

West Virginia residents' attitudes and opinions toward American black bear hunting

Christopher W. Ryan^{1,4}, John W. Edwards², and Mark Damian Duda³

¹West Virginia Division of Natural Resources, State Capitol Complex, Building 3, Room 825, Charleston, WV 25305, USA

²West Virginia University, Division of Forestry and Natural Resources, PO Box 6125, Morgantown, WV 26506-6125, USA

³Responsive Management, 130 Franklin Street, Harrisonburg, VA 22801, USA

Abstract: American black bear (*Ursus americanus*) hunting has come under close scrutiny over the past decade. As black bear populations have increased and expanded, wildlife agencies have been faced with new challenges on how to set population and harvest goals. Wildlife agencies have altered proposed regulations or have had seasons entirely stopped because of public opposition, necessitating a proactive approach to wildlife management based on a scientific understanding of public opinion rather than reactive decision-making in response to public resistance. In November–December 2006, we conducted a telephone survey of 1,206 West Virginia residents to determine their opinions and attitudes toward black bear populations and hunting seasons and to help strengthen the state's black bear management strategies. Although the majority of West Virginians, nearly 3 of 4 respondents in this study, indicated they know at least something about black bears in West Virginia, there were significant regional differences in the public's assessment of their knowledge of the species. Although most respondents thought the black bear population size was "about right," again, there were regional differences among respondents. In general, most respondents supported black bear hunting if the population was carefully monitored, if they knew the population was stable, or both; however, a number of regional and sociodemographic characteristics appeared to influence public opinion on black bear hunting and hunting seasons in the state, and support for specific seasons varied considerably according to hunting method. Interestingly, our study found that even among hunters, public opposition exceeded support for the current, year-round training season of black bear hunting dogs without harvesting animals in the state. Although it is important for wildlife managers to consider human dimensions and public opinion data in conjunction with biological data when making management decisions, we demonstrate that it also is important for managers to consider regional and sociodemographic differences with respect to attitudes and opinions when making management decisions and population objectives.

Key words: American black bear, attitudes, dogs, hunting, management, public opinion, *Ursus americanus*, West Virginia

Ursus 20(2):131–142 (2009)

In West Virginia, the West Virginia Division of Natural Resources (WVDNR) manages American black bear (*Ursus americanus*) harvest by setting bag limits, season lengths, and weight limits of legal cubs, and by using gates to control access to public lands. Black bear harvests in West Virginia have increased since record keeping began in the late 1960s, and harvest data have been the major information tool

used to manage populations (Ryan et al. 2004). The WVDNR makes management recommendations at the management unit level but generally considers 6 geographical regions for black bear management within West Virginia: Eastern Panhandle, Mountain, Central, Southern Study Area, Coal Fields, and Western (Fig. 1). Historically, black bear hunting was restricted to the Mountain region during either an archery season without bait in October and November or a gun season using dogs in December.

⁴chrisryan@wvdnr.gov

rest of the state because of the few black bears living outside of this historical range. However, due to black bear population increase and range expansion, managers have since determined that statewide stakeholder input should be considered in future management decisions. Further, because attitudes toward black bear management and conservation practices may be clustered differently within a state or regions (Morzillo et al. 2007), agencies should also take these differences into consideration for regulation proposals.

Regional differences in attitudes (Morzillo et al. 2007) may lead to public conflict and controversy that limit the use of black bear management actions on a statewide basis. As an example, during a 2004 referendum vote in Maine, only 3 of 16 counties passed a measure that would have severely restricted black bear management activities and seasons (Vashon and Cross 2005). All 3 counties were in urban, southern Maine where black bears were uncommon. However, the measure was only marginally defeated statewide by a vote of 53–47% (Vashon and Cross 2005). Attitudes toward black bear management practices may also differ based on level of participation in wildlife-related recreation and sociodemographic characteristics (Teel et al. 2002). Support for traditional wildlife management activities is often found to be stronger among hunters, rural residents, and people with low educational attainment (Manfredo et al. 1997, Teel et al. 2002). Multiple studies have found that opposition to traditional wildlife management practices is more prevalent among women than among men (Kellert and Berry 1987, Hooper 1994, Manfredo et al. 1997, Teel et al. 2002). Understanding both regional and sociodemographic differences in public attitudes will enable managers to better develop management recommendations.

In making informed management decisions, it is imperative to not only to consider biological data but also to take into account public opinion. Different methods have been employed by state agencies to gather public opinion on their black bear management plans, with most attempting to identify regional or stakeholder differences that may influence management decisions. Some agencies have relied solely on input from stakeholder surveys. For example, the Maryland Department of Natural Resources commissioned a statewide survey to gather input from a cross-section of residents (Maryland Department of Natural Resources 2004,

Responsive Management 2004). Utah State University used a telephone survey to identify different stakeholders' attitudes toward selected black bear and mountain lion (*Puma concolor*) management practices (Teel et al. 2002). Other states developed more extensive mechanisms to help managers identify opinions on black bear management among regions and stakeholder groups. For example, the Virginia Department of Game and Inland Fisheries used a stakeholder approach in 2002 (Lafon et al. 2004) that incorporated focus groups with various perspectives, from the Virginia Bear Hunters Association to the People for the Ethical Treatment of Animals. The New York State Department of Environmental Conservation (NYSDEC) sponsored an extensive situation analysis to assess stakeholder-defined impacts as the focus of their bear management plan (NYSDEC 2003). Public input for the plan included nominal group meetings in 3 regions of the state, a statewide mail survey (Siemer and Decker 2003), and regional implementations of a new stakeholder input group (SIG) process that convened a diverse array of 12–15 stakeholders to deliberate about regional concerns regarding and interests in black bears (Siemer and Decker 2006).

