/negative attitude clusters for differences in support for bear management actions in high severity human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a,b]	Positive Cluster *Mdn*	Mixed/Negative Cluster *Mdn*	*U*	p	r
Bear found breaking into homes in neighborhood					
Leave alone & monitor	-1.05	-1.50	27118.5	**< 0.001**	**-0.172**
Scare/Haze	1.11	0.57	29563.0	**0.019**	**-0.102**
Education	2.70	2.21	23056.5	**< 0.001**	**-0.309**
Capture & Release	-0.06	-0.43	30449.5	0.060	-0.082
Relocate	2.17	2.14	32528.0	0.664	-0.019
Destroy	-1.91	-0.92	40737.0	**< 0.001**	**0.189**
Bear suspected of harming a pet in neighborhood					
Leave alone & monitor	-0.48	-1.38	23432.5	**< 0.001**	**-0.262**
Scare/Haze	1.02	0.49	30461.0	0.060	-0.082
Education	2.67	2.13	22056.0	**< 0.001**	**-0.329**
Capture & Release	-0.16	-0.63	28741.5	**0.006**	**-0.120**
Relocate	2.06	1.94	31606.0	0.265	-0.049
Destroy	-1.82	-0.85	41412.0	**< 0.001**	**0.206**
Aggressive bear in neighborhood					
Leave alone & monitor	-1.10	-1.60	27879.0	**0.001**	**-0.143**
Scare/Haze	0.92	0.13	27788.0	**0.001**	**-0.142**
Education	2.74	2.27	22707.5	**< 0.001**	**-0.316**
Capture & Release	-0.77	-0.86	31741.5	0.286	-0.046
Relocate	2.19	2.03	30574.0	0.097	-0.072
Destroy	-1.01	-0.06	38635.5	**0.002**	**0.135**

[a]Leave alone & monitor = Leaving the bear alone and monitoring the situation; Scare/Haze = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

CHAPTER V

CONCLUSIONS

When considered together, the preceding three chapters suggest some of the roles of different predictors in attitudes towards bears and their management, potential areas for better public outreach and education efforts, and the importance of considering a broader variety of socioeconomic, experiential, and contextual influencers on attitudes to truly understand the diverse viewpoints of the public. This final chapter reviews this thesis' wider theoretical, methodological, and management implications, serving as a synthesis of the local and global scale findings.

Theoretical and Methodological Implications

Both our global and local methods revealed some important lessons learned, from considerations for applying a meta-analytic approach to the need for a broader exploration of attitude predictors on a greater scale. Throughout the meta-analytic process, we were presented with challenges including the underreporting of effect sizes, inconsistencies in measurement constructs and reporting, and a general lack of studies moving beyond characterizing attitudes to analyze and understand differences between groups. In theory, the literature suggests that attitudes towards wildlife, including bears, are influenced or driven by personal experiences, proximity to wildlife populations, socioeconomic background, and other interacting factors, yet, in practice, very few studies reviewed seemed to consider this multi-faceted nature of attitudes. Two issues may be at fault in this case, either in conjunction or separately, the first being that studies are not actually considering the dimensionality of predictors and attitudes, and the second

being that studies are inconsistently reporting significant and insignificant findings of effects of the predictors studied. Both options are problematic in the limitations they impose on drawing any meaningful conclusions about public attitudes on any scale.

Addressing Dimensionality and Reporting Inconsistencies

Without considering social, experiential, and contextual variables as potential drivers of attitudes, we are failing to truly understand the diversity of attitudes held by the public. While no survey is perfect, we attempted to address and explore multiple aspects of predicting attitudes of a university student population, synthesizing many of the elements identified in questionnaires in a literature review prior to the meta-analysis. In the end, this allowed us to not only understand that the student population was generally positive in their views towards bears and bear management, but to also understand what factors might be associated with those attitude differences, allowing us to better predict the landscape of attitudes in a particular sociodemographic and situational context. Furthermore, the variability in measurement constructs complicates the broader characterization of attitudes. Attitudes towards bears were measured through value orientations, desired population trends, belief indices, and questions assessing likability and feelings. While on the whole these can be diluted to summarization of positive, negative, and neutral attitudes, this summarization loses the nuances of the original findings through oversimplification.

Even when studies examine a broader range of determinants of attitudes, the reporting process itself often leads to a dilution of findings and loss of important information. Insignificant results are often underreported, as they are less “flashy” than significant findings, yet these results can yield important information about the true

effects of potential predictors of attitudes. Effect sizes are also still not commonly reported in studies, and, in many cases, the results reported do not lend themselves well to the calculation of effect sizes without access to the raw data, making the understanding of and subsequent synthesis of practical significance nearly impossible. Finally, the methodologies reported in publications frequently do not contain enough information for true replication of the methods, as is often the ideal requirement. When it comes time to publish and page or word limits must be met, methods often get slashed. This poses challenges to understanding questionnaire and analysis designs, requiring author follow-ups based on contact information that may or may not still be accurate.

Beyond a Better Understanding of Attitudes

Despite these challenges, there is still a growing set of public attitude studies on bears and other large carnivores, rich with information that can be extracted and synthesized for the better understanding of attitudes. While modeling the effects of multiple predictor variables may not yet be a viable approach, there is much to learn simply from the coding of significantly positive, significantly negative, and insignificant effects of separate predictors in a tabular format. Mapping study locations and average attitudes can provide some indication of regional differences and potential gaps in knowledge. Many studies seek to gain a better understanding of attitudes, including our survey and meta-analysis, yet most past studies and even many recent studies have overlooked or underreported findings that can help achieve that objective. Even when studies differ slightly in their focus on attitudes towards bears and their management, by assessing a broader set of influences on attitudes and going further than summarizing general positive, negative, or neutral evaluations towards bears, we can move beyond a

better understanding of attitudes to an understanding that allows for applications in a greater variety of management contexts.

Management Implications

One of the objectives of this thesis was to better inform management decisions in a given socio-demographic and situational context, and both the meta-analysis and survey contributed to this objective. These findings reinforce the importance of experience, demographic variables, and context on attitudes, the need to consider the situational context when evaluating support for management actions, and potential opportunities for broader public outreach and education to better inform the public of management actions.

The Benefits of Knowing Your Audience

Understanding the public's attitudes toward wildlife and their support for management decisions is vital to the effective management of bears and other wildlife, and this thesis further demonstrates the impacts of demographic factors and experience on public attitudes towards bears and their management. Locally and globally, attitudes towards bears were generally positive. On the local scale, types of experiences with bears more significantly impacted attitudes towards bears than did any demographic factors, although gender, home college, and experience level were also significant. Globally, demographics were more frequently reported as creating significant impacts, with age, gender, community type, education, knowledge of bears, and hunting participation commonly found to affect attitudes towards bears. While female respondents in the UW-SP sample viewed bears more positively, male respondents were more often reported as viewing bears more positively in the meta-analysis sample, likely different due to differences in levels of fear associated with different species of bears. Negative

experiences with bears were shown to negatively impact attitudes towards bears both locally and globally. Those from urban backgrounds and younger respondents were more positive towards bears in the global sample, yet these factors were insignificant locally, most likely due to the narrower age range on a college campus and interpretation of community type. Management support was influenced by a wider range of demographic and experience factors in addition to attitudes towards bears themselves both locally and globally, further emphasizing the multifaceted nature of attitudes. Despite some of this expected variation, the findings described in the preceding chapters underscore the importance of considering a multitude of socio-demographic factors and experience in the understanding of attitudes towards bears and their management.

Contextual Framing Makes a Difference

Context can be a significant influencer of attitudes and stakeholder group conflict, especially in regard to severity and frequency of encounters. While lethal management support tends to be lower, we found increasing support for these methods as the severity of the human-bear conflict increases in both the survey and meta-analysis samples. Context impacts not only management support, but also the degree of stakeholder disagreement for certain actions. Higher severity encounters with bears can increase the divisiveness of the public, making management decisions more contentious. Studies within the situational management subset in the meta-analysis further revealed that frequency of different bear encounters can alter support for management actions, especially higher-intensity actions such as destruction of the bear. Thus, the effects of context should not be overlooked when assessing attitudes towards bears and their management, and policies should be developed to be adaptable in a variety of contexts.

Educational Opportunities Exist

Misinformation and ignorance amongst the public present additional challenges in the management of bears and other wildlife. Locally, hazing and destruction attitudes were rather similar, even when these actions have very different outcomes for the bear. Likewise, relocation efforts are often favored by the public, even when these do not address the root of the conflict. Given this, knowledge gaps clearly exist among the general public, for which communication efforts must be developed to effectively address. While education and outreach may not directly change behaviors, well-designed messaging to the public can help improve agency perceptions and trust and could also improve perceptions towards different management methods. The identification of and use of effective communication strategies to address knowledge gaps and misinformation amongst members of the public is essential to maintaining social trust and improving public perceptions of bears and their management.

Concluding Thoughts

While on the surface including insights from public attitudes research in wildlife management decision-making processes may seem daunting and unnecessarily overcomplicated, the complexities of these attitudes lend a great deal of strength to the shaping of policies. The management of fish and wildlife populations, including bears, based on biological science alone does not properly account for the attitudes, needs, and objectives of the public and can lead to increased animosity between people and wildlife, to a loss of trust in managers, and even to public referendums, which remove important tools from the management toolbox. By truly understanding and incorporating attitudes

towards bears and their management in the decision-making process, policies can be better shaped to benefit both bears and human communities.

APPENDIX I

Extended Findings

Table A1-1. Kruskal-Wallis test comparisons by respondent gender for differences in support for bear management actions in five proposed human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a]	**Male *Mdn*[b]**	**Female *Mdn***	**Other *Mdn***	**H**	**p**	***η***
Bear in neighborhood						
Leave & Monitor	1.97	2.14	2.40	2.828	0.243	0.059
Scare (Haze)	0.37	-0.40	-0.67	15.438	**< 0.001**	**0.165**
Education	2.29	2.48	2.60	8.589	**0.014**	**0.120**
Capture & Release	0.32	0.45	1.00	1.132	0.568	0.016
Relocate	1.22	1.31	1.06	1.357	0.507	0.026
Destroy	-1.85	-2.42	-1.75	34.444	**< 0.001**	**0.251**
Bear found eating garbage or bird seed from bird feeders in neighborhood						
Leave & Monitor	1.19	1.59	1.40	5.675	0.059	0.094
Scare (Haze)	0.86	-0.04	0.00	22.201	**< 0.001**	**0.200**
Education	2.30	2.44	2.00	4.632	0.099	0.083
Capture & Release	0.21	0.29	0.67	0.537	0.765	0.030
Relocate	1.38	1.40	1.50	0.231	0.891	0.038
Destroy	-1.75	-2.43	-2.00	40.881	**< 0.001**	**0.274**
Bear found breaking into homes in neighborhood						
Leave & Monitor	-1.44	-1.12	-1.25	6.417	**0.040**	**0.101**
Scare (Haze)	1.09	0.77	0.00	3.008	0.222	0.062
Education	2.51	2.55	2.60	0.517	0.772	0.030
Capture & Release	-0.52	0.00	-1.50	7.175	**0.028**	**0.108**
Relocate	2.09	2.21	1.40	2.046	0.359	0.045
Destroy	0.12	-2.01	-0.50	57.784	**< 0.001**	**0.328**

Table A1-1 (continued).

