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Improving stakeholder knowledge and agency image through collaborative planning

Nelson W. Lafon, Steve L. McMullin, David E. Steffen, and Robert S. Schulman

Abstract Public participation affects stakeholder knowledge and opinions concerning other stakeholders, managers, and resources as well as management decisions. We analyzed participants' knowledge and opinions at the beginning and at the conclusion of a collaborative process to develop a management plan for black bears (Ursus americanus) in Virginia during 1999–2001. We administered identical surveys pre- and post-planning to stakeholders involved in the process: members of a stakeholder advisory committee (active participants, n=15), members of 3 stakeholder organizations with representatives on the committee (passive participants, total n = 647), and agency staff (n = 21). Both active and passive participation influenced stakeholders' knowledge and opinions concerning black bears and their management. Stakeholders' knowledge of black bears and bear management, and their image of bear managers, improved during the planning process. Stakeholder support for controversial management strategies (e.g., use of lethal methods to address bear problems) increased. Active participation apparently influenced opinions more than passive participation. Extensive interaction among advisory committee members resulted in greater tolerance for views of other stakeholder groups. Opinions of agency staff regarding bear management and stakeholder involvement in decision-making apparently were reinforced. This study demonstrates the utility of active participation, indirect involvement through interaction with active participants, and direct mailings in educating and improving relationships with and among various stakeholders.

Key words black bear, knowledge, opinions, participation, planning, stakeholder, survey, Ursus americanus

Involvement of diverse stakeholders in collaborative processes pervades natural resources planning (Wondolleck and Yaffee 2000). Given resources allocated to collaborative processes, wildlife managers should ask whether those processes are producing better plans and how involvement in the processes affects stakeholders, including agency personnel. Does collaboration improve the management climate through improved relationships between and among stakeholders and resource managers (Chase et al. 2002)? Does collaboration educate citizens about resources and the realities of management? Does the sharing of decision-making authority between resource management professionals and public stakeholders in a carefully implemented process...
generate stronger commitment to wildlife conservation (Chase et al. 2000)?

Public participation in natural resources planning can lead to improved decisions and positive impacts on participants' knowledge and opinions concerning other constituents, the agency, and the resource (McMullin and Nielsen 1991, Landre and Knuth 1993, Stout et al. 1996, Peek 1998). Public participation also may influence natural resource managers' opinions concerning their stakeholders, resource management, and the utility of public participation (McConnell 1977, Crompton et al. 1981, Godschalk and Stiftel 1981, Stout et al. 1996). Active participation (e.g., discussion within a group) appears to affect attitudes and knowledge more than passive participation (e.g., reading; hearing a lecture; indirect involvement, such as communicating with an active participant; Levine and Butler 1952, Lloyd 1973, and Leeming et al. 1997). However, participatory decision-making does not ensure consensus and, in extreme cases, may lead to hardening of positions and greater polarization of interests (Zurcher 1970, Moote et al. 1997).

Social scientists have used pre- and post-participation surveys to assess the effects of participation on knowledge and attitudes (Zurcher 1970, Lloyd 1973, Hatten and Ruhland 1995, Leeming et al. 1997), whereas researchers in the natural resources arena have relied on their subjective judgments of participant change, self-assessments of participants, or post-participation surveys only (Godschalk and Stiftel 1981, Landre and Knuth 1993, Sample 1993, Stout et al. 1996). The collaborative approach used by the Virginia Department of Game and Inland Fisheries (VDGIF) and Virginia Tech to develop a statewide black bear (Ursus americanus) management plan (VDGIF 2002) provided an opportunity to assess the effects of active and passive participation on knowledge and opinions of stakeholders using a design involving pre-test and post-test.

**Overview of management planning for black bears in Virginia**

Throughout the planning process, we focused on stakeholder involvement on making value choices (setting broad goals, ensuring that specific objectives and strategies were consistent with goals) and professional involvement on making technical choices (developing specific objectives to measure progress toward attaining goals, developing management strategies). Stakeholders participated in developing the Virginia black bear management plan either actively, by serving on a stakeholder advisory committee (hereafter, committee), or passively, through interaction with representatives on the committee or reading a summary of the plan. The committee, which met 6 times between May 2000 and June 2001, embodied a cross-section of Virginians with diverse interests in bear management issues (e.g., hunting, other recreation, agriculture, animal welfare, habitat preservation, resource management). Committee members were charged with developing goals to drive bear management, amending and approving objectives developed by VDGIF staff, and exchanging information with their constituents and other committee members. Committee members also provided input via mail surveys and interviews.

