Evolution of stakeholder knowledge, attitudes, and opinions throughout a participative process to develop a management plan for black bears in Virginia

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(**ABSTRACT**)

Wildlife management requires understanding resources and involving stakeholders. The process Virginia Department of Game and Inland Fisheries (VDGIF) and Virginia Tech used to develop a black bear (*Ursus americanus*) management plan during 1999-2001 provided me with opportunities to understand diverse stakeholders and examine influences of participation on stakeholder knowledge, attitudes, and opinions concerning bear management. I used focus groups (with 5 key stakeholder groups), pre- and post-planning surveys, and interviews. I surveyed VDGIF biologists and managers (N = 21), members of a stakeholders advisory committee (N = 15), and members of 3 constituent groups representing bear hunters (N = 459), beekeepers (N = 442), and environmental interests (N = 500). I interviewed advisory committee members to validate survey results and evaluate the bear management plan.

Participation apparently improved constituents' knowledge about bear management and their image of VDGIF bear management, and increased their support for controversial management options (e.g., lethal methods), but did not affect their opinions about bear hunting. Participation apparently had little effect on VDGIF staff opinions about bear management. Knowledge varied widely among constituent organizations. Bear hunting continues to be one of the most central, yet divisive, bear management issues in Virginia. Advisory committee members and VDGIF staff expressed satisfaction with the bear management plan and the planning process. Recommendations for wildlife decision-making processes include: balance science and public values in management, use multiple public involvement techniques, establish collaborative forums among stakeholders, reach out to all stakeholders, and nurture relationships with constituents during implementation.

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INTRODUCTION

Passage of the Equal Opportunity Act of 1964, with its "maximum feasible participation" clause, prompted much debate about the utility of citizen participation (Rosener 1978). Although citizen participation in public planning has waxed and waned since the 1960s, the "climate of volunteerism, devolution, and community partnerships" in the 1990s ushered a rebirth in community involvement (Perlstadt et al. 1998:347). A number of studies have shown that citizen participation in public planning may lead to improved decisions and services as well as constituent acceptance of plans and their implementation (Zurcher 1970, Landre and Knuth 1993, Stout et al. 1996, Guynn and Landry 1997, Peek 1998, Perlstadt et al. 1998).

Urbanization of America's residents, coupled with the shift from citizen representation to participation and shared decision making (Naisbitt 1982), led to more critical questions about wildlife management and technical decisions in general (Lautenschlager and Bowyer 1985). This scrutiny has been manifest in recent natural resources referenda (Lautenschlager and Bowyer 1985, Loker and Decker 1995, Beck 1998, Loker et al. 1998, Minnis 1998). Increasing challenges to policies of natural resource agencies may stem from the reluctance of these agencies to involve their critics in planning (Magill 1988). Agency professionals have been more concerned with changing the public's mind about management practices than considering alternatives to satisfy public goals (Magill 1988). However, the quality of a resource management agency today is judged as much for its ability to meaningfully involve its constituents as for its technical output (McMullin and Nielsen 1991). Moreover, "it is rare when meaningful public involvement fails to improve a significant management decision" (McMullin and Nielsen 1991:88).

Beck et al. (1994) stressed the importance of broadening the scope of dialogue with all publics interested in black bears - not to abandon traditional users, but to better understand current norms of our changing society. They suggested that to "ignore such a process is to invite management by ballot" (Beck et al. 1994:131). Citizen initiatives in California, Colorado, Florida, Massachusetts, Oregon, Utah, Washington, and Wyoming led to legislation restricting black bear hunting or management options during the 1990s (Bissell 1993, Loker et al. 1994,

Godfrey 1996, Higgins 1997*a*). Idaho and Michigan sportsmen rallied to prevent potential restrictions and maintain bear harvest regulations (Higgins 1997*a*). It seems reasonable that Virginia's existing policy, which permits hunting bears with hounds, may be challenged in the future (Godfrey 1996, Higgins 1997*b*).

The black bear hunting controversy thus far has concerned how, when, and whether black bears should be hunted (Beck et al. 1994, Loker and Decker 1995). Perhaps the most contentious issues involve ethics of certain methods of harvest, especially hunting bears with bait, with dogs, or during the spring season (Manville 1994, Loker and Decker 1995). Physical effects of hunting on bears and nontarget animals have been concerns of opponents (Beck et al. 1994, Loker and Decker 1995). Even the side effects of providing access for hunters on environmental quality and the expense of regulating the several hunting methods have been questioned by critics of bear hunting (Beck et al. 1994). There also has been much debate about whether wildlife agencies or the public should have the final say in black bear hunting decisions, although citizens largely have reaffirmed a desire for professional management (Loker and Decker 1995, Higgins 1997*a*). Beck et al. (1994) agreed that most management agencies in the western United States were not prepared for challenges to black bear hunting. As recognized in other arenas of wildlife management, issues already in an advanced stage of controversy before mediation occurs are very difficult to resolve (Peyton and Decker 1987).

Recognizing the controversy surrounding bear hunting and other bear management issues, the Virginia Department of Game and Inland Fisheries (VDGIF) contracted with Virginia Tech in 1994 to examine the population dynamics of Virginia's exploited bear populations (Higgins 1997*a*). Earlier studies of unhunted bear populations in Shenandoah National Park (Carney 1985, Garner 1986, Kasbohm 1994, Schrage 1994) and Great Dismal Swamp National Wildlife Refuge (Hellgren 1988, Hellgren and Vaughan 1989) provided insights into the ecology and demography of the state's black bear populations. However, data were lacking for populations of chased or hunted bears (Higgins 1997*a*). The Cooperative Alleghany Bear Study (CABS) was initiated in 1994 to examine birth, death, and growth rates; density and size; and habitat needs of the exploited bear population in the Allegheny Mountains of western Virginia (Higgins 1997*a*). Information obtained from this ongoing study will complement harvest, nuisance, and incidental kill data to provide a more complete picture of bear populations in Virginia. Trends in harvest data, miscellaneous kills (mostly road kills), nuisance complaints,

and numbers of bear sightings in formerly unoccupied range indicate that Virginia's black bear population is growing and expanding into previously unoccupied habitats (Martin and Steffen 1998).

Black bear management in Virginia and other states has become increasingly complex. Bear hunting issues are as contentious among bear hunters themselves as between hunters and nonhunters (Dubrock et al. 1978, Peyton 1989, Beck et al. 1994, Wright and Emerald 1998). The concurrent encroachment of humans farther into bear habitat and apparent expansion of bear populations in Virginia (Hellgren and Maehr 1993, Lane 1997) leads to greater potential for bear-human conflicts (Langenau 1987). The lack of habitat unoccupied by both bears and humans in Virginia leads to a greater chance for conflicts between humans and relocated problem bears. Interest is growing among conservationists to establish corridors and highway underpasses to facilitate movements of bears and other wildlife (Hellgren and Vaughan 1989, Hellgren and Maehr 1993, Lane 1997). Others wish to increase tolerance for bears through public education (Mike Roberts, Return to Nature, Evington, Virginia, personal communication). The illegal trade and sale of bear parts on the Asian market generates concern and confusion about biological impacts on bears and socioeconomic impacts to those people who care about or use bears (Mills 1992, Servheen 1996, Garshelis 1997). Bear poaching investigations in Virginia produced numerous convictions in the 1990s, fueling the suspicion that bears in the state may be the target of international poaching rings (Don Patterson, U. S. Fish and Wildlife Service, Richmond, Virginia, personal communication). Each of these issues – bear hunting, nuisance bear management, bear conservation and education, and illegal sale of bear parts – will be resolved only through concerted efforts to understand bears and involve stakeholders.

Seeking to complement its commitment to ecological research with understanding and involvement of stakeholders, VDGIF developed the first black bear management plan in Virginia. In July 1999, VDGIF contracted with Virginia Tech to develop a public involvement strategy for the planning process. A similar cooperative effort produced a statewide white-tailed deer (*Odocoileus virginianus*) management plan (Virginia Deer Management Planning Committee 1999) during 1996-1998. With technical expertise provided by VDGIF and Virginia Tech, the process for developing a black bear management plan incorporated a broad range of constituent interests, including those of homeowners, agricultural producers, hunters, individuals with environmental interests, and personnel from other resource management agencies. Virginia

Tech's role in the planning process involved conducting stakeholder focus groups, facilitating a stakeholder advisory committee, administering surveys to constituents and agency personnel, compiling proceedings from regional public input meetings, and assisting VDGIF in writing the final plan. A technical committee designed management objectives and strategies based upon values identified by the advisory committee. Constituents involved with the bear planning process focused on making value choices about their resource, while wildlife professionals focused on the technical aspects of resource management. The VDGIF Board of Directors retained final authority to approve the plan.

The Black Bear Technical Committee was comprised of VDGIF staff with responsibilities and expertise in bear management. Staff examined scientific literature and the work of other agencies and exchanged ideas with bear managers and scientists in other states and institutions. The technical committee informed the Stakeholder Advisory Committee about the biological and administrative realities of bear management, designed management objectives and strategies based upon the values identified by the Stakeholder Advisory Committee, and compiled the bear management plan.

The Stakeholder Advisory Committee, which met 6 times between May 2000 and June 2001, embodied a cross section of Virginia citizens from across the state with diverse interests in bear management issues. Virginia Tech personnel involved with the plan and officers of participating constituent organizations recommended committee members to VDGIF. Members of this committee (n = 17) represented homeowners, sportsmen, organizations with nonconsumptive interests, agricultural producers, the commercial timber industry, and resource management agencies other than VDGIF. The primary responsibilities for this committee were to identify the values that should guide bear management; formulate plan goals; and amend, approve, and prioritize management objectives designed by the VDGIF Technical Committee. Although several members of the Technical Committee always were present at Stakeholder Advisory Committee meetings, only one member regularly helped Virginia Tech personnel facilitate the discussions. Other members of the Technical Committee present did not participate actively in discussions, except to provide feedback to the Technical Committee chair and alert the Stakeholder Advisory Committee about crucial management issues and constraints.

Virginia Tech facilitators conducted 5 focus group interviews during December 2000 and January 2001 with stakeholders who (1) hunted bears with dogs, (2) hunted bears without dogs,

(3) experienced agricultural or property damage from bears, (4) had nonconsumptive interests in bears, and (5) worked for agencies besides VDGIF with interests in bear management. Focus groups comprised 7-16 individuals sharing a common interest and a facilitator who directed questions to the group and fostered discussion among group members. Focus groups were instrumental in providing in-depth information about issues important to stakeholders early in the planning process. The Stakeholder Advisory Committee used focus group input during their first meeting to articulate key issues and concerns for bear management in Virginia.

Virginia Tech cooperators designed and administered mail surveys to VDGIF professionals involved with bear management (n = 22) and to members of 3 constituent groups represented on the Stakeholder Advisory Committee, namely the Virginia Bear Hunters Association (n = 261 respondents), the Virginia State Beekeepers Association (n = 326), and the Virginia Chapter of The Nature Conservancy (n = 302). The surveys not only expanded input about key management issues, but also prompted stakeholder advisory committee representatives to articulate more fully the concerns of their constituents.

Between July 27 and August 2, 2000, VDGIF and Virginia Tech personnel conducted 5 regional input meetings across Virginia. Regional meeting participants (n = 71) had the opportunity to view a slide presentation about black bears and their management, offer opinions about regional bear populations, actively discuss draft plan goals and associated local bear management issues, and provide anonymous input. The Stakeholder Advisory Committee reviewed, discussed, and incorporated regional input during development of goals, objectives, and strategies for the plan.

The final mode of stakeholder participation in the bear planning process was broad public review during May 2001. The VDGIF Wildlife Division distributed approximately 300 full draft plans and 70,000 4-page newspaper summaries of the plan through various outlets to reach as broad a public as possible. The full draft plan and the summary also were placed on the VDGIF website for public input. Personnel from VDGIF and Virginia Tech participated in media interviews and made news releases. Stakeholder Advisory Committee members had the opportunity to consider public input and make revisions to the draft plan at their last meeting. The plan was endorsed on June 4, 2001 by the Stakeholder Advisory Committee and delivered in October 2001 to the VDGIF Board of Directors for approval.

The bear plan describes the history, status, and future of bears and their management. It also identifies a framework for what needs to be done and when and how to do it. By clarifying goals and directions of black bear management, this plan will assist Board members, VDGIF administrators and staff, and the public in addressing bear issues. As the basis for annual budgets and operations associated with bears, the plan also informs the General Assembly and the public of what VDGIF intends to accomplish.

JUSTIFICATION AND OBJECTIVES FOR RESEARCH

The public involvement process for the bear management plan provided opportunities to address (1) our limited understanding of human dimensions of black bear management in Virginia and (2) the lack of research regarding effects of public participation in natural resources planning on stakeholder knowledge, attitudes, and opinions.

Literature relating to knowledge, attitudes, and opinions associated with black bears across the United States is extensive. However, little of this work pertains specifically to Virginia's black bear stakeholders. Only limited attitudinal and behavioral information from 2 groups of bear stakeholders (bear hunters using dogs and not using dogs) currently is solicited through an annual survey of licensed hunters in Virginia (Wright 1995, 1996; Wright and Emerald 1998, Wright et al. 2001). Past human dimensions work on black bears in Virginia (Davenport 1951, Dubrock et al. 1978) and elsewhere (Peyton 1989, ElHamzaoui et al. 1994, Grise 1994) has focused on characteristics, attitudes, and perceptions of hunters. Surveys and interviews of visitors in Shenandoah (Baptiste 1977) and Great Smoky Mountains National Parks (Burghardt et al. 1972, Petko-Seus 1985, Hastings 1986) have provided knowledge and attitude data primarily applicable to national park management. Research regarding stakeholder tolerance to nuisance bear activity outside of national parks has been conducted almost exclusively in New York (Decker et al. 1981, Decker et al. 1985), Massachusetts (Jonker et al. 1998), and the West (McIvor and Conover 1994). The approach taken in the current study will yield data useful to bear managers, but also may serve as a baseline data set for future human dimensions studies that focus on Virginia's black bear resource.

Knowledge, attitude, and opinion surveys conducted before and after participation, as used in the present study, provide an objective framework for assessing the effectiveness of participation. A number of researchers in the natural resources field have reported changes in

attitudes, opinions, and knowledge based on their subjective judgments of participant changes, self-assessments by participants, or post-participation surveys only (Godschalk and Stiftel 1981, Landre and Knuth 1993, Sample 1993, Stout et al. 1996). However, a thorough review of the literature within the natural resources field failed to reveal any studies that employed pre- and post-citizen participation surveys as means to assess effects on attitudes, opinions, or knowledge. Reports of such longitudinal analyses of participatory influences are less scarce in the experimental and applied social sciences literature (e.g., Ritter 1967, Zurcher 1970, Lloyd 1973, Hatten and Ruhland 1995, and Leeming et al. 1997).

To address the lack of research into human dimensions of bear management in Virginia and into the attitudinal and knowledge effects of stakeholder participation in natural resources planning, specific objectives of my thesis research were:

1. To assess constituent knowledge, attitudes, and opinions regarding black bears, black bear management, and other black bear stakeholders, including the VDGIF.
2. To assess opinions held by VDGIF professionals about black bear management, black bear stakeholders in Virginia, and constituent involvement in wildlife management planning.
3. To evaluate changes in knowledge, attitudes, and opinions held by key stakeholder participants as a result of their involvement in developing a statewide black bear management plan.

LITERATURE REVIEW

Definitions and classifications of wildlife values, attitudes, and opinions

An understanding of human values, attitudes, and opinions associated with any wildlife species is essential to fully understanding the animal and its management (Lee 1972, Brown and Manfredo 1987). Although I did not assess explicitly values or value changes in my analyses, understanding values associated with black bears is a foundation for understanding attitudes people develop and choices they make about black bears.

Values. – The term "value" is ambiguous due to many different uses among the lay public and academic disciplines (Brown and Manfredo 1987). Brown (1984:233) wrote, "value is the expressed relative importance or worth of an object to an individual or group in a given context." Lee (1972:11) defined "value" as the "conception of desirable states of affairs, utilized

as criteria for preference or choice." Kellert and Applegate (1984:699), writing about value considerations in the management of white-tailed deer, used the term "value" to denote "the underlying standards and ideals used to guide preference, behavior and evaluation." Kellert and Applegate (1984) distinguished between "ascribed" values – those important to humans – and "intrinsic" values – those existing regardless of humans. Brown (1984) noted the difference between an "assigned value" and a "held value." An assigned value is the worth of a thing (animal) in relation to other things. A held value is an underlying personal or societal principle, standard, goal, or ideal that results in the value assigned to something (animal). A person's composite of held values is their "value system" (Brown 1984:232).

Numerous approaches have been used to classify values associated with wildlife resources (Brown and Manfredo 1987, Decker et al. 1987, Steinhoff et al. 1987). The value categories Kellert and Applegate (1984) developed for white-tailed deer are applicable to black bears and other wildlife species: evolutionary, cultural, ecological, economic, social, psychological, public service, and political.

Decision makers cannot incorporate all values of a resource due to both the silence of certain value advocates and the constraints of administrative policies (Kellert and Applegate 1984). However, an assessment of the diverse values of any resource is essential. Socially acceptable management of species such as white-tailed deer or black bear entails balancing and prioritizing values (Kellert and Applegate 1984). Wildlife managers may rely on stakeholders' assigned values to quantitatively weight outcomes or objectives (Churchman and Ackoff 1954; Churchman et al. 1957, in Lee 1972; Brown and Manfredo 1987; Robert H. Giles, Jr., Virginia Tech, personal communication).

Attitudes and Opinions. – Attitudes and held values are closely related and easily confused (Lee 1972). Held values are underlying principles or ideals (Brown 1984) upon which attitudes develop. Hastings (1986:29) defined "attitude" as "a disposition, or state of mind or feeling with regard to some matter." Lee (1972:11) distinguished attitudes and opinions, as follows:

> (1) Attitude – "The product of a belief and a value (Hughes 1971:9), 'The sum total of man's inclinations and feelings, prejudices, or bias, …fears, ideas, and convictions about any specific topic' (Thurstone 1967:77)."

(2) Opinion – "A verbal expression of an attitude [which] may be used as an index to measure an attitude (Thurstone 1967:77)."

For centuries, human attitudes toward animals have ranged from a sense of human superiority over animals (exemplified in the biblical book of Genesis) to the notion that human and non-human animals are equal (an early Hindu belief) (Steinhoff et al. 1987). Kellert's (1976, 1980) typology of attitudes toward animals is perhaps the best known and most useful classification:

(1) Naturalistic – primary interest for wildlife and nature;

(2) Ecologistic – primary interest for animals as ecosystem components;

(3) Humanistic – primary concern for individual animals, such as pets;

(4) Moralistic – primary interest in ethical treatment of animals;

(5) Scientistic - primary interest in physiological or biological aspects of animals;

(6) Aesthetic – primary attention to artistic or symbolic aspects of animals;

(7) Utilitarian – primary interest in material use of animals or habitats;

(8) Dominionistic – primary interest in control or mastery of animals;

(9) Negativistic – primary feeling of dislike or fear of animals; and

(10) Neutralistic – primary feeling of indifference toward animals.

Values associated with black bears

Values associated with black bears certainly are as diverse as those associated with white-tailed deer (Kellert and Applegate 1984). The black bear is a prized game animal (Davenport 1951, Higgins 1997*b*) and a symbol of the American wilderness (Rolston 1987). But, the black bear also is considered an agricultural pest (Black Bear Conservation Committee 1992) and an icon for illegal trade in animal parts (Mills 1992).

Values associated with hunting black bears. – Reasons people hunt black bears are indicative of values. Kellert (1978) reported that the primary reasons people hunt are to obtain meat, to experience the outdoors, and to pursue a challenging quarry. Kennedy (1970) and Hautaluoma and Brown (1979) also identified hunter affiliation or companionship as a primary value of hunting. Family and community tradition plays a big part in participation in bear hunting, which makes the loss of hunting opportunities poignant to many rural residents (Loker et al. 1994).

Grise (1994) found that preference for hunting methods related to reasons people in Michigan gave for hunting black bears. Spending time with hunting companions was much more important for dog hunters than for still hunters. Harvesting a bear was much less important for dog hunters than for still hunters, bait-only hunters, and generalists. Seeing and hearing one's dogs work was a very important factor for dog hunters, but the least important factor by bait-only hunters and still hunters (Grise 1994). Many hound hunters in Virginia are shifting their emphases from harvesting bears to sport chasing (Higgins 1997*b*).

Black bear hunters may be categorized by their preferred hunt methods, which chiefly include use of hounds only, use of bait only, use of hounds over bait, and still hunting without aid of dogs or bait (DuBrock et al. 1978, Hill and Stuht 1985, Peyton 1989, Gill and Beck 1990, Idaho Department of Fish and Game 1992, ElHamzaoui et al. 1994). DuBrock et al. (1978) confirmed that there were 2 major classes of bear hunters in Virginia: (1) those who hunted exclusively with dogs, and (2) those who killed bears incidentally while actually seeking other game. This dichotomy still is relevant in Virginia today, although some still hunters do at times hunt specifically for bears (Black bear focus group, Verona, Virginia, January 29, 2000). Only 0.6% of participants in the 1996-1997 Virginia hunter survey classified themselves as primarily bear hunters, although many more reported harvesting bears incidentally (Wright and Emerald 1998).

Although bear hunters represent but a fraction of total hunters or outdoor recreationists, the sport is valued highly by its participants (Davenport 1951, Beck et al. 1994). In Virginia, Davenport (1951) estimated total capital investments (i.e., weapons, clothing, special equipment, dogs, trailers) per bear hunter as $1,023 circa 1950 (equivalent to $7,259 in 2000). In addition, these hunters averaged spending $354 for licenses, dog food, transportation, and other expenses annually (equivalent to $2,512 in 2000). From these estimates, Davenport (1951) projected that $1,534 was spent per bear harvested circa 1950 (equivalent to $10,884 in 2000) in Virginia. Maine bear hunters spent about $389 on average during 1988 (Reiling 1991). In addition to the monetary values associated with hunting bears, Davenport (1951) offered that bear hunters' appreciation for their quarry and their sense of sport in the chase exceeded that of any other type of hunters in Virginia. For many bear hunters, "the interaction of hounds and houndsman…can be spiritually strong" (Beck et al. 1994:128). Of 940 Michigan black bear hunters surveyed, 10% of the generalist bear hunters and 29% of those who hunted bears with dogs considered bear

hunting their most important recreational pursuit (Grise 1994). Members of bear hunter organizations placed an even greater importance on bear hunting (Grise 1994).

Bear hunting normally is considered a consumptive use of the resource. However, certain attributes of the sport have "nonconsumptive" values for the participants. Hastings (1986:9) presents a workable definition: "Nonconsumptive use [is] defined as any activity where wild animals are enjoyed without a deliberate attempt being made to kill (e.g., most hunting, fishing, and trapping activities) or otherwise remove the animal from its habitat (e.g., catch-and-release fishing, live trapping)." The bond between hunter and dog, the enjoyment of the outdoors, the admiration for the bear as a quarry, and the adventure of the chase are all examples of nonconsumptive values of bear hunting (Davenport 1951, Beck et al. 1994, Grise 1994).

Values associated with the trade in bear parts. – The recreational hunting value of black bears may be augmented by the "economic reward through the sale of its parts" (Cooper 1996:75). Bile from the gall bladders of black bears is a prized medicine in Asia with traditional uses for liver disease, blood disorders, hemorrhoids, and digestive ailments (Mills 1992, Cooper 1996, Servheen 1996, Garshelis 1997). Bear gall bladders may sell for $800 to $2,500 each in some Asian countries (Servheen 1996), which translates to as much as $210 per gram of dry bile (Mills 1992). Furthermore, bear paws may sell for $24-$254 per meal in some Asian restaurants (Mills 1992).

Asian values for bears and bear parts transcend basic uses for bear parts as food or medicine. Traditional Asian cultures prize personal contact with powerful wild animals in a controlled setting (Cooper 1996). Pet bear cubs may sell for as much as $5,000 each in parts of the Orient (Mills 1992). Moreover, the act of consuming bear parts is valued by some Asians as much for "experiencing the 'essence'" of a highly revered animal as deriving health benefits or food value (Cooper 1996:72). Although bear farming for bile production recently has gained momentum in the Orient, bile from wild bears is preferred due to the belief that it is more potent (Cooper 1996, Servheen 1996).

Nonconsumptive values associated with black bears. – The reverence and admiration for bears in world cultures are manifest in cultural symbols (e.g., Russia) and names for athletic teams (Rolston 1987). More (1979) noted that bears were the 4th most commonly mentioned animal in titles of children's books in the United States during the 1970s, following only horses,

dogs, and cats. More (1977:82) noted that of all the "vicarious encounters with wildlife, the children's story is perhaps the most significant in determining wildlife perceptions."

The bear is a symbol of wildness (Rolston 1987) and is one of the wildlife species Americans most want to see when visiting the outdoors (Hastings 1986, McMullin et al. 2000). A suite of outdoor activities, from camping to hiking to auto-touring national parks, provides opportunities for human interactions with bears and adds nonconsumptive value to the bear resource. A recent telephone survey indicated that black bears (74%) were 2nd only to raptors (81%) as the animals Virginians were most interested in taking a trip to see (McMullin et al. 2000). Hastings (1986) found that 65.3% of visitors interviewed in the Great Smoky Mountains National Park wanted to see a bear more than any other wildlife species.

Bears are valuable to many citizens and natural resource professionals simply by existing in their native ecosystems. Gray et al. (1979) surveyed conservation officers in Massachusetts about their preferences for native species in the state and found that black bears ranked very high, despite a limited range of bears in the state in the 1970s.

Negative values associated with black bears. – Not all impressions of black bears are favorable, and not all positive values of bears are shared. Wade (1987:158) lists agricultural damage and hazards to humans as 2 common "social and economic" costs of bears. One consequence of continued urbanization and residential growth in black bear habitat will be human-bear conflicts (Langenau 1987).

Between 1957 and 1987, the number of state wildlife agencies reporting a species of bear causing agricultural damage in their state increased from 6 to 34 (Conover and Decker 1991). In Virginia, complaints of damage to corn, livestock, fruit trees, apiaries, and wooden structures by bears have increased significantly in recent decades (Martin and Steffen 1998). Reports in Virginia now include automobile collisions, camper harassment, residential annoyances, and problem bears at garbage dumps (Martin and Steffen 1998; Black bear focus group meeting, Richmond, Virginia, December 14, 1999). Similar types of black bear problems are recognized elsewhere in the United States (Maehr and Brady 1982, Black Bear Conservation Committee 1992, Jonker et al. 1998).

Biologists and resource managers are striving to retain the positive image of black bears in the face of increasing bear-human conflicts and eroding public tolerance for bears (McDonald 1999). States with substantial human populations have little need to discuss biological carrying

capacity because “people’s tolerance for bears is limiting the densities of bears…at far below the levels the habitats are capable of supporting” (McLaughlin 1999:17). Cultural carrying capacity, defined for deer - and applicable to bears - as the maximum number of animals compatible with human residents in a given area (Ellingwood and Spignesi 1986), is dependent on people’s attitudes toward bears and their management (Decker et al. 1995).

Attitudes toward black bears and opinions about their management.

Socially and ecologically acceptable bear management hinges on understanding stakeholder attitudes toward bears and opinions about their uses (Black Bear Conservation Committee 1992). These attitudes and opinions manifest themselves nationwide in issues of black bear hunting, nuisance bear management, and black bear conservation.

Black bear hunting. – Black bear hunting is controversial in the United States (Bissell 1993, Beck et al. 1994, Godrey 1996). Controversial aspects of bear hunting include the use of hounds, use of bait, the timing of seasons, harvest allocation, and requirement of a special bear permit. Also at issue is whether wildlife management agencies demonstrate equitable consideration of stakeholder interests and have sufficient data to make hunting decisions (Koch 1994, Loker et al. 1994).

Study results indicating overharvest of black bears in Colorado prompted hunting restrictions that some parties perceived were inadequate (Gill and Beck 1990). Controversy over biological data shifted to a debate about bear hunting methods - baiting bears, chasing bears with dogs, and hunting bears in the spring (Bissell 1993, Loker et al. 1994). The Colorado Division of Wildlife’s attempt to protect hunter opportunities in the face of known public opposition led to perceptions that the public involvement process was unfair (Bissell 1993, Loker et al. 1994). The ballot initiative that passed in 1992 banned bait, dog, and spring bear hunting as much because of failed wildlife policy as for any specific issue (Bissell 1993). That the final decision was transferred from the Colorado Division of Wildlife to a public referendum reflected the dissatisfaction of influential parties interested in bears (Bissell 1993, Loker et al. 1994).

A survey of registered Colorado voters conducted just before the referendum indicated that a majority believed the Colorado Division of Wildlife should make decisions about bear management (Standage Accureach, Inc. and Ciruli Associates, Inc. 1991). However, many voters also were willing to express their opinions without information about the issues (Standage

Accureach, Inc. and Ciruli Associates, Inc. 1991). In a survey of voters who had participated in the referendum, Loker and Decker (1995) found that opponents considered who has the final decision authority more important than did supporters of the bear hunting ban. Opponents also were more likely to state that an animal rights versus hunting debate contributed to the controversy (Loker and Decker 1995).

In 1989, the California Department of Fish and Game was restrained by court order from proceeding with black bear hunting season due to unmet demands of the California Environmental Quality Act (CEQA) (Koch 1994). According to the courts, the agency did not demonstrate that those opposed to bear hunting were given equal voice with hunters and that adequate technical data justified continuing traditional hunting methods and seasons (Bissell 1993, Koch 1994). The California Department of Fish and Game considered its interpretations exempt from CEQA processes due to technical expertise within the agency and the presumed dismissal of animal welfare sentiment as valid information in bear management planning (Bissell 1993). However, as Bissell (1993) and Beck et al. (1994) noted, concerns for "fair chase" in extant game laws is a provision with little biological significance; therefore, managers would be hypocritical to discount all other forms of animal welfare in future decisions.

Even when agencies clearly possess adequate data to justify bear hunting regulations, the public may be unaware of the data or choose to ignore them. In 1997, a record bear harvest in Tennessee, combined with confrontations between hunters and homeowners near the Great Smoky Mountains National Park, prompted an outcry from "emotionally-charged alarmists" that bear populations in the Smokies were overhunted and in danger of extirpation (Pelton 1998:26). Pelton (1998) suggested that special interest groups disseminated misinformation through various media to further their cause against bear hunting.

Hunters and nonhunters alike cited mass media as their primary source of information about the black bear hunting controversy in Colorado during the 1992 referendum campaign (Decker et al. 1993). Even though <10% of the surveyed public stated that they had heard anything specific about hunting bears in Colorado, < 25% declined to take a position of support or opposition on bear management issues (Decker et al. 1993). Comments from interest groups nationwide suggested that many people made conclusions based on very narrow perspectives and limited information (Loker and Decker 1995). More supporters than opponents (>25% vs. 4%)

of the ban on bear hunting with dogs, bait, or in spring considered themselves uninformed about black bear hunting issues in Colorado (Decker et al. 1993, Loker and Decker 1995).

Hunting black bears with dogs. – Hunting black bears with hounds is more contentious among hunters and nonhunters than any other aspect of the sport (DuBrock et al. 1978, Peyton 1989, Beck et al. 1994). Idaho Department of Fish and Game (1992) found that only 28% of survey respondents who said they hunted and only 12 % of nonhunters approved of hunting black bears with dogs. The primary reason given for opposition was that using hounds is not a sporting way to hunt bears (Idaho Department of Fish and Game 1992). Seventy-three percent of public survey respondents in Colorado opposed hunting black bears with dogs, even though 62% approved of hunting bears without use of dogs or bait (Standage Accureach, Inc. and Ciruli Associates, Inc. 1991). Although 21% of individuals providing comments to the Vermont Department of Fish and Wildlife indicated some support for hunting bears with hounds, 15% voiced strong opposition (Darling et al. 1997).

Many people who oppose hunting bears with dogs perceive that the method is 100% effective - that a chased bear automatically is doomed (Beck et al. 1994). Other critics suspect that hunters use radio-collars on their dogs to track bears rather than to retrieve dogs after the hunt (Beck et al. 1994). Beck et al. (1994) suggested that, in order for houndsmen to improve their image, they must address allegations about their perceived abuses and violations of fair chase.

For many bear hunters, "the chase is where the recreation and the reward is" (Beck et al. 1994:128). A number of states have special bear-dog training or chase seasons during which houndsmen may pursue, but not harvest, bears (Higgins 1997*b*). Opponents of chase seasons perceive an inconsistency in policies that prohibit harassing wildlife yet permit chasing bears with hounds (Beck et al. 1994). A survey by the Idaho Department of Fish and Game (1992) indicated that the primary reason for public opposition to the establishment of a special training season for bear dogs was that sport-chasing would be cruel or abusive to bears. Vermont residents cited concern for the length of the training season more frequently than any other bear hunting issue (Darling et al. 1997). Manville (1994) summarized a plethora of reasons why people oppose chasing black bears with hounds, from fair chase issues to potential biological impacts.

