ATTITUDES OF PARK VISITORS TOWARD WILDLIFE AND BLACK BEAR MANAGEMENT: A CASE STUDY OF BIG SOUTH FORK NATIONAL RIVER AND RECREATION AREA

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1.0 Introduction

It is important for wildlife management agencies to understand visitor attitudes toward various managerial actions to successfully conserve and protect the wildlife and the environment while providing education and recreation opportunities for visitors. Previous studies have indicated that the public tends to show preference, favor and support of certain species, such as the American black bear (Kellert, 1994; Bowman, Leopold, Vilella & Gill, 2004). However, black bears, and large mammals in general, have long produced polarized attitudes (Bjerke & Kaltenborn, 1999). Typically, negative attitudes toward black bear are the result of direct impacts of losing livestock, particularly for ranchers and farmers, whereas positive attitudes toward black bear are related to the understanding the essential role of black bear in the overall ecosystem (Kellert 1985; Messmer, Brunson, Reiter, & Hewitt, 1999).

Earlier studies have shown that large mammals can produce varying attitudes based on respondents' demographics, such as age, education, residential area, and occupation (Brooks, Warren, Nelms, & Tarrant, 1999; Messmer, et al., 1999; Williams, Ericsson & Heberlein, 2002). More recently, human dimensions of black bear management have been more specific in black bear nuisance complaints and management solutions (Treves, Kapp, & MacFarland, 2010; Voyles, Treves, & MacFarland, 2015), biological and social factors of human-bear conflicts and management actions (Lowery, Morse, & Steury, 2012), and global studies in black bear management (Can, D'Cruze, Garshelis, Beecham, & Macdonald, 2014). In park settings, visitors might view black bears as a physical threat to humans, while also viewing them positively in the ecosystem and natural environment (Miller, Miller, & McCollum, 1998; Bowman, et al., 2004). In addition, Morzillo, Mertig, Garner, and Liu (2007) indicated that seeing bears in the wild often leads to more positive perceptions of natural areas. However, the relationship between people's attitudes toward wildlife in general and black bears specifically remains unknown. The purpose of the study was to identify park visitors' knowledge of, and attitudes towards, black bears and related management actions, and to distinguish possible differences of park visitors' attitudes toward wildlife in general and black bears specifically.

1.1 Background

The Big South Fork National River and Recreation Area (BISO), a unit of the National Park Service (NPS) located in Tennessee and Kentucky, encompasses 125,000 acres of the Cumberland Plateau and protects rugged forests, ridges and river valleys. Having profound natural resources and diverse wildlife attracts a variety of visitors. Within BISO and the surrounding area, the number of bears has been on the rise since the mid-1990 with the reintroduction of the black bear to the area (National Park Service, 2012). An increased black bear population, approximately 15 bears in late 1990s to 250 bears in 2013, makes it possible, and probable, that interactions with visitors will increase (Lakes, 2014; Matheny, 2013). As one of the few NPS units that allows hunting (i.e. deer, turkey and wild boar), it is important for park managers to understand a variety of possible management actions and human dimensions of black bear in managing the growing black bear population within the property. Studying the human dimensions of black bears is the next logical step in understanding and managing the growing population in an effort to benefit the bears and the visiting public.

2.0 Methods
2.1 Research location and sampling

Data were collected from park visitors of BISO from March, 2013 through September, 2013. Three locations within the park were selected for data collection: one at the northeast area of the park in Kentucky, and the other two were at southern areas of the park in Tennessee. The targeted research population of this study was individuals over 18 years of age who visited BISO. Every third visitor was approached to participate in the survey at three locations in the park. Data collection dates and time was stratified by days of the week and hours of the day. Traditional paper surveys were facilitated on site to ensure participants were actual visitors to the park and to increase recall of the information encountered while at the park. A total of 144 people declined to take the survey and 386 respondents completed surveys, resulting in a 72% response rate.