Passive participants included members of 3 organizations with representatives on the committee: a hunting group, the Virginia Bear Hunters Association (Bear Hunters); an agricultural group with interests in damage caused by bears, the Virginia State Beekeepers Association (Beekeepers); and a group with broad environmental interests, the Virginia Chapter of the Nature Conservancy (TNC). Selected passive participants provided input through mail surveys. Passive participants also may have been exposed to elements of the bear management plan through communicating with VDGIF or Virginia Tech employees or by obtaining information distributed by VDGIF during the public review period for the draft plan.

VDGIF Wildlife Division biologists with bear management responsibilities (staff) participated in the planning process by providing information to the committee about bear management, completing surveys, designing plan objectives and strategies, exchanging ideas with bear managers in other states, and compiling the plan. Virginia Tech personnel primarily designed, facilitated, and evaluated the public involvement process.

This paper focuses on shifts in participants' opinions and knowledge throughout the planning process rather than on participants' opinions and knowledge about specific bear management issues (e.g., we present opinion shifts but do not give starting points for opinions). Readers interested in a more detailed presentation of stakeholder and professional opinions or a more thorough discussion of the planning process used to develop the black bear management plan should see Lafon (2002) and Lafon et al. (2003).
Methods

Experimental design
We conducted pre- and post-planning surveys and interviewed active participants at the end of the planning process. Administration of identical questionnaires to the same individuals before and after the planning process enabled us to quantify influences of participation on opinion and knowledge regarding black bears and their management. We examined influences of type of participation (active or passive) and exposure to the planning process on participants' knowledge and opinions.

Questionnaire administration
Prior to the first committee meeting (spring 2000), we designed one questionnaire to assess knowledge and opinions of stakeholders about black bear management and another questionnaire to assess opinions of VDGIF staff about stakeholder involvement in planning (see next section and Lafon 2002 for specific topics). Questionnaires administered after the planning process (summer 2001) contained the same questions previously asked, plus questions concerning participants' exposure to the planning process and their self-assessments of changes in knowledge and opinions.

We mailed a self-administered questionnaire to VDGIF staff (n=21) in July 2000 and again in June 2001, achieving a 100% response rate each time. Committee members who regularly attended and participated in meetings (n=15) completed questionnaires at the first (May 2000) and again at the last (June 2001) meeting. We interviewed 15 committee members individually via telephone after the planning process (Oct–Nov 2001) to provide an additional opportunity for members to assess their knowledge and opinion shifts and to aid in interpretation of questionnaire responses.

In summer 2000 we mailed a self-administered questionnaire to Bear Hunters (n=459), Beekeepers (n=442), and TNC members (n=500; Lafon et al. 2003). In May 2001 we mailed identical questionnaires to all Bear Hunters (n=244), Beekeepers (n=312), and TNC members (n=286) who had returned pre-planning questionnaires during summer 2000 and had not requested to be removed from our mailing lists. To enable a meaningful comparison of knowledge and opinions between those who did and did not obtain information about the plan, we randomly distributed a 4-page newspaper summary of the plan with 50% of the questionnaires that we mailed to both TNC members and Beekeepers in 2001. Members of the Bear Hunters’ Board of Directors obtained bundles of summaries and individually distributed them to members in their geographic areas. Using a modification of Dillman’s (1978) Total Design Method, we sent a postcard reminder and up to 2 follow-up mailings to survey participants who had not responded to previous mailings. Effective response rates (usable 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. Since our response rates exceeded the 65% threshold defined by Dolsen and Machlis (1991), we did not test for nonresponse bias.

Data analysis

Score construction. We constructed scores for stakeholder knowledge and opinions and for staff opinions. Stakeholder questionnaires contained 15 multiple-choice questions designed to assess respondents’ knowledge of black bear ecology and management in Virginia. 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). Knowledge scores consisted of total correct answers for each survey respondent. Scores for opinions about important black bear management issues, constituent involvement, and decision-making were ordinal responses along Likert scales with 5 balanced response options (i.e., "strongly agree"=1,"somewhat agree"=2,"neutral"=3,"somewhat disagree"=4, and "strongly disagree"=5). We provided a “no opinion” category for each opinion question but excluded “no opinion” responses during analysis. Lafon (2002) contains all specific questions used to assess knowledge and opinions.

Location shifts in scores. We used paired t-tests (or Wilcoxon signed-rank tests, TS, for non-normal data) to reveal shifts in scores before and after participation for each knowledge and opinion parameter. We analyzed differences within each category of participants (i.e., committee members, passive participants, and VDGIF staff) separately. We used 1-way analysis of variance F-tests (or Kruskal-Wallis tests, H, for non-normal data) to examine differential pre-post shifts by stakeholder group (i.e., interaction
Participation and opinion change. Lafon et al., 223

between group and score shift). We used 2-sample t-tests (or Wilcoxon rank-sum tests, $T_{RS}$, for non-normal data) to compare score shifts for 1) members of the 3 stakeholder 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 in 2001, 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 Bear Hunter about the plan. We subtracted pre-scores from post-scores for all parameters. Therefore, 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.