Bear suspected of harming a pet in neighborhood						
Leave & Monitor	-1.05	-0.88	-0.33	0.832	0.660	0.018
Scare (Haze)	0.92	0.79	0.25	0.815	0.665	0.019
Education	2.49	2.48	2.00	0.807	0.668	0.019
Capture & Release	-0.63	-0.24	0.00	3.079	0.214	0.063
Relocate	1.86	2.09	1.50	4.062	0.131	0.076
Destroy	-0.10	-1.97	-2.00	50.73	**< 0.001**	**0.307**
Aggressive bear in neighborhood						
Leave & Monitor	-1.49	-1.19	-0.50	2.507	0.286	0.053
Scare (Haze)	0.80	0.44	1.33	1.871	0.392	0.041
Education	2.55	2.59	2.83	1.482	0.477	0.030
Capture & Release	-1.23	-0.60	1.33	13.238	**0.001**	**0.152**
Relocate	2.07	2.17	1.80	1.524	0.467	0.032
Destroy	0.80	-1.39	-1.25	51.351	**< 0.001**	**0.309**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table A1-2. Mann-Whitney U test comparisons by hunting participation for differences in support for bear management actions in five proposed human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a]	Non-hunter *Mdn*[b]	Hunter *Mdn*	Total N	*U*	p	r
Bear in neighborhood						
Leave & Monitor	2.08	2.09	440	24303.5	0.811	0.011
Scare (Haze)	-0.47	-0.07	438	29074.5	**<0.001**	**0.195**
Education	2.47	2.37	436	21878.5	0.158	-0.068
Capture & Release	0.46	0.39	438	23158.0	0.630	-0.023
Relocate	1.20	1.30	439	24627.5	0.573	0.027
Destroy	-2.38	-2.05	440	28364.0	**<0.001**	**0.166**
Bear found eating garbage or bird seed from bird feeders in neighborhood						
Leave & Monitor	1.43	1.31	440	22837.0	0.371	-0.043
Scare (Haze)	-0.02	0.85	440	29043.5	**< 0.001**	**0.184**
Education	2.45	2.34	438	22049.5	0.152	-0.068
Capture & Release	0.22	0.32	436	24215.5	0.622	0.024
Relocate	1.33	1.47	439	24932.0	0.414	0.039
Destroy	-2.37	-2.03	440	28656.5	**< 0.001**	**0.177**
Bear found breaking into homes in neighborhood						
Leave & Monitor	-1.05	-1.44	439	20314.0	**0.006**	**-0.132**
Scare (Haze)	0.54	1.14	437	26494.0	**0.027**	**0.106**
Education	2.54	2.50	439	23181.0	0.547	-0.029
Capture & Release	-0.06	-0.48	438	21829.5	0.138	-0.071
Relocate	2.10	2.15	435	23981.5	0.652	0.022
Destroy	-2.00	-0.27	437	31628.5	**< 0.001**	**0.296**
Bear suspected of harming a pet in neighborhood						
Leave & Monitor	-0.83	-1.07	438	22165.5	0.207	-0.060
Scare (Haze)	0.51	1.11	439	26638.0	**0.036**	**0.100**
Education	2.51	2.47	439	23232.0	0.571	-0.027
Capture & Release	-0.27	-0.54	437	22330.5	0.305	-0.049
Relocate	2.02	1.97	438	23212.0	0.654	-0.021
Destroy	-1.86	-0.52	438	30786.5	**< 0.001**	**0.259**

Table A1-2 (continued).

Aggressive bear in neighborhood						
Leave & Monitor	-0.99	-1.54	437	19922.0	**0.004**	**-0.139**
Scare (Haze)	0.30	0.86	436	26047.0	0.055	0.092
Education	2.61	2.56	436	22629.5	0.391	-0.041
Capture & Release	-0.57	-1.06	438	21735.5	0.115	-0.075
Relocate	2.20	2.10	437	22320.0	0.276	-0.052
Destroy	-1.43	0.69	437	32672.0	**< 0.001**	**0.332**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table A1-3. Mann-Whitney U test comparisons of farmers and non-farmers for differences in support for bear management actions in five proposed human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a]	Non-farmer *Mdn*[b]	Farmer *Mdn*	Total N	*U*	p	r
Bear in neighborhood						
Leave & Monitor	2.07	2.14	440	17967.0	0.647	0.022
Scare (Haze)	-0.06	0.28	438	18852.5	0.181	0.064
Education	2.44	2.35	436	15999.0	0.259	-0.054
Capture & Release	0.47	0.27	438	15834.0	0.198	-0.061
Relocate	1.30	1.13	439	16247.5	0.288	-0.051
Destroy	-2.27	-2.03	440	19857.5	**0.026**	**0.106**
Bear found eating garbage or bird seed from bird feeders in neighborhood						
Leave & Monitor	1.35	1.43	440	17931.0	0.679	0.020
Scare (Haze)	0.36	0.65	440	19050.0	0.157	0.067
Education	2.42	2.28	438	15707.5	0.134	-0.072
Capture & Release	0.35	0.04	436	15548.5	0.119	-0.075
Relocate	1.51	1.06	439	14742.0	**0.019**	**-0.112**
Destroy	-2.27	-1.88	440	20671.5	**0.003**	**0.142**
Bear found breaking into homes in neighborhood						
Leave & Monitor	-1.29	-1.20	439	17730.5	0.778	0.013
Scare (Haze)	0.92	0.83	437	17240.5	0.946	-0.003
Education	2.52	2.51	439	17162.0	0.795	-0.012
Capture & Release	-0.26	-0.33	438	17135.5	0.834	-0.010
Relocate	2.20	1.82	435	14032.5	**0.003**	**-0.143**
Destroy	-1.48	-0.50	437	20579.0	**0.003**	**0.142**
Bear suspected of harming a pet in neighborhood						
Leave & Monitor	-1.08	-0.52	438	19662.0	**0.038**	**0.099**
Scare (Haze)	0.90	0.79	439	17247.0	0.876	-0.007
Education	2.51	2.40	439	16102.0	0.190	-0.063
Capture & Release	-0.49	-0.20	437	18161.5	0.446	0.036
Relocate	2.09	1.61	438	14354.5	**0.005**	**-0.133**
Destroy	-1.48	-0.50	438	20332.0	**0.007**	**0.128**

Table A1-3 (continued).

Aggressive bear in neighborhood						
Leave & Monitor	-1.41	-0.98	437	19893.5	**0.019**	**0.112**
Scare (Haze)	0.60	0.53	436	17739.0	0.668	0.021
Education	2.60	2.53	436	16230.5	0.394	-0.041
Capture & Release	-0.88	-0.70	438	18018.0	0.558	0.028
Relocate	2.24	1.73	437	14193.0	**0.003**	**-0.140**
Destroy	-0.64	0.30	437	20122.5	**0.011**	**0.121**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table A1-4. Mann-Whitney U test comparisons of landowners and non-landowners for differences in support for bear management actions in five proposed human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a]	**Non-landowner *Mdn***[b]	**Landowner *Mdn***	**Total N**	***U***	**p**	**r**
Bear in neighborhood						
Leave & Monitor	2.03	2.15	439	25425.0	0.285	0.051
Scare (Haze)	0.18	-0.15	437	22356.0	0.250	-0.055
Education	2.41	2.42	435	23682.0	0.962	0.002
Capture & Release	0.35	0.49	437	24945.5	0.394	0.041
Relocate	1.14	1.39	438	26066.5	0.102	0.078
Destroy	-2.28	-2.16	439	25779.5	0.172	0.065
Bear found eating garbage or bird seed from bird feeders in neighborhood						
Leave & Monitor	1.27	1.49	439	25857.0	0.169	0.066
Scare (Haze)	0.50	0.36	439	22842.0	0.348	-0.045
Education	2.36	2.41	437	24416.5	0.640	0.022
Capture & Release	0.22	0.33	435	24840.0	0.345	0.045
Relocate	1.35	1.47	438	25327.5	0.289	0.051
Destroy	-2.18	-2.22	439	23685.5	0.760	-0.015
Bear found breaking into homes in neighborhood						
Leave & Monitor	-1.21	-1.33	438	23199.5	0.554	-0.028
Scare (Haze)	1.03	0.75	436	22290.0	0.260	-0.054
Education	2.53	2.50	438	23824.0	0.905	-0.006
Capture & Release	-0.28	-0.30	437	23752.0	0.940	-0.004
Relocate	2.15	2.10	434	23160.0	0.765	-0.014
Destroy	-1.10	-1.48	436	22541.0	0.349	-0.045
Bear suspected of harming a pet in neighborhood						
Leave & Monitor	-0.86	-1.04	437	23140.5	0.580	-0.026
Scare (Haze)	0.73	1.01	438	25175.5	0.352	0.044
Education	2.49	2.48	438	23936.0	0.982	-0.001
Capture & Release	-0.32	-0.56	436	23060.5	0.598	-0.025
Relocate	1.97	2.01	437	24519.0	0.601	0.025
Destroy	-1.32	-1.29	437	23900.5	0.973	0.002

Table A1-4 (continued).

Aggressive bear in neighborhood						
Leave & Monitor	-1.22	-1.35	436	23353.5	0.762	-0.015
Scare (Haze)	0.68	0.49	435	23249.5	0.761	-0.015
Education	2.59	2.57	435	23390.0	0.827	-0.010
Capture & Release	-0.80	-0.86	437	23875.0	0.988	0.001
Relocate	2.21	2.08	436	22676.0	0.391	-0.041
Destroy	-0.35	-0.44	436	23658.0	0.944	-0.003

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table A1-5. Kruskal-Wallis test comparisons by respondent's class standing for differences in support for bear management actions in five proposed human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a]	**FR** ***Mdn***[b,c]	**SO** ***Mdn***	**JR** ***Mdn***	**SR** ***Mdn***	**GR** ***Mdn***	**H**	**p**	***η***
Bear in neighborhood								
Leave & Monitor	2.11	2.22	2.00	2.01	2.21	5.149	0.398	0.046
Scare (Haze)	-0.08	-0.28	0.18	-0.20	-0.20	1.159	0.949	0.073
Education	2.35	2.37	2.38	2.46	2.60	4.204	0.520	0.020
Capture & Release	0.50	0.21	0.57	0.34	0.56	4.769	0.445	0.038
Relocate	1.26	1.11	1.34	1.25	1.61	3.281	0.657	0.037
Destroy	-2.36	-2.39	-2.11	-2.24	-1.93	8.420	0.135	0.091
Bear found eating garbage or bird seed from bird feeders in neighborhood								
Leave & Monitor	1.33	1.56	1.29	1.51	1.50	4.642	0.461	0.035
Scare (Haze)	0.18	0.48	0.52	0.17	0.67	1.924	0.860	0.062
Education	2.35	2.35	2.34	2.45	2.57	4.054	0.542	0.010
Capture & Release	0.59	0.09	0.24	0.30	-0.20	9.287	0.098	0.100
Relocate	1.46	1.25	1.36	1.42	1.67	2.328	0.802	0.056
Destroy	-2.33	-2.45	-2.06	-2.24	-2.00	11.501	**0.042**	**0.119**
Bear found breaking into homes in neighborhood								
Leave & Monitor	-1.13	-1.18	-1.33	-1.26	-1.47	11.583	**0.041**	**0.119**
Scare (Haze)	0.86	1.04	0.85	0.85	1.08	0.828	0.975	0.077
Education	2.51	2.50	2.53	2.55	2.65	1.847	0.870	0.064
Capture & Release	0.16	-0.15	-0.38	-0.32	-0.38	5.374	0.372	0.051
Relocate	2.17	2.14	2.21	2.17	2.36	1.825	0.873	0.064
Destroy	-1.79	-1.69	-1.34	-1.28	-1.09	6.367	0.272	0.067

Table A1-5 (continued).