2.2 Research instrument

The development of this study and the construction of the questionnaire was based on current literature, including Agee and Miller (2009), Bremmer and Park (2007), Brooks et al. (1999), and feedback from BISO park managers. In order to develop a reliable and meaningful survey, the final vision of the questionnaire was examined by a preliminary test group and a pilot study for targeted park visitors. It included three major components to assist in understanding park visitors' attitude toward wildlife and black bears: (1) visitors' perspectives on wildlife management in general and black bear specifically on 7-point Likert scale, ranging from 1 "strongly disagree" to 7 "strongly agree" (Agee & Miller 2009); (2) visitor attitudes toward a variety of management actions for black bear on 5-point Likert scale, ranging from 1 "unacceptable in all case" to 5 "acceptable in all case", as original scale design (Brooks et al., 1999) ; (3) demographics (i.e. age, education, and residential location) visitation pattern,

and experience or interactions with black bears. It is important to note that instruments were minimally modified to suit this study and to provide maximum opportunity to compare to previous studies.

2.3 Data analysis
To understand the demographics of BISO park visitors, and their general attitudes toward wildlife and black bears, the researchers employed descriptive analysis. Multiple linear regression was utilized to identify the impact of general attitudes toward wildlife and black bear specific attitudes on park visitors' perspective of various possible management actions. The dependent variables of the multiple linear regression analysis were the support of various management actions, including non-lethal and lethal management strategies. There were two types s of independent variables: the first level was focused on park visitors' general attitudes toward wildlife and second level on attitudes toward black bears specifically. The analysis was used to investigate park visitors' acceptance and support of black bear management actions different from their general perception of wildlife management. Prior to the multiple linear regression analysis, the assumption of normality and collinearity were tested. Most variables were approximately normally distributed with both skewness and kurtosis between -2 and +2, except a few variables were considered as positive kurtosis (high peek) in distribution. The results of Tolerance (range from .60 to .99) and VIF (range from 1.01 to 1.66) indicated the variables were not a problem in regards to collinearity (Stevens, 2009).

3.0 Results
This section presents the results of the study, organized into four sections: profile of BISO park visitors, attitudes toward wildlife and black bear, support of management actions, and attitudes toward management actions.

3.1 Profile of BISO park visitors
A majority of BISO park visitors were from Tennessee (36%) and Kentucky (23%), and 51% of research participants were repeat visitors. The average age of the respondents was 51 years old. Hiking, wildlife watching, and camping were the top three recreation activities of park visitors. In terms of visitor-black bear experience, 89% were aware of the presence of black bears in the park, but only 19% had seen a black bear in the past 12 months. Fifty percent of park visitors received or saw information on black bears during their visit. In regard to perceived black bear population changes, 56% of the respondents were unsure of the bear population change and 29% viewed the population as having increased.

3.2 Attitudes toward wildlife and black bears
The statements of wildlife attitudes in general (Table 1), park visitors reported an agreement on the importance of wildlife education (M=6.61, SD=.77) and positive feeling of seeing wildlife in their daily life (M=6.48, SD=.89). The results indicated park visitors showed a positive attitude and more homogeneous view on wildlife education and appreciation of wildlife, whereas they had a more polarized view on the human right to manage wildlife and hunting as appreciation of wildlife. In addition, for the statements of attitudes toward black bear, park visitors highly valued the importance of black bears conservation (M=6.26, SD=1.12) and believed black bears are part of the ecosystem (M=6.21, SD=1.14), whereas they tended to be "unsure" about the negative view toward black bears, such as bears are a threat to people (M=4.09, SD=1.87) and a nuisance (M=2.32, SD=1.54).