We report means and standard errors in all cases, since these values are easy to interpret, although these statistics are not used in tests for non-normal data. Tests were considered significant at $\alpha=0.05$.

We expected stakeholder knowledge, stakeholder opinions about VDGIF decision-making for bear management, and VDGIF staff opinions about stakeholder involvement in wildlife planning to improve after the planning process. Therefore, we used 1-sided tests to examine these shifts. We also used 1-sided tests to determine whether stakeholder 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 tests were 2-sided.

Self-assessed change. Each stakeholder group member rated his or her own overall change in knowledge and opinions (i.e., unrelated to a specific issue) about black bear management in Virginia on a scale where 1 = no change, 2 = slight change, and 3 = great change.

Results

Stakeholder knowledge about black bears and their management

Committee. All 15 committee members reported an increase in knowledge about black bears and bear management after the planning process. Members reported greater awareness of damage caused by bears, the importance of managing bear problems, and the growth and expansion of bear populations statewide. However, knowledge scores for the committee as a whole did not increase during the planning process (Table 1). Members representing bear-damage interests or environmental interests, who exhibited the lowest knowledge prior to the planning process, scored much higher on post-surveys. Hunter and agency representatives, who exhibited the most knowledge initially, scored slightly (but not significantly) lower following the planning process.

Passive participants. Passive participants exhibited greater knowledge about black bears and their management in Virginia following the planning process (Table 1). Knowledge scores for group members who “heard or read” (sources not solicited in questionnaire) about the bear management plan during the period between surveys or received a newspaper summary of the plan increased more than for those who did not (Table 2).

Bear Hunters who reported reading or hearing about the plan from a newspaper summary ($P=0.003$), a VDGIF employee ($P\leq0.001$), or another Bear Hunter ($P\leq0.001$) reported a greater self-assessed increase in their knowledge than those who did not. However, we detected no significant shifts in knowledge scores between Bear Hunters who did or did not report reading or hearing about the plan from any of these 3 sources.

Opinions about black bear management

Self-assessed changes. Thirteen of 15 committee members reported a change in their opinions about bear management. Committee members reported greater appreciation for the complexity of bear management and the concept of cultural carrying

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Table 1. Knowledge$^a$ scores (max. = 15) about black bears and their management in Virginia before (2000) and after (2001) planning for surveyed members of a stakeholder advisory committee and for members of The Nature Conservancy (TNC), Virginia State Beekeepers Association (Beekeepers), and Virginia Bear Hunters Association (Bear Hunters).

<table>
<thead>
<tr>
<th>Group</th>
<th>Committee ($n=15$)</th>
<th>TNC ($n=208$)</th>
<th>Beekeepers ($n=230$)</th>
<th>Bear Hunters ($n=230$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>$\bar{x}$</td>
<td>SE</td>
<td>$\bar{x}$</td>
<td>SE</td>
</tr>
<tr>
<td>Before</td>
<td>10.13</td>
<td>0.75</td>
<td>4.33*</td>
<td>0.23</td>
</tr>
<tr>
<td>After</td>
<td>11.53</td>
<td>1.02</td>
<td>4.89*</td>
<td>0.23</td>
</tr>
</tbody>
</table>

$^a$ Knowledge regarding 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); see Lafon (2002) for specific questions used to assess.

* $P \leq 0.001$ for each pair.
** $P = 0.04$. 
capacity (i.e., the bear population level that balances the demands [positive and negative] of all stakeholders [VDGIF 2002]) after the planning process. Passive participants who heard about the bear management plan reported a greater self-assessed change in opinions overall (i.e., unrelated to a specific issue) about bear management ($\bar{x}=1.61, SE=0.05, n=167$) than those who did not hear about the plan ($\bar{x}=1.30, SE=0.02, n=429$) ($F_{8,491}=10.61, P<0.001$). This finding applied to Beekeepers, Bear Hunters, and TNC members alike ($P<0.001$).

Only Bear Hunters completed a section of the post-planning questionnaire with sufficient frequency for us to determine which sources of information about the bear management plan influenced their opinions most. Bear Hunters who reported hearing about the plan from a VDGIF employee ($P \leq 0.001$) or another Bear Hunter ($P=0.01$) also reported a greater self-assessed change in opinions overall about bear management than those who did not. Bear Hunters, choosing among 9 sources of information, indicated that personal discussion with their own members and literature from their organization had greater influence in changing their knowledge and opinions about black bear management in Virginia 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 ($F_{8,549}=10.61, P \leq 0.001$).

