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Biological and Social Investigation of Human–Black Bear Conflicts in the Panhandle of Florida

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As human–black bear conflicts increase, developing conflict mitigation strategies that account for both biological and social understanding has become a primary objective of managers. We examined black bear habitat use in the Florida Panhandle to understand its impact on the spatial distribution of conflicts. Focus groups were conducted with local residents and wildlife professionals to obtain participants' beliefs, attitudes, and preferences toward bears and conflict management approaches. Findings suggest bears prefer using areas located closer to humans and that while participants generally supported the regional presence of bears there was no consensus on how to manage human–bear conflicts. Several habitat and human management implications were identified along with suggestions for additional research. Improving biological and social understanding on the causes of human–black bear conflicts and the efficacy of various mitigation strategies can advance collaboration between the public and wildlife professionals and facilitate agreement on socially acceptable conflict management strategies.

Keywords attitudes, human–wildlife conflict, wildlife management, discrepancies, black bears

Introduction

Across the United States, interactions and conflicts between humans and American black bears (*Ursus americanus*) have increased over the last quarter of a century (Baruch-Mordo, Breck, Wilson, & Theobald, 2008; Beck, 1991; Beckmann & Berger, 2003; Carr & Burguess, 2004; Zack, Milne, & Dunn, 2003). Preventing and reducing human–black bear conflicts has come to the forefront of black bear management. As conflict mitigation strategies have continued to evolve, there has been a growing call to implement strategies that incorporate both biological and social understanding into conflict mitigation (Decker, Brown, Hustin, Clarke, & O'Pezio, 1981; Don Carlos, Bright, Teel, & Vaske, 2009; Kretser, Curtis, & Knuth, 2009). Don Carlos et al. (2009) state that "effective management of urban bear conflict demands an integrated approach that accounts for both biological and social factors" and that there is a "need for an integration of biological and

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social science methods to inform protocol development, implementation, and evaluation" of conflict management strategies.

Understanding social factors, such as individuals' beliefs and attitudes about bears, acceptable levels of conflict, and management preferences, can be important in formulating socially acceptable conflict mitigation strategies (Don Carlos et al., 2009). The viability of publicly preferred management strategies can be evaluated through comparisons with scientifically validated management options and expert opinion. Such comparisons provide insight into discrepancies that exist between the public and wildlife professionals concerning appropriate conflict management. The identification of such discrepancies can serve as the basis for future outreach efforts aimed at improving collaboration and agreement between the public and professionals concerning acceptable conflict mitigation solutions (Don Carlos et al., 2009). Understanding biological factors such as black bear habitat use can aid in determining the likely spatial distribution of conflicts and whether conflict management strategies would be better suited to focus on bear or human related aspects or both.

The state of Florida has observed a noticeable increase in human–black bear conflicts over the last 15 years (Hristienko & McDonald Jr., 2007; Spencer, Beausoleil, & Martorello, 2007). Florida contains several isolated populations of the Florida black bear (*U. americanus floridanus*). Since the banning of black bear hunting throughout Florida after 1993, black bear populations have increased in number (FWC, 2000). Over this same time period the human population within Florida has grown, resulting in expanded development and movement into previously unoccupied lands (U.S. Census Bureau, 2010). As a result of this rapid growth by both bear and human populations, Florida has experienced an upward trend in human–black bear conflicts (Eason, 2003; Spencer et al., 2007).

This study aimed to understand both the biological and social factors related to the occurrence of human–black bear conflicts associated with the Apalachicola subpopulation of black bears. From a biological standpoint, habitat use patterns of the Apalachicola subpopulation were examined with the objectives of understanding the effect of vegetative land cover and various habitat characteristics on black bear habitat use. From a social standpoint, we had two objectives. The first objective was to understand the range of local people's beliefs and attitudes about black bears and their management, identify any conflicts, and understand attitudes toward reinstating black bear hunting. The second social objective was to understand the beliefs and attitudes of local land management and wildlife experts regarding bear management. Comparisons of preferred conflict management approaches between the public and wildlife professional participants, which have been rare in past research endeavors, were utilized to reveal commonalities and/or discrepancies concerning appropriate conflict management strategies. As minimal research has been conducted on the Apalachicola subpopulation in the past (Seibert, 1993), an improved understanding of the biological and social contexts in which human–black bear conflicts transpire will aid in advancing cooperation between the public and professionals in implementing biologically appropriate and socially acceptable conflict mitigation strategies.

