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Resident Attitudes toward Black Bears and Population Recovery in East Texas

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A successful species recovery relies on the support of local residents. Our goal was to assess attitudes toward black bears in a location where bears have not existed for several decades. We randomly surveyed East Texas residents to evaluate attitudes toward black bears and a potential bear population recovery. Positive attitudes toward bears were related to sex, age, participation in wildlife-related activities, residential tenure, land ownership, and knowledge about bears. However, substantial proportions of respondents indicated uncertainty regarding their attitudes about black bears and more than one-third of residents were unsure as to whether they supported increasing the local bear population. Lack of knowledge about black bears was the most commonly noted reason for uncertainty. These results suggest that opportunities exist for managers to address existing concerns about bears, assist residents with learning more about bears, and possibly help minimize potential for bear–human conflict.

Keywords attitudes, black bear, recovery, threatened species, *Ursus americanus luteolus*, wildlife management

Introduction

Recovery is difficult for locally extirpated large Carnivore species requiring extensive habitat that may no longer exist because of human activity (e.g., Maehr, Noss, & Larkin, 2001; Reading & Clark, 1996). Regardless of land use within an area, it is improbable that far-ranging species will remain completely isolated from humans. Consequently, wildlife managers must provide for both the ecological needs of a recovering species and the needs and wants of humans who may be affected by recovery management decisions (Kleiman,

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1989; Riley et al., 2002). Thus, management for human tolerance of a species is often more challenging than ecological management, but vital for ensuring long-term species survival.

Large Carnivore recovery management has evolved as a result of past management efforts that often neglected public input and negative public attitudes toward a species (Kellert, 1991; Reading & Kellert, 1993). For example, perhaps the most well-known recent recovery was that of the Yellowstone wolf (*Canis lupus*) population. Although demographic and socioeconomic information was collected (e.g., Bath & Buchanan, 1989), it was not used directly for rigorous assessment of recovery feasibility within Yellowstone National Park. Similarly, during the 1960s, the Arkansas Game and Fish Commission assumed that Arkansas residents would not support a black bear recovery program (Smith & Clark, 1994); hence, no public input was sought. Black bear recovery in Arkansas was biologically successful, but release of bears without public input is unacceptable by present wildlife management standards, of which public accountability is an important component (Smith & Clark, 1994). It is apparent that any successful large Carnivore recovery depends on public tolerance of a particular species, for some local residents may experience regular contact with it (Clark, Huber, & Servheen, 2002; Maehr et al., 2001). This article furthers our understanding about attitudes toward recovery of large Carnivores by (a) assessing baseline attitudes toward black bears (*Ursus americanus*) in an area targeted for potential recovery, and (b) evaluating demographic and socioeconomic variables that may influence attitudes toward black bears and their recovery. Results from this research can provide managers with information about local attitudes toward black bears, as well as interest in the possibility of recovering the local black bear population.

Conceptual Background

Social psychology views attitudes as one tier within a hierarchy of human cognition ranging from values to behaviors (Decker, Brown, & Siemer, 2001; Fulton, Manfredo, & Lipscomb, 1996). In the context of wildlife management, attitudes are positive or negative responses to a particular species (e.g., Bath, 1989; Bright & Manfredo, 1996). Attitudes can vary on the basis of key demographic and socioeconomic characteristics such as knowledge about a species, sex, and household income (e.g., Bowman, Leopold, Vilella, & Gill, 2004; Kellert, Black, Rush, & Bath, 1996). Both positive and negative human attitudes have been associated with large Carnivore range expansion and recovery (e.g., Bowman et al., 2004; Enck & Brown, 2002; Peyton, Bull, Reis, & Visser, 2001; Schoenecker & Shaw, 1997), and people tend to respond quite similarly to different large Carnivore species regardless of ecological and behavioral differences (Kellert, 1985; Kellert et al., 1996; Kleiven, Bjerke, & Kaltenborn, 2004).

Specific to this particular study, people generally hold positive attitudes toward black bears, viewing them as “phylogenetically similar to people, highly intelligent, and aesthetically appealing” (Kellert, 1994, p. 46). Within their current geographic range, black bears are considered an important ecosystem component and some tolerance of negative encounters (e.g., property damage) exists (e.g., Bowman, Leopold, Vilella, Gill, & Jacobson, 2001; Jonker, Parkhurst, Field, & Fuller, 1998). However, ongoing concerns about black bear nuisance are prevalent (Peyton et al., 2001; Siemer & Decker, 2003), even within urban communities where black bears, while relatively rare, can easily adapt (Beckmann & Berger, 2003; Peine, 2001).