VDGIF staff reported a reinforcement in their belief that public involvement is valuable in planning. Staff also reported greater faith in stakeholders’ input because stakeholders were educated about management realities in the process. Staff indicated greater willingness to try new strategies to respond to bear problems. They also stated that diverse stakeholder input was important to the education of participants, stakeholder support for bear management, and the quality of the management plan produced.

**Bear populations.** Committee members expressed less support for increasing bear populations in Virginia following planning (Table 3). Their mean opinion regarding population increases converged during planning with that of VDGIF staff

<table>
<thead>
<tr>
<th>Bear Population</th>
<th>Landowner Assistance</th>
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<tbody>
<tr>
<td>Increaseb</td>
<td>Trappingc</td>
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<tr>
<td>Decreasec</td>
<td>Compensationf</td>
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<td>Desiredd</td>
<td>Adviceg</td>
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<tr>
<th>Time</th>
<th>Increase</th>
<th>SE</th>
<th>Decrease</th>
<th>SE</th>
<th>Desired</th>
<th>SE</th>
<th>Trapping</th>
<th>SE</th>
<th>Compensation</th>
<th>SE</th>
<th>Advice</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>2.60*</td>
<td>0.38</td>
<td>3.07</td>
<td>0.30</td>
<td>1.83</td>
<td>0.19</td>
<td>1.40**</td>
<td>0.13</td>
<td>2.27</td>
<td>0.25</td>
<td>1.33</td>
<td>0.16</td>
</tr>
<tr>
<td>After</td>
<td>3.67</td>
<td>0.32</td>
<td>3.47</td>
<td>0.38</td>
<td>2.08</td>
<td>0.17</td>
<td>2.47</td>
<td>0.34</td>
<td>2.67</td>
<td>0.39</td>
<td>1.33</td>
<td>0.16</td>
</tr>
</tbody>
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<tbody>
<tr>
<td></td>
<td>1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree; “Desired” column has different scale (see d below).</td>
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<td></td>
<td>b Virginia Department of Game and Inland Fisheries (VDGIF) should increase black bear populations in all habitats in Virginia that are biologically suitable.</td>
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<td>c VDGIF should decrease black bear populations in all areas of Virginia where conflict with humans is common.</td>
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<td>d There currently are too many (answer 3), too few (answer 1), or just the right number (answer 2) of black bears in the city or county where I now live.</td>
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<td></td>
<td>e The VDGIF should provide free trapping services to remove black bears causing damage to agricultural or residential property in Virginia.</td>
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<td>f Agricultural producers in Virginia should be paid for damage caused by black bears to crops, orchards, bee yards, livestock, etc.</td>
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<td>g The VDGIF should provide free on-site advice to property owners (agricultural and residential) in Virginia experiencing damage caused by black bears.</td>
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</table>

Table 2. Pre-post shifts in knowledge scoresa about bear management for 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 between surveys (2000 and 2001) and did or did not receive a newspaper summary about the bear management plan with their post-planning surveys in 2001.

<table>
<thead>
<tr>
<th>Exposure</th>
<th>TNC</th>
<th>Beekeepers</th>
<th>Bear Hunters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heard?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>$21$ 1.76* $0.68$</td>
<td>$42$ 1.02* $0.36$</td>
<td>$105$ 0.30 $0.16$</td>
</tr>
<tr>
<td>No</td>
<td>$176$ 0.41 $0.20$</td>
<td>$179$ 0.37 $0.18$</td>
<td>$83$ -0.11 $0.22$</td>
</tr>
<tr>
<td>Summary?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>$105$ 1.03* $0.24$</td>
<td>$123$ 0.78* $0.21$</td>
<td>NA^b</td>
</tr>
<tr>
<td>No</td>
<td>$103$ 0.08 $0.28$</td>
<td>$107$ 0.23 $0.25$</td>
<td></td>
</tr>
</tbody>
</table>

a Shifts $>0$ correspond to increasing knowledge over the survey period.

b Distribution of newspaper summaries to Bear Hunters was not recorded (not comparable to other groups).

* $P \leq 0.05$ for each pair.

Table 3. Opinions^a about black bear populations and assistance to landowners who experience bear damage in Virginia, as expressed by members of a stakeholder advisory committee ($n = 15$) before (2000) and after (2001) planning.
Participation and opinion change • Lafon et al.

