Going into the 21st century: a perspective on trends and controversies in the management of the American black bear

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Abstract: We surveyed 52 jurisdictions across continental North America to gather comparative information on management strategies for American black bear (*Ursus americanus*) for the late 1980s and the start of the 21st century. Specifically, we asked about: population estimates and targets, harvest objectives and hunting methods (spring hunt, use of bait, use of dogs), hunter and harvest data, and trends in human–bear conflicts. Most population estimates were derived through a subjective process of extrapolation and expert opinion and were used as the basis for adjusting management practices. In 17 jurisdictions that had spring hunts, estimated black bear populations increased by 6%, compared to a 51% increase in the 21 jurisdictions with fall-only seasons. Estimated populations increased by 87% in the 14 jurisdictions without hunting seasons. Another 10 jurisdictions had reports of occasional transient bears but no resident population. Jurisdictions with liberal hunting regimes tended to maintain human–bear conflict at stable levels, whereas those with more restrictive regimes appeared to experience a growing trend. We suggest that the goal of management should be to balance the goals of maintaining viable black bear populations, safeguarding human welfare and property, and satisfying the needs of stakeholders in a cost-effective manner. Hunting and proactive education and awareness programs are keys to achieving that balance. By setting appropriate harvest objectives and hunting methods to regulate the density and distribution of black bears, in conjunction with measures to deter bears from associating people and dwellings with food, agencies should be better able to manage for human–bear conflict in the 21st century.

Key words: American black bear, animal care, animal rights, baiting, dogs, human–bear conflict, lethal and non-lethal control, management, pets, population estimate, spring hunt, trap-and-transport, *Ursus americanus*

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Prior to and during most of the 20th century, black bear (*Ursus americanus*) habitat across North America diminished and became fragmented (Hellgren and Maehr 1992) as agriculture and logging expanded, linear development (railways, powerline corridors, access roads) extended, and human settlements grew. Early settlers killed black bears indiscriminately for food and market value, as well as in defense of people, livestock, and crops (Alexander 1890, Cardoza 1976). However, during the 20th century, the value of wildlife and the need for active conservation became recognized through laws and policy (Reiger 1986, Miller 1990).

Estimated black bear populations in the United States grew by 13% from 1970 (Cowan 1972) to the late-1980s (Garshelis and Hristienko 2006) and were considered stable by Miller (1990). Many factors likely contributed to the recovery and increase, including removal of bounties, reduced killing as 'vermin,' implementation of conservative hunting seasons and regulations (particularly the protection of females and cubs), hunting and firearm restrictions around communities, reduced hunter access to private land, and designation as threatened or endangered where applicable. In conjunction with reduced mortality, suitable habitat expanded through the natural succession of abandoned and converted farmland, logged and burned areas, and through increased availability of human-sourced foods such as garbage, birdfeed, and crops. Now that black bear populations have been restored over most of their range, the focus of management is shifting from increasing populations and providing recreational hunting opportunities to resolving issues

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brought about by abundance (Organ and Ellingwood 2000).

Concurrent with the expansion in numbers and distribution of bears and people, human–bear conflicts have increased, as evidenced by governments drafting policies and legislation to deal with problem bears, more scientific studies on the subject, and increased coverage in the popular media. Many of these issues (crop damage, vehicle collisions, and residential property damage) are similar to other human–wildlife conflicts; however, unlike most other wildlife species that conflict with people (with the exception of large cats, *Felis* spp.), black bears can be a threat to personal safety. These concerns have been fueled by media reports of bear–human encounters involving human injury, including 12 fatalities since 2000. These deaths account for 21% of all recorded black bear-related fatalities since 1900 (S. Herrero, University of Calgary, Calgary, Alberta, Canada, personal communication, 2006).

The objectives of this paper are: (1) to report on the status of black bear populations and their management in North America at the start of the 21st century, and (2) to offer our perspective on managing black bear populations as we move forward.