Virginia has held a one-month bear chase season during September since 1992 in counties where a firearm season exists (Higgins 1997*b*). Speculations that chasing bears may lead to increased automobile-bear collisions and decreased reproductive success or survival prompted research by Virginia Tech and VDGIF (Higgins 1997*b*). Higgins (1997*b*) concluded that chasing had no clear effect on winter condition of bears in her small sample.

Related to chasing bears with dogs are the issues of hunter trespass and hunter access. Beck et al. (1994) noted that hounds chasing bears sometimes trespass onto private property beyond the hunters' control. Complaints of bear hunter trespass on private lands have increased in Virginia over the last 10 years (David Steffen, VDGIF, personal communication). On public lands, provision of access to bear hunters through open roads has become an issue. Managers of the George Washington and Jefferson National Forest of Virginia have faced increased criticism from bear hunters as more road closures are enacted to achieve Forest Plan guidelines regarding road density and roadless area establishment (U. S. Department of Agriculture 1986; Ed Haverlack, U. S. Forest Service, personal communication).

Hunting black bears using bait. – Hunting over bait technically is illegal in Virginia; but, until July 1999, supplemental feeding of bears was permitted on state and federal lands within the Commonwealth. Feeding of bears is still legal on private lands, providing additional recreation for many bear hunters during the off-season and a sense of contribution to increased growth, reproduction, and survival of local bear populations (Jerry Snyder, Vice President of Virginia Bear Hunters Association, personal communication). Beck et al. (1994) offered that hunters derive nonconsumptive benefits from viewing bears at bait sites.

Opponents of bait hunting for bears claim it is unfair and inconsistent with the principle of "fair chase" applied to other game species (Beck et al. 1994). The Idaho Department of Fish and Game (1992) found that only 29% of survey respondents who said they hunted and only 8 % of nonhunters approved of hunting bears with bait. There apparently was little difference in disapproval for hunting bears with bait or dogs in Idaho. As with dog hunting, > 70% of survey respondents expressed opposition to hunting black bears with bait in Colorado (Standage Accureach, Inc. and Ciruli Associates, Inc. 1991).

Timing of black bear seasons. – Managers may manipulate season dates to minimize exposure of female bears to hunters. Male bears emerge from dens earlier in spring and enter dens later in the fall than do females (Johnson and Pelton 1980, Tietje and Ruff 1980, Hellgren

and Vaughan 1989). Holding spring hunting season early, before females emerge from dens, reduces the likelihood that cubs will be orphaned by unintentional harvest of nursing sows (Beck et al. 1994). Delaying the fall harvest ensures that a larger percentage of female bears will have denned in most years (Martin and Steffen 1998).

Spring bear hunting is a tradition in the western United States and Canada. It provides recreational opportunity at time of year when most other hunting seasons are closed (Beck et al. 1994). However, opposition to the spring season has led to its in several western states in recent years (Becker et al. 1994, Loker et al. 1994). Opposition to spring hunting has been related to ethics of hunting bears when cubs may be orphaned from females, impacts of harassing bears at a time when they are stressed physiologically or concentrated geographically, and road damage and stream siltation due to hunter travel (Beck et al. 1994). Concern about cub abandonment led 54% of surveyed Colorado voters to oppose spring bear hunting (Standage Accureach, Inc. and Ciruli Associates, Inc. 1991). Almost 90% of participants of an earlier Colorado survey agreed "that they were very bothered by the idea of hunting black bears in the spring when it might result in the killing of females with nursing cubs" (Gill and Beck 1990:24). Just 2 months before the ballot initiative banned the spring season in Colorado, 69% of survey respondents wanted spring bear hunting abolished (Manfredo et al. 1992).

Although Virginia does not have a spring bear hunting season, timing of the 3 fall harvest seasons has presented a management challenge. Due to the relative availability of female bears in early fall, the early archery season claims a larger proportion of females than does the later firearms season (Martin and Steffen 1998).

Allocation of black bear harvests and hunting opportunities. – Controversy among bear hunters about the timing of seasons and hunting techniques stems from differing perceptions of fair chase and the health of bear populations (Peyton 1989). Antagonism between bait hunters and dog hunters is well documented in Maine (ElHamzaoui et al. 1994) and Michigan (Hill and Stuht 1985, Peyton 1989). The conflict in Michigan is a "classic example of user conflict" (Peyton 1989:464).

Contention among bear hunters who use dogs and those who do not is apparent in Virginia. DuBrock et al. (1978) reported that 74% of incidental bear hunters surveyed were opposed to hunting bears with dogs. Respondents cited the use of vehicles and 2-way radios during the hunt as main reasons for opposition. Responses to a question on a more recent survey

regarding the appropriateness of a black bear chase season in Virginia were polarized: 75.0% of bear hunters who use dogs, but only 5.7% of other bear hunters, strongly favored a chase season; 11.4% of dog hunters and 44.3% of other bear hunters strongly opposed a chase season (Wright 1995; David Steffen, VDGIF, unpublished data). Perceptions that the chase season in September may interfere with bear movements and distribution prior to the early archery season has led to opposition from incidental bear hunters in Virginia (Black bear focus group, Verona, Virginia, January 29, 2000).

Wright's (1996) survey of participants in the 1994-1995 Virginia hunting season indicated that bear hunters on average rated the season that overlapped with deer season as the most important, followed by archery season, followed by bear hunting with the use of dogs, followed by the bear dog training season. Bear hunters who did not use dogs heavily influenced this ranking. Wright and Emerald (1998) reported 2 years later that 83.6% of bear hunters in Virginia during the 1996-1997 season used guns, but no dogs; 45.2% used guns and dogs; and 31.4% used bows (overlap in classification was due to individuals using more than one technique at different times throughout the season).

Allocation of the bear harvest among groups who use different hunting techniques also has led to user conflicts. In Virginia, 19.6% of the total bear harvest from 1990-1999 occurred during archery season, 32.6% during nondog firearm season, and 47.8% during dog firearm season (Martin and Steffen 1998; Dennis Martin, VDGIF bear program leader, unpublished data). Given that check card data shows that hunters using dogs take about 75% of bears harvested during the dog firearm season (Martin and Steffen 1998; Dennis Martin, VDGIF, unpublished data), the average annual take for hound hunters < 40%. Meanwhile, the proportion of bears taken by bow hunters has increased during recent decades (Martin and Steffen 1998). This has led to a resource allocation controversy between bow hunters and hound hunters (Black bear focus group, Verona, Virginia, January 22, 2000).

The period of overlap in bear and deer firearm seasons in Virginia may present the most critical allocation choice, for both biological and sociological reasons. The VDGIF approved a regulation change in 1974 that shortened and delayed the firearm season for bears in western Virginia (Martin and Steffen 1998). The rationale was to eliminate incidental take of bears during the first week of deer firearm season. The reduction in female harvest since 1974 may be a direct result of this change (Martin and Steffen 1998; Dennis Martin, VDGIF, unpublished

data). Reduced female mortality following the season change was likely the most important factor in the increase and expansion of bear populations in Virginia (Martin and Steffen 1998).

Overlapping deer and bear seasons present opportunities for more hunters to harvest bears but draw criticisms from hunters who feel that bears should only be taken by hunters pursuing bears as their sole quarry. Houndsmen dislike the overlapping deer and bear firearm seasons in western Virginia (Black bear focus group, Verona, Virginia, January 22, 2000). DuBrock et al. (1978) found that 81% of all hunters who used dogs in Virginia wanted the bear season eliminated during the deer season, whereas only 33% of incidental hunters wished for such a change. As early as 1950, traditional bear hunters and game wardens stated that they would support a law wholly separating deer and bear seasons (Davenport 1951).

Special bear hunting permits. – Hunters have expressed mixed views regarding the purchase of a special bear permit in addition to or separate from big game licenses. In Vermont, bear hunters showed more support for a separate bear license than did deer hunters (Darling et al. 1997). DuBrock et al. (1978) found that 93% of Virginia Bear Hunters Association members and 65% of nonclub hound hunters supported the requirement for a separate bear tag in Virginia. Only 38% of incidental bear hunters supported a separate bear tag (DuBrock et al. 1978). Wright and Emerald (1998) also found that bear hunters who did not use dogs were less supportive of a separate bear license than those who used dogs. In Michigan, hunter organizations have expressed concerns that additional license expense may burden low-income hunters (Grise 1994).

Nuisance black bear issues. – A primary management concern for bear hunters and other bear enthusiasts is maintenance of a bear population large enough to satisfy their pursuits (Black Bear Conservation Committee 1992). However, high bear populations inevitably lead to human-bear conflicts, many of which relate to bears' attraction to human food sources (Decker et al. 1981). The primary concern of agricultural producers, campground owners, and some residents in bear range is to keep the bear population low enough to prevent costly damage (Decker et al. 1985). The primary concern of park visitors is preventing dangerous situations involving bears (Moment 1968). Management of bear-human conflicts is necessary to retain our legacy of abundant bears in national parks (Moment 1968, Baptiste 1977). Tolerance of black bears and acceptance of bear management strategies ultimately will determine the abundance and

distribution of the species (Black Bear Conservation Committee 1992, McDonald 1999, McLaughlin 1999).

Tolerance for black bears. – Landowners generally have exhibited tolerance for black bear nuisance problems (Black Bear Conservation Committee 1992, Jonker et al. 1998). A 1978 survey of private landowners, camp managers, and corporate landowners in New York state revealed that those who had experience with bears generally had more positive attitudes about bears than those who had no experience (Decker et al. 1981). Half of landowners who had a nuisance problem still wanted the bear population to increase. Decker et al. (1985) found similar attitudes among the landowners in 1983 following an increase in the bear population. Jonker et al. (1998) found no significant relationship between producers' economic loss due to bears and their tolerance for bears in Massachusetts.

Decker et al. (1981:3) recommended merging biological and sociological data about black bears in New York to "provide for …maximum beneficial use and maintain populations at levels compatible with public interest." The authors postulated elsewhere that the factor limiting bear populations in New York would be public tolerance of the resource, resulting in a population level well below biological carrying capacity (Decker et al. 1985, Decker and Purdy 1988). The New York State Department of Environmental Conservation assessed public opinion about black bear populations following each of a series of controlled population growth and stabilization episodes (Decker and O'Pezio 1989). This process enabled public acceptance and biology to jointly determine the appropriate bear population level (Decker and O'Pezio 1989).

Likewise, "successful conservation of brown bears (*Ursus arctos*) in Europe is associated with public acceptance of damages caused by bears" (Klenzendorf 1997:i). Klenzendorf's (1997) interviews with rural residents in Europe suggested that people who had coexisted with bears for centuries were more accepting of them than were people living in areas where bears recolonized naturally or were reintroduced. Lack of public involvement in the process leading to reintroduction of brown bears in Austria may have led citizens to believe that authorities did not care about their concerns (Klenzendorf 1997).

Preferences for nuisance bear management strategies. – European wildlife agencies have found that compensating landowners for certain types of bear damage increases public acceptance of brown bears (Klenzendorf 1997). Because compensation has no effect on reducing damage caused by bears – unless compensation is dispersed in the form of deterrents or

cost share for deterrents purchased – its only utility is to increase farmers' tolerance for bears and to alleviate their costs (Olsen 1991, Wagner et al. 1997).

Only 12 states and provinces in North America had bear damage compensation programs as of 1997 (Wagner et al. 1997). Farmers in the United States have preferred other nuisance management options to compensation (Kellert 1979, Arthur 1981, both in Wagner et al. 1997; McIvor and Conover 1994). However, given that nuisance abatement techniques are not always effective, many landowners still approve of compensation programs. In Utah and Idaho, McIvor and Conover (1994) found that most farmers (58.1%), but fewer nonfarmers (19.4%), agreed that ranchers and farmers should be compensated 76-100% for losses caused by wildlife. Only 7.3% of farmers and 30.6% of nonfarmers believed that any compensation was inappropriate.

Opinions about questionable effectiveness and the expense of payment programs have pared the support for bear damage compensation (Hyngstrom and Hauge 1989, Olsen 1991, Wagner et al. 1997). All parties disliked the Wildlife Damage Compensation Program in Wisconsin before it was dissolved in 1979 (Hyngstrom and Hauge 1989). Landowners were frustrated with damage estimates, the lack of funds to cover their claims, and the inability of the program to control damage. Legislators and agency personnel were concerned about the high cost of administration, the relatively small number of landowners who were assisted by the program, and the lack of focus on abating damage (Hyngstrom and Hauge 1989). When private organizations fund compensation, landowner attitudes toward those organizations may affect approval of the programs (Olsen 1991). Plans for the Great Bear Foundation to compensate livestock producers in Montana for grizzly bear (*Ursus arctos)* kills were protested by many ranchers, some of whom would not even accept payments from the organization (Olsen 1991).

Agency personnel, agricultural producers, and homeowners have employed a number of nonlethal and lethal techniques to handle nuisance bears. Nonlethal techniques include fencing around bee hives or crops, modifying placement or configuration of crop fields, using harassment measures to deter bears, trapping and relocating problem bears, and removing food sources and other attractants when possible (Robinson et al. 1993). Beck et al. (1994) discussed the use of bear hounds to chase and deter nuisance bears from areas where damage occurs. This technique may be more economical than trapping and relocating bears and may lead to a win/win situation for landowners having bears deterred and hunters getting additional recreational

opportunities (Beck et al. 1994). Lethal measures include hunting, trapping and euthanizing, and use of producer kill permits (Robinson et al. 1993).

Natural resource professionals and the public generally agree that lethal measures to control problem bears should be used only as a last resort (Baptiste et al. 1979, Robinson et al. 1993, McIvor and Conover 1994). According to a survey (McIvor and Conover 1994), both farmers and nonfarmers in Wyoming and Utah preferred nonlethal control methods (30.8% and 51.5%, respectively) to lethal control (13.5% and 10.4%, respectively) for problem bears. In urban areas where bear-human conflicts are increasing, support for animal welfare and animal rights concerns generally outweighs support for hunting (McLaughlin 1999). These attitudes restrict bear management strategies available to managers (McLaughlin 1999).

Nuisance bears in National Parks. – U. S. National Park Service officials justifiably are concerned with human-bear conflicts that involve damage to personal property and reduce visitors' safety (Hastings 1986). National parks have experienced occasional bear attacks, especially within grizzly bear range in the West (Moment 1968). Moment (1968) suggested that the mission of the Park Service to maintain natural populations of bears while providing for safety of visitors is a contradictory mandate. Human fatalities and injuries caused by bears living within public parks raise legal and ethical questions for administrators (Moment 1968). Moment (1968) suggested that the National Park Service should choose whether to manage certain parks for people or bears, based on some measure of the species' uniqueness to the area. "Old Faithful is unique to Yellowstone, bears are not" (Moment 1968:1108).

Park managers and visitors have taken a less stringent view, particularly in eastern national parks where grizzlies are not present (Petko-Seus 1985). Surveys and interviews of visitors to the Great Smoky Mountains (GSMNP) and Shenandoah National Parks (SNP) showed that visitors recognize that proper human behavior and prompt abatement of acute bear problems permit mutual use of parks by bears and people (Burghardt et al. 1972, Pelton et al. 1974, Baptiste 1977, Baptiste et al. 1979, Petko-Seus 1985, Hastings 1986).

Many park visitors consider it their responsibility to prevent bear problems (Baptiste 1977, Petko-Seus 1985). Visitors to GSMNP preferred closure of problem areas, warnings, visitor education, and increased patrols by park staff over removal of bears (Petko-Seus 1985). In SNP, surveyed visitors did not agree that presence of bears in developed areas or bears blocking traffic were situations requiring intervention by park staff (Baptiste 1977).

Most surveyed visitors of SNP and GSMNP agreed that any human injury caused by a bear warrants action by park rangers (Baptiste 1977, Petko-Seus 1985). Visitors preferred moving chronic problem bears to other parts of the parks instead of relocating them outside the parks or creating special feeding areas (Burghardt et al. 1972, Baptiste 1977, Petko-Seus 1985). Despite their general support for bears, respondents to a survey of SNP visitors were unwilling to tolerate $25 of property damage in order to see a bear (Baptiste 1977). However, Petko-Seus (1985) found that > 65% of visitors interviewed in GSMNP did not believe that the National Park Service should compensate personal injury or property damage caused by bears. Burghardt et al. (1972) found that few visitors approved of killing problem bears in the park, and those who did usually qualified lethal options as a last resort only (Burghardt et al. 1972). Petko-Seus (1985) found that 98.5% of visitors agreed that bears should not be eliminated from the GSMNP.

Pelton et al. (1974) found that those visitors who had received injury or property damage from bears were much more likely than those who had not to suggest moving problem bears to areas outside GSMNP, creating special bear feeding areas, and more strictly enforcing rules concerning visitors and bears. However, those injured by bears were much *less* likely to suggest that managers should destroy or cage problem bears. Respondents who had received damage or injury from bears were more likely to suggest that bears taking stored food were a problem (Pelton et al. 1974).

Food and garbage attract black bears. Open garbage dumps and trash containers may concentrate bears in relatively small areas and create unsafe conditions for bear watchers (Rogers 1989). However, Rogers (1989) suggested that garbage dumps provide the only opportunity for many people to see bears and learn about their behavior. Observers may overcome fears about bears and pick up cues of aggression that may help them in bear encounters (Rogers 1989).

Black bear conservation issues. – Black bear conservation relates to all aspects of bear management. Bear management depends upon public appreciation and accommodation of bears (Decker et al. 1985). Harvest, removal of nuisance bears, poaching, and other forms of human-induced mortality directly reduce bear populations (Hellgren and Vaughan 1989, Mills 1992, Gilbert and Wooding 1996, Martin and Steffen 1998). Habitat fragmentation or alteration may reduce bear populations indirectly (Hellgren and Maehr 1993). Humans may increase bear populations by relocating bears to new areas, providing energy-rich food sources, and developing suitable habitat (Lane 1997, Vaughan 1998). Improved science enables bear managers to alter

the distribution of these human effects on the bears (Vaughan 1998), but human attitudes ultimately determine how well we conserve bears (Black Bear Conservation Committee 1992).

Cooper (1996) suggested that attitude change about the trade in black bear parts is necessary to guarantee the conservation of the species. Servheen (1996) asserted that the Asian faith in bile from wild bears and the potential profits for American hunters and poachers render the trade in bear parts intractable. But Garshelis (1997) argued that ecological dimensions of bear organ trade have been misrepresented by values of alarmed scientists and their ignorance of Asian culture. Many Americans consider consumption of bile from wild bears unethical – including American scientists – yet, many Asians consider sport hunting barbaric (Garshelis 1997). According to Garshelis (1997:6), unsubstantiated information is being cited as fact in primary bear literature, despite the "tremendous ignorance of cultures and economics, the two factors driving the trade in bear parts."

Several states permit the sale of bear parts (Cooper 1996). Some scientists, resource managers, and hunters support broader legalization of trade in bear parts. Supporters submit that parts having legitimate medical uses should not be wasted and that trade may provide an additional source of revenue for wildlife agencies (Garshelis 1997). However, a survey by Idaho Department of Fish and Game (1992) showed little support for the legal sale of black bear parts. Only 34% of surveyed black bear tag holders in Idaho approved of a legal sale of bear parts. The primary reason cited for opposition was that legal trade in bear parts was an improper use of hunting and wildlife for profit (Idaho Department of Fish and Game 1992). Where sale is legal, the public may encourage strict accounting for bear parts. The Vermont Department of Fish and Wildlife's proposal to implement mandatory tagging of bear parts before sale was met with 59% approval and 28% disapproval by the surveyed public (Darling et al. 1997).

Knowledge about black bears

Stakeholder knowledge about a species has implications for realistic, acceptable management options. A number of public surveys (Burghardt et al. 1972; Mollohan and LeCount 1981, in LeCount and Baldwin 1986) have shown that many people lack even basic knowledge about size of black bears and bear habitat needs.

Surveys and interviews of visitors in GSMNP and SNP have demonstrated the variability in public knowledge about black bears. Burghart et al. (1972) examined visitors' knowledge

regarding black bears in the GSMNP through personal interviews. Ninety percent of respondents did not know the correct term for an adult male (boar) and female (sow) bear and > 50% of respondents thought that, on average, an adult bear weighs > 400 pounds. More respondents chose ≥ 50 pounds than chose ≤1 pound for the weight of a newborn black bear. However, > 66% of the respondents knew that black bears eat mostly plant material and can run faster than a human. Over 75% knew that black bears would not make good pets (Burghart et al. 1972).

Of GSMNP backcountry campers interviewed in the 1980s, 83% were aware that bears can be active during daylight hours, 85% knew that adult black bears can climb, and 87% knew that the black bear was the only species of bear present in the park (Petko-Seus 1985). About 75% of campers interviewed realized that bears sometimes cause injuries to visitors of GSMNP (Petko-Seus 1985). Hastings (1986) found that, of visitors interviewed in the Cades Cove section of the GSMNP, 6% thought that grizzly bears were present there, 45% thought poachers were not causing a decline in the park's bear population, and 64% recognized that the National Park Service had been relocating nuisance bears.

A survey conducted in SNP confirmed results from GSMNP interviews (Baptiste 1977). Seventy-five percent of respondents knew that bears could run faster than humans and 85% were aware that black bears could climb trees. Sixty-four percent knew the general diet of bears and 72% knew that bears are more visible in developed areas of the park near human sources of food. Nearly all (91%) recognized that a sow with cubs is more dangerous than a lone adult bear (Baptiste 1977).

Hunting may increase knowledge about the ecology and management of bears and other game species. A random sample of 1,500 Iowa residents revealed that hunters knew more about principles of wildlife biology and management than those who did not hunt (Dahlgren et al. 1977). In GSMNP, Burghardt et al. (1972) found that 27% of visitors who said they hunted and 11% of nonhunters scored ≥7 out of 10 on the bear knowledge test. Hastings (1986) found that hunters knew more about game species than nonhunters, but hunters had no more knowledge about a wide range of species in GSMNP. In their survey of bear hunters in Virginia, DuBrock et al. (1978) found that 83% of Virginia Bear Hunter Association members were familiar with bear projects being conducted by the VDGIF. Less than 50% of incidental bear hunters and hound hunters who were not in clubs were aware of these projects (DuBrock et al. 1978).

Attitudes toward black bears may relate to knowledge about the animals (Burghardt et al. 1972, Decker et al. 1985). In a survey of landowners in the Catskill Mountains of New York, Decker et al. (1985) found that only 48% of respondents who did not want the bear population to increase realized that the black bear was the only bear species in the area. On the other hand, 82% of those who wanted the bear population to increase realized that the black bear was the only bear species in the area. Interviews in GSMNP suggested a strong relationship between knowledge about bears and attitudes about bear management (Burghardt et al. 1972). Those scoring above the median on the bear knowledge test were more likely than those scoring below the median to suggest removing problem bears to other parts of the park or outside the park and less likely to suggest putting them in zoos or cages (Burghardt et al. 1972). These studies suggest that education may alter constituent expectations about bear management.

Attitudes and opinions of natural resource managers toward public involvement

In addition to educating the public about safety and other resource use issues, managers within natural resource agencies provide information to the public as a means to promote agency credibility and to justify selected management alternatives (Magill 1988, Stout et al. 1996). Many agencies have welcomed public comments and feedback on management (Soden et al. 1988). Citizens traditionally have shared their concerns through unsolicited input rather than invited participation (Stout et al. 1996). In recent years, however, constituents increasingly have demanded a more active role in public planning, due in part to distrust of government institutions and lack of satisfaction that decisions are based on the best information available (Finiter 1970, Naisbitt 1982, Lautenschlager and Bowyer 1985). Natural resource professionals have been hesitant to reciprocate (Magill 1988), though studies indicate that citizen participation actually may improve decision quality and bolster public confidence in the agency (McMullin and Nielsen 1991, Landre and Knuth 1993, Stout et al. 1996, Guynn and Landry 1997, Peek 1998). Stout et al. (1996:316) concluded that much of the "value of public involvement lies within the participation process itself."

Industrial leaders in the mid-20th century were fearful of involving workers in decisions, claiming that workers lacked sufficient knowledge and experience and/or desired to make selfish decisions (Maier 1950). Likewise, natural resource managers have been reluctant to involve the public in making management decisions due to the perception that most people do not know

what is best for the resources (Magill 1988). Some critics have claimed that the negative attitude of agency administrators toward citizen input has been the factor limiting public involvement in agency planning (Crompton et al. 1981). Moreover, willingness to involve citizens does not equal attentiveness to public input or needs. Some agencies may "welcome input from organized interests, but generally disparage the public's ability to contribute to the policymaking process in an informed manner" (Soden et al. 1988:313).

Bear biologists and managers at a recent Eastern Black Bear Workshop pondered whether they should "attempt to influence public attitudes" (McLaughlin 1999:17). Although workshop participants were uneasy discussing the human dimensions of bear management, McLaughlin (1999) submitted that agencies and universities have made great strides in bear knowledge and management from a technical standpoint. "We now need to focus on managing an increasingly important part of the bear's world – the people that live in bear country, sharing and competing with bears for space and resources." (McLaughlin 1999).

Experience with public involvement may change the attitudes of agency personnel regarding the utility of citizen participation (McConnell 1977, Crompton et al. 1981). Crompton et al. (1981) found that most senior administrators of recreation agencies in Texas believed that their personnel were disposed positively toward public participation in planning (junior administrators were not surveyed). McConnell (1977) reported that U. S. Forest Service employees who participated in the agency's public involvement program generally had more positive attitudes toward public participation in planning than those who had little experience with the program. McConnell (1977) also observed a positive relationship between the frequency of participation and attitudes toward public involvement.

Effects of participation on knowledge, attitudes, and opinions

One of the greatest values of public involvement is the impact on participants' knowledge, attitudes, and opinions concerning other stakeholders, the agency, and the resource (Stout et al. 1996). There is much qualitative support for the role of citizen participation in improving agency image, decision acceptance, project support, cooperation among stakeholders, and knowledge about resources (Ireland 1975, Hillborn and Luedke 1987, Peyton 1987, Sample 1993, Slover 1996, Stout et al. 1996).

Public involvement also may influence managers' knowledge of constituents and alter the attitudes and opinions of agency personnel about stakeholders and issues. In New York, deer managers reported benefiting from citizen task force and survey approaches to public involvement in planning (Stout et al. 1996:316). Agency staff involved with water planning in North Carolina stated that their "opinions about the 208 planning process, 208 issues, and about the public were altered by their exposure to the public participation process" (Godschalk and Stiftel 1981:607). However, McConnell (1977) found that regional supervisors in the U. S. Forest Service reported less effect of public involvement on their attitudes than field staff. McConnell (1977:57) suggested that "attitudinal inertia" – certainty or rigidity produced from years of hearing and learning about issues – may dampen the effects of new information expressed during public involvement.

Increased knowledge. – Several studies have suggested that active participation in natural resource management can improve stakeholder knowledge. Godschalk and Stiftel (1981) found that citizens in North Carolina who participated in dialogue with water planners scored much higher on knowledge tests than those citizens involved only through review and informational (passive) modes of participation. Advisory committee members for Great Lakes Remedial Action Planning overwhelmingly reported a gain in knowledge about causes of pollution and water quality regulations through participation (Landre and Knuth 1993). Constituent knowledge also may increase through less formal interactions with professionals. Using the example of a Canadian daily newspaper, Struzik (1989) found that "quality and educational value" of wildlife-related news stories improved over time, partly due to the interaction of journalists with biologists.

Social science researchers also have reported effects of active participation on knowledge. Leeming et al. (1997) documented that elementary school children who participated in an environmental education program made greater gains in environmental knowledge than nonparticipating children. Lloyd (1973) found that, as compared to no treatment, workshop participation induced a significant increase in factual knowledge among college women involved with life planning. Marenin (1989) reported that > 72% of participants in the Nigerian National Youth Service Corps reported that they had gained "much" or "very much" knowledge of other parts of the country.

Changes in attitudes and opinions. – A sizeable body of social science literature documents changes in attitudes and opinions resulting from participation. Some of the studies relied on subjective assessments of change, whereas others incorporated surveys before and after participation to quantify changes.

Participation may improve participants' attitudes about power, influence, achievement, and personal control. Zurcher (1970) administered questionnaires to poverty board members in Topeka, Kansas 7 months apart during their service to test for participation-induced change in certain social-psychological variables. Zurcher (1970) found no significant changes in these variables for middle-class representatives. These participants initially felt comfortable that their involvement would bring about positive changes. However, board members representing the poor, who initially were suspicious of the process and its utility to the community, exhibited significant positive changes in attitudes of activism and achievement orientation through participation. Representatives for the poor who served longest were most likely to express a decrease in powerlessness (Zurcher 1970). Falkson (1974, in Kweit and Kweit 1981) found a weak positive relationship between attitudes and participation in a study of 8 municipal service areas. He concluded that attitudes about education improved after participation due to citizens' belief that they had influence in the program. Zimmerman and Rappaport (1988:725), conducting a series of studies on introductory level psychology students, found that "individuals reporting a greater amount of participation scored higher on indices of empowerment." Hatten and Ruhland (1995) found that participation in a Small Business Institute program had a positive effect on college students' entrepreneurial attitudes.

Other studies have demonstrated that participation in groups may reduce prejudice or resistance to change. Over 50% of participants in the Nigerian National Youth Service Corps reported positive shifts in their views of local people in their country, including a loss of prejudice (Marenin 1989). Coch and French (1948), examining attitudes of factory workers who had expressed grievances about involuntary changes in work duties, found that participation by workers in production planning programs reduced their resistance to change.

Lloyd (1973) hypothesized that success in changing attitudes may depend on the type of attitudes involved and the degree of change sought. She found evidence that workshop attendance (active participation) produced greater attitude changes than reading literature (passive participation). However, she found less change than expected, perhaps because initial

positions of many subjects were close to the position advocated by program leaders. Lloyd (1973) concluded that participants with attitudinal positions initially very close or very far from target positions might exhibit less change than those whose initial attitudinal positions are moderately distant from advocated positions.

Another study examined the effects of active and passive participation on attitude changes (Leeming et al. 1997). Passive participation may include reading (Lloyd 1973), lecture (Ritter 1967), or receiving information from active participants outside of a formal participation program (indirect participation). Leeming et al. (1997) found that participation in an environmental education program effected significant positive changes in attitudes of elementary school children toward the environment. Parents of children in the groups receiving environmental education also reported a greater change in their own environmental concerns throughout the time of their children's participation as compared to parents of nonparticipating children. The frequency of discussion among parents and their children accounted for 22.5% of the variance in parents' data, illustrating benefits from parents' communication (i.e., passive participation) with their children (Leeming et al. 1997).

Discussion may be the primary agent of attitude or opinion change in individual or group settings. Ritter (1967), summarizing psychological studies in the areas of religion (Kagan 1952), food habits (Lewin 1947), and manufacturing (Levine and Butler 1952) demonstrated that group interaction was superior to lecture and/or reading techniques in effecting attitude changes. Ritter (1967) reported that studies in education (Antonelli 1962, Cherryholmes 1963) and ethnocentrism (Mitnick and McGinnies 1958) also showed that group discussion had a significant impact on attitude change. Early studies of college students interacting in groups indicated that participants were likely to change their initial opinions or decisions about a topic after learning how others in the group felt (Burtt 1920, Jenness 1932). Levine and Butler (1952) found that group discussion was more effective than lecturing in reducing biased performance ratings issued by foremen in a large manufacturing plant.

Unstructured group participation may produce a more extreme consensus than would be expected by averaging the initial positions of individual group members (Kogan and Wallach 1964, in Rosenbaum 1987; Doise 1969, Moscovici and Zavalloni 1969). This may be especially relevant in groups of like-minded individuals. Discussion among students from a private architectural school in Paris led to polarized judgments about their own group (Doise 1969).

This polarization became more apparent when researchers injected the presumed opinion of a rival school into the discussion. Moscovici and Zavalloni (1969:134) concluded from their study of Parisian secondary students that "group discussion to consensus results in a polarization of responses" and that the "opinions and judgments expressed by the group consensus will often be adopted by the individuals as their personal opinions."

Rosenbaum (1987:121) cautioned that when "individuals participate in a group process without strong leadership and without structure, the group dynamics can be such that significant changes in feelings and attitudes are possible, for better or worse." Rosenbaum presented evidence that fear of personal crime increased significantly following participation in Chicago crime prevention programs. He suggested that the exchange of personal stories about local crime may have increased fear among attendees of neighborhood watch meetings.

An additional risk of citizen participation may be evident when decisions are final. Citizens expecting greater influence in decisions may be disappointed (Kweit and Kweit 1981). Skeptics may become more unyielding in their belief that decision makers always will ignore them (Buck 1984). Zurcher (1970) found that poverty boards positively influenced active participants' attitudes, but negatively influenced the attitudes of inactive citizens (Zurcher 1970). Kweit and Kweit (1981) suspected that citizens believed they previously were misled in believing poverty boards had influence in decisions. Buck (1984) found a similar response by participants he surveyed 4 years after completion of a plan for Yosemite National Park. As compared to their attitudes during planning, participants generally showed less confidence that they could influence the National Park Service (NPS), less support for future plan decisions by NPS planning experts, and more concern that the NPS really was not interested in public perspectives (Buck 1984). Those individuals who showed greatest support during the planning process also expressed the greatest stability of opinion following completion of the plan. Apparently, "those who were skeptical…found their fears justified" (Buck 1984:478).