Methods

Study Area

Within Franklin (Population: 11,549; U.S. Census Bureau, 2010) and Gulf (Population: 15,863; U.S. Census Bureau, 2010) counties Florida, conflicts between humans and black bears are increasing. In 2005, the Apalachicola subpopulation of Florida black bears

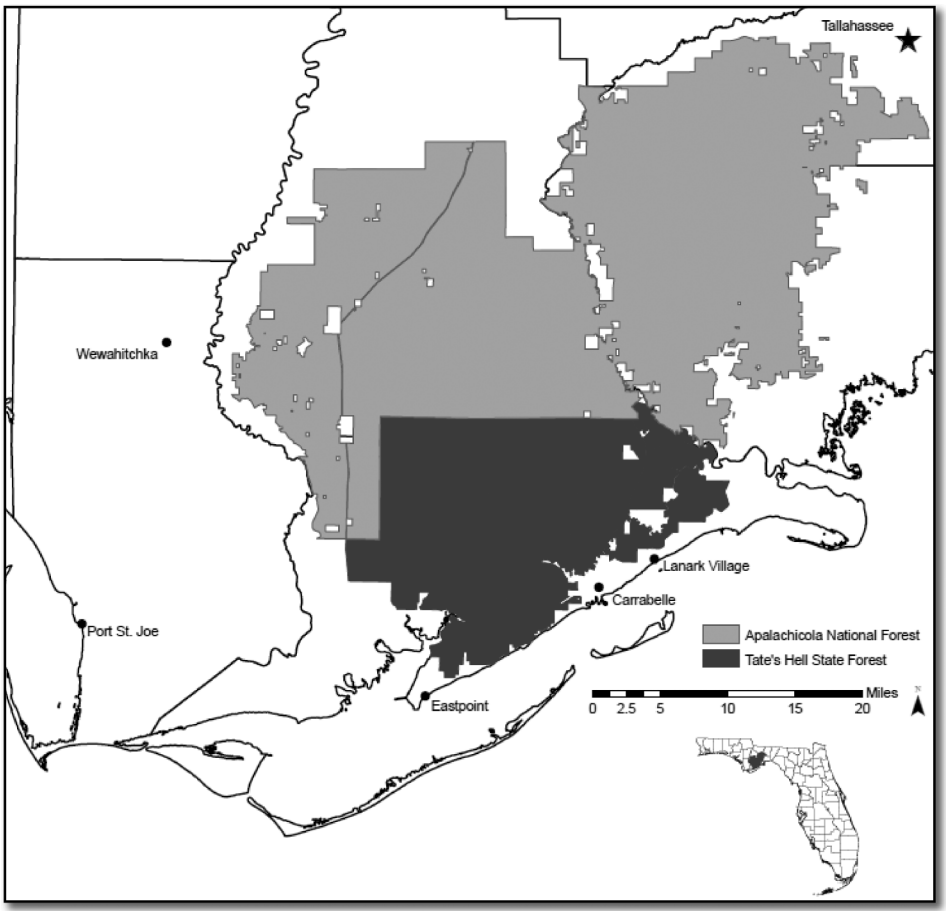

Figure 1. Map of study area located in the Panhandle of Florida where human–black bear conflicts were examined.

consisted of approximately 438 to 695 bears within a primary range of 951,944 hectares (Simek, Jonker, Scheick, Endries, & Eason, 2005). The core area of the subpopulation resides in Apalachicola National Forest (ANF; 231,111) and Tate's Hell State Forest (THSF; 81,923) (Figure 1). The forests contain bottomland hardwood stands, upland pine flatwoods, and longleaf pine (*Pinus palustris*) sandhills (Seibert, 1993; Simek, Jonker, Scheick, Endries, & Eason, 2005). Large expanses of wetlands, swamps, and shrub bays are also present. Black bear habitat use was studied in these two forests.