Recognizing the importance of public attitudes regarding black bear management and hunting regulations in West Virginia, we assessed public opinion on attitudes toward black bear populations, black bear management, black bear hunting, and training for black bear hounds. Although some research exists regarding public opinion on black bear management and black bear hunting (Teel et al. 2002, Siemer and Decker 2003, Responsive Management 2004, Morzillo et al. 2007), there is limited research on differences in public attitudes toward black bears and black bear management based on regional or sociodemographic characteristics. In this study, we analyzed results on both a statewide and regional basis to further delineate regional differences in public attitudes and demonstrate the importance of taking regional data into consideration when setting management or population goals. In addition, we examined how human demographics relate to acceptance of black bear hunting. Our objective was to identify West Virginia residents' attitudes and opinions, to determine the regional and sociodemographic nuances that affect public opinion on black bear management issues, and ultimately, to provide wildlife management professionals a springboard for developing effective management recom-

mentations based on a better understanding of the public they serve.

Methods

Telephone survey

We designed a telephone survey to assess residents' opinions on and attitudes toward black bear populations, black bear management in the state, black bear hunting, and training for black bear hounds. Telephone surveys are currently the most reliable method for accurately assessing the general population, because almost everyone in the US has a telephone (Belinfante 2009). The questionnaire was pre-tested with a representative sample of West Virginia residents and refined for survey implementation.

Sample size and selection

Responsive Management surveyed West Virginia residents age 18 years and older using random digit dialing (RDD) to collect data representative of the general population and to ensure that each resident had an equal chance of being selected, in accordance with the standard telephone survey methodology guidelines established by Dillman (1978). A state-wide random selection of household telephone numbers was obtained from Survey Sampling International (Shelton, Connecticut, USA), a global survey sample provider. Responsive Management used the last-birthday method for within-household respondent selection, one of the most common selection methods used for telephone surveys (Gaziano 2005) because it is minimally intrusive and has a relatively high accuracy rate (Lind et al. 2000). Although Responsive Management currently obtains wireless telephone numbers to reach elusive populations and further ensure the representativeness of the sample population, wireless telephone numbers were not used to supplement the sample in this study. However, a study conducted by Pew Research Center (2006) during the same year suggested that excluding US residents without landline telephone service had little impact on telephone survey results (see also Hudenko et al. 2008).

We designed the study to achieve a 95% confidence interval with a maximum sampling error of 2.82 percentage points for the total population of West Virginia residents, age 18 and older. Responsive Management completed a total of 1,206 telephone interviews with West Virginia

residents age 18 and older ($n = 1,206$ for all study results).

Survey implementation

Responsive Management maintains its own centrally located, in-house telephone interviewing facilities. These facilities are staffed by professional interviewers trained according to standards established by the Council of American Survey Research Organizations. Further, because Responsive Management specializes in researching public opinion on natural resource issues, interviewers conduct surveys only on these issues and understand the nuances involved in conducting the interviews.

In-depth project briefings were conducted with the interviewing staff prior to their work on this study to reinforce consistency among the interviewers. Interviewers were instructed on survey goals and objectives, the type of study, handling of survey questions, interview length, termination points and qualifiers for participation, reading of interviewer instructions, reading of the survey, reviewing of skip patterns for questions that do not apply based on a previous response (for example, if a respondent indicates that he or she does not hunt a particular species, skip patterns ensure that the respondent is not asked these additional), and probing and clarifying techniques necessary for specific questions on the survey. Telephone workstations were closely monitored to maintain strict quality control over the data collection process, and researchers checked each completed survey for clarity, understanding, completeness, and format.

Interviews were conducted Monday–Friday, 9:00 am–9:00 p.m., Saturday, noon–5:00 pm, and Sunday, 5:00–9:00 pm, local time in November and December 2006. A 5-callback design was used to maintain the sample framework, avoid bias toward people easy to reach by telephone, and provide an equal opportunity for all to participate.

Data collection

Responsive Management conducted the telephone interviews and entered responses using Questionnaire Programming Language 4.1 (QPL) software, a comprehensive system for computer-assisted telephone interviewing that provides complete capabilities for designing, administering, and managing telephone-based research operations. The survey instrument was programmed to automatically skip, code, and substitute phrases in the survey based on responses, as necessary, for the logic and flow of the

Ursus 20(2):131–142 (2009)

interview. Survey data were entered into the computer as each interview was conducted, thereby eliminating potential subsequent data-entry errors.

Data analysis

We analyzed data using Statistical Package for the Social Sciences 11.5 (SPSS, Chicago, Illinois, USA) software as well as proprietary software developed by Responsive Management. Post-stratification (Pedhazur and Schmelkin 1991) was used to ensure appropriate weighting of the results during analysis. For data analysis, we divided the state into 6 regions. Criteria used for regional segmentation included human population densities, input from WVDNR biologists, hunting methods, and black bear harvests (Fig. 1). We analyzed results on statewide, regional, and hunter versus non-hunter basis. During data analysis, results were weighted so that the proportion of the sample among the counties matched the distribution of the population statewide. Survey results were analyzed to obtain descriptive statistics as well as to examine relationships among variables. We assessed differences from expectations using Pearson χ^2 cross-tabulations of survey results.

Results

Nearly 1 in 4 respondents (23%) said they knew a “great deal” or “moderate amount” about black bears in West Virginia; just over half (51%) said that they knew “a little,” while 26% said they knew “nothing” about West Virginia black bears. Self-professed knowledge was highest (responded “a great deal”) in the Mountain and Southern Study Area regions and among hunters.