Meaningful public involvement may improve agency image (McMullin and Nielsen 1991). Agency image or credibility includes competence and trustworthiness of agency function and personnel (Grise 1994). Without these attributes, the agency is handicapped in making acceptable decisions (Grise 1994). Decker (1985:43) defined agency image as "the stereotypic impression people have of an agency, particularly their perceptions of and beliefs and attitudes about an agency's personnel, management functions, and communication behaviors" (Decker

1985:43). Of these attributes, Decker (1985) suggests that communication behavior needs greatest improvement in most cases.

Cooperation among citizens and natural resource managers during public involvement may lead to improved images of the agency and the various stakeholder groups (Stout et al. 1996). Solicited participation led to positive comments about the New York State Department of Environmental Conservation following deer management planning (Stout et al. 1996). In 3 of 4 advisory committees involved with Great Lakes Remedial Action Planning, a large majority of members reported gaining confidence in the Wisconsin Department of Natural Resources (Landre and Knuth 1993). All 4 committees had > 90% of their members reporting an increased understanding of community views. However, 26 of the 35 members of 1 committee reported losing confidence in the agency. In this case, more economic risks and lack of agency dealings with communities may have led to mistrust (Landre and Knuth 1993).

In the social science literature, Kweit and Kweit (1981) found mixed reports regarding impacts of participation on trust in government and community. In 1 study, > 60% of participants in community action programs reported increased trust and confidence in local authorities and their neighborhoods (Cole 1975). However, Finiter (1970) and Yin et al. (1973, in Kweit and Kweit 1981) found no evidence that active citizen participation increased trust in government. The degree of involvement and the quality of group discussions may have differed in the conflicting studies (Zurcher 1970, Kweit and Kweit 1981).

Agencies may enhance the credibility of public involvement processes by involving a capable third party mediator. Citizens who attended controversial U. S. Forest Service land use planning workshops in Colorado reported no more agreement with the agency than those who did not attend (Twight and Carroll 1983). Twight and Carroll (1983) hypothesized that many stakeholders present at the meetings saw the Forest Service as an adversary instead of an objective mediator. An agency seen as an adversary to stakeholders may gain public trust if it uses a "credible third-party mediator" in the process (Twight and Carroll 1983).

Assessing the effects of participation

Conducting surveys before and after participation is an objective framework for assessing the effectiveness of participation. Social scientists have examined influences of participation by comparing attitude, opinion, or knowledge scores of identical subjects before and after

participation (the treatment) (Ritter 1967, Zurcher 1970, Lloyd 1973, Hatten and Ruhland 1995, and Leeming et al. 1997). Cook and Campbell (1979) called this approach a one-group pretest-posttest design.

Researchers often are unable to control for various external variables in natural settings (i.e., in cases where research is adapted to a larger process instead of driving an experiment) (Cook and Campbell 1979, Leeming et al. 1997). Such is the case with my research into effects of participation in bear management planning.

The necessity for nonrandom assignment to groups in some field studies led to the term "quasi-experimentation" (Cook and Campbell 1979). Leeming et al. (1997) used the Children's Environmental Attitude and Knowledge Scale (CHEAKS; Leeming et al. 1993) to test environmental attitudes and knowledge of elementary school children before and after they participated in an environmental education program. They used 19 nonparticipating classes (controls) and 16 participating classes. Due to nonrandom assignment of classes to the experimental and control conditions and the voluntary nature of participation in the program, the data collection by Leeming et al. (1997:36) "constitute[d] a quasi-experimental design." Lloyd (1973) administered pre- and post-surveys to female college students in Arizona involved in workshops and reading literature about women's issues. Her groups were workshop/reading, reading only, and no treatment. Like Leeming et al. (1997), she was unable to randomly assign participants to groups, in part because some of the participants specifically signed up for the workshops.

Social science literature provides examples of other threats to validity in pretest-posttest designs. First, Lewin (1947) recognized that different expectations of group discussion participants and lecture addressees might have confounded his findings of discussion effectiveness. Researchers told discussion participants before the experiment that they would be asked afterwards if their behaviors had changed. Second, interaction between participants in control groups and experimental groups may diminish differences between the groups. Ritter (1967) used pre- and post-surveys of 15 high school students to examine changes in attitudes and values attributable to extra-curricular group discussions. She also surveyed 15 students who did not participate in group discussions as a control. Ritter (1967) documented communications between experimental and control students that potentially influenced control students' posttest attitude scores. Third, an overall insignificant change in attitudes of participants may mask

highly significant changes for some participants. Marenin (1989) found much less differences in attitude changes of youth corps participants using his pretest-posttest format than with his self-assessment surveys following service. A "year of service has a differential impact on different categories of participants…[so] in effect, an overall lack of change in attitudes hides a significant change in attitudes for those participants who are most in need of change" (Marenin 1989:41).

OBJECTIVES, HYPOTHESES, AND OVERVIEW OF METHODS

Following is an overview of methods used in my thesis research. Chapter 2 of the thesis describes procedures and results related to thesis objectives 1 and 2. Chapter 3 covers work associated with thesis objective 3.

Objective 1: To assess constituent knowledge, attitudes, and opinions regarding black bears, black bear management, and other black bear stakeholders, including the Virginia Department of Game and Inland Fisheries (VDGIF).

I used focus groups and surveys to accomplish the first objective. However, stakeholder advisory committee meetings and regional input meetings provided additional qualitative information about Virginia's black bear constituents.

My goal for focus groups was to gain understanding of the importance of black bear issues from the perspectives of constituents. Focus groups provided in-depth, qualitative information used to identify primary stakeholder issues and designing quantitative surveys (Clark et al. 1994, Minnis et al. 1997). Focus groups stimulated thoughts about phrasing questions and the breadth of response scales for surveys (DiCamillo 1995, Duda et al. 1998, Minnis et. al 1997).

Each focus group consisted of a structured discussion among 7 - 16 constituents, all with similar interests and concerns about black bears and black bear management in Virginia. During November 1999 to January 2000, I administered 1 focus group interview to selected representatives from each of 5 key stakeholders categories: (1) those who hunt bears with hounds, (2) those who hunt bears without hounds, (3) those concerned with nuisance bears and bear damage, (4) those with nonconsumptive interests in the bear resource, and (5) agencies other than VDGIF involved with bear management in Virginia.

I used a written script to guide questions (Bissell and Duda 1993) at each focus group interview (Appendix 1). I produced textual transcripts (Bissell 1993, Duda et al. 1998) and summaries from recorded focus group proceedings. Although transcripts enabled some comparisons among constituent groups (Knodel 1993), my analysis emphasized categorization of primary constituent issues.

Pre- and post-planning constituent surveys addressed Objectives 1 and 3 of this study (Appendix 2). Mail surveys provided quantitative data about attitudes, opinions, and knowledge of black bear constituents in Virginia (Dillman 1978, Pollock et al. 1994, Duda et al. 1998). I surveyed all individuals participating on the statewide stakeholder advisory committee before and after participation (i.e., May 2000 and June 2001). I also surveyed constituents from groups represented by participants on the stakeholder advisory committee. Sample frames were taken from organizational mailing lists.

Specific objectives of my black bear stakeholder surveys included:

1. Assessing constituent knowledge of black bear ecology and management in Virginia,
2. Assessing constituent attitudes toward black bears and opinions about bear management in Virginia,
3. Assessing constituent opinions about VDGIF decision-making for black bear management,
4. Assessing constituent opinions about the input of other black bear stakeholders in Virginia, and
5. Assessing demographic characteristics of black bear constituents in Virginia.

Administration of surveys followed a modified version of Dillman's (1978) Total Design Method. I used Likert-type scales (Pollock et al. 1994), multiple choice questions, and yes/no questions (Duda et al. 1998). Likert-type scales consisted of an odd number of balanced categories (Dillman 1978, Pollock et al. 1994). Because a single question often cannot effectively measure an attitude or perception (Duda et al. 1998), I incorporated a series of questions to assess Kellert (1980) attitude types. Percentage of correct responses to knowledge questions served as a knowledge score (Kellert 1980).

I used chi-squared tests of homogeneity to examine differences in frequency of responses for all survey participants by constituent category (e.g., hunter, damage recipient). Performing analyses of variance (ANOVA) on composite scores enabled me to compare attitudes

and knowledge among constituent categories. See Chapter 2 "Methods" for more procedural details.

Objective 2: To assess opinions held by VDGIF professionals about black bear management, black bear stakeholders in Virginia, and constituent involvement in wildlife management planning.

Pre- and post-planning surveys of VDGIF Wildlife Division professionals addressed Objectives 2 and 3 of this study. I surveyed VDGIF staff involved with the Black Bear Technical Committee and/or other agency duties directly related to the black bear management planning process. Procedures for design, scheduling, and analysis were similar to that for constituent surveys (Objective 1).

Specific objectives of my VDGIF surveys included:

1. Assessing VDGIF staff opinions about black bear management in Virginia,
2. Assessing VDGIF staff opinions about the input of black bear stakeholders in Virginia, and
3. Assessing VDGIF staff opinions toward general stakeholder involvement in wildlife management in Virginia.

I asked many of the same questions about black bear management and the input of black bear stakeholders to VDGIF staff and black bear stakeholders. The VDGIF staff survey also included additional questions about specific bear management options in Virginia not asked of black bear stakeholders (Appendix 3). Specific questions relating to the third survey objective above also were unique to VDGIF staff surveys. See Chapter 2 "Methods" for more procedural details.

Objective 3: To evaluate changes in knowledge, attitudes, and opinions held by key stakeholder participants as a result of their involvement in developing a statewide black bear management plan.

I evaluated the effects of participation on the knowledge, attitudes, and opinions of constituent and VDGIF staff participants using a combination of longitudinal analyses of survey responses and post-planning interviews. By administering identical surveys (Appendices 2 and 3) to the same individuals before and then after planning, I was able to examine influences of

participation (active or passive) on attitudes, opinions, and knowledge regarding black bears and their management (Cook and Campbell 1979, Hatten and Ruhland 1995, Leeming et al. 1997). "Active participation" in my study referred to the personal involvement of stakeholder advisory committee members. "Passive participation" referred to the interaction of constituent group members with their actively participating representatives on the advisory committee (mediated participation) or other means of involvement (e.g, reading, discussing with VDGIF employee).

Longitudinal analysis involved comparison of pre-planning survey responses with post-planning survey responses. I used paired *t* tests (when data were normally distributed) and Wilcoxon signed rank tests (when data were not normally distributed) to reveal differences between participant scores before and after participation. I used 1-way analyses of variance and Kruskal-Wallis tests to examine differential pre-post change by constituent group; i.e. interaction between group and pre-post difference. For each of the 3 constituent groups, I employed 2-sample *t* tests and Wilcoxon rank sum tests to determine the effect of hearing about the planning process between surveys on pre-post change. I used the Pitman-Morgan test (Morgan 1939, Pitman 1939) to assess differences in variance between pre- and post-samples. See Chapter 3 "Methods" for more procedural details.

To validate longitudinal analysis, I interviewed members of the stakeholder advisory committee individually following completion of their service (Appendix 4). Interviewees provided assessments of the planning process and offered explanations about why their attitudes may have changed throughout their involvement.

Research hypotheses

1. Active participation on the Stakeholder Advisory Committee (1) changes participants' attitudes about bears; (2) changes participants' opinions about bear management; (3) increases participants' knowledge about bears and bear management; (4) improves participants' image of VDGIF decision making for bear management; (5) changes participants' opinions about the input of other black bear stakeholders; and (6) reduces extremism in participants' knowledge, attitudes, and opinions.
2. Passive (mediated) participation of constituent group members who have representatives on the Stakeholder Advisory Committee also affects individuals as noted in 1 above.

3. Participation of VDGIF staff in the planning process (1) changes professionals' opinions about black bear management; (2) increases professionals' belief in the value of constituent involvement in wildlife decision making in Virginia; (3) changes professionals' opinions about the input of black bear stakeholders; and (4) reduces extremes in professionals' opinions.

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CHAPTER 2 - KNOWLEDGE, ATTITUDES, AND OPINIONS OF STAKEHOLDERS OF BLACK BEAR MANAGEMENT IN VIRGINIA

INTRODUCTION

Black bear management in the United States is becoming increasingly complex due to the profusion of contentious issues regarding bear hunting (Beck et al. 1994), human-bear conflicts (Decker et al. 1985), bear habitat conservation (Black Bear Conservation Committee 1992), and trade in bear parts (Garshelis 1997). Resolution of issues will require concerted efforts to understand both bears and stakeholders in bear management. Effective management provides for meaningful stakeholder participation in decision-making processes while also maintaining the important technical role of wildlife professionals in the management process (McKinney 1991, McMullin 1996). Stakeholders are more likely to make meaningful contributions to the decision-making process (and wildlife managers are more likely to be satisfied with public input) if they are well informed (McMullin and Nielsen 1991).

Numerous studies since the 1980s focused on the ecology of black bears in Virginia (Carney 1985, Hellgren and Vaughan 1989, Vaughan 1998). However, research relating to knowledge, attitudes, and opinions of black bear stakeholders in Virginia is scarce. Limited information has been obtained through an annual survey of licensed hunters in Virginia (Wright et al. 2001). Human dimensions work pertaining to black bears in Virginia (Davenport 1951, Dubrock et al. 1978) and elsewhere (Peyton 1989, ElHamzaoui et al. 1994, Grise 1994) has focused primarily on characteristics, attitudes, and perceptions of bear hunters. Surveys of visitors in Shenandoah (Baptiste 1977) and Great Smoky Mountains National Parks (Burghardt et al. 1972, Petko-Seus 1985, Hastings 1986) provided data primarily applicable to bear management in national parks. Research on stakeholder attitudes about nuisance black bear activity and management outside of national parks has been conducted almost exclusively in several northeastern (Decker et al. 1981, 1985; Jonker et al. 1998) and western states (McIvor and Conover 1994).

Throughout development of Virginia's first black bear management plan, facilitators focused on balancing public values with professional expertise. The public involvement process associated with development of the management plan provided the opportunity to assess the knowledge, attitudes, and opinions of key stakeholders of bear management. I involved a wide

variety of stakeholders in numerous opportunities for public input, including an advisory committee, focus groups, regional input meetings, surveys, and review of a draft management plan. I especially was interested in examining how stakeholder concerns might affect success of the planning process. I also wanted to assess the philosophy of VDGIF professionals regarding public involvement in the planning process.

Goals of this study included: (1) improving VDGIF bear managers' knowledge of stakeholders in the management process and (2) identification of potential problems arising from differences in public and professional opinions regarding management issues and philosophy of public involvement in management decision-making. Specific objectives included:

1. Assessment of the knowledge, attitudes, and opinions of representatives of three major groups of constituents in black bear management in Virginia;
2. Comparison of opinions expressed by VDGIF professionals and constituents about important black bear management issues such as population levels, nuisance management, and the importance of considering input from various bear stakeholders; and
3. Examination of VDGIF professionals' opinions about the relative roles of professionals and constituents in developing goals, objectives, and strategies and evaluating progress toward goals for black bear management in Virginia.

METHODS

Questionnaire administration

During spring 2000, I designed 2 different questionnaires to investigate key issues in the management of black bears in Virginia (Appendices 2 and 3). I identified issues through discussions with bear researchers and managers in Virginia and a series of focus groups with hunters, people with nonconsumptive interests in bears, people who had experienced agricultural or residential damage from bears and representatives of government agencies other than VDGIF that were involved in bear management in Virginia. One questionnaire assessed knowledge, attitudes, and opinions of external constituents, whereas the other assessed opinions of VDGIF professionals.

I mailed a self-administered questionnaire to each VDGIF Wildlife Division biologist and manager with bear management responsibilities (N = 22), to all members of the Virginia Bear Hunters Association (Bear Hunters, N = 459) and the Virginia State Beekeepers Association

(Beekeepers, $N = 442$), and to a random sample of the Virginia Chapter of The Nature Conservancy (TNC; $N = 500$). These organizations were not intended to represent all constituents in Virginia, but were chosen to illustrate 3 different perspectives important to black bear managers in Virginia – those of bear hunters, agricultural producers, and general environmental interests. Although the Bear Hunters hunted almost exclusively with hounds and, therefore, had substantially different interests from bow hunters and rifle hunters, they nevertheless had more in common with other hunters than they did with agricultural producers or general environmental interests. Beekeepers were one of several agricultural constituent groups concerned about black bear damage, and TNC members were one of several constituent groups with broad interests in biodiversity and the environment. Limited financial and personnel resources precluded sampling of all stakeholders groups; however, these 3 groups captured the spectrum of broad interests represented on the Stakeholder Advisory Committee that assisted VDGIF in development of the statewide black bear management plan. Using a modification of Dillman's (1978) Total Design Method, I sent a postcard reminder and up to 2 follow-up mailings to constituents who had not responded to previous mailings.

Data analysis

Data assumptions. – I used both parametric tests and their nonparametric analogs to evaluate location differences when data were not normal. Both types of tests provided similar p-values and led to identical decisions to reject or fail to reject null hypotheses at $= 0.05$ in all cases. Large, homogenous samples and robust parametric methods led to consistent results even with departures from normality. I present statistics only from parametric tests to avoid redundancy.

Analysis of constituent knowledge about bears. – Constituent questionnaires contained 15 multiple-choice questions designed to assess respondents' knowledge of black bear ecology and management in Virginia (Appendix 2). Questions pertained to basic life history of black bears (size, diet, reproduction, home range, denning ecology, potential population growth) and specific bear management issues in Virginia (bear attacks, population trends and distribution, harvest allocation, nuisance complaints). The number of survey items answered correctly served as a knowledge score for each survey respondent. I counted responses marked "Not Sure" as incorrect. I used 2-way analyses of variance (ANOVA) followed by Tukey's pair-wise

comparisons to examine differences in mean knowledge scores among the 3 organizations. I tested for differences in knowledge scores between those respondents who had versus had not: (a) hunted any species of game or (b) attempted to observe or photograph a wild black bear in Virginia during 1996-2000. I tested for interactions between organization and the effect of hunting any game or observing bears.

I used a ^{2} test for homogeneity to assess: (a) respondents' primary sources of information about black bears, and (b) frequencies of responses about information sources for members who scored below versus above the mean on the knowledge test for their particular organization. If > 20% of cells in any given ^{2} contingency table had expected frequencies < 5, I collapsed categories with low frequencies and performed a new test. Collapsing categories changed the degrees of freedom for tests and led to variable degrees of freedom for ^{2} tests throughout the analysis.

Analysis of constituent attitudes about bears. – I adapted 5 of Kellert's (1980) attitude types about animals to black bears:

1. *Ecologistic.* Interest for black bears as components of populations and ecosystems
2. *Humanistic.* Interest and concern for the welfare of individual bears
3. *Moralistic.* Ethical concern about any form of exploitation of bears
4. *Negativistic.* Feeling of dislike or fear of bears
5. *Utilitarian.* Interest in material use of bears or bear habitat

I chose to assess only 5 of Kellert's (1980) attitude scales for 2 reasons. First, I chose a subset of Kellert's attitude scales because of my concern for length of the questionnaire. Second, I chose these attitude scales because focus group discussions suggested that if the constituent groups differed in their attitudes, the differences most likely would be manifested in these scales. Based on focus group discussions, I assumed that Bear Hunters likely would exhibit strong orientation toward the utilitarian and ecologistic scales and weak orientation toward the moralistic and negativistic scales. I assumed that Beekeepers would exhibit strong orientation toward the utilitarian scale, and perhaps the negativistic scale, and weak orientation toward the moralistic and humanistic scales. I assumed that TNC members would exhibit strong orientation toward the ecologistic and the humanistic scales and weak orientation toward the utilitarian scale.

Following Kellert's (1980) approach, I coded responses marked "strongly agree" with a 2, "somewhat agree" with a 1, and responses marked "neutral," "somewhat disagree," and "strongly disagree" with a 0. I reversed scoring for items in which disagreement, rather than agreement, corresponded with a particular attitude. I summed codes from 3 survey items pertaining to each of 5 attitude types to create an attitude score (Appendix 2). Thus, 15 Likert-scale items were converted into 5 separate attitude scores per respondent, with values ranging from 0 to 6. I excluded attitude data for individuals (n = 6) who left any of the 15 questions blank so as not to confound the summed scores.

For each of the 5 attitude types, I used a 2-way analysis of variance (ANOVA) F-test followed by Tukey's pair-wise comparisons to examine differences among the 3 organizations. I tested for differences in attitude scores for those respondents who had above versus below average knowledge scores for their organization or had versus had not hunted any species of game in Virginia within 5 years of receiving the survey. My design allowed me to test for interactions between organization and either effect of knowledge level or hunting on attitudes. I used a Student's t-test to examine differences in attitudes between Beekeepers who had versus had not experienced bear damage within 5 years of receiving the survey.

Analysis of constituent opinions about bear management. – I used a ^{2} test for homogeneity to detect differences among the 3 organizations for responses to each Likert-scaled item on the questionnaire that addressed constituent opinions about important black bear management issues or VDGIF management and decision-making. I excluded the "no opinion" category for all tests except those that addressed VDGIF management and decision-making (Table 2.3). If > 20% of cells in any given ^{2} contingency table had expected frequencies < 5, I collapsed categories with low frequencies and performed a new test. Collapsing categories changed the degrees of freedom for tests and led to variable degrees of freedom for ^{2} tests throughout the analysis.

Analysis of VDGIF professional opinions. – I sampled the entire population (n = 22) of VDGIF professionals who had some responsibility for management of black bears; therefore, I present data from their survey without statistical comparisons. An exception was the comparison of VDGIF respondents' opinions of the current roles of stakeholders in making decisions for black bear management and the roles that professionals thought stakeholders should have in making decisions. For this analysis, I computed mean responses to a series of Likert-scaled

survey items and examined differences between scores corresponding to current and normative roles using paired t-tests.

Interpretation using qualitative results. – I used transcripts from 5 focus groups, written comments provided by survey respondents, summaries from 5 regional input meetings, and Stakeholder Advisory Committee meeting notes to help interpret survey results. During December 1999 and January 2000, I conducted focus group interviews with (1) personnel from other agencies besides VDGIF with interests in black bear management, (2) individuals who had experienced problems associated with bears, (3) individuals with primarily nonconsumptive interests in bears, (4) bear hunters who used dogs, and (5) bear hunters who did not use dogs (Appendix 1). Focus group results were instrumental in both designing questionnaires and interpreting results.

RESULTS

Nonresponse bias

Effective response rates (useable returns, excluding undeliverable questionnaires) were 100% (n = 22) for VDGIF professionals and 60.6% (n = 302), 75.5% (n = 326), and 61.0% (n = 261) for TNC, Beekeepers, and Bear Hunters, respectively. The response rate for Beekeepers exceeded the 65% threshold of concern for nonresponse bias identified by Dolsen and Machlis (1991), but responses rates for Bear Hunters and TNC fell slightly below that threshold. Given the high percentage of no opinion or neutral responses by TNC respondents, I assumed that nonrespondents from TNC had little interest or knowledge of black bears or their management and likely would have increased the incidence of no opinion or neutral responses. I did not assess nonresponse bias among Bear Hunters for several reasons: (1) both Virginia Tech researchers and VDGIF personnel had frequent contact with members of the organization and felt confident that they understood its members well, (2) leaders of the organization had assisted in notifying members about the survey and had encouraged members to respond, and (3) mine was the third survey of the membership in 4 years, so I was concerned that aggressive follow-up with nonrespondents would alienate members who, heretofore, had strongly supported all research efforts related to black bears.

Constituent knowledge

Mean knowledge scores for TNC, Beekeepers, and Bear Hunters were 4.1 (SE = 0.2, n = 295), 5.7 (SE = 0.2, n = 317), and 10.6 (SE = 0.1, n = 259), respectively ($F_{2,865}$ = 146.6, P < 0.001). All 3 means differed according to Tukey's pair-wise comparisons (P < 0.05). More members of TNC (61%) and Beekeepers (47%) chose "Not Sure" for any given knowledge question than did Bear Hunters (11%).

Bear Hunters relied more on personal experience or observation as sources of information about black bears than did Beekeepers and TNC members, both of whom relied more on literature and television ($_{14}^2$ = 448.4, P < 0.001; Table 2.1). Beekeepers, and especially TNC members, frequently added written comments on the questionnaire that their lack of knowledge of black bears resulted from little exposure to them. This is probably true of the public at large, as previous studies have reported that the public lacks even basic knowledge about black bear ecology (Burghardt et al. 1972, LeCount and Baldwin 1986). Among members of all 3 organizations, greater knowledge about bear ecology and management in Virginia (assessed by the surveys) was associated with reliance on personal experience/observation and literature sources, whereas lower knowledge was associated with reliance on television and friends or family. Beekeepers with above-average knowledge for their organization (n = 153) reported greater use (29.4% vs. 16.7%) of popular publications and less use of television (26.1% vs. 38.9%) and friends or family (8.5% vs. 18.3%) compared to members (n = 126) with low knowledge scores ($_5^2$ = 16.6, P = 0.005). I found no significant differences between TNC members or Bear Hunters with above or below average knowledge scores.

Knowledge scores for survey respondents in all 3 organizations who attempted to observe or photograph black bears in Virginia during 1996-2000 ($\bar{\mathbf{x}}$ = 9.3, SE = 0.2; n = 310) were higher than scores for those who did not ($\bar{\mathbf{x}}$ = 5.1, SE = 0.2; n = 561) ($F_{2,865}$ = 22.8, P < 0.001). Likewise, members of TNC and Beekeepers who reported that they had hunted any species of game in Virginia during 1996-2000 had higher knowledge scores ($\bar{\mathbf{x}}$ = 7.2, SE = 0.3;n = 152) than nonhunting members ($\bar{\mathbf{x}}$ = 4.2, SE = 0.2; n = 465) ($F_{1,613}$ = 56.7, P < 0.001). Because > 99% of the Bear Hunters hunted in Virginia during the period in question, I did not compare knowledge scores within this group. There were no significant interactions between organization and either observing bears (P = 0.40) or hunting game in Virginia (P = 0.72).

Constituent attitudes about bears

Mean scores for each of the 5 attitude scales examined differed among the 3 organizations (Table 2.2). For all 5 tests, $F_{2,877} \geq 27.9$ and $P < 0.001$. As expected, members of TNC exhibited stronger orientation toward the humanistic and ecologistic scales and weaker orientation toward the utilitarian scale than Beekeepers and especially Bear Hunters. Beekeepers exhibited weaker orientations toward the ecologistic and humanistic scales than the other 2 groups and a weak orientation toward the utilitarian scale. Of the 3 groups, Bear Hunters exhibited the weakest orientation toward the negativistic and moralistic scales, and the strongest orientation toward the utilitarian scale.

Respondents' knowledge of bear ecology and management in Virginia affected their attitudes toward bears. Overall, survey respondents who demonstrated above average knowledge of bears for their organization (n = 454) exhibited stronger orientations toward the ecologistic ($\bar{x}$ = 3.6, SE = 0.1 vs. $\bar{x}$ = 3.0, SE = 0.1, $F_{1,877}$ = 18.2, $P < 0.001$) and utilitarian ($\bar{x}$ = 1.9, SE = 0.1 vs. $\bar{x}$ = 1.4, SE = 0.1, $F_{1,877}$ = 11.1, $P < 0.001$) scales, and weaker orientation toward the negativistic scale ($\bar{x}$ = 0.6, SE = 0.1 vs. $\bar{x}$ = 0.9, SE = 0.1, $F_{1,877}$ = 7.9, P = 0.005) than respondents with below average knowledge (n = 429). These differences were most notable among Beekeepers. Attitude differences between Bear Hunters with high and low knowledge were not significant. Among TNC members, only ecologistic scores were significantly higher for high knowledge scorers ($\bar{x}$ = 3.8, SE = 0.1 vs. $\bar{x}$ = 3.3, SE = 0.1, $F_{1,296}$ = 6.34, P = 0.01).

Experience with hunting game and bear damage also appeared to influence respondents' attitudes about bears. Members of TNC and Beekeepers who had hunted in Virginia during 1996-2000 (n = 155) exhibited stronger utilitarian orientation ($\bar{x}$ = 2.4, SE = 0.2 vs. $\bar{x}$ = 1.0, SE = 0.1, $F_{1,614}$ = 55.1, $P < 0.001$), weaker moralistic orientation ($\bar{x}$ = 0.8, SE = 0.1 vs. $\bar{x}$ = 2.1, SE = 0.1, $F_{1,614}$ = 31.4, $P < 0.001$), and weaker negativistic orientation ($\bar{x}$ = 0.7, SE = 0.1 vs. $\bar{x}$ = 1.1, SE = 0.1, $F_{1,614}$ = 9.01, P = 0.003) than were those who had not hunted (n = 463). There were no significant interactions between organization and hunting ($P > 0.05$). Approximately 16% of Beekeepers reported experiencing damage from black bears during 1996-2000. Beekeepers who had experienced damage (n = 52) exhibited stronger utilitarian ($\bar{x}$ = 2.6, SE = 0.2 vs. $\bar{x}$ = 1.8, SE = 0.1, t_{76} = 3.7, $P < 0.001$) and negativistic orientations ($\bar{x}$ = 1.5, SE = 0.2 vs. $\bar{x}$ = 1.0, SE = 0.1, t_{65} = 2.1, P = 0.039), and weaker moralistic orientation ($\bar{x}$ = 0.7, SE = 0.2 vs. $\bar{x}$ = 1.2, SE = 0.1, t_{82} = 2.4, P = 0.018) than were those who had not experienced damage (n = 267).

Constituent opinions about VDGIF bear management and decision making

Eighty-four percent of Bear Hunters agreed that VDGIF is managing bears well, whereas 80% of TNC members and 55% of Beekeepers were neutral or expressed no opinion about how well VDGIF manages bears ($_{10}^2$ = 362.8, $P < 0.001$; Table 2.3). Among those who expressed an opinion, Beekeepers were 2.5 times more likely to agree than disagree and TNC members were 9 times more likely to agree than disagree that VDGIF manages bears well. A majority of TNC members and Beekeepers were neutral or expressed no opinion, whereas 83% of Bear Hunters agreed that VDGIF adequately considers bear biology ($_{10}^2$ = 291.3, $P < 0.001$). Members of TNC who expressed an opinion were nearly 12 times more likely to agree than disagree and Beekeepers were more than 4 times more likely to agree than disagree that VDGIF adequately considers bear biology in making management decisions. Sixty-seven percent of Bear Hunters agreed that VDGIF fairly considers concerns of all interested parties when making bear management decisions, whereas 65% of TNC members and 45% of Beekeepers were neutral or expressed no opinion ($_{10}^2$ = 270.4, $P < 0.001$; Table 2.3).

Prior contact with VDGIF personnel may have influenced respondents' opinions about how well the agency manages bears. Members of TNC and Bear Hunters who reported contact with VDGIF personnel during 1996-2000 agreed more frequently (33.3% vs. 13.8%, 86.7% vs. 62.0%, respectively) that the agency manages bears well and expressed no opinion less frequently (41.3% vs. 69.2%, 0.4% vs. 10.3%, respectively) than their counterparts who lacked prior contact ($_2^2$ = 20.2, $P < 0.001$ and $_2^2$ = 16.5, $P < 0.001$, respectively). Beekeepers who reported prior contact also expressed no opinion less frequently (29.0 vs. 40.6%), but disagreed more frequently (18.9% vs. 7.3%) than those without prior contact that VDGIF manages bears well ($_5^2$ = 11.4, $P = 0.05$). I observed similar relationships between prior contact and respondents' attitudes about how well VDGIF considers both bear biology and stakeholder concerns in bear management decisions.

Means and amount of contact with VDGIF personnel during 1996-2000 differed among the 3 organizations ($_{16}^2$ = 421.4, $P < 0.001$; Table 2.4). Seventy-two percent of TNC members and 43% of Beekeepers, but only 11% of Bear Hunters, reported having no contact with VDGIF. Beekeepers and Bear Hunters interacted with VDGIF personnel chiefly though public or organizational meetings.

Constituent and professional opinions about bear management issues

Members of the 3 constituent groups and VDGIF professionals differed in their opinions about increasing or decreasing bear populations, assisting landowners who experience bear damage, using lethal methods to control problem bears, and considering input from different parties interested in bear management. Constituents differed markedly in their opinions about bear hunting in Virginia.

Bear Hunters overwhelmingly supported an increase in black bear populations in all areas of Virginia that biologically are suitable. Although Beekeepers (of whom 16% sustained damage from bears) were less supportive of an increase in bear populations than other constituent groups, ($_8^2$ = 294.4, $P < 0.001$; Table 2.5), more members of this group agreed than disagreed that bear populations should be increased. Unlike the constituent groups, more VDGIF professionals disagreed than agreed that bear populations should be increased. Both VDGIF professionals and TNC members expressed mixed opinions about whether to decrease bear populations in all areas of Virginia where conflict with humans is common. Beekeepers were most supportive of a decrease in bear populations, whereas Bear Hunters showed most opposition ($_8^2$ = 117.9, $P <$ 0.001; Table 2.5).