Table 4. Opinions about the use of lethal methods in bear management in Virginia, as expressed by members of The Nature Conservancy, Virginia State Beekeepers Association, and Virginia Bear Hunters Association (pooled) by time (before planning in 2000 or after in 2001) and by whether or not they heard about the bear management plan between surveys (2000 and 2001).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Safetyb</th>
<th>Nonlethal firstc</th>
<th>Neverd</th>
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<tr>
<td></td>
<td>n</td>
<td>x</td>
<td>SE</td>
</tr>
<tr>
<td>Timea</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>606</td>
<td>2.01</td>
<td>0.05</td>
</tr>
<tr>
<td>After</td>
<td>606</td>
<td>1.80</td>
<td>0.04</td>
</tr>
<tr>
<td>Heard3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>162</td>
<td>-0.40</td>
<td>0.10</td>
</tr>
<tr>
<td>No</td>
<td>411</td>
<td>-0.13</td>
<td>0.06</td>
</tr>
</tbody>
</table>

a For before and after comparison: 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree. For heard vs. not heard comparison: shifts (post-scores minus pre-scores) along this same scale <0 indicate shifts toward more agreement and shifts >0 indicate shifts toward more disagreement.
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.
e Interaction between organization and opinion shift: Bear Hunters > Beekeepers > TNC shift (P = 0.004).

(\(\bar{x}=3.62, SE=0.23\)). We did not detect shifts in opinions of passive participants or VDGIF staff concerning bear populations (P > 0.05).

Assistance to landowners with bear damage. Committee members expressed less support for trapping problem bears following planning (Table 3). This opinion converged with that of VDGIF staff (\(\bar{x}=2.95, SE=0.27\)). We did not detect shifts in opinions of passive participants or VDGIF staff regarding compensating landowners or advising them about bear damage (P > 0.05).

Use of lethal methods. We did not detect shifts in committee or staff opinions concerning the use of lethal methods to control problem black bears (P > 0.05). Following planning, passive participants indicated more support for use of lethal methods when human safety is jeopardized (Table 4). Passive participants who heard about the bear management plan between surveys became more tolerant of using lethal methods than members who did not hear about the plan (Table 4).

Black bear hunting. Neither committee members nor passive participants shifted in any opinions related to black bear hunting in Virginia (P > 0.05). After planning, nonhunting committee members indicated they were more tolerant of bear hunting with dogs; one member was more convinced that regulated hunting was the most important option to control bear populations. We did not ask VDGIF staff about hunting issues.

Virginia Department of Game and Inland Fisheries decision making and bear management. Following planning, committee members agreed more strongly that VDGIF manages bears well and considers the concerns of all interested parties fairly in making decisions about bear management (Table 5). Passive participants had more positive opinions about all aspects of VDGIF bear management and decision-making following planning.

Table 5. Opinions about Virginia Department of Game and Inland Fisheries (VDGIF) decision making and management of bears, as expressed by surveyed members of an advisory committee and members (pooled) of The Nature Conservancy, Virginia State Beekeepers Association, and Virginia Bear Hunters Association before (2000) and after (2001) planning.

<table>
<thead>
<tr>
<th>Group</th>
<th>Wellb</th>
<th>Biologyc</th>
<th>Understandsd</th>
<th>Considers(e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>(\bar{x})</td>
<td>SE</td>
<td>(\bar{x})</td>
<td>SE</td>
</tr>
<tr>
<td>Committee</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>2.31**</td>
<td>0.29</td>
<td>1.93</td>
<td>0.30</td>
</tr>
<tr>
<td>After</td>
<td>1.54</td>
<td>0.14</td>
<td>1.79</td>
<td>0.21</td>
</tr>
<tr>
<td>Pooled</td>
<td>(n=375)</td>
<td>(n=383)</td>
<td>(n=409)</td>
<td>(n=411)</td>
</tr>
<tr>
<td>Before</td>
<td>2.17***</td>
<td>0.05</td>
<td>2.07***</td>
<td>0.05</td>
</tr>
<tr>
<td>After</td>
<td>2.01</td>
<td>0.05</td>
<td>1.90</td>
<td>0.05</td>
</tr>
</tbody>
</table>

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.

\(P = 0.01\), ** \(P = 0.03\), *** \(P < 0.001\) for each pair.
Table 6. Pre-post shifts 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).

<table>
<thead>
<tr>
<th>Heard?</th>
<th>Well</th>
<th>Biology</th>
<th>Understands</th>
<th>Considers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x_d</td>
<td>SE</td>
<td>x_d</td>
<td>SE</td>
</tr>
<tr>
<td>Yes</td>
<td>139</td>
<td>0.22</td>
<td>136</td>
<td>0.32*</td>
</tr>
<tr>
<td>No</td>
<td>210</td>
<td>0.10</td>
<td>221</td>
<td>0.10</td>
</tr>
</tbody>
</table>

a Shifts along a scale where 1 = strongly agree, 2 = somewhat agree, 3 = neutral, 4 = somewhat disagree, 5 = strongly disagree. Shifts (post-scores minus pre-scores) < 0 indicate shifts toward more agreement and shifts > 0 indicate shifts toward more disagreement.

