Evaluating Public Attitudes Toward Growing Black Bear Populations in Alabama

by

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Abstract

Although black bear (*Ursus americanus*) populations in Alabama have been low since the early part of the 20th century, an increase in sightings over the past decade has spurred discussion on restoring the species throughout its native range in the state. Human-bear interactions are likely to occur as bear populations increase and bears and humans live in closer proximity to one another. Effectively managing the species for both population viability and public satisfaction requires that management agencies understand the attitudes of their constituents. We utilized a mail-in survey, distributed in regions identified as being most important to black bear recovery in order to identify resident attitudes, values, and opinions regarding these growing bear populations. This research attempts to understand the demographic and cognitive factors that influence resident attitudes towards black bears and black bear population recovery. Additionally, we evaluated the acceptability of common black bear conflict management strategies in response to specific bear encounter scenarios and used these evaluations to predict the potential for conflict among residents as a result of these actions.

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Table of Contents

List of Tables

List of Figures

List of Abbreviations

ADCNR   Alabama Department of Conservation and Natural Resources

PCA   Principal Component Analysis

PCI   Potential for Conflict Index

WVO   Wildlife Value Orientations

Chapter 1: Introduction and Methods

Introduction

Although black bears (*Ursus americanus*) were historically common throughout Alabama, agricultural habitat modification and aggressive human harvests in the early part of the 20th century led to considerable population declines (Hersey, 2004). By the 1920s, populations were limited to a small area around the Mobile-Tensaw River basin in the southwest corner of the state (Howell, 1921). However, an increase in sightings over the past decade has led management agencies to believe populations may be growing (Associated Press, 2014). At the very least, black bears appear to be living in closer proximity to human communities in various parts of Alabama than they have in the recent past.

The growth of any large carnivore population is likely to increase human-wildlife conflicts and attract outspoken opinions both in support of and against population recovery (Bruskotter & Shelby, 2010; Kellert, 1994). Effective wildlife management may depend just as much on shaping public perception as it does on understanding the ecology and biology of the species (Kellert, 1994). Public opposition towards conservation initiatives can halt progress, draw on limited budgets and initiate unwanted policy changes, all of which can seriously affect the chance of success of a project (Jacobson & McDuff, 1998; Frank et al., 2015; Treves et al., 2013). Understanding the values, concerns and opinions of the residents of potential recovery areas can allow biologists and wildlife managers to prevent any of these barriers to success rather than trying to mitigate them after they already exist.

One of the core tenets of The North American Model of Wildlife Conservation, under which we manage wildlife in the United States, is that wildlife species belong to the public and are managed in trust through state and federal agencies (Organ et al., 2012). Riley et al. (2002) define wildlife management as "the guidance of decision-making processes and implementation of practices to purposefully influence interactions among and between people, wildlife and habitats to achieve impacts valued by stakeholders". As such, public opinion should be a major component in the decision making process. Traditionally, citizen involvement has occurred through public meetings and open houses (Bath, 1998). These meetings are most likely to attract and highlight the vocal minorities (those who hold extreme views in opposition or support of a given issue) and selected stakeholders such as landowners and hunters (Riley et al., 2002). In reality, the majority of the public belongs to a more silent group who hold views on wildlife but are less likely to express these views in public forums. Assessing the views and opinions of this majority is a major goal of human dimensions research.

Humans and Black Bears

Though classified as carnivores, black bears could more accurately be described as opportunistic omnivores and are known to locate and exploit any and all available food sources (Bastille-Rousseau et al., 2011). Additionally, they have proven to be a highly intelligent and adaptable species, often returning to food sources once they are identified and able to thrive in diverse habitats and environments (Peine, 2001; Clark & Pelton, 1999). These characteristics make them especially prone to wandering into human occupied areas in search of trash, crops, apiaries and other human created foodstuffs, which is the primary cause of nearly all human-black bear conflicts (Graber, 1985; Hristienko & Macdonald, 2007; Don Carlos et al., 2009). Past research surveying bear biologists and bear experts throughout the world has identified an

2

increase in human-bear conflict complaints, which in turn have had a growing impact on bear management initiatives (Can et al., 2014). This increase in the occurrence of human-bear conflicts is most likely the result of growing human populations and urbanization, particularly along the wildland urban interface (Don Carlos et al., 2009; Peine, 2001; Zajac et al., 2012; Lackey & Ham, 2004). These conflicts between humans and black bears can threaten human safety, influence recreation decisions on public lands and incur substantial costs on individual citizens and public agencies (Howe et al., 2010).

Despite their considerable cultural and symbolic significance, black bears are one of the most popular big game species in North America. According to the U.S. Fish and Wildlife Service (2011), over 500,000 Americans spent a combined 5.5 million days hunting black bears in 2010. This unique combination of public affection and consumptive use may contribute to the conflict that sometimes surrounds the management of the species. As evidenced by the implementation of a Florida bear hunt in 2015, which attracted thousands of protesters and garnered tens of thousands of petition signatures, bear management can draw considerable media attention and dissenting opinion (Wilkinson, 2015; Shiffman, 2015; Rivett-Carnac, 2015). Although evidence suggests that properly managed hunts can stabilize human-bear conflicts (Hristienko & Macdonald, 2007), harvest plans and other population management strategies must be drawn up with both population viability and stakeholder satisfaction in mind.

Human Dimensions of Wildlife Research

Attitudes toward the management of wildlife species by state and federal agencies may be symbolic of larger underlying social issues. Public opinion is often a reflection of differential access to social power, sense of place, conflicting ideas on private property and divergent beliefs about the relationships of humans with nature (Wilson, 1997; Sandström et al., 2015; Treves et

al., 2006). However, these attitudes are not always static, and attitudinal changes may be influenced by a variety of factors including growing or decreasing wildlife populations, policy changes, personal experience and education (Majic & Bath, 2010; Bruskotter et al., 2007; Karlsson & Sjostrom, 2007; Ericsson & Heberlein, 2003). Fundamental values, which tend to be deeply-rooted and more resistant to change than evaluations of specific scenarios, have also been shown to influence attitudes (Manfredo et al., 2003). It is important for decision makers to understand whether differences in public opinion represent differences in core values or other more fluid factors. Conflict resolution and compromise is more likely to occur between conflicting parties if both groups feel that their core values are being addressed.

The general plans of state and federal wildlife agencies, which describe desired habitat and species management outcomes, are intrinsically linked to the public's accepted values towards wildlife (Whittaker et al., 2006). In human dominated landscapes, public tolerance is as much of a measure of habitat quality as access to food, cover and other resources, and social science research may be the best way to gauge public knowledge, perception and opinions on wildlife populations and management techniques within a given region (Treves et al., 2013; Sandström et al., 2015). Research investigating the underlying factors that influence attitudes and behaviors can help agencies and policy makers better create and implement management plans, and by gauging preferences for management actions we can predict how residents will respond and what we can do to facilitate cooperation in the management of the species. Our research attempted to acquire this information by directly surveying Alabama residents that live in relatively close proximity to known bear populations.

Literature Review

Since the mid-1990s, human dimensions of black bear management and human-bear conflicts have been studied in Alaska, Colorado, Mississippi, New York, Texas, Montana, California, Florida and Tennessee, among others (Decker et al., 1985; Don Carlos et al., 2009; Hristienko & McDonald Jr., 2007; Kellert, 1994; Peine, 2001; Whittaker et al., 2006; Bowman et al., 2004). These studies have aimed at identifying underlying factors contributing to bear tolerance and the acceptability of management actions among various stakeholder groups.

Morzillo et al. (2007) examined attitudes towards black bears and potential black bear population recovery among residents in a region of East Texas where bears had not been found for several decades. The study noted that attitudes toward bears were related to sex, age, land ownership, bear knowledge and participation in wildlife related recreation. The results also showed that a lack of knowledge about bears was commonly cited as a reason for uncertainty in support for recovery. Similar research in the Trans-Pecos region of Texas showed support for recolonization to be highest among younger, more educated respondents (Rice et al., 2007). Additionally, the researchers found that low levels of support were generally due to feared loss of livestock, perceived loss of big game, and concerns for safety and property damage. These results indicate that education on bear behavior and conflict reduction techniques could strongly influence overall public support.

Bowman et al. (2004) developed a model tying socioeconomic variables to attitudes and beliefs towards black bear recovery in the state of Mississippi, with the goal of providing spatial information on recovery attitudes that could be modeled to the state level. The researchers used a combination of mail-in and telephone surveys to collect information from 3,522 residents throughout the state. The final model, which used age, community size, race, sex and number of

years of land ownership as predictor variables, was able to correctly classify 84% of their telephone survey responses as either supporting or opposing black bear restoration.

Whitaker et al. (2006) and Don Carlos et al. (2009) showed that while general attitudes toward bears were positive, individuals with different value orientations differed in their preference for management responses. Whitaker found that value orientations could predict feelings toward general management and specific management action, especially for the most severe responses (lethal control of problem bears). They also found that value orientations had more of an influence on the acceptability of hunting as a way to control animal populations than it did on killing an animal in response to a specific conflict, indicating that acceptance of lethal measures was specific to context.

Additional studies have come to similar conclusions. Jacobs et al. (2014) looked at how wildlife value orientations can help managers estimate the public's acceptability of wildlife management interventions. The study found that value orientations are most predictive of the acceptability of the most severe interventions (hunting or killing), followed by the least severe interventions (doing nothing). The researchers noted that intermediate interventions, such as applying contraceptives, typically create minimal internal conflict for either party but are often adequate at solving problems caused by wildlife.

Hristienko and McDonald Jr. (2007) performed surveys in 52 North American jurisdictions in order to gather information on black bear populations and wildlife agency management strategies. The study found that jurisdictions with liberal hunting regulations were able to maintain human-bear conflicts at stable levels while jurisdictions with more restrictive hunting regulations saw conflict trends increasing. This indicates that the reproductive abilities of bears may out pace conservative methods of species control. The study suggests that

communities need to become involved in working with management authorities to determine the levels of bear presence and the types of bear conflicts that they are willing to tolerate. The research concludes that successful management of bear populations should involve a balance between maintaining bear populations, safeguarding human welfare and satisfying stakeholder needs and that hunting and proactive awareness education programs are pivotal in achieving this balance.

A thesis developed by William Underwood at Auburn University in 2002 studied the values, beliefs and attitudes of members of stakeholder groups regarding black bears in Alabama. Targeted groups included the Nature Conservancy, Alabama Cattleman's Association, beekeepers registered with the Alabama department of Agriculture and Industries, field wildlife biologists and town hall meeting attendees. This study gauged respondent's level of bear knowledge and support for species recovery and assessed the influence of demographics on wildlife value orientations. Utilizing the Dillman survey methodology, Underwood distributed 3,000 surveys and received 1,953 completed responses (65% response rate). His results showed that 76.1% of respondents supported reintroduction of bear populations in Alabama in currently uninhabited areas. Beekeepers and cattleman were less supportive than other stakeholders, but still showed 60% support. Perhaps most importantly, the study found that bear knowledge was a strong indicator of support for reintroduction but overall knowledge of black bears was poor, even among these individuals within these stakeholder groups. He underlined that wildlife professionals in the state lacked adequate knowledge on bears and could use additional training in order to increase their understanding of bear biology and behavior. While this study provides useful information, the values and attitudes of stakeholders with significant interest in bear populations cannot be generalized to the public. Underwood suggests that future research efforts

"should be made to assess public support in the immediate vicinity of areas targeted for bear repatriation".

A 2004 thesis by Kent Russell Hersey of the University of Tennessee used the Bowman et al. (2004) model to assess potential support of black bear recovery in southeastern Alabama. This model predicted very low levels of support for recovery. However, Hersey's study found the demographic variables in the model to be very weak predictors of reintroduction support. Similar to Underwood, Hersey notes that directly surveying the local residents of potential reintroduction sites would be a better strategy.

Peine (2001) reviewed community wide policies and regulations that have been created in response to black bear conflicts in Alaska, California, Montana and Tennessee. This study found that many communities initially attempted to use aversive conditioning (using noxious stimuli to discourage unwanted behavior) but that most of these strategies failed. This failure led to the acceptance of the need for bear proof garbage cans and changes in some human behaviors. The study showed that because little was known about bear conflict reduction strategies to begin with, most cases of policy formation or alteration took a considerable amount of time (10-25 years). Peine also noted that most human-bear conflicts involved bears conditioned to unnatural food sources and cited garbage control as a main preventative measure for bear conflicts.

A number of studies have investigated the relationship between demographic variables and value orientations on black bear acceptance and management preference. However, the findings of these studies suggest that attitudes toward black bears and the factors that can be used to predict these attitudes vary considerably between geographic regions and populations. Many researchers have recommended surveying the residents of potential recovery sites in order to accurately gauge public attitudes and beliefs.

Research Objectives

The aim of this research was to provide wildlife managers with a comprehensive understanding of the attitudes, values and opinions of Alabama residents regarding the management of growing black bear populations in the state. We hoped to gain a stronger understanding of the general views of respondents towards wildlife and wildlife management, and how these views may influence their tolerance for bears. Our specific goals were as follows:

1. Assess respondent support or opposition toward black bear recolonization

2. Identify the areas of most concern among residents regarding black bears

3. Identify the demographic, cognitive and experiential factors that can be used to predict attitudes toward bears

4. Evaluate respondents' tolerance for various bear encounter scenarios, varying in severity and frequency, based on their acceptance of different management responses to these encounters

5. Estimate the potential for conflict associated with common bear management strategies

The survey was designed in order to satisfy all of these key objectives and acquire general demographic information about our respondents. Specific questions were designed and worded in a way that is similar to other public surveys on black bears and black bear conflict in order to maintain academic consistency.

Methods

Study Area

Data was collected from residents of two distinct Alabama regions that were determined to be critical to black bear recovery based on historic and current bear population estimates.

9

1,500 surveys were distributed to residents of Washington, Clarke, Mobile, Baldwin, Conecuh

and Escambia Counties in the southwest region of the state. This region has contained the state's

only established and self-sustaining bear population for the majority of the past 100 or so years.

The remaining 1,500 surveys were sent to residents of Madison, Jackson, Marshall, DeKalb,

Etowah, Cherokee, Calhoun, St. Clair, Cleburne, Clay, Talladega and Shelby Counties in the

northeast corner of the state. Numerous black bear sightings have been reported in this region,

and biologists have recently identified a small self-sustaining population around Little River

Canyon National Preserve in DeKalb County.

Data Collection

All data was acquired through mail-in surveys. A modified version of the Tailored

Design Method was used as a guide to writing and administering the survey (Dillman and Smyth,

2009). This design method describes best practices in terms of question order, wording, format

and length. The method also provides instruction for the sampling, contact and presentation of

surveys in a way that reduces measurement and non-response bias. The names and addresses of

survey recipients were acquired through Survey Sampling International, a private company that

specializes in providing survey samples. In total, we distributed 3,000 surveys with a goal of at

least 500 completed and usable surveys for analysis.

The Tailored Design Method outlines a total of five contacts with each recipient over a

ten week period: an initial contact letter, survey packet, reminder postcard, second survey packet

for non-respondents and a final phone call for a non-response bias check. We modified the

method from four mail contacts to three. The first contact with survey recipients consisted of the

survey itself, a stamped and addressed return envelope for completed surveys, a complimentary

Black Bears of Alabama bumper sticker and an initial contact letter informing recipients of their

selection and explaining the goals of the research study as well as the rights of participants as approved by the Auburn University Internal Review Board. Approximately two weeks after the initial mailing packet, non-respondents were sent a reminder postcard requesting the completion of the survey. Two weeks after the reminder postcard, a final contact was sent to all non-respondents. This final contact included information about our research goals as well as instructions on how to complete the survey online using Qualtrics online survey software. All survey instruments were evaluated and approved by the Auburn University Institutional Review Board (Protocol #15-147 EP 1508).

Survey Content and Design

The survey was designed in order to understand respondent demographics, values towards black bears and other wildlife species, outdoor recreation participation, bear knowledge, experience and concerns regarding black bears in the state, and finally their preferences for a number of potential management strategies in response to specific bear encounter scenarios. Many survey items were designed to mimic questions used by previous research projects in order to maintain academic consistency and allow for regional comparisons.

The first portion of the survey asked respondents about their communities, homes and household behaviors that may influence attitudes toward bears or facilitate bear conflicts. The next section assessed respondent's general attitudes towards wildlife and specific attitudes towards bears in Alabama. Respondents then identified their participation in a variety of outdoor and wildlife related recreation activities, including hunting. The following section assessed bear knowledge, experience and concerns. The largest portion of the survey aimed at identifying respondent's views towards black bear management strategies and the Alabama Department of Conservation and Natural Resources. This included a section where respondent's rated the

acceptability of five management actions in response to four different potential bear encounter scenarios, varying in severity and frequency. The final page of the survey gathered data on demographic characteristics of participants.

Data Analysis

Data from completed surveys was entered using the Qualtrics online survey program. Once data was stored in Qualtrics, Microsoft Excel 2010 and IBM SPSS Statistics 23 compatible spreadsheets were downloaded for data analysis. Primary statistical analyses were performed using IBM SPSS Statistics 23. Microsoft Excel was used for variable organization and the calculation of the second generation of the Potential for Conflict Index (PCI_2).

In order to account for non-response bias, we used independent samples t-tests to compare select survey items between those who responded after the first mailing and those whose response required multiple mailings. This method assumes that those who required additional effort in order to elicit a response are more similar to non-respondents. Additionally, we compared demographic variables with data from the U.S. Census (2010). According to this data, our respondents were older and more likely to be male and white than the general population of our survey counties. In order to account for these differences, data was weighted by gender, age class and race in analyses where it was appropriate.

Basic descriptive statistics such as mean and standard deviation were calculated for all variables of interest. Principal Component Analysis (PCA) with varimax rotation was used to group related variables. Prior to PCA, Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were used in order to confirm that this analysis was appropriate for our data (Kaiser, 1974; Snedecor & Cochran, 1989). All composite rating scales

12

were assessed for reliability and internal consistency using the Cronbach's alpha reliability measure (Vaske, 2008). Relationships between group variables were evaluated using Chi-squared tests, independent samples t-tests and two-way repeated measures analysis of variance (ANOVA). Least squares multiple regression was used to test the relationship between independent variables and attitudes toward black bears (a continuous dependent variable).

We utilized the second generation of the Potential for Conflict Index (PCI_2) formula to estimate the potential for conflict associated with 5 different management actions in response to bear conflict scenarios of varying severity and frequency (Vaske et al., 2010). The Potential for Conflict Index version 2.0 workbook for Microsoft Excel was used to calculate and graphically represent PCI_2 scores (obtained from http://warnercnr.colostate.edu/~jerryv/PCI2/). Statistical differences in PCI_2 scores were calculated based on standard deviations of simulated PCI_2 distributions.

References

Associated Press (2014) Alabama's black bear population growing. *The Washington Times*. Retrived from http://www.washingtontimes.com/news/2014/jul/9/alabamas-black-bear-population-growing/

Bastille-Rousseau, G., Fortin, D., Dussault, C., Courtois, R., & Ouellet, J. (2011). Foraging strategies by omnivores: are black bears actively searching for ungulate neonates or are they simply opportunistic predators? *Ecography*, 34, 588-596.

Bath, A. (1998). The role of human dimensions in wildlife resource research in wildlife management. *Ursus*, 10, 349-355.

Bowman, J.L., Leopold, B.D., Vilella, F.J., & Gill, D.A. (2004). A spatially explicit model,

derived from demographic variables, to predict attitudes toward black bear restoration.

Journal of Wildlife Management, 68(2), 223-232.

Bruskotter, J.T., & Shelby, L.B. (2010). Human dimensions of large carnivore conservation and

management: Introduction to the special issue. *Human Dimensions of Wildlife*, 15(5),

311-314.

Bruskotter, J.T., Schmidt, R.H., & Teel, T.L. (2007). Are attitudes toward wolves changing? A

case study in Utah. *Biological Conservation,* 139(1), 211-218.

Can, Ö. E., D'Cruze, N., Garshelis, D. L., Beecham, J., & Macdonald, D.W. (2014). Resolving

Human-Bear Conflict: A Global Survey of Countries, Experts, and Key Factors.

Conservation Letters, 7, 501–513.

Clark, J.D., & Pelton, M.R. (1999). Management of a large carnivore: Black Bear. Pp. 209–222,

In J.D. Peine, (Ed.). Ecosystem Management for Sustainability: Principles and Practices.

CRC Press, Boca Raton, FL. 500 pp.

Dillman, D., & Smyth, J. (2009). Internet, mail, and mixed-mode surveys: The tailored design

method. (3rd ed.). Hoboken, N.J.: Wiley & Sons.

Decker, D.J., R.A. Smolka, Jr., J. O'Pezio & T.L. Brown. 1985. Social determinants of black

bear management for the northern Catskill Mountains. pgs. 239-247 in S. L. Beasom and

S. F. Roberson (eds.) Game Harvest Management. Caesar Kleberg Wildlife Research

Institute, Kingsville, TX.

Don Carlos, A.W., Bright, A.D., Teel, T.L. & Vaske, J.J. (2009). Human Black Bear Conflict in

Urban Areas: An Integrated Approach to Management Response. *Human Dimensions of

Wildlife*, 14(3), 174-184.

Ericsson, G., & Heberlein, T. (2003). Attitudes of hunters, locals and the general public in

Sweden now that the wolves are back. *Biological Conservation,* 111, 149–159.

Frank, J., Johansson, M. & Flykt, A. (2015). Public attitudes towards the implementation of

management actions aimed at reducing human fear of brown bears and wolves. *Wildlife*

Biology, 21, 122–130.

Fulton, D. C., Manfredo, M.J, & Lipscomb, J., (1996). Wildlife value orientations: a conceptual

and measurement approach. Human Dimensions of Wildlife, 1, 24–47.

Graber, D.M. (1985). Conflicts between wilderness users and black bears in Sierra Nevada

National Parks. Proceedings of the National Wilderness Research Conference.

Hersey, K.R. (2004). Habitat assessment for potential reintroduction of black bears to the

Mobile-Tensaw Delta of southwestern Alabama. Unpublished master's thesis, University

of Tennessee, Knoxville, Tennessee.

Howe, E.J., Obbard, M.E., Black, R. & Wall, L.L. (2010). Do public complaints reflect trends in

human–bear conflict? *Ursus*, 21, 131–142.

Howell, A. H. (1921). A biological survey of Alabama. *North American Fauna*, 1-89.