More than 60% of Beekeepers and Bear Hunters and nearly two-thirds of TNC members who expressed an opinion supported compensating agricultural producers for black bear damage ($_{10}^2$ = 107.4, $P < 0.001$; Table 2.6). Eighty-seven percent (n = 52) of Beekeepers who had sustained bear damage during 1996-2000 agreed that producers should be compensated for losses due to bears versus 63% (n = 265) of those who had not sustained damage ($_4^2$ = 22.9, $P <$ 0.001). None of the VDGIF professionals believed that agricultural producers should be compensated for bear damage. Majorities (> 80%) of all 3 constituent groups agreed that VDGIF should provide free trapping services to remove black bears causing damage to agricultural or residential property. The VDGIF professionals were less supportive of providing free trapping services for bear damage (Table 2.6), probably reflecting the agency's current policy of managing bear problems in place (e.g., aversive conditioning) rather than moving offending animals.

Four scenarios for using lethal methods to manage bear problems elicited divergent responses from the 3 constituent groups and professionals (Table 2.7). Constituents and VDGIF

professionals strongly supported use of lethal methods when bears jeopardize human safety; TNC members and Bear Hunters tended to be less supportive than Beekeepers or VDGIF professionals ($_8^2$ = 62.7, $P < 0.001$). A plurality of TNC members and Bear Hunters agreed, but a majority of Beekeepers disagreed, that lethal methods should never be used to control agricultural damage ($_8^2$ = 95.0, $P < 0.001$). A majority of all 3 constituent groups disagreed that lethal methods should be used to control agricultural damage regardless of whether nonlethal methods have been tried. Beekeepers were more likely to support use of lethal methods regardless of previous attempts to abate damage ($_8^2$ = 84.5, P < 0.001). A majority of VDGIF respondents also indicated that they believed lethal methods should sometimes be used and that lethal methods should be used only after prior attempts to abate damage. Members of all 3 constituent groups concurred with the conditional use of lethal methods ($_8^2$ = 13.9, $P = 0.085$; Table 2.7).

Opinions about black bear hunting in Virginia varied considerably among the 3 constituent groups (Table 2.8). Members of TNC showed less support for bear hunting in general than Beekeepers and Bear Hunters ($_{10}^2$ = 445.4, $P < 0.001$). Members of TNC strongly opposed the use of dogs to hunt bears, Beekeepers were split evenly and, all Bear Hunters (who belonged to a hound hunting association) supported the use of dogs ($_{10}^2$ = 599.3, $P < 0.001$). Bear Hunters were split nearly evenly on bow hunting for bears, Beekeepers supported the method, and TNC members opposed it ($_{10}^2$ = 77.0, $P < 0.001$; Table 2.8).

Bear Hunters and VDGIF professionals placed great importance on considering input from all stakeholders in bear management, whereas TNC members and Beekeepers placed less importance on input from hunters than other stakeholders (Table 2.9). All constituents, but especially TNC members, placed great importance on input of people primarily concerned with preserving bears and their habitat ($_8^2$= 71.3, $P < 0.001$). Similarly, all constituents, but especially Beekeepers, placed great importance on input of people who experience bear damage ($_8^2$ = 102.1, $P < 0.001$). Bear Hunters placed most importance on input from Bear Hunters who use dogs, but they also considered the input of other hunters important. In contrast, TNC members and Beekeepers placed less importance on input from hunters who do not use dogs ($_8^2$ = 122.0, $P < 0.001$), and even less importance on the input of those who do ($_8^2$ = 521.6, $P < 0.001$; Table 2.9).

Opinions of professionals about their role and constituents' role in decision making

Professionals in the VDGIF indicated that constituents should have greater influence in making all types of decisions that affect bear management than they currently do, particularly in setting goals for management ($P \leq 0.003$ for all 5 tests; Figure 1). Professionals indicated that constituent opinions should weigh equally or slightly more than professional opinions in setting goals, but that professional opinion should outweigh public opinion in developing objectives, developing and selecting specific strategies, and evaluating progress toward goals for bear management. For all 5 types of decisions, VDGIF respondents indicated that current decision-making processes rely almost entirely upon professional opinions.

DISCUSSION

As expected, members of the three diverse constituent groups I surveyed differed in their knowledge and attitudes toward black bears and their knowledge and opinions regarding management of black bears. Differences among the constituent groups met my expectations, corroborating the value of the focus groups I conducted at the beginning of the planning process for the design and interpretation of surveys (Minnis et al. 1997, Duda et al. 1998).

Among my most significant findings were TNC members' lack of knowledge about black bears and lack of awareness about VDGIF management efforts. Members of TNC's Virginia Chapter may be knowledgeable of general ecological principles, but apparently they are not well informed about the ecology of black bears. Lack of TNC members' awareness of VDGIF management efforts is consistent with their lack of interest in or disapproval of hunting and with other opinions they expressed in the survey.

My research has provided an attitudinal profile for 3 key constituent groups interested in bear management (Table 2.2). Respondents' scores on ecologistic and humanistic attitude scales probably reflected their appreciation for bears, bear habitats, and bear populations. Bear Hunters and members of TNC scored higher on these 2 scales than did Beekeepers. High ecologistic scores for Bear Hunters lends credence to others' findings that bear hunters' interest in bears goes beyond consumptive or recreational use of the resource (Davenport 1951, Beck et al. 1994, Grise 1994). Beekeepers and TNC members demonstrated stronger orientation toward the negativistic attitude scale, but the focus groups and written comments suggested different

reasons for the negativistic attitudes. Beekeepers disliked bears because of the damage they caused to bee yards, whereas TNC members expressed more fear than dislike of bears.

The stronger moralistic attitudes of TNC respondents may reflect their disapproval of bear hunting in Virginia. Given that 2 of the 3 survey items used to assess the utilitarian attitude involved bear hunting, it is no surprise that TNC respondents, < 10% of whom hunted, had much lower utilitarian scores than either Beekeepers or Bear Hunters. Kellert (1978) suggested that one of the 3 chief reasons people hunt is to obtain meat, a utilitarian orientation inherent in Bear Hunters' relatively high scores on this scale. Over 39% of Beekeepers indicated that they hunted some game species in Virginia during 1996-2000, which, combined with their concern for economic loss due to bears, led to moderate utilitarian scores. Not surprisingly, Beekeepers who reported damage due to bears exhibited stronger utilitarian and negativistic orientations, and weaker moralistic orientations, findings that are similar to other studies of agricultural producers (Peyton and Langenau 1985).

The relatively high knowledge about black bear ecology and management in Virginia demonstrated by Bear Hunters may relate to their exposure to and interest in black bears. Dubrock et al. (1978) noted that members of the Virginia Bear Hunters Association were more familiar with bear management than were other hunters. Bear Hunters, especially those who use hounds and belong to bear-hunting organizations, place considerable importance on their quarry and their sport (Davenport 1951, Grise 1994). Surveys of visitors to Great Smoky Mountains National Park suggested that hunters had more knowledge about bears and other game animals, but knew no more about a variety of other wildlife species in the park than nonhunting participants (Burghardt et al. 1972, Hastings 1986). Previous studies have reported that the public lacks even basic knowledge about black bear ecology (Burghardt et al. 1972, LeCount and Baldwin 1986).

Knowledge of bears appeared to be related to the source of learning. Survey results suggest that those constituents who rely on personal experience (e.g., hunting any game or attempting to observe/photograph bears) and literature may gain more knowledge about black bears than those who learn from television or friends and family. Perhaps wildlife-related activities are as much a catalyst to learn about bears through other means as an educational experience in and of themselves (e.g., Bear Hunters frequently collaborated with VDGIF and Virginia Tech bear researchers).

If managers are interested in raising the ecologistic orientation of citizens, education may be key. The literature supports my findings that knowledge about bears relates inversely to negativistic attitudes and positively to ecologistic attitudes. Decker et al. (1981, 1985) found that landowners in New York who had greater experience with or knowledge about native black bears tended to have greater tolerance for bears and a greater desire for larger bear populations. Burghardt et al. (1972) found that visitors to the Great Smoky Mountains National Park who were most knowledgeable about black bear ecology were most likely to desire a large wild population in the park and least likely to suggest caging problem bears.

A majority of surveyed constituents, regional input meeting participants, and focus group participants in my study desired larger bear populations in suitable habitats across Virginia. However, members of the Stakeholder Advisory Committee – which included bear proponents as well as agricultural producers – and VDGIF professionals took a more moderate stance. The VDGIF professionals did not support across-the-board increases in bear populations because of the likelihood that bear damage and other concerns may escalate. Of constituents I surveyed, Bear Hunters presumably would gain the most from increased bear populations (through enhanced recreation), whereas Beekeepers had the most to lose (potential damage to hives).

The VDGIF professionals, along with participants in focus groups and the advisory committee, were more aware of constraints on assisting landowners with bear damage than were constituent survey respondents. Focus group participants who had experienced bear problems preferred resolution of bear problems to compensation for the damage bears caused – a sentiment documented in other states (McIvor and Conover 1994, Wagner et al. 1997). Stakeholder advisory committee members, after learning about the expense, lack of suitable release areas, and other problems associated with trapping and relocating problem bears, encouraged managers to manage bear problems where they occur (e.g., fence bee hives, conduct aversive conditioning of bears) rather than trap and relocate offending animals. Further research is needed to determine if known or perceived problems associated with compensation programs (Hyngstrom and Hauge 1989) and bear relocation (Fies et al. 1987, Comley 1993) led VDGIF professionals to show less support for those methods than constituent survey respondents.

Natural resource professionals and the public nationwide agree that lethal measures should be used to control problem bears only as a last resort (Baptiste et al. 1979, Robinson et al. 1993, McIvor and Conover 1994). Constituents and professionals in Virginia supported use of

lethal methods when bears jeopardize human safety or when nonlethal methods are not effective in controlling agricultural damage from bears. However, nearly 20% of respondents from both TNC and Bear Hunters opposed use of lethal measures when bears jeopardize human safety. In the case of TNC members, this may testify to the charismatic appeal of the species (Rolston 1987, McMullin et al. 2000). Bear Hunters likely were motivated by more utilitarian reasons (i.e., reducing the number of bears available for hunters). Responses of Beekeepers and VDGIF professionals suggested that they were more likely to support a flexible approach to the use of lethal measures than were either TNC members or Bear Hunters. Regional meeting participants and Stakeholder Advisory Committee members were reluctant to tie managers' hands with the caveat that nonlethal methods must always be tried before lethal ones. However, most constituents involved in the bear planning process in Virginia clearly preferred nonlethal approaches if they are feasible for addressing problems with bears.

Throughout the planning process in Virginia, hunting has been one of the most central, yet divisive, issues. My surveys and qualitative investigations corroborated the volatility of dog hunting issues documented elsewhere in the United States (Bissell 1993, Beck et al. 1994, Loker and Decker 1995, Peyton 1998). Bear hunting is as controversial among hunters as between hunters and nonhunters (Dubrock et al. 1978, Peyton 1989). Bear Hunters indicated, in this survey and during focus groups, that the only means of bear hunting they fully support is the use of dogs (remember that I sampled an organization of hound hunters). Through focus groups, I found that hunters who use bows or otherwise hunt bears without dogs in Virginia are opposed largely to hunting bears with dogs, a finding that is consistent with previous research (Dubrock et al. 1978, Wright et al. 2001).

Surveyed constituents placed most importance on input from people most like themselves, whereas VDGIF respondents considered the input of all parties important in bear management decisions. The TNC members placed most importance on input of those with concerns about preserving bears and their habitats, Beekeepers placed most importance on agricultural producers' input, and Bear Hunters placed most importance on input of Bear Hunters who use dogs. That TNC members and Beekeepers placed little value on input from Bear Hunters, a segment with traditionally the most interest in bear management, is significant for several reasons. It may demonstrate that constituents translate their like or dislike of a stakeholder's activities (e.g., hunting with dogs) to the value of that stakeholder's input. Second,

constituent groups develop their opinions about others in relative isolation, whereas VDGIF professionals interact with diverse groups regularly. Recognition that polar interests can be legitimate often comes through personal interaction (Ritter 1967, Landre and Knuth 1993), as evidenced during my Stakeholder Advisory Committee discussions.

The VDGIF's image relative to bear management apparently depends on constituents' awareness of the agency, particularly their prior interaction with VDGIF personnel (Landre and Knuth 1993, Stout et al. 1996). Bear Hunters interacted more with agency personnel and expressed greater approval for VDGIF bear management than did either TNC members or Beekeepers. In comments written on the questionnaire, many TNC members and Beekeepers noted that they were not familiar enough with VDGIF to evaluate its bear management and decision-making; however, those who gave an opinion generally were satisfied. Interactions between Beekeepers and VDGIF personnel frequently occur under negative circumstances (e.g., agency responses to bear damage complaints). Lower approval of VDGIF bear management by Beekeepers with prior contact may reflect their unhappiness with agency personnel's responses to their problems or frustrations with bear damage rather than the agency's management.

Studies of effectively managed agencies show that one of the reasons they enjoy strong public support is that they balance public concerns and scientific management of resources well (McMullin 1993). For my survey of VDGIF professionals, I defined setting goals as the process of determining broad general directions for management programs (e.g., increasing the distribution of bears in Virginia). Thus, setting goals requires little technical expertise and should reflect a balance of stakeholder values, in my opinion. On the other hand, setting specific, measurable objectives (e.g., maintaining a population density of 1 bear per 100 hectares) and developing strategies to attain those objectives frequently requires technical expertise. I believe that professionals should have greater involvement in making those decisions. Selecting strategies often is contentious because professionals traditionally have adopted a "we are the experts, so we should make the decisions" attitude, whereas constituents increasingly have come to expect a major role in making decisions. Professionals must recognize that more than one "right" answer often exists, and avoid personal investment in a single strategy. Evaluating progress toward goals requires both professional and public input. Evaluation nearly always involves both technical measures of progress (e.g., % reduction in

nuisance complaints) and assessment of public satisfaction with progress (e.g., % of producers who are satisfied with the way VDGIF has handled their problems).

The VDGIF survey respondents' believed that constituents should have a larger role in making all types of bear management decisions. Conversely, VDGIF professionals believed they rely too much on professional expertise in making decisions about bear management. The difference was most pronounced for setting goals, suggesting that, although VDGIF professionals recognize the need for greatest public involvement in goal setting, they are not accomplishing it effectively. This difficulty is not unique to the VDGIF, but is a common problem among fish and wildlife management agencies (McMullin 1996).

Wildlife managers in Virginia are aware of the need to reach out more effectively to stakeholders and involve them in decision-making processes, but they still have much work to do. The agency appears to be effective in reaching out to traditional stakeholders (hunters), who were both knowledgeable and supportive of the agency and its management efforts. Members of TNC knew little about bears and the agency, and were relatively ecologistic. Environmental interest groups like TNC and Audubon Society have become more active in decision-making processes for wildlife management in Virginia. Because members who knew enough about the agency to express an opinion in my survey tended to be supportive, it behooves the agency to reach out more effectively to groups that may be welcome allies in contentious processes once they become informed. Inviting these groups to participate in decision-making processes is a good first step, but wildlife managers will need to determine how the knowledge gained by participation can be transferred to the membership at large.

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Table 2.1. Primary sources of information about black bears, as indicated by respondents to a survey conducted in Virginia during 2000.

	Respondents by group[a] (%)		
Primary Source of Information	TNC (*n* = 257)	Beekeepers (*n* = 279)	Bear Hunters (*n* = 244)
Personal experience or observation	4.7	10.0	71.7
Books	7.0	7.5	2.5
Magazines/popular literature	45.1	23.7	2.5
Technical publications	2.7	2.5	0.4
Television	26.8	31.9	1.2
Friends or family	4.7	12.9	9.8
Bear researchers or scientists	3.1	4.3	9.0
Other	5.8	7.2	2.9

[a]TNC = The Nature Conservancy, Beekeepers = Virginia State Beekeepers Association, Bear Hunters = Virginia Bear Hunters Association

Table 2.2. Mean attitude scores (0 = no expression of an attitude to 6 = max. expression of an attitude) and associated standard errors for respondents to a survey conducted about black bears in Virginia during 2000.

		Attitude Score[a]									
		Ecologistic		Humanistic		Moralistic		Negativistic		Utilitarian	
Group[b]	n	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
TNC	298	3.5A[c]	0.1	2.6	0.1	2.4	0.1	0.9B	0.1	0.8	0.1
Beekeepers	325	2.7	0.1	1.8	0.1	1.2	0.1	1.1B	0.1	1.9	0.1
Bear Hunters	260	3.8A	0.1	2.3	0.1	0.4	0.1	0.3	0.0	2.4	0.1

[a]Modified after Kellert (1980); see Appendix 2 for which survey items were used to assess each attitude.

[b]TNC = The Nature Conservancy, Beekeepers = Virginia State Beekeepers Association, Bear Hunters = Virginia Bear Hunters Association

[c]Means with the same letters in the same column were not different ($P > 0.05$) according to Tukey's pair wise comparison.

Table 2.3. Survey respondents' opinions during 2000 about black bear management and decision-making by the Virginia Department of Game and Inland Fisheries (VDGIF).

Issue	Group[a]	n	Frequency of Opinion[b] (%)					
			SA	A	N	D	SD	NO
Manages Well[c]	TNC	289	3.8	14.9	17.3	1.0	0.7	62.3
	Beekeepers	321	9.0	23.1	19.0	8.7	4.4	35.8
	Bear Hunters	259	38.6	45.6	5.0	6.2	3.1	1.5
Considers Biology[d]	TNC	290	7.6	15.9	13.4	1.7	0.3	61.0
	Beekeepers	323	12.4	23.8	19.2	6.2	1.5	36.8
	Bear Hunters	260	33.8	49.2	6.9	5.4	3.1	1.5
Considers Concerns[e]	TNC	290	6.2	13.8	15.5	4.1	0.3	60.0
	Beekeepers	323	9.3	28.8	16.1	11.1	6.2	28.5
	Bear Hunters	260	25.4	41.2	8.8	14.2	8.1	2.3

[a]TNC = The Nature Conservancy, Beekeepers = Virginia State Beekeepers Association, Bear Hunters = Virginia Bear Hunters Association

[b]SA = strongly agree, A = somewhat agree, N = neutral, D = somewhat disagree, SD = strongly disagree, NO = no opinion

[c]VDGIF manages black bears well

[d]VDGIF adequately considers bear biology when making management decisions

[e]VDGIF fairly considers concerns of all interested parties when making management decisions

Table 2.4. Methods of contact with Virginia Department of Game and Inland Fisheries (VDGIF) personnel during 1996-2000, as reported by respondents to a survey conducted in Virginia during 2000.

	Respondents (%) by Group[a]		
Methods of contact with VDGIF personnel	TNC (*n* = 302)	Beekeepers (*n* = 326)	Bear Hunters (*n* = 261)
Public meeting held by VDGIF	3.6[b]	7.1	39.5
VDGIF office	2.6	5.2	9.6
Club or organizational meeting	5.6	28.5	68.6
Show or exposition	10.9	13.8	19.2
Phone conversation	6.6	12.9	25.3
Visit by VDGIF to home or property	1.7	9.2	8.4
Work with on a professional basis	3.0	8.9	12.3
Other	5.6	7.7	11.9
No contact	71.9	42.9	11.1

[a]TNC = The Nature Conservancy, Beekeepers = Virginia State Beekeepers Association, Bear Hunters = Virginia Bear Hunters Association

[b]Percentages, based on all returned surveys, will not add to 100 due to multiple responses.

Table 2.5. Opinions about black bear population status in Virginia, as reported by respondents to surveys conducted in Virginia during 2000.

Issue	Group[a]	n	Frequency of Opinion[b] (%)					
			SA	A	N	D	SD	NO
Increase[c]	TNC	298	22.5	30.2	22.8	7.0	6.0	11.4
	Beekeepers	324	19.4	27.8	14.8	15.1	15.7	7.1
	Bear Hunters	257	80.5	15.2	3.1	0.8	0.0	0.4
	VDGIF	22	13.6	18.2	18.2	27.3	22.7	0.0
Decrease[d]	TNC	295	8.1	28.5	14.9	20.7	19.7	8.1
	Beekeepers	324	21.9	26.9	14.2	16.4	15.7	4.9
	Bear Hunters	260	5.0	16.5	11.5	17.3	49.2	0.4
	VDGIF	22	9.1	31.8	13.6	22.7	22.7	0.0

[a]TNC = The Nature Conservancy, Beekeepers = Virginia State Beekeepers Association, Bear Hunters = Virginia Bear Hunters Association, VDGIF = Virginia Department of Game and Inland Fisheries

[b]SA = strongly agree, A = somewhat agree, N = neutral, D = somewhat disagree, SD = strongly disagree, NO = no opinion

[c]VDGIF should increase bear populations in all habitats that are biologically suitable

[d]VDGIF should decrease bear populations in all areas where conflict with humans is common

Table 2.6. Opinions concerning provision of assistance to individuals experiencing bear damage, as expressed by respondents to surveys conducted in Virginia during 2000.

Issue	Group[a]	n	Frequency of Opinion[b] (%)					
			SA	A	N	D	SD	NO
Pay[c]	TNC	295	8.1	39.3	20.0	17.3	9.5	5.8
	Beekeepers	323	40.2	26.3	13.3	9.9	8.0	2.2
	Bear Hunters	260	19.2	41.5	13.5	7.7	15.0	3.1
	VDGIF	22	0.0	0.0	9.1	18.2	72.7	0.0
Trap[d]	TNC	296	40.5	40.5	8.8	3.0	3.7	3.4
	Beekeepers	324	63.6	26.5	4.0	1.5	2.8	1.5
	Bear Hunters	259	63.7	27.8	3.9	2.3	1.2	1.2
	VDGIF	22	13.6	36.4	13.6	31.8	4.5	0.0

[a]TNC = The Nature Conservancy, Beekeepers = Virginia State Beekeepers Association, Bear Hunters = Virginia Bear Hunters Association, VDGIF = Virginia Department of Game and Inland Fisheries

[b]SA = strongly agree, A = somewhat agree, N = neutral, D = somewhat disagree, SD = strongly disagree, NO = no opinion

[c]Agricultural producers should be paid for damage caused by black bears to orchards, beeyards, livestock, etc.

[d]VDGIF should provide free trapping services to remove black bears causing damage to agricultural of residential property

Table 2.7. Opinions concerning the use of lethal methods to manage bear problems, as expressed by respondents to surveys conducted in Virginia during 2000.

Issue	Group[a]	n	Frequency of Opinion[b] (%)					
			SA	A	N	D	SD	NO
Human safety[c]	TNC	294	32.7	36.7	7.1	8.2	10.9	4.4
	Beekeepers	323	60.1	20.4	7.1	4.6	5.3	2.5
	Bear Hunters	258	33.3	36.0	8.5	7.0	11.2	3.9
	VDGIF	22	77.3	22.7	0.0	0.0	0.0	0.0
Never for agriculture[d]	TNC	291	25.8	20.3	16.5	21.0	11.0	5.5
	Beekeepers	316	12.0	12.3	11.7	19.0	41.8	3.2
	Bear Hunters	246	25.6	17.9	16.7	20.7	16.7	2.4
	VDGIF	22	0.0	9.1	0.0	18.2	72.7	0.0
Regardless[e]	TNC	286	4.9	4.2	8.7	19.9	57.0	5.2
	Beekeepers	316	13.6	13.3	11.7	26.6	31.0	3.8
	Bear Hunters	244	2.0	9.8	13.1	13.5	57.4	4.1
	VDGIF	22	0.0	13.6	9.1	27.3	50.0	0.0

Table 2.7 continued.

Issue	Group[a]	n	Frequency of Opinion[b] (%)					
			SA	A	N	D	SD	NO
After nonlethal[f]	TNC	291	27.1	41.9	7.6	7.9	11.3	4.1
	Beekeepers	320	33.8	31.9	11.9	9.1	11.3	2.2
	Bear Hunters	254	34.6	36.2	9.8	4.7	11.8	2.8
	VDGIF	22	31.8	40.9	9.1	13.6	4.5	0.0

[a]TNC = The Nature Conservancy, Beekeepers = Virginia State Beekeepers Association, Bear Hunters = Virginia Bear Hunters Association, VDGIF = Virginia Department of Game and Inland Fisheries

[b]SA = strongly agree, A = somewhat agree, N = neutral, D = somewhat disagree, SD = strongly disagree, NO = no opinion

[c]Lethal methods should be permitted when human safety is jeopardized

[d]Lethal methods of controlling agricultural damage should never be used

[e]Lethal methods to control agricultural damage should be used regardless of whether nonlethal methods have been tried

[f]Lethal methods to control agricultural damage should be used only when nonlethal methods have been tried, but were not effective

Table 2.8. Opinions about black bear hunting in Virginia, as expressed by respondents to a survey conducted in Virginia during 2000.

Issue	Group[a]	n	Frequency of Opinion[b] (%)					
			SA	A	N	D	SD	NO
Hunting in general[c]	TNC	296	11.5	22.3	18.9	15.5	27.7	4.1
	Beekeepers	325	51.1	21.8	12.0	6.2	7.1	1.8
	Bear Hunters	260	98.8	1.2	0	0	0	0
With dogs[d]	TNC	296	4.1	5.7	10.8	16.9	55.7	6.8
	Beekeepers	324	23.8	14.5	18.8	9.6	29.6	3.7
	Bear Hunters	260	97.7	1.9	0	0	0.4	0
With bows[e]	TNC	293	11.3	17.4	14.3	12.3	38.2	6.5
	Beekeepers	322	38.8	18.0	13.7	8.7	16.8	4.0
	Bear Hunters	257	22.6	18.3	13.6	11.7	32.7	1.2

[a]TNC = The Nature Conservancy, Beekeepers = Virginia State Beekeepers Association, Bear Hunters = Virginia Bear Hunters Association

[b]SA = strongly agree, A = somewhat agree, N = neutral, D = somewhat disagree, SD = strongly disagree, NO = no opinion

[c]I support bear hunting in VA in general

[d]I support the use of dogs to hunt bears in VA

[e]I support the use of bows to hunt bears in VA

Table 2.9. Opinions concerning the importance of input from selected bear stakeholders, as expressed by respondents to surveys conducted in Virginia during 2000.

Stakeholder	Group[a]	n	Frequency of Opinion[b] (%)					
			VI	I	N	U	VU	NO
Habitat interests[c]	TNC	296	51.4	36.8	4.7	1.4	0.3	5.4
	Beekeepers	320	25.9	42.2	12.8	9.1	4.7	5.3
	Bear Hunters	261	43.7	31.8	8.8	8.0	5.4	2.3
	VDGIF	22	40.9	45.5	9.1	4.5	0.0	0.0
Agricultural producers[d]	TNC	295	27.8	50.8	8.1	6.8	1.0	5.4
	Beekeepers	321	50.5	34.3	7.8	1.6	1.9	4.0
	Bear Hunters	260	17.7	47.7	15.4	6.5	7.3	5.4
	VDGIF	22	63.6	36.4	0.0	0.0	0.0	0.0
Hunters with dogs[e]	TNC	296	4.4	12.5	10.8	12.5	53.7	6.1
	Beekeepers	321	12.5	18.4	18.4	13.1	29.9	7.8
	Bear Hunters	261	80.8	16.9	1.5	0.0	0.0	0.8
	VDGIF	22	50.0	40.9	0.0	9.1	0.0	0.0

Table 2.9 continued.

Stakeholder	Group[a]	n	Frequency of Opinion[b] (%)					
			VI	I	N	U	VU	NO
Hunters without dogs[f]	TNC	296	7.1	24.0	14.2	16.2	32.1	6.4
	Beekeepers	321	19.0	24.6	22.4	11.2	15.0	7.8
	Bear Hunters	259	35.5	31.7	11.6	8.1	8.9	4.2
	VDGIF	22	50.0	45.5	0.0	4.5	0.0	0.0

[a]TNC = The Nature Conservancy, Beekeepers = Virginia State Beekeepers Association, Bear Hunters = Virginia Bear Hunters Association, VDGIF = Virginia Department of Game and Inland Fisheries

[b]VI = very important, I = somewhat important, N = neutral, U = somewhat unimportant, VU = very unimportant, NO = no opinion

[c]Individuals *primarily* concerned with preserving bears and their habitat

[d]Agricultural producers who experience bear damage

[e]Bear hunters who use dogs

[f]Bear hunters who do not use dogs

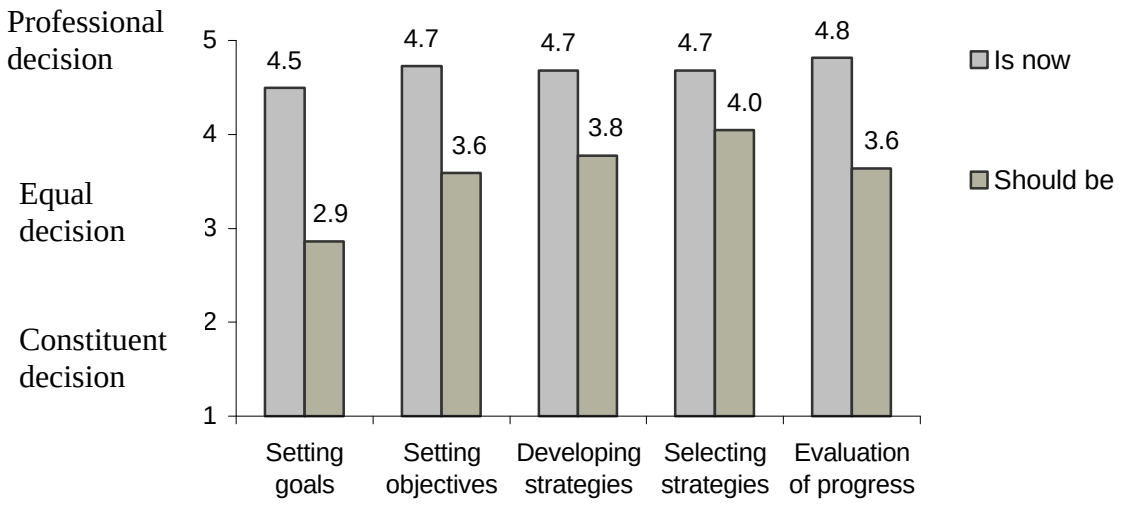

Figure 2.1. Opinions of VDGIF professionals about the current and desired roles of professionals and constituents in making 5 types of decisions about black bear management in Virginia. Data labels represent mean responses (n = 22) to 10 Likert-type survey items.

CHAPTER 3 – EVOLUTION OF STAKEHOLDER KNOWLEDGE, ATTITUDES, AND OPINIONS DURING DEVELOPMENT OF THE VIRGINIA BLACK BEAR MANAGEMENT PLAN

INTRODUCTION

Involvement of diverse stakeholders in collaborative processes pervades natural resources planning (Wondolleck and Yaffee 2000). Given the time, money, and other resources allocated to these processes, we need to ask not only if we are producing better plans, but also how we are affecting stakeholders – including agency personnel – involved in these processes. Are we improving relationships between constituents and resource managers? Are we educating citizens about resources and the realities of management? Are we fostering understanding among competing interests?

During 1999-2001, the Virginia Department of Game and Inland Fisheries (VDGIF) used a collaborative approach to develop the Commonwealth's first statewide black bear management plan (VDGIF 2001). Virginia bear managers contend with many of the same difficult issues seen elsewhere in the United States: bear hunting (Beck et al. 1994), human-bear conflicts (Decker et al. 1985), bear habitat conservation (Black Bear Conservation Committee 1992), and trade in bear parts (Garshelis 1997). Recognizing the need to balance sound biological science with public values regarding bear management, VDGIF and Virginia Tech have used a 2-pronged approach. First, they collaborated in research on the ecology of black bears in Virginia (Carney 1985, Hellgren and Vaughan 1989, Godfrey 1996). Second, they have encouraged input of diverse stakeholders through use of an advisory committee, focus groups, regional input meetings, surveys, and public review of a draft management plan. Development of the Virginia black bear management plan provided opportunities to examine the effects of different types of participation on the knowledge, attitudes, and opinions of stakeholders.

Public participation in natural resources planning often has led to improved decisions and positive impacts on participants' knowledge, attitudes, and opinions concerning other constituents, the agency, and the resource (McMullin and Nielsen 1991, Landre and Knuth 1993, Stout et al. 1996, Guynn and Landry 1997, Peek 1998, Wondolleck and Yaffee 2000). Researchers of decision-making processes in natural resource management suggest that citizen participation can improve agency image, decision acceptance, project support, cooperation among stakeholders, and knowledge about resources (Ireland 1975, Hillborn and Luedke 1987,

Peyton 1987, Sample 1993, Slover 1996, Stout et al. 1996). Public participation also may influence the attitudes of natural resource managers concerning their constituents and resource management issues (Godschalk and Stiftel 1981, Stout et al. 1996). Positive experiences with participatory processes may fortify managers' acceptance and commitment to citizen participation (McConnell 1977, Crompton et al. 1981).