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 ≤ 0.02 for each pair.

Passive participants who heard about the plan during the period between surveys shifted toward greater approval than those who did not (Table 6). Beekeepers and TNC members who received a newspaper summary shifted toward greater approval than those who did not (Table 7). Bear Hunters who communicated with another Bear Hunter shifted toward greater agreement that VDGIF understands concerns of all parties (x_d = -0.31, SE = 0.13, n = 83) than Bear Hunters who did not (x_d = 0.02, SE = 0.13, n = 106) (T_{RS} = 7.245, P = 0.03).

Importance of different stakeholders' input. Eleven of 15 committee members reported a change in their opinions about other parties interested in bear management. Committee members indicated they had greater respect for the opinions and civility of other interests; had greater tolerance, understanding, and respect for bear hunters; were surprised at how well animal welfare and environmental interests represented themselves; had more concern and sympathy for those suffering bear damage; and had greater appreciation for VDGIF’s role in bear management. Both before and after planning, VDGIF staff, committee members, and passive participants indicated it is important to consider concerns of most stakeholders in bear management, including agency professionals, individuals with nonconsumptive interests in bears, landowners who experience bear damage, and bear hunters. However, post-planning, committee members attached significantly less importance to the input of individuals primarily interested in viewing bears, humane interests, and agricultural producers or homeowners who experience damage from bears (Table 8). Passive participants indicated post-planning that it is less important to consider concerns of preservation interests and...
Table 8. Opinions about the importance of considering stakeholder concerns in management of black bears, as expressed by members of a stakeholder advisory committee and members (pooled) of The Nature Conservancy, Virginia State Beekeepers Association, and Virginia Bear Hunters Association before (2000) and after (2001) planning.

<table>
<thead>
<tr>
<th>Group</th>
<th>Watching b</th>
<th>Humane c</th>
<th>Agricultural d</th>
<th>Residential e</th>
<th>Habitat f</th>
<th>Other Agencies g</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Committee</td>
<td>(n = 14)</td>
<td>(n = 15)</td>
<td>(n = 15)</td>
<td>(n = 15)</td>
<td>(n = 15)</td>
<td>(n = 15)</td>
</tr>
<tr>
<td>Before</td>
<td>1.71*</td>
<td>0.16</td>
<td>2.20*</td>
<td>0.22</td>
<td>1.27**</td>
<td>0.15</td>
</tr>
<tr>
<td>After</td>
<td>2.93</td>
<td>0.22</td>
<td>3.07</td>
<td>0.24</td>
<td>2.00</td>
<td>0.31</td>
</tr>
<tr>
<td>Pooled</td>
<td>(n = 563)</td>
<td>(n = 570)</td>
<td>(n = 560)</td>
<td>(n = 584)</td>
<td>(n = 588)</td>
<td>(n = 536)</td>
</tr>
<tr>
<td>Before</td>
<td>2.61h</td>
<td>0.05</td>
<td>2.92</td>
<td>0.06</td>
<td>1.93l</td>
<td>0.04</td>
</tr>
<tr>
<td>After</td>
<td>2.69</td>
<td>0.05</td>
<td>2.93</td>
<td>0.06</td>
<td>1.96</td>
<td>0.04</td>
</tr>
</tbody>
</table>

- **p ≤ 0.05 for each pair.
- *p ≤ 0.01 for each pair.

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.

f Individuals who primarily are concerned with preserving bears and bear habitat.

h Bear Hunters (n = 184) indicated less importance (P = 0.02).

i Interaction between organization and opinion shift: Bear Hunters indicated more importance whereas TNC members indicated less (P = 0.05).

The Virginia Department of Game and Inland Fisheries staff perceptions of stakeholder involvement. Staff did not shift their opinions during the planning process concerning the relative roles of stakeholders and professionals in setting broad management goals, setting specific management objectives, developing and selecting specific management strategies, and evaluating progress toward management goals (P > 0.30 for all tests). Both before and after planning, staff supported a larger role for stakeholders than currently observed in all phases of decision-making (Lafon 2002, Lafon et al. 2003). Staff (n = 21) disagreed more after (x̄ = 3.76, SE = 0.30) than before (x̄ = 3.10, SE = 0.33) the planning process that they were uncomfortable having goals for wildlife management based on stakeholder values (Tsk = 52.5, P = 0.05). Staff opinions did not differ before and after planning about other issues regarding stakeholder involvement in wildlife decision-making (P > 0.05; Lafon 2002).