Table 1. Descriptive Analysis of Park Visitors' Attitudes toward Wildlife and Black Bear

Attitudes on wildlife in general	Mean [a]	S.D.
Seeing wildlife during my daily routine gives me a positive feeling	6.48	.89
It is not important for people to manage wildlife	2.87	2.02
Wildlife education is important	6.61	.77
People appreciate wildlife through hunting	4.75	1.83
Attitudes on black bear	Mean	S.D
I enjoy seeing black bears in the park	5.76	1.54
Bears are an important part of our ecosystem	6.21	1.14
Bears are not a threat to people	4.09	1.87
Black bears in the park should be conserved for future generations	6.26	1.22
Black bears are a nuisance	2.32	1.54
Black bears are being properly managed in the park	5.01	1.37

Note: [a] Measured by 7-point Likert scale ranged from 1 "strongly disagree" to 7 "strongly agree"

3.3 Support of management actions
"Educate the public about human-bear conflicts" (M=4.65, SD=.75) was the most supported management action among all the statements, whereas euthanize black bears captured in popular visitor sites received the least support from park visitors (M=2.34, SD=1.23) (Table 2). In general, park visitors reported a greater variation and lower support for lethal management actions, such as hunting and euthanizing bears when compared to non-lethal management actions, such as education efforts and relocation of bears. Although euthanizing bears is not the most acceptable management action, park visitors were more likely to accept euthanizing bears repeatedly causing problems for people than bears captured in popular visitor sites without causing problems.

Table 2. Descriptive Analysis of Park Visitors' Support for Management Actions

Management action	Mean [a]	S.D.
Capture and relocate bears	3.71	.96
Euthanize black bears captured in popular visitor sites	2.34	1.23
Educate the public about human-bear conflicts	4.65	.75
Use regulated hunting to manage bear numbers	3.94	1.20
Euthanize bears that repeatedly cause problems for people	3.27	1.24
Leave bears alone	3.85	1.06

Note: [a] Measured by 5-point Likert scale, ranged from 1 "unacceptable in all case" to 5 "acceptable in all case"

3.4 Attitudes toward management action

Results of multiple linear regression analyses indicated that park visitors' general attitudes toward wildlife were able to predict a certain degree of support in most of the managerial actions. Further, the black bear specific attitudes were able to increase the prediction, although the best predictor of visitors' support varied with different management actions. For example, five of six management actions, including "capture and relocate", "educate the public about human-bear conflicts", "euthanize black bears captured in popular area", "euthanize black bears repeatedly cause problems", and "regulation of bear hunting", predicted by visitors' general attitudes of wildlife management. Park visitors' attitudes toward wildlife in general predict between 6% to 15% variance in their support of black bear management actions in the first level (see details in Table 3). Specific attitudes toward black bears predicted 10% to 24% variance in their support of possible management actions. The combination of general wildlife and black bear specific attitudes performed the best for predicting the management strategies related to regulation of bear hunting (R^2=.24) and education opportunity of human-bear conflicts (R^2=.23). The "leave bears alone" management action was the only option that could not be significantly predicted by park visitors' general perspectives of wildlife management (p=.606), however, after adding visitors' perspective toward black bear, the model was able to predict the total variance up to 20.2% (p<.001***).

Park visitors who tended to believe that it is important for people to manage wildlife were more likely to support the capture and relocate technique; these same individuals were also more likely to view bears as a threat to people and believed black bears are appropriately managed in the park. In addition, park visitors who support "educating the public about human-bear conflicts" tended to have positive attitudes toward wildlife education and enjoyment of wildlife watching in general. Furthermore, they were also less likely to view black bears as a nuisance and believed bears were an important part of ecosystem.

Regarding lethal wildlife management actions, park visitors who generally believe people appreciate wildlife through hunting were more likely to support euthanizing black bears, whereas only those who viewed bears as a threat to people tended to support euthanizing bears captured in popular sites, even for bears that do not repeatedly cause problems for people. Moreover, park visitors who viewed hunting as a way to appreciate wildlife and perceived bears as a nuisance were more likely to support utilizing regulated hunting to manage bear numbers. Finally, "leave bears alone" was the only bear management action that could not be predicted by park visitor general attitudes toward wildlife; however several black bear specific attitudes (i.e. enjoying seeing bears and bears are not a threat to people) significantly predicted visitors support of this management action (Table 3).