Research in applied social sciences has documented effects of participation in improving knowledge and changing attitudes and opinions concerning a plethora of issues, from poverty to the environment to entrepreneurship (Ritter 1967, Zurcher 1970, Lloyd 1973, Marenin 1989, Hatten and Ruhland 1995, Leeming et al. 1997). The magnitude of attitudinal shift is related to the extremity of initial positions and the amount and type of participation. Zurcher (1970) and Lloyd (1973) found that individuals who held attitudinal positions that differed significantly from other participants or were moderately far from the position advocated by a leader in a participatory process shifted their attitudes most during participation. Several studies have documented a positive relationship between the intensity of participation and the magnitude of change in attitudes (Zurcher 1970, Falkson 1974, Zimmerman and Rappaport 1988). Levine and Butler (1952), Lloyd (1973), and Leeming et al. (1997) have shown that active participation (e.g., discussion within a group) affects attitudes and knowledge more than passive participation (e.g., reading; hearing a lecture; mediated involvement, such as communicating with an active participant). Numerous early studies pointed to discussion as the primary agent of attitude or opinion change in individual or group settings (Jenness 1932, Lewin 1947, Kagan 1952, Mitnick and McGinnies 1958, Antonelli 1962).

Social scientists have examined influences of participation by comparing individuals' attitude, opinion, or knowledge scores before and after participation (Ritter 1967, Zurcher 1970, Lloyd 1973, Hatten and Ruhland 1995, Leeming et al. 1997). Researchers in the natural resources field have reported attitudinal changes based on their subjective judgments of participant changes, self-assessments by participants, or post-participation surveys only (Godschalk and Stiftel 1981, Landre and Knuth 1993, Sample 1993, Stout et al. 1996). However, a thorough review of the literature within the natural resources field failed to reveal any studies that employed pre- and post-participation surveys of the same individuals as means to assess effects of participation on attitudes, opinions, or knowledge.

Natural resources managers frequently have voiced concerns about the cost-effectiveness of time consuming participatory processes used to develop plans or make decisions (Wondolleck and Yaffee 2000). However, McMullin (1996) suggested that the process used to make a management decision often is as important as the decision itself: decisions that significantly affect or interest diverse stakeholders call for their participation in decision-making processes. Stout et al. (1996) recognized that participation often is more than a means to an end, that the value of participation often lies in participation itself. Therefore, an objective assessment of how participation affects stakeholders' knowledge, attitudes, and opinions has important implications for the utility of participatory processes.

My research sought to determine if active and passive participation results in more knowledgeable, supportive, and less polarized stakeholders. I evaluated changes in knowledge, attitudes, and opinions held by key stakeholder participants before and after development of the Virginia Black Bear Management Plan. Specifically, I tested the following hypotheses:

1. Active participation on the Stakeholder Advisory Committee (1) changes participants' attitudes about bears; (2) changes participants' opinions about bear management; (3) increases participants' knowledge about bears and bear management; (4) improves participants' image of VDGIF decision making for bear management; (5) changes participants' opinions about the importance of other stakeholders' concerns in bear management; and (6) reduces extremes in participants' attitudes, and opinions.
2. Passive participation of constituent group members who have representatives on the Stakeholder Advisory Committee also affects participants as noted in 1 above.
3. Participation of VDGIF staff in the planning process (1) changes professionals' opinions about black bear management; (2) increases professionals' belief in the value of constituent involvement in wildlife decision making in Virginia; (3) changes professionals' opinions about the importance of other stakeholders' concerns in bear management; and (4) reduces extremes in professionals' opinions.

METHODS

Experimental design

My approach included both longitudinal analysis of questionnaire responses and interviews of participants after planning. Administration of identical questionnaires to the same

individuals before and after the planning process enabled me to examine quantitatively the influences of participation on attitude, opinion, and knowledge scores regarding black bears and their management. I examined location differences in questionnaire responses before and after planning for each of 3 categories of participants: members of the Stakeholder Advisory Committee, and VDGIF staff who participated in the planning process. I also tested differences in variances of pre- and post-data to determine if responses moderated during the planning process.

I examined the influences of type of participation (active or passive) and exposure to the planning process on participants' knowledge, attitudes, and opinions. Members of the Stakeholder Advisory Committee, hereafter called "committee," comprised the active participants. The committee, which met 6 times between May 2000 and June 2001, embodied a cross section of Virginians from across the state with diverse interests in bear management issues: homeowners, sportsmen, members of environmental interest groups, agricultural producers, and representatives of the commercial timber industry and resource management agencies besides VDGIF. Primary responsibilities for the committee were to identify values that should guide bear management; formulate plan goals; and amend, approve, and prioritize management objectives and strategies designed by VDGIF staff. Staff members of the VDGIF informed the committee at its first meeting that ultimate responsibility for policy-level decisions regarding black bear management lies with the Board of VDGIF. Committee representatives were encouraged to share information with and solicit feedback from their constituents through existing channels within their organizations or stakeholder groups (e.g., meetings, newsletters). Constituent group members (passive participants) also may have been exposed to elements of the bear management plan through communication with VDGIF or Virginia Tech employees or by obtaining information distributed by VDGIF during the public review period for the draft plan. The VDGIF staff participated in the planning process by providing information to the committee about crucial management issues and constraints, designing plan objectives and strategies, exchanging ideas with bear managers in other states, and compiling or reviewing the plan.

Questionnaire administration

During spring 2000 (prior to the first committee meeting), I designed 2 different questionnaires based upon key issues identified during focus groups, in the literature, and by bear

researchers and managers in Virginia (Appendices 2 and 3). One questionnaire assessed knowledge, attitudes, and opinions of constituents (members of the committee and 3 constituent groups with representatives on the committee) about black bears and their management whereas the other assessed VDGIF professionals' opinions. Questionnaires administered after the planning process contained the same knowledge, attitude, and opinion questions as well as additional questions concerning participants' exposure to the planning process, their self-assessments of change, and their evaluations of the planning process.

I mailed a self-administered questionnaire to each VDGIF Wildlife Division biologist and manager with bear management responsibilities (N = 21) in July 2000 and again in June 2001, and achieved a 100 % response rate each time. One biologist retired during the period between my first and second surveys (Chapter 2 indicates N = 22 for staff). Committee members who regularly attended and participated in meetings (N = 15) completed questionnaires at the first (May 2000) and again at the last (Jun 2001) meeting.

I surveyed members of 3 organizations with representatives on the committee. The 3 organizations represented a spectrum of interests about key bear management issues (e.g., bear hunting, human-bear conflicts, habitat conservation). In May 2001, I mailed self-administered questionnaires to all members of the Virginia Bear Hunters Association (Bear Hunters, N = 244), the Virginia State Beekeepers Association (Beekeepers, N = 312), and the Virginia Chapter of the Nature Conservancy (TNC, N = 286) who had returned pre-planning questionnaires during the summer of 2000 and had not requested to be removed from my mailing lists. Given the limited opportunities of members to hear or read about the plan between surveys, I included a 4-page newspaper summary of the plan with 50% of the questionnaires that I mailed to both TNC members and Beekeepers. I wished to make a meaningful comparison of knowledge, attitudes, and opinions between those who did and did not obtain information about the plan. The Virginia Bear Hunters Association had its own mechanism for distributing these newspaper summaries among its members. Using a modification of Dillman's (1978) Total Design Method, I sent a postcard reminder and up to 2 follow-up mailings to survey participants who had not responded to previous mailings. Due to high response rates, I did not test for nonresponse bias. Effective response rates (useable returns, excluding undeliverables) and effective sample sizes were 74.1% (n = 212), 74.7% (n = 233), and 82.8% (n = 202) for TNC members, Beekeepers, and Bear Hunters, respectively.

Data analysis

Score construction. – I constructed 3 types of scores, one corresponding to constituent knowledge about bears and bear management, another to constituent attitudes about bears, and another to constituent and staff opinions about black bear management and constituent involvement in decision making. Constituent questionnaires contained 15 multiple-choice questions designed to assess respondents' knowledge of black bear ecology and management in Virginia (Appendix 2). The number of survey items answered correctly served as a knowledge score for each survey respondent. I counted responses marked "Not Sure" as incorrect.

To assess constituent attitudes about black bears, I adapted 5 of Kellert's (1980) attitude types about animals to black bears:

6. *Ecologistic.* Interest for black bears as components of populations and ecosystems
7. *Humanistic.* Interest and concern for the welfare of individual bears
8. *Moralistic.* Ethical concern about any form of exploitation of bears
9. *Negativistic.* Feeling of dislike or fear of bears
10. *Utilitarian.* Interest in material use of bears or bear habitat

Kellert (1980) devised a method to digest Likert-scale data into a score for each of his attitude types. Using his approach, I coded responses marked "strongly agree" with a 2, "somewhat agree" with a 1, and responses marked "neutral," "somewhat disagree," and "strongly disagree" with a 0. I reversed scoring for items in which disagreement, rather than agreement, corresponded with a particular attitude. I summed codes from 3 survey items pertaining to each of 5 attitude types to create an attitude score. Thus, 15 Likert-scale items (Appendix 2) were converted into 5 separate attitude scores per respondent, with values ranging from 0 to 6.

Although opinion scores were not summations of responses from multiple survey items like knowledge and attitude scores, I use the term "score" for consistency in my analysis. Opinion scores were ordinal responses along Likert scales with 5 balanced categories (i.e., "strongly agree" = 1, "somewhat agree" = 2, "neutral" = 3, "somewhat disagree" = 4, and "strongly disagree" = 5). For survey items that assessed constituent and staff opinions regarding the importance of other stakeholders' input in bear management decisions, 1 = "very important," 2 = "somewhat important," 3 = "neutral," 4 = "somewhat unimportant," and 5 = "very

unimportant." I provided a "no opinion" category for each opinion question, but excluded the category during analysis.

Location shifts in scores. – I used either a paired *t* test (if data were normally distributed) or a Wilcoxon signed rank test (if data were not normally distributed) to reveal differences between scores before and after participation for each knowledge, attitude, and opinion parameter. I looked for differences within each category of participants (i.e., committee members, constituent group members, and VDGIF staff) separately. I analyzed scores of constituent group members by each group separately and across all groups combined. I used 1-way analysis of variance *F*-tests (ANOVAs) (if data were normally distributed) or Kruskal-Wallis tests (if data were not normally distributed) to examine differential pre-post shifts by constituent group, i.e., interaction between group and score shift. I employed 2-sample *t* tests (if data were normally distributed) or Wilcoxon rank sum tests (if data were not normally distributed) to compare score shifts for (1) members of the 3 constituent groups who had or had not heard about the planning process during the period between surveys, (2) TNC members and Beekeepers who were or were not mailed newspaper summaries of the bear plan with their surveys, and (3) Bear Hunters who did or did not report reading a newspaper summary, communicating with VDGIF personnel about the plan, or communicating with another member of the Virginia Bear Hunters Association about the plan. I subtracted pre-scores from post-scores for all parameters. Opinion score shifts > 0 signified shifts toward greater disagreement (the upper end of the Likert scale) and opinion shifts < 0 signified shifts toward greater agreement. I report means instead of medians in all cases. Tests were considered significant at $= 0.05$.

Hypotheses required 1-sided tests to examine shifts in constituent knowledge, constituent opinions about VDGIF decision making for bear management, and VDGIF staff opinions about constituent involvement in wildlife planning. I expected these parameters to improve after the planning process. I also used 1-sided tests to determine if constituent group members who reported hearing or receiving information about the bear plan reported larger changes in their knowledge and opinions than those who did not. All other location tests were 2-sided.

Dispersion differences in scores. – I used the Pitman-Morgan test (Morgan 1939, Pitman 1939) to assess differences in variances of pre- and post-scores. This procedure tests if the correlation between (X – Y) and (X + Y) equals 0, where X is the set of pre-scores and Y is the

set of post-scores. If sample variances decreased in post-scores, I halved *P*-values derived from this test to reflect my 1-sided hypothesis; i.e., variances should decrease in post-scores.

Self-assessed change. – Each constituent group member was given an opportunity to rate his/her own global change in knowledge and opinions about black bear management in Virginia on a scale where 1 = no change, 2 = slight change, and 3 = great change. I used 1-way ANOVAs and Tukey's pairwise comparisons to compare changes reported by members of the 3 groups.

Reported influences of different information sources. – I asked constituent group members if they had heard or read about the black bear management plan from a variety of sources. Respondents could rank, on a scale of 1-5 (where 5 denotes greatest influence), the influence each source had on changing their knowledge and opinions about black bear management. I used a 1-way ANOVA and Tukey's pairwise comparisons to examine differential influences of the sources of information.

Post-planning interviews

I interviewed the 15 active committee members individually during October and November 2001 via telephone. Interviewees evaluated the planning process according to a series of open-ended questions (Appendix 4) and described ways in which their attitudes and opinions changed throughout their involvement.

RESULTS

Participation in and exposure to the planning process

Committee. – Individual committee members had varying degrees of interaction with other stakeholders during the planning process. Eight members had participated in focus group discussions before I administered the first survey and 9 attended regional input meetings between the pre- and post-planning surveys. Six of the 15 members surveyed did not miss any of the 6 committee meetings, 5 missed 1 meeting, 3 missed 2 meetings, and 1 missed 4 meetings.

Constituent organizations. – Twenty-eight percent of constituent group respondents (11% of TNC members, 19% of Beekeepers, and 56% of Bear Hunters) reported that they heard or read about the black bear management plan during the period between surveys. Bear Hunters reported hearing or reading about the plan from at least 9 different sources (Table 3.1); TNC

members and Beekeepers did not report any of these sources with frequencies sufficient for statistical analysis.

During post-planning interviews, the Bear Hunters' representative indicated that he had discussed the bear management plan every 3 months during regular meetings of his organization (about 100 people each time), monthly with 14 officers and directors, and monthly with other citizens informally. The Beekeepers' representative reported that he solicited bear damage information and feedback from members using his own survey early in the planning process and that he briefed nearly 200 people about the bear management plan at 2 meetings during the time the plan was being developed. None of the 4 representatives from TNC who attended 1 committee meeting each advised me of their efforts to inform or involve their members.

Only 8 of 107 (7.5%) TNC member respondents who were mailed a newspaper summary of the black bear management plan, and 4 of 105 (3.8%) who were not mailed a summary reported reading about the plan from that source. Twenty of 126 (15.9%) Beekeeper respondents who were mailed the summary reported reading about the plan from that source, and 6 of 107 (5.6%) who were not mailed the summary reported reading about the plan from that source. Even though I did not mail any newspaper summaries to Bear Hunters, 61 of 202 respondents (30.2%) reported reading about the plan from that source. For all 3 groups, members who did not receive a summary with their survey may have obtained one through another member, resource agency offices, hunting license vendors, or other outlets VDGIF used to distribute nearly 70,000 copies.

VDGIF professionals. – Ten of the professionals surveyed (n = 21) did not attend any of the Stakeholder Advisory Committee meetings, 7 attended 1 - 3 meetings, and 4 attended 4 - 6 meetings. Approximately 10 VDGIF professionals served as a technical working group during all planning phases. All VDGIF staff who were surveyed also received a copy of the draft plan for review and 12-15 of them participated in a meeting to get additional comments, discussion, and feedback before conclusion of the planning process.

Self-assessed changes in knowledge and opinions

Committee. – All 15 committee members reported at least a slight increase in their knowledge about black bears and bear management after the planning process. Thirteen members reported at least a slight change in their opinions about bear management. One

representative from an agency besides VDGIF and 1 member representing bear damage interests reported no change in opinions about bear management. Interviewed members said that they had a greater awareness of bear damage and the importance of managing bear problems, were surprised at the growth and expansion of bear populations statewide, had a greater appreciation for the complexity of bear management, and had a greater appreciation for the concept of cultural carrying capacity after the planning process. On their post-planning surveys, 11 of the 15 members reported at least a slight change in opinions about other parties interested in bear management. Interviewed members said that they had greater respect for the opinions and civility of other interests; greater tolerance, understanding, and respect for bear hunters; were surprised at how well animal welfare and environmental concerns were represented; had more concern and sympathy for those suffering bear damage; and had a greater appreciation for VDGIF's role in bear management.

Constituent organizations. – Combined, 46% of constituent group members reported at least a slight increase in their knowledge and 35% reported at least a slight change in their opinions about bear management in Virginia since they received the first survey. On a scale of 1 (no change) to 3 (increased greatly), Bear Hunters reported the greatest increase in knowledge ($\bar{x}$ = 1.84, SE = 0.05, n = 197), followed by Beekeepers ($\bar{x}$ = 1.46, SE = 0.04, n = 224) and TNC members ($\bar{x}$ = 1.31, SE = 0.04, n = 203) ($F_{2,619} = 43.91$, $P \leq 0.001$; all 3 means differed). On a scale of 1 (no change) to 3 (changed greatly), Bear Hunters reported a greater global change in opinions about bear management ($\bar{x}$ = 1.60, SE = 0.05, n = 199) than did Beekeepers ($\bar{x}$ = 1.34, SE = 0.04, n = 227) or TNC members ($\bar{x}$ = 1.26, SE = 0.03, n = 203) ($F_{2,626} = 19.85$, $P \leq$ 0.001; means for Beekeepers and TNC members did not differ).

Combined, and by each group, constituents who heard about the bear management plan reported both a greater increase in knowledge and a greater global change in opinions about bear management than those who did not hear about the plan (Table 3.2). Beekeepers who were mailed a newspaper summary of the plan reported a greater increase in knowledge ($\bar{x}$ = 1.55, SE = 0.05, n = 121) than those who were not ($\bar{x}$ = 1.34, SE = 0.05, n = 103) (Wilcoxon statistic, T = 14917.5, P = 0.001). Bear Hunters who reported reading or hearing about the plan from a newspaper summary, a VDGIF employee, or another Bear Hunter reported a greater increase in their knowledge than those who did not (Table 3.3). Those who reported hearing about the plan from a VDGIF employee or another Bear Hunter also reported a greater global change in

opinions about bear management than those who did not (Table 3.3). Bear Hunters reported differential influences of 9 different sources of information in changing their knowledge and opinions about black bear management ($F_{8,549} = 10.61$, $P < 0.001$; Table 3.1): Virginia Bear Hunters Association literature or discussion with other members or associates > personal discussion with VDGIF or Virginia Tech employees > VDGIF information distributed during the pubic review process.

VDGIF staff. – Through responses to open-ended questions on a post-planning survey, staff assessed changes in their own opinions about bear management and other parties interested in bear management during development of the plan. Staff reported a reinforcement in their belief that public involvement is valuable in planning; a greater faith in constituents' input because they were educated about management realities in the process; a greater willingness to try new strategies to respond to bear problems; and a recognition that diverse stakeholder input was important to the education of participants, their support for bear management, and the quality of the management plan produced.

Constituent knowledge about black bears and their management

Committee. – Knowledge scores for committee members ($n = 15$) observed after the planning process ($\bar{x} = 11.53$ out of 15 points, SE = 0.75) were not statistically higher ($\bar{x}_d = 1.40$, SE = 0.88) than those observed before ($\bar{x} = 10.13$, SE = 1.02) ($T = 57.0$, $P = 0.09$). Six members scored higher (total of 30 points) and 6 member scored lower (total of 9 points) on the post-planning survey. Members with lower knowledge scores initially made larger gains during planning than those who were more knowledgeable about bears. Several members representing bear damage interests or environmental interests scored much higher on post-surveys, whereas several hunter and agency representatives (besides VDGIF) scored slightly lower than before (likely not statistically significant, but there was no way to test such small subsamples). Hunters and agency representatives were more knowledgeable initially than members representing damage and environmental interests. Three committee representatives more than doubled their knowledge scores.

Constituent organizations. – Combined, and by each group, constituents exhibited higher knowledge about black bears and their management in Virginia following the planning process (Table 3.4). Knowledge scores for constituent group members who heard about the plan during

the period between surveys increased (shifted in a positive direction) more ($\bar{x}_d$ = 0.67 points out of 15, SE = 0.16, n = 168) than for those who did not hear about the plan ($\bar{x}_d$ = 0.30, SE = 0.12, n = 438) (t_{347} = 1.83, P = 0.03). Although this trend was apparent and significant for the 3 groups combined, only TNC members' knowledge scores shifted statistically according to whether or not they had heard about the plan (heard: $\bar{x}_d$ = 1.76, SE = 0.69, n = 21; did not hear: $\bar{x}_d$ = 0.41, SE = 0.20, n = 176; T = 2533.5, P = 0.03). Knowledge scores for Beekeepers who were mailed a newspaper summary of the plan shifted more ($\bar{x}_d$ = 0.78, SE = 0.21, n = 123) than scores for those who were not ($\bar{x}_d$ = 0.23, SE = 0.25, n = 107) (t_{215} = 1.68, P = 0.05). Likewise, knowledge scores for TNC members who were mailed a newspaper summary of the plan shifted more ($\bar{x}_d$ = 1.03, SE = 0.24, n = 105) than scores for those who were not ($\bar{x}_d$ = 0.08, SE = 0.28, n = 103) (T = 12,005.0, P = 0.01). I detected no differences in knowledge shifts between Bear Hunters who did or did not report reading or hearing about the plan from a newspaper summary, a VDGIF employee, or another Bear Hunter.

Constituent attitudes toward black bears

Committee. – Committee members (n = 15) were more negativistic toward bears ($\bar{x}_d$ = 0.87, SE = 0.32) after the planning process ($\bar{x}$ = 1.13 out of 6, SE = 0.26) than before ($\bar{x}$ = 0.27, SE = 0.15) (T = 39.5, P = 0.05), but still were only weakly negativistic. One survey item that examined an increased concern about bears harming children or pets influenced this shift (Appendix 2). I did not detect any shifts in ecologistic, humanistic, moralistic, or utilitarian attitude scores (Appendix 5).

Constituent organizations. – In contrast with committee members, constituent group members (n = 631) were slightly less negativistic toward bears ($\bar{x}_d$ = -0.09, SE = 0.04) after the planning process ($\bar{x}$ = 0.67, SE = 0.05) than before ($\bar{x}$ = 0.76, SE = 0.05) (T = 12,300.5, P = 0.05). Although this trend was apparent for all 3 groups, only Bear Hunters' (n = 200) negativistic scores decreased statistically ($\bar{x}_d$ = -0.13, SE = 0.05; before: $\bar{x}$ = 0.29, SE = 0.05; after: $\bar{x}$ = 0.17, SE = 0.03; T = 279.0, P = 0.02). Ecologistic, humanistic, moralistic, and utilitarian attitude scores did not shift after planning for any constituent group (Appendix 6). Variances in Bear Hunters' negativistic (s^2 = 0.24 [after] vs. 0.46, n = 200, P < 0.001) and moralistic (s^2 = 0.42 [after] vs. 0.56, n = 198, P = 0.03) attitude scores decreased after planning.

Opinions about black bear populations

Committee. – Committee members (n = 15) disagreed more ($\bar{x}_d$ = 1.07, SE = 0.37; $\bar{x}_d$ = 1.07, SE = 0.37) after the planning process ($\bar{x}$ = 3.67, SE = 0.32) than before ($\bar{x}$ = 2.60, SE = 0.38) that VDGIF should increase bear populations in all habitats in Virginia that biologically are suitable for bears (T = 49.5, P = 0.03). After the planning process, all categories of committee members expressed less support for increasing bear populations. Their mean opinion ($\bar{x}$ = 3.67, SE = 0.32) converged with that of VDGIF staff ($\bar{x}$ = 3.62, SE = 0.23). I did not detect pre-post shifts in opinions concerning desired populations levels (cultural carrying capacity) or whether VDGIF should decrease populations in areas where conflict with humans is common. Committee members essentially were neutral regarding both issues before and after the planning process (Appendix 5).*Constituent organizations and VDGIF staff.* – I did not detect shifts in opinions of constituent group members or VDGIF staff concerning increasing bear populations, decreasing bear populations, or cultural carrying capacity (Appendices 6 and 7). Both before and after the planning process, combined constituent group members believed that there were too few bears in their locality of residence. Both before and after the planning process, combined constituent group members agreed that VDGIF should increase bear populations in all areas that biologically are suitable for bears and disagreed that VDGIF should decrease bear populations in areas where conflict between humans and bears is common. Staff disagreed both before and after the planning process that bear populations should be increased in suitable areas and essentially were neutral regarding whether bear populations should be decreased in areas of conflict.

Opinions about assisting landowners with black bear damage

Committee. – Committee members (n = 15) agreed less strongly after the planning process ($\bar{x}$ = 2.47, SE = 0.34) than before ($\bar{x}$ = 1.40, SE = 0.13) that VDGIF should provide free trapping services to remove black bears causing agricultural or residential property damage (T = 79.0, P = 0.02). Their opinion ($\bar{x}$ = 2.47, SE = 0.34) converged with that of VDGIF staff ($\bar{x}$ = 2.95, SE = 0.27). I did not detect shifts in opinions about paying agricultural producers for bear damage or whether VDGIF should provide free on-site advice to property owners who experience bear damage. Committee members supported both types of assistance before and after the planning process (Appendix 5).

Constituent organizations and VDGIF staff. – I did not detect shifts in opinions about paying for agricultural damage, providing free on-site advice, or providing free trapping services among constituent group members or VDGIF staff (Appendices 6 and 7). Combined, constituent group members supported all 3 types of assistance both before and after the planning process. Staff supported free on-site advice, were neutral regarding free trapping services, and did not support payments for damage both before and after the planning process.

Opinions about the use of lethal methods in managing bear problems

Committee. – I did not detect shifts in members' opinions concerning the use of lethal methods to control problem black bears (Appendix 5). Both before and after the planning process, committee members supported the use of lethal methods to control problem bears when human safety is jeopardized and to control agricultural or residential damage, if nonlethal methods were tried first. They disagreed that lethal methods should never be used, or used regardless of whether nonlethal methods were tried first, to control agricultural or residential bear damage.

Constituent organizations. – Constituent group members agreed more strongly post-planning that use of lethal methods should be permitted when human safety is jeopardized (Table 3.5). I detected an interaction between group and opinion shift on this issue, with Bear Hunter's shift > Beekeepers' shift > TNC members' shift ($H_2 = 10.98$, $P = 0.004$). Combined, constituent group members who heard about the bear management plan between surveys became more tolerant of the use of lethal methods than members who did not hear about the plan. Those who heard about the plan shifted more toward agreement (i.e., the shift in their post-score was in a more negative direction toward the lower end of the Likert scale) that the use of lethal methods should be permitted when human safety is jeopardized and to control agricultural damage only when nonlethal methods have been tried; they shifted more toward disagreement that lethal methods never should be used to control agricultural damage (Table 3.6). I detected no interaction between constituent group and opinion shift for any of these 3 issues. As to whether lethal methods should never be used to control agricultural damage, Beekeepers who were mailed a newspaper summary shifted more toward disagreement ($\bar{\mathbf{x}}_d = 0.24$, SE = 0.12, $n = 117$) than those who were not mailed a summary ($\bar{\mathbf{x}}_d = -0.26$, SE = 0.14, $n = 96$)($T = 13{,}667.5$, $P = 0.01$). Likewise, members of TNC who were mailed a newspaper summary shifted more toward

disagreement ($\bar{x}_d$ = 0.34, SE = 0.15, n = 94) than those who were not mailed a summary ($\bar{x}_d$ = -0.10, SE = 0.16, n = 93) (T = 9,546.0, P = 0.04). For constituent group members combined (n = 606), I detected a pre-post decrease in the variance of opinion scores concerning the use of lethal methods when human safety is jeopardized (s^2 = 1.16 vs. 1.56, $P \leq 0.001$).

VDGIF staff. – Staff (n = 21) did not shift in any opinions related to the use of lethal methods to control problem bears (Appendix 7). Like committee members, staff before and after the planning process supported the use of lethal methods to control problem bears when human safety is jeopardized and to control agricultural or residential damage, if nonlethal methods were tried first. They disagreed that lethal methods never should be used, or used regardless of whether nonlethal methods were tried first, to control agricultural or residential bear damage. Pre-post variances of staff opinion scores concerning never using lethal methods to control agricultural (s^2 = 0.13 vs. 0.86, $P \leq 0.001$) and residential damage from bears (s^2 = 0.83 vs. 1.85, P = 0.05) decreased.

Constituent opinions about black bear hunting

Neither committee members nor constituent group members shifted in any opinions related to black bear hunting in Virginia (Appendices 5 and 6). Both before and after the planning process, committee and group members supported hunting bears in general, with dogs, and with firearms, but essentially were neutral about chasing bears with dogs during the training (nonharvest) season. Committee members supported and constituent group members were neutral about hunting bears with bows. Several nonhunting committee members indicated during interviews that they were more tolerant of bear hunting with dogs after the planning process, and one member was more convinced that regulated hunting was the most important option to control bear populations. Pre-post variances of opinion scores about the use of firearms to hunt bears decreased for both Beekeepers (s^2 = 1.32 vs. 1.74 , n = 219, $P \leq 0.001$) and Bear Hunters (s^2 = 0.49 vs. 0.61, n = 199, P = 0.04).

Constituent opinions about VDGIF decision making and bear management

Committee. – Following planning, committee members agreed more strongly (i.e., their scores shifted toward the portion of the Likert scale) that VDGIF manages black bears well ($\bar{x}_d$ = -0.79, SE = 0.30; before: $\bar{x}$ = 2.31, SE = 0.29; after: $\bar{x}$ = 1.54, SE = 0.14; n = 13; t_{12} = -2.54, P

= 0.01) and considers concerns of all interested parties fairly when making management decisions about black bears ($\bar{x}_d$ = -0.50, SE = 0.25; before: $\bar{x}$ = 2.50, SE = 0.23; after: $\bar{x}$ = 2.00, SE = 0.21; n = 14; T = 0.0, t_{13}= -1.99, P = 0.03). Pre-post variances of members' opinion scores about whether VDGIF manages bears well (s^2 = 0.27 vs. 1.06, n = 13, P = 0.02) and whether VDGIF adequately considers biological information when making bear management decisions (s^2 = 0.61 vs. 0.74, n = 14, P = 0.05) decreased.

Constituent organizations. – Combined, constituent group members agreed more strongly post-planning that VDGIF manages bears well, adequately considers biological information, understands concerns of all parties interested in bears, and considers all parties' concerns fairly (Table 3.7, see Appendix 6 for each group). I detected no interaction between constituent group and opinion shift relative to any of these 4 issues. Combined, constituent group members (n = 357) agreed less after planning ($\bar{x}$ = 2.86, SE = 0.06) than before ($\bar{x}$ = 2.66, SE = 0.06) that VDGIF places more emphasis on bear biology than on interested parties' concerns (t_{356}= 2.90, P = 0.004). I detected an interaction between group and opinion shift relative to this issue: Beekeepers agreed more and Bear Hunters and TNC members agreed less that VDGIF places more emphasis on biology than parties' concerns (H_2 = 12.17, P = 0.002, see Appendix 6). Pre-post variances of group members' opinion scores (pooled) about whether VDGIF adequately considers bear biology (s^2 = 0.81 vs. 0.94, n = 383, P = 0.05) and whether VDGIF considers all parties' concerns fairly (s^2 = 1.21 vs. 1.42, n = 411, P = 0.04) decreased.

Combined, constituents who heard about the plan during the period between surveys shifted more toward agreement that VDGIF adequately considers biological information, understands concerns of all parties, and considers all parties' concerns fairly (Table 3.8, see Appendix 6 for each group). Beekeepers and TNC members who were mailed a newspaper summary improved their image of VDGIF bear management and decision making more than those who were not (Table 3.9, see Appendix 6 for each group). Bear Hunters who communicated with another Bear Hunter shifted more toward agreement that VDGIF understands concerns of all parties ($\bar{x}_d$ = -0.31, SE = 0.13, n = 83) than Bear Hunters who did not ($\bar{x}_d$ = 0.02, SE = 0.13, n = 106) (T = 7245.0, P = 0.03).

Opinions about the importance of different stakeholders' input

Committee. – Both before and after planning, committee members indicated that it is important to consider the concerns of all stakeholders in bear management: agency professionals and scientists, individuals with a nonconsumptive interest in bears, landowners who experience bear damage, and bear hunters. However, after planning, committee members indicated less importance (i.e., their scores were higher on the Likert scale) in considering the concerns of individuals primarily interested in watching or photographing bears, those concerned with humane treatment of bears, and agricultural producers and residential landowners who experience bear damage (Table 3.10).

Constituent organizations. – Like committee members, constituent group members still considered input of all parties important after planning. Combined, constituent group members indicated that it is less important (i.e., their scores shifted toward the upper end of the Likert scale) to consider the concerns of personnel from other government agencies besides VDGIF ($\bar{x}_d$ = 0.13, SE = 0.05; before: $\bar{x}$ = 1.72, SE = 0.04; after: $\bar{x}$ = 1.85, SE = 0.04; n = 536; T = 18,515.5, P = 0.01) and individuals primarily concerned with preserving bears and bear habitat ($\bar{x}_d$ = 0.10, SE = 0.04; before: $\bar{x}$ = 1.90, SE = 0.04; after: $\bar{x}$ = 2.00, SE = 0.05; n = 588; T = 21,978.0, P = 0.04). I did not detect any interaction between group and opinion shift for either of these issues. After planning, members of TNC indicated that it is less important ($\bar{x}_d$ = 0.16, SE = 0.07) to consider the concerns of agricultural producers who experience damage (before: $\bar{x}$ = 1.94, SE = 0.06; after: $\bar{x}$ = 2.09, SE = 0.04; n = 186; T = 1,911.0, P = 0.04). I detected an interaction between group and opinion shift regarding this issue: TNC members indicated that it is less important whereas Bear Hunters considered it more important to consider the concerns of producers (H_2 = 6.19, P = 0.05). Bear Hunters indicated post-planning that it is less important ($\bar{x}_d$ = 0.22, SE = 0.10) to consider the concerns of individuals who are interested primarily in watching or photographing bears (before: $\bar{x}$ = 2.61, SE = 0.08; after: $\bar{x}$ = 2.83, SE = 0.10; n = 184; T = 3474.5, P = 0.02).