Discussion

Both active and passive participation in developing the Virginia black bear management plan influenced stakeholders' knowledge and opinions concerning black bears and their management. Not surprisingly, active involvement had a greater effect than passive involvement. Involvement of stakeholders in the planning process improved their knowledge about black bear management and their image of VDGIF decision-making and management of black bears. Stakeholders' expressed mixed opinions about the value of other stakeholders' input in decision-making. Active participants, who had far greater interaction with other stakeholders and with VDGIF staff, gained greater appreciation for other interests and for wildlife professionals than did passive participants. Following planning, we found more stakeholder support for controversial management strategies (e.g., use of lethal methods to address bear problems, control of bear populations) but little change in their opinions about bear hunting.

The findings of our pre- and post-planning surveys were similar to those of other researchers in the natural resources field who have reported knowledge 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). The most important benefit of citizen participation may be the participation process itself (Stout et al. 1996). Whether serving on a committee or receiving a survey, being involved with management of a public resource and realizing that managers care enough to ask may enhance stakeholder appreciation of the resource and their image of managers.

**Effects of participation on knowledge about bears and their management**

*Active participation.* Involvement in the development of a bear plan compelled committee members to become conversant in many complex management issues, as was noted by Peek (1998) after working with a committee of user groups discussing restoration of grizzly bears in Idaho. Lack of power in our design utilizing pre- and post-test prevented quantitative confirmation that committee members’ knowledge actually increased. However, committee members who were least knowledgeable about bears and bear management at the beginning of the planning process learned the most by the end of the process. Similarly, Marenin (1989) noted that youths who were least knowledgeable before their involvement in participative service projects learned more about their communities than those who began with higher knowledge. Moreover, knowledge about black bear management includes a myriad of complex parameters we did not assess, such as management constraints and complexity, the concept of stakeholder acceptance capacity (also called cultural carrying capacity; McLaughlin 1999, Carpenter et al. 2000), damage abatement strategies (Jonker et al. 1998), and hunter motivations (Grise 1994). Therefore, our survey assessment of stakeholder knowledge, which focused on basic black bear biology and the ecology of bears in Virginia, did not account for the full impact of the planning process on committee members’ knowledge.

*Passive participation.* Passive participants demonstrated increases in knowledge about bears and bear management following the planning process. Improvements in passive participants’ knowledge were related positively to hearing or reading about the plan during the period between surveys. This finding demonstrates that even mass-produced, impersonal approaches to involving stakeholders in decision-making (e.g., newspaper summaries) can have significant, positive effects in improving stakeholder knowledge. People who did not hear about the plan also exhibited a slight increase in knowledge post-planning, perhaps indicating that the population at large became more knowledgeable 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).

**Effects of participation on opinions about bear management and other stakeholders**

*Active participation.* Throughout the planning process, committee members’ opinions shifted toward those of VDGIF staff with respect to increasing bear populations in suitable habitats and providing free trapping services to remove problem bears. Committee members’ support decreased for both scenarios. Although VDGIF staff shared public input with the committee and explained the positive and negative implications of larger bear populations (e.g., recreational benefits, damage, management expense) and translocation of problem bears (e.g., nonlethal resolution of problems, expense, risk of transferring nuisances, lack of suitable release sites; VDGIF 2002), they avoided any attempts to convince committee members that one technique was better than another. As committee members learned more about the implications of management actions, they became more aware of potential problems with expanding bear populations and moving bears from one area to another. In addition, committee members concluded that many bear problems could best be dealt with by teaching people not to bring bear problems upon themselves.

Although committee members gained greater appreciation for other interests in bears besides their own, they were not convinced that all interests should have greater input into making decisions. Committee discussions about bear damage, bear population expansion, and human safety may have compelled members to place less importance on concerns of individuals primarily interested in watching or photographing bears, as well as those primarily concerned with humane treatment of bears. Following planning, committee members placed less importance on input of agricultural and residential property owners who experience bear damage. Although committee members expressed sympathy for those experiencing damage, they appeared to conclude that bears inevitably cause
mischief and that people, especially homeowners with bear problems, need to learn how to live with bears.

**Passive participation.** Passive participants became more approving of VDGIF management of black bears but did not change their opinions about other stakeholders. Lacking interaction with other stakeholders that committee members experienced, passive participants did not gain greater appreciation or tolerance of other points of view. This suggests that though passive dissemination of information may be somewhat effective in improving knowledge, it is unlikely to reduce conflicts between stakeholder groups. To reduce conflicts, managers must bring conflicting interests together (McMullin 1996, Wondolleck and Yaffee 2000).