Hristienko, H., & McDonald Jr., J.E. (2007). Going into the 21st century: a perspective on trends

and controversies in the management of the American black bear. *Ursus*, 18(1), 72-88.

Jacobs, M. H., Vaske, J. J., & Roemer, J. M. (2012). Toward a mental systems approach to

human relationships with wildlife: The role of emotional dispositions. *Human*

Dimensions of Wildlife, 17, 4–15.

Jacobs, M. H., Vaske, J. J., & Sijtsma, M. T. (2014). Predictive potential of wildlife value

orientations for acceptability of management interventions. *Journal for Nature*

Conservation, 22, 377–383.

Jacobson, S.K. & McDuff, M. (1998). Training idiot savants: The lack of human dimensions in

    conservation biology. *Conservation Biology*, 12(2), 263-267.

Kaiser, H.F. (1974). Multiple factor analysis. Chicago, IL: University of Chicago Press.

Karlsson, J. & M. Sjöström. (2007). Human attitudes towards wolves, a matter of distance.

    Biological Conservation, 137, 610–616.

Kellert, S. R. (1994). Public attitudes toward bears and their conservation. Proceedings of the

    International Conference on Bear Research and Management, 9, 43-50.

Lackey, B. & Ham, S. (2004). Assessment of Communication Focused on Human-Black Bear

    Conflict at Yosemite National Park. *Journal of Interpretation Research*, 8(1), 25-40.

Majic, A., & Bath, A. (2010). Changes in attitudes toward wolves in Croatia. *Biological*

    Conservation, 143, 255-260.

Manfredo, M., Teel, T., & Bright, A. (2003). Why Are Public Values Toward Wildlife

    Changing? *Human Dimensions of Wildlife*, 8(4), 287-306.

Organ, J.F., V. Geist, S.P. Mahoney, S. Williams, P.R. Krausman, G.R. Batcheller, T.A. Decker,

    R. Carmichael, P. Nanjappa, R. Regan, R.A. Medellin, R. Cantu, R.E. McCabe, S.

    Craven, G.M. Vecellio, & D.J. Decker. (2012). The North American Model of Wildlife

    Conservation. *The Wildlife Society Technical Review*,12-04.

Peine, J.D. (2001). Nuisance bears in communities: strategies to reduce conflict. *Human*

    Dimensions of Wildlife, 6, 223–237.

Riley, S.J., Decker, D.J., Carpenter, L.H., Organ, J.F., Siemer, W.F., Mattfeld, G.F. & Parsons,

    G. (2002). The essence of wildlife management. *Wildlife Society Bulletin*, 30, 585-593.

Rivett-Carnac, M. (2015, October 26). Hunters kill 295 black bears in controversial Florida cull.

    Time. Retrieved from http://time.com/4086680/florida-hunt-bear-animals-wildlife/

Sandström, C., Johansson, M., & Sjölander-Lindqvist, A. (2015) The management of large

      carnivores in Sweden — challenges and opportunities. *Wildlife Biology*, 21(3), 120-121.

Shiffman, D. (2015, October 29). 298 bears killed in Florida hunt that 'ignored science'. The

      Washington Post. Retrieved March 04, 2016, from

      https://www.washingtonpost.com/news/speaking-of-science/wp/2015/10/29/298-bears-

      killed-in-florida-hunt-that-ignored-science/Snedecor, G.W., & Cochran, W.G. (1989).

      Statistical Methods, Eighth Edition. Iowa State University Press.

Teel, T. L., & Manfredo, M.J. (2009). Understanding the diversity of public interests in wildlife

      conservation. *Conservation Biology*, 24(1), 128–39.

Treves, A., Wallace, R.B., Naughton-Treves, L. & Morales, A. (2006) Co-Managing Human–

      Wildlife Conflicts: A Review, *Human Dimensions of Wildlife*, 11(6), 383-396.

Treves, A., Naughton-Treves, L. & Shelley, V. (2013). Longitudinal analysis of attitudes toward

      wolves. *Conservation Biology*, 27(2), 315-323.

U.S. Department of the Interior, U.S. Fish and Wildlife Service & U.S. Department of

      Commerce, U.S. Census Bureau. (2011) *National Survey of Fishing, Hunting, and*

      Wildlife-Associated Recreation. Report No. FHW/11-NAT (RV).

Vaske, J.J. (2008).Survey research and analysis: Applications in parks, recreation and human

      dimensions. State College, PA: Venture Publishing.

Vaske, J. J., Beaman, J., Barreto, H., & Shelby, L. B. (2010). An Extension and Further

      Validation of the Potential for Conflict Index. *Leisure Sciences*, 32(3), 240–254.

Whittaker, D., Vaske, J., & Manfredo, M. (2006). Specificity and the Cognitive Hierarchy: Value

      Orientations and the Acceptability of Urban Wildlife Management Actions. *Society &*

      Natural Resources, 19, 515-530.

Wilkinson, T. (2015, October 23). Is Florida's bear hunt necessary? *National Geographic*.

    Retrieved from http://news.nationalgeographic.com/2015/10/151023-black-bear-hunt-

    florida-animals-conservation/

Wilson, M. (1997). The Wolf In Yellowstone: Science, Symbol, Or Politics? Deconstructing The

    Conflict Between Environmentalism And Wise Use. *Society & Natural Resources*, 10(5),

    453-468.

Zajac, R. M., Bruskotter, J. T., Wilson, R. S. & Prange, S. (2012). Learning to live with black

    bears: A psychological model of acceptance. *The Journal of Wildlife Management*, 76,

    1331–1340.

Chapter 2: Predicting Resident Attitudes Toward Black Bears in Alabama

Abstract

Black bear (*Ursus americanus*) populations in Alabama have been low since the early part of the 20th century, but an increase in sightings over the past decade has spurred discussion on restoring the species throughout its native range in the state. The plans and actions of state and federal wildlife agencies should correspond to the values, desires and needs of the public that they represent. Specific management goals, like black bear recolonization, require an understanding of public values and how these values influence attitudes and corresponding behaviors that may either help or hinder the efforts of wildlife management agencies. In an attempt to gain a comprehensive understanding of attitudes toward increasing black bear populations, we administered a mail-in questionnaire for 3,000 randomly selected residents in two distinct regions of Alabama where natural black bear recovery is believed to be taking place. Overall, respondents had positive attitudes toward bears and strong support for bear population recovery. Attitudes were predicted by respondent's core value orientations towards wildlife, race, hunting participation, perception of risk, exposure to bear education materials and attitudes toward Alabama's wildlife management agency. Because bear awareness was relatively low and most respondents reported to have never seen information about bears in the state, we recommend extensive outreach programs focused on bear management methods and preventing unwanted bear encounters.

Introduction

The sizable habitat requirements and specialization of large carnivores has meant that they face a particularly grave threat from rapid urbanization and increasing human populations (Linnell, Swenson, & Andersen, 2001; Ordeñana et al., 2010). However, black bears (*Ursus americanus*) have proven to be an adaptable species that are able to thrive even in areas with high human presence (Clark & Pelton, 1999; Peine, 2001). Their ability to adapt to anthropocentric pressure suggests that bears and humans will continue to live in close proximity to one another. Successfully managing a large, adaptable, and diversely valued species that is able to share habitat with human communities is a unique and complicated challenge for wildlife managers (Minnis & Peyton, 1995).

Black bears were historically abundant throughout Alabama until anthropogenic pressure (e.g. habitat modification and human harvesting) limited populations to a small region in the southwest corner of the state. However, a recent increase in sightings has led wildlife managers to believe that bear populations may be growing. Rising bear populations typically mean increasing problematic bear encounters (Siemer, Hart, Decker & Shanahan, 2009) and human-bear conflicts are likely to increase along with bear populations in Alabama. Managing for reduced bear conflicts may be further complicated by private land ownership, which makes up around 95% of Alabama's forest area (Hartsell & Johnson, 2005). Without the benefit of public land that can be managed for multiple uses on a large scale, conservationists and wildlife managers often depend on the support and cooperative behaviors of private landowners in order to create effective management initiatives (Willcox, Giuliano, Wynn & Sanders, 2009).

Understanding and accounting for public attitudes will have a significant effect on management outcomes amid growing bear populations in the state. Effectively managing the

species for both ecological benefit and human satisfaction will require a comprehensive understanding of how Alabama residents feel about bears and bear management strategies and an investigation into the underlying factors that contribute to these attitudes. A number of research projects have examined public attitudes toward black bears, but a limited amount of work has been done to investigate public attitudes in areas where bear presence is low or novel. Previous research on attitudes towards bears in Alabama was limited to specific stakeholder groups and did not investigate the opinions of the general public (Underwood, 2002). In this paper we evaluated public attitudes toward black bear population recovery in Alabama and investigated the predictive value of cognitive, experiential and demographic factors on these attitudes.

Predictors of Wildlife Attitudes

The cognitive hierarchy framework posits that behaviors and behavioral intentions are built upon a foundation of attitudes, beliefs and values, with each subsequent layer being more fundamental and deep-seated than the previous (Fulton, Manfredo & Lipscomb, 1996; Vaske & Donnelly, 1999). Attitudes are defined by Ajzen & Fishbein (1977) as a person's evaluation of a subject in question and are typically derived from a combination of cognitive and affective components which are influenced by a variety of psychological, experiential and demographic factors (Eagly & Chaiken, 1993; Manfredo, 2008). Because wildlife management depends on public behaviors and actions, there is a growing body of research investigating the relationship between various factors and attitudes towards wildlife and preferences for management strategies.

Value orientations can be described as basic beliefs that are organized around foundational values and give meaning to those values in a given context (Teel & Manfredo, 2009). For instance, whereas two people may both have strong positive values towards the

21

conservation of wildlife, these values may have entirely different orientations. One person may value wildlife for their use to humans (e.g. meat) while the other may see their value as being intrinsic. Studies on wildlife value orientations have shown them to be reliable predictors of attitudes, behaviors and management preferences toward wildlife species (Fulton, Manfredo & Lipscomb, 1996; Vaske & Donnelly, 1999; Jacobs, Vaske & Sijtsma, 2014; Teel & Manfredo, 2009).

Concern for potential human-black bear conflicts and the perception of bear related risks can influence people's beliefs and attitudes towards the species. The belief that bears pose a serious threat to people or property can have a serious impact on the extent to which people are willing to support bear management (Knuth, Stout, Siemer, Decker & Stedman, 1992; Decker, Lauber & Siemer, 2002). However, concern and risk perceptions regarding wildlife have been shown to be moderated by direct experiences and familiarity with a species (Jackman & Rutberg, 2015; Zimmerman, Wabakken & Dötterer, 2001) and an individual's trust in wildlife management agencies (Vaske, Timmons, Beaman & Petchenik, 2004). Siemer, Hart, Decker, & Shanahan (2009) found that experience around bears and familiarity with conflict prevention techniques had a positive effect on landowner attitudes towards the species. Similarly, Decker, Smolka, O'Pezio & Brown (1985) found that landowners in Upstate New York who had the most experience with bears and were most familiar with bear management programs were more likely to favor bear population increases.

Studies throughout the world have indicated considerable variation in the significant predictors of wildlife attitudes among different groups of people (Teel & Manfredo, 2009; Teel, Manfredo, & Stinchfield, 2007). Differences in sociopolitical climates, cultural norms, land use practices and personal values can make it difficult to generalize wildlife attitude findings across

populations and large geographic areas (Jackman & Rutberg, 2015). For instance, community type (e.g. urban, rural) was significant in predicting attitudes toward black bears in Mississippi (Bowman, Leopold, Vilella & Gill, 2004) but not in East Texas (Morzillo, Mertig, Garner & Liu, 2007). Similar studies have demonstrated varying effects of gender, age, recreation participation and other variables on attitudes toward wildlife and wildlife management depending on location, wildlife species and target sample populations (Kellert & Berry, 1987; Rice et al., 2007; Hayman, Harvey, Mazzotti, Israel & Woodward, 2014; Bruskotter, Vaske & Schmidt, 2009; Lloyd & Miller, 2010). The lack of consensus regarding the influence of demographic and cognitive factors suggests that in order to attain information this is valuable from a management perspective, attitude studies must be specific to the place and population of concern. Building on past research, we developed and analyzed self-administered surveys in order to satisfy the following core objectives:

1.) Assess respondent support or opposition toward black bear recolonization.

2.) Identify wildlife value orientations among survey respondents and their influence on attitudes toward bears.

3.) Understand the role of demographic and cognitive variables in influencing attitudes towards black bears in Alabama.

Methods

Study Area

The study area consisted of two distinct regions of Alabama determined to be critical to black bear recovery based on historic and current bear population estimates. The southwest region of the study, consisting of Clarke, Washington, Mobile, Baldwin, Escambia and Conecuh

23

Counties, encompasses a total of 6,932 sq. miles and has a population of roughly 700,000 people (U.S. Census, 2010). The region contains the state's largest bear population, which until recently was believed to be the only self-sustaining population in Alabama (Howell, 1921; Hersey, 2004). The northeast region of the study consisted of Madison, Jackson, Marshall, DeKalb, Etowah, Cherokee, Calhoun, St. Clair, Talladega, Cleburne, Clay and Shelby Counties. The region has a total population of 1.15 million people and encompasses 8,236 sq. miles including Talladega National Forest, the state's largest piece of public forest. An established bear population consisting of at least 26 individuals has recently been identified in DeKalb County near the Little River Canyon National Wildlife Preserve (Associated Press, 2014). Each study region contains a wide range of community sizes and one major metropolitan area: Huntsville (population of 180,000) in the northeast region and Mobile (population of 195,000) in the southwest.

Survey Instrument

All data was obtained from a mail-in survey of a random selection of residents from the 18 aforementioned counties. In total, the survey consisted of 51 questions containing 140 survey items. A pretest of the survey ($n = 10$) was conducted to test formatting, question clarity and total completion time. The names and mailing addresses of 3,000 residents of the study counties were obtained from Survey Sampling International, a private sample selection company.

Surveys were designed and distributed following a modified version of the Dillman method (Dillman & Smyth, 2009). The modified version required three separate mail contacts: (1) an initial packet containing an information letter, survey instrument, stamped return envelope and an Alabama Black Bears bumper sticker, (2) a reminder postcard and (3) a final mailing with instructions on how to complete an online version of the survey. Initial mailings were sent out on September 28, 2015. We allowed two weeks between each mailing.

Variable Selection

Demographic variables used for our analysis on attitudes toward bears were age, gender, race, education, community size, region of residence, hunting participation and exposure to black bear information. Age was measured by subtracting the respondents birth year from the survey year. Gender was either Male or Female. Respondent's race was limited to either white/Caucasian or black/African American due to a lack of responses from individuals identifying as other races. Education level was coded on a 6-point scale that included (1) Did not complete High School, (2) High School diploma or GED, (3) Some college but no degree, (4) Associatess degree, (5) Bachelor's degree and (6) Graduate or professional degree. Income was coded on a 5-point scale, ranging from (1) Less than $25,000 to (5) $100,000 or more, in $25,000 increments. Community size was measured on a 6-point scale ranging from (1) Rural (less than 1,000 people) to (6) Urban (more than 100,000 people). Region of residence was either the southwest region or the northeast region of our study. Hunting participation and exposure to bear education materials were both dichotomous variables based on Yes or No options in response to the questions "Have you hunted in the past 12 months?" and "Have you ever seen or received information in your county about black bears and how to deal with potential black bear encounters?".

Fear was measured by asking respondents how strongly they agreed or disagreed with the statement "I would feel frightened" if they were to encounter a non-aggressive black bear near their home or in their neighborhood. Additional cognitive predictor variables were obtained using composite measure scores. Bear knowledge was calculated using five True/False questions concerning basic black bear biology and behavior. Correct answers were given a value of 1 and summed in order to obtain a final bear knowledge score. Arithmetic means were used to create

measurements of risk perception, wildlife value orientations and attitudes toward the Alabama Department of Conservation and Natural Resources (ADCNR). Risk perceptions were calculated from respondent's level of concern for seven potential bear conflict scenarios on a unipolar 5-point Likert scale ranging from 1 (not at all concerned) to 5 (very concerned). Wildlife value orientation and Attitudes toward ADCNR were both measured on a bipolar 5-point Likert scale ranging from -2 (strongly disagree) to 2 (strongly agree) with a neutral/no opinion option at 0. Attitudes toward ADCNR were calculated from responses to five statements assessing respondent's trust and self-perceived value salience with the state's wildlife management agency. We used a modified version of the scale described in Fulton et al. (1996) reduced to 13 total items in order to calculate wildlife value orientations.

We utilized a multi-item composite scale to measure respondents' attitudes toward black bears in Alabama, which was used as the primary dependent variable in this study. The scale was measured from respondent's level of agreement toward six statements concerning black bear populations in Alabama on a 5-point bipolar Likert scale ranging from -2 (strongly disagree) to 2 (strongly agree) with a neutral midpoint. Final bear attitude scores were calculated using the mean acceptability of all six statements. A dichotomous support for assisted bear recovery variable, grouped as either "support" or "do not support/no opinion", was used for correlation analysis.

Statistical Analysis

Data was examined in order to identify and remove unengaged responses. Casewise diagnostics identified entries with standardized residuals greater than 3 standard deviations from the attitudes toward bears mean. These entries were considered outliers and removed from the dataset. In order to determine if respondents differed from non-respondents, we compared the

means of individuals who responded within two weeks of the first mailing to those who responded after the second mailing. This method assumes that those individuals who do not respond until after the second mailing are more similar to non-respondents due to the increased effort required to elicit a response (Miller & Smith, 1983).

Principal Component Analysis (PCA) was used to group together correlated variables in order to create composite scale indices. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used to ensure that PCA was appropriate on our dataset. Cronbach's alpha reliability analysis was used to test the reliability and consistency of all composite scales. Alpha scores greater than 0.7 were considered to have adequate internal reliability (Gliem & Gliem, 2003). We used forced entry least squares multiple regression to test the relationships between respondents' attitudes toward bears and our independent variables. Initial separate regression models were run using only demographic variables and only cognitive variables. A final, full model included all significant variables from the partial models. Independent samples t-tests were used to determine differences in attitudes towards bears among dichotomous groups and Chi-square and Cramer's V correlations were used to examine the relationships among categorical variables.

Results

Survey Responses

The final usable survey was received in late January of 2016. In total, we received 564 completed surveys resulting in a final response rate of 21% after accounting for undeliverable addresses. Respondents ranged from 20 - 94 years old, with an average age of 56. Comparisons to Census data from the state of Alabama showed that respondents were more likely to be white,

male and to have a college degree than the state's general population. Just over 25% of respondents reported having hunted in the twelve months prior to the survey, which is over twice the state wide hunting participation rate (U.S. Fish and Wildlife, 2012). These characteristic biases are typical of wildlife survey respondents from other studies in the region (Agee & Miller, 2009). Non-response bias checks comparing first mailing respondents to those who required additional mailings before responding showed no differences on 6 measured Likert scale questions selected from the survey including attitudes toward bears, our dependent variable. A full description of demographics of survey respondents can be seen in Table 2.1.

Descriptive Findings and Correlations

When asked if they were aware of bear populations in their region, 71% of respondents said that they were. Respondents from the southwest region of our study were more likely to be aware of bear populations than those in the northeast region (*p < 0.001*). Although 9.8% reported having either seen a bear or bear property damage near their home or neighborhood, only 5% reported having ever received any information about bears and how to deal with human-bear conflicts. Despite having greater awareness of bear presence, respondents from the southwest region were not more likely to have received information on living with black bears than those in the northeast region. The majority of respondents supported black bear population recovery in the state, with 61.2% of respondents in favor of wildlife management agencies actively facilitating black bear population recovery in Alabama, whereas 28.4% had no opinion and 10.4% opposed it. Over 80% of respondents were in support of some type of bear population recovery strategy, be it either assisted or natural. Support for population recovery was significantly correlated with exposure to black bear information, race, education, community type and hunting participation (Table 2.2). The establishment of a consistent black bear

management plan was the most likely incentive scenario to increase support for recovery (Figure 2.1). Roughly three quarters of respondents (76.6%) said that they would support a sustainable black bear hunt should populations grow large enough to support it.

Cognitive Scales

Principal Component Analysis with varimax rotation resulted in bear attitude and attitude towards ADCNR items each loading on a single component, confirming our scales. Cronbach's alpha successfully demonstrated internal reliability in scales of attitudes toward bears (α = 0.883), risk perception (α = 0.890) and attitudes toward ADCNR (α = 0.897) (Table 2.3). The majority of survey respondents expressed generally positive views toward black bears in the state (M = 0.91, SD = 0.59). Over 91% of respondents had favorable attitudes towards bears compared to only 5.7% with unfavorable views. Respondents also indicated mostly positive attitudes toward the Alabama Department of Conservation and Natural Resources (M = 0.63, SD = 0.61).

A PCA was used to reduce the 13 basic belief statements into wildlife value orientation subscales (Table 2.4). We retained three factors with an eigenvalue greater than 1.0 (Cattell, 1966) which together accounted for 64% of total variance. A Cronbach's alpha reliability analysis yielded acceptable levels for each of these belief scales which will now be referred to as "wildlife use beliefs" (α = 0.751), "hunting beliefs" (α = 0.800) and "mutualist beliefs" (α = 0.858). Mutualist beliefs (M = 0.37, SD = 0.76) was calculated from seven survey items while hunting beliefs (M = 1.02, SD = 0.75) and wildlife use beliefs (M = 0.11, SD = 0.89) were both derived from three items.

Multiple Regression Models

A multiple linear regression model examined the effect of seven demographic variables on respondents' attitudes toward bears (Table 2.5). Age, community size, race, hunting

participation and exposure to bear education materials were all statistically significant predictors at the p = 0.05 level, but the model explained only 8% of the variation in attitudes toward bears (R^2_{adj} = 0.080). A second linear regression model explored the influence of cognitive and affective variables on attitudes toward bears. This model explained 41.8% of the variation in attitudes toward bears (R^2_{adj} = 0.418) and all predictor variables were statistically significant (Table 2.6).

A final full regression model using all of the variables that were significant in the previous two models explained 45.8% of bear attitude variation (R^2_{adj} = 0.458) (Table 2.7). Mutualist beliefs, hunting beliefs, bear knowledge, attitudes toward ADCNR, fear, age, race, community size and exposure to bear information were all significant predictors in this model at the p = 0.05 level.