VDGIF staff. – Staff did not shift in any opinions related to the importance of considering stakeholder input in management of bears: they considered the input of all stakeholders important both before and after the planning process (Appendix 7). I detected pre-post decreases in variances of staff opinion scores (n = 21) about how important it is to consider input of

individuals primarily concerned with humane treatment of bears (s^2 = 1.06 vs. 1.56, P = 0.002) and residential landowners who experience bear damage (s^2 = 0.25 vs. 0.66, P = 0.01).

VDGIF staff opinions about bear management options

Throughout the planning process, staff did not shift their opinions regarding the appropriateness of different options for managing black bears (Appendix 7). Both before and after the planning process, they considered regulated hunting, abating nonhunting mortality, habitat modification, kill permits, aversive conditioning, repellents, and exclusion devices as appropriate measures to manage bears in Virginia. They essentially were neutral about trapping and relocating or trapping and euthanizing bears. They did not consider fertility control, allowing nature to take its course, or supplemental feeding to be appropriate. Pre-post variances of staff (n = 21) opinion scores about trapping and euthanizing bears (s^2 = 0.92 vs. 1.82, P = 0.05), issuing kill permits (s^2 = 0.26 vs. 0.56, P = 0.05), and supplemental feeding of bears (S^2 = 0.13 vs. 0.76, $P \leq 0.001$) decreased.

VDGIF staff opinions about constituent involvement

Constituent and professional roles in bear management. – Staff did not shift their opinions during the planning process concerning the relative roles of constituents and professionals in setting broad management goals, setting specific management objectives, developing and selecting specific management strategies, and evaluating progress toward management goals (Appendix 7). Staff supported a larger role for constituents in all phases of decision making both before (Figure 2.1) and after the planning process.

Constituent involvement in wildlife decision making. – Staff (n = 21) disagreed more ($\bar{x}_d$ = 0.67, SE = 0.37) after ($\bar{x}$ = 3.76, SE = 0.30) than before ($\bar{x}$ = 3.10, SE = 0.33) the planning process that they were uncomfortable having goals for wildlife management based on constituent values (T = 52.5, P = 0.05). Staff opinions did not differ before and after planning about other issues regarding constituent involvement in wildlife decision making (Appendix 7). Staff agreed that decisions should be made with constituents in mind and that VDGIF cannot balance the demands of competing stakeholders without their input. Staff disagreed that constituent involvement is an academic idea that does not work in practice, that constituent involvement has produced few benefits for the constituents, that constituents do not know

enough about wildlife management to provide useful input, and that managers know what is best for wildlife resources without constituent input. Pre-post variances of staff (n = 21) opinion scores about whether constituent involvement is an academic idea that does not work in practice (s^2 = 0.19 vs. 0.86, $P \leq 0.001$) and whether constituent involvement in wildlife management has produced relatively few benefits for the constituents (s^2 = 0.25 vs. 0.56, P = 0.04) decreased.

DISCUSSION

I found evidence that both active and passive participation in development of the Virginia black bear management plan influenced constituents' (committee and constituent group members) knowledge, attitudes, and opinions concerning black bears and their management (Table 3.11). My findings suggest that involvement of constituents in the planning process improved their knowledge about black bear management and their image of VDGIF decision making and management of black bears. Following their involvement, I found more constituent support for controversial management options (e.g., use of lethal methods to address bear problems), but little change in their opinions about bear hunting. Group members who were exposed in some way to the development of the plan between surveys demonstrated larger improvements in their knowledge about bears and image of VDGIF and greater changes in their opinions about bear management than those who were not exposed to the planning process. My research suggests that participation of VDGIF biologists and managers in the process did not affect their opinions appreciably about bear management and constituent involvement in wildlife decision making.

These findings supplement those of other researchers in the natural resources field who have reported knowledge, attitude, and opinion changes based on their subjective judgments of participant changes, self-assessments by participants, or post-participation surveys only (Godschalk and Stiftel 1981, Landre and Knuth 1993, Sample 1993, Stout et al. 1996). Although reasons for such changes are discussed here and elsewhere, it may be that the true value of participation lies in the participation process itself (Stout et al. 1996). Whether serving on a committee or receiving a survey, just being involved with the management of a public natural resource and realizing that resource managers care enough to ask may enhance constituent appreciation of the resource and especially their image of the managers.

Constituent knowledge about bears and their management

Involvement in the development of a comprehensive bear plan in Virginia compelled committee members to become conversant in many complex management issues, as also was noted by Peek (1998) after working with a committee of user groups discussing restoration of grizzly bears in Idaho. On post-planning surveys, all active committee members in my study noted that their knowledge about bear management increased throughout the process. However, a lack of power in my pretest-posttest design prevented quantitative confirmation that their knowledge actually had increased. Several members representing bear damage interests or environmental interests scored much higher on knowledge, whereas several hunter and agency representatives (besides VDGIF) who initially were knowledgeable scored essentially the same pre- and post-planning. Thus, gains in knowledge occurred where they were needed most. Marenin (1989) made similar findings working with youths in participative service projects.

It is important to note that knowledge measured by the 15 items on pre- and post-planning surveys represented knowledge concerning those 15 topics only, albeit a broad set (Appendix 2). Knowledge about black bear management includes a myriad of more complex parameters not included on the questionnaire, such as management constraints and complexity, the concept of cultural carrying capacity (McLaughlin 1999), damage abatement strategies (Jonker et al. 1998), and hunter motivations (Grise 1994). Therefore, longitudinal survey results, while useable, were not able to account for the full impact of the planning process on committee members' knowledge about bears and their management.

Constituent group members both reported and demonstrated (through increased scores) increases in knowledge about bears and bear management following the planning process. Improvements in members' knowledge were related positively to hearing or reading about the plan during the period between surveys, demonstrating one of the positive dividends of reaching out to a broad constituency during decision making processes. That people who did not hear about the plan also exhibited higher knowledge post-planning might indicate that the constituent population at large was improving their knowledge during the planning period or that participants simply learned from the experience of filling out the first questionnaire (i.e., they were predisposed to seek or take note of information pertaining to the questions asked).

Bear Hunters who heard or read about the plan did not demonstrate greater gains in knowledge. However, they were highly knowledgeable about bears and their management

before the planning process began. I did not expect the most knowledgeable participants to improve their knowledge as much as those participants who started with lower knowledge levels. Similarly, Lloyd (1973) hypothesized that the initial attitudinal position espoused by a participant affects whether he or she will shift: those with positions closest to a target position will shift the least.

Constituent attitudes about bears

The minimal change in constituents' attitudes toward black bears throughout the planning process was expected. A person's attitudes toward animals and other natural resources generally are based on a rather rigid value system (Kellert 1980, Brown 1984). Constituent group members and committee members did not demonstrate changes in their ecologistic, humanistic, moralistic, or utilitarian attitudes toward bears. Most interviewed committee members reported that their attitudes toward bears changed little to none.

Only one survey item influenced the increased negativistic scores of committee members – the concern that bears may harm children or pets. During interviews, committee members cited a number of reasons for this increased concern. Primary reasons included increased awareness that growing bear populations are closer to more homes, increased awareness of the extent and frequency of bear damage throughout Virginia, and involvement with bear issues that heightened their sensitivity to news coverage of the unusual number of black bear attacks in the United States during the time the plan was being developed. Had news of these bear attacks influenced the public at large, I should have detected an increase in negativistic attitudes within at least 1 of the 3 constituent groups. The slight decrease in negativistic attitudes ($\bar{x}$ = 0.67 vs. 0.76) expressed by constituent group members after the planning process probably was not meaningful sociologically or psychologically.

Constituent and staff opinions about bear management

Committee members did not translate their greater appreciation for the danger and damage associated with bears into greater support for decreasing bear populations in all areas of the state where conflict with humans is common. Likewise, Decker et al. (1985) and Jonker et al. (1998) found that even landowners with property damage from black bears in New York and

Massachusetts, respectively, did not want managers to decrease bear populations indiscriminately.

Longitudinal analysis confirmed my observations during committee meetings that members' opinions shifted toward those of VDGIF staff with respect to increasing populations in suitable habitats and providing free trapping services to remove problem bears. To alert members of the desires and concerns of the Virginia citizens they were representing, facilitators shared results from constituent surveys and notes from regional input meetings and focus groups with the committee. A theme common throughout these documents was that a majority of Virginia stakeholders wanted more bears across the state. Managers encouraged members to consider all ramifications of larger bear populations, from positive recreational benefits, to negative pressures placed on residents and farmers, to the challenges and expenses in managing more bears. The resulting population objectives in the draft plan reflected the will of the people, but were tempered by discussion of consequences. Many areas of Virginia were slated for increases whereas some areas with high bear or human population densities were slated for stabilized populations (VDGIF 2001). A similar discussion of trapping and relocating bears dampened committee members' enthusiasm for continuation of the practice. After learning about the expense, lack of suitable release sites, risk of transferring a nuisance animal from one place to another, and other problems associated with trapping and relocation, members encouraged managers to address bear problems where they occur. This recommendation mirrored a shift already underway in VDGIF policy to manage bear problems at the point of origin.

Constituents group members, especially those who reported hearing about the plan during the period between surveys, expressed greater support for the use of lethal methods to address bear problems following the planning process. However, it would be premature to interpret the increased support for lethal methods and the direction to manage bears in place as a signal to indiscriminately dispatch bears involved in conflicts with humans. Both before and after the planning process, constituent group members, committee members, and VDGIF staff did not want to stipulate that lethal methods never should be used to manage agricultural or residential damage caused by bears, but favored their use only after nonlethal methods had been tried first. These match sentiments expressed elsewhere (Baptiste et al. 1979, McIvor and Conover 1994, Jonker et al. 1998). During committee discussions, members were hesitant to tie managers'

hands, but encouraged restraint in the application of lethal methods. In short, constituents have given VDGIF managers discretion to use lethal methods, among other options, to abate bear damage. Managers' efforts to maintain the trust of their constituents as they execute decisions to control problem bears has implications for VDGIF's credibility in all facets of bear management.

The image of VDGIF relative to managing and making decisions about black bears improved among all constituents during development of the plan. A sense that managers are competent and fair in decision making leads to better working relationships between and among stakeholder groups and the agency (Decker 1985, Grise 1994). To sustain this relationship, the agency must strive to follow through with the expectations of its constituents and constituents must reciprocate by attempting to understand the realities of management and resource capabilities.

Constituent and staff opinions about stakeholder involvement in bear management

Both before and after the planning process, constituent and staff participants considered the concerns of all interested stakeholders important in bear management. Interviewed committee members indicated a greater respect and tolerance for the input of other parties interested in black bears, a trend readily observed during committee meetings. However, surveyed committee and constituent group members indicated less importance in considering the input of several different stakeholder groups in managing bears after planning. Committee members placed less importance on the concerns of individuals primarily interested in watching or photographing bears, those primarily concerned with humane treatment of bears, and agricultural and residential property owners who experience bear damage. This may represent a changing in the weights associated with different constituents involved in the planning process; e.g., 4 committee members representing bear damage concerns may have been deemed excessive by other committee members, although interviewees still expressed a greater concern for those experiencing damage.

Staff opinions about bear management and constituent involvement in wildlife decision making did not shift markedly during the process. This lack of change probably was attributable to the fact that much information exchanged during the process was not new to VDGIF staff. McConnell (1977:57), working with U. S. Forest Service professionals, suggested that "attitudinal inertia" - certainty or rigidity produced from years of hearing and learning about

issues - may dampen the effects of new information expressed during public involvement. Constituent participation in planning was not new to many VDGIF staff who also were involved 5 years earlier in a similar process to develop Virginia's first statewide deer management plan (Virginia Deer Management Planning Committee 1999).

When they completed their pre-planning survey, VDGIF survey respondents' suggested that constituents should have a significant role in making bear management decisions, particularly those related to developing goals (Figure 2.1). Following planning, they were even more comfortable with goals based on constituent values. Several interviewed staff stated that the planning process reinforced their belief in constituent participation. In other resource management agencies, the amount of experience with public involvement has been shown to change the attitudes of personnel regarding the utility of citizen participation (McConnell 1977, Crompton et al. 1981). McConnell (1977) observed a positive relationship between the frequency of participation by U. S. Forest Service professionals and their attitudes toward public involvement.

Before the planning process, VDGIF representatives were aware of and responsive to public values concerning bear management. Staff may have acquired these characteristics via informal and nebulous processes (e.g., political pressure, talking with constituents, phone calls). The planning process may have validated what VDGIF staff already think and do by shifting constituents' opinions toward their own. If true, this could indicate that agency personnel are good synthesizers of public values. Agency objectives and programs already might reflect diverse public concerns, even without formally derived and publicly developed plans, but without the public support a planning process brings. Another explanation might be that VDGIF staff provided the same information during planning – based on their knowledge of resource capacities and experience working with diverse user groups – that they presently use when making management decisions. As a result, constituents involved in the planning process arrived at the same conclusions professionals already have reached.

Both of these explanations hold, to some extent, for VDGIF staff involved in the development of the black bear management plan in Virginia. Before the planning process, VDGIF staff and constituents (committee and constituent group members) agreed more often than not regarding important bear management issues, suggesting that staff generally were in line with their constituents. Staff expressed similar opinions as their constituents about the

importance of considering the concerns of diverse stakeholders in bear management, the restrained use of lethal methods to manage bear problems, and providing free technical assistance to individuals experiencing bear damage. After the planning process, committee members' opinions about increasing bear populations in all suitable habitats and relocating problem bears converged with those of VDGIF staff. As noted earlier, VDGIF staff shared their perspectives about these 2 management issues during committee meetings.

Moderation of opinions

I expected that interaction among and between constituents and VDGIF staff would moderate opinions about all facets of bear management. However, the use of variance tests did not demonstrate a moderation in most opinions after planning. Only 31 (15%) of 205 total tests revealed significant ($P \leq 0.05$) decreases in the variances of opinion scores. I observed the largest proportion (50%; 4 of 8 tests) of significant variance decreases in the opinions of committee and pooled constituent group members about VDGIF bear management and decision making. This finding may provide weak evidence for a more solidified constituent image of VDGIF after the planning process.

Active versus passive participation

Through group discussion, interaction with VDGIF professionals, and review of constituent group comments and draft management plan components, committee members had more exposure to the planning process than constituent group members and even most VDGIF staff participants. However, both the committee's small size (n = 15), which led to low power, and the compensating effects of individual members' score shifts tempered the apparent influence of their active participation. In a small group, an individual's response can produce or mask a significant result; or, as noted by Marenin (1989), an overall insignificant change in attitudes of participants may mask substantial changes for some participants. I expected certain committee members to shift their opinions in opposite directions as moderated by discussion (Burtt 1920, Jenness 1932). Shifts toward opposing directions likely canceled each other out. Therefore, shifts analyzed and reported for the committee in aggregate may represent minimum impacts of participation on individual members. Nine (23.6%) of 38 location tests performed on committee data were significant at = 0.05; 18 (15.8%) of 114 comparable tests performed on

constituent group members' data were significant. Despite the larger sample sizes and homogeneity of each constituent group in my study, passive participation through various means apparently had less effect than active participation within the committee, a finding similar to those noted elsewhere (Levine and Butler 1952, Lloyd 1973, Leeming et al. 1997).

Mediated involvement, direct mailings, and other avenues of passive participation

Bear Hunters had the most exposure to the planning process, followed by Beekeepers, and lastly, TNC members. The Bear Hunters' representative on the advisory committee frequently exchanged information about the plan with his membership throughout the planning process. In addition to mediated involvement through their representatives on the committee, constituent group members had access to the planning process through a number of avenues (Table 3.1). That Bear Hunters reported the greatest global change in their knowledge and opinions about bear management, followed by Beekeepers, may indicate the influence of their exposure to the planning process. Moreover, given the central role of black bears in Bear Hunters' lives, they likely were more interested in information exchanged during the planning process than were TNC members of Beekeepers.

Bear Hunters' rankings of what sources of information about the plan influenced them most provide evidence for the importance of mediated involvement. Bear Hunters indicated that personal discussion with their own members and literature from their own organization had greater influence in changing their knowledge and opinions about bear management than impersonal sources such as news releases, online resources, or literature provided by VDGIF during the public review period for the draft bear management plan. However, longitudinal analysis of survey responses generally did not indicate that Bear Hunters' discussion with another member was more influential than hearing about the plan from a VDGIF employee or from the newspaper summary.

Beekeepers and TNC members who received a newspaper summary of the draft bear management plan with their post-planning surveys exhibited greater shifts in reported and measured knowledge, greater support for lethal methods to control problem bears, and more positive opinions concerning VDGIF decision making and bear management than those who did not receive a summary. However, only 7.5% of TNC members and 15.9% of Beekeepers who were mailed a summary reported reading or hearing about the bear management plan from that

source, a minority seemingly too small to influence the changes noted above. Therefore, I presume that respondents did not recognize the newspaper summary option presented with the list of other sources of information within a questionnaire item (Table 3.1). Given this likely bias, the lower percentages of TNC members (3.8%) and Beekeepers (5.6%) who were not mailed a summary, but reported reading or hearing about the plan from that source, probably represents less than the maximum population exposure of the newspaper. Besides summaries mailed to a 50% sample of each group, Beekeepers and TNC members may have obtained a newspaper summary through resource agency offices, hunting license vendors, or other outlets VDGIF used to distribute nearly 70,000 copies.

Wildlife managers have an array of choices when deciding how to provide information to their constituents. This study provided evidence for the utility of several different methods for disseminating information, including direct mailings, news releases, discussion with agency professionals, and mediated involvement through active participants. Direct mailings, while perhaps less influential than mediated involvement, have the potential of reaching larger segments of the population and a broader constituent base when active channels of communication between an organization's members and its leadership do not exist. A recent survey of Virginia residents found that direct mailing was the preferred choice for receiving fisheries and wildlife information (McMullin et al. 2000). Given variable costs associated with different methods to disseminate information, further investigation is needed to demonstrate their differential effectiveness.

Self-assessment versus pretest-posttest designs to evaluate changes

Further research may clarify the reliability of participant's self-assessments relative to pretest-posttest designs in evaluating shifts in knowledge, attitudes, and opinions through participation. Self-assessments enabled me to validate shifts observed through longitudinal analysis (e.g., increased concerns about human safety and bears) and expound upon quantitative results limited by the constructs of the survey (e.g., knowledge shift in committee members). Longitudinal analyses and self-assessments did not always agree (e.g., decreased importance placed on agricultural producers' input). Like Marenin (1989), I found fewer differences in participants' shifts using my pretest-posttest format than using self-assessments through post-planning surveys or interviews. It would be premature for me to assert that one method is better

than the other, as self-assessments are more economical and pretest-posttest designs are more statistically rigorous.

I urge caution in extending the results of my pretest-posttest design to all planning processes. I cannot ignore the potential influences of factors outside of the planning process on participants' knowledge, attitudes, and opinions about bears and their management. My design, like that of both Lloyd (1973) and Leeming et al. (1997), falls into the category of "quasi-experimentation" (Cook and Campbell 1979); i.e., it was adapted to a natural setting (the planning process) where I had neither control over the quality of the treatment (participation) nor ability to randomly assign subjects to multiple groups for replication. I could not establish control groups due to the inclusiveness of the planning process and necessity of allowing interested publics to participate at least passively. However, post-planning interviews and participants' self-assessments were instrumental in validating survey responses.

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Table 3.1. Influence of 9 sources of information about the Virginia black bear management plan in changing Virginia Bear Hunters Association (Bear Hunters) members' knowledge and opinions about bear management as reported on post-planning surveys during 2001.

Source	n[a]	Influence ($\bar{x}$)[b]	SE	Differences[c]
1. Newspaper article, TV/radio announcement	43	2.28	0.19	5,6,7,8,9
2. World Wide Web link to the draft plan	34	2.44	0.24	7,8,9
3. Newspaper summary of draft plan	61	2.57	0.15	7,8,9
4. Full text of draft plan	45	2.80	0.20	8,9
5. Discussion with VDGIF[d] employees	64	3.27	0.18	1
6. Discussion with Virginia Tech employees	62	3.27	0.19	1
7. Discussion outside of Bear Hunters	67	3.54	0.16	1,2,3
8. Discussion with other Bear Hunters	88	3.73	0.15	1,2,3,4
9. Bear Hunters newsletters or other literature	94	3.80	0.13	1,2,3,4

[a] Out of 202 total respondents

[b] On a scale of 1 (no influence) to 5 (strong influence)

[c] Numbers in this column correspond to sources in the first column with a different ($P \leq 0.05$) mean influence, according to Tukey's pairwise comparisons.

[d] Virginia Department of Game and Inland Fisheries

Table 3.2. Self-assessed changes in knowledge and opinions about black bear management in Virginia, as reported by members of The Nature Conservancy (TNC), Virginia State Beekeepers Association (Beekeepers), and Virginia Bear Hunters Association (Bear Hunters) who did or did not hear about the bear management plan during the period between the pre- and post-planning surveys (2000 - 2001).

	Knowledge Increase [a]			Opinion Change [b]		
Group	*n*	$\bar{x}$	SE	*n*	$\bar{x}$	SE
Combined constituents						
- Heard about plan	167	2.02*	0.04	168	1.61*	0.05
- Did not hear about plan	429	1.33*	0.02	435	1.30*	0.02
TNC						
- Heard about plan	20	1.95*	0.11	20	1.45**	0.11
- Did not hear about plan	174	1.24*	0.03	176	1.23**	0.03
Beekeepers						
- Heard about plan	45	1.98*	0.08	43	1.49**	0.10
- Did not hear about plan	175	1.33*	0.04	178	1.30**	0.04
Bear Hunters						
- Heard about plan	104	2.05*	0.06	105	1.69**	0.07
- Did not hear about plan	80	1.53*	0.07	81	1.47**	0.07

[a] On a scale of 1 (no change) to 3 (increased greatly)

[b] On a scale of 1 (no change) to 3 (changed greatly)

* $P \leq 0.001$ for each pair

** $P \leq 0.05$ for each pair

Table 3.3. Self-assessed changes in knowledge and opinions about black bear management in Virginia, as reported in 2001 by surveyed members of the Virginia Bear Hunters Association (Bear Hunters) who did or did not read or hear about the bear management plan from 3 different sources.

	Knowledge Increase [a]			Opinion Change [b]		
Source	*n*	$\bar{x}$	SE	*n*	$\bar{x}$	SE
VDGIF[c] newspaper summary	61	2.03*	0.08	61	1.71	0.09
No newspaper summary	136	1.76*	0.06	138	1.55	0.05
Discussion w/VDGIF employee	64	2.11**	0.08	64	1.81**	0.09
No discussion	133	1.71**	0.06	135	1.50**	0.05
Discussion w/Bear Hunter	87	2.12**	0.07	88	1.73*	0.07
No discussion	110	1.63**	0.06	111	1.50*	0.06

[a] On a scale of 1 (no change) to 3 (increased greatly)

[b] On a scale of 1 (no change) to 3 (changed greatly)

[c] Virginia Department of Game and Inland Fisheries

* $P \leq 0.05$ for each pair

** $P \leq 0.001$ for each pair

Table 3.4. Knowledge scores (max. = 15) about black bears and their management in Virginia before (2000) and after (2001) planning for surveyed members of The Nature Conservancy (TNC), Virginia State Beekeepers Association (Beekeepers), and Virginia Bear Hunters Association (Bear Hunters).

	All (n = 640)		TNC (n = 208)		Beekeepers (n = 230)		Bear Hunters (n = 202)	
Time	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Before	6.94*	0.16	4.33*	0.23	5.90*	0.25	10.81**	0.14
After	7.37*	0.16	4.89*	0.23	6.42*	0.25	11.00**	0.15
$\bar{x}_d$	0.43	0.09	0.56	0.19	0.53	0.16	0.19	0.13

* $P \leq 0.001$ for each pair

** $P = 0.04$

Table 3.5. Opinions[a] about the use of lethal methods on problem black bears when human safety is jeopardized, as expressed by surveyed members of The Nature Conservancy (TNC), Virginia State Beekeepers Association (Beekeepers), and Virginia Bear Hunters Association (Bear Hunters) before (2000) and after (2001) planning.

	All (n = 606)		TNC (n = 192)		Beekeepers (n = 221)		Bear Hunters (n = 193)	
Time	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Before	2.01*	0.05	2.18	0.09	1.67**	0.07	2.23*	0.09
After	1.80*	0.04	2.13	0.08	1.49**	0.06	1.84*	0.08
$\bar{x}_d$	-0.21	0.05	-0.06	0.10	-0.19	0.07	-0.38	0.10

[a]1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree

* $P \leq 0.001$ for each pair

** $P = 0.01$

Table 3.6. Pre-post shifts[a] in scores for opinions about the use of lethal methods in bear management, as expressed by members of The Nature Conservancy, Virginia State Beekeepers Association, and Virginia Bear Hunters Association (pooled) who did or did not hear about the bear management plan between surveys (2000 and 2001). Shifts (post-scores minus pre-scores) < 0 indicate shifts toward more agreement and shifts > 0 indicate shifts toward more disagreement.

	Issue								
	Safety[b]			Nonlethal first[c]			Never[d]		
Heard?	*n*	$\bar{x}_d$	SE	*n*	$\bar{x}_d$	SE	*n*	$\bar{x}_d$	SE
Yes	162	-0.40*	0.10	158	-0.08*	0.11	155	0.22*	0.13
No	411	-0.13*	0.06	394	0.09*	0.08	397	-0.09*	0.08

[a] Shifts along a scale where 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree; see Appendix 6 for pre- and post-scores

[b] Lethal methods should be permitted when human safety is jeopardized.

[c] Lethal methods should be used to control agricultural damage, but only when nonlethal methods have been tried first.

[d] Lethal methods should never be used to control agricultural damage.

$P \leq 0.05$ for each pair

Table 3.7. Opinions[a] about Virginia Department of Game and Inland Fisheries (VDGIF) decision making and management of bears, as expressed by surveyed members of The Nature Conservancy, Virginia State Beekeepers Association, and Virginia Bear Hunters Association (pooled) before (2000) and after (2001) planning.

	Issue							
	Well[b] (n = 375)		Biology[c] (n = 383)		Understands[d] (n = 409)		Considers[e] (n = 411)	
Time	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Before	2.17*	0.05	2.07*	0.05	2.34*	0.06	2.46*	0.06
After	2.01*	0.05	1.90*	0.05	2.14*	0.05	2.25*	0.05
$\bar{x}_d$	-0.16	0.05	-0.17	0.05	-0.19	0.06	-0.20	0.06

[a] 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree

[b] VDGIF manages bears well.

[c] VDGIF adequately considers bear biology during decision making.

[d] VDGIF understands the concerns of all parties interested in black bears.

[e] VDGIF considers the concerns of all interested parties fairly during decision making.

* $P \leq 0.001$ for each pair.

Table 3.8. Pre-post shifts [a] in scores for opinions about Virginia Department of Game and Inland Fisheries (VDGIF) decision making and bear management, as expressed by members of The Nature Conservancy, Virginia State Beekeepers Association, and Virginia Bear Hunters Association (pooled) who did or did not hear about the bear management plan between surveys (2000 and 2001). Shifts (post-scores minus pre-scores) < 0 indicate shifts toward more agreement and shifts > 0 indicate shifts toward more disagreement.

	Issue								
	Biology[b]			Understands[c]			Considers[d]		
Heard?	*n*	$\bar{x}_d$	SE	*n*	$\bar{x}_d$	SE	*n*	$\bar{x}_d$	SE
Yes	136	-0.32*	0.08	144	-0.39*	0.10	142	-0.43*	0.10
No	221	-0.10*	0.07	239	-0.10*	0.08	244	-0.11*	0.07

[a] Shifts along a scale where 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree; see Appendix 6 for pre- and post-scores

[b] VDGIF adequately considers bear biology during decision making.

[c] VDGIF understands the concerns of all parties interested in black bears.

[d] VDGIF considers the concerns of all interested parties fairly during decision making.

* $P \leq 0.05$ for each pair.

Table 3.9. Pre-post shifts [a] in scores for opinions about Virginia Department of Game and Inland Fisheries (VDGIF) decision making and bear management, as expressed by members of The Nature Conservancy (TNC) and Virginia State Beekeepers Association (Beekeepers) who did or did not receive a newspaper summary about the bear management plan with their post-planning surveys in 2001. Shifts (post-scores minus pre-scores) < 0 indicate shifts toward more agreement and shifts > 0 indicate shifts toward more disagreement.

	Issue											
	Well[b]			Biology[c]			Understands[d]			Considers[e]		
Group/ Summary?	*n*	$\bar{x}_d$	SE	*n*	$\bar{x}_d$	SE	*n*	$\bar{x}_d$	SE	*n*	$\bar{x}$	SE
Beekprs./ yes	67	-0.48*	0.14	68	-0.27	0.12	84	-0.38	0.14	82	-0.56*	0.13
Beekprs./ no	55	0.00*	0.11	56	-0.18	0.13	63	-0.13	0.15	67	0.03*	0.16
TNC / yes	29	-0.31*	0.11	29	-0.55**	0.15	37	-0.38*	0.16	35	-0.29	0.14
TNC / no	31	0.00*	0.17	38	0.00**	0.11	36	-0.03*	0.17	39	-0.10	0.16

[a] Shifts along a scale where 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree; see Appendix 6 for pre- and post-scores

[b] VDGIF manages bears well.

[c] VDGIF adequately considers bear biology during decision making.

[d] VDGIF understands the concerns of all parties interested in black bears.

[e] VDGIF fairly considers the concerns of all interested parties during decision making.

[*] $P \leq 0.05$ for each pair.

[**] $P \leq 0.001$

Table 3.10. Opinions[a] about the importance of considering stakeholder concerns in management of black bears as expressed by Stakeholder Advisory Committee members before (2000) and after (2001) planning.

	Stakeholder group							
	Watching[b] (n = 14)		Humane[c] (n = 15)		Agricultural[d] (n = 15)		Residential[e] (n = 15)	
Time	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Before	1.71*	0.16	2.20*	0.22	1.27*	0.15	1.53*	0.24
After	2.93*	0.22	3.07*	0.24	2.00*	0.31	2.20*	0.33
$\bar{x}_d$	1.21	0.21	0.87	0.19	0.73	0.23	0.67	0.25

[a] 1 = very important, 2 = somewhat important, 3 = neutral, 4 = somewhat unimportant, 5 = very unimportant

[b] Individuals who primarily are interested in watching or photographing bears

[c] Individuals who primarily are concerned with the humane treatment of bears

[d] Agricultural producers who experience bear damage

[e] Residential landowners who experience bear damage

* $P \leq 0.05$ for each pair.

Table 3.11. Summary of changes in constituent knowledge, attitudes, and opinions, as assessed by use of surveys before (2000) and surveys and interviews after (2001) development of the Virginia Black Bear Management Plan. Signs indicate direction of change: + = greater (expression of knowledge, an attitude, or support), 0 = no change, and – = less.

Knowledge, attitude, or opinion	Committee	Constituent Groups (pooled)
Knowledge about bears and bear management	+[1]	+
Negativistic attitude toward bears	+	0[2]
Ecologistic, humanistic, moralistic, utilitarian attitudes	0	0
Increasing bear populations in biologically suitable areas	–	0
Free trapping services for landowners with bear damage	–	0
Bear hunting (all types)	0	0
Use of lethal methods to control problem bears	0	+
VDGIF bear management and decision making	+	+
Importance of selected stakeholders' input	–[3]	–

[1] Interviews and self-assessments indicated a net increase despite a non-significant increase in survey scores.

[2] The significant decrease in survey scores was probably not meaningful sociologically or psychologically.

[3] Interviews and self-assessments indicated greater respect and tolerance of others views, but survey scores indicated significant decreases in the importance placed on other stakeholders' concerns in bear management.

CHAPTER 4 – DEVELOPMENT OF THE VIRGINIA BLACK BEAR MANAGEMENT PLAN: EVALUATION AND RECOMMENDATIONS

INTRODUCTION

Chapter 3 augments evidence that stakeholder involvement in natural resources planning has positive influences on the knowledge, attitudes, and opinions of participants (McMullin and Nielsen 1991, Landre and Knuth 1993, Stout et al. 1996, Guynn and Landry 1997, Peek 1998, Wondolleck and Yaffee 2000). Following development of the Virginia black bear management plan, constituent participants had an increased understanding of the complexities bear managers face: multi-dimensional issues, diversity of opinions, technological limitations, resource capacities, administrative constraints. Because of their familiarity with bear management issues and the planning process, members of the stakeholder advisory committee had a unique perspective for evaluating the process and the draft plan. Staff from the Virginia Department of Game and Inland Fisheries (VDGIF) responsible for black bear management had important perceptions regarding development of the plan based on their intimate association with bear management issues on a daily basis. Constituent and staff evaluations can help managers improve processes used to involve constituents in wildlife management decisions.