Respondents who stated they knew at least a “moderate amount” about black bears were more likely to have hunted ($\chi^2 = 82.700$, 1 df, $P < 0.001$), to think the black bear population should be increased ($\chi^2 = 32.407$, 1 df, $P < 0.001$), and to be male ($\chi^2 = 31.966$, 1 df, $P < 0.001$) than respondents that did not proclaim that they knew at least a “moderate amount” about black bears. Respondents who said they knew “little” or “nothing” about black bears were more likely not to have hunted ($\chi^2 = 72.321$, 1 df, $P < 0.001$), to oppose having black bears within 1.6 km of their home ($\chi^2 = 34.902$, 1 df, $P < 0.001$), and to be female ($\chi^2 = 34.638$, 1 df, $P < 0.001$) than respondents that did not answer that they knew “little” or nothing about black bears.

Ursus 20(2):131–142 (2009)

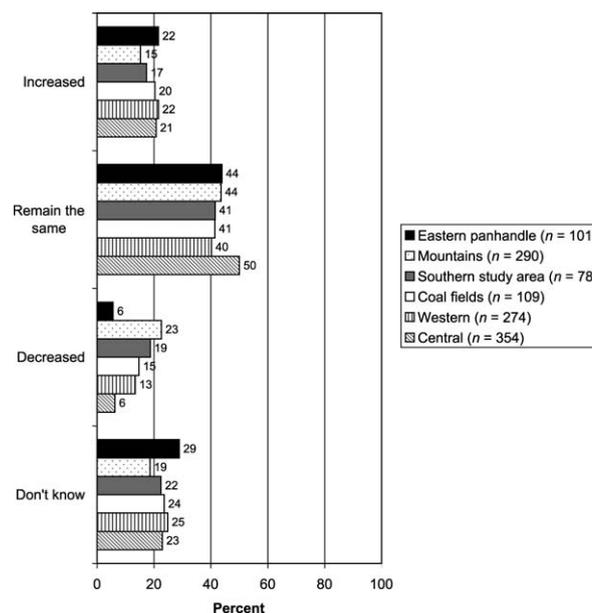


Fig. 2. Respondents' opinions of whether the black bear population should be increased, remain the same, or be decreased in West Virginia, 2006.

One in 20 (5%) respondents experienced problems with nuisance black bears within the last 2 years. The most common complaint involved black bears disturbing trash (42%) and bird feeders (14%), and miscellaneous damage to structures or fencing around their homes. Respondents in the Southern Study Area, Mountain, and Coal Field regions had the highest percents (9%, 7%, and 7%, respectively) of nuisance complaints; the Western and Eastern Panhandle regions had the lowest percents (1% and 2%, respectively).

A majority of respondents (65%) thought that the WVDNR had done a “good” or “excellent” job of managing black bears, 17% thought that WVDNR had done a “poor” or “fair” job, and 18% answered “don’t know.” More hunters (73%) than non-hunters (63%) thought the WVDNR had done a “good” or “excellent” job managing black bears.

Black bear population

Most respondents (38%) thought the black bear population was “about right,” 17% thought it was “too low,” 11% thought it was “too high,” and 33% answered “don’t know.” In a similar question, nearly half (43%) of respondents thought the black bear population should remain the same size, 20% thought it should be increased, 13% thought it

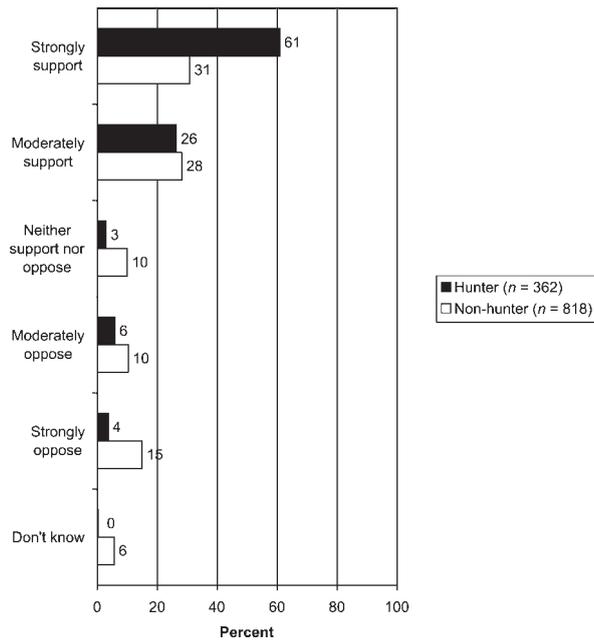


Fig. 3. Support and opposition to black bear hunting in West Virginia in 2006 among hunters (n = 362) and non-hunters (n = 818).

should be decreased, and 24% answered “don't know.” On a regional basis, respondents who thought the black bear population was “about right” varied from 29% in the Western region to 46% in the Eastern Panhandle and Southern Study Area regions.

The Mountain region had the highest percentage of respondents (23%) who thought the black bear population should be decreased, whereas only 6% of the Eastern Panhandle and Central region respondents thought the black bear population should be decreased. At least 20% of respondents in the Eastern Panhandle (22%), Coal Fields (20%), Western (22%), and Central (21%) regions thought that black bear population should be increased (Fig. 2).