Along the southern border of THSF the small towns of Carrabelle, East Point, and Lanark Village, which are in Franklin County, regularly experience human–black bear conflicts. Within Gulf County, which lies directly west of both ANF and THSF, conflicts occur in the small towns of Port St. Joe and Wewahitchka, among several others (Figure 1). Both counties and the towns within are predominantly rural, but residents vary demographically. Franklin and Gulf counties contain long-term residents and retirees, second home buyers and newcomers, and individuals of various races, ages, occupations, and socioeconomic statuses. In both counties wildlife biologists devote substantial time and effort to

mitigating human–black bear conflicts (Warwick & Telesco, 2009, personal communication). It is within those communities that the social aspects associated with conflicts were explored.

Biological Data: Black Bear Habitat Use

Data Collection. Detailed data collection and data analysis procedures that were utilized to examine the habitat usage patterns of the Apalachicola subpopulation of Florida black bears can be referenced within Lowery's (2011) thesis. What follows is a brief overview of data collection and analysis methods that were employed.

Within ANF and THSF 85 remote camera surveys were conducted from May through July 2010, and 23 scat detection dog surveys were conducted from late October through late November 2010 to determine the presence or absence of black bears at survey sites. For the camera surveys, digital cameras were in place at each site on average for 7 days. For the scat detection dog surveys, a triangular transect of 900 m on average was created around each survey site, and along each transect a single dog searched off-lead for black bear scat. For each scat found, the location was recorded with a global positioning system (GPS).

For each camera and scat detection dog survey site, pertinent habitat data were collected. In ArcGIS (ArcGIS 9.3.1, ESRI, 2009), each site was categorized into a specific NLCD land cover class and whether it occurred in ANF or THSF. For each site, we also examined, in ArcGIS, the distance to Gulf coast, distance to nearest water source, distance to nearest paved road, distance to nearest dirt road, road density, distance to nearest human population center, and human population density. Habitat data collected in the field for the camera surveys consisted of percent canopy cover, percent understory density, and availability of mast crops at each survey site.

Data Analysis. Occupancy modeling, via the package Unmarked (Fiske, Chandler, & Royle, 2011) in the computer program R, version 2.11.0 (The R Foundation for Statistical Computing, 2010), was utilized to analyze habitat use and the effects of different habitat features on use. Detection covariates originally considered for analysis of the camera surveys included amount of rain, mean temperature, maximum temperature, minimum temperature, and average wind speed. Site covariates for analysis included all of the previously mentioned habitat variables listed in the data collection section. Each detection dog transect was subdivided spatially into approximately 10 replicate detection samples. Detection covariates initially included for analysis of detection dog surveys were humidity, mean temperature, maximum temperature, minimum temperature, average wind speed, and total distance searched by the dog along that transect. Site covariates included were all of the previously mentioned habitat variables listed in the data collection section, excluding distance to dirt road, road density, percent canopy cover, percent understory density, and availability of mast crops due to data limitations.

Global models were generated for both the camera and scat detection dog data once appropriate detection and site covariates were determined. An all models subset approach was employed, and R provided the associated AICc, ΔAICc, and coefficient estimates for each covariate in each model. Model averaged coefficient estimates, standard errors, cumulative covariate weights, and odds ratios were calculated to quantitatively evaluate Florida black bear habitat use and the effects of specific habitat features (Burnham & Anderson, 2002). We reported 85% confidence intervals such that measures of uncertainty would be fully compatible with AIC model selection procedures (Arnold, 2010).

Social Data: Human Dimensions of Human–Black Bear Conflicts

Data Collection. Data regarding social factors related to human–black bear conflicts were obtained through focus group discussions. Focus groups allowed participants to emphasize what information they deemed as most relevant and provided in-depth and comprehensive understanding of participants' attitudes and beliefs (Kruger & Casey, 2009). Key informants within both counties aided in recruiting participants and forming initial focus groups. As initial focus groups were conducted, snowball sampling was utilized to identify additional groups of individuals with whom to discuss aspects related to human–black bear conflicts. Both key informants and snow ball sampling were employed as a diversity of groups was sought to acquire a broad range of attitudes and opinions in relation to study objectives. Additional focus groups were conducted until it was determined that saturation was reached. We defined saturation as the point where the collection of additional data was unlikely to provide new information regarding beliefs and attitudes about bears and bear management (Kruger & Casey, 2009). The lead researcher, in consultation with a peer researcher, determined that this point was achieved after three consecutive focus groups failed to yield new details. A total of 18 focus group discussions were conducted in the summer of 2010, with each group averaging 5 to 8 individuals. Focus groups consisted of one group of local marine industry workers, one group of ecotourism workers, one group of realtors, one group of small business owners, one group of educators, three groups of second home buyers and new residents, four groups of long-term residents (individuals whose families had lived in the counties for multiple generations) and retirees, three groups consisting of members from local recreational clubs including a hunt club, and two concerned citizen groups. One focus group consisting of state biologists and foresters was conducted for comparison with participants from the general public about beliefs and attitudes toward bears, conflicts, and management preferences.