Status determination

Ten provincial, 2 territorial (Nunavut, Canada, was combined with the Northwest Territories for comparative purposes), and 49 state wildlife agencies in continental North America were contacted by telephone in 2002 to initiate contact and to identify which jurisdictions allowed hunting of black bears. Later that year, a survey was sent via email to identify hunting methods and trends in black bear populations and human–bear conflicts. In 2004, these jurisdictions were resurveyed to gain information on bear management planning, legal hunter harvests, and regulations concerning the feeding of bears.

The first survey was based on McLaughlin and Smith (1990), who summarized management strategies practiced by 41 jurisdictions in the late 1980s. Managers were asked to estimate population size and assess trend (stable, growing, declining) and severity of (manageable, serious, minimal) human–bear conflict during 1987–1989 and 1999–2001. Managers were asked to declare whether population estimates were based on empirical data (densities derived from field research conducted within the jurisdiction) or educated guesses. Respondents were also asked to identify which harvest management practices (spring hunting, fall hunting, baiting, use of dogs) were in place during these periods and to summarize the number of nuisance complaints, bears relocated, bears destroyed, total compensation paid for damage caused by bears, and program delivery costs.

Subsequent contacts were made to resolve questions and to ensure that questionnaires were completed. In June of 2003, all respondents were asked to verify the accuracy of the tabulated responses from the 2002 survey.

A second survey was emailed to the same contacts in February 2004 asking whether their agency had a formal black bear management plan during 1985–2001, or by 2004, and if they had a black bear population management target, harvest objective, or both. In the absence of a management plan, the agency was asked if they followed an unwritten policy (as expressed by members of a regulatory board or in press releases by agency management). Agencies were also asked to identify any regulations prohibiting the feeding of bears, intentional or inadvertent, and the year they were enacted.

Each manager was asked to provide the following harvest data for each year from 1985 to 2001 inclusive; total males harvested, total females harvested, total harvest, and number of bear hunters. The average number of black bear hunters, black bears harvested, and the percent of female bears taken during 1987–89 and 1999–2001 inclusive was computed for each jurisdiction. In instances where data were not available for the periods requested, the closest 3 years of complete hunter harvest information (e.g., Michigan, 1990, 1991, 1992) was averaged. If a jurisdiction suspended a hunting practice, we summed hunter harvest data with equal intervals pre-and-post change (e.g., Colorado suspended baiting, spring hunting, and hound hunting in 1994 thus, we calculated pre-change as 1986–93 and post-change as 1994–2001).

Results

Responses to both email surveys were received from all 10 provinces, 2 territories and 49 states in continental North America. Twenty-two agencies (1 provincial and 21 state) reported no bear hunting season or no resident black bear populations.

Table 1. Hunting seasons, legal methods, estimated population sizes (as reported by provincial bear biologists), and current nuisance levels for black bears in Canadian provinces for the late 1980s and 2001.

	Late 1980s			2001			Human–bear conflicts	
Jurisdiction	Season[a]	Methods[b]	Population estimate[c]	Season[a]	Methods[b]	Population estimate[c]	Trend	Level
Alberta	both	bait	35.0–40.0	both	bait	35.0–40.0	stable	manageable
British Columbia	both	hounds	120.0–160.0	both	hounds	120.0–160.0	stable	minimal
Manitoba	both	bait	25.0–35.0	both	bait	25.0–35.0	stable	manageable
New Brunswick	both	bait	13.0–15.0	both	bait	14.0–16.0	growing	manageable
Newfoundland[d]	both	bait	8.0	both	bait	8.0	growing	minimal
NW Territories[e]	both	neither	>5.0	both	neither	10.0	stable	manageable
Nova Scotia	fall	bait	8.0–10.0	fall	bait	8.0–10.0	stable	manageable
Ontario	both	both	65.0–75.0	fall	both	75.0–100.0	growing	manageable
Quebec	both	both	60.0	both	bait	60.0	growing	manageable
Saskatchewan	both	bait	24.0–30.0	both	bait	35.0–40.0	stable	manageable
Yukon	both	neither	10.0	both	neither	10.0	stable	manageable

[a]Fall, spring, or both.
[b]Bait, hounds, both, or neither.
[c]Multiples of 1,000.
[d]Excludes Labrador.
[e]Northwest Territories, includes Nunavut.