Discussion

Highly polarized public opinion regarding wildlife typically increases the challenges associated with population recovery and management efforts (Meadow, Reading, Phillips, Mehringer & Miller, 2005). The overall lack of respondents who hold negative views toward black bears or actively oppose recovery is promising for wildlife professionals hoping to increase populations in the state. Respondents also indicated widespread support for sustainable bear hunts if populations reach an adequate level. Together, these trends could indicate less potential for conflict and controversy should agencies wish to actively facilitate population increases and/or use hunting as an incentive or population management option.

Support for assisted population recovery was lower among respondents to this survey than in the previous study on bear recovery attitudes in Alabama (Underwood, 2002). However,

recovery support in that study was measured among wildlife biologists, conservation officers, Nature Conservancy members and town hall meeting attendees. Less support among the general public compared to stakeholder groups was expected. The level of support among our respondents is similar to that of Louisiana residents reported by Van Why & Chamberlain (2003). A number of parallels exist between the current status of black bears in Alabama and those in Louisiana at the time of their study. Habitat loss and modification led to the Louisiana black bear (*Ursus americanus luteolus*) being listed as threatened in 1992. Conservation efforts backed by community support and partnerships between wildlife agencies, private landowners and NGOs helped lead to twofold population increases and the recent delisting of the species (U.S. Fish and Wildlife Service, 2015). Our data on attitudes toward bears and recovery support suggest that similar partnerships between landowners and public and private organizations may be possible in Alabama.

      The cognitive variables measured through composite scales proved to be far better predictors of attitudes toward bears than demographic variables. Mutualist beliefs, hunting beliefs, attitudes toward ADCNR, bear knowledge and risk perception were all significant variables in our best regression model. Mutualist belief scores were the most significant predictors of attitudes toward bears among all demographic and cognitive variables. These findings are consistent with past studies that have described a high degree of complexity involved in the formation of wildlife attitudes (Dickman, 2010) and confirm a number of recent studies which have illustrated the importance of basic belief structures on informing wildlife attitudes (Frank, Glikman, Sutherland & Bath, 2016; Hartel, Carlton & Prokopy, 2015; Loyd & Miller, 2010).

Although we did find significant demographic variables, these alone were poor predictors and explained only a small amount of the variation in attitudes toward bears. Gender and education, which were found to be significant in similar studies, were not statistically significant among our respondents. The lack of relationship between attitudes toward bears and education was surprising, as a number of studies have shown a positive relationship between years of education and attitudes towards wildlife and environmental issues (Smith, Nielsen & Hellgren, 2014; Rice et al., 2007; Dressel, Sandström & Ericson, 2014). However, some studies have shown that a positive relationship between education and environmental attitudes may only exist among students with biology training. For instance, Tikka, Kuitunen & Tynys (2000) found that students of subjects related to technology and mathematics, such as engineering, tended to have negative overall environmental attitudes and few nature related hobbies. We did see higher attitudes toward bears among hunters and those who have received information regarding black bear populations in their county. Hunters may spend more time recreating outdoors and may be more educated on wildlife related issues than non-hunters, which could make up for less formal education. These characteristics in our data suggest that among our respondents the influence of subject specific education may be much stronger than that of formal education.

The influence of race on attitudes toward bears and recovery support is particularly important in Alabama, where African American populations are among the highest in the country. Mean attitudes toward bears were lower among black/African Americans ($M = 0.55$, $SD = 0.67$) than white/caucasians ($M = 0.94$, $SD = 0.57$) ($p < 0.001$), and black respondents were significantly less likely to support assisted bear recovery ($p = 0.014$). In Washington, Escambia and Conecuh Counties, which made up half of our southwestern study area, black/African American citizens make up 25, 32 and 46 percent of the total population, respectively. Regions

of the state with particularly high African American populations may have less positive attitudes toward bears and lower support for population recovery than what we saw among our respondents. Although research on race and wildlife attitudes is limited, Bowman et al. (2004) saw a similar relationship in Mississippi. This supports previous research which has emphasized the need to foster wildlife appreciation and experience among racial minorities (Van Velsor & Nilon, 2006). Focusing additional outreach and education in minority communities near areas with bear populations may help to influence these less positive attitudes toward the species.

The relationship between Attitudes toward bears and age may reflect a national trend toward less traditional orientations towards wildlife and higher mutualistic or pluralist views among young people (Manfredo, Teel, & Bright, 2003; Zinn, Manfredo, & Barro, 2002). Principal Component Analysis indicated that hunting beliefs and appropriate use beliefs among our respondents did not fall into the same component, as they have in many past surveys in other regions. In fact, hunting beliefs were the most positive out of the three belief dimensions, while appropriate use beliefs were the most negative. This is particularly true among our youngest respondents (18 - 29 year age class), who had the strongest mutualistic and hunting beliefs but the lowest appropriate use beliefs among all age classes. This group also had our most positive attitudes toward bears. These findings are important for wildlife management because they suggest that younger generations may interpret a wider range of benefits from wildlife and do not see positive hunting beliefs as exclusive from positive mutualist beliefs. This could indicate that future generations may be more tolerant of wildlife species than past generations while still remaining accepting of a wide range of management methods.

33

Management Implications

Like many other state wildlife agencies, Alabama's Wildlife and Freshwater Fisheries Division does not receive general tax money. Instead, the division is funded largely through fishing and hunting licenses, permit fees and excise taxes on sporting arms, ammunition and other hunting/fishing gear (Alabama Department of Conservation and Natural Resources, 2012). As such, hunter support is often necessary for management programs to be successful and will likely be a major component in determining the success of long-term objectives. Our data shows that respondents who reported hunting in the past 12 months had more positive general attitudes toward black bears in Alabama and were more likely to support black bear population recovery than non-hunters.

Additionally, the influence of hunters on management support and strategy can lead us to reasonably assume that one of the long-term management goals of black bear restoration may be a sustainable, regulated harvest (Morzillo et al., 2009). Respondents to our survey showed a strong support for hunting, both in general and of black bears. This response may be a reflection of cultural norms and values that are specific to the region and it is promising for agencies should they decide to use bear hunting as a recovery incentive and management tool.

Respondents chose a comprehensive and consistent plan for bear management as the most likely scenario to increase their support for population recovery. Additionally, attitudes toward the Alabama Department of Conservation and Natural Resources, which were relatively positive among respondents, had a significant effect on attitudes toward bears. A lack of knowledge or access to bear related information may suggest that attitudes toward bears are not yet fully formed among many respondents. Together, these factors leave the Alabama

Department of Conservation and Natural Resources in a good position to influence public support for bear management initiatives.

Past research has shown that people who receive information on black bears are more accepting of management actions, have less concern about risks associated with bears, and are more likely to feel that bears are being properly managed (Lakes & Sharp, 2015). A positive relationship between access to bear information and attitudes toward bears was supported by our findings. However, only 5% of respondents reported having received any such information in the past and a large majority of respondents to our study claimed that they were unsure of bear population levels in their region. Increasing bear awareness through education campaigns could have a positive influence on attitudes toward bears by outlining agency goals and facilitating communication between residents and wildlife managers. Often times a single event or experience can strongly influence an individual's attitudes or reaction to a given scenario. This influence does not need to be from a direct personal encounter; if individuals with undeveloped attitudes toward bears receive positive bear information early on, their perceptions and support for recovery may be permanently influenced.

Additionally, concern over potential bear conflicts would likely be eased if residents are familiar with the wildlife professionals in their area and the protocol and procedures in place in the event that a conflict or encounter should occur. Many of the most likely conflicts between humans and black bears can easily be prevented when citizens take basic precautionary measures to limit anthropogenic food sources that act as attractants for bears (Gore & Knuth, 2006; Hurst, 2012). Such measures are well known in areas with historically abundant bear populations, but will more than likely need to be emphasized in the majority of Alabama.

Finally, our findings reflect why cooperative and bipartisan solutions are so important in wildlife management. Although there was considerable diversity among stakeholder values, generally positive attitudes toward bears were seen among most respondents. These results suggest a commonality in opinion among groups that may normally not see eye to eye — that healthy, sustainable bear populations in Alabama are a good thing. A management agency focused on shared goals and values, rather than values which favor one group over another, may help reduce conflict and garner support. The relationship between hunters and wildlife management agencies is sure to remain a core component of wildlife conservation in the U.S., but agencies should ensure to simultaneously cultivate trust and relationships with citizens who may have different values, but similar end goals. Establishing this type of trust could further improve public attitudes and agency efficacy (Bruskotter & Wilson, 2014; Eiser, Stafford, Henneberry & Catney, 2009).

References

Agee, J.D., & Miller, C.A. (2009). Factors contributing toward acceptance of lethal control of black bears in Central Georgia, USA. *Human Dimensions of Wildlife*, 14, 198-205.

Ajzen, I., & Fishbein, M. (1977). Attitude–behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, 84(5), 888-918.

Associated Press (2014) Alabama's black bear population growing. The Washington Times. Retrieved from http://www.washingtontimes.com/news/2014/jul/9/alabamas-black-bear-population-growing/

Bowman, J.L., Leopold, B.D., Vilella, F.J., & Gill, D.A. (2004). A spatially explicit model, derived from demographic variables, to predict attitudes toward black bear resporation.

Journal of Wildlife Management, 68(2), 223-232.

Bruskotter, J. T., & Wilson, R. S. (2014). Determining where the wild things will be: Using

psychological theory to find tolerance for large carnivores. *Conservation Letters*, 7(3), 158–

165.

Bruskotter, J. T., Vaske, J. J., & Schmidt, R. H. (2009). Social and cognitive determinants of

Utah residents' acceptance of the lethal control of wolves. *Human Dimensions of Wildlife*,

14(1), 119-132.

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*,

1, 245-276.

Clark, J.D., & Pelton, M.R. (1999). Management of a large carnivore: Black Bear. Pp. 209–222,

In J.D. Peine, (Ed.). *Ecosystem Management for Sustainability: Principles and Practices*.

CRC Press, Boca Raton, FL. 500 pp.

Decker, D.J., Smolka Jr., R.A., O'Pezio, J. & Brown, T.L. (1985). Social determinants of black

bear management for the northern Catskill Mountains. pgs. 239-247 in S. L. Beasom and S.

F. Roberson (eds.) Game Harvest Management. Caesar Kleberg Wildlife Research Institute,

Kingsville, TX.

Decker, D. J., Lauber, T. B., & Siemer, W. F. (2002). Human–wildlife conflict management: A

practitioner's guide. *Northeast Wildlife Damage Management Research and Outreach

Cooperative*. Ithaca, NY.

Dillman, D., & Smyth, J. (2009). Internet, mail, and mixed-mode surveys: The tailored design

method. (3rd ed.). Hoboken, N.J.: Wiley & Sons.

Dickman, A.J. (2010). Complexities of conflict: the importance of considering social factors for

effectively resolving human–wildlife conflict. *Animal Conservation*, 13, 458–466.

Don Carlos, A.W., Bright, A.D., Teel, T.L. & Vaske, J.J. (2009). Human Black Bear Conflict in Urban Areas: An Integrated Approach to Management Response. *Human Dimensions of Wildlife*, 14:3, 174-184.

Dressel, S., Sandström, C., & Ericsson, G. (2014). A meta-analysis of studies on attitudes toward bears and wolves across Europe 1976-2012. *Conservation Biology*, 1-10.

Eagly, A. H., & Chaiken, S. (1993). The psychology of attitudes. Fort Worth, TX: Harcourt Brace Jovanovich.

Eiser, J.R., Stafford, T., Henneberry, J. & Catney, P. (2009). "Trust me, I'm a scientist (not a developer)": Perceived expertise and motives as predictors of trust in assessment of risk from contaminated land. *Risk Analysis*, 29, 288-297.

Frank, B., Glikman, J.A., Sutherland, M. & Bath, A. (2016). Predictors of extreme negative feelings toward coyote in Newfoundland. *Human Dimensions of Wildlife*.

Fulton, D. C., Manfredo, M.J, & Lipscomb, J., (1996). Wildlife value orientations: a conceptual and measurement approach. *Human Dimensions of Wildlife*, 1, 24–47.

Gliem, J. A. & Gliem, R. R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for likert-type scales. Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education. Columbus, OH: Ohio State University.

Gore, M.L. & Knuth B.A. (2006). Attitude and behavior change associated with the New York NeighBEARhood Watch Program. HDRU Series Report 06-14. Department of Natural Resources. N.Y.S. College of Agriculture and Life Sciences, Ithaca , New York .

Hartel, C.M., Carlton, J.S., & Prokopy, L.S. (2015) The Role of Value Orientations and Experience on Attitudes Toward a Well-Liked Threatened Reptile, *Human Dimensions of Wildlife*, 20(6), 553-562.

Hartsell, A. J. & Johnson, T. G.(2005). Alabama's Forests, 2005. *United States Department of Agriculture Resource Bulletin*, SRS-146.

Hayman, R.B., Harvey, R.G., Mazzotti, F.J., Israel, G.D. & Woodward, A.R. (2014). Who complains about alligators? Cognitive and situational factors influence behavior toward wildlife. *Human Dimensions of Wildlife*, 19(6), 481-497.

Hersey, K.R. (2004). Habitat assessment for potential reintroduction of black bears to the Mobile-Tensaw Delta of southwestern Alabama. Unpublished master's thesis, University of Tennessee, Knoxville, Tennessee.

Howell, A. H. (1921). A biological survey of Alabama. *North American Fauna*, 1-89.

Hurst, J. E. (2012). An Evaluation of Black Bear Management Options, (August), 1–42.

Jackman, J.L. & Rutberg, A.T. (2015). Shifts in Attitudes toward Coyotes on the Urbanized East Coast: The Cape Cod Experience, 2005-2012. *Human Dimensions of Wildlife*, 20(4), 333-348.

Jacobs, M. H., Vaske, J. J., & Sijtsma, M. T. (2014). Predictive potential of wildlife value orientations for acceptability of management interventions. *Journal for Nature Conservation*, 22, 377–383.

Kaiser, H.F. (1974) An index of factorial simplicity. *Psychometrika*, 39, 31-36.

Kellert, S. R. & Berry, J. K. (1987). Attitudes, knowledge and behaviors toward wildlife as affected by gender. *Wildlife Society Bulletin*, 15(3), 363-371.

Knuth, B. A., Stout, R. J., Siemer, W. F., Decker, D. J., & Stedman, R. C. (1992). Risk management concepts for improving wildlife population decisions and public communication strategies. *Transactions of the 57th North American Wildlife and Natural Resources Conference*, Washington D.C.

Lakes, R.M., & Sharp, R. (2015). Visitor perceptions of black bear management options in Big

    South Fork National River and Recreation Area, USA. *Human Dimensions of Wildlife,* 20,

    185-187.

Linnell, J., Swenson, J. E., & Andersen, R. (2001). Predators and people: conservation of large

    carnivores is possible at high human densities if management policy is favourable. *Animal*

    Conservation, 4, 345–349.

U.S. Fish and Wildlife Service (2015, November 2) Louisiana Black Bear Species Profile.

    Retrieved March 8, 2016, from http://www.fws.gov/southeast/wildlife/mammal/louisiana-

    black-bear/#recovery

Loyd, K. & Miller, C. (2010). Factors related to preferences for Trap–Neuter–Release

    management of feral cats among Illinois homeowners. *Journal of Wildlife Management*, 74,

    460-465.

Manfredo, M., Teel, T., & Bright, A. (2003). Why Are Public Values Toward Wildlife

    Changing? *Human Dimensions of Wildlife*, 8(4), 287–306.

Manfredo, M. J. (2008). Attitudes and the study of human dimensions of wildlife. In M. J.

    Manfredo (Ed.), Who cares about wildlife? (pp. 75–109). New York, NY: Springer.

Meadow, R., Reading, R.P., Phillips, M., Mehringer, M. & Miller, B.J. (2005) The influence of

    persuasive arguments on public attitudes toward a proposed wolf restoration in the southern

    Rockies. *Wildlife Society Bulletin*, 33, 154-163.

Miller, L. E., & Smith, K. L. (1983). Handling nonresponse issues. *Journal of Extension*.

Minnis, D.L., & Peyton, R.B. (1995). Cultural carrying capacity: modeling a notion. Pages 19-34

    in J.B. McAninch, editor. Urban deer: a manageable resource? *Proceedings of the*

    symposium of the 55th Midwest Fish & Wildlife Conference. North Central Section of The

Wildlife Society, 12-14 December 1993, St. Louis, Missouri, USA.

Morzillo, A. T., Mertig, A. G., Garner, N., & Liu, J. (2009). Evaluating Hunter Support for Black

Bear Restoration in East Texas. *Human Dimensions of Wildlife*, *14*(6), 407–418.

Ordeñana, M. a, Crooks, K. R., Boydston, E. E., Fisher, R. N., Lyren, L. M., Siudyla, S., …

Vuren, D. H. Van. (2010). Effects of urbanization on carnivore species distribution and

richness Effects of urbanization on carnivore species distribution and richness. *Journal of*

Mammalogy, 91(6), 1322–1331.

Peine, J.D. (2001). Nuisance bears in communities: strategies to reduce conflict. *Human*

Dimensions of Wildlife, 6, 223–237.

Rice, M. B., Ballard, W. B., Fish, E. B., Wester, D. B., & Holdermann, D. (2007). Predicting

Private Landowner Support toward Recolonizing Black Bears in the Trans-Pecos Region of

Texas. *Human Dimensions of Wildlife*, 12(6), 405–415.

Riley, S.J., Decker, D.J. (2000). Wildlife stakeholder acceptance capacity for cougars in

Montana. *Wildlife Society Bulletin*, 28(4), 931-939.

Riley, S.J., Decker, D.J., Carpenter, L.H., Organ, J.F., Siemer, W.F., Mattfeld, G.F. & Parsons,

G. (2002). The essence of wildlife management. *Wildlife Society Bulletin*, 30, 585-593.

Rilley, S. P. D., Sauvajot, R. M., Fuller, T. K., York, E. C., Kamradt, D. a, Bromley, C., &

Wayne, R. (2003). Effects of Urbanisation and Habitat Fragmentation on Bobcats and

Coyotes in Southern California. *Conservation Biology*, 17(2), 566–576.

Siemer, W. F., Hart, P. S., Decker, D. J., & Shanahan, J. E. (2009). Factors that Influence

Concern About Human–Black Bear Interactions in Residential Settings. *Human Dimensions*

of Wildlife, 14, 185–197.

Smith, J.B., Nielsen, C.K., & Hellgren, E.C. (2014). Illinois resident attitudes toward

recolonizing large carnivores. *The Journal of Wildlife Management*, 78(5), 930-943.

Teel, T. L., Manfredo, M. J., & Stinchfield, H. M. (2007). The Need and Theoretical Basis for Exploring Wildlife Value Orientations Cross-Culturally. *Human Dimensions of Wildlife*, 12(5), 297–305.

Teel, T. L., & Manfredo, M.J. (2009). Understanding the diversity of public interests in wildlife conservation. *Conservation Biology*, 24(1), 128–39.

Tikka, P.M., Kuitunen, M.T. & Tynys, S.M. (2000) Effects of Educational Background on Students' Attitudes, Activity Levels, and Knowledge Concerning the Environment. *Journal of Environmental Education*, 31, 12-19.

Underwood, W.V. (2002). Stakeholder values, beliefs and knowledge about black bears in Alabama. Unpublished master's thesis, Auburn University, Auburn, Alabama.

U.S. Department of the Interior, U.S. Fish and Wildlife Service, & U.S. Department of Commerce, U.S. Census Bureau (2011) National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

Van Velsor, S. & Nilon C. (2006) A qualitative investigation of the urban minority adolescent experience with wildlife. *Human Dimensions of Wildlife*, 11, 359–369.

Van Why, K. R., & Chamberlain, M.J. (2003). Sportsmen knowledge and opinions on restoring the Louisiana black bear. *Proceedings of the Southeastern Association of Fish and Wildlife Agencies*, 57, 299–307.

Vaske, J.J., & Donnelly, M.P. (1999). A value-attitude-behavior model predicting wildland preservation voting intentions. Society & Natural Resources, 12, 523-537.

Vaske, J.J. (2008).Survey research and analysis: Applications in parks, recreation and human dimensions. State College, PA: Venture Publishing.

Vaske, J. J., Timmons, N. R., Beaman, J., & Petchenik, J. (2004). Chronic wasting disease in Wisconsin: Hunter behavior, perceived risk, and agency trust. *Human Dimensions of Wildlife*, 9(3), 193-209.

Willcox, A.S., Giuliano, W.M., Wynn, C. & Sanders, J.S. (2009). Wildlife Management on Private Lands in Florida. *Proceedings from the Annual Conference of Southeastern Association of Fish and Wildlife Agencies*, 63, 27-34.

Woodroffe, R., Thirgood, S. J., Rabinowitz, A. (Eds.), (2005). People and Wildlife: Conflict or Coexistence? Cambridge, UK: Cambridge University Press.

Zimmermann, B., Wabakken, P. & Dötterer, M. (2001) Human-carnivore interactions in Norway: How does the re-appearance of large carnivores affect people's attitudes and levels of fear? *Forest, Snow and Landscape Research*, 76, 137-153.

Zinn, H. C., Manfredo, M. J., & Barro, S. C. (2002). Patterns of Wildlife Value Orientations in Hunters' Families. *Human Dimensions of Wildlife*, 7(3), 147–162.