Table 3. Multiple Linear Regression Analysis of Park Visitors' Attitudes toward Management Actions

Management Action (DV)	Level [a]	R [b]	R^2 [b]	p-value [c]	Significant Independent Variables
Capture & relocate bears	I	.24	.06	$p<.01$**	It is not important for people to manage wildlife (β=-.18, $p<.001$**)
	II	.33	.11	$p<.001$***	Adding: Bears are not a threat to people (β=-.14, $p<.05$*); Black bears are being properly managed in the park (β=.24, $p<.001$***)
Educate the public about human-bear conflicts	I	.39	.15	$p<.001$***	Seeing wildlife during my daily routine gives me a positive feeling (β=.25, $p<.001$); Wildlife education is important (β=.17, $p<.01$**)
	II	.47	.23	$p<.001$***	Adding: I enjoy seeing black bears in the park (β=-.15, $p<.05$*); Bears are an important part of our ecosystem (β=.20, $p<.01$**); Black bears are a nuisance (β=-.14, $p<.05$*)
Euthanize black bears captured in popular visitor sites	I	.24	.06	$p<.01$**	People appreciate wildlife through hunting (β=.22, $p<.001$**)
	II	.34	.11	$p<.001$***	Adding: Bears are not a threat to people (β=-.16, $p<.01$**)
Euthanize bears that repeatedly cause problems for people	I	.24	.06	$p<.01$**	People appreciate wildlife through hunting (β=.22, $p<.001$***)
	II	.31	.10	$p<.01$**	None
Use regulated hunting to manage bear numbers	I	.44	.20	$p<.001$***	People appreciate wildlife through hunting (β=.44, $p<.001$***)
	II	.49	.24	$p<.001$***	None
Leave bear alone	I	.12	.01	$p=.38$	None
	II	.42	.18	$p<.001$***	I enjoy seeing black bears in the park (β=.17, $p<.05$*); Bears are not a threat to people (β=.18, $p<.01$**)

Note:
[a] Level: two levels in multiple linear regression analysis: level I (attitude toward wildlife in general) and level II (attitude toward black bear specific)
[b] R: standardized regression coefficient; R^2: squared multiple correlation
[c] significant level: * $p<.05$; ** $p<.01$; *** $p<.001$

4.0 Discussion and Conclusion

Findings of this research revealed the relationship between park visitors' attitudes toward black bears and their support level of management actions, which not only assist the BISO making management decisions but also could be valuable for other agencies dealing with black bears management on their property. The results showed that park visitors' attitudes toward wildlife in general help in understanding a certain degree of support for most management actions and their attitudes toward black bear enhance the prediction of visitor acceptance of various managerial actions. For example, park visitors who supported educational efforts about human-bear conflicts expressed more support for black bears conservation and perceived black bears were not a nuisance, whereas park visitors who supported using regulated hunting as a management tool to control bear population tended to believe people appreciate wildlife through hunting and viewed bears as a threat to visitors. However, from park visitors' perspective, leave-bear-along strategy is only acceptable for managing black bears but not for managing the general wildlife in the park. The find is consistent with other studies that visitors especially in recreational settings have a highly favorable attitude towards black bears and express pronounced interests in seeing black bears in parks (Bowman, et al., 2004; Kellert, 1994; Morzillo et al., 2007).

Park visitors in general accept situational solutions using lethal methods in the park for reducing human-bear conflict, ensuring public safety, and preserving ecological health (Koval & Merting, 2004; Treves & Naughton-Treves, 2005). Education efforts and marketing techniques for wildlife population control may increase support for management of black bears through both lethal and nonlethal wildlife management actions (Treves & Naughton-Treves, 2005; Morzillo et al., 2010). Gaining a basic understanding of visitor's opinions and views on black bears and their management is valuable when management action is needed. It is necessary for wildlife management agencies to continue studying public attitudes in specific situations via case studies, enabling managers to understand visitor preference, tolerance, and reaction to wildlife management actions (Koval & Merting, 2004).