Past research on attitudes toward black bears and similar species has focused primarily on existing populations of a species. Although this provides a good starting point for

evaluating the influence of attitudes toward recovery, such information may not apply to locations where a species has not existed for an extended period of time. For example, although Mississippi residents (a location targeted for recovery) were less knowledgeable about black bear ecology than Arkansas residents (where black bears already exist), Mississippi residents were more likely than Arkansas residents to support increasing the local bear population (Bowman et al., 2001). Residents in both locations, however, were willing to incur some bear damage to personal property (Bowman et al., 2001). Although predetermined expectations may exist about changes in attitudes if bear–human conflict takes place, collection of baseline information prior to initiation of recovery efforts is necessary for rigorous quantitative evaluation of attitude dynamics. Bowman et al. (2004) suggested that age, community size, race, sex, and number of years of land ownership were significant predictors of public support for black bear restoration in Mississippi. Shropshire (1996) reported that income, education, age, and knowledge about bears were significant predictors of support for increasing the Mississippi black bear population. Beyond these two studies, however, such information for the general public for the south-central U.S. is not available.

We assessed local resident attitudes toward black bears and population recovery in a location where bears have not existed for several decades. Based on past literature related to black bears and their recovery (e.g., Bowman et al., 2004; Kellert, 1994; Shropshire, 1996), it is expected that: (a) residents hold generally positive attitudes toward black bears, (b) residents hold generally positive attitudes toward increasing the local black bear population, and (c) particular demographic and socioeconomic characteristics, such as sex, length of local residence, and knowledge about bears, contribute to differences in attitudes toward black bears and increasing the black bear population size.

Methods

Study Area and Context

The Louisiana black bear (*U. a. luteolus*) was nearly extirpated from its historical range of Louisiana, East Texas, and southern Mississippi as a result of overharvest and habitat destruction. Recently, recovery plans were created for Louisiana (BBCC, 1997; Bowker & Jacobson, 1995) where two remnant populations remained. In East Texas, the number of black bear sightings has increased during the past decade, which prompted creation of a black bear conservation and management plan. Ten-year plan objectives include public coordination, communication, outreach/information dissemination, habitat management, and research, with the ultimate goal of restoring habitat for the purpose of reestablishing black bears in East Texas (TPWD, 2005). At the time of management plan creation, no formal analysis of local resident attitudes toward black bears or increasing the bear population had taken place.

Our study area (25,372 km²) consisted of 12 counties (Angelina, Hardin, Jasper, Liberty, Newton, Orange, Polk, Sabine, San Augustine, San Jacinto, Trinity, and Tyler) in southeastern Texas where bear sightings have taken place during the past decade. According to the U.S. Census Bureau, the human population of this area in 2000 was roughly 500,000. Much of the area is rural, interspersed with small towns and one larger community (Lufkin, TX). More than half of the land is privately managed for timber (46%) or owned by the Federal government (15%; Big Thicket National Preserve and the Davy Crockett, Sabine, Angelina, and Sam Houston National Forests); mixed hardwood-conifer forest is the dominant land cover (Morzillo, 2005).

Data Collection

We used population density information from the U.S. Census Bureau and ArcView GIS 3.2 (Environmental Systems Research Institute, Inc., Redlands, California, USA) to divide the study area into three mutually exclusive strata (Sheskin, 1985) and control sample size selection among strata (Kalton, 1983). Two strata (rural and urban) were created based on U.S. Census Bureau definitions (rural: <500 people per square mile and villages with populations of <2,500, urban: ≥500 people per square mile and towns containing a population of ≥2,500 people). Members of these strata are distributed irregularly across the study area. The third stratum (suburban) was substantially different from the other two strata in that it was confined to the extreme southern edge of the study area and represents suburban development at the outskirts of Houston and Beaumont.

We used multiple mailings in order to increase response rate (Dillman, 2000). In January 2004, a questionnaire was mailed to residents ($n = 3,000$; roughly 1% of the area's adult population) randomly selected within each of the three strata: (a) rural ($n = 2,000$), (b) urban ($n = 600$), and (c) suburban ($n = 400$). Because initial recovery efforts will likely focus on rural areas (based on black bear ecology; Pelton, 2003), we assumed that rural residents would have the greatest probability of contact with bears. Sample sizes were chosen to ensure adequate representation of the rural stratum while maintaining sufficient sample sizes for the other strata (Kalton, 1983; Sheskin, 1985). Name and address information was purchased from Survey Sampling, Inc. (Fairfield, CT). The University Committee on Research Involving Human Subjects (UCRIHS; IRB #02-155) at Michigan State University granted permission for use of human subjects.