Each focus group discussion followed a questioning guide for consistency across groups. Questions posed to participants were open-ended and designed to facilitate discussion on four main topics: (a) general attitudes and beliefs about black bears, (b) types of interactions and conflicts encountered, (c) opinions concerning current conflict management and preferences for future conflict management, and (d) attitudes toward re-opening a season for hunting black bears. Focus group sessions were conducted in a conversational fashion and in a comfortable location (e.g., restaurant, library). As each open-ended question was posed all participants were encouraged to share their thoughts and respond to other participants' comments. Each discussion was audio recorded, transcribed verbatim into an electronic text file, and reviewed to ensure accuracy and completeness.

Data Analysis. Qualitative analysis techniques, as described by Strauss and Corbin (1990), were employed to analyze each focus group discussion. A start list of primary codes was developed to categorize common responses concerning attitudes toward bears, conflicts encountered, conflict management opinions and preferences, and attitudes toward re-opening bear hunting. As transcripts were read, secondary codes were also generated to capture additional themes and opinions related to each primary coding category. Proposed coding categories were reviewed by project staff, and a final coding scheme was agreed on prior to formal coding.

All coding was completed using the qualitative analysis software NVivo v8.0. For each transcript, pertinent passages were coded into appropriate categories based on the content of the text. Reliability of coded transcripts was assessed by additional project staff at the conclusion of initial coding, and necessary changes were made to ensure the accuracy and

reliability of coded passages. Following the coding of all transcripts, similarities and dissimilarities in responses across constituent groups were explored to decipher differences in groups' views of bears, thoughts on conflicts, conflict management preferences, and attitudes toward re-opening black bear hunting. Comparisons of data provided by wildlife professionals and the focus groups consisting of individuals from the public were utilized to identify discrepancies concerning beliefs about appropriate management of human–black bear conflicts. These comparisons were made by first coding comments into categories for all groups and then examining the wildlife professionals' responses to each question concerning the management of human–black bear conflicts and comparing their answers to those of individuals from the public.

While focus groups were conducted with a wide variety of social and occupational groups and care was taken to strive for saturation of response themes, the goal of focus groups is to capture the range of beliefs and attitudes present and provide understanding concerning human–black bear conflicts as opposed to generalizing to the larger population. These findings provide valuable information for developing discussion points for outreach programs, formulating preliminary management recommendations, and for developing hypotheses for a future quantitative study.

Results

Biological Data: Black Bear Habitat Use

Presence/Absence Surveys. One or more bears were detected at 17 of the 85 camera sites. At four of those 17 sites, there were multiple detections of bears. The raw daily detection rate of bears for the camera surveys, calculated as the number of detection periods with a bear detected divided by the total number of detection periods, was 0.034. For the scat detection dog surveys, 12 transects contained no scats, six transects contained one scat, four transects contained two scats, and one transect contained three scats. The raw detection rate of bear scats for the scat detection dog surveys was 0.073 per 90 meter section of transect.

Model Output. Detailed model output and interpretation of findings concerning the habitat use patterns and the effects of habitat features on habitat use for the Apalachicola subpopulation of Florida black bears can be referenced within Lowery's (2011) thesis. The global model generated for the remote camera data contained the detection covariates of rain amount and mean temperature. Site covariates included in the model were percent canopy cover, percent understory density, THSF, evergreen forest land cover, woody wetland land cover, and all other land covers were grouped together as a reference land cover. Examination of output from analyses revealed support for the covariate for rain amount affecting detection and for the covariate of THSF impacting black bear habitat use (Table 1). The Akaike weight for the covariate for THSF suggested that the variable has a 0.62 probability of being in the best explanatory model, among those considered, and the odds ratio revealed a bear was 2.69 (85% CL: 0.54–13.31) times as likely to use THSF as ANF.