Trends in black bear populations

Four of 11 Canadian jurisdictions reported increases in estimated bear populations (Table 1) between 1988 and 2001, although in 2 of those cases the estimated ranges overlapped. The remaining 7 jurisdictions reported stable population estimates. All of the Canadian jurisdictions except Prince Edward Island (where black bears have been extirpated) allowed some form of bear hunting.

Of 33 US states that reported resident black bear populations in both 1988 and 2001, 28 reported an increase in estimated abundance during that period (Tables 2, 3). Some states reported wide population ranges and others reported a single number without any estimate of variation. Three states reported a stable population over the interval and 2 states (Alabama, Montana) reported decreases. Fifteen states reported increases $\geq$100% during the interval (Tables 2, 3). Nine states explicitly stated they used empirical data (Florida, Kentucky, Massachusetts, Minnesota, New Jersey, North Carolina, Pennsylvania, Utah, and Wisconsin) to derive their estimates. Methodologies used in the remaining jurisdictions ranged from fairly rigorous mark–recapture or modeling exercises using field data to educated guesses.

Trends in black bear management planning

Five of the 11 Canadian provinces and territories that hunted bears reported having a formal management plan by 2001 and 1 had a draft plan by 2004. Of the 6 provinces with management plans, 3 set population targets and harvest objectives and 1 set a harvest objective but no population target. The 2 remaining provincial management plans did not specify a population target or harvest objective.

Eighteen of 28 states that hunted bears reported having formal black bear management plans by 2001 and 21 states reported having a plan by 2004. Of these 21 states, 3 reported having a specific population target and harvest objective, 4 states had a population target but no harvest objective, and 1 state had a harvest objective but no population target. The 13 remaining state management plans did not identify a population target or harvest objective.

Harvest and hunters

Of 10 Canadian jurisdictions that had estimates of hunter numbers for both intervals (early: 1987–89, late: 1999–2001), only Nova Scotia reported increases from the early to late interval (Table 4). The decreases in the other 9 jurisdictions ranged from 2% to 210% (Table 4).

Eighteen US states had estimates of hunter numbers for both intervals (Table 5). Of those, 15 reported increases in estimated hunter numbers between the intervals, ranging from 14% to 238% (Table 5). In each state that prohibited baiting, spring hunting, hound hunting, or some combination of those methods (Colorado, Massachusetts, Oregon, Washington), hunter numbers increased by 32% to 112% for equal intervals, pre-and post

Table 2. Hunting seasons, legal methods, estimated population sizes (as reported by state bear biologists), and current nuisance levels for black bears in US states for the late 1980s and 2001.