Dependent Variables

Two dependent variables were examined. First, "attitudes toward black bears," was constructed using principal components analysis with varimax rotation (Fabrigar, Wegener, MacCallum, & Strahan, 1999) from eight basic attitude- and belief-based statements related to black bears and two related to bear management. Respondents indicated agreement/disagreement with each of the following statements: (a) the presence of black bears is a sign of a healthy environment, (b) black bears would reduce the size of wild hog populations, (c) black bears in East Texas would increase my quality of life, (d) black bears near my home would increase my quality of life, (e) black bears have the right to exist wherever they may occur, (f) I would feel personally at risk if black bears exist in East Texas, (g) I am afraid of black bears, (h) black bears commonly harm humans, (i) wildlife experts know how to manage black bears, and (j) wildlife experts understand landowners' concerns about black bears. Responses to each of the 10 statements were measured using 5-point scales indicating level of agreement (5 = strongly agree, 1 = strongly disagree). Items were coded so that larger values reflected greater support for black bears and then summed. Cronbach's alpha (α) was used as the test for internal consistency (Cortina, 1993).

The second dependent variable, "attitudes toward population increase," was evaluated by asking participants to respond to the statement, "The black bear population in East Texas should be increased." Responses were measured on a 5-point scale (5 = strongly agree, 1 = strongly disagree).

Independent Variables

Independent variables were derived from 15 survey questions focusing on respondent demographics and familiarity with bears (Morzillo, 2005): (a) community type (e.g., urban, rural), (b) number of children (<18 years of age) in household, (c) pets (i.e., do they own pets or not?), (d) sex, (e) age, (f) education, (g) income, (h) membership in wildlife-related organizations (i.e., are they a member or not?), (i) participation in utilitarian activities related to wildlife (described later), (j) participation in passive-appreciative activities related to wildlife (described later), (k) time in area (length of residence), (l) livestock ownership (i.e., do they own livestock or not?), (m) number of acres owned, (n) knowledge about bears (described later), and (o) having seen a bear in the wild. Three independent variables (two activity variables and knowledge) were composites of separate items from the survey.

Activities. Respondents were asked to report their participation in 16 activities that could potentially put them in either active (direct) or passive (indirect) contact with black bears: (a) hiking, (b) jogging/running outside, (c) biking (trail/mountain/road), (d) camping (tent/trailer/RV), (e) motorboating/jetskiing/waterskiing, (f) canoeing/kayaking, (g) riding motorized all-terrain vehicles, (h) reading about wildlife, (i) watching wildlife TV shows or movies, (j) observing or studying wildlife outdoors, (k) hunting big game (e.g., deer), (l) hunting small animals (e.g., squirrel), (m) fishing, (n) working on a farm or ranch, (o) working in the timber industry, and (p) working in the oil/gas industry. Responses were measured on 3-point scales (3 = often, 2 = sometimes, 1 = never). Principal components analysis was used to combine activities for analysis; six items were retained as an index of "utilitarian" activities and three items were retained for an index of "passive-appreciative" activities. For each set of activities, we derived a scale score by summing responses for each item; larger values reflected greater levels of activity participation.

Knowledge. Respondents were asked to indicate (yes or no) whether they were aware of each of six factual statements about black bears in the region: (a) until the early 1900s, eastern Texas contained a large population of black bears, (b) the number of black bear sightings in eastern Texas has increased during the past decade, (c) black bear populations are increasing in size in Arkansas, Louisiana, and Oklahoma, (d) black bears in Texas are protected by both federal and state legislation, (e) black bears exist throughout most of the United States and North America, and (f) black bears are mainly vegetarians. A score of 1 was given for each "yes" indicated by the respondent, and a 0 for each "no." Scores were summed to create an overall knowledge score for each individual.

Non-Response Follow-Up

A non-response follow-up was mailed to individuals ($n = 1,600$) within the survey sample who did not return a survey. Non-respondents were asked 10 questions from the actual survey. Demographic characteristics and responses did not differ significantly between survey and non-response follow-up respondents ($n = 163$).