For the scat detection dog data, the global model consisted of the detection covariate of mean temperature, and the site covariates of THSF, woody wetland land cover, with evergreen forest as the reference land cover. Analyses indicated that relevant variables included the detection covariate of mean temperature and the site covariate of THSF (Table 1). The Akaike weight for THSF suggested there is a probability of 0.26 that the variable is in the best explanatory model, and the odds ratio revealed a bear is 1.53 (85% CL: 0.38–6.15) times as likely to use THSF as ANF.

Table 1
Important predictors of bear habitat use and detection in Apalachicola National Forest and Tate's Hell State Forest in 2010 as determined from analysis using AIC and multimodel inference. Akaike weight is the probability of that variable being contained in the true best model among those considered

Covariate[1]	Estimate (SE)	Akaike weight	Odds ratio (85% CL)
Cameras			
p.Rain	0.58 (0.59)	0.63	1.79 (0.76–4.18)
psi.THSF	0.99 (1.11)	0.62	2.69 (0.54–13.31)
Scat Detection Dogs			
p.Mean Temperature	0.17 (0.12)	0.80	1.19 (1.00–1.41)
psi.THSF	0.42 (0.97)	0.26	1.53 (0.38–6.15)

[1]p represents detection covariates. psi represents site covariates.

Although estimated confidence limits suggest that there may be uncertainty regarding the strength and direction of the relationship between the covariate THSF and black bear habitat use, the odds ratios and Akaike weights for the variable, coupled with small sample sizes, suggest that the relationship between THSF and bear habitat use may be biologically important. Larger sample sizes are warranted to elucidate the strength of the relationship between THSF and black bear habitat use.

Social Data: Human Dimensions of Human–Black Bear Conflicts

Participants' generally held positive attitudes toward black bears, and similar conflicts with black bears were identified across focus groups. However, participants' preferred conflict management approaches and attitudes toward re-opening bear hunting varied greatly within and across groups. Specific discrepancies between the public and wildlife professional participants regarding appropriate management of conflicts were also brought to light. What follows is a summary of the (a) general attitudes and beliefs about black bears, (b) types of interactions and conflicts encountered, (c) opinions concerning current conflict management and preferences for future conflict management, (d) attitudes toward re-opening a season for hunting black bears, and (e) discrepancies in conflict management approaches between the public and wildlife professional participants.

General Attitudes and Beliefs About Black Bears. The majority of focus group participants held bears in a positive light or were indifferent toward bears, regardless of the conflicts bears created. One participant stated: "It's one of the biggest thrills in my life down here when I spot a black bear. When I spot a black bear I can sit there and watch him, and to watch them run and move it's exciting to me." Numerous participants described bears as "beautiful" and "majestic." The unique scenario of having bears along the coast was mentioned multiple times and highly valued by most. Participants explained and expressed satisfaction knowing that the presence of bears in the area demonstrates that the counties are still "wild" and "pristine." A few participants, mostly long-term residents whose families had lived in the counties for multiple generations, provided attitudes toward bears from a negative perspective and as "pests" because of the conflicts they have experienced with bears.

Human Interactions and Conflicts With Black Bears. Both wildlife professionals and non-professionals clearly stated that the most common conflict encountered was bears eating garbage and overturning trashcans: "I have a huge bear issue at my house. I have big bears that come to my house, and they will come to my trashcan all the time and dump it and whatever and drag it across the street." Property damage was another key conflict with multiple participants claiming bears damaged yards, gardens, bird and deer feeders, and grills. Participants noted vehicle collisions with black bears were increasing and stressed personal concern over colliding with a black bear. A few participants also mentioned bears hurting their pets and in some cases trying to enter their house. Participants also viewed the possibility of bears injuring small children as a serious potential conflict. Purposeful feeding of bears by individuals in the community was also viewed as a human-induced problem that perpetuated conflicts.