Respondents who thought the black bear population was “about right” were more likely to think that the WVDNR had done a “good” or “excellent” job of managing black bears ($P < 0.001$, $\chi^2 = 79.847$, $df = 1$), to support regulated hunting if they knew the population as a whole was stable ($P < 0.001$, $\chi^2 = 24.985$, $df = 1$), and to think they knew a moderate or great deal about black bears ($\chi^2 = 19.139$, $1 df$, $P < 0.001$) than respondents that did not think the black bear population was “about right.”

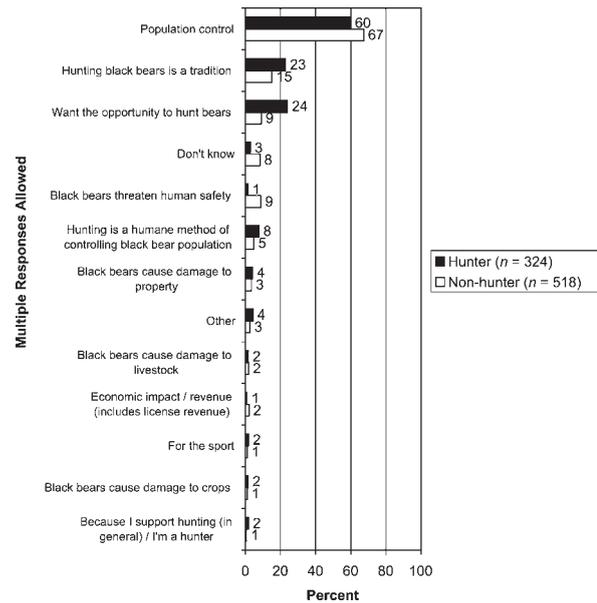


Fig. 4. Reasons why hunters (n = 324) and non-hunters (n = 518) indicated they would support regulated black bear hunting in West Virginia, 2006.

Respondents who answered that the black bear population was “too high” were more likely to have suffered property damage from black bears within the 2 years prior to the survey ($\chi^2 = 70.408$, $1 df$, $P < 0.001$), to think the WVDNR had done a poor or fair job of managing black bears ($\chi^2 = 67.412$, $1 df$, $P < 0.001$), and to support a number of different hunting seasons ($\chi^2 = 24.337$, $1 df$, $P < 0.001$) than respondents who did not think the black bear population was “too high.” Respondents who wanted the black bear population increased rather than decreased or maintained were more likely to support having black bears within 1.6 km of their home ($\chi^2 = 123.172$, $1 df$, $P < 0.001$), to be male ($\chi^2 = 61.006$, $1 df$, $P < 0.001$), and to have hunted in West Virginia in the past 12 months ($\chi^2 = 50.974$, $1 df$, $P < 0.001$). Hunters (34%) were more likely to want the black bear population increased than non-hunters (16%).

Black bear hunting seasons

Most respondents (77%) supported black bear hunting if they knew that the WVDNR carefully monitored the population ($\chi^2 = 321.535$, $1 df$, $P < 0.001$), and 71% would support black bear hunting if they knew the population was stable ($\chi^2 = 276.898$, $1 df$, $P < 0.001$). Hunting supporters also were more

likely to be male ($\chi^2 = 94.378$, 1 df, $P < 0.001$) and to have hunted in West Virginia in the past 12 months ($\chi^2 = 81.705$, 1 df, $P < 0.001$; Fig. 3) than opponents. The primary reason given for supporting black bear hunting was population control (Fig. 4). Non-hunters primarily opposed black bear hunting (54%) because they were opposed to hunting in general or because of their belief in animal rights ($\chi^2 = 16.022$, 1 df, $P < 0.001$), whereas hunter opposition to black bear hunting (38%) was because they did not think the population was high enough ($\chi^2 = 50.331$, 1 df, $P < 0.001$).

The majority of respondents supported the hunting of black bear with a gun without dogs and bait (77%), or bows without bait (60%). However, approval was lower for hunting black bears using dogs (23%), with a gun over bait (16%), or with a bow over bait (15%). A large majority of respondents in each region opposed hunting black bears using dogs or bait. Although opposition was higher among non-hunters for hunting with dogs (71%) or bait (82%), a majority of hunters also opposed the use of dogs (57%) or bait (72%).

A majority of respondents opposed (56%) rather than supported (28%) creating a spring black bear season; hunters (52%) also opposed creating a spring season.

Respondents who opposed black bear hunting would still do so even if they knew the WVDNR monitored the population ($\chi^2 = 327.333$, 1 df, $P < 0.001$) and that the population was stable ($\chi^2 = 226.890$, 1 df, $P < 0.001$). Opponents also were more likely than supporters of black bear hunting seasons to have not hunted in West Virginia in the 12 months prior to the survey ($\chi^2 = 31.785$, 1 df, $P < 0.001$), to be female ($P < 0.001$, $\chi^2 = 27.293$, df = 1), to have at least a bachelor's degree ($\chi^2 = 14.076$, 1 df, $P < 0.001$), not to own land in West Virginia ($\chi^2 = 6.930$, 1 df, $P < 0.01$), and to have a pre-tax income $> \$80,000$ ($\chi^2 = 5.035$, 1 df, $P < 0.05$). In addition, they were more likely than supporters to oppose all hunting methods proposed in the survey ($\chi^2 = 137.034$, 1 df, $P < 0.001$), and to think it is acceptable to feed white-tailed deer ($\chi^2 = 5.351$, 1 df, $P < 0.05$).