Several limitations and future study suggestions of this study are as follows: (1) a few variables' distribution showed positive kurtosis problems, so it is important to interpret the results with caution. The positive kurtosis distribution resulted from a high positive attitude toward general wildlife education and educating the public about human-bear conflicts, which researchers might need to rewrite and test for future use; (2) although this research sought to assist land management agencies to understand visitors' perception of black bears in a park setting, it might not represent the perspectives of local residents, adjacent property owners,

and farmers, who are more likely to have negative attitudes toward and complaints about black bears (Messmer, et al., 1999, Treves, et al, 2010). For future studies, including both park visitors and local residents' attitudes towards black bears might provide a broader and unbiased perspective for bear management. Finally, as for management implications for black bears in the park, results are consistent with earlier studies where the public showed greater support for non-lethal compared to lethal actions (Messmer, et al., 1999; Morzillo, et al., 2007).

5.0 Citations

Agee, J.D. & Miller, C.A. (2009). Factors contributing towards acceptance of lethal control of black bears in central Georgia, USA. *Human Dimensions of Wildlife, 14*(3), 198-205.

Bjerke, T. & Kaltenborn, B.P. (1999). The relationship of eccentric and anthropocentric motives to attitudes toward large carnivores. *Journal of Environmental Psychology, 19*, 415-421.

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.

Bremner, A., & Park, K. (2007). Public attitudes to the management of invasive non-native species in Scotland. *Biological Conservation, 139*(3), 306-314.

Brooks, J. J., Warren, R. J., Nelms, M. G. & Tarrant, M. A. (1999). Visitor attitudes toward and knowledge of restored bobcats on Cumberland Island National Seashore, Georgia. *Wildlife Society Bulletin 27*, 1089-1097.

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*(6), 501-513.

Kellert, S. R. (1994). Public attitudes toward bears and their conservation. *International Conference on Bear Research and Management, 9*, 43–50.

Kellert, S.R. (1985). Public perceptions of predators, particularly the wolf and coyote. *Biological Conservation, 31*, 167-189.

Koval, M. H., & Mertig, A. G. (2004). Attitudes of the Michigan public and wildlife agency personnel toward lethal wildlife management. *Wildlife Society Bulletin, 32*(1), 232-243.

Lakes, R. M. (2014). Visitors perception of black bears management options in Big South Fork National River and Recreation Area (Master's thesis). Retrieved from http://encompass.eku.edu/cgi/viewcontent.cgi?article=1229&context=etd

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.

Matheny, J. (2013, May 6). Relocated black bear numbers soar in Big South Fork. WBIR News. Retrieved from http://scott.wbir.com/news/news/574252-relocated-black-bear-numbers-soar-big-south-fork

Messmer, T. A., Brunson, M., Reiter, W. D. & Hewitt, D. G. (1999). United States public attitudes regarding predators and their management to enhance avian recruitment. *Wildlife Society Bulletin, 27*, 75-85.

Miller, S. M., Miller, S. D. & McCollum D. W. (1998). Attitudes toward and relative value of Alaskan brown and black Bears to resident Voters, resident hunters, and nonresident hunters. *Ursus, 10*, 357-376.

Morzillo, A. T., Mertig, A. Garner, G. N. & Liu, J. (2007). Resident attitudes toward black bears and population recovery in east Texas. Human Dimensions of Wildlife 12, 6-21.

National Park Service (2012). Big South Fork National River and Recreation Area. Retrieved from http://www.nps.gov/biso/index.htm

Stevens, J. P. (2009). *Applied multivariate statistics for the social sciences*. Routledge: New York, NY.

Treves, A., & Naughton-Treves, L. (2005). Evaluating lethal control in the management of human-wildlife conflict. *Conservation Biology Series-Cambridge, 9*, 86-106.

Treves, A., Kapp, K. J., & MacFarland, D. M. (2010). American black bear nuisance complaints and hunter take. *Ursus, 21*(1), 30-42.

Voyles, Z., Treves, A., & MacFarland, D. (2015). Spatiotemporal effects of nuisance black bear management actions in Wisconsin. *Ursus, 26*(1), 11-20.

Williams, C. K., Ericsson, G. & Heberlein, T. A. (2002). A quantitative summary of attitudes toward wolves and their reintroduction (1972-2000). *Wildlife Society Bulletin, 30*, 575- 584.