Conflict Management Opinions and Preferences. Overall there appeared to be a split between participants who believed local wildlife professionals and agencies were satisfactorily managing conflicts and others who believed agencies should be doing more to manage conflicts. Dissatisfied participants viewed management as needing to address both human- and bear-related problems. From a human standpoint, participants stated the need for improved educational efforts concerning why human–bear conflicts occur, the need for enhanced waste services, and regulations on garbage. One participant addressed all three of these stating: "The public has to be educated about how not to leave your garbage lying around, and it might be mandatory to literally have bear-proof trashcans around because that is 99% of the problem." In order to reduce conflicts through the management of bears, participants mentioned trapping and relocating bears, opening a bear hunting season, and improving habitat management away from population centers to help keep bears away from humans. A participant stated:

> Bring the hardwoods back to the plantation so there are acorns and those sorts of things. You have pushed bears out of the forest because they have taken a lot of the hardwoods and a lot of the habitat that the bears would have probably flourished in north of here and pushed them where the people are on the coast.

The participant recognizes the possibility that differences in habitat between ANF (i.e., "north of here") and THSF may account for the finding that bears are using habitats closer to human communities along the coast. This statement reinforces the point that there is a need to collect both biological and social data related to human–black bear conflicts.

Wildlife professionals stated they were making progress in addressing conflicts given financial and agency limitations but also agreed management needed to continue to improve. Professionals believed most conflicts were related to altering human behavior and managing people rather than strict bear management: "It is a people problem. Most of all bear management is managing the response level of people." To improve future conflict management, professionals proposed increasing educational efforts and outreach to the public, improving waste services or implementing an ordinance on the storage of garbage, and creating harsher penalties for purposefully feeding bears.

Attitudes Toward Black Bear Hunting. Both strong support and resistance to re-opening a hunting season for black bears was apparent among participants. Participants who supported hunting were mostly long term community members whose families had lived in the counties for multiple generations, where participants opposed to hunting were mostly new

residents or transplants to the area. Supporters believed hunting would reduce the occurrence of conflicts, and thus viewed hunting positively: "The black bears they better do something about them. They have become a nuisance. The best way to control it is open it to hunting." All supporters of hunting in our focus groups stressed the need for a controlled hunt with a set quota and limit on the number and types of bears that could be harvested.

Participants opposed to hunting believed nuisance bears would not be the ones harvested but rather bears in wildland areas not causing conflicts, and therefore they viewed hunting negatively: "The bears that are causing problems are in your neighborhoods. The bears that you hunt are out in the wilderness. So I think that is a very good reason for me to say no." Concerns were also expressed that the local bear population may not be large enough to maintain a sustainable population with the onset of hunting.

Wildlife professionals expressed their belief that human–black bear conflicts and hunting were two separate issues that overlapped minimally. Professionals stated that they understood the value of hunting for sustenance purposes and as a population control technique, but they believed and stressed that hunting would not solve the problems locals were having with individual bears. There was consensus within the focus group of professionals regarding this matter.

Conflict Management Discrepancies. Discrepancies between public and wildlife professional participants concerning proper conflict management revolved around three main aspects: black bear hunting, trapping and relocating problem bears, and the alteration of human behavior. Hunting was viewed as an inappropriate management tool for reducing human–black bear conflicts by wildlife professionals, whereas some nonprofessional participants believed a hunting season would reduce the occurrence of conflicts. One professional discussing hunting explains:

> It does have some value as far as management goes for public relations, but we've really made an effort to try to get people in the county to realize hunting and the problems with bears are really two separate issues. They overlap a little but very little. If the idea is that hunting is going to make those problems go away it is not true.

Relocating nuisance bears was also viewed as ineffective at solving conflicts by wildlife professionals because attractants often remain in place and a new bear moves into the vacated area. However, nonprofessional participants frequently called for increased trapping and removal of problem bears. Altering human behavior was another topic where there were differences in emphasis for management as professionals strongly believed many residents were not aware of the role humans play in the management of conflicts. Professionals stated residents needed to improve efforts aimed at storing garbage properly, decreasing the attractiveness of their homes to bears, and understanding the role humans play in the creation of conflicts. Some nonprofessional participants echoed similar sentiments, but others were unaware of the role humans play in conflict mitigation and called for management approaches that primarily focused on altering bear behavior.

Discussion

The steady increase in human–black bear conflicts over the last 15 years in Franklin and Gulf counties has made the management of such conflicts a priority of local wildlife agencies. Examination of both biological and social factors reveals important insight into the

occurrence of these conflicts and assists with formulating biologically appropriate and socially acceptable conflict mitigation strategies.