Statistical Analysis

Because we over sampled rural residents, weights were applied to descriptive analyses to reflect the actual population distribution of the entire area (Kalton, 1983). Principal components analysis with varimax rotation was used for data reduction. One-way

ANOVA and Pearson's r were used to compare sample means and test the variable relationships. Alpha values were defined at the 95% confidence interval. After accounting for multiple comparisons in bivariate analyses (15 tests per dependent variable) with a Bonferroni correction, $p \leq 0.003$ was considered significant. Ordinary least squares regression was used to predict each dependent variable. Effect size (eta) was calculated for all variables identified as significant by statistical analysis to assess the strength of relationship between variables (Gliner, Vaske, & Morgan, 2001).

Results

The overall response rate was 40% ($n = 1,006$). The non-response follow-up indicated that the most common reasons for not completing the original survey included respondents had little or no knowledge about black bears (45%) or did not like answering surveys (24%).

The majority (72%) of respondents were male, 26% held at least a Bachelor's degree, and average respondent age was 54 years. A majority (71%) owned a pet, 14% owned livestock, and 11% were members of wildlife-related organizations. On average, respondents had lived in the area about 39 years and 23% have seen a bear in the wild (see Table 1 for additional information about the sample and the independent variables).

Six outdoor activities were included in a "utilitarian activities" factor and explained 32% of the overall variance ($\alpha = 0.84$). These six activities were (factor loading scores in parentheses): camping (0.70), boating (0.80), all-terrain vehicle use (0.52), hunting big game (0.60), hunting small game (0.58), and fishing (0.75). Three activities formed a "passive-appreciative activities" factor, explaining 9% of the variance ($\alpha = 0.79$). These activities were (factor loading scores in parentheses): reading about wildlife (0.81), watching wildlife-related TV shows or movies (0.83), and wildlife observation (0.77).

Principal components analysis revealed that 7 of 10 belief-attitude statements grouped together (44% variance explained) for the dependent variable, "attitudes toward black bears" ($\alpha = 0.86$) (Table 2). These statements included (factor loading scores in parentheses): (a) the presence of black bears is a sign of a healthy environment (0.76), (b) black bears in East Texas would increase my quality of life (0.72), (c) black bears near my home would increase my quality of life (0.74), (d) black bears have the right to exist wherever they may occur (0.64), (e) I would feel personally at risk if black bears exist in East Texas (0.79), (f) I am afraid of black bears (0.765), and (g) black bears commonly harm humans (0.73). The mean "attitudes toward black bears" score across all respondents was 25.59 (SD = 5.135; possible score range = 7–35). Responses to the question used to measure the second dependent variable, "attitudes toward population increase," were: strongly agree = 13%; agree = 28%; unsure = 41%; disagree = 14%; strongly disagree = 4%.

Bivariate results suggested that respondents who were male ($F = 23.222$, $df = 1, 472$, $eta = 0.22$), had higher incomes ($r = 0.149$; $eta = 0.15$), participated more frequently in utilitarian ($r = 0.239$; $eta = 0.24$) or passive-appreciative ($r = 0.300$; $eta = 0.30$) activities, were newer to the area ($r = -0.089$; $eta = 0.20$), were more knowledgeable about bears ($r = 0.344$; $eta = 0.34$), and have seen a black bear in the wild ($F = 8.963$, $df = 2, 471$; $eta = 0.10$) held significantly more positive attitudes toward bears. Respondents who had more children ($r = 0.110$; $eta = 0.11$), were male ($F = 43.231$, $df = 1, 916$; $eta = 0.21$), younger ($r = -0.176$; $eta = 0.18$), had higher incomes ($r = 0.138$; $eta = 0.14$), were members of wildlife-related organizations ($F = 12.884$, $df = 1, 915$; $eta = 0.12$), participated more frequently in utilitarian ($r = 0.293$; $eta = 0.29$) or passive-appreciative ($r = 0.338$; $eta = 0.34$) activities, were more knowledgeable about bears ($r = 0.0358$; $eta = 0.36$), and have seen a black bear in the wild ($F = 19.664$, $df = 2, 919$; $eta = 0.08$) were more supportive of increasing the bear population.