Table 2.1

Demographic characteristics of 2015 Alabama black bear survey respondents

Variable	Category/Descriptive Results	Frequency	Percent
Age	Mean = 55.99; StdDev = 14.41		
Sex	Male	353	66.6
	Female	177	33.4
Education	Did not complete High School	19	3.6
	High School diploma or GED	88	16.5
	Some college but no degree	122	22.9
	Associate's degree	49	9.2
	Bachelor's degree	141	26.5
	Graduate or Professional degree	103	19.4
Income	Less than $25,000	84	16.8
	$25,000 - $49,999	108	21.6
	$50,000 - $74,999	120	24
	$75,000 - $99,999	75	15
	More than $100,000	114	22.8
Community Type	Rural (<1,000 people)	114	21.3
	Small town (1,000 - 5,000 people)	90	16.8
	Medium town (5,001 - 10,000 people)	87	16.3
	Large town (10,001 - 25,000 people)	64	12
	Small city (25,001 - 100,000 people)	74	13.8
	Urban (>100,000 people)	106	19.8
Region	Northeast Region	279	52.3
	Southwest	254	47.7
Hunting Participation	Yes	135	25.3
	No	399	74.7
Received Bear Information	Yes	30	5.4
	No	527	94.6

Table 2.2

Comparisons of demographic groups in their support for black bear population recovery in Alabama, through either assisted or natural methods

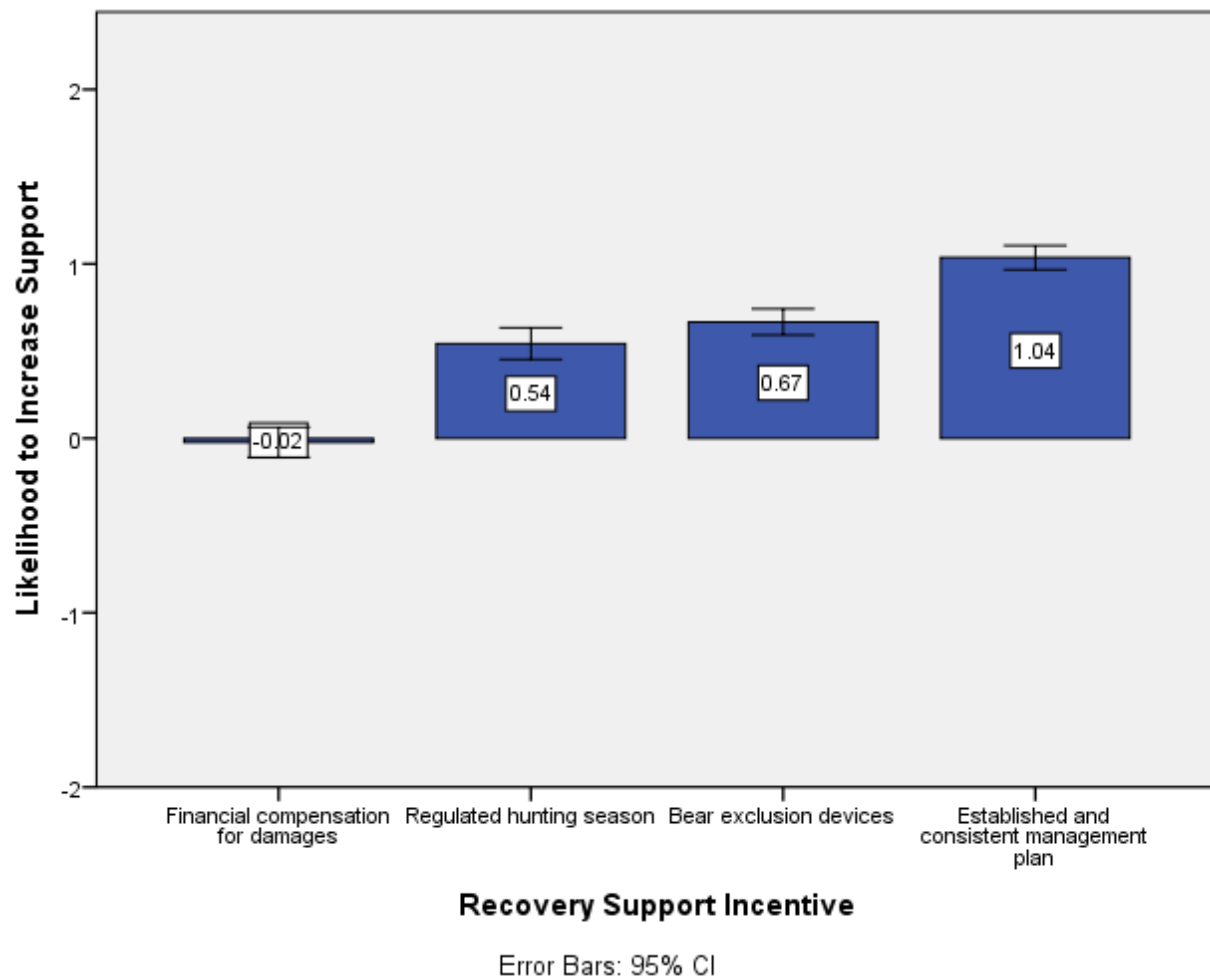| Variable	Support for Population Recovery		X^2	p-value
	Support (n = 450)	Oppose or no opinion (n = 85)		
Age	M=55.38; SD=14.32	M=58.21; SD=14.50		0.098
Sex			3.683	0.055
Male	86.3	13.7		
Female	79.8	20.2		
Race			23.513	<0.001
White/Caucasion	86.7	13.3		
Black/African American	56.8	43.2		
Education			0.174	0.014
Did not complete High School	66.7	33.3		
High School diploma or GED	74.1	25.9		
Some college but no degree	84.2	15.8		
Associate's degree	89.8	10.2		
Bachelor's degree	85.7	14.3		
Graduate or Professional degree	89.3	10.7		
Income			0.077	0.569
Less than $25,000	81.2	18.8		
$25,000 - $49,999	81.5	18.5		
$50,000 - $74,999	85.6	14.4		
$75,000 - $99,999	85.3	14.7		
More than $100,000	88.5	11.5		
Community Type			0.162	0.017
Rural	79.6	20.4		
Small town	83.0	17.0		
Medium town	77.4	22.6		
Large town	82.5	17.5		
Small city	90.4	9.6		
Urban	93.3	6.7		
Alabama Region			2.002	0.157
Northeast	86.5	13.5		
Southwest	82.0	18.0		
Hunting Participation			5.218	0.022
Yes	90.3	9.7		
No	81.9	18.1		
Bear Information (Y/N)			5.568	0.018
Yes	100.0	0.0		
No	83.3	16.7		

Figure 2.1 Mean likelihood of four hypothetical incentive scenarios to increase respondent support for black bear population recovery in Alabama.

Table 2.3

Principle Component Analysis (PCA) and Cronbach's alpha reliability analysis of items used to measure attitudes toward black bears, attitudes toward the Alabama Department of Conservation and Natural Resources, and risk perception

Cognitive Component survey item	Item total correlation	Cronbach's alpha	alpha if deleted
Attitude toward bears[a]		0.883	
I would enjoy seeing a black bear	0.772		0.868
The presence of black bears in Alabama is a sign of a healthy environment	0.788		0.865
Black bears have a right to exist in Alabama	0.815		0.861
People should learn to live with black bears near their homes	0.780		0.869
I enjoy knowing that black bears exist in Alabama, even if I never see one	0.870		0.849
Black bears are a part of Alabama's heritage	0.786		0.866
Attitude toward ADCNR[a]		0.897	
I trust ADCNR to protect human safety related to black bear human interactions	0.858		0.869
I trust ADCNR to manage problems associated with black bears	0.868		0.865
I feel that ADCNR shares the same values as me	0.835		0.876
The goals and objectives of ADCNR are consistent with the goals and objectives of Alabama residents	0.845		0.873
ADCNR employees in my region are capable of managing wildlife populations in order to achieve ecological goals while also preventing harm to humans	0.802		0.885
Risk Perception[bc]		0.89	
Being confronted by a black bear while outdoors	-		0.878
The cost of residential property damage caused by black bears	-		0.870
Driving in areas where you may hit a black bear with your vehicle	-		0.874
The safety of pets that may encounter a black bear	-		0.868
Conflicts between neighbors over the issue of feeding black bears	-		0.881
The cost of agricultural damage (e.g. crops, livestock, bee hives) caused by black bears	-		0.868
The safety of children that may encounter a black bear	-		0.883

[a]Evaluated on 5-point bipolar Likert scale: -2 = Strongly disagree and +2 = Strongly agree
[b]Evaluated on 5-point unipolar Likert scale: 1 = Not at all concerned and 5 = Very concerned
[c]Additive scale did not require Principal Component Analysis (PCA)

Table 2.4

Principle Component Analysis (PCA) and Cronbach's alpha reliability analysis of items used to measure wildlife value orientations

Value orientation belief dimension survey item	Item total correlation	Cronbach's alpha	Alpha if deleted
Wildlife use beliefs[a]		0.751	
Humans should manage wild animal populations so that humans benefit	0.841		0.678
The needs of humans should take priority over fish and wildlife protection	0.727		0.648
Fish and wildlife are on earth primarily for people to use	0.735		0.676
Hunting beliefs[a]		0.800	
We should strive for a world where there's an abundance of fish and wildlife for hunting and fishing	0.806		0.749
It is *not* cruel to hunt wildlife	0.818		0.722
People who want to hunt should be provided the opportunity to do so	0.823		0.710
Mutualist Beliefs[a]		0.858	
Wildlife should have rights similar to the rights of humans	0.730		0.837
I view all living things as part of one big family	0.752		0.834
Wildlife are like my family and I want to protect them	0.840		0.818
I take great comfort in the relationship I have with wildlife	0.737		0.841
I feel a strong emotional bond with wildlife	0.783		0.831
I care about animals as much as I do people	0.658		0.847
I value the sense of companionship I receive from animals	0.573		0.855

[a]Evaluated on 5-point bipolar Likert scale: -2 = Strongly disagree and +2 = Strongly agree

Table 2.5

Multiple linear regression of the relationship between survey respondents' attitudes toward black bears and demographic variables

Independent Variable	Unstandardized Coefficient	Standard Error	t	p-value
Age	-0.004	0.002	-2.257	0.024
Gender[a]	-0.002	0.060	-0.028	0.977
Race[b]	-0.412	0.102	-4.05	<0.001
Education	-0.021	0.017	-1.182	0.238
Community Size	0.034	0.015	2.243	0.025
Alabama Region[c]	-0.069	0.053	-1.309	0.191
Hunting Participation[d]	0.150	0.065	2.309	0.021
Received Bear Info[d]	0.436	0.118	3.686	<0.001

Adj. $R^2 = 0.080$

Dependent Variable: Bear Attitude

[a]Male used as reference variable

[b]White/Caucasion used as reference variable

[c]Southwest region used as reference variable

[d]No used as reference variable

Table 2.6

Multiple linear regression of the relationship between survey respondents'
attitudes toward black bears and cognitive scale and affective variables

Independent Variable	Unstandardized Coefficient	Standard Error	t	p-value
Mutualist Beliefs	0.300	0.032	9.275	<0.001
Hunting Beliefs	0.146	0.030	4.859	<0.001
Wildlife Use Beliefs	-0.064	0.027	-2.323	0.021
Bear Knowledge	0.060	0.021	2.847	0.005
Attitudes toward ADCNR	0.218	0.038	5.715	<0.001
Risk Perception	-0.057	0.023	-2.475	0.014
Fear	-0.088	0.021	-4.167	<0.001

Adj. R^2 = 0.418
Dependent Variable: Bear Attitude

Table 2.7
Multiple linear regression of the relationship between respondents' attitudes toward black bears and all significant variables from previous models containing demographic, cognitive and affective variables

Independent Variable	Unstandardized Coefficient	Standard Error	t	p-value
Mutualist Beliefs	0.311	0.033	9.490	<0.001
Hunting Beliefs	0.117	0.033	3.551	<0.001
Wildlife Use Beliefs	-0.041	0.028	-1.481	0.139
Bear Knowledge	0.064	0.023	2.842	0.005
Attitudes toward ADCNR	0.241	0.039	6.220	<0.001
Risk Perception	-0.036	0.025	-1.449	0.148
Fear	-0.082	0.022	-3.729	0.000
Age	-0.004	0.002	-2.451	0.015
Race[a]	-0.261	0.088	-2.961	0.003
Community Size	0.027	0.012	2.303	0.022
Hunting Participation[b]	0.041	0.053	0.774	0.439
Received Bear Info[b]	0.241	0.096	2.526	0.012

Adj. R^2 = 0.458
Dependent Variable: Bear Attitude
[a]White/Caucasion used as reference variable
[b]No used as reference variable

Chapter 3: Acceptability of Management Actions and the Potential for Conflict Following Human-Black Bear Encounters

Abstract

Despite low numbers for the past century, black bear (*Ursus americanus*) populations in Alabama appear to be growing. With an increase in populations, management agencies can expect to see an increase in human-bear encounters and conflicts. There is often strong emotional reaction and public disagreement toward how wildlife management agencies respond to these encounters. We surveyed 564 residents of Alabama counties that are in close proximity to bear populations in order to identify and evaluate the level of acceptance for various black bear management actions in response to specific human-bear encounter scenarios. We then used this information to estimate the potential for conflict among residents in response to these actions. Acceptability of management methods was influenced by the severity and frequency of the bear encounter. All non-lethal methods of bear management were acceptable among survey respondents for all encounter types, while lethal control of bears was on average considered unacceptable for all potential encounter scenarios. Potential for conflict varied according to severity and frequency of the bear encounter and severity of management actions, and was greater in rural areas. We recommend managers create bear management action protocols in order to maintain consistency and limit negative public reaction to management techniques.

Introduction

In the past, wildlife conflict and wildlife damage has primarily been a problem for
ranchers and agricultural producers in rural areas (Messmer, 2000), but recent urban, suburban
and exurban sprawl along with increased rural development has drastically altered American
landscapes that serve as important habitat for wildlife (Terris, 1999; Heimlich & Anderson,
2001). These demographic changes have resulted in more and more species living in close
proximity to humans and often times even sharing their resources (Sijtsma, Vaske & Jacobs,
2012). As a result, wildlife conflicts are no longer limited to certain subsets of people or regions
and they can create major economic, social and political issues in the United States. A significant
amount of wildlife agency time and resources are spent on managing these conflicts. In addition
to direct conflict from wildlife, agency decisions on land use restrictions, hunting regulations,
carnivore management and a number of other issues often elicit hostile and emotional reactions
from citizens and special interest groups on both sides. Considering both human-wildlife and
human-human interactions arising from wildlife, the potential for conflict associated with the
management of charismatic megafauna like black bears (Ursus americanus) is especially high
(Johnson & Sciascia, 2013).

The ability of black bears to adapt to human expansion means that humans must adapt as
well. Public complaints of nuisance bears are on the rise and homeowners adjacent to bear
habitat are often forced to take precautionary measures to prevent property damage caused by
bears (Siemer, Hart, Decker, & Shanahan, 2009; Carr & Burguess, 2004; Don Carlos et al.,
2009). When these damage prevention measures are not effective, citizens typically rely on
actions from wildlife management agencies in order to reduce unwanted encounters. However,
agencies are often limited when it comes to effective, immediate options in response to unwanted

53

interactions between humans and bears, and some of these options may be highly controversial to many residents (Witmer & Whittaker, 2001; Wittman, Vaske, Manfredo & Zinn, 2008; Agee & Miller, 2009). Public opposition towards management decisions can draw on limited budgets, attract unwanted media attention and initiate unwanted policy changes, all of which can seriously affect the chances of success of management and conservation projects (Jacobson and McDuff, 1998; Frank, Johansson & Flykt, 2015; Treves, Naughton-Treves & Shelley, 2013).

Because bears have been rare in Alabama for the past 100 or so years, human-bear conflicts and thus human-human conflicts associated with bear management have been limited. However, the recent recognition of growing bear populations in the state, especially in previously unoccupied regions, has encouraged wildlife managers to consider public attitudes and opinion regarding bear management. Alabama does not currently have an official black bear management plan, and the creation of such a plan will require that the state understand the degree of public acceptance of bears and bear management strategies. When combined with biological data, human dimensions research can help predict the areas most likely to experience bear conflicts and the regions that are most likely to perceive management responses as negative (Lowery, Morse & Steury, 2012; Krester, Curtis & Knuth, 2009). Anticipating which actions are most likely to cause conflict in specific regions can help wildlife agencies create and implement black bear management plans with the best overall chance of success.

A number of studies have shown that wildlife management acceptability often varies based on target species, respondent values and the severity of conflict and response method used (Wittman, Vaske, Manfredo & Zinn, 1998; Jacobs, Vaske & Sijtsma, 2014; Teel, Krannich & Schmidt, 2002; Jacobs, Vaske, Dubois & Fehres, 2014; Sijtsma, Vaske & Jacobs, 2012). In particular, the use of lethal management is often highly controversial, and various studies have

54

examined the acceptability of this management method among citizens (Teel, Krannich & Schmidt, 2002; Jacobs, Vaske & Sijtsma, 2014; Zinn, Manfredo, Vaske & Wittmann, 1998; Wittman, Vaske, Manfredo & Zinn, 1998; Urbanek, Nielson, Davenport & Woodson, 2012). The number of studies looking at a broad range of management alternatives in response to context specific scenarios is more limited. No two wildlife encounters or conflicts are exactly alike, so a thorough understanding of the public's likely reaction to management responses requires an evaluation of a number of context specific factors.

We used a self-administered survey to measure the acceptability of 5 black bear management strategies in response to human-bear encounter scenarios at multiple levels of severity and frequency. We then utilized the second generation of the Potential for Conflict Index (Vaske, Beaman, Barreto & Shelby, 2010) to estimate the likelihood of public disagreement and conflict over these management strategies. This is the first research that we know of to evaluate the acceptability of wildlife management actions based on all 4 specificity variables described by Ajzen & Fishbein (1980) – target, context, action and time – and to incorporate PCI_2 into this analysis.

Potential for Conflict Index

Conflict has been defined as "the tension an individual or group experiences because of perceived differences between him or herself and another individual or group" (De Dreu et al., 1999). Conflict measurements generally consist of calculating the level of disagreement or consensus regarding a given issue. Low levels of consensus are seen when people do not share similar values, attitudes or norms regarding what they consider acceptable (Vaske, Beaman, Barreto & Shelby, 2010). High levels of consensus from a population typically indicate that little

potential for conflict exists, while low consensus, or high frequencies of responses on both

extreme ends of a spectrum, indicates that the public is at odds and conflict is likely.

The Potential for Conflict Index (PCI) was first developed and presented by Manfredo,

Vaske & Teel (2003) in order to visually convey the ratio of responses on either side of the

central point of a scale. This measurement provides researchers and managers with a quantified

and graphically illustrated indicator of the level of conflict likely to arise from a given scenario.

One of the key components of PCI is that it produces a graphic representation that is easy to

explain and understand, even for people who may not be familiar with statistical methods or

research. The PCI value for each scenario is displayed on a graph as a circle, with the size of the

circle corresponding to the degree of potential for conflict; large circles indicate a high potential

for conflict while small circles indicate a low potential for conflict. The Y-axis is the rating scale

used in the survey, and the center of the circle is the mean score for each group on the X-axis.

Using this method, we are able to display the mean acceptability score of a management action

(i.e. central tendency) and the level of standard deviation of scores across the sample population

(i.e. dispersion).

An extension and refinement of the original PCI formula was presented in Vaske,

Beaman, Barreto & Shelby (2010). This modified formula, referred to as PCI_2, allows for

researchers to specify unequal intervals within scales in order to better represent the likelihood of

conflict in an applied setting. For instance, an individual who rates lethal management as

strongly acceptable (+2) will most likely not be in conflict with an individual who rates the

method as acceptable (+1), despite a difference in the value of their scores. Likewise, an

individual who chooses a neutral value may not be in conflict with individuals on either side of

the spectrum. PCI_2 allows researchers to specify distance functions and exclude neutral values

when calculating distance between two scores. Additionally, this extension allows for statistical comparisons of PCI_2 scores between datasets.

Despite its utility, the Potential for Conflict Index has been used sparingly to evaluate attitudes regarding carnivore management. Part of our objective of this study beyond understanding attitudes and conflict potential was to add to the body of work that incorporates PCI_2 into wildlife management research.

Methods

Survey Instrument

All data was collected using a self-administered mail-in survey distributed in the fall of 2015. The surveys contained a total of 51 questions aimed at identifying the attitudes and beliefs of Alabama residents toward black bear population recovery and management in the state. Surveys were created and distributed following a modified version of the Dillman Method, which identifies best practices for planning and conducting survey analysis in order to maximize response rate and reliability (Dillman & Smyth, 2009). We used a small pre-test ($N = 10$ individuals) to assess survey clarity and completion time. In total, recipients received three mail contacts. The initial contact included a survey packet, information letter, pre stamped return envelope and a complimentary Alabama Black Bears bumper sticker. Two weeks after mailing the initial packet, non-respondents received a reminder postcard. After an additional two weeks, a final contact letter including instructions on how to complete the survey online using Qualtrics survey software was mailed to all non-respondents. All survey instruments were evaluated and approved by the Auburn University Institutional Review Board (Protocol #15-147 EP 1508).

Study Area and Population

Survey Sampling International, a private survey sample company, was used to select names and addresses from the general population of 18 Alabama counties. These counties were chosen due to their close proximity to the state's primary black bear populations. 1,500 surveys were mailed to residents of Clarke, Washington, Mobile, Baldwin, Escambia and Conecuh Counties near the Mobile-Tensaw River Delta in the southwest corner of the state. This region consists of a total of 6,932 sq. miles and contains roughly 700,000 people (U.S. Census Bureau, 2010). The region contains the state's primary bear population (Hersey, 2004; Howell, 1921), which is found between urbanized Mobile County (252 people per square mile) and rural Washington county (16 people per sq. mile). The remaining 1,500 surveys were sent to residents of Madison, Jackson, Marshall, DeKalb, Etowah, Cherokee, St. Clair, Calhoun, Cleburne, Clay, Talladega and Shelby counties in the northeast region of the state. A population of at least 26 individuals has recently been identified near Little River Canyon National Preserve in DeKalb County, and the region is adjacent to areas with known black bear populations in Georgia (Associated Press, 2014). Talladega National Forest, the state's largest area of public land at 392,567 acres, also lies within this region and contains high quality potential black bear habitat. In total, the northeast region encompasses 8,236 sq. miles and has a population of roughly 1,150,000 people (U.S. Census Bureau, 2010). Each region contains one major urban area with a population of > 100,000 people. Surveys recipients for each county were proportional to the total county population.

Bear Management Acceptability

We assessed the acceptability of 5 common black bear management responses following different black bear encounter scenarios. We used the four specificity variables described by

Ajzen and Fishbein (1980) in order to create a set of scenarios which could give us context specific evaluations of bear management acceptability. The four specificity variables consist of target (black bears), context (encounter scenario), action (management response) and time (frequency of bear encounter). Four different bear encounter scenarios, varying in their severity, were presented to the respondent, who then rated the acceptability of five different management approaches in response to each scenario. Each of these encounter scenarios was separately assessed as a one-time event and as a frequent occurrence. Encounters, ranging from least severe to most severe, included: (a) A black bear is seen along a popular hiking trailing in the forest, (b) A black bear damages property (birdfeeder, garbage can, outdoor grill) near your home or in your neighborhood, (c) A black bear threatens and chases a pet near your home or in your neighborhood and (d) A black bear approaches a person in a residential neighborhood and must be scared off (no attack or injury to the person). Possible management responses were (1) Educate people on how to change their behavior to reduce black bear conflicts, (2) Monitor the situation to determine if the black bear will cause further concern, (3) Frighten the black bear using aversive conditioning techniques, (4) Capture and relocate the black bear and (5) Euthanize the black bear. All management responses were evaluated on a 5-point Likert scale ranging from highly unacceptable (-2) to highly acceptable (+2) with a neutral midpoint (0).