Biological findings related to black bear habitat use suggest bears are using THSF over ANF. Three major differences exist between ANF and THSF that may account for observed differences in use: land cover differences, the use of prescribed fire, and variation in plant diversity. ANF comprises and is intensively managed for upland longleaf pine forests, and prescribed fire is extensively utilized. As a result of intense management and prescribed fire practices, the presence of black bear escape cover and mast species is minimal in ANF. Unlike ANF, THSF maintains a majority of bottomland hardwood stands and woody wetlands, and prescribed fire is minimal. As a result, THSF provides bears with escape cover in the form of dense understory vegetation and is considered to have a greater variety of several known bear food sources including oaks, muscadines, gallberries, and blackberries.

These major differences between ANF and THSF may account for observed differences in black bear use as previous work has discovered that Florida black bears regularly use swamp and bottomland areas over other habitat types (Benson & Chamberlain, 2007; Simek et al., 2005; Wooding & Hardisky, 1994), and burned areas are used less by Florida black bears than unburned areas (Stratman & Pelton, 2007). Evidence from these studies and our habitat findings shed light onto the importance of understanding how specific land management practices, such as prescribed burning, may affect black bear habitat use and thus the spatial distribution of conflicts. As prescribed burning may influence bear habitat use in a negative manner, there may be management implications for mimicking the effects of burning near communities to reduce human–bear interactions with the additional benefit of developing fire safe areas. Increased knowledge regarding black bear habitat use may allow for an improved habitat management program that's part of a larger strategy aimed at reducing conflicts.

Although the specific biological and management mechanisms influencing black bear habitat use need further research, the selective use of THSF over ANF suggests that bears are utilizing habitats closer to humans. As a result, the small towns bordering THSF may be experiencing increased conflicts as local bears encounter easily accessible garbage and other attractants. In our study, biological understanding that bears are using areas located closer to human populations further highlights the need to understand the social factors associated with human–black bear conflicts (Decker et al., 1981; Don Carlos et al., 2009; Kretser et al., 2009).

Information supplied by study participants provides initial insights into the various issues examined and offers a platform for future inquiry aimed at obtaining a more holistic understanding of human–black bear conflicts associated with the Apalachicola subpopulation. Similar to other studies, our focus group findings reveal participants' attitudes toward black bears are held in a positive light, even in the presence of conflicts (Decker et al., 1981; Don Carlos et al., 2009; Kellert, 1994). As our focus groups findings are not representative of the larger population, further research should be utilized to explore acceptability levels of different types of conflicts within the greater population and attitudinal changes in relation to potential increases in these conflicts.

While opinions varied among participants concerning specific conflict management strategies and preferences, there were many strategies where there was common agreement suggesting there may be several possible mitigation approaches deemed as acceptable (Don Carlos et al., 2009; Vaske, Don Carlos, & Bright, 2008; Wittmann, Vaske, Manfredo, & Zinn, 1998; Zinn, Manfredo, Vaske, & Wittmann, 1998). In this study, public and wildlife professional participants agreed county provided waste service options and improved educational efforts were needed to reduce conflicts. Future efforts should strive to quantitatively

assess which management preferences, such as county provided waste service options or educational endeavors, are viewed as most appropriate by the larger population for reducing conflicts. As a preliminary management recommendation based on initial focus group insights and the finding that bears are residing in habitats located in close proximity to humans, any educational outreach efforts that are initiated should likely advise residents of the need to securely stow garbage, place garbage out only on the day of pick up, feed pets indoors, remove wildlife feeders, and properly clean and store grills (Hristienko & McDonald Jr., 2007; Kaczensky, Blazic, & Gossow, 2004; Spencer et al., 2007).

Comparisons of responses between public and wildlife professional participants suggest discrepancies exist concerning conflict management preferences. Preliminary insights suggest discrepancies may exist concerning the effectiveness of the specific conflict mitigation techniques of hunting, bear relocations, and the alteration of human behavior. As the acceptability of reinstating a hunting season was divided among participants additional efforts should aim to understand the level of support and opposition to black bear hunting within the greater population. Questions surrounding hunting can incite strong emotional responses and effort should be given to further understanding and quantifying the social acceptability of hunting. In addition to social concerns surrounding hunting, the legitimacy of hunting as a conflict mitigation technique is compounded by the mixed conclusions past studies have garnered regarding the biological appropriateness of hunting programs. Several studies have demonstrated hunting aided in reducing conflicts by likely decreasing bear population sizes and causing bears to be more cautious of humans (Landriault, 1998; McCullough, 1982; Wolgast, Ellis, & Vreeland, 2005), while other findings revealed that hunting was ineffective at reducing conflicts (Tavss, 2005; Treves, Kapp, & MacFarland, 2010). As the Apalachicola black bear population continues to grow in size and conflicts become more frequent, managers will likely need to develop outreach materials to explain their beliefs regarding the viability of hunting as a biologically and socially acceptable conflict reduction technique.