Bear suspected of harming a pet in neighborhood								
Leave & Monitor	-0.67	-1.04	-0.85	-0.97	-1.50	14.402	**0.013**	**0.140**
Scare (Haze)	0.80	1.13	0.62	0.84	1.13	5.321	0.378	0.050
Education	2.44	2.48	2.44	2.54	2.58	2.657	0.753	0.050
Capture & Release	-0.17	-0.38	-0.15	-0.54	-1.15	7.776	0.169	0.084
Relocate	2.18	2.06	1.97	1.85	2.20	4.664	0.458	0.035
Destroy	-1.64	-1.58	-1.19	-1.44	-1.33	3.953	0.556	0.009
Aggressive bear in neighborhood								
Leave & Monitor	-1.15	-1.39	-1.31	-1.33	-1.36	3.607	0.607	0.027
Scare (Haze)	0.75	0.72	0.73	0.37	-0.17	2.911	0.714	0.045
Education	2.48	2.58	2.51	2.64	2.67	6.886	0.229	0.074
Capture & Release	-0.52	-0.88	-0.70	-0.95	-1.14	4.441	0.488	0.029
Relocate	2.26	2.12	2.09	2.06	2.22	2.023	0.846	0.061
Destroy	-0.96	-0.97	0.05	-0.54	-0.25	7.417	0.191	0.080

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]FR = Freshman; SO = Sophomore; JR = Junior; SR = Senior; GR = Graduate Student

[c]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table A1-6. Kruskal-Wallis test comparisons by respondent's home college for differences in support for bear management actions in five proposed human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a]	**CLS** ***Mdn***[b,c]	**CNR** ***Mdn***	**CPS** ***Mdn***	**CFAC** ***Mdn***	**UN** ***Mdn***	**H**	**p**	η
Bear in neighborhood								
Leave & Monitor	2.04	2.14	2.08	2.24	2.00	10.18	0.179	0.089
Scare (Haze)	-0.59	0.68	-0.39	-0.65	0.00	39.37	**< 0.001**	**0.251**
Education	2.42	2.51	2.26	2.43	2.50	14.04	0.050	0.123
Capture & Release	0.43	0.34	0.45	0.52	0.17	5.24	0.631	0.038
Relocate	1.31	1.29	1.22	1.20	1.00	4.99	0.661	0.044
Destroy	-2.36	-2.03	-2.30	-2.43	-1.83	15.62	**0.029**	**0.134**
Bear found eating garbage or bird seed from bird feeders in neighborhood								
Leave & Monitor	1.61	1.42	1.39	1.56	1.25	9.76	0.202	0.084
Scare (Haze)	-0.09	1.22	-0.21	-0.38	0.33	48.62	**< 0.001**	**0.283**
Education	2.40	2.51	2.23	2.38	2.25	11.96	0.102	0.106
Capture & Release	0.38	0.17	0.27	0.36	0.38	6.66	0.465	0.035
Relocate	1.43	1.40	1.32	1.33	1.50	2.86	0.898	0.077
Destroy	-2.39	-1.96	-2.33	-2.45	-1.67	21.99	**0.003**	**0.173**
Bear found breaking into homes in neighborhood								
Leave & Monitor	-1.14	-1.37	-1.18	-0.95	-1.83	11.14	0.133	0.098
Scare (Haze)	0.61	1.35	0.49	0.88	1.13	16.59	**0.020**	**0.142**
Education	2.50	2.65	2.42	2.54	2.45	10.25	0.175	0.089
Capture & Release	0.05	-0.75	0.07	-0.05	-1.00	16.21	**0.023**	**0.139**
Relocate	2.19	2.16	2.15	2.06	1.88	3.09	0.877	0.074
Destroy	-2.04	-0.16	-1.81	-2.00	0.00	42.49	**< 0.001**	**0.263**

Table A1-6 (continued).

Bear suspected of harming a pet in neighborhood								
Leave & Monitor	-0.78	-0.80	-1.17	-0.70	-1.14	8.01	0.332	0.062
Scare (Haze)	0.42	1.28	0.57	0.60	1.50	18.02	**0.012**	**0.151**
Education	2.50	2.60	2.33	2.52	2.10	15.38	**0.031**	**0.133**
Capture & Release	-0.40	-0.59	0.00	-0.33	-0.43	9.68	0.207	0.084
Relocate	2.05	1.96	2.02	2.06	1.57	5.33	0.619	0.036
Destroy	-1.90	-0.59	-1.71	-1.84	-0.25	25.23	**0.001**	**0.191**
Aggressive bear in neighborhood								
Leave & Monitor	-1.19	-1.45	-1.29	-1.00	0.00	4.23	0.754	0.058
Scare (Haze)	0.00	1.08	0.50	0.47	1.25	16.36	**0.022**	**0.140**
Education	2.60	2.66	2.45	2.55	2.20	12.01	0.100	0.107
Capture & Release	-0.75	-1.25	-0.46	-0.62	0.17	13.69	0.057	0.121
Relocate	2.21	2.04	2.08	2.13	2,00	7.39	0.390	0.051
Destroy	-1.56	0.51	-0.86	-1.15	-0.14	31.59	**< 0.001**	**0.220**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]CLS = College of Letters and Science; CNR = College of Natural Resources; CPS = College of Professional Studies; CFAC = College of Fine Arts and Communication; UN = Undecided

[c]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table A1-7. Kruskal-Wallis test comparisons by experience level with bears and bear sign for differences in support for bear management actions in five proposed human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a]	**Low** ***Mdn***[b]	**Moderate** ***Mdn***	**High** ***Mdn***	**H**	**p**	***η***
Bear in neighborhood						
Leave & Monitor	1.96	2.18	2.20	9.394	**0.024**	**0.117**
Scare (Haze)	-0.27	-0.11	0.43	8.304	**0.040**	**0.109**
Education	2.43	2.39	2.40	0.758	0.860	0.048
Capture & Release	0.48	0.35	0.34	4.623	0.202	0.070
Relocate	1.36	1.08	1.37	7.859	**0.049**	**0.105**
Destroy	-2.27	-2.35	-1.88	9.405	**0.024**	**0.117**
Bear found eating garbage or bird seed from bird feeders in neighborhood						
Leave & Monitor	1.40	1.61	1.21	5.362	0.147	0.079
Scare (Haze)	0.07	0.39	1.04	10.812	**0.013**	**0.128**
Education	2.39	2.43	2.35	0.645	0.886	0.050
Capture & Release	0.29	0.22	0.32	2.198	0.532	0.019
Relocate	1.47	1.23	1.48	5.733	0.125	0.084
Destroy	-2.30	-2.30	-1.88	9.375	**0.025**	**0.117**
Bear found breaking into homes in neighborhood						
Leave & Monitor	-1.21	-1.07	-1.56	7.691	0.053	0.103
Scare (Haze)	0.78	1.05	1.02	1.767	0.622	0.021
Education	2.53	2.56	2.52	1.789	0.617	0.020
Capture & Release	-0.11	-0.06	-0.74	7.041	0.071	0.097
Relocate	2.26	1.98	2.18	7.993	**0.046**	**0.106**
Destroy	-1.69	-1.61	-0.10	16.260	**0.001**	**0.164**
Bear suspected of harming a pet in neighborhood						
Leave & Monitor	-0.94	-0.64	-1.32	7.279	0.064	0.099
Scare (Haze)	0.68	0.98	1.07	2.921	0.404	0.042
Education	2.46	2.54	2.52	3.010	0.390	0.043
Capture & Release	-0.33	-0.12	-0.96	9.412	**0.024**	**0.118**
Relocate	2.07	1.92	2.02	1.914	0.590	0.013
Destroy	-1.70	-1.44	-0.40	15.960	**0.001**	**0.162**

Table A1-7 (continued).

Aggressive bear in neighborhood						
Leave & Monitor	-1.37	-1.05	-1.54	5.200	0.158	0.078
Scare (Haze)	0.30	1.04	0.66	7.122	0.068	0.098
Education	2.56	2.59	2.61	0.529	0.912	0.053
Capture & Release	-0.77	-0.51	-1.41	12.262	**0.007**	**0.139**
Relocate	2.19	2.11	1.93	4.486	0.214	0.068
Destroy	-1.18	-0.49	0.96	24.878	**< 0.001**	**0.207**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table A1-8. Kruskal-Wallis test comparisons by urban index for differences in support for bear management actions in five proposed human-bear conflicts. Significant p-values and effect sizes in bold.

Encounter Scenario/ Management Action[a]	**RF** ***Mdn*** [b,c]	**RNF** ***Mdn***	**ST** ***Mdn***	**LT** ***Mdn***	**SC** ***Mdn***	**LC** ***Mdn***	**H**	**p**	η
Bear in neighborhood									
Leave & Monitor	2.26	2.23	2.06	2.03	1.80	2.06	10.722	0.057	0.113
Scare (Haze)	0.33	-0.31	0.07	-0.05	-0.11	-0.35	4.483	0.482	0.030
Education	2.24	2.44	2.42	2.41	2.38	2.56	5.173	0.395	0.047
Capture & Release	-0.26	0.25	0.96	0.55	0.41	0.16	22.951	**< 0.001**	**0.190**
Relocate	1.11	1.12	1.45	1.19	1.50	1.00	11.361	**0.045**	**0.118**
Destroy	-2.11	-2.25	-2.14	-2.31	-2.28	-2.43	4.918	0.426	0.042
Bear found eating garbage or bird seed from bird feeders in neighborhood									
Leave & Monitor	1.54	1.43	1.36	1.67	1.34	1.58	2.445	0.785	0.054
Scare (Haze)	0.88	0.15	0.32	0.42	0.46	0.00	6.381	0.271	0.067
Education	2.21	2.44	2.39	2.42	2.40	2.44	3.511	0.622	0.030
Capture & Release	-0.24	0.25	0.53	0.48	0.11	0.30	9.654	0.086	0.104
Relocate	1.14	1.37	1.54	1.33	1.52	1.17	5.117	0.402	0.046
Destroy	-2.18	-2.20	-2.14	-2.39	-2.28	-2.39	5.235	0.388	0.048
Bear found breaking into homes in neighborhood									
Leave & Monitor	-1.00	-1.36	-1.11	-1.00	-1.38	-1.29	5.591	0.348	0.055
Scare (Haze)	1.00	0.81	0.73	1.19	1.06	0.63	2.661	0.752	0.051
Education	2.48	2.60	2.39	2.54	2.57	2.56	5.827	0.323	0.059
Capture & Release	-0.65	-0.40	-0.23	0.14	-0.04	0.12	6.432	0.266	0.068
Relocate	1.87	2.11	2.26	2.26	2.27	2.03	9.289	0.098	0.101
Destroy	-0.82	-1.12	-1.43	-1.73	-1.78	-1.75	11.944	**0.036**	**0.123**

Table A1-8 (continued).

Bear suspected of harming a pet in neighborhood									
Leave & Monitor	-0.39	-1.10	-0.89	-0.47	-1.15	-0.80	10.189	**0.070**	**0.108**
Scare (Haze)	0.79	0.67	0.74	1.04	1.15	0.53	3.028	0.696	0.043
Education	2.31	2.55	2.38	2.65	2.50	2.50	7.937	0.160	0.086
Capture & Release	-0.48	-0.60	-0.35	-0.24	-0.21	0.05	2.981	0.703	0.044
Relocate	1.47	1.91	2.15	2.16	2.22	1.80	17.189	**0.004**	**0.158**
Destroy	-0.85	-1.14	-1.48	-1.64	-1.67	-1.93	8.031	0.155	0.088
Aggressive bear in neighborhood									
Leave & Monitor	-0.86	-1.47	-1.31	-0.86	-1.47	-1.25	9.496	0.091	0.102
Scare (Haze)	0.54	0.73	0.45	0.80	0.55	0.21	1.443	0.920	0.070
Education	2.44	2.66	2.44	2.65	2.61	2.55	8.542	0.129	0.093
Capture & Release	-1.13	-0.95	-0.79	-0.72	-0.70	-0.13	6.002	0.306	0.062
Relocate	1.82	2.14	2.17	1.80	2.20	2.29	6.003	0.306	0.062
Destroy	0.00	0.09	-0.40	-1.14	-1.24	-1.64	15.467	**0.009**	**0.148**

[a]Leave & Monitor = Leaving the bear alone and monitoring the situation; Scare (Haze) = Scaring/hazing the bear away; Education = Providing education for local residents; Capture & Release = Capturing and releasing the bear on site; Relocate = Capturing and relocating the bear to another area; Destroy = Destruction (euthanasia) of the bear

[b]RF = Rural, farm or ranch; RNF = Rural, not farm or ranch; ST = Small town; LT = Large town; SC = Small city; LC = Large city

[c]Evaluated on 7-point bipolar scale: -3 = strongly unsupportive; +3 = strongly supportive.

Table A1-9. Results of AIC model selection for the top five linear regression models to determine predictors of attitude cluster membership, including parameters, AIC_c, ΔAIC_c, and weight (w_i) for each model. The null and global models are included for reference.