Statistical Analysis

Data was examined in order to identify and remove unengaged responses. We compared select variable means from individuals who responded within two weeks of the first mailing to those who responded after the second mailing in order to determine if respondents differed from non-respondents. This method assumes that individuals who require additional mailings before responding are more similar to non-respondents (Miller & Smith, 1983). Data was weighted for

age class, sex and race to better represent the general population of our survey areas by adding a frequency weighting variable in SPSS.

A two-way repeated measure analysis of variance (ANOVA) with a Bonferroni post hoc test was used to test the effect of severity and frequency of encounter on the acceptability of management actions. Independent samples t-tests were used to examine differences in acceptability of management response between northeast and southwest respondents and respondents from urban and rural communities for each level of encounter severity. IBM SPSS Statistics version 23.0 was used for these analyses.

We utilized the second generation of the Potential for Conflict Index (PCI_2) formula described in Vaske et al. (2010) to calculate the potential for conflict resulting from four of the five management actions across all encounter severities and frequencies. We excluded "educating the public" from the PCI_2 analysis because it can be performed in conjunction with other actions and thus would likely not contribute to conflict. The Potential for Conflict Index version 2.0 workbook for Microsoft Excel was used to calculate and graphically represent PCI_2 scores (workbook obtained from http://warnercnr.colostate.edu/~jerryv/PCI2/). In our calculation of PCI_2 we selected a distance function of 1, meaning that neutral values were not included when calculating the distance between two values. For instance, a score of -2 and a score of +1 would be given a conflict distance of 2 rather than 3, because we do not anticipate respondents with neutral views as having significant contribution to potential conflict (Vaske et al., 2010). The PCI_2 scale ranges from 0 (minimal potential for conflict) to 1 (maximum potential for conflict).

To identify group differences we compared PCI_2 scores from the southwest sample population with those of the northeast sample population. Past studies have shown greater

tolerance for bears in regions that are familiar and experienced with their presence (Decker &

O'Pezio, 1989), and we hypothesized that PCI_2 scores would be different between the two

regions, as residents of the southwest region were more likely to be accustomed to, or at least

familiar with, bear presence. In addition, we investigated the differences in PCI_2 between rural

urban communities. Differences were calculated using standard deviations from simulated

distributions as described in Vaske et al. (2010). Based on critical value charts, difference values

>1.96 were considered significant at the $p = 0.05$ level.

Results

In total, we received 564 usable surveys resulting in a final response rate of 21% after

adjusting for undeliverable addresses. Response rates were similar between the northeast and the

southwest study populations. Distribution of community sizes was adequate to make

comparisons in our analysis, with all six categories contributing over 10% of the total responses.

We compared sociodemographic characteristics of survey respondents to U.S. Census data on the

state of Alabama in order to identify any major differences between respondents and the general

population. Age of survey respondents ($M = 56.0$; 68.5% >50 years of age) was greater than the

general population and respondents were more likely to be male (67.8%), white (85.7%) and

hold a bachelor's degree or higher (44.8%). Independent sample t-tests showed no significant

differences between the acceptability of management responses of first contact respondents and

follow up contact respondents.

Mean acceptability for educating the public, monitoring the situation, using aversive

conditioning techniques and capturing and relocating the bear were positive across all levels of

severity and frequency. The acceptability of lethal management increased with encounter

severity and frequency but remained negative for all scenarios. Mean scores showed that as conflict severity and frequency increased the less severe responses tended to become less acceptable and the more severe responses tended to become more acceptable (Table 3.1).

Mauchly's test of sphericity suggested that we did not have sphericity for our interaction term ($p < 0.05$). Although our violation of sphericity was minimal in all cases ($\varepsilon > 0.9$), we used the Huynh-Feldt estimate while evaluating within-subjects effects in the repeated measures ANOVA in order to avoid Type II error. Results from the repeated measures ANOVA indicated that acceptability of all management responses differed by encounter severity, frequency and severity*frequency interaction (Table 3.2). Capture and relocating bears was the most context specific management response for both severity (F = 121.707, p < 0.001, eta^2 = 0.194) and frequency (F = 247.424, p < 0.001, eta^2 = 0.329). Independent sample t-tests indicated significant differences in mean acceptability between the southwest region and the northeast region study populations in five scenarios Table 3.3). In each of these significant scenarios, respondents from the southwest region were less accepting of severe management responses or more accepting of less severe responses. Independent samples t-tests for all encounters and management responses between urban and rural respondents showed statistically significant differences in 17 out of the 40 possible responses (Table 3.4). Rural residents were more likely to accept lethal control as a management response for all possible scenarios.

PCI$_2$ scores for each management response varied between encounter severity and frequency. For Scenario 1 (Figure 3.3), PCI$_2$ scores were lowest for monitoring the situation (PCI$_{2(once)}$ = 0.04, PCI$_{2(frequent)}$= 0.11) and lethal control (PCI$_{2(once)}$ = 0.10, PCI$_{2(frequent)}$ =0.13), the least and most extreme management measures. In Scenario 2 (Figure 3.4), PCI$_2$ was highest for aversive conditioning (PCI$_{2(once)}$ = 0.32, PCI$_{2(frequent)}$ = 0.36). Mean Acceptability of capturing and

relocating the bear increased and potential for conflict decreased between one time and frequent events for this scenario ($PCI_{2(once)}$ = 0.34, $PCI_{2(frequent)}$ = 0.13). Mean acceptability of monitoring the situation decreased and potential for conflict increased between one time and frequent events in Scenarios 2, 3 and 4. In Scenario 3 (Figure 3.5) and Scenario 4 (Figure 3.6), mean acceptability for aversive conditioning stayed roughly the same and PCI_2 did not change significantly between one time and frequent events, while PCI_2 for capturing and relocating the bear decreased slightly with encounter frequency. Both mean acceptability and potential for conflict from lethal management increased significantly between one time and frequent events in the final two scenarios. On average, non-lethal but potentially invasive management techniques (aversive conditioning and capture/relocate) showed the highest levels of potential for conflict. The highest PCI_2 came from capturing and relocating a bear who had been seen along a popular hiking trail in the forest (PCI_2 = 0.40).

We examined skewness in the simulated PCI_2 scores in order to assess for normality before comparing scores (Vaske et al., 2010). Skewness for all scores was between -1.0 and +1.0, indicating that estimates were normally distributed and simulated standard deviations could be used to compare scores. PCI_2 scores for lethal management differed significantly in 3 out of the 8 encounter scenarios for both northeast/southwest (Table 3.5) and urban/rural (Table 3.6) comparisons. Rural communities had a higher potential for conflict index score in 32 out of the 40 possible scenarios (five management responses, four scenarios, two frequencies), although only 3 of those differences were significant at the $p = 0.05$ level. Comparisons between regions showed that the northeast study population had higher PCI_2 scores in 26 out of the 40 scenarios.

Discussion

Overall, non-lethal methods of control were rated as acceptable and lethal control was rated as unacceptable by the majority of study participants, though levels of acceptability varied based on the severity and frequency of bear encounters. Educating the public on how to change their behavior in order to reduce conflict was the most acceptable response for nearly every conflict scenario. However, this response is not an immediate solution and it can be carried out simultaneously to all of the other responses. Misunderstanding may have existed among respondents as to whether they were rating this action as the sole response or in conjunction with other actions. Regardless, outreach and access to bear information should be available in any communities that have healthy bear populations.

Though the acceptability of all management responses changed with the severity and frequency of the encounter, monitoring the situation and education were the least sensitive to these changes. Mean acceptability for aversive conditioning was close to neutral for the least severe scenario, but increased with frequency and severity. This method had the highest mean potential for conflict among all methods and peaked for the scenario of a bear being seen along a popular hiking trail on multiple occasions. Similar to aversive conditioning, capturing and relocating was borderline acceptable for the least severe encounter, but increased with severity and frequency. Agreement on the acceptance for this method increased between one time and frequent encounters, thus decreasing PCI_2 scores. Lethal control was for the most part considered very unacceptable for all encounter scenarios, though PCI_2 for this method increased significantly for frequent instances of a black bear chasing a pet and a black bear approaching a human. In general, we saw that the acceptability of management actions was more sensitive to

changes in frequency of the encounter scenario than severity, indicating that a large concern of the public was whether or not the incident was likely to happen again.

As expected, we found that the acceptability of the most extreme management responses (capture/relocating and lethal control) increased with the severity and frequency of bear encounter events (Figure 3.1 and Figure 3.2). These findings support past studies examining the acceptability of management actions in response to bear (Palmer et al., 2011) and mountain lion (Zinn et al., 1998) encounters of varying severity. We saw very little difference between respondents from the southwest region and those from the northeast region in their mean acceptability of management actions (Table 3.3). However, differences between rural and urban residents were identified in a number of the scenarios (Table 3.4). In scenarios where a significant difference existed, rural respondents were typically more accepting of lethal response and less accepting of the less severe responses. These results are consistent with the findings of similar studies regarding lethal management of wildlife (Smith, Nielsen & Hellgren, 2014; Loyd & Miller, 2010; Koval & Mertig, 2004; Reiter, Brunson & Schmidt, 1999). Rural communities also had higher PCI_2 scores in nearly every scenario, including all scenarios using lethal control, indicating a greater amount of dissenting opinion in rural regions. However, frequency of the encounter event had a greater influence on urban respondents, whose mean acceptability of lethal control and corresponding PCI_2 increased dramatically between one time and frequent encounters. Being as rural communities are closer to quality bear habitat in most parts of the state and thus more likely to be in close proximity to bears, we recommend that management agencies focus early bear outreach efforts in these regions.

In general, PCI_2 scores were high when the severity of the response did not correspond to the severity of the encounter (i.e. more severe actions in response to less severe encounters and

less severe actions in response to more severe encounters). The smallest potential for conflict

existed from monitoring the situation (which was highly acceptable) and lethal control (which

was highly unacceptable) in response to Scenario 1 (A black bear is seen along a popular hiking

trail). These actions also have the highest and lowest mean acceptability ratings of all scenarios,

respectively. This may reflect minimal value collisions among respondents, who likely do not

perceive a significant negative impact associated with the specific encounter and thus don't see a

need for drastic management actions. Although inclination may lead us to believe that the most

potential for conflict will typically occur as a result of the most severe human-bear encounters or

the most severe management actions, our data suggests otherwise. Respondents tended to agree

on the acceptability of the least and most severe responses, but disagreed strongly on the

intermediate interventions. The management strategies that typically had the highest potential for

conflict were aversive conditioning and trapping and relocating. These findings contrast with

those reported in Manfredo et al. (2003), which surveyed respondents from 6 western states and

found the highest potential for conflict existed for leaving the bear alone and destroying the bear

in the scenario that a bear damages property in a residential area. In the aforementioned study, 4

out of the 6 states surveyed have substantial black bear populations (Alaska, Arizona, Colorado

and Idaho). Differences in our findings may reflect differences in familiarity with bears and bear

management techniques or a number of other regional factors.

Although black bear attacks on humans are exceedingly rare, lethal response is likely if

attacks do occur. Our data shows that most respondents felt that lethal control of bears was

unacceptable even in situations where a threat to human safety could be legitimately perceived.

Our results contrasted somewhat with similar studies in North Carolina (Palmer et al., 2011),

where residents had a higher mean acceptability for lethal control in the scenario that a bear

chases a pet, though they still considered lethal control in this scenario unacceptable on average. Respondents in North Carolina also considered lethal control acceptable for scenarios where a bear tried to enter a person's home and when a bear injures a human. When they feel that long-term, permanent removal is necessary, respondents in our study appear to see trapping and relocating as a more desirable strategy than lethal control.

Management Implications

Acceptability means and PCI$_2$ scores suggest that management agencies should only implement lethal control measures in scenarios where it is absolutely necessary. Respondents were in relatively widespread agreement that lethal control was not an acceptable response to most scenarios, so the strongest potential for conflict arising from this management method may be between management agencies and the public should the agency decide to euthanize a problem bear. The majority of wildlife management agencies in the U.S. in regions with substantial bear populations have well defined protocols and standard operating procedures for field personnel responding to complaints regarding bears and other charismatic species (Spencer et al., 2007). Typically, these protocols are based on a combination of research and public input (Wittman, Vaske, Manfredo & Zinn, 1998). For instance, after public outcry following management actions in response to human-mountain lion conflicts in Arizona between 2001 and 2004, the Arizona Game and Fish Department developed a Mountain Lion Action Plan that outlined how specific encounters between humans and mountain lions would be handled (Wakeling et al., 2009). If agencies in Alabama are proactive rather than reactive in developing similar protocols for bears, excessive conflicts and controversies can likely be avoided.

There was broad acceptability of trapping and relocating problem bears along with mostly negative views toward lethal control. Although trapping and relocating is currently the

most common agency response to problem bears other than simple site monitoring (Spencer et al., 2007), studies have shown a number of problems associated with relocating wildlife as a means of management and conflict control including disruption of population dynamics, disease spread and an increased chance of vehicle collisions (Aiello et al., 2014; Beringer et al., 2004). In the case of black bears, relocating an individual who is habituated to human presence may simply be transferring the problem to a different community. Wildlife managers and biologists must decide whether or not they are willing to take the risks of relocating habituated large carnivores across natural boundaries. The general public is likely not aware of the dangers of moving animals and if they were, may be less likely to see it as an acceptable option. Research has shown that people who are exposed to educational materials on black bears are more likely to feel that bears are being properly managed and accept management actions (Lakes & Sharp, 2015). If relocation is not seen as a viable or safe management method and residents are educated on why those decisions were made, they may be more accepting of lethal management when permanent removal is deemed necessary.

Conclusion

Widespread disagreement on the acceptability of management responses and the resulting conflicts can exhaust funding for conservation projects and draw unwanted attention to wildlife issues (Jacobson & McDuff 1998; Frank Johansson & Flykt, 2015; Treves, Naughton-Treves & Shelley, 2013). A quick Google search on Florida's implementation of a 2015 bear hunt will reveal numerous articles heavily criticizing wildlife agencies in the state and their ability to effectively manage wildlife species (Shiffman, 2015; Wilkinson, 2015; Orr, 2015). Regardless of the validity of these writings or the merit of their authors, bad press can have adverse effects on public perceptions of the agency and weaken the community level trust that is so important in

effective management. While some level of conflict is unavoidable, information obtained from this research can help agencies best align their management objectives with those of Alabama residents in order to maximize stakeholder satisfaction and agency approval.

Both severity and frequency of the bear encounter had a significant influence on the acceptability of methods and the potential for conflict associated with those methods, further supporting previous research that has underlined the importance of context in management preferences among citizens (Zinn et al, 1998; Wittman et al., 1998; Decker, Jacobson & Brown, 2006). Evaluating these factors in a non-specific way (i.e. general acceptability of lethal control) may lead to inaccurate conclusions regarding public opinions of a management method, so we suggest that any assessments on these factors be done at the most specific level possible. Finally, although disagreement among the general public is important, it is only one of the ways that wildlife agencies have to deal with conflict. We suggest that future studies utilize PCI_2 in order to investigate the differences in management method preference between the general public, wildlife management professionals and wildlife researchers.

References

Agee, J.D., & Miller, C.A. (2009). Factors contributing toward acceptance of lethal control of black bears in Central Georgia, USA. *Human Dimensions of Wildlife*, 14, 198-205.

Aiello, C.M., Nussear, K.E., Walde, A.D., Esque, T.C., Emblidge, P.G., Sah, P., Bansal, S., & Hudson, P.J. (2014). Disease dynamics during wildlife translocations: disruptions to the host population and potential consequences for transmission in desert tortoise contact networks. *Animal Conservation*, 17, 27–39.

Ajzen, I. & Fishbein, F. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice Hall.

Associated Press (2014). Black bears on the rise in Northeast Alabama. *Times Free Press*. Retrieved from http://www.timesfreepress.com/news/local/story/2014/nov/10/black-bears-on-rise-in-northeast-alabama/273032/

Beringer, J., Hansen, L.P., Demand, J.A., Sartwell, J., Wallendorf, M., & Mange, R. (2002). Efficacy of translocation to control urban deer in Missouri: Costs, efficiency, outcome. *Wildlife Society Bulletin*, 30, 767–774.

Carr, P. C., & Burguess, K. (2004). Black bear in New Jersey status report 2004. Trenton: New Jersey Division of Fish and Wildlife.

Decker, D.J., Jacobson, C.A., & Brown, T.L. (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.

Decker, D. J., & O'Pezio, J. (1989). Consideration of bear–people conflicts in black bear management for the Catskill region of New York: Application of a comprehensive management model. In M. Bromley (Ed.), Bear-people conflicts: Proceedings of a symposium on management strategies (pp. 181–187). Yellowknife, Northwest Territories, Canada: Northwest Territories Department of Renewable Resources.

Decker, D. J., & Purdy, K. G.. (1988). Toward A Concept of Wildlife Acceptance Capacity in Wildlife Management. *Wildlife Society Bulletin*, 16(1), 53–57.

De Dreu, Carsten K. W.; Harinck, Fieke; Van Vianen, Annelies E. M., Cooper, Cary L., Robertson & Ivan T. (1999). Conflict and performance in groups and organizations. *International review of industrial and organizational psychology*, 14, 369-414.

Dillman, D., & Smyth, J. (2009). Internet, mail, and mixed-mode surveys: The tailored design

method. (3rd ed.). Hoboken, N.J.: Wiley & Sons.

Don Carlos, A.W., Bright, A.D., Teel, T.L. & Vaske, J.J. (2009). Human Black Bear Conflict in

Urban Areas: An Integrated Approach to Management Response. *Human Dimensions of

Wildlife*, 14(3), 174-184.

Frank, J., Johansson, M. & Flykt, A. (2015). Public attitude towards the implementation of

management actions aimed at reducing human fear of brown bears and wolves. *Wildlife

Biology*, 21, 122–130.

Heimlich, R. E., & Anderson, W. D. (2001). Development at the Urban Fringe and Beyond:

Impacts on Agriculture and Rural Land. *Monographs of the Society for Research in Child

Development*, 66(1), 146–147.

Hersey, K.R. (2004). Habitat assessment for potential reintroduction of black bears to the

Mobile-Tensaw Delta of southwestern Alabama. Unpublished master's thesis, University

of Tennessee, Knoxville, Tennessee.

Howell, A. H. (1921). A biological survey of Alabama. North American Fauna, 1-89.

Jacobs, M. H., Vaske, J. J., Dubois, S., & Fehres, P. (2014). More than fear: Role of emotions in

acceptability of lethal control of wolves. *European Journal of Wildlife Research*, 60(4),

589–598.

Jacobs, M. H., Vaske, J. J., & Sijtsma, M. T. (2014). Predictive potential of wildlife value

orientations for acceptability of management interventions. *Journal for Nature

Conservation*, 22(4), 377–383.

Jacobson, S.K. & McDuff, M. (1998). Training idiot savants: The lack of human dimensions in

conservation biology. *Conservation Biology*, 12(2), 263-267.

Johnson, B.B. & Sciascia, J. (2013) Views on Black Bear Management in New Jersey. *Human Dimensions of Wildlife*, 18(4), 249-262

Koval, M.H., & Mertig, A.G. (2004). Attitudes of the Michigan public and wildlife agency personnel toward lethal wildlife management. *Wildlife Society Bulletin*, 31(1), 232-243.

Lakes, R.M. & Sharp, R. (2015) Visitor Perceptions of Black Bear Management Options in Big South Fork National River and Recreation Area, USA. *Human Dimensions of Wildlife*, 20(2), 185-187.

Likert, R. (1932). A Technique for the Measurement of Attitudes. *Archives of Psychology*, 140, 1–55.

Lowery, D. R., Morse, W. C., & Steury, T. D. (2012). Biological and Social Investigation of Human–Black Bear Conflicts in the Panhandle of Florida. *Human Dimensions of Wildlife*, 17(3), 193–206.

Loyd, K.A.T., & Miller, C.A. (2010). Influence of demographics, experience and value orientations on preferences for lethal management of feral cats. *Human Dimensions of Wildlife*, 15(4), 262-273.

Manfredo, M., Vaske, J., & Teel, T. (2003). The Potential for Conflict Index: A Graphic Approach to Practical Significance of Human Dimensions Research. *Human Dimensions of Wildlife*, 8(3), 219–228.

Messmer, T. A. (2000). The emergence of human-wildlife conflict management: turning challenges into opportunities. *International Biodeterioration & Biodegradation*, 45(3-4), 97–102.

Orr, J. (2015, November 02). Florida Black Bear Hunt Is a Travesty; The Attack on Wildlife Has

    to End. *The Huffington Post*. Retrieved March 08, 2016, from

    http://www.huffingtonpost.com/julia-orr/florida-black-bear-hunt-i_b_8445826.html

Palmer, D., Jones, M.D., Olfenbuttel, C., & Cobb, D.T. (2011). Acceptance of North Carolinans

    for Strategies to Manage Human-black Bear Interactions. *Proceedings from the Annual*

    Conference of Southeastern Association of Fish and Wildlife Agencies, 65, 27-31.

Peine, J.D. (2001). Nuisance bears in communities: strategies to reduce conflict. *Human*

    Dimensions of Wildlife, 6, 223–237.

Reiter, D.K., Brunson, M.W., & Schmidt, R.H. (1999). Public attitudes toward wildlife damage

    management and policy. *Wildlife Society Bulletin*, 27(3), 746-758.

Shiffman, D. (2015, October 29). 298 bears killed in Florida hunt that 'ignored science'. *The*

    Washington Post. Retrieved March 04, 2016, from

    https://www.washingtonpost.com/news/speaking-of-science/wp/2015/10/29/298-bears-

    killed-in-florida-hunt-that-ignored-science/

Siemer, W. F., Hart, P. S., Decker, D. J., & Shanahan, J. E. (2009). Factors that Influence

    Concern About Human–Black Bear Interactions in Residential Settings. *Human*

    Dimensions of Wildlife, 14, 185–197.

