STAKEHOLDER VALUES RELATED TO BLACK BEAR DAMAGE IN ALABAMA

WILLIAM V. UNDERWOOD, School of Forestry and Wildlife Science, Auburn University, AL 36849, USA
JAMES B. ARMSTRONG, Extension Wildlife Damage Specialist, School of Forestry and Wildlife Science, Auburn University, AL 36849, USA

Abstract: Members of several stakeholder groups in Alabama were surveyed regarding their experience with bear damage and their potential tolerance for bear damage assuming black bear numbers were to increase. Very little bear related damage was reported. Regression analysis revealed that support for reintroduction, group affiliation, educational status, and knowledge of bears were important in explaining variation in the level of tolerance for potential bear related damage. Members of commodity related groups (i.e. beekeepers, cattlemen) were less likely to be tolerant of bear damage. Educational programs should be implemented before augmentation of the bear population in Alabama is attempted.

Key words: bears, beekeeping, damage, education, human dimensions, values

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INTRODUCTION

Few bears reside in Alabama (likely less than 100), and these animals are centered in the southwest corner of the state. Currently, investigations are underway to determine the feasibility of increasing this bear population. Little is known about Alabamians' attitudes towards black bears (*Ursus americanus floridanus*) and the damage that they can cause. While reports of bear related damage are rare, isolated incidents of bear-related damage have the potential to reduce public support for potential increases of the bear population.

A number of surveys regarding bear-caused damage have been published DuBrock et al. (1978) reported on demographic characteristics of hunters and harvest methods in Virginia, but only touched on the hunter's attitudes towards bear management in the state. Virginia bear hunters were generally supportive of the management policies of the Virginia Game Commission. Decker et al. (1981) studied public attitudes towards black bears in the Catskill Mountains of New York. They found that most respondents in their survey had positive attitudes towards bears and were willing to tolerate some property damage caused by bears. Clark et al. (1991) examined landowner attitudes towards black bears in Arkansas. They found that 83% of those surveyed thought that bear populations in Arkansas should be maintained or increased. Clark et al. (1991) reported that statewide bear damage in Arkansas was minor, but that some individual farmers suffered serious losses. Landowners who had negative experiences with bears were less supportive of maintaining the bear population in Arkansas. Peyton and Grise (1995) reported that Michigan residents valued black bears in the state and would be willing to support habitat protection for bears. Shropshire (1996) and Bowman

(1999) found that Mississippi residents generally were supportive of efforts to increase the bear population in that state.

Regarding surveys of tolerance of bear damage, Massachusetts has a growing bear population (approximately 1200 bears), and damage reports are on the rise in that state (Jonker et al. 1998). Jonker et al. (1998) reported that Massachusetts farmers considered bears to be a nuisance, but thought that they were an important part of the heritage of the state. One hundred twelve out of 1,598 respondents in the Massachusetts survey reported agricultural damage caused by bears. Corn producers and livestock producers considered the damage to their commodities to be moderate. Beekeepers reported their losses to be substantial, even though their reported damage levels were similar to the other producer groups. This suggests that beekeepers in Massachusetts are more sensitive to damage caused by bears. Only five Massachusetts producers reported livestock damage from bears. The authors suggested that farmers should be taught how to prevent damage from bears in an effort to keep positive support for bears among the group. Finally, White et al. (1995) reported that support among hunting clubs for increasing the bear population in the Mississippi alluvial valley dropped markedly as damage to tree stands, garbage receptacles, and food plots increased.

We surveyed several stakeholder groups in Alabama regarding attitudes about the potential for damage to property and crops caused by black bears. We also attempted to ascertain the amount of bear-related damage experienced by respondents.

METHODS

Members of 4 stakeholder groups with interest in black bears in Alabama were surveyed regarding their experiences, values, and beliefs about bear damage as part of a larger survey of stakeholder values, beliefs, and knowledge of bears in the state. Additionally, attendees at nine town-hall meetings across Alabama were surveyed.