Respondents who owned land were more likely to support regulated black bear hunting if the population was stable ($\chi^2 = 41.808$, 1 df, $P < 0.001$) and the WVDNR monitored the population ($\chi^2 = 131.892$, 1 df, $P < 0.001$) than if they did not have any knowledge about the black population or WVDNR

monitoring program. Moreover, they were more likely to have a bachelor's degree but no graduate degree ($\chi^2 = 13.314$, 1 df, $P < 0.001$), to have had problems from black bears in the 2 years prior to the survey ($\chi^2 = 12.381$, 1 df, $P < 0.001$), and to be male ($\chi^2 = 11.872$, 1 df, $P < 0.001$) than respondents who did not own land.

Respondents who did not own land were more likely than respondents who owned land to oppose black bear hunting even if they knew the population was stable ($\chi^2 = 36.642$, 1 df, $P < 0.001$) or if WVDNR monitored the population ($\chi^2 = 14.604$, 1 df, $P < 0.001$). They were also more likely than respondents who owned land to consider their place of residence to be a large city, urban area, or suburban area ($\chi^2 = 22.057$, 1 df, $P < 0.001$), to be below the median age of 52 ($\chi^2 = 10.097$, 1 df, $P < 0.001$), to have not hunted in West Virginia in the year prior to the survey ($\chi^2 = 9.895$, 1 df, $P < 0.01$), and to be female ($\chi^2 = 9.534$, 1 df, $P < 0.01$).

Dog training season

Opposition (61%) exceeded support (28%) for the current year-round training season of black bear hunting dogs without harvesting animals. The most common reasons for opposing year-round dog training on black bears was a general opposition to hunting with dogs (67% of those opposed) or the belief that it disturbs black bears (19% of those opposed). The most common responses for supporting a year-round training season were that there is no reason to oppose it (46% of those supporting) or that training increases hunting success and that dogs need to be trained (27% of those supporting). A majority of hunters also opposed year-round training seasons; however, support was higher among hunters than among non-hunters.

Only a small number of respondents (4%) had experienced problems resulting from the year-round training of black bear hunting dogs. The most common problems were trespassing, a general disturbance or nuisance, disturbance of wildlife, or threat to people or livestock. Mountain region respondents were more likely to have had problems resulting from the training of dogs than other regions.

Respondents who opposed year-round training of dogs were more likely to oppose any black bear hunting season ($\chi^2 = 88.002$, 1 df, $P < 0.001$), to disagree that it is acceptable to feed white-tailed deer ($\chi^2 = 25.259$, 1 df, $P < 0.001$), to oppose regulated

hunting of black bears if they knew the population was stable ($\chi^2 = 17.609$, 1 df, $P < 0.001$), and to have had problems resulting from the training of dogs ($\chi^2 = 17.378$, 1 df, $P < 0.001$) than those who supported year-round training. Supporters of a year-round training season were more likely to support all hunting methods for black bears ($\chi^2 = 72.877$, 1 df, $P < 0.001$), to agree that it was acceptable to feed white-tailed deer ($\chi^2 = 35.875$, 1 df, $P < 0.001$), and to be male ($\chi^2 = 31.235$, 1 df, $P < 0.001$).

Discussion

The majority of West Virginians sampled believed they have at least a general awareness of black bears in the state, with nearly 3 of 4 respondents in this study indicating they know at least something about black bears in West Virginia. There were also regional differences in the public's assessment of their knowledge of the species: respondents of the Mountain and Southern Study Area regions claimed to have known more about black bears than those from other regions. These regions had the highest estimated black bear populations, and the WVDNR has a large-scale research and monitoring program in each region that receives considerable media coverage. In addition, WVDNR routinely has more requests and gives more public talks concerning black bears in these regions. The combination of a higher black bear population, resulting in possible black bear-human interactions, and increased outreach and communication efforts in these regions may have led respondents to the conclusion that they know at least a moderate amount about black bears.

Attitudes toward predator management often form bimodal or even trimodal distributions, with opinions of strong support or opposition (Teel et al. 2002). Bimodal distributions of opinions present managers with unique challenges on how to incorporate public input into management strategies. In the present study, respondents with strong support for management programs were more likely to have hunted, whereas the majority of respondents opposed to regulated black bear hunting were against hunting in general or had strong animal rights beliefs. Conducting surveys and public involvement meetings may help to identify areas where managers have the most opposition to proposals. Furthering public education or stakeholder involvement may help break down these barriers and make approval of hunting regulations easier.

Black bear population

In our study, a majority of respondents said the black bear population was "about right"; however, there were regional differences related to respondents' attitudes toward WVDNR performance in managing black bears and the population size. In this study, more respondents from regions with higher black bear harvests, higher estimated black bear populations, and more nuisance complaints wanted the population decreased rather than increased. Similarly, respondents of the neighboring state of Maryland expressed differing regional opinions toward black bear populations and management (Responsive Management 2004). Maryland respondents living in the western region of the state, the area with the highest black bear population and harvest (Spiker 2008), also thought that the black bear population was too high compared with other regions in the state (Responsive Management 2004).

These findings suggest that residents who experience damage from black bear or other carnivores may develop a negative view of these species and therefore may be more likely to respond that the population is too high. In other examples, Wisconsin citizens reporting loss from wolves (*Canis lupus*) or other predators were more likely to favor reducing or eliminating Wisconsin's wolf population (Naughton-Treves et al. 2003). Rural landowners in northwestern Minnesota had negative attitudes toward wolves and felt they were a threat to their livelihood (Chavez et al. 2005). Arizona residents living adjacent to Saguaro National Park favored mountain lion protection on private and public land, but 69% thought mountain lions should be trapped or shot after causing problems that affected humans (Casey et al. 2005). Respondents in Montana who desired decreased mountain lion populations were more likely to have negative attitudes toward mountain lions and to have perceived that mountain lion populations were increasing (Riley and Decker 2000). Although both of the regions in Maryland and West Virginia experiencing the highest number of nuisance black bear complaints had lower human population densities, survey data demonstrate that the black bear population may have reached its cultural carrying capacity and respondents wanted the population reduced or stabilized.