Table 1
Sample characteristics and descriptive results for independent variables

Variable (<i>n</i>)	Category or Descriptive Results ^a	Percent
Community type (985)	Large city (>50,000 people)	0
	Small city (10,001–50,000 people)	23
	Suburb	6
	Large town (5,000–10,000 people)	13
	Small town (<5,000 people)	20
	Rural, farm	12
	Rural, non-farm	26
Number of children (979)	Mean = 0.67; SD = 1.03	
Pet owner (985)	Yes	70
Sex (984)	Male	72
Age (962)	Mean = 54.0 years; SD = 15.11	
Education (977)	Primary school (grade 8)	3
	High school or equivalent	28
	Vocational or trade school	9
	Some college	26
	Associate's or two year degree	8
	College graduate	17
	Graduate or professional degree	9
Income (895)	Less than \$20,000	14
	\$20,000 to \$39,999	25
	\$40,000 to \$59,999	24
	\$60,000 to \$74,999	15
	\$75,000 or more	22
Organization member (981)	Yes	11
Utilitarian activities ^b (905)	Range = 1–18; Mean = 10.87; SD = 3.52	
Passive-appreciative activities ^b (938)	Range = 1–9; Mean = 7.02; SD = 1.64	
Time in area (974)	Mean = 38.78 years; SD = 19.25	
Livestock owner (957)	Yes	14
Acres owned	Mean = 22.13 acres; SD = 84.14	
Knowledge (995)	Range = 0–6; Mean = 2.48; SD = 1.77	
See bear (987)	Yes	23

^aDescriptive results were weighted to account for oversampling of rural residents.

^bActivities combined based on results of factor analysis.

Multivariate analyses indicated that those with significantly ($p < 0.005$) more positive attitudes toward both black bears and increasing the bear population included men, younger respondents, more frequent participants in passive-appreciative activities, and those more knowledgeable about bears (Table 3). Respondents who were newer to their current location and those who have seen a bear in the wild also held more positive attitudes toward bears; those owning fewer acres of land were also more supportive of increasing the bear population. Effect sizes (*Eta*) for both analyses suggested a relatively small impact of independent variables on the overall multivariate models (range 0.10–0.22).

Table 2
Descriptive results (percent of responses) of statements combined to measure “attitudes toward black bears”^a

Belief statement	<i>n</i>	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	<i>M (SD)</i> ^b
The presence of black bears is a sign of a healthy environment	963	2	46	32	4	1	3.7 (0.8)
Black bears in East Texas would increase my quality of life	975	3	18	46	26	7	2.8 (0.9)
Black bears near my home would increase my quality of life	977	3	14	38	33	14	2.6 (1.0)
Black bears have the right to exist wherever they may occur	975	17	45	17	16	4	3.6 (1.1)
I would feel personally at risk if black bears exist in East Texas ^{*c}	984	4	11	23	44	18	3.6 (1.0)
I am afraid of black bears [*]	973	7	22	20	36	16	3.3 (1.2)
Black bears commonly harm humans [*]	973	1	4	34	43	19	3.7 (1.0)

^aDescriptive results were weighted to account for oversampling of rural residents.

^bScale values (strongly agree = 5 to strongly disagree = 1) were used to calculate mean and standard deviation values, with higher values indicating more favorable attitudes toward black bears.

^cSurvey questions, for which coding (for consistency such that higher values indicate more favorable attitudes toward black bears) was reversed, are indicated by an asterisk (*).

Discussion

This was the first attempt to quantitatively assess attitudes toward black bears and recovering black bear populations in East Texas, which is important given that few studies have assessed attitudes for a species prior to a potential recovery attempt. Published attitudes toward black bears were skewed in a positive direction, which is consistent with our expectation as well as past research in other regions (e.g., Kellert, 1994). A greater percentage of respondents had positive (41%) rather than negative (18%) attitudes toward increasing the bear population, also consistent with past research in locations both with already existing bear populations (e.g., Decker, Brown, Hustin, Clarke, & O’Pezio, 1981; Siemer & Decker, 2003) and those targeted for bear recovery (e.g., Bowman et al., 2004). Several demographic and socioeconomic variables were statistically significant in relation to the dependent variables and matched those identified in past research (Bowman et al., 2004; Peyton et al., 2001; Shropshire, 1996) as expected, although direction of the relationship was not always consistent. Based on effect sizes, however, the impact of the

Table 3
Regression model^a for attitudes toward black bears^b and increasing
the black bear population size^c