Model Parameters	AIC_c	ΔAIC_c	w_i
ExpType + ExpLevel	97.56	0.00	0.351
ExpType + Gender + ExpLevel + College	98.54	0.97	0.216
ExpType + Urban + Gender + ExpLevel + College	98.87	1.31	0.183
ExpType + Hunter + Landowner + Farmer + Urban + Gender + ExpLevel + College	99.66	2.10	0.123
ExpType + Hunter + Landowner + Farmer + Urban + Gender + ExpLevel +College + Class (Global)	100.01	2.45	0.103
…			
Null	102.79	5.22	0.026

APPENDIX II

Meta-Analysis Search Protocol

A. Inclusion and Exclusion Criteria

Criteria 1	Included studies must examine attitudes or beliefs about bears (regardless of species) or the management of bears, or both. Studies regarding captive bear populations will be excluded. Studies targeting specific emotional responses to bears (e.g. fear) will only be included if relevant attitude data is present.
Criteria 2	Meta-analyses themselves will not be included in the sample, but any studies analyzed or cited within them are subject to inclusion if they meet the other criteria.
Criteria 3	Included studies must utilize quantitative methodology.
Criteria 4	Studies without clear methodology and detailed results will be excluded, unless sufficient information can be supplemented by the authors.
Criteria 5	Included studies must provide sufficient information to compute effect sizes or be supplemented by the authors.
Criteria 6	Unpublished studies, reports, surveys, etc. will be included if the rest of the inclusion criteria is met.

B. Databases and Search Methods Included

The literature search will utilize three databases: EBSCO (EBSCOHost), Web of Knowledge (Web of Science), and Google Scholar. Unpublished studies will be sought out through web searches for relevant agency reports, conference proceedings, organization reports, dissertations/theses, and other unpublished studies. Researchers, agencies, and organizations involved with bear management and research will be contacted to identify any further unpublished studies.

C. Search Methods

Step 1 Search databases using the keyword table and appropriate Boolean search strings.

i. Adjust and add keywords as needed.

	ii. Modify Boolean search strings and wildcard marks as appropriate.
Step 2	Contact researchers, agencies, and organizations involved in bear research.
Step 3	Review of articles to determine methods and exclusion of those not using quantitative methodology.
Step 4	Secondary review of articles to determine whether detailed results are included. i. Contact authors for additional information, if necessary. ii. Determine factors analyzed, adjustment of coding criteria, if necessary.
Step 5	Identification of and search for further studies from reference lists of initially identified studies.
Step 6	Curation of data set and coding of data from pool of studies. i. Adjustment of coding criteria and data set as needed. ii. Recoding of data as needed.
Step 7	Review and verification of final data set, ensuring all included studies are coded consistently.
Step 8	Statistical analysis of final data set.

APPENDIX III

Meta-Analysis Keywords

Table A3-1. Full keyword database for the meta-analysis literature search, grouped by topic.

Species	Management	Human Dimensions	Study	Human
bear	intervention, intervene	attitude	survey	human
Ursus	mitigation, mitigate	perception	meta-analysis	people
carnivore	action	value	analysis	person
predator	information, inform	value orientation	inquiry	hunter
Tremarctos	management, manage	human dimensions	examination	farmer
Ailuropoda	participation, participate	belief	study	rancher
Helarctos	coexistence, coexist	opinion	attitude survey	shepherd
Mulursus	interaction, interact	behavior	social survey	community
Ursidae	education, educate	acceptance, acceptability	questionnaire	local
large carnivore	legislation	tolerance, tolerate	interview	resident
large predator	law	norms	synthesis	native
	program	support	review	stakeholder
	population	judgement		public
	conservation, conserve	emotion		student
	protection, protect	attitude change		agency
	introduction, introduce	reaction		demographic
	reintroduction, reintroduce	association		
	maintain	awareness		
	kill	social acceptability		
	reduce, reduction	concerns		
	remove, removal	fear		

Table A3-1 (continued).

	control	worry
	lethal	threat
	nonlethal	danger
	hunt	anxiety
	harvest	risk
	damage	conflict
	capture	depredation
	release	experience
	relocate, relocation	encounter
	translocate, translocation	feelings
	euthanize, euthanasia	response
	policy	
	haze, hazing	
	destroy, destruction	
	engagement, engage	
	communication, communicate	
	deterrent, deter	

Table A3-2. Reduced keyword list used in meta-analysis literature search after review by UWSP librarians.[1]

Species	Management	Human Dimensions	Human
bear	management	attitude	public
Ursidae		belief	stakeholder
		perception	
		opinion	

[1]Literature search conducted using Boolean search string, e.g., (bear OR Ursidae) AND management AND (attitud* OR perce* OR opinion* OR belie*) AND (public OR stakeholder).

APPENDIX IV

Meta-Analysis Coding Manual and Coding Sheet

Coding Manual

Manual Purpose: The following is a guide for the coding of studies for inclusion in the meta-analysis. The purpose of this manual is to provide clear definitions and instruction for the coding of each criterion included on the companion coding sheet.

Manual Structure: There are seven coding sections that will be covered in more detail later in the manual: **Study Identifier**, **Secondary Inclusion Check**, **Sample Characteristics**, **Measurement Characteristics**, **Design Characteristics**, **Source Characteristics**, and **Study Quality**. Each section contains a brief overview, criterion definitions, and criterion codes. Entry into the electronic data base is discussed at the end of the coding sections under **Database Entry**.

Prior to coding within the different sections, the coding date must be recorded at the top of the coding sheet. Likewise, the date the coding sheet is transferred to the electronic database must also be recorded, when applicable. If the study has a companion study or additional files, record that information on the back of the ***General Coding Sheet***.

Date coded: Date of coding; MM/DD/YYYY
Date entered into database: Date coding sheet was entered into database; MM/DD/YYYY

The first section of the ***General Coding Sheet*** is the **Study Identifier** section. In this section, important information regarding the identification of the study must be recorded. Definitions and codes for each criterion are included below.

Study Identifier

1. Study number: 1-3 digit study ID number
2. Study authors: All authors of study recorded in F. M. Last format
3. Year: Year of publication or report write-up recorded as YYYY

4. File name: Name of file as entered in computer

The second section of the ***General Coding Sheet*** is the **Secondary Inclusion Check** section. The purpose of this section is to ensure coded studies meet the inclusion criteria for this meta-analysis. All studies that have made it to the coding stage have already undergone an initial review for inclusion, thus this section serves as a check on the initial review. Definitions and codes for each criterion are included below.

Secondary Inclusion Check

5. Quantitative: Is the study quantitative in nature, or if mixed-methods are used, is the attitude data measured quantitatively?
    0. No
    1. Yes
6. Attitudes measured: Does the study measure attitudes towards bears and/or attitudes towards bear management?
    0. No
    1. Attitudes towards bears only
    2. Attitudes towards management only
    3. Attitudes towards both bears and their management
7. Wild population: Does the study focus on attitudes towards wild bears and/or their management?
    0. No
    1. Yes
8. Meta-analysis: Is the study a primary study and not a meta-analysis or review of past studies?
    0. No
    1. Yes

The third section of the ***General Coding Sheet*** is the **Sample Characteristics** section. The purpose of this section is to characterize important information about the study sample. Definitions and codes for each criterion are included below. All applicable codes should be recorded, where appropriate.

Sample Characteristics

9. Study location: Specific location(s) of the study recorded as State or Province, Country when applicable. If town names are provided, they should be included in parentheses.
10. Sample size: Size of the sample recorded numerically. If sub-samples are reported, recorded sub-sample groupings and sizes in parenthesis.
11. Response rate: Reported response rate, recorded as a percentage.
12. Sample group: Does the study sample include any of the following pre-defined sample groups?
    1. General public
    2. Urban public
    3. Public in bear area (area with established population)
    4. Farmers (including shepherds, livestock owners, crop farmers, and apiarists)
    5. Students
    6. Hunters
13. Demographics considered: Code as 0 if not reported. Record scale or categories if reported as well as proportions of sample, if possible.
    a. Age:
    b. Stakeholder affiliation:
    c. Gender:
    d. Education level:
14. Unique sample characteristics: Any additional demographics or sample characteristics reported.

The fourth section of the ***General Coding Sheet*** is the **Measurement Characteristics** section. The purpose of this section is to characterize the measurement scales used and variables examined in the study. If a study utilizes other relevant measures not characterized by these criterion, they should be included under "Additional Measures" (Criterion 30). Definitions and codes for each criterion are included below. All applicable codes should be recorded, where appropriate.

Measurement Characteristics

15. Attitudes towards bears – source of information: How attitudes are measured
    1. Self-report
    2. Observations
    3. Other - Specify
    4. Can't Tell
    5. Not Measured
16. Attitudes towards bears – name of scale: Record code and specify.
    1. Established measure – original
    2. Established measure – short form
    3. Established measure – modified
    4. Author-designed scale
    5. Not Applicable
17. Beliefs about bears – source of information: How beliefs are measured
    1. Self-report
    2. Observations
    3. Other - Specify
    4. Can't Tell
    5. Not Measured
18. Beliefs about bears – name of scale: Type of scale used
    1. Established measure – original
    2. Established measure – short form
    3. Established measure – modified
    4. Author-designed scale
    5. Not Applicable
19. Knowledge of bears – source of information: How knowledge is measured
    1. Self-report
    2. Observations
    3. Other - Specify
    4. Can't Tell
    5. Not Measured

20. Knowledge of bears – name of scale: Type of scale used
    1. Established measure – original
    2. Established measure – short form
    3. Established measure – modified
    4. Author-designed scale
    5. Not Applicable
21. Personal experience with bears – source of information: How personal experience is measured
    1. Self-report
    2. Observations
    3. Other - Specify
    4. Can't Tell
    5. Not Measured
22. Personal experience with bears – name of scale: Type of scale used
    1. Established measure – original
    2. Established measure – short form
    3. Established measure – modified
    4. Author-designed scale
    5. Not Applicable
23. Attitudes towards management – source of information: How attitudes are measured
    1. Self-report
    2. Observations
    3. Other - Specify
    4. Can't Tell
    5. Not Measured

24. Attitudes towards management – name of scale: Type of scale used
    1. Established measure – original
    2. Established measure – short form
    3. Established measure – modified
    4. Author-designed scale
    5. Not Applicable
25. Management interventions: Management interventions considered should be written down specifically and coded by category.
    0. No management interventions considered
    1. Education/Information
    2. Policy – Bear-Oriented (e.g., population caps)
    3. Policy – Human-Oriented (e.g., carcass disposal regulations, bird feeder policies)
    4. Trap and Release/Hazing
    5. Relocation
    6. Destruction
    7. Direct – Bear Spray, Firearms
    8. Can't Tell
    9. Other - Specify
26. Species of bear: Species of bears studied. If other species beyond bears are studied, code as 9 (Other) and specify.
    1. Brown Bear
    2. American Black Bear
    3. Sun Bear
    4. Spectacled (Andean) Bear
    5. Giant Panda
    6. Sloth Bear
    7. Polar Bear
    8. Asiatic Black Bear
    9. Other - Specify

27. Species occurrence in country/state/province: If using outside source for coding, record code followed by "OS".
    0. Far away, species not present and return unlikely
    1. Close, few reported sightings and high probability of immigration from surrounding regions
    2. Newly arrived, species returned less than 10 years ago
    3. Established, proof of occurrence for more than 10 years
    4. Long established, proof of occurrence for more than 30 years
28. Bear protection status: If using outside source for coding, record code followed by "OS".
    0. Not protected, hunting allowed
    1. Some protections exist or threatened
    2. Fully protected or endangered (no hunting)
29. Reported effect size: Record both the measure used, and the variables considered for each reported effect size.
    1. Pearson's r
    2. Standardized mean difference (e.g., g)
    3. Odds ratio (e.g., o)
    4. Other - Specify
    5. Not Reported
30. Additional Measures: Any additional measures or scales reported in the study, coded as outlined above.

The fifth section of the ***General Coding Sheet*** is the **Design Characteristics** section. The purpose of this section is to characterize the study design, including sampling methodology, study type, data type, and time span. Definitions and codes for each criterion are included below. All applicable codes should be recorded, where appropriate.

Design Characteristics

31. Study type:
    1. Mail survey
    2. Online survey distributed via email
    3. Online survey distributed via other means – specify
    4. In-person survey
    5. Telephone survey
    6. Interview
    7. Mixed-methods – specify
    8. Can't tell
32. Data type: Level of measurement of data
    1. Nominal
    2. Ordinal
    3. Interval-Ratio
33. Time span: Recorded as specifically as possible in MM/DD/YY-MM/DD/YY format.
34. Sampling method:
    1. Randomly sampled from a defined population
    2. Stratified sampling from a defined population
    3. Cluster sampling
    4. Convenience sampling
    5. Quota sampling
    6. Other – specify
    7. Can't tell
35. Detailed methodology: Are methods described in enough detail to accurately code study characteristics? Note: If coded as 0 (No), study authors must be contacted.
    0. No
    1. Yes

The sixth section of the ***General Coding Sheet*** is the **Source Characteristics** section. The purpose of this section is to characterize the source of the study and its authors for

use in evaluation of publication and other biases. Definitions and codes for each criterion are included below. All applicable codes should be recorded, where appropriate.