Passive participants exposed to the planning process expressed greater support for the use of lethal methods to address bear problems. However, it would be premature to interpret this support as a signal to indiscriminately dispatch bears involved in conflicts with humans. Both before and after the planning process, stakeholders and VDGIF staff were hesitant to restrict managerial options, but encouraged discretion in using lethal methods. Similar sentiments have been expressed elsewhere (Baptiste et al. 1979, McIvor and Conover 1994, Jonker et al. 1998).

**Virginia Department of Game and Inland Fisheries staff.** At the beginning of the process, VDGIF staff cautiously supported the planning approach designed to focus public involvement on making value choices and involvement of professionals on making technical choices. They indicated that constituents should have a significant role in making bear management decisions, particularly value-laden decisions related to developing goals (Lafon et al. 2003). Following planning, VDGIF staff expressed even greater comfort in basing goals on stakeholder values and focusing staff involvement on the technical aspects of management planning. Several interviewed staff stated that the planning process reinforced their belief in stakeholder participation. In other resource management agencies, experience with public involvement has been shown to change attitudes of personnel regarding the utility of public involvement (McConnell 1977, Crompton et al. 1981). McConnell (1977) observed a positive relationship between frequency of participation by United States Forest Service professionals and their attitudes toward public involvement.

Although staff opinions about bear management and stakeholder involvement in wildlife decision-making did not shift markedly during the planning process, staff did not appear to suffer from “attitudinal inertia” (certainty or rigidity resulting from years of hearing and learning about issues [McConnell 1977: 57]). Collaborative planning was not new to many VDGIF staff, who were involved 5 years earlier in a similar process to develop a statewide deer management plan (VDGIF 1999).

Before the planning process, VDGIF managers apparently were aware of and responsive to public values concerning bear management. The bear planning process may have validated what VDGIF staff already thought and did by shifting stakeholder opinions toward their own. If true, this could indicate that agency personnel were good synthesizers of public values in relation to management of black bears. Agency objectives already may have reflected diverse public concerns, even without formally derived and publicly developed plans. It also is possible that VDGIF staff provided stakeholders with the same information they presently use when making bear management decisions. As a result, stakeholders involved in the planning process arrived at the same conclusions as professionals. Both of these explanations hold, to some extent. Before the planning process, VDGIF staff and stakeholders agreed more often than not regarding important bear management issues. After the planning process, committee members’ opinions about increasing bear populations and relocating problem bears converged with those of VDGIF staff. Although staff made no overt attempts to influence the committee on these 2 management issues, they did share their perspectives.

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, who must reciprocate by attempting to understand realities of management and resource capabilities.

**Conclusions**

We conclude that the collaborative process to develop a management plan for black bears in
Virginia improved the management climate through improved relationships between and among stakeholders and resource managers (Chase et al. 2002). Active participants in the process understood other interests better and became more tolerant of other points of view. Although passive participants did not display more tolerance of other stakeholder interests, both they and active participants developed a more positive image of VDGIF wildlife professionals.

Collaborative planning also educated citizens about the black bear resource and the realities of black bear management. Positive changes in knowledge about black bears and their management were significant for passive participants, but our small sample size prevented detection of a significant change for active participants. Nevertheless, active participants who knew the least about bears going into the process clearly improved their knowledge.

We also conclude that sharing decision-making authority between resource management professionals and stakeholders can generate stronger commitment to wildlife conservation (Chase et al. 2000). Diverse stakeholders involved in development of Virginia’s black bear management plan demonstrated their commitment by testifying before the Virginia Board of Game and Inland Fisheries. Committee members representing hunting, environmental, and damage interests testified in support of the plan and the process used to develop it.

Wildlife managers have an array of options for involving stakeholders in decision-making processes. This study provided evidence for the utility of several different methods for disseminating information, including direct mailings, news releases, discussion with agency professionals, and indirect involvement through active participants. Direct mailings may potentially reach larger segments of the population and a broader stakeholder base than indirect involvement through active channels of communication between an organization’s members and its leadership. A recent survey found that Virginia residents preferred direct mailing for receiving information about fisheries and wildlife (McMullin et al. 2000).

We urge caution in extending our results to all planning processes. We cannot ignore the potential influences of factors outside the planning process on participants’ knowledge and opinions about bears and their management. Our “quasi-experimentation” (Lloyd 1973, Cook and Campbell 1979, Leeming et al. 1997) was adapted to a natural setting (the planning process) where we had neither control over the quality of the treatment (participation) nor ability to randomly assign subjects to multiple groups for replication. We could not establish control groups due to inclusiveness of the planning process and necessity of allowing interested public groups to participate at least passively. However, post-planning interviews and participants’ self-assessments were instrumental in validating survey responses.

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