Black bear managers who set population or harvest objectives based on cultural carrying capacity are faced with difficult challenges when survey data indicate that respondents want the population

increased in their region but there is limited suitable habitat. The population in the Western and Eastern Panhandle regions had lower harvests (Ryan 2007) and observations during surveys (Ryan et al. 2006), which may have influenced respondents in these regions: many respondents in these regions wanted the black bear population increased. This was similar to Maryland, where residents in areas with fewer black bear sightings had different views from those from other regions (Responsive Management 2004). Although residents in regions with lower exposure to black bear and fewer black bear sightings may want to increase the black bear population, managers need to consider additional factors such as habitat availability, land-use patterns, and the potential for human–bear conflicts.

There is also a correlation between the public's opinion on black bear management issues and their confidence in wildlife management agencies and personnel. Gore et al. (2007) identified agency capacity (trust, responsiveness, and agents) and individual capacity (seriousness, volition, and frequency) as factors that influence risk perception associated with human–bear conflicts. Although their study focused on specific conflicts, it showed that trust in and responsiveness of wildlife managers was a key component to how the public perceived wildlife situations or conflicts. The majority of respondents in our study that thought the black bear population should remain the same were also more likely to believe that the WVDNR had done a good or excellent job of managing black bears, whereas respondents who thought the black bear population should be increased or decreased believed that the WVDNR had done a poor or fair job managing black bears. Public education programs via media outlets (radio, television, web site, etc.) and other educational programs may help to educate the public about black bears, improve public confidence in a managing agency, and increase the tolerance and cultural carrying capacity of black bears.

Black bear hunting seasons

Many wildlife agencies are currently facing opposition to traditional black bear hunting methods. Maine DNR narrowly defeated a referendum that would have severely limited its ability to manage black bears (Vashon and Cross 2005). Colorado and Oregon lost referenda (Boulay et al. 1999), New Jersey had seasons stopped by political pressure, and

Maryland had its management practices challenged in court. Although each of these states had ongoing black bear research projects, they still had considerable opposition to their recommendations, which in most cases came from non-hunters or residents of urban areas (Vashon and Cross 2005).

A majority of respondents in the current study supported regulated black bear hunting when they knew the population was stable and monitored by the WVDNR. Maryland residents also supported (65%) regulated black bear hunting to control populations (Responsive Management 2004). In both surveys, respondents were more likely to support hunting if they knew that the population was stable and that the DNR monitored the population. The ability of wildlife agencies to educate both non-hunters and residents may be a key factor in the success or failure of wildlife management issues when they are voted on by the general public.

The use of dogs to hunt black bears has been a topic of concern for certain groups, especially non-hunters (Teel et al. 2002). In West Virginia, black bear hunting using dogs has been the traditional hunting method to control populations; however, only 23% of respondents in our survey supported this method. Moreover, the majority of hunters also opposed this hunting method. In 1994, Oregon voters eliminated the use of dogs or bait to hunt black bears during a citizen-sponsored ballot, and in 1996 voters rejected a measure that would have repealed the 1994 measure (Boulay et al. 1999). Our results indicate that the WVDNR could lose the use of hounds to hunt black bears as a management tool if it were voted on by the citizens of the state.

In California, supporters of the use of dogs argued that predators, especially mountain lions, can only be successfully harvested using dogs (Beck et al. 1995). Wildlife managers often argue that this is especially true in West Virginia, where baiting or feeding of black bears is illegal. In West Virginia, the large amount of public land (485,622 hectares) and large number of parcels of land over ≥ 404 hectares provides hunters with adequate access to hunt black bears using dogs while reducing possible confrontations on posted, private land. Boulay et al. (1999) found no change in the statewide composition of harvested black bears in Oregon after hunting with hounds was prohibited. Loss of hunting with hounds may present managers with challenges, however,

because the use of hounds is very effective in some areas.

In our study, respondents who opposed the use of dogs were more likely to oppose all other black bear hunting seasons, to have not hunted in West Virginia in the previous year, and to think that the black bear population was too low. However, these respondents were also more likely to think that the WVDNR had done a good or excellent job managing black bears. Bimodal distributions of respondents' answers may appear in wildlife surveys (Teel et al. 2002), and it is likely that opposition to some management methods or hunting seasons were made from respondents who rarely, if ever, contacted the WVDNR to voice their opinion unless specifically asked. In Colorado, 74% of non-hunters with a high interest in wildlife opposed the use of dogs to hunt black bears, whereas fewer than half of hunters opposed the use of dogs (Teel et al. 2002). Education, length of residency, and geographic location of residence were important factors in predicting attitudes toward the use of hounds to hunt black bears in Colorado (Teel et al. 2002). Managers should consider human demographics when proposing regulations for areas that may not be accustomed to hunting seasons.

Respondents in this study who approved the use of dogs were more likely than opponents to support all black bear hunting seasons, to think that the black bear population was too high, to have hunted in West Virginia in the year prior to this study, and to have not personally had problems with the training of hunting dogs. Respondents who approved use of dogs also were more likely to believe that the WVDNR had done a poor or fair job of managing black bears. While hunters may not agree with all types of predator management (Teel et al. 2002), areas with a larger proportion of hunters or numerous nuisance black bears may garner more support for regulation changes to control the population. Wisconsin residents who lost a domestic animal to wolves or other predators were more likely to shoot a wolf encountered while hunting than residents who had not lost an animal to a predator (Naughton-Treves et al. 2003).