My objectives in this chapter are to (1) evaluate the Virginia black bear management plan and the process used to develop it from the perspectives of stakeholders (including VDGIF staff) closely involved with the planning process, and (2) provide practical recommendations concerning citizen involvement in wildlife decision making based on stakeholders' evaluations, findings from previous chapters, and my experience working with the planning process.

METHODS

Post-planning questionnaires administered to members of the stakeholder advisory committee (n = 15), hereafter called "committee," and VDGIF staff with bear management responsibilities (n = 21) provided respondents an opportunity to briefly evaluate the planning process and the plan (Appendices 2 and 3). During October - November 2001, committee members also had an opportunity to evaluate the plan and the process more fully during a 15-45 minute telephone interview. I used a script to guide my interviews with committee members (Appendix 4). I compiled, condensed, and ranked interview responses by question.

RESULTS

Stakeholder advisory committee

Planning process. – Eleven surveyed committee members were very satisfied with the process used to develop the bear management plan, 3 were somewhat satisfied, and 1 was neutral. Aspects of the planning process that interviewed members liked most included (1) the bringing together of many diverse interests to work toward a common goal; (2) the skill of facilitators in getting all views expressed and keeping the group on task; (3) the organization, efficiency, and pace of the planning process; (4) the atmosphere of acceptance among so many diverse views; (5) the balance of stakeholder interests represented; and (6) the opportunity to learn about the intricacies of bear management. Aspects of the planning process that interviewed members liked least included (1) being rushed at some of the committee meetings, making it tough to get closure on certain aspects; (2) the brief public comment period; (3) the long road trips to the committee meetings, which made attending difficult for some representatives; and (4) the scientific level of discussion before some members were familiar enough to be conversant.

During interviews, committee members generally indicated that all stakeholders had equal opportunity to participate in the planning process. Nine committee members expressed disappointment with the Virginia Farm Bureau Federation for their lack of participation, noting that the group's absence at committee meetings was not a fault of the process. Four members expressed disappointment with The Virginia Chapter of The Nature Conservancy for a lack of continuity in representation at committee meetings. One member noted that there was inadequate representation from broad-based environmental concerns. Three members noted that anti-hunters, while missing from the committee, would have only impeded the process. Several members noted that committee members most familiar with black bears dominated discussions but that other members generally benefited from their ideas. Two committee members were concerned that bear hunters and other hunters were represented disproportionately more on the committee and at least one of the regional input meetings than other interests.

Plan. – Ten members were very satisfied with the draft black bear management plan endorsed by the committee, 4 were somewhat satisfied, and 1 was neutral. Aspects of the plan that interviewed members liked most included (1) its comprehensiveness with respect to bear management across Virginia, (2) that it gives VDGIF tools and direction necessary to ensure the long term viability of bears, (3) that it covers multiple options for managing bears, and (4)that it

is balanced with respect to hunting and other concerns. Aspects of the plan that interviewed members liked least included (1) its lack of firm strategies to assist landowners with bear damage, especially regarding use and effectiveness of aversive conditioning and other nonlethal damage abatement techniques; (2) its overwhelming appearance to the reader, pronounced by the lack of an executive summary; and (3) its direction away from trapping and relocation as the preferred damage control option. Three members expressed concern that the plan will not be implemented as written due to budgetary or administrative constraints.

During interviews, committee members generally indicated that the plan provided adequate, balanced treatment of all topics. Several committee members noted that the plan should have addressed in more detail the resolution of bear problems and how to assist those experiencing damage (e.g., how and when nonlethal methods and kill permits will be used and how bear hunters can help VDGIF manage bear problems). Two members suggested that the opening of new bear seasons and the allocation of bear harvest/seasons were not addressed adequately in the plan. One member suggested that the role of highway underpasses in bear survival needed more attention whereas another suggested that highway underpasses were addressed too much. One member suggested that the bear plan addressed population viability more than necessary.

VDGIF staff

Planning process. – Fourteen surveyed VDGIF staff were very satisfied with the process used to develop the black bear management plan and 7 were somewhat satisfied. Positive aspects of the planning process mentioned by VDGIF staff on post-surveys included (1) constituent support and ownership gained for future management, (2) productive interchange of ideas and values between diverse stakeholder groups, (3) development of positive relationships between constituents and the VDGIF and among constituents, (4) education of constituents, (5) incorporation of staff input from across the state, and (6) the balance of public goal setting and professional implementation. Negative aspects of the planning process mentioned by VDGIF staff on post-surveys included (1) limited geographic representation by some stakeholders, (2) the brief public comment period, (3) exclusion of certain stakeholders (e.g., anti-hunters) from participating, (4) the potential inordinate influence of stakeholders who may have used bears to advance other agendas, (5) administrative staff's failure to obtain input from experienced field

staff regarding nuisance bear issues, (6) the hurried pace to meet deadlines that left some topics without complete closure, (7) the extra burden on staff, and (8) the time it took to produce a draft plan.

Plan. – Twelve surveyed VDGIF staff were very satisfied with the black bear management plan, 8 were somewhat satisfied, and 1 had no opinion because he had not seen the plan. Positive aspects of the draft bear management plan mentioned by VDGIF staff on post-surveys included its management direction, its comprehensiveness, its collection of information on bear biology and management, its dynamic nature, its balanced approach with respect to all stakeholders, and its embodiment as Virginia's bear plan rather than VDGIF's bear plan. Negative aspects of the draft bear management plan mentioned by VDGIF staff on post-surveys included its lack of specifics regarding damage management, its length, its idealistic target dates for meeting objectives, and its lack of clarity about the mechanisms to be used for updating objectives.

DISCUSSION AND RECOMMENDATIONS

Overall, staff and committee members were pleased with both the draft bear management plan and the process used to develop the plan. Positive aspects of the draft plan cited by both committee members and VDGIF staff were its management direction, its comprehensiveness, and its balanced treatment of stakeholder concerns; negative aspects were its unspecific strategies to address bear damage and its length and/or inadequate summary. Positive aspects of the planning process cited by both committee members and VDGIF staff were collaboration among diverse stakeholders and education of constituents; negative aspects were the brief public comment period and the hurried pace that precluded closure on some issues. These evaluations, along with results discussed elsewhere in my thesis, have implications for future processes used to make wildlife management decisions involving constituents, particularly those that concern controversial, high profile species like the black bear.

Recommendation 1: Use a decision-making approach that balances sound biology and constituent values in management, and that clearly distinguishes the role of constituents in making value choices from the role of professionals in making technical decisions.

As noted elsewhere, effective management provides for meaningful constituent participation in decision-making processes while also maintaining the important technical role of wildlife professionals in the management process (McMullin 1996). My results indicate that VDGIF staff welcome constituent involvement throughout the decision-making process, particularly in establishing value-driven goals for management (Figure 2.1). Development of the Virginia black bear management plan provides an example of the practical application of this approach. Early in the planning process, facilitators established the ground rules and procedures: committee members, with the aid of input from a broad constituent base, would provide the values to drive bear management and professionals would design objectives and strategies to attain these goals. This process resulted in clear direction for VDGIF to manage bears, as noted by committee members and staff during evaluations.

Facilitators should stress the distinction between constituent and professional roles in future decision-making efforts. As evidenced by comments during their evaluations and their insistence on discussing specific strategies during committee meetings, members apparently had expectations to delve into details for issues where the plan gave general direction but left implementation to professionals. At the same time, professionals must be cautious not to ignore constituents' sentiments about specific strategies, as value decisions have a part to play in selecting any one of several technically valid options (e.g., kill permits, aversive conditioning, trapping and relocating).

Recommendation 2: Use multiple public involvement techniques from beginning to end of a decision-making process.

Multiple involvement techniques increase the opportunities for more people to become involved and the techniques often complement or enhance one another. During development of the black bear management plan, logistics limited the number of advisory committee representatives to invite and constituent groups to survey. However, criticisms that VDGIF excluded certain stakeholder interests largely are unfounded if one looks at all interests that were represented through focus groups, regional input meetings, and draft plan review (VDGIF 2001, appendices). Focus groups were important in exploring wording for my survey questions (Minnis et al. 1997). More importantly, focus groups gave me and other facilitators thorough insights into all key issues early during the process so that we were not taken off guard with new

issues as we facilitated regional meetings and advisory committee meetings. Surveys were important to keep committee representatives in touch with their constituents, regional input meetings were important to validate locally the statewide direction offered by the committee, and draft plan review was an important filter to reveal public concerns overlooked by committee representatives and VDGIF staff.

Recommendation 3: Establish a collaborative forum among diverse stakeholders.

When the process used to make management decisions is as important as the decision quality (McMullin 1996), it is important to use a collaborative forum whereby diverse stakeholders can meet face to face to exchange ideas among themselves and with professionals (e.g., the stakeholder advisory committee used during development of the Virginia black bear management plan, the citizen task force used by Stout et al. [1996]). My research and that of Jenness (1932), Levine and Butler (1952), and Lloyd (1973) show that active participation through group discussion influences participants' knowledge, attitudes, and opinions. Discussion permits various parties to appreciate the complexities of managing natural resources and to actively learn about one another on common terms (Stout et al. 1996). Representatives who served on the stakeholder advisory committee during development of the Virginia black bear management plan represented homeowners, sportsmen, nonconsumptive interests, agricultural producers, commercial timber industry, and resource management agencies other than VDGIF. Discussion among committee members in an atmosphere of acceptance encouraged understanding about the activities, plights, motivations, similarities, and differences of other constituents as well as challenges facing VDGIF staff. The end result was a committee that functioned and saw itself as a team charged with a common purpose – to develop a mutually acceptable bear management plan for all citizens of the Commonwealth.

Recommendation 4: Reach out to broad constituencies, including both traditional and nontraditional stakeholders, through various channels during decision-making.

My results demonstrate the need to think beyond the obvious, active participants when considering the influence and scope of public involvement processes. The interaction I documented during interviews between stakeholder advisory committee members and their constituents suggests that mediated involvement may be an important and cost-effective transfer

of information during planning processes. Although most committee members reported that they communicated with other citizens about the bear management plan, most indicated that their outreach was irregular and limited in scope. Bear plan facilitators should have provided more encouragement for committee members to carry their messages back to constituents and to facilitate coverage of the bear planning process in their organizational literature. The influences of frequent interactions between the members of the Virginia Bear Hunters Association and its representative on the committee is evidence for the effectiveness of mediated involvement.

If mediated involvement has limited potential for some stakeholder groups, direct mailings to their broader constituencies holds promise. Mailing newspaper summaries of the draft black bear management plan to members of Virginia State Beekeepers Association and the Virginia Chapter of The Nature Conservancy (TNC) apparently influenced members' knowledge and opinions. Using a combination of techniques may be necessary to reach stakeholders that have only recently begun expressing an interest in bear management. Traditional stakeholders (e.g., bear hunters, agricultural producers) are easier to reach, but the challenge for VDGIF remains to reach out to those constituencies like TNC who now demand a greater voice in wildlife management, but who are less familiar with resources and their management than the traditional groups. Traditional stakeholders will remain important, but VDGIF must embrace nontraditional groups to be effective in future management decisions (McMullin et al. 2000).

Recommendation 5: Follow through after decision making by nurturing relationships with constituents and enlisting their support throughout implementation.

Following planning processes, such as the one used to develop the Virginia black bear management plan, managers may be tempted to bask in their improved image and become complacent about their relationships with constituents. However, as Beck et al. (1994) admonished, wildlife managers must strive to maintain dialogue with and among competing stakeholders to prevent adversarial public relations in the future. Virginia bear managers currently enjoy unprecedented relationships with various stakeholder groups. However, the bear plan's proof will be in its implementation, a task that will be impossible unless VDGIF nurtures its newfound relationships with dedicated stakeholders.

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APPENDIX 1. FOCUS GROUP SCRIPTS.

The following questions were asked of participants during 5 focus group discussions early in the planning process (Dec 1999 – Jan 2000). One focus group was conducted for each of the following key stakeholder groups: (1) personnel from agencies besides Virginia Department of Game and Inland Fisheries (VDGIF) with interests in black bear management, (2) individuals who had experienced problems associated with bears (e.g., agricultural producers), (3) individuals with primarily nonconsumptive interests in bears, (4) bear hunters who used dogs, and (5) bear hunters who did not use dogs.

(1) Agency personnel besides VDGIF

- In what ways does your agency have an interest in black bear management?
- What are the most important bear management issues facing your agency?
- Is there a working relationship between your agency and VDGIF? Can it be improved?
- What black bear stakeholders do you hear from the most?
- Are there other stakeholders we haven't mentioned that should be involved with this bear management planning process?

(2) Individuals experiencing bear problems

- Briefly tell us what bear-related problems you've experienced.
- In general, tell us how you feel about black bears in Virginia.
- Are they just a problem?
- Are there times when you enjoy having or seeing bears on your property?
- Do you think there are too few, too many, or just the right number of bears in the area where you live?
- Many techniques have been used in an attempt to manage nuisance bears. As you may well - know, they may not all be equally effective. Here are a few of the major ones that we have come up with:

    Lethal
    - Kill permits - in or out of regular season
    - Trap and kill
    - Hunting – within season or during site specific hunt season
    - Other?

    Non-lethal
    - Preventive measures – physical deterrence or harassment
    - Trap and relocate?
    - Other?
    - Is education needed?

- What is your preference for dealing with nuisance black bears on your property?
- What kind of problems do producers see with kill permits?

- Are there harassment measure that work for bears?
- Does anything work?
- We were unable to find a representative for folks receiving chronic residential damage, but wonder if education about food or garbage storage may be the problem there.
- Looking back, is there anything any of you could have done differently to prevent attracting bears in the first place?
- Is trapping and relocating the problem?
- Have some of you benefited from trapping and relocating?
- Are there hunters in your area who would hunt under a special site-specific hunt when the damage occurs?
- Would such a hunt be effective?
- Is there a general policy or procedure VDGIF should follow in responding to nuisance complaints? For example, should non-lethal options always be attempted before lethal ones are considered?
- How about a 2 or 3 strikes and the bear's out policy?
- How serious of a problem is bear hunter trespass on your land?
- Judging from what you have personally experienced (not just what you have heard), is this problem widespread?
- How has it been resolved to date?
- Besides moving the dog-hunting boundary and changing the dog search law, what else would you like to have done about trespass of bear hunters on your land in the future?
- Have any of the rest of you have any problems with bear hunters?
- Does the new chase season cause you any problems?
- Going back to bear damage, we have two questions I'll ask together since they are related. First, should you be compensated for bear damage? Secondly, should you be compensated for preventive measures you put in place to prevent bear damage?
- Who should pay compensation?
- Should hunters pay for compensation?
- Should general public tax revenues be used for compensation?
- Should counties pay you for compensation?
- Should only damage that directly affects your livelihood be compensated?
- Should damage to hobby or non-commercial, private ventures also be compensated?
- Does it seem more fair one way or the other?
- If you used preventive measures, should you be compensated?
- How well have your bear problems been handled?
- Has the response been timely?
- Would it have been resolved without assistance from VDGIF or others?
- Who do you think to call first for assistance?
- Sheriff's or animal control offices? Or cooperative extension?
- Have you felt satisfied that your concerns were balanced with others?
- At this time, we'd like to open the floor to any of you who have additional comments. There may be something you'd like to say or ask about which we haven't covered.

<u>(3) Individuals with nonconsumptive interests</u>

- What are your primary interests and concerns about black bears in Virginia?

- How have your current attitudes toward bears developed? Have they always been positive? Have you had negative experiences with black bears?
- Do you think there are too few, too many, or just the right number of bears in your area
- Do you feel that bear populations should be allowed to grow in any habitats that will support more bears in Virginia?
- Should the state reintroduce bears into sparsely occupied or unoccupied habitats?
- Are there any areas in Virginia where bear populations should be managed below biological carrying capacity?
- Are the following factors affecting the long-term viability of black bear populations that you feel need addressing now: Hunting pressure? Poaching/sale of bear parts? Attitudes and tolerance of landowners? Habitat destruction (urban sprawl? timber management? open roads?)? Lack of habitat connectivity and corridors?"
- Are all interested parties are given equitable consideration in bear management? Why do you think this is the case?
- Do you feel that bears should or should not be hunted in Virginia? If not, do you feel this way just about bears or other animals also?
- Do you feel that the bear populations can sustain the current hunting pressure?
- Do you feel differently about hunting bears with and without dogs?
- Do you feel differently about hunters pursuing bears during the firearms season and during the chase season?
- Is there a general policy or procedure that should be followed in responding to nuisance bear complaints? For example, should non-lethal options always be attempted before lethal methods are considered?
- Should lethal methods ever be an option in dealing with nuisance bears?
- How would you feel about a '2 or 3 strikes and the bear is out' policy?
- How do you feel about compensation for crop damage? Should people who use preventive measures to protect resources be compensated for their costs?

(4) Bear hunters who use dogs

- Please tell us how you became interested in bear hunting.
- How important is bear hunting for you compared to other types of hunting and recreation?
- What are top three most important aspects of bear hunting for you?
- Do you try to take only trophies or will any bear do?
- Do you think there are too many, too few, or the right number of bears where you hunt?
- Are there areas where the bear populations are small enough that bears should be reintroduced?
- Are there areas in Virginia where bear numbers should be kept below what the habitat could support?
- Are there certain places in Virginia where bear hunting should not be allowed? Are there forested areas that are too small or too close to residential areas to run dogs? How large of an area do you have to have before you're sure dogs aren't going to get into trouble?
- In general, how do you feel about seasons and regulations for black bear hunting in Virginia?
- In general, if you had to choose, would you take more harvest and less chase or more harvest and less chase?
- Do you all feel differently about killing deer with bows than killing bears with bows?
- Should Virginia have a special bear hunting license?

- How do you feel about group tags?
- Should non-lethal methods always be attempted before lethal options in dealing with nuisance bears?
- Should lethal methods ever be an option?
- How would you all feel about site-specific hunts at the time of damage being administered? This would be done by rules of fair chase and may include killing or not killing the bears.
- What would you think about a two or three strikes and the bear's out policy?
- In general, how do you feel about trapping and relocating bears to other areas of the state?
- Do you feel that all interested parties are given equal consideration in bear management?
- Should bear management be based more on biological information or user interests?
- How do you feel about the one-week overlap in deer season and bear season during which dogs may not be used?

(5) Bear hunters who do not use dogs

- What experience have you had hunting bears and what is your weapon of choice?
- How important is bear hunting for you compared to other types of hunting and recreation?
- Are there any times when you go out just to hunt bears?
- What are top three most important aspects of bear hunting for you?
- Do any of you hunt because of the equipment or weapons?
- Is scouting important to you?
- Is harvesting any bear acceptable or does it have to be a trophy?
- Do you think there are too many, too few, or just the right number of bears where you hunt?
- Should bear populations be allowed to increase in all habitats that will support more bears?
- Are there any areas in the state where bears should be actively reintroduced?
- Would you prefer reintroduction or natural movement of bears along habitat corridors to recover bear populations in the lower density areas?
- Are there areas where bear populations should be kept below what the habitat will support?
- Should bears be kept below their biological carrying capacity in agricultural areas?
- Are there areas where bear hunting should not be allowed?
- Are there any forested areas too small to hunt with dogs?
- How do you feel about bow hunting in crop fields adjacent to Shenandoah National Park or Great Dismal Swamp?
- How do you feel about baiting bears in Virginia?
- How do you feel about the current seasons and regulations for hunting bears in Virginia?
- Is there a difference in using dogs during the chase season versus the later hunting season?
- Is the ethics or fair chase the problem with dog hunting?
- Should there be only one bear season during which all legal methods are used?
- Can the bear populations sustain the pressure from current hunting seasons and regulations?
- Should we have a special bear hunting license in Virginia?
- Should nonlethal methods always be attempted before lethal options for controlling nuisance bear problems are considered?
- Should lethal methods ever be an option? If so, under what circumstances?
- How would you feel about site-specific special hunts designed to kill bears at time of damage?
- How do you feel about trapping and relocating nuisance black bears?
- How about a 2 or 3 strikes and the bear is out protocol?

APPENDIX 2. CONSTITUENT QUESTIONNAIRE.

The following questionnaire, modified from its original format in Survey Pro©, was administered to members of the stakeholder advisory committee and members of 3 constituent groups: The Nature Conservancy (Virginia Chapter), the Virginia State Beekeepers Association, and the Virginia Bear Hunters Association both before (2000) and after (2001) the planning process used to develop the Virginia Black Bear Management Plan. Items in **bold** (23-30) near the end of this appendix were used only on the pre-planning questionnaires, and items in *italics* at the end of the appendix were used only on the post-planning questionnaires. Notes within brackets [] are included in this appendix to remove duplication or clarify items.

1) The statements below represent different attitudes people may have about black bears. Please indicate the extent to which you personally agree or disagree with each statement. If you have no opinion, please mark "No opinion." [All 15 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion. In parentheses following these statements, E = ecologistic, H = humanistic, M = moralistic, N = negativistic, and U = utilitarian.]

(a) My interest in bears focuses less on individual bears and more on bear populations (E).
(b) I am naturally drawn to black bears because of their human-like qualities (H).
(c) I see little wrong with hunting black bears as long as their populations are not endangered (M).
(d) I would rather see black bears on television or in a zoo than in the forests near my home (N).
(e) I approve of protecting bears even if it hurts economic development (U).
(f) My interest in bears is related to the role of the species as an indicator of healthy ecosystems (E).
(g) The idea of loving a wild animal like a black bear strikes me as a strange emotion (H).
(h) I believe that black bears have a right not to have pain inflicted on them by humans (M).
(i) I am not afraid of black bears when I am in the woods (N).
(j) An important value of black bears is the use of their meat for human consumption (U).
(k) I have little interest in learning about the role of black bears in the ecosystem (E).
(l) It is important that we nurture orphaned black bear cubs (H).
(m) Although hunting bears may be legal, I consider the activity ethically wrong under any circumstances (M).
(n) I am concerned that black bears will harm my children or pets (N).
(o) If bear populations are managed properly, hunting bears for their annual surplus is no different than harvesting apples each year (U).

(2) The following statements pertain to specific bear management issues in Virginia. Please indicate the extent to which you agree or disagree with each statement. If you have no opinion, please mark "No opinion." [All 15 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion.]

(a) Management efforts by the Virginia Department of Game and Inland Fisheries (VDGIF) should be directed toward increasing black bear populations in all habitats in Virginia that are biologically suitable.

(b) Management efforts by VDGIF should be directed toward decreasing black bear populations in all areas in Virginia where conflict with humans is common.
(c) Agricultural producers in Virginia should be paid for damage caused by black bears to crops, orchards, beeyards, livestock, etc...
(d) Agricultural producers in Virginia should be reimbursed for measures they take (e.g., fencing) to prevent damage by black bears.
(e) The VDGIF should provide free materials to agricultural producers in Virginia who take measures to prevent damage by black bears.
(f) The VDGIF should provide free on-site advice to property owners (agricultural and residential) in Virginia experiencing damage caused by black bears.
(g) The VDGIF should provide free trapping services to remove black bears causing damage to agricultural or residential property in Virginia.
(h) In general, I support bear hunting in Virginia.
(i) I support the use of dogs to hunt bears in Virginia.
(j) I support the use of dogs to chase bears in Virginia during hound training season (when hunters may chase bears but not kill them).
(k) I support the use of bows to hunt bears in Virginia.
(l) I support the use of firearms to hunt bears in Virginia.
(m) The VDGIF should collect valuable parts from legally harvested black bears and sell them as a source of agency revenue.
(n) The sale of bear parts by private individuals should be legalized in Virginia.
(o) Use of lethal methods should be permitted to address problem black bears in Virginia when human safety is jeopardized.

3) Lethal methods of controlling agricultural damage caused by black bears in Virginia should... [All 3 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion.]

(a) Never be used.
(b) Be used regardless of whether nonlethal methods have been tried.
(c) Be used only when nonlethal methods have been tried, but were not effective.

4) Lethal methods of controlling residential damage caused by black bears in Virginia should... [All 3 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion.]

(a) Never be used.
(b) Be used regardless of whether nonlethal methods have been tried.
(c) Be used only when nonlethal methods have been tried, but were not effective.

5) The following statements pertain to black bear management and decision making by VDGIF. Please indicate the extent to which you agree or disagree with each statement. If you have no opinion, please mark "No opinion." [All 5 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion.]

(a) I believe that VDGIF manages Virginia's black bears well.

(b) I believe that VDGIF adequately considers information about black bear biology when making management decisions about black bears.
(c) I believe that VDGIF understands the concerns of all parties interested in black bears.
(d) I believe that VDGIF fairly considers the concerns of all interested parties when making management decisions about black bears.
(e) I believe that VDGIF places more emphasis on biology than on the concerns of interested parties when making black bear management decisions.

6) The following statements pertain to different parties interested in black bears in Virginia. Please indicate how important you think it is to consider concerns of the following groups in management of black bears in Virginia. If you have no opinion, please mark "No opinion." [All 9 items were scaled 1 = very important, 2 = somewhat important, 3 = neutral, 4 = somewhat unimportant, 5 = very unimportant, 6 = no opinion.]

(a) Personnel from government agencies besides VDGIF that are affected by bear management in Virginia (e.g., U.S. Forest Service, Shenandoah National Park, etc..)
(b) Black bear researchers and scientists
(c) Individuals who primarily are interested in watching or photographing bears.
(d) Individuals who primarily are concerned with the humane treatment and prevention of cruelty to bears
(e) Individuals who primarily are concerned with preserving bears and bear habitat.
(f) Agricultural producers who receive damage from bears
(g) Residential landowners who receive damage from bears
(h) Bear hunters who use dogs
(i) Bear hunters who do not use dogs

Items 7-21 are intended to assess your familiarity with certain aspects of black bear biology and management in Virginia. Please mark the box corresponding to what you believe is the most correct answer. Please check only one box per item. If you do not know or are not sure, please mark "Not sure." [Items 7-11 were scaled 1 = true, 2 = false, 3 = not sure.]

7) In Virginia, an average of 4 to 5 people per year suffer personal injuries resulting from attacks by black bears.

8) Male black bears regularly patrol a larger area than female black bears.

9) Female black bears generally enter their winter dens later than male black bears.

10) Approximately one-half of all black bears legally harvested in Virginia each year are females.

11) In most places where black bears are found in Virginia, acorns are an important component of their diet.

12) The diet of black bears living in Virginia consists of....
[ ] Mostly animal matter. [ ] Equal portions of animal and plant matter. [ ] Mostly plant matter.

[ ] Not sure

13) Compared to other land mammals in North America, the rate at which black bear populations can grow, under best conditions, is considered to be....
[ ] Slow. [ ] Moderate. [ ] Fast. [ ] Not sure

14) On average, how frequently do female black bears give birth?
[ ] Every year [ ] Every other year [ ] Every 3 years [ ] Not sure

15) A female black bear gives birth....
[ ] Before entering her winter den. [ ] While in her winter den. [ ] After emerging from her winter den. [ ] Not sure

16) Black bears in Virginia may den in....
[ ] Hollow trees. [ ] Thickets on the ground. [ ] Caves and rock cavities. [ ] All of the above.
[ ] Not sure

17) The average weight of an adult male black bear in Virginia is....
[ ] 50-200 pounds (23-91 kg.). [ ] 201-350 pounds (91-159 kg.). [ ] 351-500 pounds (159-227 kg.). [ ] 501-650 pounds (227-295 kg.). [ ] Not sure

18) Legal harvests, nuisance reports, road kills, and incidental sightings of black bears over the last 20 years in Virginia have....
[ ] Increased. [ ] Remained stable. [ ] Decreased. [ ] Not sure

19) Over the last 10 years, most legally harvested black bears in Virginia were taken during which season?
[ ] Archery season for bears. [ ] Firearms season for bears when dogs are not allowed. [ ] Firearms season for bears when dogs are allowed. [ ] Not sure

20) Reproducing populations of black bears in Virginia are largely confined to....
[ ] The western mountains and the southern Piedmont. [ ] The central Piedmont and the Great Dismal Swamp. [ ] The western mountains and the Great Dismal Swamp. [ ] Not sure

21) The Virginia Department of Game and Inland Fisheries annually receives the greatest number of complaints about which type of black bear activity statewide in Virginia?
[ ] Damage in orchards (breaking limbs, eating fruit) [ ] Damage in bee yards (breaking hives, eating honey and bee larvae) [ ] Damage in corn fields (knocking down stalks, eating corn) [ ] Killing livestock [ ] Damage to residential property and other residential nuisances (destroying bird feeders, getting into trash, eating pet food, etc.) [ ] Not sure

22) Please indicate whether you believe there currently are too many, too few, or just the right number of black bears in the city or county where you now live. If you have no opinion, please mark "No opinion."
[ ] Too many [ ] Too few [ ] Just the right number [ ] No opinion

[Questions 23-30, in bold below, were used only on pre-planning questionnaires.]

23) What is your city or county of residence? _____

24) Have you hunted any species of game in Virginia during the last 5 years? [ ] Yes [ ] No

25) Have you hunted black bears in Virginia during the last 5 years? [ ] Yes [ ] No

If yes, how often, on average, have you hunted black bears in Virginia during the last 5 years?
[ ] Less than 1 day per year [ ] 1-5 days per year [ ] 6-10 days per year [ ] More than 10 days per year

26) Have you attempted to observe or photograph a wild black bear in Virginia during the last 5 years?
[ ] Yes [ ] No

If yes, how often, on average, have you attempted to observe or photograph wild black bears in Virginia during the last 5 years?
[ ] Less than 1 day per year [ ] 1-5 days per year [ ] 6-10 days per year [ ] More than 10 days per year

27) Have you experienced property damage or injury from a wild black bear in Virginia during the last 5 years?
[ ] Yes [ ] No

(a) If yes, what type(s) of damage or injuries have you experienced? _____

(b) How often, on average, have you experienced damage or injury from wild black bears in Virginia during the last 5 years?
[ ] Less than once per year [ ] 1 to 5 times per year [ ] 6 to 10 times per year [ ] More than 10 times per year

28) In what ways have you had contact with VDGIF personnel during the past 5 years? Please check all that apply.
[ ] At a public meeting held by VDGIF [ ] At a VDGIF office [ ] At a club or organizational meeting [ ] At a show or exposition [ ] Through a phone conversation [ ] Through a visit by VDGIF personnel to my home or property [ ] Through working with VDGIF personnel in a professional capacity [ ] Other (please list)_____ [ ] No contact

29) From what source have you received most of your information about black bears? Please choose only one response option below.
[ ] Personal experience or observation [ ] Books [ ] Magazines or other popular publications [ ] Technical publications [ ] Television [ ] Friends or family [ ] Bear researchers or scientists [ ] Other (Please list) _____

30) Before you received this survey, were you aware that the Virginia Department of Game and Inland Fisheries (VDGIF) is developing a statewide black bear management plan? [ ] Yes [ ] No

Do you have other thoughts or concerns about black bears or black bear management in Virginia that you would like to share with us? Please use the space below or on the back of this questionnaire to provide your comments.

[Questions 23-26, italicized below, were used only on post-planning questionnaires administered to members of the 3 constituent groups.]

23) Since you received our first black bear survey last year, have you heard or read any more about the Virginia Black Bear Management Plan? [ ] Yes [ ] No

24) For each item listed below, please check the box if you have heard or read about the VA Black Bear Management Plan from that source (please check all items that apply). Then, for each item you checked, please indicate by circling a number from 1 to 5 on the scale to the right of that item how much influence that item has had on changing your knowledge and opinions about black bear management in Virginia. [All10 items were scaled from 1 = no influence to 5 = strong influence.]

[ ] A newspaper summary entitled "DRAFT Virginia Black Bear Management Plan"
[ ] A full text version (app. 85 pages) of VDGIF's "DRAFT Virginia Black Bear Management Plan"
[ ] A newspaper article or radio/TV announcement about the VA Black Bear Management Plan
[ ] The VDGIF World Wide Web (internet) link to the VA Black Bear Management Plan
[ ] Direct personal discussion of the VA Black Bear Management Plan with VDGIF employees
[ ] Direct personal discussion of the VA Black Bear Management Plan with Virginia Tech employees
[ ] Newsletters or other literature about the VA Black Bear Management Plan provided by the VA Chapter of The Nature Conservancy [or Virginia Bear Hunter Association or Virginia State Beekeeper Assocation]
[ ] Direct communication about the VA Black Bear Management Plan with other members of the VA Chapter of The Nature Conservancy[or Virginia Bear Hunter Association or Virginia State Beekeeper Assocation]
[ ] Direct communication about the VA Black Bear Management Plan with friends, family, or other associates outside the VA Chapter of The Nature Conservancy[or Virginia Bear Hunter Association or Virginia State Beekeeper Assocation]
[ ] Other _____ (Please list only one other source of information)

25) Compared to last year, when you received our first black bear survey, would you say that your knowledge about black bear management in Virginia has...?
[ ] Not changed at all [ ] Increased slightly [ ] Increased greatly

26) Compared to last year, when you received our first black bear survey, would you say that your opinions about black bear management in Virginia have...?
[ ] Not changed at all [ ] Changed slightly [ ] Changed greatly

[Questions 23-28, italicized below, were used only on post-planning questionnaires administered to members of the stakeholder advisory committee.]