A 67-item survey instrument was developed to assess values, beliefs and knowledge using 4-point Likert-type scales. Additional questions were designed to assess the respondents' experience with bears in Alabama and to measure demographic variables. Several questions were specifically related to bear damage. These included the following: I would tolerate some property damage caused by a bear; If a bear damaged my property, I would want the bear to be destroyed; Bears are an important wildlife species in Alabama, even of they cause some damage; Bears in Alabama should be protected regardless of the damage they might cause. The responses to these 4 questions were combined into a 16 point scale, with scores of 8 and better considered to indicate increasing levels of tolerance for bear related damage. Respondents were also asked if they would contact the state wildlife agency in the event of bear related property damage and if they had ever experienced bear damage to beehives, livestock, timber, or crops. Additionally, respondents were asked if they would support the reintroduction of bears into portions of Alabama even if they might cause some damage.

Self-administered survey instruments were mailed to 2,941 Alabama residents who were members of one of the following groups: Alabama Chapter of the Nature Conservancy, Alabama Cattlemen's Association, beekeepers registered with the Alabama Department of Agriculture, and wildlife biologists and conservation officers employed by the Alabama Department of Conservation.

Statistical Analyses

All data were entered using Microsoft Excel 97 spreadsheet software and analyzed using SPSS 10.0.5. Linear regression analysis (Pedhauzer 1997, Shannon and Davenport 2001) was used to determine the influence of demographic variables (TOWNSIZE, GENDER, AGE, INCOME, GROUP, EDUCATION), average knowledge (KNOWLEDGE) score, and average support for reintroduction (SUPPORT) score on scores for the 16 point damage scale (dependent variable). Restricted and full regression models (Pedhauzer 1997, Shannon and Davenport 2001) were constructed for the scale. The full model included demographic variables (TOWNSIZE, GENDER, AGE, INCOME, GROUP, EDUCATION) along with computed scores for KNOWLEDGE and SUPPORT. The restricted model for the scale included only those variables that made a significant contribution (beta value significant at $p \leq 0.05$) to the full model. These beta values provided an estimate of the relative contribution of each variable to the explanation of the variance in the model. Positive or negative beta values indicated that the variable was positively or negatively related to the explanation of the variance in the scale. Values closer to 1 or –1 indicated stronger relationships. The change in R^2 was noted between the full and restricted model. If the change in R^2 was not significant ($p > 0.05$), the restricted model provided the most parsimonious explanation for the variation present in the scale. The change in standard error between the full and restricted models was also examined to ensure that there was not a marked increase in the error between the models. The restricted model was most desirable because it could explain the variation in the scale using the least number of variables.

Cronbach's alpha was calculated for the scale, providing an estimate of internal reliability. Higher estimates of Cronbach's alpha indicate that the responses to survey items correlate highly to each other, and that the results could be generalized to other questions dealing with the same subject matter (Crocker and Algina 1986). Analysis of variance (ANOVA) (Keppel and Zedeck 1998, Shannon and Davenport 2001) was used to detect differences in the mean scores for variables that were significant predictors ($p \leq 0.05$) in the scale model. Levene's statistic for homogeneity of variance was calculated for each ANOVA to determine if the assumption of homogeneity of variance had been violated (Keppel and Zedeck 1998). Tukey's test was used to examine mean differences for independent variables that passed Levene's test ($p > 0.05$, Keppel and Zedeck 1998). The Dunnett-C test was used for independent variables that failed the Levene's test ($p \leq 0.05$) because it is considered to be a more conservative test (Keppel and Zedeck 1998).

RESULTS

Response Rate

A total of 1,953 (response rate 70.1%) people responded in this study. One hundred seventy-six respondents opted out of completing the mail survey, resulting in 1,777 usable surveys. The most common reason given for not responding was a lack of knowledge about bears. State biologists had the highest response rate (94.4%), while members of the Alabama Cattlemen had the lowest response rate (53.7%). Dolsen and Machilis (1991) reported that non-response bias was not a significant concern in studies where the response rate met or exceeded 65%, so no attempt was made to contact non-respondents.

Subject Profile

The average age of respondents in this survey was 55.8 (SD = 14.5) years.

Significant differences existed between the mean ages for the stakeholder groups ($F_{5,1817}$ = 40.761, $p < 0.001$). Beekeepers and members of the Nature Conservancy were on average older than all other groups. Town hall meeting attendees, conservation officers, and state biologists were younger than all other groups. The majority of respondents (68.9%) reported that they lived in a town of greater than 30,000 residents. Members of the Nature Conservancy were more likely to reside in towns of greater than 30,000 residents than all other groups ($F_{5,1803}$ = 82.482, $p < 0.001$). On average, town hall meeting attendees, beekeepers, conservation officers, and biologists resided in more rural settings, however, all of these groups were more urban than members of the Alabama Cattlemen. Overall, 72.1% of respondents were male. Members of the Nature Conservancy were more likely to be female than were members of all other groups, while conservation officers and state biologists were more likely to be male than were respondents from the remaining groups ($F_{5,1834}$ = 112.013, $p < 0.001$).