	Late 1980s			2001			Human–bear conflicts	
Jurisdiction	Season[a]	Methods[b]	Population estimate[c]	Season[a]	Methods[b]	Population estimate[c]	Trend	Level
Alaska	both	both	60.0–100.0	both	both	60.0–100.0	growing	manageable
Arkansas	fall	neither	2.4	fall	bait	4.0	stable	manageable
Arizona	both	hounds	2.0–2.5	both	hounds	2.0–2.5	stable	manageable
California	fall	hounds	20.0	fall	hounds	31.0	growing	manageable
Colorado	both	both	6.0–10.0	fall	neither	8.0–12.0	growing	manageable
Florida	fall	hounds	1.2–>1.8	no	neither	1.2–>1.8	growing	manageable
Georgia	fall	hounds	2.1	fall	hounds	2.2	growing	manageable
Idaho	both	both	20.0–25.0	both	both	20.0–25.0	stable	minimal
Maine	fall	both	19.0	fall	both	23.0	stable	manageable
Massachusetts	fall	hounds	<1.0	fall	neither	>2.0	growing	manageable
Michigan	fall	both	8.0–9.0	fall	both	19.0	growing	manageable
Minnesota	fall	bait	10.0–15.0	fall	bait	20.0–30.0	stable	manageable
Montana	both	neither	20.0–25.0	both	neither	20.0	growing	manageable
New Hampshire	fall	both	4.0	fall	both	4.9	growing	manageable
New Mexico	fall	hounds	4.8	fall	hounds	5.5	stable	manageable
New York	fall	neither	5.0	fall	neither	6.0	growing	manageable
North Carolina	fall	hounds	6.7	fall	hounds	10.7	growing	manageable
Oregon	both	both	22.0–27.0	both	neither	25.0–30.0	growing	minimal
Pennsylvania	fall	neither	7.5	fall	neither	15.0	growing	manageable
South Carolina	fall	hounds	0.3	fall	hounds	0.6	growing	manageable
Tennessee	fall	hounds	1.0	fall	hounds	2.0–2.5	growing	manageable
Utah	both	both	<1.0	both	both	3.0–3.5	stable	manageable
Vermont	fall	hounds	2.5	fall	hounds	3.5	growing	manageable
Virginia	fall	hounds	2.5–3.5	fall	hounds	5.0–6.0	growing	manageable
Washington	both	both	<20.0	both	neither	25.0–30.0	growing	manageable
West Virginia	fall	hounds	3.5–4.5	fall	hounds	12.0–15.0	growing	serious
Wisconsin	fall	both	8.1	fall	both	11.9	stable	manageable
Wyoming	both	bait	5.0–7.0	both	bait	5.0–7.0	growing	manageable

[a]Fall, spring, or both.
[b]Bait, hounds, both, or neither.
[c]Multiples of 1,000.

change. Fourteen of 41 US states that reported having resident bear populations in 2001 did not allow any bear hunting, although Florida did have a hunting season in 1988 (Tables 2, 3). Since 2001, New Jersey (2003) and Maryland (2005) opened bear seasons after 33 and 50 year closures, respectively. For some states (Arkansas, Georgia, Idaho, Maine, North Carolina, New York, Virginia, Vermont), no separate bear hunting license or permit is required to hunt bears during some seasons, thus these hunter numbers may not encompass all hunters eligible to take bears.

In the 10 Canadian jurisdictions that had harvest estimates for 1987–89 and 1999–2001, 6 provinces reported increases, despite hunter numbers decreasing in 5 jurisdictions (Table 4).

Twenty-three of 26 US states that had estimates of total bear harvest for both intervals reported increases (Table 5). Arizona and Utah reported decreases in hunter numbers and harvest between intervals, and Wyoming reported a decrease in hunter numbers and a relatively small increase in the average harvest (Table 5). Utah intentionally reduced the number of licences to reduce harvest. Two of the 3 states that banned hound and bait hunting (Oregon, Washington) reported 8% and 6% harvest decreases for equal intervals pre-and-post change, whereas Colorado reported a 28% increase. In Massachusetts, which banned hounds in 1996, the bear harvest increased by 26% between the pre-and-post intervals (377 and 476, respectively).

Although total big game license sales decreased by 1.5% in 18 US states between 1991 and 2001 (US Fish and Wildlife Service 2004), black bear license sales and harvest increased by 62% and 65%, respectfully (Table 6). The trend in hunter numbers in Canada for the same period was reversed, decreasing by 40% while the harvest increased marginally by 2%. Black bear license sales in both countries represented <6% of total big game license sales.

Table 3. Estimated population sizes (as reported by state authority) and nuisance levels for black bears in jurisdictions without hunting seasons for the late 1980s and 2001.