Model	Attitudes toward black bears			Attitudes toward increasing the black bear population size		
	β	t	<i>Eta</i>	β	t	<i>Eta</i>
Community type	-0.017	-0.340		-0.022	-0.586	
Number < 18	0.022	0.346		-0.001	-0.013	
Pets (Owner = 1)	0.094	1.850		0.020	0.529	
Sex (Female = 1)	-0.225	-4.422*	0.22	-0.179	-4.649*	0.16
Age	-0.199	-3.522*	0.10	-0.198	-5.208*	0.10
Education	0.014	0.272		0.014	0.375	
Income	0.042	0.805		0.050	1.255	
Organization member (Yes = 1)	0.026	0.179		0.009	0.236	
Utilitarian activities	0.052	0.866		0.075	1.609	
Passive-appreciative activities	0.195	3.603*	0.18	0.248	5.958*	0.20
Time in area	-0.154	-2.755*	0.15	-0.036	-0.872	
Livestock (Owner = 1)	0.065	1.260		0.043	1.092	
Acres owned	-0.074	-1.454		-0.121	-3.199*	0.15
Knowledge	0.232	4.238*	0.21	0.231	5.127*	0.20
See bear (Yes = 1)	0.087	1.735*	0.10	0.062	1.656	

^aStandardized coefficients reported. An (*) denotes significance at the 95% confidence level.

^b $R^2 = 0.269$ (*Adj. R^2* = 0.251), $F = 20.072$, $p < .001$.

^c $R^2 = 0.241$ (*Adj. R^2* = 0.234), $F = 34.070$, $p < .001$.

independent variables was not substantial. This may be related to the large amount of general uncertainty among respondents. Although not addressed here, it is also likely that people are concerned about possible conflicts between bears and humans (Peine, 2001; Morzillo, 2005). We suggest that researchers and managers focus on further evaluation of uncertainty of residents, and proactive efforts to minimize bear–human conflict.

While focusing on black bears, this research contributes to the already-existing, yet limited, human dimensions knowledge available for wildlife recovery in regions where a particular species has not existed for many decades. One difficulty with collecting reliable human dimensions information in this context is that the object of interest (e.g., black bears) is not within a respondent's frame of mind (Upmeyer & Six, 1989). Without black bears constituting an observable component of the local landscape, respondents may have difficulty formulating an attitude (Upmeyer & Six, 1989) or perceive themselves as not informed enough to do so, resulting in a greater number of "unsure" responses. Indeed, "I don't know anything about bears" was the most commonly stated reason for "unsure" responses in both the survey and non-response follow-up (Morzillo, unpublished data). This is consistent with our findings, as well as past research suggesting a direct relationship between knowledge about and attitudes toward black bears (e.g., Bowman et al., 2001; Kellert, 1994) and other Carnivore species (e.g., Bath, 1989). More than half of our respondents requested informational brochures about black bears and ways to minimize the potential for bear–human conflicts. Requests were sometimes accompanied with comments

such as: "I have a fear of bears of any kind probably because I do not know much about them ... any [information] that can be sent to me about the black bear would be appreciated." We cannot determine whether black bear presence will result in local residents having more knowledge about black bears (Bowman et al., 2001). Likewise, we cannot expect that efforts to increase knowledge about black bears among local residents will lead to greater support for increasing the bear population (Bath, 1989; Lohr, Ballard, & Bath, 1996). Outreach exercises such as this survey serve as means to collect attitude information and identify particular items of public concern. More importantly, they may function as tools for assisting residents in making better-informed decisions about local wildlife management initiatives by initiating the thought process about local environmental phenomena.

Regardless of public interest, presence of black bears likely will result in nuisance complaints about bears by residents, as bears can adapt to a variety of habitats including urban areas (Beckmann & Berger, 2003; Peine, 2001). Although we cannot predict exact reactions to bear-human conflict (Kim & Hunter, 1993), local residents' perceptions of black bears may change if conflict occurs (Gore, Siemer, Shanahan, Schuefele, & Decker, 2005). Some studies have suggested that some human-bear conflict is considered tolerable (Bowman et al., 2001; Jonker et al., 1998; Siemer & Decker, 2003), whereas others have suggested low or no tolerance of black bear-caused property damage among particular stakeholder groups (e.g., beekeepers; Shropshire, 1996). Support for increasing the black bear population was dramatically greater when respondents were given a scenario indicating that steps would be taken by managers to lessen the probability of black bear-human conflict. Nuisance complaints about black bears in East Texas are currently rare; the most recent was in 1997, when a landowner photographed a black bear eating corn from a mechanized deer feeding station. Opportunity exists for practitioners to proactively address landowner concerns and provide information about means by which residents can manage their property to minimize the potential for human-black bear conflict at both the individual and community level (Peine, 2001). For example, electric fencing was the most effective method for deterring bears in Massachusetts (Jonker et al., 1998).