Source Characteristics

36. Source title: Title of publication or source of study.
37. Source type:
    1. Dissertation or Thesis
    2. Journal Article – Well-known
    3. Journal Article – Not Well-known
    4. Government Report
    5. Technical/Extension Report
    6. NGO Report
    7. Other – Peer-reviewed (Specify)
    8. Other – Not Peer-reviewed (Specify)
    9. Can't Tell
38. Publication status:
    0. Not published
    1. Published, not peer-reviewed
    2. Published, peer-reviewed
39. Year of data collection: Recorded as YYYY.
40. Funding:
    0. No funding reported
    1. Funded
41. Source of Funding:
    0. No funding reported
    1. Governmental
    2. Non-Governmental/Interest Group
    3. University
    4. Can't Tell – Specify

42. Researcher characteristics:
    a. Discipline:
        1. Social Sciences (Sociology, Psychology)
        2. Human Dimensions
        3. Natural Sciences
        4. Statistics
        5. Other - Specify
    b. Gender:
        1. Male
        2. Female
    c. Background:
        1. Conducted by social survey institution
        2. Conducted by natural scientists
        3. Conducted with input from at least one social scientist
        4. Can't tell

The seventh and final section of the ***General Coding Sheet*** is the **Study Quality** section. The purpose of this section is to characterize the internal validity, external validity, construct validity, and statistical inclusion validity of the study in order to assess overall study quality. Definitions and codes for each criterion are included below. All applicable codes should be recorded, where appropriate.

Study Quality

43. Internal validity:
    a. Criterion validity: Whether or not the questions asked can answer the research objectives
        0. Scale items cannot reasonably explain desired outcome
        1. Scale items can reasonably explain desired outcome
        2. Can't tell
44. External validity: Whether the results can be generalized to the target population; Note: Refer to **Sample Characteristics** and **Design Characteristics** sections to better inform these criteria.

a. Use of random sampling:
    0. Random sampling was not used
    1. Random sampling used
    2. Can't tell
b. Samples based on specific subpopulations: Note: If coded as 1 (Yes), record subpopulations sampled.
    0. No
    1. Yes

45. Construct validity:
    a. Reliability of measures: Reported reliability for measures used. If reported, these should be included for each measure with reported reliability. If not reported, code as 0.
        i. Score: Code as NR if not reported.
        ii. Metric:
        iii. Source of score reliability estimate:
    b. Validity of measures: Reported validity for measures used. If reported, these should be included for each measure with reported validity. If not reported, code as 0.
        i. Estimate: Code as NR if not reported.
        ii. Source:
        iii. Nature of estimate:
    c. Content validity: Whether measures used match what is supposed to be measured.
        0. Scale is poor measure of construct
        1. Scale is adequate measure of construct
        2. Scale is good measure of construct
        3. Can't Tell

46. Statistical conclusion validity:
    a. Violation of assumptions: Record any reported or determined violations of assumptions of statistical measures used. Specify the measure and assumption violated, in addition to any corrections used.
        0. No measure assumptions are violated
        1. One assumption is violated, but accounted for
        2. One assumption is violated, and not accounted for
        3. More than one assumption is violated, but accounted for
        4. More than one assumption is violated, and not accounted for
        5. Can't Tell

After each section is coded on the ***General Coding Sheet***, any necessary author follow-ups should be performed. Once coding is finalized, database entry can occur as indicated below.

Database Entry

Each coding criteria will have an associated variable code in the coding database. The codes for database entry are indicated below. The date of database entry must be recorded on the ***General Coding Sheet***, as must any subsequent updates to the database. The database should be set up with variable code names as columns and coded characteristics as rows. A preliminary database will be established and modified as the **Coding Manual** is updated.

Date coded: [DateCode]
Date entered into database: [DateEnter]

Study Identifier

1. Study number: **[StudyID]**
2. Study authors: **[StudyAuthors]**
3. Year: **[StudyYear]**
4. File name: **[File]**

Secondary Inclusion Check

5. Quantitative: **[IncQuan]**
6. Attitudes measured: **[IncAttitude]**
7. Wild population: **[IncWild]**
8. Meta-analysis: **[IncMeta]**

Sample Characteristics

9. Study location: **[StudyLoc]**
10. Sample size: **[N]**
11. Response rate: **[Response]**
12. Sample group: **[SGroup]**
13. Demographics considered:
    a. Age: **[SAge]**
    b. Stakeholder affiliation: **[SStakeAff]**
    c. Gender: **[SGender]**
    d. Education level: **[SEdLevel]**
14. Unique sample characteristics: **[SUnique]**

Measurement Characteristics

15. Attitudes towards bears – source of information: **[AttitudeSource]**
16. Attitudes towards bears – name of scale: **[AttitudeScale]**
17. Beliefs about bears – source of information: **[BeliefSource]**
18. Beliefs about bears – name of scale: **[BeliefScale]**
19. Knowledge of bears – source of information: **[KnowSource]**
20. Knowledge of bears – name of scale: **[KnowScale]**
21. Personal experience with bears – source of information: **[PESource]**
22. Personal experience with bears – name of scale: **[PEScale]**
23. Attitudes towards management – source of information: **[MgtSource]**
24. Attitudes towards management – name of scale: **[MgtScale]**
25. Management interventions: **[MgtInterv]**
26. Species of bear: **[Species]**

27. Species occurrence in country/state/province: **[Occur]**
28. Bear protection status: **[Protect]**
29. Reported effect size: **[ReportES]**
30. Additional Measures: **[AddMeasures]**

Design Characteristics

31. Study type: **[StudyType]**
32. Data type: **[DataType]**
33. Time span: **[DataTime]**
34. Sampling method: **[SMethod]**
35. Detailed methodology: **[Details]**

Source Characteristics

36. Source title: **[SourceTitle]**
37. Source type: **[SourceType]**
38. Publication status: **[PubStatus]**
39. Year of data collection: **[DataYear]**
40. Funding: **[Fund]**
41. Source of Funding: **[FundType]**
42. Researcher characteristics:
    a. Discipline: **[RDiscipline]**
    b. Gender: **[RGender]**
    c. Background: **[RBackground]**

Study Quality

43. Internal validity:
    a. Criterion validity: **[CritValid]**
44. External validity:
    a. Use of random sampling: **[RandS]**
    b. Samples based on specific subpopulations: **[SSubpop]**

45. Construct validity:
    a. Reliability of measures:
        i. Score: **[RelMScore]**
        ii. Metric: **[RelMMetric]**
        iii. Source of score reliability estimate: **[RelMSource]**
    b. Validity of measures:
        i. Estimate: **[ValidMEst]**
        ii. Source: **[ValidMSource]**
        iii. Nature of estimate: **[ValidMNature]**
    c. Content validity: **[ConValid]**
46. Statistical conclusion validity:
    a. Violation of assumptions: **[ViolAss]**

General Coding Sheet

Date coded:
Date entered into database:

Study Identifier

1. Study number:
2. Study authors:
3. Year:
4. File name:

Secondary Inclusion Check

5. Quantitative:
6. Attitudes measured:
7. Wild population:
8. Meta-analysis:

Sample Characteristics

9. Study location:
10. Sample size:
11. Response rate:
12. Sample group:
13. Demographics considered:
    a. Age:
    b. Stakeholder affiliation:
    c. Gender:
    d. Education level:
14. Unique sample characteristics:

Measurement Characteristics

15. Attitudes towards bears – source of information:
16. Attitudes towards bears – name of scale:

17. Beliefs about bears – source of information:
18. Beliefs about bears – name of scale:
19. Knowledge of bears – source of information:
20. Knowledge of bears – name of scale:
21. Personal experience with bears – source of information:
22. Personal experience with bears – name of scale:
23. Attitudes towards management – source of information:
24. Attitudes towards management – name of scale:
25. Management interventions:
26. Species of bear:
27. Species occurrence in country/state/province:
28. Bear protection status:
29. Reported effect size:
30. Additional Measures:

Design Characteristics

31. Study type:
32. Data type:
33. Time span:
34. Sampling method:
35. Detailed methodology:

Source Characteristics

36. Source title:
37. Source type:
38. Publication status:
39. Year of data collection:
40. Funding:
41. Source of Funding:
42. Researcher characteristics:
    a. Discipline:

b. Gender:

c. Background:

Study Quality

43. Internal validity:

    a. Criterion validity:

44. External validity:

    a. Use of random sampling:

    b. Samples based on specific subpopulations:

45. Construct validity:

    a. Reliability of measures:

        i. Score:

        ii. Metric:

        iii. Source of score reliability estimate:

    b. Validity of measures:

        i. Estimate:

        ii. Source:

        iii. Nature of estimate:

    c. Content validity:

46. Statistical conclusion validity:

    a. Violation of assumptions:

APPENDIX V

List of Included Studies in Meta-Analysis

Full citations of primary studies included in the meta-analytic review. Studies are listed alphabetically, except when grouped with companion articles where appropriate.

Individual Studies

Angus Reid Strategies. 2006. Parks Canada: Bears & risk perception. Angus Reid Strategies, Vancouver, British Columbia, Canada and Parks Canada, Gatineau, Quebec, Canada.

Bath, A.J. 1989. Public attitudes towards bears: Implications to the management of black and grizzly bears in the Yukon. Bath Associates, Canyon, Wyoming, USA and Yukon Renewable Resources, Whitehorse, Yukon, Canada.

Bjerke, T., T.S. Ødegårdstuen, and B.P. Kaltenborn. 1998. Attitudes toward animals among Norwegian children and adolescents: Species preferences. Anthrozoös 11(4):227-235.

Blekesaune, A., and K. Rønningen. 2010. Bears and fears: Cultural capital, geography and attitudes towards large carnivores in Norway . Norsk Geografisk Tidsskrift - Norwegian Journal of Geography 64:185-198.

Brown, T.L., D.J. Decker, and D.L. Huston. 1979. Public attitudes toward black bear in the Catskills. Outdoor Recreation Research Unit, Cornell University, Ithaca, New York, USA.

Byrd, E.S., N.J. Olynk Widmar, E.A. Yeager, and J.G. Lee. 2017. Identifying wildlife species believed to be deserving of protection from hunting by U.S. residents. Human Dimensions of Wildlife 22(4):374-381.

Campbell, M.O. 2013. The relevance of age and gender for public attitudes to bown bears (*Ursus arctos*), black bears (*Ursus americanus*), and cougars (*Puma concolor*) in Kamloops, British Columbia. Society & Animals 21(4):341-359.

Canepa, S., K. Annis, and W. Kasworm. 2008. Public opinion and knowledge survey of grizzly bears in the Cabinet Yaak Ecosystem: Final report. Interagency Grizzly Bear Committee, Libby, Montana, USA.

Carter, N.H. 2007. Predicting ecological and social suitability of black bear habitat in Michigan's lower peninsula. Thesis, University of Michigan, Ann Arbor, Michigan, USA.

Clark, J.D., D.L. Clapp, K.G. Smith, and T.B. Wigley. 1991. Black bear damage and landowner attitudes towards bears in Arkansas. Proceedings of the Annual Conference of Southeastern Association of Fish and Wildlife Agencies 25:208-217.

Comeau, J.V. 2012. Assessing the efficacy of wildlife ordinances as a management tool for reducing human-bear conflicts in New Hampshire. Thesis, University of New Hampshire, Durham, New Hampshire, USA.

Davis, J., and C. Morgan. 2003. Grizzly Bear Outreach Project evaluation baseline survey report. Western Wildlife Outreach, Grizzly Bear Outreach Project, Port Townsend, Washington, USA.

Davis, J., and C. Morgan. 2005. Grizzly Bear Outreach Project evaluation final report. Western Wildlife Outreach, Grizzly Bear Outreach Project, Port Townsend, Washington, USA.

Debata, S., K.K. Swain, H.K. Sahu, and H.S. Palei. 2016. Human-sloth bear conflict in a human-dominated landscape of northern Odisha, India. Ursus 27(2):90-98.