Average education level among respondents was 3.7 of 5 (SD = 1.1), with the majority of respondents having had at least some college education. Biologists, members of the Nature Conservancy, and town hall meeting attendees had achieved, on average, higher levels of education than all other groups. Conservation officers, cattlemen, and beekeepers did not differ regarding education level. Differences also existed in income between groups ($F_{5,1662}$ = 9.665, $p < 0.001$). Members of the Alabama Cattlemen, members of the Nature Conservancy, town hall meeting attendees, and state biologists were more likely to earn more than $45,000 per year than were conservation officers and beekeepers.

Summary of Reliability

Cronbach's alpha for the bear damage measurement scale was calculated at 0.837, indicating these items to be highly consistent.

Bear Damage Scale

The full regression model for the bear damage scale accounted for 49.3% of the variance (R^2 = 0.493, $F_{8,1399}$, $p < 0.001$) in the dependent variable of damage tolerance. AGE, INCOME, and TOWNSIZE were not significant predictors of tolerance of damage, and were removed from the regression equation. The restricted model (R^2 = 0.492 , $F_{5,1402}$, $p < 0.001$) contained the five remaining independent variables (KNOWLEDGE, GENDER, SUPPORT, EDUCATION, and GROUP).

The restricted model provided a parsimonious solution by providing a simpler model with five independent variables instead of eight. The removal of the AGE, INCOME, and TOWNSIZE variables from the full model decreased the explained variance of the model by only 0.1% , and did not produce a significant F-change ($F_{3,\ 1,405}$ = 1.326, $p > 0.05$). The standard error of the estimate increased slightly (1.7830 to 1.7836).

All of the variables were positively correlated to the scores on the damage scale. Support for reintroduction contributed most to the explanation (β = 0.538, t = 26.328, $p < 0.001$). GROUP (β = 0.213, t = 9.390, $p < 0.001$), GENDER (β = 0.115, t = 5.543, $p < 0.001$), KNOWLEDGE (β = 0.070, t = 3.520, $p < 0.001$), and EDUCATION (β = 0.052, t = 2.564, $p < 0.05$) were significant positive contributors to the explanation of the damage variable.

Differences occurred between the means on the bear damage variable for GROUP ($F_{5,1643}$ = 83.627, $p < 0.001$). Mean score on the bear damage scale was 11.20 (SD = 2.50) of 16, with scores above 8 indicating an increasing level of acceptance

of bear damage. State biologists, Nature Conservancy members, town hall meeting attendees, and conservation officers scored higher than registered beekeepers and Alabama Cattlemen. Females were more willing to accept some bear damage than males ($F_{1,1643} = 84.521$, $p < 0.001$). Willingness to accept bear damage also increased as knowledge of bears increased. There were differences in the means for EDUCATION on the damage scale ($F_{4,1629} = 21.845$, $p < 0.001$). Respondents with graduate and college degrees were more tolerant of possible bear damage than all other groups.

Respondents were asked several questions related to their involvement in farming, livestock, timber production, and beekeeping in Alabama. Those who were involved in the above activities were asked if a bear had ever caused any damage to their operations in Alabama. Perceived or actual damage was low for all groups. Among 854 Nature Conservancy members who responded to the survey, 3 (0.4%) claimed that bears had caused damage to their livestock, 2 (0.2%) claimed to have timber damage, and 1 (0.1%) claimed to have crop damage. Of 544 cattlemen who responded, 2 (0.4%) claimed livestock damage, 6 (1.1%) claimed timber damage, and 1 (0.2%) claimed crop damage by bears. Fourteen (5.8%) beekeepers claimed to have had damage to their beehives, 1 (0.4%) claimed damage to livestock, 2 (0.8%) claimed damage to timber, and 2 (0.8%) claimed damage to crops. Among town hall meeting attendees, only 1 (1.4%) claimed damage to beehives, 1 (1.4%) claimed damage to timber, and 1 (1.4%) claimed damage to crops. When asked if they would support the reintroduction of bears into portions of Alabama even if they would cause some damage, 92.6% of town hall meeting attendees, 90.3% of wildlife biologists, 87.5% of conservation officers, 72.7% of Nature Conservancy members, and, 53.7% of beekeepers, and 51.3% of Alabama Cattlemen answered affirmatively.