Over the course of bear recovery, replication of this study and further collection of attitude data is essential for evaluating changes in attitudes in response to greater bear-human contact and possibly conflict. For example, temporal variation in responses to each of the separate belief-attitude statements used in variable construction, and the resulting statistical relationships and effect sizes, may reflect mechanisms affecting changes in attitudes as a result of human-bear conflict (An, Linderman, Qi, Shortridge, & Liu, 2005). Although beyond the scope of our data, a combination of our results and future attitude data may be applied to test theoretical frameworks that measure links between attitudes and behaviors (e.g., Ajzen, 1991) and thresholds of acceptance (e.g., Minnis & Peyton, 1995). Combining baseline data presented here, results from future replication of this study, and before mentioned theoretical frameworks, researchers may enable managers not only to link changes in attitudes with occurrences of bear-human conflict but also provide information to deal with potential conflicts (e.g., knowing which stakeholder groups will likely be less tolerant of conflicts).

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50, 179-211.
- An, L., Linderman, M., Qi, J., Shortridge, A., & Liu, J. (2005). Exploring complexity in a human-environment system: An agent-based spatial model for multidisciplinary and multiscale integration. *Annals of the Association of American Geographers* 95, 54-79.

- Bath, A. J. (1989). The public and wolf reintroduction in Yellowstone National Park. *Society and Natural Resources*, 2, 297–306.
- Bath, A. J., & Buchanan, T. (1989). Attitudes of interest groups in Wyoming toward wolf restoration in Yellowstone National Park. *Wildlife Society Bulletin*, 17, 519–525.
- Beckmann, J. P., & Berger, J. (2003). Using black bears to test ideal-free distribution models experimentally. *Journal of Mammalogy*, 84, 594–606.
- Black Bear Conservation Committee (BBCC). (1997). Black bear restoration plan. Baton Rouge, Louisiana.
- Bowker, B., & Jacobson, T. (1995). Louisiana black bear (*Ursus americanus luteolus*) recovery plan. Atlanta, GA: U.S. Fish and Wildlife Service.
- 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, 223–232.
- Bowman, J. L., Leopold, B. D., Vilella, F. J., Gill, D. A., & Jacobson, H. A. (2001). Attitudes of landowners toward American black bear compared between areas of high and low bear populations. *Ursus*, 12, 153–160.
- Bright, A. D., & Manfredi, M. J. (1996). A conceptual model of attitudes toward natural resource issues: A case study of wolf reintroduction. *Human Dimensions of Wildlife*, 1, 1–21.
- Clark, J. D., Huber, D., & Servheen, C. (2002). Bear reintroductions: Lessons and challenges. *Ursus*, 13, 335–345.
- Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, 78, 98–104.
- Decker, D. J., Brown, T. L., & Siemer, W. F. (2001). *Human dimensions of wildlife management in North America*. Bethesda, MD: The Wildlife Society.
- Decker, D. J., Brown, T. L., Hustin, D. L., Clarke, S. H., & O’Pezio, J. (1981). Public attitudes toward black bears in the Catskills. *New York Fish and Game Journal*, 28, 1–20.
- Dillman, D. (2000). *Mail and Internet surveys: The tailored design method* (2nd ed.). New York: John Wiley & Sons.
- Enck, J. W., & Brown, T. L. (2002). New Yorkers’ attitudes toward restoring wolves to the Adirondack Park. *Wildlife Society Bulletin*, 30, 16–28.
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. 1999. Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4, 272–299.
- Fulton, D. C., Manfredi, M. J., & Lipscomb, J. 1996. Wildlife value orientations: A conceptual and measurement approach. *Human Dimensions of Wildlife*, 1, 24–47.
- Gliner, J. A., Vaske, J. J., & Morgan, G. A. (2001). Null hypothesis significance testing: Effect size matters. *Human Dimensions of Wildlife*, 6, 291–301.
- Gore, M. L., Siemer, W. F., Shanahan, J. E., Schuefele, D., & Decker, D. J. (2005). Effects on risk perception of media coverage of a black bear-related human fatality. *Wildlife Society Bulletin*, 33, 507–516.
- Jonker, S. A., Parkhurst, J. A., Field, R., & Fuller, T. K. (1998). Black bear depredation on agricultural commodities in Massachusetts. *Wildlife Society Bulletin*, 26, 318–324.
- Kalton, G. (1983). *Introduction to survey sampling*. Newbury Park, CA: Sage Publications, Inc.
- Kellert, S. R. (1985). Public perceptions of predators, particularly the wolf and coyote. *Biological Conservation*, 31, 167–189.
- Kellert, S. R. (1991). Public views of wolf restoration in Michigan. *Transactions of the North American Wildlife and Natural Resources Conference*, 56, 152–161.
- Kellert, S. R. (1994). Public attitudes toward bears and their conservation. *International Conference Bear Research and Management*, 9, 43–50.
- Kellert, S. R., Black, M., Rush, C. R., & Bath, A. J. (1996). Human culture and large carnivore conservation in North America. *Conservation Biology*, 10, 977–990.
- Kim, M., & Hunter, J. E. (1993). Attitude-behavior relations: A meta analysis of attitudinal relevance and topic. *Journal of Communication*, 43, 101–142.
- Kleiman, D. G. (1989). Reintroduction of captive mammals for conservation. *Bioscience*, 39, 152–161.