Decker, D.J., C.A. Jacobson, and T.L. Brown. 2006. Situation-specific "impact dependency" as a determinant of management acceptability: Insights from wolf and grizzly bear management in Alaska. Wildlife Society Bulletin 34(2):426-432.

Don Carlos, A.W., A.D. Bright, T.L. Teel, and J.J. Vaske. 2009. Human–black bear conflict in urban areas: An integrated approach to management response. Human Dimensions of Wildlife 14(3):174-184.

Dubois, S., and D. Fraser. 2014. Local attitudes towards bear management after illegal feeding and problem bear activity. Journal of Wildlife Rehabilitation 34(1):11-20.

Duda, M.D., and K.C. Young. 1993. Floridian's opinions on black bear hunting in Florida. Responsive Management, Harrisonburg, Virginia, USA.

Eriksson, M., C. Sandström, and G. Ericsson. 2015. Direct experience and attitude change towards bears and wolves. Wildlife Biology 21(3):131-137.

Frank, J., M. Johansson, and A. Flykt. 2015. Public attitude towards the implementation of management actions aimed at reducing human fear of brown bears and wolves. Wildlife Biology 21(3):122-130.

Frost, J.R. 1985. Living with grizzlies: Perceptions of Mission Valley residents. Thesis, University of Montana, Missoula, Montana, USA.

Gangaas, K.E., B.P. Kaltenborn, and H.P. Andreassen. 2013. Geo-spatial aspects of acceptance of illegal hunting of large carnivores in Scandinavia. PLOS ONE 8(7): e68849.

Garshelis, D.L., R.S. Sikes, D.E. Andersen, and E.C. Birney. 1999. Landowners' perceptions of crop damage and management practices related to black bears in east-central Minnesota. Ursus 11:219-224.

Glikman, J.A., J.J. Vaske, A.J. Bath, P. Ciucci, and L. Boitani. 2012. Residents' support for wolf and bear conservation: The moderating influence of knowledge. European Journal of Wildlife Research 58(1):295-302.

Hosoda, M., T. Aoi, and S. Yamamoto. 2009. Differing perceptions of Japanese black bears in urban and rural Japan. Journal of Forest Planning 15:53-59.

Jonker, S.A., J.A. Parkhurst, R. Field, and T.K. Fuller. 1998. Black bear depredation on agricultural commodities in Massachusetts. Wildlife Society Bulletin 26(2):318-324.

Kaczensky, P., M. Blazic, and H. Gossow. 2004. Public attitudes towards brown bears (*Ursus arctos*) in Slovenia. Biological Conservation 118(5):661-674.

Kaltenborn, B.P., O. Andersen, and J.D.C. Linnell. 2013. Is hunting large carnivores different from hunting ungulates? Some judgments made by Norwegian hunters. Journal for Nature Conservation 21(5):326-333.

Karamanlidis, A.A., S. Pllaha, L. Krambokoukis, K. Shore, and A. Zedrosser. 2014. Preliminary brown bear survey in southeastern Albania. Ursus 25(1):1-7.

Kotierk, M. 2010. The documentation of Inuit and public knowledge of Davis Strait polar bears, climate change, Inuit knowledge and environmental management using public opinion polls. Department of the Environment, Government of Nunavet, Iqaluit, Nunavet, Canada.

Kotierk, M. 2012. Public and Inuit interests, western Hudson Bay polar bears and wildlife management: Results of a public opinion poll in western Hudson Bay communities. Department of the Environment, Government of Nunavet, Iqaluit, Nunavet, Canada.

Kubo, T., and Y. Shoji. 2016. Public segmentation based on the risk perception of brown bear attacks and management preferences. European Journal of Wildlife Research 62(2):203-210.

Lindberg, D.E. 2008. Attitudes toward brown bears (*Ursus arctos*) in Sweden. Examensarbete i ämnet biologi, Swedish University of Agricultural Sciences, Umeå, Sweden.

Liordos, V., V.J. Kontsiotis, M. Anastasiadou, and E. Karavasias. 2017. Effects of attitudes and demography on public support for endangered species conservation. Science of the Total Environment 595:25-34.

Lynes, L. 2007. Communicating across species boundaries: How community knowledge and public attitude affect human and bear interspecies relations in Alberta's Bow Valley. Thesis, Royal Roads University, Colwood, British Columbia, USA.

Ma, K., D. Liu, R. Wei, G. Zhang, H. Xie, Y. Huang, D. Li, H. Zhang, and H. Xu. 2016. Giant panda reintroduction: Factors affecting public support. Biodiversity and Conservation 25(14):2987-3004.

Majić, A., A. Marino Taussig de Bodonia, D. Huber, and N. Bunnefeld. 2011. Dynamics of public attitudes toward bears and the role of bear hunting in Croatia. Biological Conservation 144(12):3018-3027.

Marino, A. 2010. Public attitudes toward the brown bear in Croatia: A change over time. Dissertation, Imperial College, London, England, UK.

Mazaika, K. 2013. Beyond the bear necessities: A mixed methods analysis examining the conflicts arising in human-black bear encounters. Dissertation, George Mason University, Fairfax, Virginia, USA.

McIvor, D.E., and M.R. Conover. 1994. Perceptions of farmers and non-farmers toward management of problem wildlife. Wildlife Society Bulletin 22(2):212-219.

Mihalic, D.A. 1974. Visitor attitudes toward grizzly bears in Glacier National Park, Montana. Thesis, Michigan State University, East Lansing, Michigan, USA.

Miller, S.M., S.D. Miller, and D.W. McCollum. 1998. Attitudes toward and relative value of Alaskan brown and black bears to resident voters, resident hunters, and nonresident hunters. Ursus 10:357-376.

New Hampshire Fish and Game Department. 2015. 2015 New Hampshire game management questionnaire. New Hampshire Fish and Game Department, Concord, New Hampshire, USA.

Palmer, D. 2009. 2005 Survey of bear hunters in North Carolina. North Carolina Wildlife Resources Commission, Division of Wildlife Management, Raleigh, North Carolina, USA.

Paunović, M., and D. Ćirović. 2006. Viability increase and recovery of brown bear *Ursus arctos* L. 1758 population in northeastern Serbia. Faculty of Biology, University of Belgrade, Belgrade, Serbia.

Petchenik, J., L. Bradshaw, and R. Holsman. 2018. Public awareness of and attitudes towards black bears in their management in Wisconsin. Wisconsin Bureau of Wildlife Management, Wisconsin Department of Natural Resources, Madison, Wisconsin, USA.

Petko-Seus, P.A. 1985. Knowledge and attitudes of campers toward black bears in Great Smoky Mountains National Park. Thesis, University of Tennessee – Knoxville, Knoxville, Tennessee, USA.

Peyton, B. 1989. A profile of Michigan bear hunters and bear hunting issues. Wildlife Society Bulletin 17(4):463-470.

Piédallu, B., P.Y. Quenette, C. Mounet, N. Lescureux, M. Borelli-Massines, E. Dubarry, J.J. Camarra, and O. Gimenez. 2016. Spatial variation in public attitudes towards brown bears in the French Pyrenees. Biological Conservation 197:90-97.

Quinn, M.S., and S.M. Alexander. 2011. Final survey report: Carnivores & communities in the Waterton Biosphere Reserve. Miistakis Institute, University of Calgary, Calgary, Alberta, Canada.

Responsive Management. 2004. Public attitudes towards black bear management in Maryland. Responsive Management, Harrisonburg, Virginia, USA.

Responsive Management. 2007. Public opinion on wildlife species management in Vermont. Responsive Management, Harrisonburg, Virginia, USA.

Responsive Management. 2008. Pennsylvania residents' opinions on and attitudes toward black bears. Responsive Management, Harrisonburg, Virginia, USA.

Responsive Management. 2008. Public opinion on hunting and wildlife management in Washington. Responsive Management, Harrisonburg, Virginia, USA.

Responsive Management. 2010. Anchorage residents' opinions on bear and moose population levels and management strategies. News from Responsive Management. March 2010.

Responsive Management. 2010. Virginia residents' opinions on black bears and black bear management. Responsive Management, Harrisonburg, Virginia, USA.

Responsive Management. 2013. Public attitudes towards black bear management in Maryland. Responsive Management, Harrisonburg, Virginia, USA.

Responsive Management. 2014. New Hampshire residents' and hunters' opinions on the status and management of big game populations. Responsive Management, Harrisonburg, Virginia, USA.

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APPENDIX VI

Survey Instrument

Campus Bear Attitude Survey

Survey Flow

Standard: Informed Consent (1 Question)
Standard: Experience with Bears (5 Questions)
Block: Attitudes towards Bears (6 Questions)
Standard: Management Attitudes (6 Questions)
Standard: Demographic Info (11 Questions)

Page Break

Start of Block: Informed Consent

Informed Consent to Participate in Human Subject Research

Summary of Research: Dr. Mike Rader, Professor of Natural Resources at the University of Wisconsin-Stevens Point, and his graduate student, Haley Netherton, are conducting a study on attitudes towards bears and their management and would appreciate your participation in this study. You are being asked to complete an anonymous survey that should take up no more than 15 minutes of your time. The benefit of the study is a greater understanding of student attitudes towards bears and their management to help inform policy decisions.

Details of Research:

A. Purpose: The attitudes of university students towards bears and their management are being surveyed.

B. Procedures: An anonymous online survey will ask you questions about your attitudes towards bears and their management.

C. Risks or Discomforts: We anticipate no risk to you as a result of your participation in this study other than the inconvenience of the time to complete the survey. You could, however, experience some discomfort if you have ever had a negative encounter with bears and your completing the survey causes you to remember this.

D. Benefits to the Participant or Others: While there may be no immediate benefit to you as a result of your participation in this study, it is hoped that we may gain valuable information about student attitudes towards bears and their management, which will help create recommendations to guide future management actions.

E. Possible Alternative Procedures: While there are multiple methods our study could use to meet our objectives, such as interviews or focus groups, we believe that the use of an online survey is the quickest and easiest method for obtaining this information.

F. Confidentiality: The information that you give us on the questionnaire will be recorded in anonymous form using Qualtrics software. No personally identifiable information will be available to the researchers or the public.

G. Rights of Participant: If you want to withdraw from the study at any time, you may do so without penalty. Because the information you provided up to that point would be anonymous, we would still retain it.

Once the study is completed, we would be glad to give you the results. In the meantime, if you have any questions, please ask us or contact:

Dr. Mike Rader or Haley Netherton
College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-2876

mike.rader@uwsp.edu or haley.k.netherton@uwsp.edu

If you have any complaints about your treatment as participant in this study, please call or write:

Dr. Debbie Palmer, Chair
Institutional Review Board for the Protection of Human Subjects
Department of Psychology
Science Building, D240
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-3953
irbchair@uwsp.edu

Although Dr. Palmer will ask your name, all complaints are kept in confidence.

This research project has been approved by the UWSP Institutional Review Board for the Protection of Human Subjects.

- ○ I have received a complete explanation of the study and agree to participate. (1)
- ○ I do not wish to participate in this study. (2)

Skip To: End of Survey If Informed Consent to Participate in Human Subject Research Summary of Research: Dr. Mike Rader,... = I do not wish to participate in this study.

End of Block: Informed Consent

Start of Block: Experience with Bears

Q1 Have you ever seen a bear within close proximity to where you live?

- ○ No, never (1)
- ○ Yes, a few times (2)
- ○ Yes, several times (3)

Q2 Have you ever seen the tracks of a bear within close proximity to where you live?

- ○ No, never (1)
- ○ Yes, a few times (2)
- ○ Yes, several times (3)

Q3 Have you ever seen a bear in the wild (e.g. outside of a zoo, sanctuary, or other captive environment)?

- ○ No, never (1)
- ○ Yes, a few times (2)
- ○ Yes, several times (3)

Q4 Have you ever seen the tracks of a bear in the wild (e.g. outside of a zoo, sanctuary, or other captive environment)?

- ○ No, never (1)
- ○ Yes, a few times (2)
- ○ Yes, several times (3)

Q5 How would you describe your bear sighting experience in general?