DISCUSSION

Overall, even among beekeepers, little damage caused by bears was reported in this study. Much of the bear damage was reported by respondents who lived in areas of Alabama not known to support a bear population. Misidentification of the species causing damage may explain much of the damage reported in this study. However, even the perception of bear related damage has the potential to reduce public support for reintroduction efforts. While usually not widespread, bear damage to individual producers can cause financial hardship. Several studies have reported that landowners who have experienced bear damage are less likely to support restoration efforts (Clark et al. 1991, Jonker et al. 1998). Wildlife policy makers in Alabama should consider proactive strategies to prevent bear damage to agricultural crops in an effort to maintain positive feelings towards bears in the state. Efforts should be made to educate these groups about ways to prevent and control bear damage before it becomes a problem.

Support for reintroduction proved to be the strongest explanatory variable revealed by regression analysis. Those respondents who were more supportive of bear reintroduction in Alabama were more likely to tolerate some bear related damage. Group affiliation was also important in explaining the variation in the regression model. Members of the Alabama Cattlemen and registered beekeepers were less likely to tolerate bear damage than other groups. Perhaps this is because members of these groups are more likely to earn a living by producing commodities that are susceptible to bear damage. Efforts should be made to target these groups for extension-based

programs aimed at reducing the vulnerability of their assets to damage by bears.

Respondents who had attended institutions of higher learning tended to be more accepting of potential bear damage, as were respondents who scored higher on a bank of questions dealing with knowledge about black bears. This adds support to the need for education regarding bears in Alabama. Efforts to reestablish the black bear in Alabama should be preceded by a rigorous educational campaign designed to enlighten the public about the potential benefits of a bear population and the potential for bear related damage.

LITERATURE CITED

BOWMAN, J.L. 1999. An assessment of habitat suitability and human attitudes for black bear restoration in Mississippi. Dissertation, Mississippi State University, Starkville, MS, USA.

CLARK, J.D., D.L. CLAPP, K.G. SMITH, AND T.B. WIGLEY. 1991. Black bear damage and landowner attitudes toward bear in Arkansas. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 45:208-217.

CROCKER, L., AND J. ALGINA. 1986. Introduction to classical and modern test theory. Holt, Rinehart, and Winston, New York, NY, USA.

DECKER, D.J., T.L. BROWN, D.L. HUSTIN, S.H. CLARKE, AND J. O'PEZIO. 1981. Public attitudes towards black bears in the Catskills. New York Fish and Game Journal 28:1-20.

DOLSEN, D.E. AND G.E. MACHLIS. 1991. Response rates and mail recreation survey results: how much is enough? Journal of Leisure Research 23:272-277.

DUBROCK, C.W., A.R. TIPTON, AND J.B. WHELAN. 1978. Evaluation of a bear hunter survey and its implications on black bear management in Virginia. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 32:202-207.

JONKER, S.A., J.A. PARKHURST, R. FIELD, AND T.K. FULLER. 1998. Black bear depredation on agricultural commodities in Massachusetts. Wildlife Society Bulletin 26:318-324.

KEPPEL, G. , AND S. ZEDECK. 1998. Data analysis for research designs. W.H. Freeman, New York, USA.

PEDHAUZUR, E.J. 1997. Multiple regression in behavior research. Third edition. Harcourt Brace, Fort Worth, TX, USA.

PEYTON, R.B. AND L. GRISE. 1995. A 1994 survey of Michigan public attitudes regarding bear management issues. Research report, Michigan State University, East Lansing, MI, USA.

SHANNON, D.M., AND M.A. DAVENPORT. 2001. Using SPSS to solve statistical problems: a self instruction guide. Merril, Upper Saddle River, NJ, USA.

SHROPSHIRE, C.C. 1996. History, status and habitat components of black bears in Mississippi. Dissertation, Mississippi State University, Starkville, MS, USA.

WHITE, T.H. JR., C.S. SHROPSHIRE, AND M. STATEN. 1995. Black bear damage in the Mississippi alluvial valley. Proceedings of the Eastern Wildlife Damage Conference 7:109-117.