- Kleiven, J., Bjerke, T., & Kaltenborn, B. P. (2004). Factors influencing the social acceptability of large carnivore behaviors. *Biodiversity and Conservation*, 13, 1647–1658.
- Lohr, C., Ballard, W. B., & Bath, A. (1996). Attitudes toward gray wolf reintroduction to New Brunswick. *Wildlife Society Bulletin*, 24, 414–420.
- Maehr, D. S., Noss, R. F., & Larkin, J. L. (2001). *Large mammal restoration*. Washington, DC: Island Press.
- Minnis, D. L., & Peyton, R. B. (1995). Cultural carrying capacity: Modeling a notion. In J. B. McAninch (Ed.), *Proceedings of the Symposium of the 55th Midwest Fish and Wildlife Conference, North Central Section of The Wildlife Society, 12–14 December 1993, St. Louis, Missouri* (pp. 19–31).
- Morzillo, A. T. (2005). *Integrating ecology and socioeconomics for species restoration: feasibility of a Louisiana black bear reintroduction in and around Big Thicket National Preserve, Texas*. Unpublished doctoral dissertation, Michigan State University, East Lansing.
- Peine, J. D. (2001). Nuisance bears in communities: Strategies to reduce conflict. *Human Dimensions of Wildlife*, 6, 223–237.
- Pelton M. R. (2003). Black bear. In J. A. Chapman and G. A. Feldhamer (Eds.), *Wild mammals of North America* (2nd ed.; pp. 547–555). Baltimore, MD: John Hopkins University Press.
- Peyton B., Bull, P., Reis, T., & Visser, L. (2001). Public Views on Bear and Bear Management in the Lower Peninsula of Michigan. Report to the Michigan Department of Natural Resources, Wildlife Division. Lansing, Michigan, USA.
- Reading, R. P., & Clark, T. W. (1996). Carnivore reintroductions: An interdisciplinary examination. In J. L. Gittleman (Ed.), *Carnivore behavior, ecology, and evolution, volume 2* (pp. 296–336). Ithaca, NY: Cornell University Press.
- Reading, R. P., & Kellert, S. R. 1993. Attitudes toward a proposed reintroduction of black-footed ferrets (*Mustela nigripes*). *Conservation Biology*, 7, 569–580.
- 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.
- Schoenecker, K. A., & Shaw, W. W. (1997). Attitudes toward a proposed reintroduction of Mexican gray wolves in Arizona. *Human Dimensions of Wildlife*, 2, 42–55.
- Sheskin, I. M. (1985). *Survey research for geographers*. Washington, DC: Association of American Geographers.
- Shropshire, C. C. (1996). *History, status, and habitat components of black bears in Mississippi*. Unpublished doctoral dissertation, Mississippi State University, Mississippi State.
- Siemer, W. F., & Decker, D. J. (2003). 2002 New York State black bear management survey. Human Dimensions Research Unit Series No. 03–6. New York State College of Agriculture and Life Sciences, Cornell University, Ithaca, New York, USA.
- Smith, K. G., & Clark, J. D. (1994). Black bears in Arkansas—characteristics of a successful translocation. *Journal of Mammalogy*, 75, 309–320.
- Texas Parks and Wildlife Department (TPWD). (2005). *East Texas black bear conservation and management plan* (PWD PL W7000-1046 [6/05]). Austin, Texas.
- Upmeyer, A., & Six, B. (1989). Strategies for exploring attitudes and behavior. In A. Upmeyer (Ed.), *Attitudes and behavioral decisions* (pp. 1–18). New York: Springer-Verlag.