- ○ Extremely positive (1)
- ○ Moderately positive (2)
- ○ Slightly positive (3)
- ○ Neither positive nor negative (4)
- ○ Slightly negative (5)
- ○ Moderately negative (6)
- ○ Extremely negative (7)
- ○ Not applicable (8)

End of Block: Experience with Bears

Start of Block: Attitudes towards Bears

Q6 Which of the following best describes your feelings towards bears (any species)?

- ○ Extremely positive (1)
- ○ Moderately positive (2)
- ○ Slightly positive (3)
- ○ Neither positive nor negative (4)
- ○ Slightly negative (5)
- ○ Moderately negative (6)
- ○ Extremely negative (7)

Q7 Which of the following best describes your feelings towards black bears?

- ○ Extremely positive (1)
- ○ Moderately positive (2)
- ○ Slightly positive (3)
- ○ Neither positive nor negative (4)
- ○ Slightly negative (5)
- ○ Moderately negative (6)
- ○ Extremely negative (7)

Q8 Which of the following best describes your feelings towards brown (grizzly) bears?

- ○ Extremely positive (1)
- ○ Moderately positive (2)
- ○ Slightly positive (3)
- ○ Neither positive nor negative (4)
- ○ Slightly negative (5)
- ○ Moderately negative (6)
- ○ Extremely negative (7)

Q9 To have bears in your region is for you:

- ○ Extremely positive (1)
- ○ Moderately positive (2)
- ○ Slightly positive (3)
- ○ Neither positive nor negative (4)
- ○ Slightly negative (5)
- ○ Moderately negative (6)
- ○ Extremely negative (7)

Q10 Please select the response that best describes your feelings towards each of the following statements.

	Strongly Agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)	Not Applicable (8)
I enjoy seeing bears near where I live. (1)	○	○	○	○	○	○	○	○
I enjoy knowing that bears are around, even if I never see one. (2)	○	○	○	○	○	○	○	○
Bears are an important part of the natural ecosystem. (3)	○	○	○	○	○	○	○	○
Learning how to coexist with bears is important. (4)	○	○	○	○	○	○	○	○

Q11 Please select the response that best describes your feelings towards each of the following statements.

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)	Not Applicable (8)
There are no benefits to having bears near where I live. (1)	○	○	○	○	○	○	○	○
Bears pose a threat to the safety of people. (2)	○	○	○	○	○	○	○	○
Bears pose a threat to the safety of pets. (3)	○	○	○	○	○	○	○	○
Bears cause abundant damage to livestock. (4)	○	○	○	○	○	○	○	○
Bears cause abundant damage to crops. (5)	○	○	○	○	○	○	○	○
Having bears near where I live causes me to be fearful. (6)	○	○	○	○	○	○	○	○
Having bears near where I live is an inconvenience. (7)	○	○	○	○	○	○	○	○

End of Block: Attitudes towards Bears

Start of Block: Management Attitudes

Q12 Please select the answer that best matches your feelings on the following management actions concerning bears.

	Strongly supportive (1)	Supportive (2)	Somewhat supportive (3)	Neither supportive or unsupportive (4)	Somewhat unsupportive (5)	Unsupportive (6)	Strongly unsupportive (7)
Providing education about living with bears for local residents (1)	○	○	○	○	○	○	○
Setting an upper limit for bear populations (2)	○	○	○	○	○	○	○
Providing bear safety education (3)	○	○	○	○	○	○	○
Carrying bear (pepper) spray in areas with known bear populations (4)	○	○	○	○	○	○	○
Relocation of problem bears (5)	○	○	○	○	○	○	○
Frightening/hazing of problem bears (6)	○	○	○	○	○	○	○
Destruction (euthanization) of problem bears (7)	○	○	○	○	○	○	○
Policies restricting available attractants, including those which might restrict the use of bird feeders and trash cans in your community (8)	○	○	○	○	○	○	○

Q13 If a bear were to be found in your neighborhood, how supportive would you be of the following management actions?

	Strongly supportive (1)	Supportive (2)	Somewhat supportive (3)	Neither supportive nor unsupportive (4)	Somewhat unsupportive (5)	Unsupportive (6)	Strongly unsupportive (7)
Leave the bear alone/monitor the situation (1)	○	○	○	○	○	○	○
Scare (haze) the bear away (2)	○	○	○	○	○	○	○
Provide education for local residents (3)	○	○	○	○	○	○	○
Capture and release the bear on site (4)	○	○	○	○	○	○	○
Capture and relocate the bear to another area (5)	○	○	○	○	○	○	○
Destroy (euthanize) the bear (6)	○	○	○	○	○	○	○

Q14 If a bear were to be found eating garbage or bird seed from bird feeders in your neighborhood, how supportive would you be of the following management actions?

	Strongly supportive (1)	Supportive (2)	Somewhat supportive (3)	Neither supportive nor unsupportive (4)	Somewhat unsupportive (5)	Unsupportive (6)	Strongly unsupportive (7)
Leave the bear alone/monitor the situation (1)	○	○	○	○	○	○	○
Scare (haze) the bear away (2)	○	○	○	○	○	○	○
Provide education for local residents (3)	○	○	○	○	○	○	○
Capture and release the bear on site (4)	○	○	○	○	○	○	○
Capture and relocate the bear to another area (5)	○	○	○	○	○	○	○
Destroy (euthanize) the bear (6)	○	○	○	○	○	○	○

Q15 If a bear were to be found breaking into homes in your neighborhood, how supportive would you be of the following management actions?

	Strongly supportive (1)	Supportive (2)	Somewhat supportive (3)	Neither supportive nor unsupportive (4)	Somewhat unsupportive (5)	Unsupportive (6)	Strongly unsupportive (7)
Leave the bear alone/monitor the situation (1)	○	○	○	○	○	○	○
Scare (haze) the bear away (2)	○	○	○	○	○	○	○
Provide education for local residents (3)	○	○	○	○	○	○	○
Capture and release the bear on site (4)	○	○	○	○	○	○	○
Capture and relocate the bear to another area (5)	○	○	○	○	○	○	○
Destroy (euthanize) the bear (6)	○	○	○	○	○	○	○

Q16 If a bear were to be suspected of harming a pet in your neighborhood, how supportive would you be of the following management actions?

	Strongly supportive (1)	Supportive (2)	Somewhat supportive (3)	Neither supportive nor unsupportive (4)	Somewhat unsupportive (5)	Unsupportive (6)	Strongly unsupportive (7)
Leave the bear alone/monitor the situation (1)	○	○	○	○	○	○	○
Scare (haze) the bear away (2)	○	○	○	○	○	○	○
Provide education for local residents (3)	○	○	○	○	○	○	○
Capture and release the bear on site (4)	○	○	○	○	○	○	○
Capture and relocate the bear to another area (5)	○	○	○	○	○	○	○
Destroy (euthanize) the bear (6)	○	○	○	○	○	○	○

Q17 If an aggressive bear were to be found near your neighborhood, how supportive would you be of the following management actions?

	Strongly supportive (1)	Supportive (2)	Somewhat supportive (3)	Neither supportive nor unsupportive (4)	Somewhat unsupportive (5)	Unsupportive (6)	Strongly unsupportive (7)
Leave the bear alone/monitor the situation (1)	○	○	○	○	○	○	○
Scare (haze) the bear away (2)	○	○	○	○	○	○	○
Provide education for local residents (3)	○	○	○	○	○	○	○
Capture and release the bear on site (4)	○	○	○	○	○	○	○
Capture and relocate the bear to another area (5)	○	○	○	○	○	○	○
Destroy (euthanize) the bear (6)	○	○	○	○	○	○	○

End of Block: Management Attitudes

Start of Block: Demographic Info

Q18 Please select any group(s) that you would consider yourself a member of from the following. Select all that apply.

- [ ] Hunters (1)
- [ ] Farmers/Ranchers (2)
- [ ] Landowners (3)
- [ ] Other (please specify) (4) _____

Q19 Please select the College in which your major or degree path is a part. If you are currently undecided, please select Undecided.

- ○ College of Fine Arts and Communication (1)
- ○ College of Letters and Science (2)
- ○ College of Natural Resources (3)
- ○ College of Professional Studies (4)
- ○ Undecided (5)
- ○ I do not know which college my major belongs to (6)

Display This Question:

If Please select the College in which your major or degree path is a part. If you are currently unde... = College of Fine Arts and Communication

Q20 Please select the department or school under which your major falls.

▼ Art and Design (1) ... Uncertain (5)

Display This Question:

If Please select the College in which your major or degree path is a part. If you are currently unde... = College of Letters and Science

Q21 Please select the department or school under which your major falls.

▼ Biology (1) ... Uncertain (14)

Display This Question:

If Please select the College in which your major or degree path is a part. If you are currently unde... = College of Natural Resources

Q22 Please select the department or school under which your major falls.

▼ Fisheries and Water Resources (1) ... Uncertain (7)

Display This Question:

If Please select the College in which your major or degree path is a part. If you are currently unde... = College of Professional Studies

Q23 Please select the department or school under which your major falls.

▼ Business and Economics (1) ... Uncertain (8)

Display This Question:

If Please select the College in which your major or degree path is a part. If you are currently unde... = Undecided

Or Please select the College in which your major or degree path is a part. If you are currently unde... = I do not know which college my major belongs to

Q24 Please type the name of the major or degree path you are currently considering or pursuing.

_____

Q25 What is your current academic standing?

▼ Freshman (1) ... Graduate (5)

Q26 What is your state of permanent residence? If you are not a permanent resident of the United States, please type the name of the country in which you are a permanent resident.

_____

Q27 Which of the following best describes the area where you grew up? If you have lived in more than one type of area, please select the area in which you have lived the longest.

- ○ On a farm or ranch (1)
- ○ In a rural setting, but not on a farm (2)
- ○ Small town or village (less than 5,000) (3)
- ○ Large town (5,000-9,999) (4)
- ○ Small city or suburb (10,000-50,000) (5)
- ○ Large city (over 50,000) (6)

Q28 What is your gender?

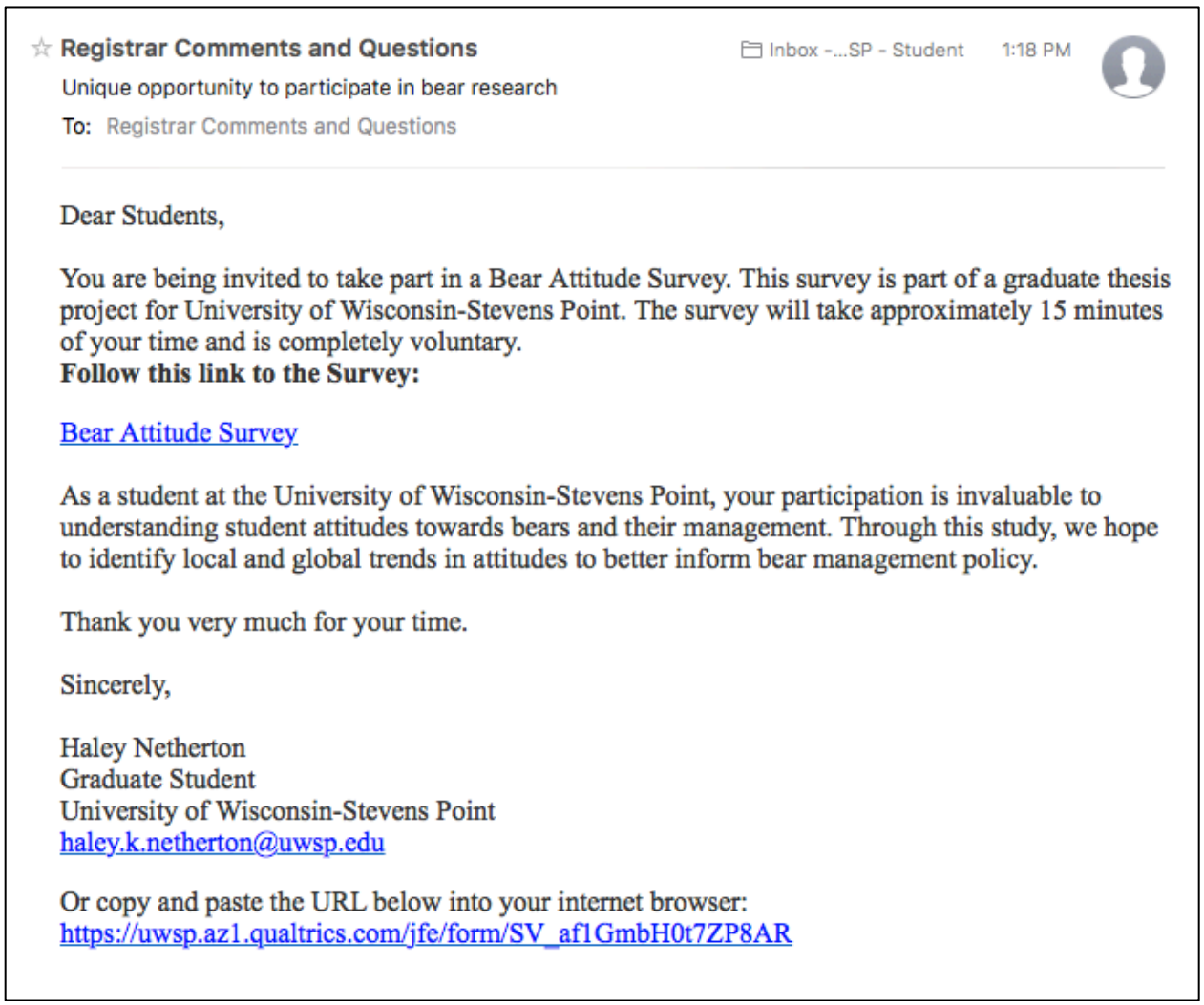
- ○ Male (1)
- ○ Female (2)
- ○ Other (3)

End of Block: Demographic Info

APPENDIX VII

Survey Distribution Emails

Figure A7-1. First distribution email to enrolled UWSP students, sent March 19, 2018.