Sijtsma, M. T. J., Vaske, J. J., & Jacobs, M. H. (2012). Acceptability of Lethal Control of

    Wildlife that Damage Agriculture in the Netherlands. *Society & Natural Resources*,

    25(12), 1308–1323.

Smith, J.B., Nielsen, C.K., & Hellgren, E.C. (2014). Illinois resident attitudes toward

    recolonizing large carnivores. *The Journal of Wildlife Management*, 78(5), 930-943.

Spencer, R. D., Beausoleil, R.A., & Martorello, D.A. (2007). How Agencies Respond to
Human–black Bear Conflicts: A Survey of Wildlife Agencies in North America. *Ursus*,
18(2), 217–229.

Teel, T. L., Krannich, R. S., & Schmidt, R. H. (2002). Utah stakeholders attitudes toward
selected cougar and black bear management practices. *Wildlife Society Bulletin*, 30(1), 2–
15.

Teel, T. L., Dayer, A. A., Manfredo, M. J., & Bright, A. D. (2005). Regional results from the
research project entitled "Wildlife Values in the West." (Project Rep. No. 58). *Project
Report for the Western Association of Fish and Wildlife Agencies*. Fort Collins, CO:
Colorado State University, Human Dimensions in Natural Resources Unit.

Terris, J. (1999). Unwelcome (human) neighbors: the impacts of sprawl on wildlife. *Natural
Resources Defense Council*. [online] URL: http://www.nrdc.org/cities/
smartgrowth/pwild.asp

Treves, A., Naughton-Treves, L., Harper, E. K., Mladenoff, D. J., Rose, R. A., Sickley, T. A., &
Wydeven, A.P. (2004). Predicting human-carnivore conflict: A spatial model derived
from 25 years of data on wolf predation on livestock. *Conservation Biology*, 18(1), 114–
125.

Treves, A., Naughton-Treves, L. & Shelley, V. (2013). Longitudinal analysis of attitudes toward
wolves. *Conservation Biology*, 27(2), 315-323.

Urbanek, R. E., Nielsen, C. K., Davenport, M. A., & Woodson, B. D. (2012). Acceptability and
Conflict Regarding Suburban Deer Management Methods. *Human Dimensions of
Wildlife*, 17(6), 389–403.

U.S. Census Bureau. (2010). Demographic of Mobile County, AL. Retrieved from

    http://www.census.gov/quickfacts/table/PST045215/01097

Vaske, J. J., Beaman, J., Barreto, H., & Shelby, L. B. (2010). An Extension and Further

    Validation of the Potential for Conflict Index. *Leisure Sciences*, 32(3), 240–254.

Wakeling, B., Broscheid, B., Thompson, R., Boe, S., Millican, J., Swain, M., McMullen, C.,

    Culver, M., McKinney, T., Conrad, D., Langely, R., Day, R., Munig, A., & Stewart, B.

    (2009). Arizona Game and Fish Department Mountain Lion and Bear Conservation

    Strategies Report. Arizona Game and Fish Department.

Wilkinson, T. (2015, October 23). Is Florida's Bear Hunt Necessary? *National Geographic*.

    Retrieved March 08, 2016, from http://news.nationalgeographic.com/2015/10/151023-

    black-bear-hunt-florida-animals-conservation/

Witmer, G.W. & Whittaker, D.G., (2001). Deal with nuisance and depredating black bears.

    USDA National Wildlife Research Center. Staff Publications. Paper 581.

Wittmann, K., Vaske, J. J., Manfredo, M. J., & Zinn, H. C. (1998). for Lethal Response To

    Problem Urban Wildlife. *Human Dimensions of Wildlife*, 3(4), 29–48.

Zinn, H. C., Manfredo, M. J., Vaske, J. J., & Wittmann, K. (1998). Using normative beliefs to

    determine the acceptability of wildlife management actions. *Society & Natural*

    Resources, *11*(7), 649–662

Table 3.1
Mean acceptability of five potential wildlife agency responses to common
human-bear encounter scenarios among two frequency types

Encounter	Management Response	Mean	Std. Dev.
Scenario 1	Educate	1.31	0.691
(one time)	Monitor	1.23	0.743
	Frighten	0.14	1.155
	Capture/Relocate	0.21	1.244
	Euthanize	-1.36	0.912
Scenario 1	Educate	1.30	0.753
(frequent)	Monitor	1.19	0.88
	Frighten	0.43	1.172
	Capture/Relocate	0.73	1.092
	Euthanize	-1.20	1.025
Scenario 2	Educate	1.30	0.729
(one time)	Monitor	1.25	0.741
	Frighten	0.55	1.134
	Capture/Relocate	0.53	1.166
	Euthanize	-1.29	0.968
Scenario 2	Educate	1.21	0.929
(frequent)	Monitor	1.05	1.043
	Frighten	0.66	1.202
	Capture/Relocate	1.14	0.871
	Euthanize	-1.07	1.159
Scenario 3	Educate	1.22	0.885
(one time)	Monitor	1.17	0.874
	Frighten	0.67	1.153
	Capture/Relocate	0.71	1.135
	Euthanize	-1.14	1.063
Scenario 3	Educate	1.14	1.021
(frequent)	Monitor	0.99	1.129
	Frighten	0.68	1.238
	Capture/Relocate	1.21	0.871
	Euthanize	-0.83	1.293

(*Continued*)

Encounter	Management Response	Mean	*Std. Dev.*
Scenario 4 (one time)	Educate	1.31	0.826
	Monitor	1.21	0.897
	Frighten	0.83	1.131
	Capture/Relocate	0.79	1.093
	Euthanize	-1.11	1.101
Scenario 4 (frequent)	Educate	1.21	1.013
	Monitor	1.04	1.143
	Frighten	0.80	1.223
	Capture/Relocate	1.23	0.929
	Euthanize	-0.70	1.353

(Continued)

Table 3.2

Repeated measures two-way analysis of variance for the acceptability of black bear management actions by severity, frequency, and severity*frequency interaction

Management Response	F statistic	p-value	eta^2
Euthanize			
Severity	65.830	<0.001	0.116
Frequency	126.135	<0.001	0.200
Severity*Frequency	13.384	<0.001	0.026
Capture/Relocate			
Severity	121.707	<0.001	0.194
Frequency	247.424	<0.001	0.329
Severity*Frequency	4.328	0.006	0.008
Aversive Conditioning			
Severity	88.098	<0.001	0.150
Frequency	16.823	<0.001	0.032
Severity*Frequency	22.658	<0.001	0.043
Monitor			
Severity	6.853	<0.001	0.013
Frequency	34.565	<0.001	0.064
Severity*Frequency	7.734	<0.001	0.015
Educate			
Severity	7.268	<0.001	0.014
Frequency	8.901	0.003	0.017
Severity*Frequency	3.894	0.009	0.008

Table 3.3

Differences in mean acceptability of black bear management responses between northeast and southwest regions of Alabama for all encounter scenarios

Encounter	Management Response	*t* value	Mean Difference	p-value (2-tailed)
Scenario 1 (one time)	Educate	0.109	0.007	0.913
	Monitor	1.694	0.110	0.091
	Frighten	-0.543	-0.056	0.588
	Capture/Relocate	-0.027	-0.003	0.979
	Euthanize	-2.003	-0.161	0.046
Scenario 1 (frequent)	Educate	0.425	0.028	0.671
	Monitor	0.804	0.062	0.422
	Frighten	0.721	0.075	0.471
	Capture/Relocate	1.124	0.109	0.261
	Euthanize	-1.637	-0.148	0.102
Scenario 2 (one time)	Educate	2.212	0.142	0.027
	Monitor	1.967	0.128	0.050
	Frighten	-0.086	-0.009	0.932
	Capture/Relocate	1.162	0.120	0.246
	Euthanize	-1.840	-0.158	0.066
Scenario 2 (frequent)	Educate	0.988	0.082	0.324
	Monitor	1.711	0.159	0.088
	Frighten	0.137	0.015	0.891
	Capture/Relocate	1.257	0.097	0.209
	Euthanize	-2.058	-0.211	0.040
Scenario 3 (one time)	Educate	0.946	0.074	0.345
	Monitor	0.172	0.013	0.863
	Frighten	-1.821	-0.185	0.069
	Capture/Relocate	0.980	0.099	0.327
	Euthanize	-1.255	-0.117	0.210
Scenario 3 (frequent)	Educate	0.978	0.089	0.328
	Monitor	0.567	0.057	0.571
	Frighten	-0.831	-0.091	0.407
	Capture/Relocate	1.412	0.109	0.159
	Euthanize	-1.686	-0.192	0.092

(*Continued*)

Encounter	Management Response	*t* value	Mean Difference	p-value (2-tailed)
Scenario 4 (one time)	Educate	-0.416	-0.031	0.677
	Monitor	0.611	0.049	0.542
	Frighten	-0.232	-0.023	0.817
	Capture/Relocate	-0.106	-0.010	0.916
	Euthanize	-1.975	-0.192	0.049
Scenario 4 (frequent)	Educate	0.135	0.012	0.893
	Monitor	0.541	0.055	0.589
	Frighten	-0.660	-0.072	0.510
	Capture/Relocate	1.009	0.083	0.314
	Euthanize	-0.914	-0.109	0.361

(Continued)

Table 3.4

Differences in mean acceptability of black bear management responses
between urban and rural residents for all encounter scenarios

Encounter	Management Response	t value	Mean Difference	p-value (2-tailed)
Scenario 1 (*one time*)	Educate	-2.173	-0.198	0.031
	Monitor	-3.235	-0.318	0.001
	Frighten	-0.034	-0.005	0.973
	Capture/Relocate	0.825	0.136	0.410
	Euthanize	2.441	0.289	0.015
Scenario 1 (*frequent*)	Educate	-2.300	-0.232	0.022
	Monitor	-1.469	-0.172	0.143
	Frighten	-0.432	-0.065	0.666
	Capture/Relocate	-0.889	-0.133	0.375
	Euthanize	2.126	0.283	0.035
Scenario 2 (*one time*)	Educate	-2.450	-0.246	0.015
	Monitor	-2.544	-0.248	0.012
	Frighten	-0.063	-0.009	0.950
	Capture/Relocate	0.162	0.025	0.871
	Euthanize	2.770	0.369	0.006
Scenario 2 (*frequent*)	Educate	-3.450	-0.454	0.001
	Monitor	-1.305	-0.185	0.193
	Frighten	-0.549	-0.087	0.584
	Capture/Relocate	-0.702	-0.084	0.483
	Euthanize	2.214	0.348	0.028
Scenario 3 (*one time*)	Educate	-2.856	-0.353	0.005
	Monitor	-1.742	-0.211	0.083
	Frighten	-0.432	-0.066	0.666
	Capture/Relocate	0.093	0.014	0.926
	Euthanize	1.270	0.178	0.206
Scenario 3 (*frequent*)	Educate	-2.684	-0.374	0.008
	Monitor	-1.728	-0.260	0.086
	Frighten	-1.391	-0.225	0.166
	Capture/Relocate	-0.795	-0.093	0.428
	Euthanize	1.337	0.234	0.183

(*Continued*)

	(*Continued*)			
Encounter	Management Response	*t* value	Mean Difference	p-value (2-tailed)
Scenario 4 (one time)	Educate	-2.501	-0.289	0.013
	Monitor	-2.213	-0.281	0.028
	Frighten	-0.039	-0.006	0.969
	Capture/Relocate	0.438	0.061	0.662
	Euthanize	2.212	0.326	0.028
Scenario 4 (frequent)	Educate	-2.583	-0.365	0.010
	Monitor	-2.373	-0.375	0.019
	Frighten	-1.751	-0.293	0.081
	Capture/Relocate	-0.781	-0.098	0.436
	Euthanize	1.090	0.201	0.277

Table 3.5

Comparison of PCI2 values between respondents from the southwest and northeast regions of Alabama for each scenario and management response

| Scenario | Management Response | Southwest | | Northeast | | |
		PCI_2	SD	PCI_2	SD	d
Scenario 1 (once)	Monitor	0.03	0.015	0.09	0.025	2.06**
	Frighten	0.33	0.025	0.28	0.023	1.47
	Relocate	0.39	0.029	0.32	0.024	1.86*
	Euthanize	0.09	0.028	0.15	0.032	1.41
Scenario 1 (frequent)	Monitor	0.12	0.027	0.14	0.029	0.5
	Frighten	0.33	0.029	0.29	0.024	1.06
	Relocate	0.23	0.031	0.26	0.032	0.67
	Euthanize	0.11	0.032	0.21	0.035	2.11**
Scenario 2 (once)	Monitor	0.03	0.016	0.11	0.029	2.42**
	Frighten	0.31	0.03	0.26	0.025	1.28
	Relocate	0.25	0.032	0.32	0.029	1.62
	Euthanize	0.08	0.026	0.19	0.034	2.57**
Scenario 2 (frequent)	Monitor	0.2	0.033	0.28	0.036	1.64*
	Frighten	0.35	0.034	0.30	0.031	1.09
	Relocate	0.11	0.028	0.14	0.027	0.77
	Euthanize	0.19	0.035	0.32	0.038	2.52**
Scenario 3 (once)	Monitor	0.15	0.029	0.13	0.029	0.49
	Frighten	0.33	0.03	0.23	0.031	2.32**
	Relocate	0.26	0.031	0.28	0.032	0.45
	Euthanize	0.15	0.03	0.23	0.038	1.65*
Scenario 3 (frequent)	Monitor	0.29	0.039	0.31	0.036	0.38
	Frighten	0.38	0.031	0.31	0.033	1.55
	Relocate	0.10	0.028	0.15	0.031	1.2
	Euthanize	0.32	0.036	0.39	0.038	1.34
Scenario 4 (once)	Monitor	0.14	0.032	0.15	0.029	0.23
	Frighten	0.30	0.035	0.23	0.031	1.5
	Relocate	0.23	0.032	0.26	0.031	0.67
	Euthanize	0.17	0.035	0.25	0.035	1.46
Scenario 4 (frequent)	Monitor	0.28	0.039	0.31	0.036	0.57
	Frighten	0.38	0.037	0.29	0.034	1.79*
	Relocate	0.13	0.033	0.17	0.032	0.87
	Euthanize	0.36	0.038	0.41	0.034	0.98

[a]Double asterisk (**) indicates significance at $p = <0.05$
[b]Single asterisk (*) indicates significance at $p = <0.10$

TABLE 3.6

Comparison of PCI2 values between respondents from rural and urban
community types for each scenario and management response

Scenario	Management Response	Rural		Urban		
		PCI_2	StdDev	PCI_2	StdDev	d
Scenario 1 (once)	Monitor	0.10	0.041	0.02	0.019	1.77*
	Frighten	0.23	0.031	0.38	0.036	3.16*
	Relocate	0.32	0.037	0.34	0.040	0.37
	Euthanize	0.14	0.043	0.05	0.038	1.57
Scenario 1 (frequent)	Monitor	0.11	0.038	0.16	0.051	0.79
	Frighten	0.27	0.036	0.30	0.047	0.51
	Relocate	0.27	0.039	0.25	0.046	0.33
	Euthanize	0.18	0.051	0.08	0.042	1.51
Scenario 2 (once)	Monitor	0.11	0.043	0.02	0.018	1.93*
	Frighten	0.24	0.04	0.23	0.045	0.17
	Relocate	0.27	0.04	0.28	0.045	0.16
	Euthanize	0.21	0.039	0.07	0.047	2.13**
Scenario 2 (frequent)	Monitor	0.28	0.053	0.18	0.048	1.40
	Frighten	0.32	0.052	0.26	0.052	0.82
	Relocate	0.16	0.043	0.11	0.041	0.84
	Euthanize	0.33	0.056	0.15	0.054	2.31**
Scenario 3 (once)	Monitor	0.16	0.05	0.14	0.044	0.30
	Frighten	0.25	0.049	0.29	0.051	0.57
	Relocate	0.22	0.038	0.27	0.043	0.87
	Euthanize	0.22	0.044	0.11	0.043	1.79*
Scenario 3 (frequent)	Monitor	0.31	0.052	0.23	0.058	1.03
	Frighten	0.33	0.057	0.27	0.051	0.78
	Relocate	0.15	0.048	0.08	0.036	1.17
	Euthanize	0.38	0.049	0.32	0.052	0.84
Scenario 4 (once)	Monitor	0.20	0.053	0.13	0.048	0.98
	Frighten	0.27	0.052	0.27	0.052	0.0
	Relocate	0.22	0.041	0.17	0.041	0.86
	Euthanize	0.30	0.051	0.08	0.041	3.36**
Scenario 4 (frequent)	Monitor	0.35	0.054	0.25	0.058	1.26
	Frighten	0.34	0.052	0.32	0.060	0.25
	Relocate	0.18	0.053	0.13	0.048	0.70
	Euthanize	0.43	0.045	0.39	0.051	0.59