Relocating nuisance bears may also be a point of contention as public and wildlife professional participants in this study disagreed on the use of bear relocations as a viable approach to mitigating conflicts. Similar to findings from past studies, wildlife professionals espoused that relocating problem bears is ineffective at reducing conflicts as incentives that attract bears to an area often remain in place, problem bears carry their nuisance behaviors with them when relocated, and there is a shortage of relocation sites (Hristienko & McDonald Jr., 2007; Linnel, Aanes, Swenson, Odden, & Smith, 1997; Spencer et al., 2007). Relocations are also problematic because relocated bears often attempt to return to their original home ranges (Hristienko & McDonald Jr., 2007; Landriault, 1998). As bears attempt to return home they are likely to place themselves and motorists in danger by crossing roadways, or they find new human settlements and exhibit similar nuisance behaviors, thus shifting the problem to a different area. Further study is needed to determine the specific views the greater population holds toward bear relocations, but insights provided by focus group participants reveal the appropriateness of relocations may be regarded differently between general citizens and wildlife professionals.

The views held by the public and wildlife professionals concerning the role human behavior plays in conflict mitigation also should be explored further. Wildlife professionals exclaimed there is a need for individuals to consciously alter their behavior to reduce the occurrence of conflicts. Professionals pointed to the need for residents to responsibly store garbage and understand the role garbage plays in creating conflicts. Viewpoints held by professionals differed from some participants from the public who called for conflict management strategies solely or mostly related to altering bear behavior rather than human

behavior. This finding provides insight into the possibility that there may be fundamental differences in how the public and professionals view humans as agents in the occurrence of human–black bear conflicts. The biological data also reveal that managing human behavior regarding attractants may be critical to reducing conflicts as the habitats used by bears are located close to human populations. Focusing future efforts on assessing how the greater population understands the role of humans and the role of bears in the creation of conflicts may be necessary to implement successful and socially acceptable conflict reduction strategies.

Conclusions

Managing conflicts between humans and black bears is a complex task, which relies on both biological and social understanding. By understanding biological and social factors related to conflicts, conflict mitigation approaches can be developed that align social management preferences with scientific understanding of the biological drivers contributing to the occurrence of conflicts. We believe that several insights were obtained from this study with management implications including: (a) understory thinning/burning in Tate's Hell State Forest may help to decrease human–bear encounters, (b) control of habitat features (mainly understory and mast crop) around homes may reduce human–bear encounters, (c) human attractants will likely continue to be a problem without changes in behavior, and (d) there may be a disconnect between the beliefs about effective conflict management strategies between regional professionals and study participants.

Black bear use of areas located closer to humans serves as the foundation for developing future research hypotheses that aim to understand the relationship between habitat use and the occurrence of conflicts. Focus group findings concerning conflicts provide insights regarding the beliefs, attitudes, and preferences toward bears and conflict management approaches. Findings further suggest that the public and wildlife professionals may not be congruent on the appropriateness of certain management approaches. Nonprofessional individuals' attitudes toward particular conflict reduction techniques, such as relocating nuisance bears, may be based on little information about their effectiveness or impacts elsewhere. The presence of potential discrepancies also suggests increased educational efforts directed at informing the public of bear biology and the biological appropriateness of certain strategies may be warranted so wildlife managers and the public can better agree upon viable approaches for minimizing conflicts. Although educational outreach is not a panacea or a guarantee that individuals will change their beliefs, attitudes, and behaviors (Gore, Knuth, Curtis, & Shanahan, 2006), improved educational efforts may be part of an overall outreach effort at developing socially acceptable mitigation efforts. As managing human–black bear conflicts will likely only increase in relevance as both bear and human populations continue to grow, incorporating both biological knowledge and social understanding into conflict mitigation strategies and outreach efforts will be necessary.

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