Attitudes toward animals are often influenced by respondent gender (Kellert and Berry 1987). In the current study, females were more likely to oppose regulated hunting of black bears than males. Female residents in Utah were more likely than males to disapprove of black bear hunting and using dogs to

hunt black bears (Teel et al. 2002). As citizen participation and input increases in wildlife management, this may be an important factor for managers to consider when making recommendations. Regulations that are supported by predominately male hunters may be subject to extensive challenges if voted on by the general public or through the legislative process.

In our study, landowners were more likely to support black bear hunting than respondents who did not own land. Landowners in Minnesota believed that wolves were a threat to their livelihood (Chavez et al. 2005). Respondents in our study who supported black bear hunting also were more likely to have had problems with black bears in the two years prior to the study. Direct support of black bear hunting may have been influenced by real or perceived nuisance problems with black bears.

Dog training season

Year-round training of dogs used to hunt black bears has been controversial during the past decade in the southern Appalachian Mountains. The WVDNR received complaints concerning the year-round training season and how it may affect wildlife populations; however, at the present time there are no biological data from West Virginia to suggest that this training season negatively impacts black bear populations.

A majority (61%) of respondents in our study opposed the year-round training season. However, only 4% of respondents ever personally experienced any problems from the training of hunting dogs. General opposition to the training of dogs and black bear hunting with dogs, even though the overwhelming majority of respondents had not experienced problems, should be a point of concern for hunters and agencies who allow this method. Allowing the year-round training of dogs may increase the public's opposition to using dogs for the hunting of black bear and other species. If the use of hunting dogs during harvest seasons is taken away from managers, they may have to use alternate, perhaps less effective, methods to manage the black bear population. Moreover, in states or provinces where long training seasons are not legal, managers should carefully consider all options before implementing or extending training seasons because this may result in greater public opposition, which could negatively affect hunters and restrict management options.

Management implications

Wildlife agencies have used numerous methods to incorporate public input or stakeholder involvement into management decisions (Decker et al. 2001) and must continue to find creative ways to initiate stakeholder participation (Burkardt and Ponds 2006). Although no method is perfect in every situation, management goals and decisions based on some form of public involvement should garner greater support. In addition, if the agency's management plan is challenged, they will be more likely to successfully defend their recommendations in court or through the political process if they have completed scientific, legally defensible public opinion research when forming policy recommendations.

Our findings suggest that there are significant regional and sociodemographic differences in public knowledge of black bears and attitudes toward black bear management issues, including black bear populations, black bear hunting, and dog training. Although the majority of West Virginians indicate that they know at least something about black bears in West Virginia, there are significant regional differences in the public's assessment of their knowledge of the species. Further, there are a number of regional and sociodemographic characteristics that appeared to influence public opinion on black bear hunting and hunting seasons in the state. These differences need to be considered when making black bear management decisions.

Successful bear management plans depend not only on biology and ecology but on a corresponding knowledge of socioeconomic factors, public values, and political forces (Kellert 1994). Factors such as gender, participation in hunting, and urban or rural residency have long been known to influence attitudes toward wildlife management. However, wildlife managers must also consider regional differences when gathering public input and opinions, which can be an important factor in the success and acceptance of these management plans. Managers should carefully consider regional differences in attitudes and opinions about wildlife species, especially black bears, where harvest or population objectives are set based on the cultural carrying capacity of the area. Data that are specific to a particular region or management unit may be used to adjust management or population goals. By considering these differences on a management unit or regional basis, managers can better serve the needs of all citizens.

Ursus 20(2):131–142 (2009)

Acknowledgments

Funding for this study was provided by the West Virginia Division of Natural Resources, Pittman-Robertson Program, through Project W-48R. We thank J. Evans, P. Johansen, and C. Taylor for administrative support. Additional in-kind support was provided by West Virginia University Division of Forestry and Natural Resources and the West Virginia Cooperative Fish and Wildlife Research Unit.

Literature cited

- BECK, T.I., D.S. MOODY, D.B. KOCH, J.J. BEECHAM, G.R. OLSON, AND T. BURTON. 1995. Sociological and ethical considerations of black bear hunting. Pages 119–132 in J. Auger and H.L. Black, editors. Proceedings of the fifth western black bear workshop. Brigham Young University, Provo, Utah, USA.
- BELINFANTE, A. 2009. Telephone subscribership in the United States: Data through July 2008. Report by the Industry Analysis and Technology Division, Wireline Competition Bureau, Federal Communications Commission. http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-289169A1.pdf, accessed 20 May 2009.
- BOULAY, M.C., D.H. JACKSON, AND D.A. IMMELL. 1999. Preliminary assessment of a ballot initiative banning two methods of bear hunting in Oregon: Effects on bear harvest. *Ursus* 11:179–184.
- BURKARDT, N., AND P.D. PONDS. 2006. Using role analysis to plan for stakeholder involvement: A Wyoming case study. *Wildlife Society Bulletin* 34:1306–1313.
- CASEY, A.L., P.R. KRAUSMAN, W.W. SHAW, AND H.G. SHAW. 2005. Knowledge of and attitudes toward mountain lions: A public survey of residents adjacent to Saguaro National Park, Arizona. *Human Dimensions of Wildlife* 10:29–38.
- CHAVEZ, A.S., E.M. GESE, AND R.S. KRANNICH. 2005. Attitudes of rural landowners toward wolves in northwestern Minnesota. *Wildlife Society Bulletin* 33:517–527.
- DECKER, D.J., T.L. BROWN, AND W.F. SIEMER. 2001. Human dimensions of wildlife management in North America. The Wildlife Society, Bethesda, Maryland, USA.
- DILLMAN, D.A. 1978. Mail and telephone surveys: The total design method. John Wiley & Sons, New York, New York, USA.
- GAZIANO, C. 2005. Comparative analysis of within-household respondent selection techniques. *Public Opinion Quarterly* 69(1):125–157.
- GORE, M.L., B.A. KNUTH, P.D. CURTIS, AND J.E. SHANAHAN. 2007. Factors influencing risk perception associated with human–black bear conflict. *Human Dimensions of Wildlife* 12:133–136.