[a]Double asterisk (**) indicates significance at $p = <0.05$
[b]Single asterisk (*) indicates significance at $p = <0.10$
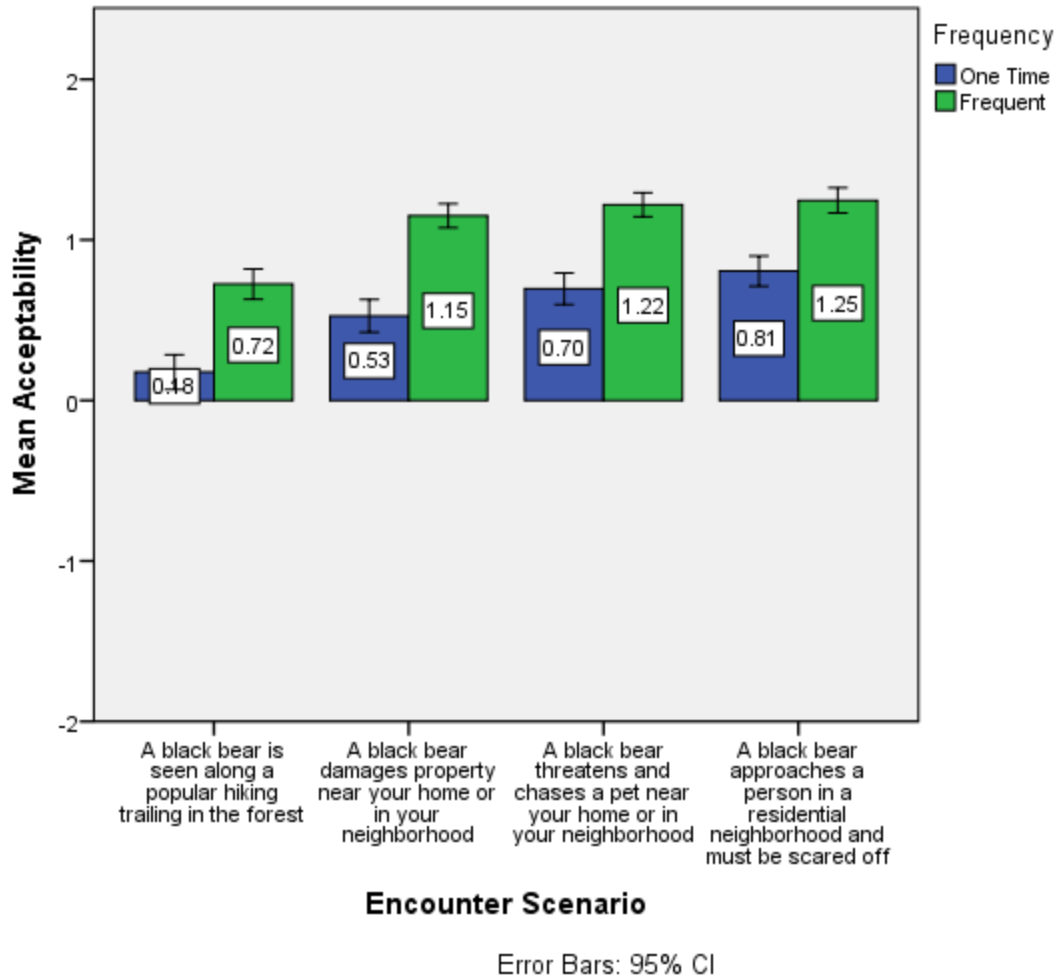
Figure 3.1 Comparison of the acceptability of trapping and relocating black bears between one time and frequent occurrences for four potential bear encounter scenarios
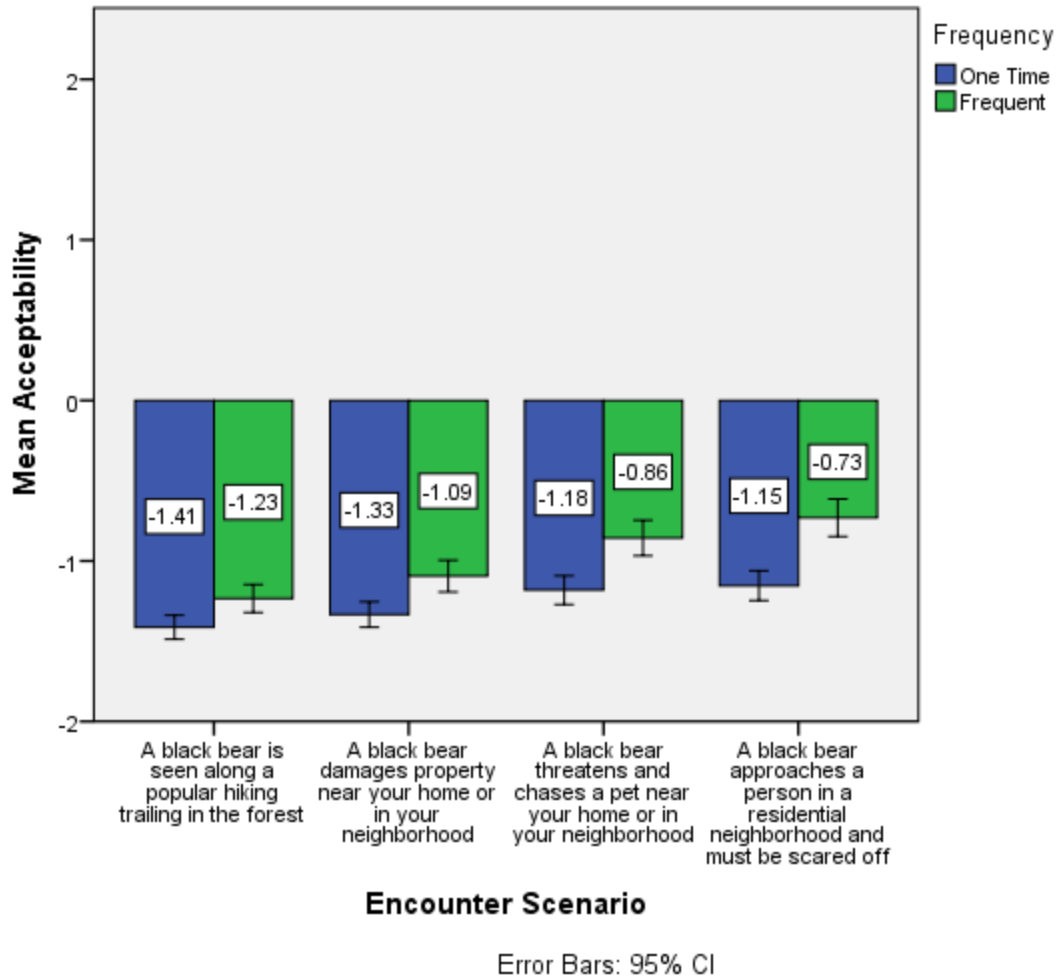
Figure 3.2 Comparison of the mean acceptability of lethal control of black bears between one time and frequent occurrences for four potential bear encounter scenarios
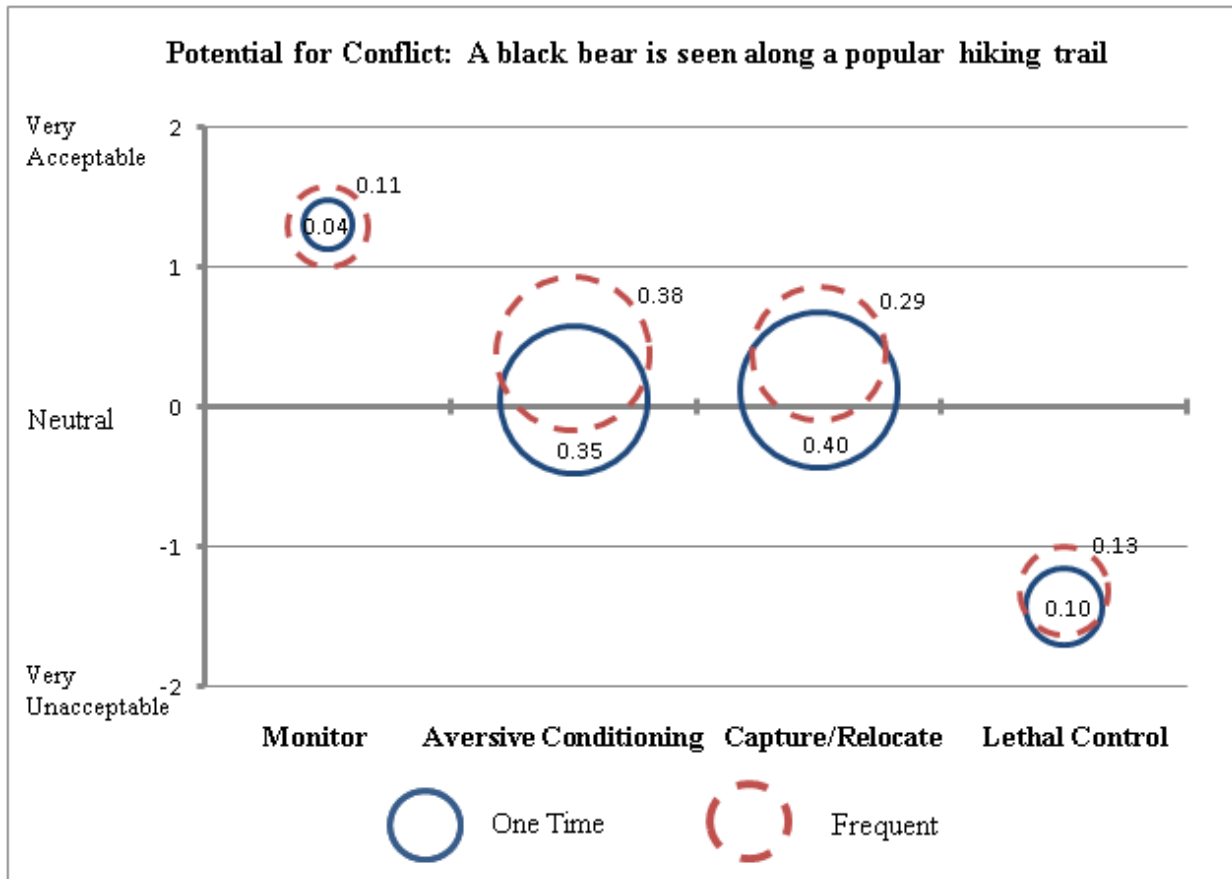
FIGURE 3.3 The Potential for Conflict Index (PCI2) from monitoring the situation, aversive conditioning, capture and relocating and lethal control for both one time and frequent occurrences of a bear being seen along a popular hiking trail.
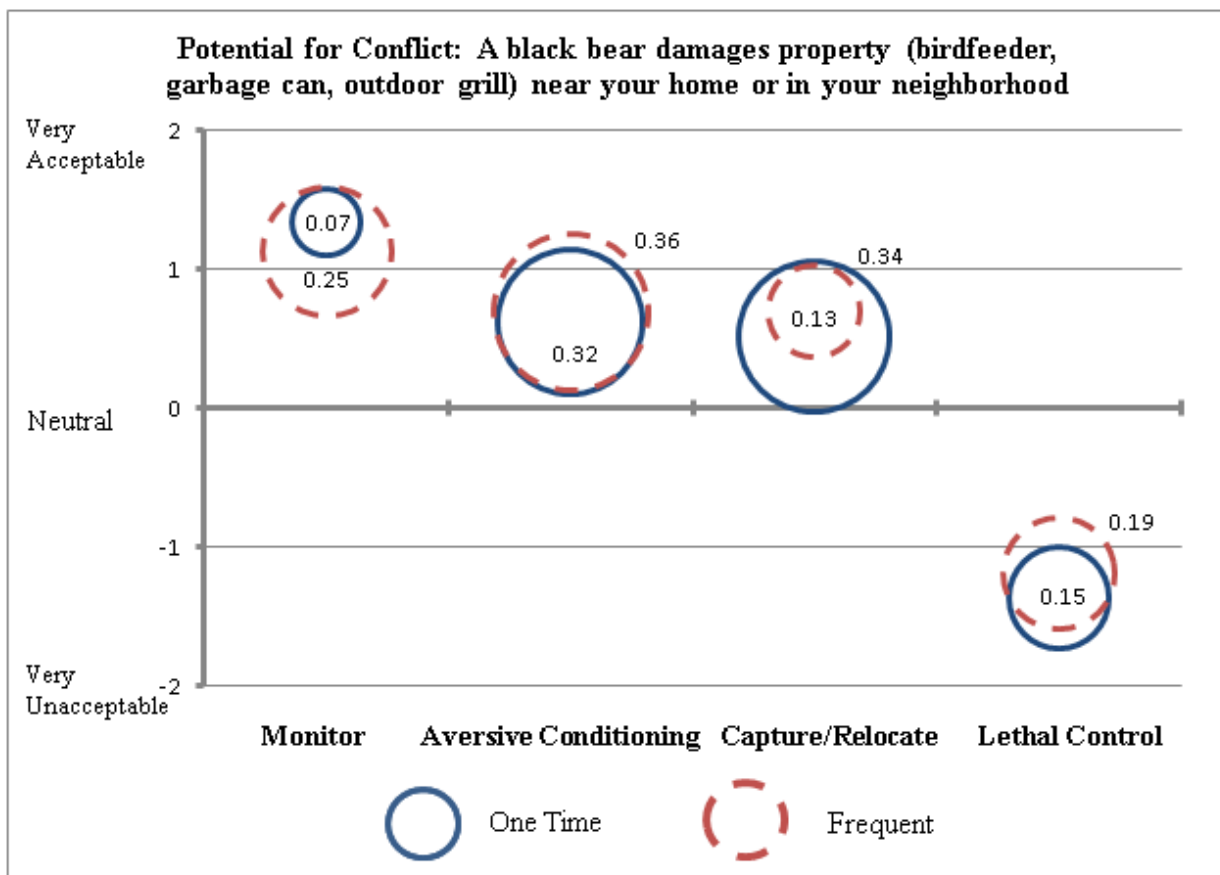
FIGURE 3.4 The Potential for Conflict Index (PCI2) from monitoring the situation, aversive conditioning, capture and relocating and lethal control for both one time and frequent occurrences of a bear damaging property (birdfeeder, garbage can, outdoor grill) near respondents home or in their neighborhood.
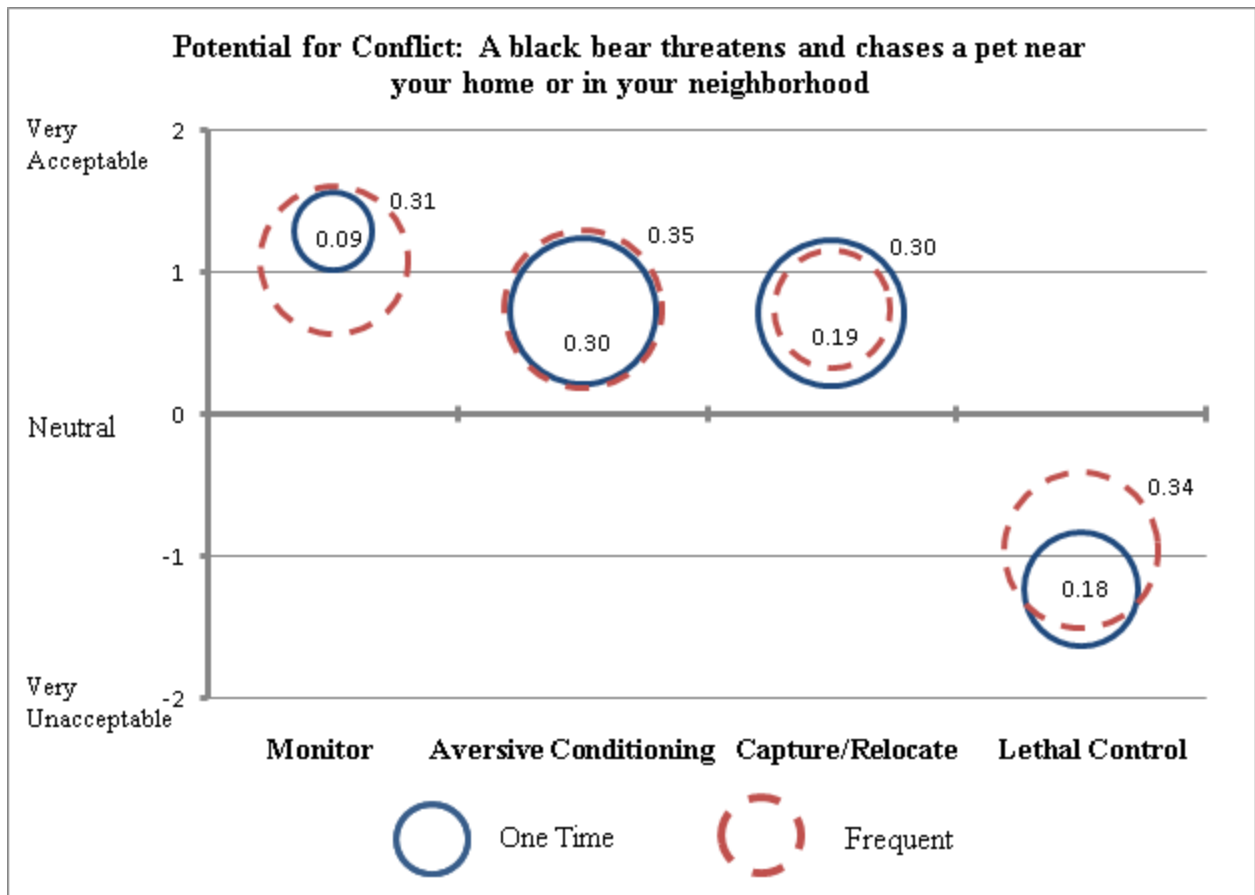
FIGURE 3.5 The Potential for Conflict Index (PCI2) from monitoring the situation, aversive conditioning, capture and relocating and lethal control for both one time and frequent occurrences of a black bear threatening and chasing a pet near respondents home or in their neighborhood.
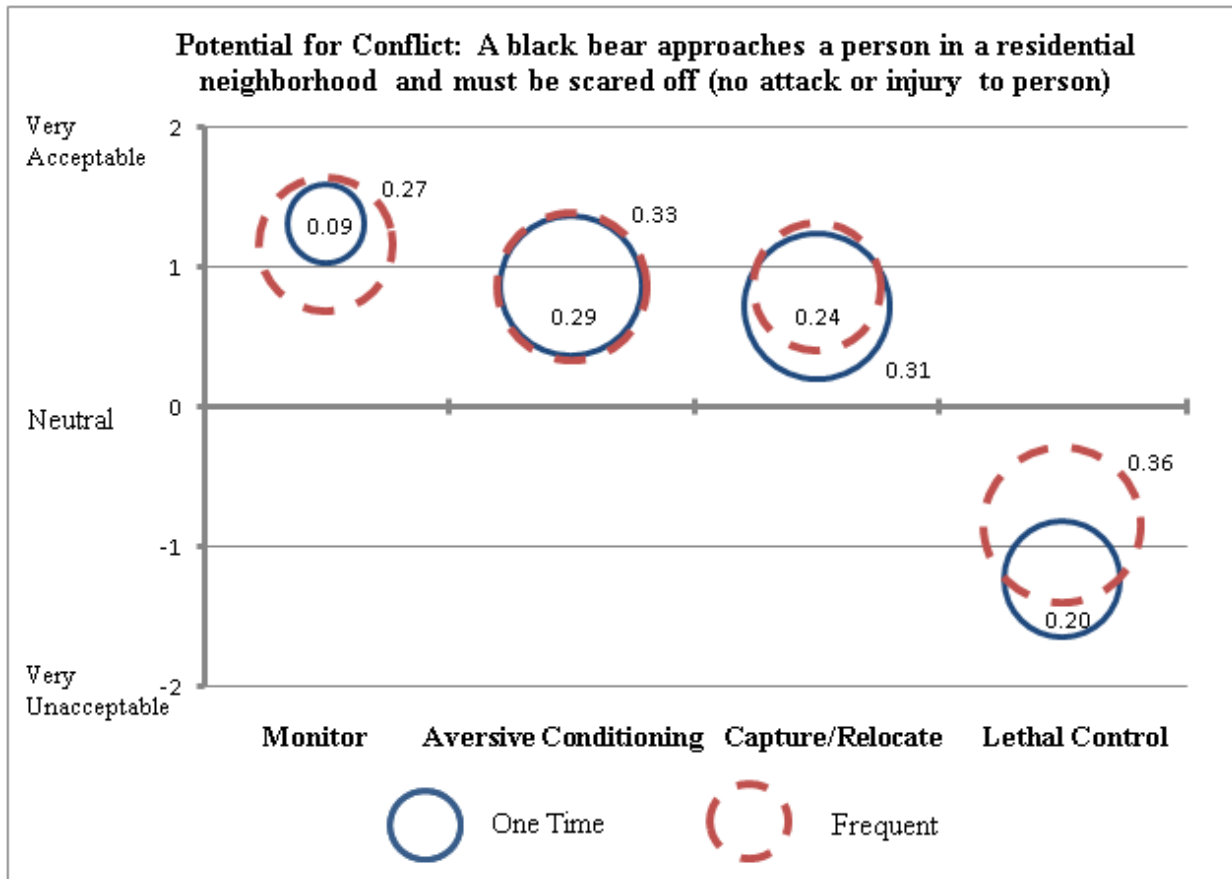
FIGURE 3.6 The Potential for Conflict Index (PCI2) from monitoring the situation, aversive conditioning, capture and relocating and lethal control for both one time and frequent occurrences of a black bear approaching a person in a residential neighborhood and having to be scared off, with no attack or injury to the person.
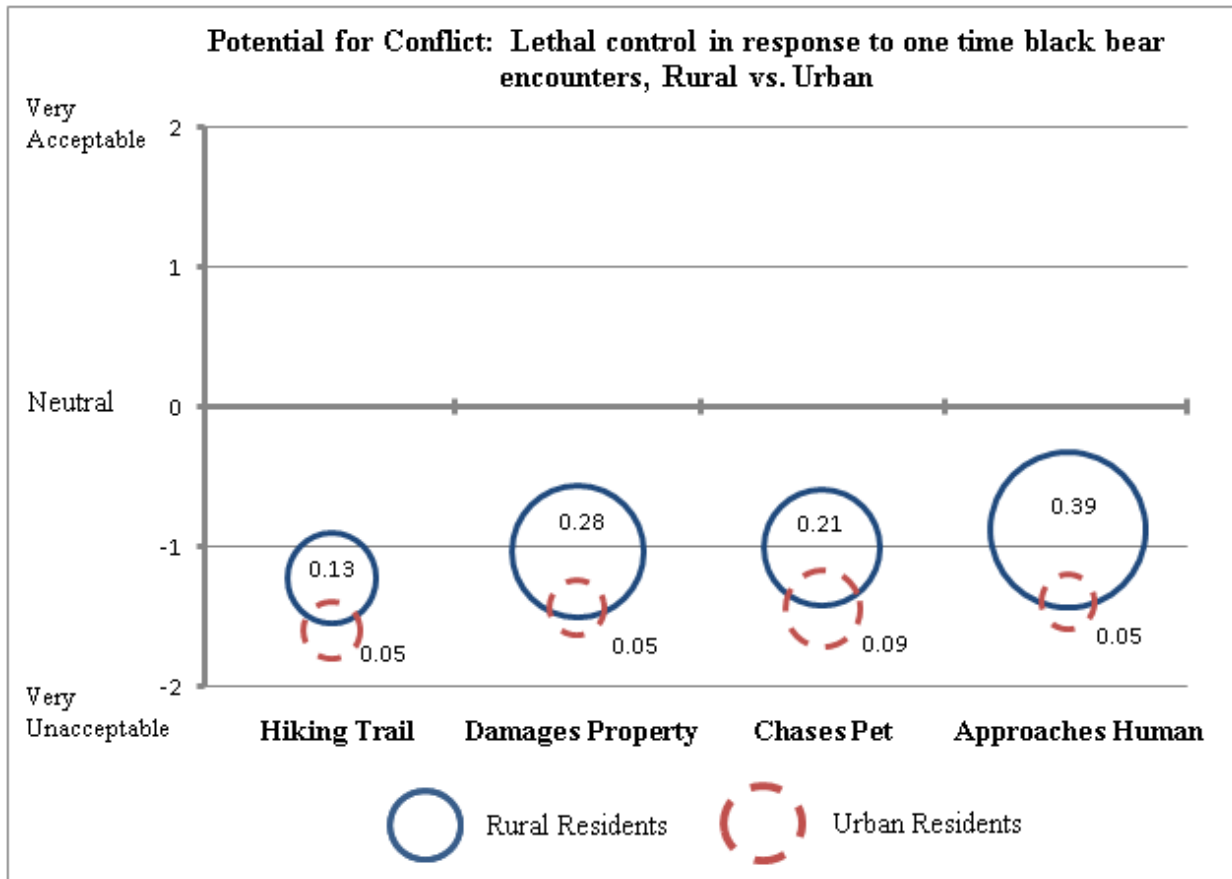
FIGURE 3.7 The Potential for Conflict Index (PCI2) from lethal control in response to four potential black bear encounter scenarios evaluated as a one-time occurrence.
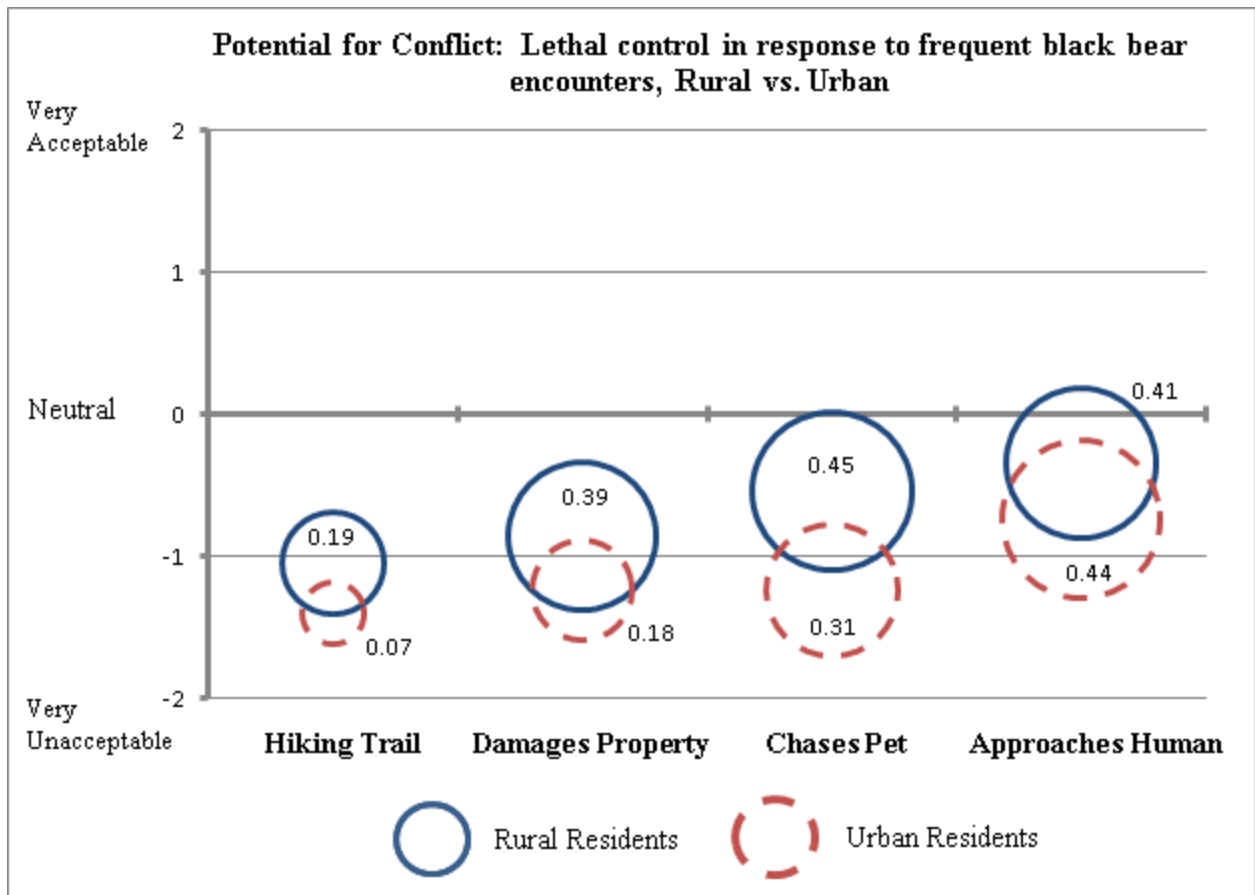
FIGURE 3.8 The Potential for Conflict Index (PCI2) from lethal control in response to four potential black bear encounter scenarios evaluated as a frequent occurrence.