☆ **Registrar Comments and Questions** Inbox -...SP - Student 1:18 PM

Unique opportunity to participate in bear research

To: Registrar Comments and Questions

Dear Students,

You are being invited to take part in a Bear Attitude Survey. This survey is part of a graduate thesis project for University of Wisconsin-Stevens Point. The survey will take approximately 15 minutes of your time and is completely voluntary.
Follow this link to the Survey:

Bear Attitude Survey

As a student at the University of Wisconsin-Stevens Point, your participation is invaluable to understanding student attitudes towards bears and their management. Through this study, we hope to identify local and global trends in attitudes to better inform bear management policy.

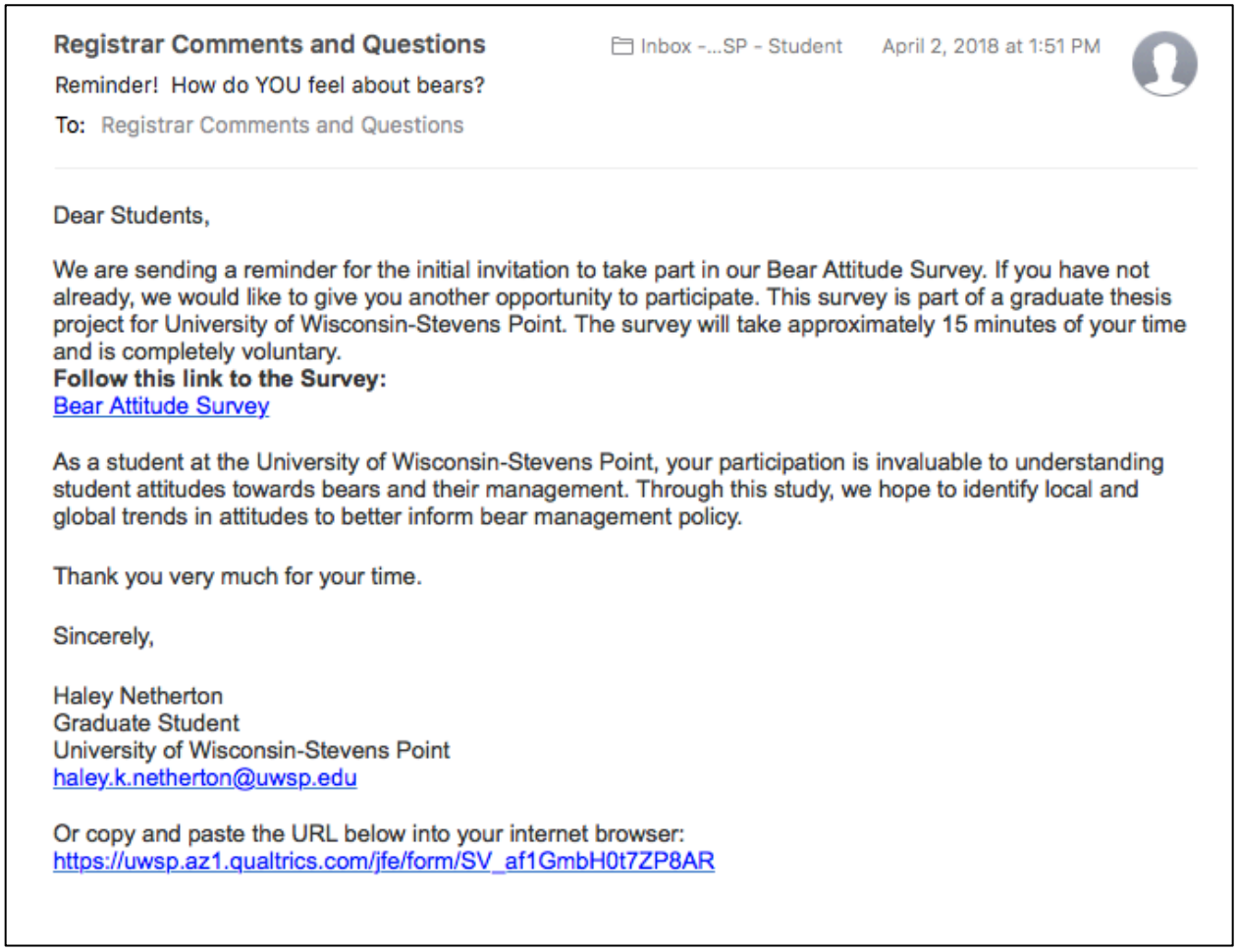
Thank you very much for your time.

Sincerely,

Haley Netherton
Graduate Student
University of Wisconsin-Stevens Point
haley.k.netherton@uwsp.edu

Or copy and paste the URL below into your internet browser:
https://uwsp.az1.qualtrics.com/jfe/form/SV_af1GmbH0t7ZP8AR

Figure A7-2. First follow-up email to enrolled UWSP students, sent April 2, 2018.



Registrar Comments and Questions Inbox -...SP - Student April 2, 2018 at 1:51 PM

Reminder! How do YOU feel about bears?

To: Registrar Comments and Questions

Dear Students,

We are sending a reminder for the initial invitation to take part in our Bear Attitude Survey. If you have not already, we would like to give you another opportunity to participate. This survey is part of a graduate thesis project for University of Wisconsin-Stevens Point. The survey will take approximately 15 minutes of your time and is completely voluntary.
Follow this link to the Survey:
Bear Attitude Survey

As a student at the University of Wisconsin-Stevens Point, your participation is invaluable to understanding student attitudes towards bears and their management. Through this study, we hope to identify local and global trends in attitudes to better inform bear management policy.

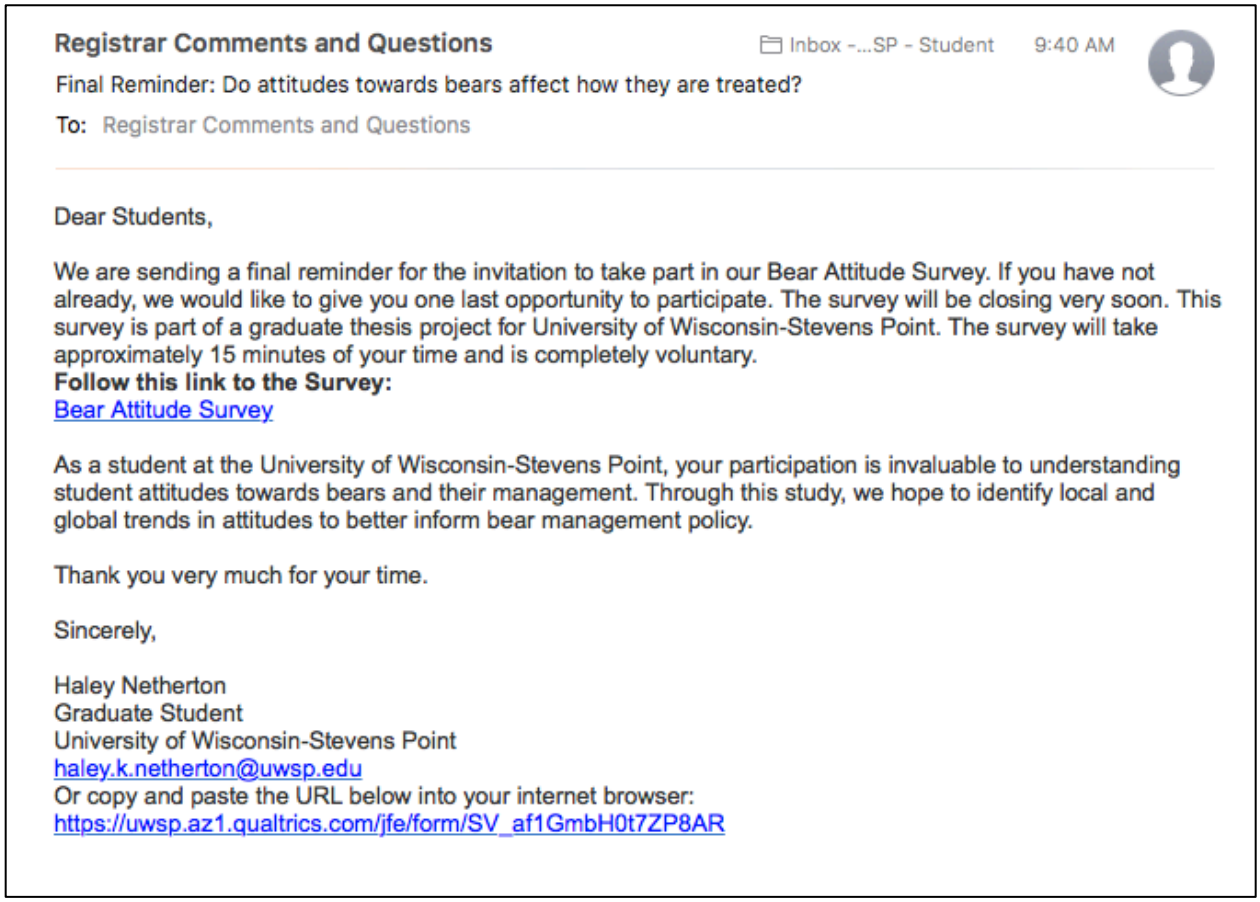
Thank you very much for your time.

Sincerely,

Haley Netherton
Graduate Student
University of Wisconsin-Stevens Point
haley.k.netherton@uwsp.edu

Or copy and paste the URL below into your internet browser:
https://uwsp.az1.qualtrics.com/jfe/form/SV_af1GmbH0t7ZP8AR

Figure A7-3. Final follow-up email to enrolled UWSP students, sent April 16, 2018.



Registrar Comments and Questions Inbox -...SP - Student 9:40 AM

Final Reminder: Do attitudes towards bears affect how they are treated?

To: Registrar Comments and Questions

Dear Students,

We are sending a final reminder for the invitation to take part in our Bear Attitude Survey. If you have not already, we would like to give you one last opportunity to participate. The survey will be closing very soon. This survey is part of a graduate thesis project for University of Wisconsin-Stevens Point. The survey will take approximately 15 minutes of your time and is completely voluntary.
Follow this link to the Survey:
Bear Attitude Survey

As a student at the University of Wisconsin-Stevens Point, your participation is invaluable to understanding student attitudes towards bears and their management. Through this study, we hope to identify local and global trends in attitudes to better inform bear management policy.

Thank you very much for your time.

Sincerely,

Haley Netherton
Graduate Student
University of Wisconsin-Stevens Point
haley.k.netherton@uwsp.edu
Or copy and paste the URL below into your internet browser:
https://uwsp.az1.qualtrics.com/jfe/form/SV_af1GmbH0t7ZP8AR