- HOOPER, J.K. 1994. What do animal activists want? (And how should wildlife managers respond?). *Proceedings of the Vertebrate Pest Conference* 16:320–326.
- HUDENKO, H.W., D.J. DECKER, AND W.F. SIEMER. 2008. Reliance on informants in wildlife management situation analysis—Shortcut or shortcoming? *Human Dimensions of Wildlife* 13:459–470.
- KELLERT, S.R., AND J.K. BERRY. 1987. Attitudes, knowledge, and behaviors toward wildlife as affected by gender. *Wildlife Society Bulletin* 15:363–371.
- . 1994. Public attitudes toward bears and their conservation. *International Conference on Bear Research and Management* 9(1):43–50.
- LAFON, N.W., S.L. McMULLIN, D.E. STEFFEN, AND R.S. SCHULMAN. 2004. Improving stakeholder knowledge and agency imagine through collaborative planning. *Wildlife Society Bulletin* 32:220–332.
- LIND, K., M. LINK, AND R. OLDENDICK. 2000. A comparison of the accuracy of the last birthday method versus next birthday methods for random selection of household respondents. 2000 Proceedings of the American Statistical Association, Survey Research Methods Section [CD-ROM], Alexandria, Virginia, USA.
- MANFREDO, M.J., D.C. FULTON, AND C.L. PIERCE. 1997. Understanding voter behavior on wildlife ballot initiatives: Colorado's trapping amendment. *Human Dimensions of Wildlife* 2:22–39.
- MARYLAND DEPARTMENT OF NATURAL RESOURCES. 2004. Wildlife and heritage service black bear management plan. H.S. Spiker and S.L. Bittner, editors. Annapolis, Maryland, USA.
- MORZILLO, A.T., A.G. MERTIG, N. GARNER, AND J. LIU. 2007. Spatial distribution of attitudes toward proposed management strategies for a wildlife recovery. *Human Dimensions of Wildlife* 12:15–29.
- NAUGHTON-TREVES, L., R. GROSSBERG, AND A. TREVES. 2003. Paying for tolerance: Rural citizens' attitudes toward wolf depredation and compensation. *Conservation Biology* 17:1500–1511.
- NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION. 2003. A framework for black bear management in New York. Albany, New York, USA.
- PEDHAZUR, E.J., AND L.P. SCHMELKIN. 1991. Measurement, design, and analysis: An integrated approach. Psychology Press, New York, New York, USA.
- PEW RESEARCH CENTER. 2006. National polls not undermined by growing cell only population: The cell phone challenge to survey research. News release: 15 May 2006. The Pew Research Center for the People and the Press, Washington, DC, USA.
- RESPONSIVE MANAGEMENT. 2004. Public attitudes toward black bear management in Maryland. Responsive Management, Harrisonburg, Virginia, USA.
- RILEY, S.J., AND D.J. DECKER. 2000. Wildlife stakeholder acceptance capacity for cougars in Montana. *Wildlife Society Bulletin* 28:931–939.
- RYAN, C.W., J.C. PACK, W.K. IGO, J.C. RIEFFENBERGER, AND A.B. BILLINGS. 2004. Relationship of mast production to big-game harvests in West Virginia. *Wildlife Society Bulletin* 32:786–794.
- , C.D. TEETS, R.L. TUCKER, K.D. KRANTZ, AND S.A. WARNER. 2006. West Virginia bowhunter survey. West Virginia Division of Natural Resources, Charleston, West Virginia, USA.
- . 2007. Black bear. *West Virginia Big Game Bulletin* 07:01. West Virginia Division of Natural Resources, Charleston, West Virginia, USA.
- SIEMER, W.F., AND D.J. DECKER. 2003. 2002 New York state black bear management survey: Study overview and findings highlights. Human Dimensions Research Unit Series Publication 03-6. Department of Natural Resources, Cornell University, Ithaca, New York, USA.
- , AND ———. 2006. An assessment of black bear impacts in New York. Human Dimensions Research Unit Series Publication 06-6. Department of Natural Resources, Cornell University, Ithaca, New York, USA.
- SPIKER, H. 2008. Maryland status report. Proceeding from the 19th Eastern Black Bear Workshop. 9–12 April 2007, Shepherdstown, West Virginia, USA.
- TEEL, T.L., R.S. KRANNICH, AND R.H. SCHMIDT. 2002. Utah stakeholders' attitudes toward selected cougar and black bear management practices. *Wildlife Society Bulletin* 30:2–15.
- VASHON, J.H., AND R.A. CROSS. 2005. Maine black bear status report. Proceedings of the 18th Eastern Black Bear Workshop. 2–7 April 2005, Tallahassee, Florida, USA.

Received: 15 December 2008

Accepted: 11 June 2009

Associate Editor: W. Siemer