(23) Compared to last year, when you completed our first black bear survey, would you say that your knowledge about black bear management in Virginia has...?
[ ] Not changed at all [ ] Increased slightly [ ] Increased greatly

(24) Compared to last year, when you completed our first black bear survey, would you say that your opinions about black bear management in Virginia have...?
[ ] Not changed at all [ ] Changed slightly [ ] Changed greatly

In what specific ways have your opinions changed?_____

(25) Compared to last year, when you completed our first black bear survey, would you say that your opinions about other parties interested in black bears in Virginia have...?
[ ] Not changed at all [ ] Changed slightly [ ] Changed greatly

In what specific ways have your opinions changed?_____

(26) How satisfied are you with ... [Both items were scaled 1 = very satisfied, 2 = somewhat satisfied, 3 = neutral, 4 = somewhat dissatisfied, 5 = very dissatisfied, and 6 = no opinion]

...the process we used to develop the Virginia Black Bear Management Plan?
...the end product we call the Virginia Black Bear Management Plan?

(27) What was particularly good or bad about the planning process?_____

(28) What is particularly good or bad about the plan?_____

APPENDIX 3. VDGIF STAFF QUESTIONNAIRE.

The following questionnaire, modified from its original format in Survey Pro©, was administered to Virginia Department of Game and Inland Fisheries staff with responsibilities for black bear management both before (2000) and after (2001) the planning process used to develop the Virginia Black Bear Management Plan. Items in *italics* at the end of the appendix were used only on the post-planning questionnaires. Notes within brackets [] are included in this appendix to remove duplication or clarify items.

Items 1-16 pertain to specific bear management issues in Virginia. Please indicate the extent to which you agree or disagree with each statement. If you have no opinion, please mark "No opinion." [All 10 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion.]

(1) Management efforts by the Virginia Department of Game and Inland Fisheries (VDGIF) should be directed toward increasing black bear populations in all habitats in Virginia that are biologically suitable.
(2) Management efforts by VDGIF should be directed toward decreasing black bear populations in all areas in Virginia where conflict with humans is common.
(3) Agricultural producers in Virginia should be paid for damage caused by black bears to crops, orchards, beeyards, livestock, etc...
(4) Agricultural producers in Virginia should be reimbursed for measures they take (e.g., fencing) to prevent damage by black bears.
(5) The VDGIF should provide free materials to agricultural producers in Virginia who take measures to prevent damage by black bears.
(6) The VDGIF should provide free on-site advice to property owners (agricultural and residential) in Virginia experiencing damage caused by black bears.
(7) The VDGIF should provide free trapping services to remove black bears causing damage to agricultural or residential property in Virginia.
(8) The VDGIF should collect valuable parts from legally harvested black bears and sell them as a source of agency revenue.
(9) The sale of bear parts by private individuals should be legalized in Virginia.
(10) Use of lethal methods should be permitted to address problem black bears in Virginia when human safety is jeopardized.

Lethal methods of controlling agricultural damage caused by black bears in Virginia should... [All 3 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion.]

(11) Never be used.
(12) Be used regardless of whether nonlethal methods have been tried.
(13) Be used only when nonlethal methods have been tried, but were not effective.

Lethal methods of controlling residential damage caused by black bears in Virginia should... [All 3 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion.]

(14) Never be used.
(15) Be used regardless of whether nonlethal methods have been tried.
(16) Be used only when nonlethal methods have been tried, but were not effective.

Items 17-19 pertain to general policies for VDGIF's management of nuisance black bears. Please indicate the extent to which you agree or disagree with each statement. If you have no opinion, please mark "No opinion." [All 3 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion.]

(17) Regional VDGIF personnel should have primary responsibility for managing nuisance bears within their own regions.
(18) VDGIF personnel should follow standard procedures in their responses to nuisance bear management.
(19) The current nuisance bear management protocol is effective.

Items 20-31 briefly describe options for managing black bears. For each of the following, please indicate the extent to which you agree or disagree that the option is appropriate for managing black bears in Virginia. If you have no opinion or are not familiar with an option below, please mark "No opinion." [All 12 items were scaled 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat agree, 5 = strongly disagree, 6 = no opinion.]

(20) Regulated bear hunting
(21) Abating nonhunting bear mortality (e.g., road kills, poaching)
(22) Controlling fertility (e.g., contraception)
(23) Trapping and relocating bears
(24) Trapping and euthanizing bears
(25) Modifying bear habitat (e.g., altering food and cover)
(26) Allowing nature to take its course, without human intervention
(27) Issuing kill permits for bears
(28) Supplemental feeding of bears (e.g., plantings, feed stations)
(29) Aversive conditioning of bears (i.e., negative reinforcement)
(30) Using repellents (e.g., chemicals, guard animals) to deter bears
(31) Using devices (e.g., fences, food containers) to exclude bears

Items 32-40 pertain to different parties interested in black bears in Virginia. Please indicate how important you think it is to consider concerns of the following groups in management of black bears in Virginia. If you have no opinion, please mark "No opinion." [All 9 items were scaled 1 = very important, 2 = somewhat important, 3 = neutral, 4 = somewhat unimportant, 5 = very unimportant, 6 = no opinion.]

(32) Personnel from government agencies besides VDGIF that are affected by bear management in Virginia (e.g., U.S. Forest Service, Shenandoah National Park, etc..)
(33) Black bear researchers and scientists
(34) Individuals who primarily are interested in watching or photographing bears.

(35) Individuals who primarily are concerned with the humane treatment and prevention of cruelty to bears
(36) Individuals who primarily are concerned with preserving bears and bear habitat.
(37) Agricultural producers who receive damage from bears
(38) Residential landowners who receive damage from bears
(39) Bear hunters who use dogs
(40) Bear hunters who do not use dogs

The VDGIF may set both broad management goals (e.g., emphasize nonlethal damage management) and specific management objectives (reduce demand for out-of-season kill permits by 10% by 2005) for black bears in Virginia. For each of the following tasks in items 41-50 below, please indicate what you believe the roles of VDGIF professionals and bear stakeholders currently are, and what they should be. [All 10 items were scaled 1 = mostly a stakeholder decision, 2 = shared decision, stakeholder opinion more important, 3 = shared equally, 4 = shared decision, professional opinion more important, 5 = mostly a professional decision.]

(41) Setting broad management goals currently is…
(42) Setting broad management goals should be…
(43) Setting specific management objectives currently is…
(44) Setting specific management objectives should be…
(45) Developing potential strategies to meet objectives currently is…
(46) Developing potential strategies to meet objectives should be…
(47) Selecting specific strategies to meet objectives currently is…
(48) Selecting specific strategies to meet objectives should be…
(49) Evaluation of progress toward management goals currently is…
(50) Evaluation of progress toward management goals should be…

Items 51-57 pertain to stakeholder involvement in wildlife management in general (not just for bears). Please indicate the extent to which you agree or disagree with each statement. If you have no opinion, please mark "No opinion." [All 7 items were scaled 1 = very important, 2 = somewhat important, 3 = neutral, 4 = somewhat unimportant, 5 = very unimportant, 6 = no opinion.]

(51) I consider stakeholder involvement in wildlife management to be an academic idea that does not work in practice.
(52) Stakeholder involvement in VDGIF's wildlife management has produced relatively few benefits for the stakeholders.
(53) Wildlife management decisions by VDGIF always should be made with the stakeholders in mind.
(54) I believe that VDGIF wildlife managers cannot balance competing demands of stakeholders without stakeholder involvement.
(55) I believe that stakeholders do not know enough about wildlife biology or logistics of management to provide useful input.
(56) I am uncomfortable having goals for wildlife management based on stakeholder values
(57) I believe that VDGIF managers know what is best for the wildlife resource without stakeholder input.

If you wish to clarify a response to a question or make additional comments, please do so in the space provide below or on the back of this form.

(58) Compared to last year, when you completed our first black bear survey, would you say that your opinions about black bear management in Virginia have...?
[ ] Not changed at all [ ] Changed slightly [ ] Changed greatly

(59) In what specific ways have your opinions changed?
_____

60-61. How satisfied are you with ... [Both items were scaled 1 = very satisfied, 2 = somewhat satisfied, 3 = neutral, 4 = somewhat dissatisfied, 5 = very dissatisfied, and 6 = no opinion]

(60) ...the process we used to develop the Virginia Black Bear Management Plan?
(61)...the end product we call the Virginia Black Bear Management Plan?

(62) What was particularly good or bad about the planning process?
_____

(63) What is particularly good or bad about the plan?
_____

APPENDIX 4. INTERVIEW SCRIPT.

The following questions were used to guide post-planning interviews with active members of the stakeholder advisory committee during October and November 2001.

1) What did you like most about the process used to develop the bear management plan?

2) What did you like least about the process used to develop the bear management plan?

3) What do you like most about the bear management plan, the end product?

4) What do you like least about the bear management plan, the end product?

5) How did your opinions about bear management change during the last year while you were involved with the planning process?

6a) How did your attitudes toward black bears themselves change during the last year while you were involved with the planning process?

6b) Do you feel differently now about bears and human safety?

6c) What do you think influenced the increased concern among SAC members about bears harming their children or pets?

7a) At any time throughout the process of developing a black bear management plan, did you communicate with individuals or groups for the purpose of sharing information or seeking their input?

7b) Who? How many? How frequently?

8) How did your opinions about other parties interested in bear management change during the last year while you were involved with the planning process?

9a) Do you think that any stakeholders had too little input during the planning process?

9b) Too much input?

10a) Do you think that any issues were addressed too little in the plan we produced?

10b) Addressed too much?

APPENDIX 5. DATA TABLE: STAKEHOLDER ADVISORY COMMITTEE

Knowledge, attitudes, and opinions about black bears and their management as expressed by surveyed members of the stakeholders advisory committee before (2000) and after (2001) a planning process used to develop a black bear management plan in Virginia.

		Before		After		
Parameter[a]	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*
KNOWLEDGE[b]	15	10.13	1.02	11.53	0.75	0.09
ATTITUDES[c]						
Ecologistic	15	4.40	0.41	4.53	0.31	0.59
Humanistic	15	1.60	0.34	1.27	0.35	0.29
Moralistic	15	0.33	0.19	0.33	0.19	1.00
Negativistic	15	0.27	0.15	1.13	0.26	0.05
Utilitarian	15	2.47	0.31	2.00	0.35	0.29
OPINIONS[d]						
Bear populations						
Increase in suitable habitats	15	2.60	0.37	3.67	0.32	0.03
Decrease where conflicts	15	3.07	0.30	3.47	0.38	0.21
Damage assistance						
Pay producers	15	2.27	0.25	2.67	0.39	0.33
Provide free advice	15	1.33	0.16	1.33	0.16	1.00
Provide free trapping	15	1.40	0.13	2.47	0.34	0.02
Bear hunting						
Hunting in general	15	1.40	0.16	1.40	0.16	1.00
Hunting with dogs	15	2.80	0.35	2.40	0.32	0.15
Chasing with dogs	14	3.36	0.40	3.07	0.42	0.30
Hunting with bows	15	2.27	0.35	2.27	0.35	0.84
Hunting with firearms	15	1.27	0.15	1.60	0.16	0.18
Lethal methods						
Human safety	14	1.57	0.23	1.36	0.22	0.40
Lethal - agricultural damage						
Never	15	3.93	0.35	4.13	0.32	0.46
Regardless if nonlethal tried	14	4.29	0.30	3.93	0.41	0.33
Only after nonlethal	14	2.14	0.40	2.50	0.43	0.37

Appendix 5 continued.

Parameter	*n*	Before $\bar{x}$	Before SE	After $\bar{x}$	After SE	*P*
Lethal - residential damage						
Never	15	3.73	0.33	4.07	0.33	0.37
Regardless if nonlethal tried	13	4.31	0.31	4.31	0.33	1.00
Only after nonlethal	14	2.00	0.38	2.07	0.34	0.82
VDGIF[e] bear management						
Manages well	13	2.31	0.29	1.54	0.14	0.02
Considers biology	14	1.93	0.30	1.79	0.21	0.29
Understands parties' concerns	15	2.47	0.26	2.20	0.22	0.25
Fairly considers all concerns	14	2.50	0.23	2.00	0.21	0.05
Emphasises biology most	14	3.43	0.34	3.50	0.25	0.80
Stakeholder input[f]						
Gov't personnel besides VDGIF	15	1.13	0.09	1.33	0.13	0.18
Researchers and scientists	15	1.20	0.14	1.13	0.09	0.79
Interest: photo/watch bears	14	1.71	0.16	2.93	0.22	0.004
Interest: humane treatment/cruelty	15	2.20	0.22	3.07	0.25	0.006
Interest: preserving bears/habitat	15	1.47	0.17	1.87	0.27	0.09
Agricultural producers	15	1.27	0.15	2.00	0.31	0.02
Residential landowners	15	1.53	0.24	2.20	0.33	0.03
Bear hunters using dogs	15	2.13	0.34	2.13	0.19	0.83
Bear hunters without dogs	15	1.87	0.17	2.07	0.18	0.42
CCC[g]	12	1.83	0.21	2.08	0.19	0.18

[a]For full descriptions of survey parameters, see Appendix 2

[b]Knowledge score is number of questions answered correctly out of 15.

[c]Kellert's (1980) attitude types measured on scale where 0 = none to 6 = max.

[d]Opinions measured on a scale where 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree.

[e]Virginia Department of Game and Inland Fisheries

[f]Opinions measured on a scale where 1 = very important, 2 = somewhat important, 3 = neutral, 4 = somewhat unimportant, 5 = very unimportant.

[g]"Cultural carrying capacity": opinions measured on a scale where 1 = too few bears, 2 = just right, and 3 = too many.

APPENDIX 6. DATA TABLE: CONSTITUENT GROUPS

Knowledge, attitudes, and opinions about black bears and their management as expressed by surveyed members of The Nature Conservancy (TNC), Virginia State Beekeepers Association (Beekeepers), and Virginia Bear Hunters Association (Bear Hunters) before (2000) and after (2001) a planning process used to develop a black bear management plan in Virginia.

	Combined groups						TNC						Beekeepers						Bear Hunters					
		Before		After				Before		After				Before		After				Before		After		
Parameter[a]	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*
KNOWLEDGE[b]	640	**6.94**	0.16	**7.37**	0.16	*<0.001*	208	**4.33**	0.23	**4.89**	0.23	*0.001*	230	**5.90**	0.25	**6.42**	0.25	*<0.001*	202	**10.81**	0.14	**11.00**	0.15	*0.04*
ATTITUDES[c]																								
Ecologistic	620	**3.36**	0.07	**3.44**	0.07	*0.31*	204	**3.60**	0.12	**3.75**	0.11	*0.18*	220	**2.72**	0.13	**2.80**	0.12	*0.52*	196	**3.83**	0.11	**3.84**	0.10	*0.88*
Humanistic	626	**2.16**	0.06	**2.16**	0.06	*0.95*	205	**2.56**	0.10	**2.65**	0.11	*0.39*	225	**1.64**	0.10	**1.67**	0.11	*0.71*	196	**2.34**	0.11	**2.20**	0.11	*0.16*
Moralistic	631	**1.27**	0.07	**1.30**	0.07	*0.60*	205	**2.42**	0.14	**2.58**	0.15	*0.11*	228	**1.04**	0.10	**1.04**	0.10	*0.93*	198	**0.34**	0.05	**0.27**	0.05	*0.17*
Negativistic	631	**0.76**	0.05	**0.67**	0.05	*0.05*	205	**0.78**	0.09	**0.73**	0.09	*0.66*	226	**1.15**	0.10	**1.06**	0.11	*0.29*	200	**0.29**	0.05	**0.17**	0.03	*0.02*
Utilitarian	631	**1.74**	0.06	**1.74**	0.06	*0.90*	206	**0.77**	0.07	**0.76**	0.08	*0.84*	226	**1.97**	0.10	**1.87**	0.10	*0.22*	199	**2.48**	0.10	**2.62**	0.09	*0.20*
OPINIONS[d]																								
Bear populations																								
Increase in suitable habitats	575	**2.12**	0.05	**2.11**	0.05	*0.75*	172	**2.34**	0.09	**2.23**	0.08	*0.23*	205	**2.80**	0.10	**2.83**	0.10	*0.78*	198	**1.23**	0.04	**1.26**	0.04	*0.52*
Decrease where conflicts	588	**3.28**	0.06	**3.25**	0.06	*0.59*	181	**3.20**	0.10	**3.23**	0.10	*0.73*	209	**2.72**	0.10	**2.72**	0.10	*0.96*	198	**3.94**	0.09	**3.81**	0.10	*0.25*
Damage assistance																								
Pay producers	598	**2.45**	0.05	**2.38**	0.05	*0.19*	184	**2.79**	0.08	**2.75**	0.08	*0.57*	220	**2.07**	0.08	**2.01**	0.08	*0.50*	194	**2.57**	0.10	**2.45**	0.08	*0.22*
Provide free advice	616	**1.41**	0.03	**1.45**	0.03	*0.28*	198	**1.42**	0.05	**1.49**	0.04	*0.13*	223	**1.35**	0.04	**1.36**	0.04	*0.47*	195	**1.48**	0.05	**1.53**	0.06	*0.70*
Provide free trapping	616	**1.61**	0.04	**1.62**	0.04	*0.67*	197	**1.85**	0.07	**1.91**	0.07	*0.54*	224	**1.49**	0.06	**1.47**	0.05	*0.86*	195	**1.49**	0.06	**1.50**	0.06	*0.80*

Appendix 6. continued.

	Combined groups						TNC						Beekeepers						Bear Hunters					
		Before		After				Before		After				Before		After				Before		After		
Parameter	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*
Bear hunting																								
Hunting in general	617	**2.02**	0.06	**2.01**	0.06	*0.93*	196	**3.21**	0.10	**3.24**	0.11	*0.73*	220	**1.88**	0.08	**1.85**	0.08	*0.86*	201	**1.00**	0.00	**1.00**	0.00	*1.00*
Hunting with dogs	605	**2.74**	0.07	**2.77**	0.07	*0.45*	190	**4.32**	0.08	**4.36**	0.07	*0.59*	214	**2.97**	0.11	**3.01**	0.11	*0.50*	201	**1.01**	0.01	**1.00**	0.00	*0.37*
Chasing with dogs	601	**2.91**	0.07	**2.89**	0.07	*0.66*	192	**4.43**	0.07	**4.31**	0.08	*0.14*	210	**3.23**	0.11	**3.29**	0.11	*0.51*	199	**1.09**	0.04	**1.08**	0.03	*0.80*
Hunting with bows	592	**2.99**	0.07	**3.02**	0.06	*0.64*	186	**3.51**	0.11	**3.52**	0.11	*0.93*	212	**2.38**	0.10	**2.45**	0.10	*0.46*	194	**3.15**	0.12	**3.16**	0.11	*0.87*
Hunting with firearms	611	**2.10**	0.06	**2.03**	0.06	*0.10*	193	**3.10**	0.11	**3.08**	0.11	*0.89*	219	**1.90**	0.09	**1.79**	0.08	*0.10*	199	**1.36**	0.06	**1.28**	0.05	*0.21*
Lethal methods																								
Human safety	606	**2.01**	0.05	**1.80**	0.04	*<0.001*	192	**2.18**	0.09	**2.13**	0.08	*0.60*	221	**1.67**	0.07	**1.49**	0.06	*0.01*	193	**2.23**	0.09	**1.84**	0.08	*<0.001*
Lethal – agricultural damage																								
Never	548	**3.13**	0.06	**3.15**	0.06	*0.79*	187	**2.66**	0.10	**2.78**	0.10	*0.26*	213	**3.78**	0.09	**3.79**	0.09	*0.88*	178	**2.85**	0.11	**2.79**	0.11	*0.50*
Regardless if nonlethal tried	560	**3.94**	0.06	**3.98**	0.05	*0.42*	182	**4.31**	0.08	**4.38**	0.07	*0.42*	207	**3.40**	0.10	**3.50**	0.10	*0.33*	171	**4.22**	0.09	**4.10**	0.08	*0.52*
Only after nonlethal	583	**2.25**	0.06	**2.30**	0.05	*0.36*	186	**2.27**	0.09	**2.39**	0.10	*0.22*	212	**2.23**	0.09	**2.31**	0.09	*0.38*	185	**2.27**	0.10	**2.20**	0.09	*0.56*
Lethal – residential damage																								
Never	565	**3.22**	0.06	**3.27**	0.06	*0.51*	179	**2.93**	0.10	**2.94**	0.10	*0.88*	212	**3.76**	0.10	**3.95**	0.09	*0.82*	174	**2.87**	0.11	**2.76**	0.11	*0.35*
Regardless if nonlethal tried	559	**3.96**	0.05	**3.92**	0.05	*0.65*	180	**4.32**	0.08	**4.26**	0.08	*0.71*	204	**3.47**	0.10	**3.41**	0.10	*0.71*	175	**4.18**	0.09	**4.17**	0.08	*0.99*
Only after nonlethal	590	**2.38**	0.06	**2.32**	0.05	*0.37*	193	**2.32**	0.09	**2.35**	0.09	*0.77*	211	**2.43**	0.10	**2.39**	0.09	*0.73*	186	**2.38**	0.10	**2.22**	0.09	*0.11*
VDGIF bear management																								
Manages well	375	**2.17**	0.05	**2.01**	0.05	*0.001*	60	**2.37**	0.09	**2.22**	0.10	*0.10*	122	**2.57**	0.10	**2.31**	0.10	*0.004*	193	**1.85**	0.07	**1.75**	0.06	*0.07*
Considers biology	383	**2.07**	0.05	**1.90**	0.05	*0.001*	67	**2.09**	0.10	**1.85**	0.08	*0.02*	124	**2.31**	0.09	**2.08**	0.08	*0.01*	192	**1.92**	0.07	**1.80**	0.05	*0.07*

Appendix 6 continued.

	Combined groups						TNC						Beekeepers						Bear Hunters					
		Before		After				Before		After				Before		After				Before		After		
Parameter	*n*	$\bar{x}$	SE	$\bar{x}$	SE	P	*n*	$\bar{x}$	SE	$\bar{x}$	SE	P	*n*	$\bar{x}$	SE	$\bar{x}$	SE	P	*n*	$\bar{x}$	SE	$\bar{x}$	SE	P
Understands parties' concerns	409	**2.34**	0.06	**2.14**	0.05	*0.001*	73	**2.15**	0.10	**1.95**	0.09	*0.05*	147	**2.59**	0.10	**2.32**	0.09	*0.01*	189	**2.21**	0.09	**2.08**	0.08	*0.11*
Fairly considers all concerns	411	**2.46**	0.06	**2.25**	0.05	*<0.001*	74	**2.34**	0.11	**2.15**	0.11	*0.07*	149	**2.68**	0.10	**2.39**	0.09	*0.003*	188	**2.33**	0.09	**2.19**	0.08	*0.05*
Emphasises biology more than others	357	**2.66**	0.06	**2.86**	0.06	*0.004*	54	**2.96**	0.13	**3.41**	0.15	*0.03*	124	**2.69**	0.10	**2.59**	0.10	*0.41*	179	**2.54**	0.09	**2.89**	0.09	*0.002*
Stakeholder input[e]																								
Gov't personnel besides VDGIF	536	**1.72**	0.04	**1.85**	0.04	*0.01*	173	**1.43**	0.05	**1.52**	0.05	*0.23*	182	**1.69**	0.07	**1.76**	0.07	*0.37*	181	**2.02**	0.08	**2.24**	0.10	*0.02*
Researchers and scientists	571	**1.43**	0.03	**1.49**	0.03	*0.09*	188	**1.25**	0.04	**1.35**	0.04	*0.10*	191	**1.62**	0.06	**1.67**	0.06	*0.49*	192	**0.65**	0.00	**1.46**	0.06	*0.51*
Interest: photo/watch bears	563	**2.61**	0.05	**2.69**	0.05	*0.08*	186	**2.38**	0.08	**2.40**	0.07	*0.77*	193	**2.82**	0.09	**2.84**	0.09	*0.77*	184	**2.61**	0.08	**2.83**	0.10	*0.02*
Interest: humane treatment/ cruelty	570	**2.92**	0.06	**2.93**	0.06	*0.96*	190	**2.03**	0.08	**2.07**	0.07	*0.70*	202	**2.96**	0.10	**3.05**	0.10	*0.28*	178	**3.83**	0.10	**3.71**	0.10	*0.19*
Interest: preserving bears/ habitat	588	**1.90**	0.04	**2.00**	0.05	*0.04*	191	**1.53**	0.05	**1.62**	0.05	*0.16*	205	**2.22**	0.08	**2.34**	0.09	*0.13*	192	**1.93**	0.08	**2.02**	0.09	*0.41*
Agricultural producers	580	**1.93**	0.04	**1.96**	0.04	*0.41*	186	**1.94**	0.06	**2.09**	0.06	*0.04*	212	**1.55**	0.05	**1.62**	0.06	*0.19*	182	**2.36**	0.08	**2.21**	0.07	*0.10*
Residential landowners	584	**2.05**	0.04	**2.03**	0.04	*0.70*	189	**2.01**	0.07	**2.13**	0.07	*0.09*	211	**1.73**	0.06	**1.72**	0.06	*0.87*	184	**2.47**	0.09	**2.30**	0.08	*0.07*
Bear hunters using dogs	582	**2.82**	0.07	**2.79**	0.07	*0.52*	184	**4.11**	0.09	**4.07**	0.09	*0.55*	199	**3.25**	0.10	**3.13**	0.10	*0.22*	199	**1.18**	0.03	**1.26**	0.04	*0.06*
Bear hunters without dogs	566	**2.76**	0.06	**2.80**	0.06	*0.42*	182	**3.40**	0.10	**3.49**	0.10	*0.34*	199	**2.69**	0.10	**2.66**	0.09	*0.69*	185	**2.20**	0.09	**2.28**	0.10	*0.43*
CCC[f]	340	**1.57**	0.04	**1.54**	0.04	*0.88*	65	**1.51**	0.07	**1.43**	0.07	*0.92*	111	**1.97**	0.07	**1.96**	0.08	*0.66*	164	**1.32**	0.04	**1.30**	0.04	*0.73*

[a]For full descriptions of survey parameters, see Appendix 2
[b]Knowledge score is number of questions answered correctly out of 15.
[c]Kellert's (1980) attitude types measured on scale where 0 = none to 6 = max.
[d]Opinions measured on a scale where 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree.
[e]Virginia Department of Game and Inland Fisheries
[f]Opinions measured on a scale where 1 = very important, 2 = somewhat important, 3 = neutral, 4 = somewhat unimportant, 5 = very unimportant.
[g] "Cultural carrying capacity": opinions measured on a scale where 1 = too few, 2 = just right, and 3 = too many

APPENDIX 7. DATA TABLE: VDGIF STAFF

Opinions about black bear management and constituent involvement as expressed by Virginia Department of Game and Inland Fisheries staff surveyed before (2000) and after (2001) a planning process used to develop a black bear management plan in Virginia.

		Before		After		
Parameter[a]	*n*	$\bar{x}$	SE	$\bar{x}$	SE	*P*
OPINIONS[b]						
Bear populations						
Increase in suitable habitats	21	3.33	0.30	3.62	0.23	0.36
Decrease where conflicts	21	3.24	0.28	2.91	0.30	0.41
Damage assistance						
Pay producers	21	4.67	0.14	4.62	0.15	0.79
Provide free advice	21	1.33	0.10	1.38	0.11	0.79
Provide free trapping	21	2.81	0.26	2.95	0.27	0.80
Lethal methods						
Human safety	21	1.19	0.09	1.48	0.16	0.06
Lethal - agricultural damage						
Never	21	4.57	0.20	4.86	0.08	0.27
Regardless if nonlethal tried	21	4.19	0.24	3.76	0.27	0.28
Only after nonlethal	20	2.25	0.27	2.25	0.28	1.00
Lethal - residential damage						
Never	21	4.05	0.30	4.67	0.20	0.12
Regardless if nonlethal tried	21	4.43	0.18	4.10	0.26	0.24
Only after nonlethal	20	1.85	0.23	1.95	0.26	0.74
Stakeholder input[c]						
Gov't personnel besides VDGIF	21	1.14	0.08	1.10	0.07	0.79
Researchers and scientists	21	1.33	0.16	1.19	0.11	0.62
Interest: photo/watch bears	21	1.67	0.16	1.76	0.18	0.64
Interest: humane treatment/cruelty	21	2.10	0.27	2.00	0.22	0.67
Interest: preserving bears/habitat	21	1.71	0.17	1.67	0.16	0.86
Agricultural producers	21	1.33	0.10	1.29	0.10	0.79
Residential landowners	21	1.57	0.18	1.38	0.11	0.27
Bear hunters using dogs	21	1.67	0.20	1.67	0.22	1.00
Bear hunters without dogs	21	1.57	0.16	1.57	0.16	1.00

Appendix 7 continued.

Parameter[a]	*n*	Before $\bar{x}$	Before SE	After $\bar{x}$	After SE	*P*
Nuisance bear management[b]						
Regional responsibilty	21	1.33	0.16	1.38	0.20	1.00
Follow standard procedures	21	1.48	0.16	1.81	0.20	0.21
Current protocol is effective	21	3.00	0.28	3.00	0.27	1.00
Management options						
Regulated hunting	21	1.05	0.05	1.00	0.00	1.00
Abating nonhunting mortality	18	2.39	0.34	2.06	0.26	0.33
Controlling fertility	21	4.95	0.05	4.86	0.10	0.59
Trapping and relocating	21	2.76	0.27	2.81	0.29	1.00
Trapping and euthanizing	21	2.86	0.29	2.29	0.21	0.07
Modifying habitat	21	2.33	0.29	2.57	0.26	0.22
Nature taking its course	20	4.80	0.16	4.50	0.25	0.23
Kill permits	21	1.52	0.16	1.52	0.11	0.83
Supplemental feeding	21	4.52	0.19	4.88	0.08	0.11
Aversive conditioning	21	1.62	0.18	1.81	0.22	0.44
Repellents	19	2.05	0.31	1.90	0.24	0.48
Exclusion devices	20	1.20	0.12	1.40	0.17	0.36
Constituents' role in bear mgt.[d]						
Setting broad goals is	21	4.48	0.18	3.91	0.27	0.08
Setting broad goals should be	21	2.81	0.21	2.62	0.20	0.35
Setting objectives is	21	4.71	0.16	4.43	0.15	0.21
Setting objectives should be	21	3.57	0.22	3.48	0.21	0.61
Developing strategies is	21	4.67	0.10	4.67	0.10	1.00
Developing strategies should be	21	3.76	0.18	3.91	0.21	0.48
Selecting strategies is	21	4.67	0.13	4.76	0.10	0.59
Selecting strategies should be	21	4.05	0.20	4.19	0.24	0.53
Evaluating progress is	21	4.81	0.11	4.57	0.13	0.22
Evaluating progress should be	21	3.62	0.20	3.57	0.19	0.84
Constituent involvment[b]						
Does not work	21	4.43	0.20	4.76	0.10	0.06
Has produced few benefits	20	4.65	0.17	4.60	0.11	0.40
Decisions must consider all	21	1.17	0.26	1.91	0.28	0.77
Needed to balance demands	21	1.91	0.18	1.91	0.25	0.56
Constituents know too little	21	3.76	0.27	3.86	0.25	0.40
Afraid of consituents's goals	21	3.10	0.33	3.76	0.30	0.05
Managers know best	21	4.24	0.23	4.48	0.18	0.19

[a]For full descriptions of survey parameters, see Appendix 3.

[b]Opinions measured on a scale where 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree.

[c]Opinions measured on a scale where 1 = very important, 2 = somewhat important, 3 = neutral, 4 = somewhat unimportant, 5 = very unimportant.

[d]Opinions measured on a scale where 1 = mostly a stakeholder decision, 2 = shared decision, stakeholder opinion more important, 3 = shared equally, 4 = shared decision, professional opinion more important, 5 = mostly a professional opinion

VITA

Nelson Wade Lafon was born February 24, 1972 in Radford, Virginia and grew up in neighboring Pulaski County. He has one older brother, Charles. Their parents, Wade and Pearl Lafon, are both descendants of early settlers in the New River Valley. Nelson graduated from Pulaski County High School in 1990 as the valedictorian and as an active member of Future Farmers of America. In 1994, Nelson obtained a B. S. (summa cum laude) in Forestry and Wildlife Sciences from Virginia Tech. While working on his B. S., Nelson served as an officer in the student chapter of The Wildlife Society, conducted nutritional research on captive ruffed grouse, and worked two summers – in Virginia and Montana - as a biological technician.

After finishing his B. S. in 1994, Nelson went to Escalante, Utah to work with the Dixie National Forest. He worked there for three years, conducting wildlife species inventories, marking timber, maintaining and mapping trails, and fighting wildfires. Nelson returned to Virginia in 1997 to work as a wildlife biologist assistant to the state forest game bird and bear biologists with the Virginia Department of Game and Inland Fisheries (VDGIF) in Staunton.

In July 1999, Nelson began his M. S. research into the human dimensions of black bear management in Virginia with his advisor and collaborator, Dr. Steve McMullin, in the Department of Fisheries and Wildlife Sciences at Virginia Tech. On June 1, 2001, Nelson began working in his current position as the statewide forest stewardship biologist with the VDGIF.

Nelson married Lisa Ann Raines of Stuarts Draft, Virginia on October 2, 1999. Nelson and Lisa Lafon now live in Powhatan, Virginia.