2015 Alabama Black Bear Survey

Understanding your views and attitudes towards black bears and other Alabama wildlife
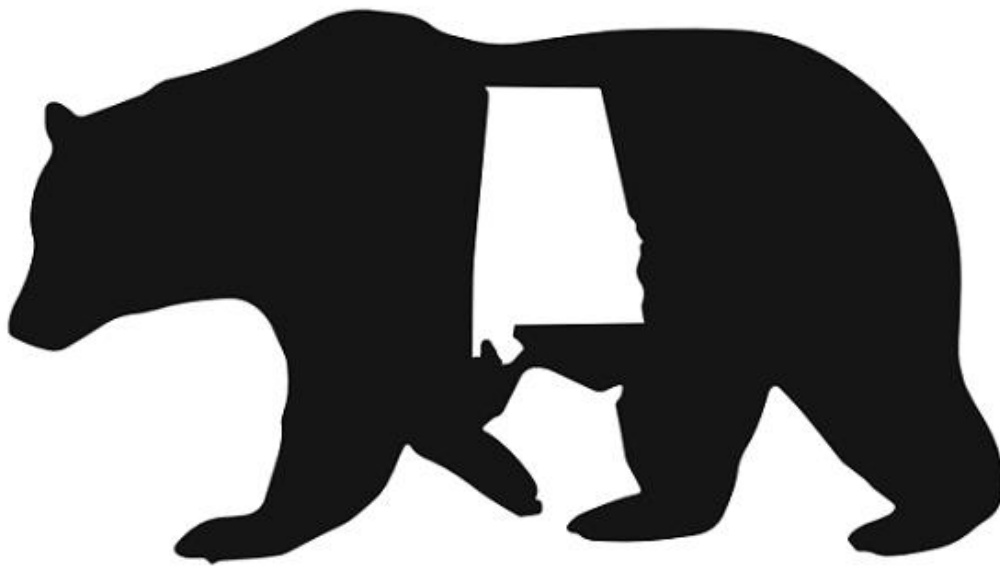
A Study By:

Alabama Division of Wildlife and Freshwater Fisheries
and
The School of Forestry and Wildlife Sciences
Auburn University

Greetings from Auburn University and the Alabama Division of Wildlife and Freshwater Fisheries

The Alabama Division of Wildlife and Freshwater Fisheries (WFF) wants to understand your opinions on black bear populations in your region. For this reason, WFF has partnered with Auburn University to gather information about your attitudes, concerns and preferences to help guide in wildlife management decisions in the state.

The best way we have of learning about Alabama residents feelings toward wildlife management is by asking a diverse group of citizens to share their thoughts and opinions. You are one of a small number of randomly selected residents who we are asking to complete this survey. This questionnaire is only available to participants _**age 19 and over**_ that are residents of the address to which it was mailed. The questions should take approximately 15 minutes to complete. Your responses are voluntary and will be kept confidential. Your answers will never be associated with your mailing address or your name. We appreciate and value your input and look forward to receiving your completed survey.

Your decision about whether or not to participate will not jeopardize your future relations with AU, the School of Forestry and Wildlife Sciences, or WFF. If you have any questions about this survey, please contact Dr. Wayde Morse, by telephone at (334) 844-1086 or by email at blackbears@auburn.edu. WFF strives to keep a balance that is beneficial to Alabama's wildlife populations and its residents.

By taking a few minutes to share your experiences, you will be helping WFF have a better understanding of Alabama residents' preferences for the management of black bears and other wildlife species. The information you share with us will be used to enhance wildlife management related decisions in Alabama. We look forward to receiving your responses.

Sincerely,

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

You and Your Neighborhood

1. **Before you received this questionnaire, were you aware that black bears live in or around your county?**

   ○   Yes   ○   No

2. **How many consecutive years have you lived in your current county of residence?**

   [**years**]

3. **Have you ever had a permanent residence in any state other than Alabama?**

   ○   Yes   ○   No

   If so, where? _____

4. **In what type of community do you currently live?**

   ○   Rural (Less than 1,000 people)   ○ Small town (1,001 - 5,000 people)

   ○   Large town (5,001-10,000 people)   ○ City (>10,000 people)

5. **Do you own or rent the land you currently reside on?**

   ○   Own

   ○   Rent

6. **How large is the property where you currently reside?**

   ○ Less than 1 acre   ○ 1-10 acres   ○ 11-50 acres

   ○ 51-100 acres   ○ 101-500 acres   ○ More than 500 acres

7. **Do you have birdfeeders at or near your home?**

   ○ Yes   ○ No

8. Do you own any pets that are sometimes kept outside? (mark all that apply)

No   ○

Dog   ○

Cat   ○

Other ○   _____

9. Where do you normally keep household garbage cans and bags?

○ Outside   ○ Inside garage, house, storage shed or fenced in area

10. When do you usually bring your garbage out to the spot where it is picked up?

○ Night before pickup or earlier   ○ Morning of pick up

○ I do not place my trash outside
  for pickup

11. Which of the following land use activities presently take place on the property <u>that you reside on or land adjacent to it</u> in Alabama? (mark all that apply)

○ Timber management ○ Livestock grazing   ○ Row crop agriculture

○ Hunting   ○ ATV use   ○ Bee keeping (apiaries)

○ Residential   ○ Unmanaged forest   ○ None of the above

12. Do you keep livestock <u>on the property that you reside on</u>?

○   Yes   ○   No

If you selected Yes, please indicate how many:

Cattle # _____   Chickens # _____   Pigs # _____   Goats # _____   Other # _____

Your Views and Experiences with Wildlife and the Outdoors

13. We are interested in knowing your views about wildlife and the outdoors. Below are statements representing different views that people may have concerning wildlife. Please indicate how strongly you agree or disagree with the following statements. (Select one circle per line)

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Humans should manage wild animal populations so that humans benefit	○	○	○	○	○
Fish and wildlife are on earth primarily for people to use	○	○	○	○	○
We should strive for a world where there's an abundance of fish and wildlife for hunting and fishing	○	○	○	○	○
People who want to hunt should be provided the opportunity to do so	○	○	○	○	○
Animals should have rights similar to the rights of humans	○	○	○	○	○
I view all living things as part of one big family	○	○	○	○	○
I feel a strong emotional bond with animals	○	○	○	○	○
I care about animals as much as I do other people	○	○	○	○	○

14. Please tell us how often you engage in outdoor recreation activities in Alabama. For each of the following activities, please write approximately how many days you participated in the activity in the past year (12 months). Include parts of days as full days, so an hour long hike would count as 1 day.

Example: If you go fishing every Sunday morning, you would enter <u>52</u> in the "Fishing" category.

Activity	Approximate number of days you did this activity in past year
Family or other group gathering	
Walking/Jogging in city or park	
Hiking on trails or in forest	
Bird watching	
Other wildlife viewing	
Hunting	
Fishing	
Swimming (lakes or rivers)	
Camping	
Canoeing/Kayaking	
Biking on trails	
Motorized sports (4x4, all-terrain vehicles, dirt bikes)	

15. How would you rate your current knowledge of black bears?

○ Low
○ Moderate
○ High

16. Please indicate how strongly you agree or disagree with the following statements about black bears. (Select one circle per line)

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I would enjoy seeing black bears	○	○	○	○	○
I worry about the damages black bears might cause my property	○	○	○	○	○
The presence of black bears in Alabama is a sign of a healthy environment	○	○	○	○	○
Black bears have a right to exist in Alabama	○	○	○	○	○
People should learn to live with black bears near their homes	○	○	○	○	○
I enjoy knowing that black bears exist in Alabama, even if I never see one	○	○	○	○	○
Black bears are a part of Alabama's heritage	○	○	○	○	○

17. Have you hunted in the state of Alabama in the past 12 months?

        ○   Yes   ○   No

If you answered No, please skip to question 22.

18. Please select the type of species that you hunt. (mark all that apply)

        ○   White-tailed Deer   ○ Turkey   ○ Feral Hogs

        ○   Quail/Doves   ○ Waterfowl   ○ Alligators

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

19. Do you use supplemental feed to attract game species?

        ○ Yes   ○ No

20. Do you have food plots planted on your property in order to attract deer?

     ○   Yes   ○   No

21. If you were out hunting in Alabama and encountered a non-aggressive black bear, please indicate how strongly you would agree or disagree with the following statements.
(Select one circle per line)

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I would feel happy	○	○	○	○	○
I would feel excited	○	○	○	○	○
I would feel curious	○	○	○	○	○
I would feel frightened	○	○	○	○	○
I would feel angry	○	○	○	○	○

22. To the best of your knowledge, assess the following statement: black bears are predators that will cause deer populations to noticeably decline in Alabama.

     ○   True   ○   False

Living with Black Bears

Please answer the following questions about your personal beliefs on black bears and black bear behavior to the best of your knowledge:

23. Until the early 1900s, Alabama contained a large population of black bears.

    ○   True   ○   False

24. Most conflicts between black bears and humans are related to the bear's search for food.

    ○   True   ○   False

25. The majority of a black bear's diet consists of plant material.

    ○   True   ○   False

26. Black bears in Alabama hibernate during the winter.

    ○   True   ○   False

27. It is common for male black bears in Alabama to weigh 500 lbs or more.

    ○   True   ○   False

Please answer the following questions regarding your personal experiences with black bears that have occurred at or near <u>your current residence only</u>.

28. Have you seen a black bear near your home or neighborhood?

    ○   Yes   ○   No

29. Have you or a family member personally been confronted by a black bear near your home or neighborhood?

    ○   Yes   ○   No

30. Has a black bear damaged belongings near your home or neighborhood?

    ○   Yes   ○   No

31. Have you had a black bear threaten or attack pets near your home or neighborhood?

◯   Yes   ◯   No

32. How concerned are <u>you personally</u> about the following issues or experiences involving black bears? (Select one circle per line)

	1	2	3	4	5
	Not at all Concerned	Slightly Concerned	Somewhat Concerned	Moderately Concerned	Very Concerned
Being confronted by a black bear while outdoors	◯	◯	◯	◯	◯
The cost of residential property damage caused by black bears	◯	◯	◯	◯	◯
Driving in areas where you may hit a black bear with your vehicle	◯	◯	◯	◯	◯
The safety of pets that may encounter a black bear	◯	◯	◯	◯	◯
Conflicts between neighbors over the issue of feeding black bears	◯	◯	◯	◯	◯
The cost of agricultural damage (e.g., crops, livestock, bee hives) caused by black bears	◯	◯	◯	◯	◯
The safety of children that may encounter a black bear	◯	◯	◯	◯	◯

33. Please select the answer that best describes <u>your beliefs</u> on black bear populations in your county? (check only one)

◯ There are too many black bears in my county

◯ There are not enough black bears in my county

◯ The black bear population in my county is just right

◯ I am unsure of the black bear population in my county

34. If you were to see a non-aggressive black bear <u>near your home or in your neighborhood</u>, please indicate how strongly you would agree or disagree with the following statements. (Select one circle per line)

	1 Strongly Disagree	**2** Disagree	**3** Neither Agree nor Disagree	**4** Agree	**5** Strongly Agree
I would feel happy	○	○	○	○	○
I would feel excited	○	○	○	○	○
I would feel curious	○	○	○	○	○
I would feel frightened	○	○	○	○	○
I would feel angry	○	○	○	○	○

Whereas the Alabama Department of Conservation and Natural Resources <u>is not</u> considering implementation of the following proposals, we wish to know how acceptable these potentially controversial actions would be to <u>you</u>:

35. To what extent do you support or oppose the following methods of black bear management in Alabama? (Select one circle per line)

	1 Strongly Oppose	**2** Oppose	**3** Neutral	**4** Support	**5** Strongly Support
Assisted Population Growth (wildlife agencies actively facilitate black bear population growth in suitable habitat)	○	○	○	○	○
Natural Recovery (black bear populations are allowed to naturally increase without assistance from wildlife agencies)	○	○	○	○	○
Exclusion (black bear populations are prevented from increasing)	○	○	○	○	○

36. If black bear populations grew to a point where a closely regulated sustainable harvest through hunting could be implemented in Alabama, would you support it?

      ○   Yes   ○   No

37. Please indicate how likely the following scenarios would be to <u>increase your support</u> for black bear recovery in Alabama. (Select one circle per line)

	1	2	3	4	5
	Highly Unlikely	Unlikely	Neutral	Likely	Highly Likely
Financial compensation for damages incurred by black bears	○	○	○	○	○
Regulated hunting season once black bear populations reach sufficient numbers	○	○	○	○	○
Easy access to black bear exclusion devices such as bear proof trash cans	○	○	○	○	○
An established and consistent plan for black bear management	○	○	○	○	○

38. Have you ever seen or received information in your county about black bears and how to deal with potential black bear encounters?

○　　Yes　　　　　○　　No

If you answered No, please skip to question 40.

39. How did you receive this information? (mark all that apply)

○ Newspaper　　○　Pamphlet or brochure　　○　Informational sign in public area

○ TV or radio　○　Email/Online　　○　Communication with wildlife professional

○ Other _____

40. What would be your preferred method for receiving information about living with black bears in Alabama? (mark all that apply)

○　Newspaper　　　○　Pamphlet or brochure　　○　Informational sign in public area

○　TV or radio　　　○　Email/Online ○　Communication with wildlife professional

○　Other _____

41. Please rank the level to which you agree or disagree with the following statements regarding public wildlife agencies and human-wildlife interactions. (Select one circle per line)

Alabama Department of Conservation and Natural Resources (ADCNR) includes the Division of Wildlife and Freshwater Fisheries who manage wildlife in the state of Alabama.

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I trust ADCNR to protect human safety related to black bear human-interactions	○	○	○	○	○
I trust ADCNR to manage problems associated with black bears	○	○	○	○	○
I feel that ADCNR shares the same values as me	○	○	○	○	○
The goals and objectives of ADCNR are consistent with the goals and objectives of Alabama residents	○	○	○	○	○
ADCNR employees in my region are capable of managing wildlife populations in order to achieve ecological goals while also preventing harm to humans	○	○	○	○	○
I can prevent most conflicts with wildlife or damage caused by wildlife on my property by taking basic precautionary measures	○	○	○	○	○
Humans are responsible for many unwanted wildlife encounters	○	○	○	○	○

Your Preferred Management Responses

42. On the following pages, you will be asked to rate how acceptable you would find each of the listed management actions from wildlife agencies in response to the specified black bear encounter scenarios.

    For each encounter scenario, you will be asked to rate the acceptability of five different management actions in response to both <u>isolated incidents</u> (A) and <u>frequent incidents</u> (B).

<u>Management Responses</u>

Educate: Residents are given information that explains what to do in a bear encounter situation, how to avoid future encounters and who to contact if help is needed in dealing with the bear.

Monitor: This is essentially no action. Concerned residents are told to monitor the black bear and contact authorities if any more problems arise.

Frighten: Authorities use non-lethal aversive conditioning methods, such as air horns and other loud noises, rubber bullets, or bear pepper spray to frighten the bear away and restore their natural wariness of humans.

Capture and Relocate: Authorities use traps or tranquilizers to capture the bear and relocate it to natural habitat far from the site of concern.

Euthanize: Lethal control methods are used to permanently remove the bear.

Scenario 1: A black bear is seen along a popular hiking trail in the forest.

A) The black bear is seen <u>once or twice during a summer</u>. (In the below table, <u>fill in one circle per management response</u>)

Management Response	1 Very Unacceptable	2 Unacceptable	3 No Opinion	4 Acceptable	5 Very Acceptable
Educate people on how to change their behavior to reduce black bear conflicts	○	○	○	○	○
Monitor the situation to determine if the black bear will cause further concern	○	○	○	○	○
Frighten the black bear using aversive conditioning techniques	○	○	○	○	○
Capture and relocate the black bear	○	○	○	○	○
Euthanize the black bear	○	○	○	○	○

B) The black bear is seen <u>frequently over a summer.</u> (In the table above, <u>check one square per management response</u>.

Management Response	1 Very Unacceptable	2 Unacceptable	3 No Opinion	4 Acceptable	5 Very Acceptable
Educate people on how to change their behavior to reduce black bear conflicts	☐	☐	☐	☐	☐
Monitor the situation to determine if the black bear will cause further concern	☐	☐	☐	☐	☐
Frighten the black bear using aversive conditioning techniques	☐	☐	☐	☐	☐
Capture and relocate the black bear	☐	☐	☐	☐	☐
Euthanize the black bear	☐	☐	☐	☐	☐

Scenario 2: A black bear damages property (birdfeeder, garbage can, outdoor grill) near your home or in your neighborhood.

A) The property is damaged <u>once or twice during a summer</u>. (In the below table, <u>fill in one circle per management response</u>)

Management Response	1 Very Unacceptable	2 Unacceptable	3 No Opinion	4 Acceptable	5 Very Acceptable
Educate people on how to change their behavior to reduce black bear conflicts	○	○	○	○	○
Monitor the situation to determine if the black bear will cause further concern	○	○	○	○	○
Frighten the black bear using aversive conditioning techniques	○	○	○	○	○
Capture and relocate the black bear	○	○	○	○	○
Euthanize the black bear	○	○	○	○	○

B) The property is damaged <u>frequently over a summer</u>. (In the table below, <u>check one square per management response</u>)

Management Response	1 Very Unacceptable	2 Unacceptable	3 No Opinion	4 Acceptable	5 Very Acceptable
Educate people on how to change their behavior to reduce black bear conflicts	☐	☐	☐	☐	☐
Monitor the situation to determine if the black bear will cause further concern	☐	☐	☐	☐	☐
Frighten the black bear using aversive conditioning techniques	☐	☐	☐	☐	☐
Capture and relocate the black bear	☐	☐	☐	☐	☐
Euthanize the black bear	☐	☐	☐	☐	☐

Scenario 3: A black bear threatens and chases a pet near your home or in your neighborhood.

A) **The pet is threatened <u>once or twice during a summer</u>.** (In the below table, <u>check one circle per management response</u>)

Management Response	1 Very Unacceptable	2 Unacceptable	3 No Opinion	4 Acceptable	5 Very Acceptable
Educate people on how to change their behavior to reduce black bear conflicts	○	○	○	○	○
Monitor the situation to determine if the black bear will cause further concern	○	○	○	○	○
Frighten the black bear using aversive conditioning techniques	○	○	○	○	○
Capture and relocate the black bear	○	○	○	○	○
Euthanize the black bear	○	○	○	○	○

B) **The pet is threatened <u>frequently over a summer</u>.** (In the table below, <u>check one square per management response</u>)

Management Response	1 Very Unacceptable	2 Unacceptable	3 No Opinion	4 Acceptable	5 Very Acceptable
Educate people on how to change their behavior to reduce black bear conflicts	☐	☐	☐	☐	☐
Monitor the situation to determine if the black bear will cause further concern	☐	☐	☐	☐	☐
Frighten the black bear using aversive conditioning techniques	☐	☐	☐	☐	☐
Capture and relocate the black bear	☐	☐	☐	☐	☐
Euthanize the black bear	☐	☐	☐	☐	☐

Scenario 4: A black bear approaches a person in a residential neighborhood and must be scared off (no attack or injury to person).

A) The encounter occurs <u>once or twice over a summer</u> (In the below table, <u>fill in one circle per management response</u>)

Management Response	1 Very Unacceptable	2 Unacceptable	3 No Opinion	4 Acceptable	5 Very Acceptable
Educate people on how to change their behavior to reduce black bear conflicts	○	○	○	○	○
Monitor the situation to determine if the black bear will cause further concern	○	○	○	○	○
Frighten the black bear using aversive conditioning techniques	○	○	○	○	○
Capture and relocate the black bear	○	○	○	○	○
Euthanize the black bear	○	○	○	○	○

B) The encounter occurs <u>frequently over a summer</u> (In the table below, <u>check one square per management response</u>)

Management Response	1 Very Unacceptable	2 Unacceptable	3 No Opinion	4 Acceptable	5 Very Acceptable
Educate people on how to change their behavior to reduce black bear conflicts	☐	☐	☐	☐	☐
Monitor the situation to determine if the black bear will cause further concern	☐	☐	☐	☐	☐
Frighten the black bear using aversive conditioning techniques	☐	☐	☐	☐	☐
Capture and relocate the black bear	☐	☐	☐	☐	☐
Euthanize the black bear	☐	☐	☐	☐	☐

Demographics

43. What year were you born?

> 19

44. What is your gender?   ○ Female   ○ Male

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

46. What is your ethnicity?

○ American Indian   ○ Asian

○ Black/African American ○ White/Caucasian

○ Latino   ○ Other

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

○ Did not complete high school ○ Associate's degree

○ High School Diploma or GED ○ Bachelor's degree

○ Some college, but no degree   ○ Graduate or professional degree

○ Other

48. What is your marital status?

○ Single   ○ Divorced   ○ Other

○ Married   ○ Widowed

49. Please check the box that corresponds to your income for 2013. This information is only used to understand black bear opinions and management preferences across income groups.

○ Less than $14,999   ○ $25,000- $34,999   ○ $75,000- $99,999

○ $15,000 - $19,999   ○ $35,000- $49,999   ○ $100,000- $149,999

○ $20,000 - $24,999   ○ $50,000- $74,999   ○ $150,000 or more

Please fold this survey along the dotted line and return it to the School of Forestry and Wildlife Sciences at Auburn University in the self-addressed, stamped envelope provided.

THANK YOU FOR PARTICIPATING IN THIS STUDY!

Your answers to this survey will provide our agency with useful information regarding the management and conservation of our natural resources. We appreciate your participation in the survey and value your support of Alabama wildlife.
Please provide any additional comments here.