Jurisdiction	Late 1980s Population estimate	2001 Population estimate	Human–bear conflicts Trend	Level
Alabama	200	50–100	stable	minimal
Connecticut		200	growing	manageable
Delaware		transients		
Illinois		no bears		
Indiana		no bears		
Iowa		transients		
Kansas		transients		
Kentucky	<100	<500	growing	manageable
Louisiana	<300	<500	growing	manageable
Maryland		250–450	growing	serious
Mississippi		<100	stable	minimal
Missouri		300–400	growing	manageable
Nebraska		transients		
Nevada		150–250	growing	serious
New Jersey	<300	1,400–1,800	growing	serious
North Dakota	<100	100–300	stable	minimal
Ohio		30–50	growing	manageable
Oklahoma		200–300	growing	manageable
Rhode Island		transients		
South Dakota		no bears		
Texas		<50	growing	manageable

Black bear hunting methods

Each of the 8 Canadian jurisdictions that allowed hunting bears with bait in 1988 allowed baiting in 2001 (Table 1). Baiting was mandatory in Nova Scotia. Ten of 11 jurisdictions in Canada allowed spring hunting in 1988, and 9 of 11 held spring hunts in 2001 (Table 1). Ontario eliminated the spring season in 1999. Three jurisdictions allowed the use of hounds in 1988 (Table 1). In 2001, British Columbia and Ontario allowed hounds, but Quebec prohibited hunting with hounds in 1998.

Twelve of 28 states that hunted bears in 1988 allowed baiting (Table 2). In 2001, 10 of 27 states allowed baiting, with Colorado (1994), Oregon (1994), and Washington (1996) banning baiting and Arkansas permitting it in 2001. Eight states allowed at least limited spring bear hunting in 1988 (Table 2). In 2001, 7 of those states allowed some spring hunting whereas Colorado prohibited spring hunts in 1994. In 1988, 22 of 28 states allowed the use of hounds to hunt bears (Table 2). In 2001, 17 of 27 states allowed hunting with hounds, with Colorado (1994), Massachusetts (1996), Oregon (1994), and Washington (1996) enacting prohibitions on the use of hounds. Florida allowed hounds in 1988, but banned all bear hunting after 1993.

Human–bear conflict management

Ten jurisdictions provided partial or full compensation for damages to beehives, crops, or livestock caused by black bears. New Hampshire, West Virginia, Wisconsin, and Manitoba compensated for all these damages, whereas Pennsylvania and Ontario covered poultry, livestock, and beehives. Utah covered only livestock, Alberta and Colorado covered crops and livestock, Wyoming covered beehives and livestock, and Saskatchewan covered grain crops and beehives. California, Michigan, Minnesota, North

Table 4. Black bear hunter harvest data for Canadian provinces comparing the late 1980s with the early 21st century.

Jurisdiction	3 yr average (1987–1989) Hunters	Bear harvest	Harvest level[a]	female (%)	3 yr average (1999–2001) Hunters	Bear harvest	Harvest level[a]	Female (%)
Alberta	17,336	1,779	5	24	7,202	1,076	3	21
British Columbia	10,477	4,018	3	19	10,249	4,463	3	19
Manitoba	3,541[b]	1,655[b]	6[b]	24[b]	3,144	1,720	6	26
New Brunswick	4,834	966	6	41	4,351	1,715	11	34
Newfoundland[c]	4,375	457	6	3,267[c]	334[c]	4[c]		
NW Territories	no formal harvest monitoring system							
Nova Scotia	225[d]	62[d]	1[d]		647	233	3	26
Ontario	30,162	6,493	9	34	18,493	4,693	5	30
Quebec	22,877	2,844	5	36	7,400	3,696	6	30
Saskatchewan	4,784	1,379	5	30	4,365	2,158	6	31
Yukon	396	106	1	20	269	96	1	20

[a]Percent harvested based on estimated population.
[b]3-yr average is for 1987, 1988, 1990.
[c]Excludes Labrador; 2001 only.
[d]3-yr average is for 1988, 1989, 1990.

Table 5. Black bear hunter harvest data for US states comparing the late 1980s with the early 21st century.

	3 yr average (1987–89)				3 yr average (1999–2001)			
Jurisdiction	Hunters	Total harvest	Harvest level (%)[a]	Female (%)	Hunters	Total harvest	Harvest level (%)[a]	Female (%)
Alaska	Data not summarized on a state basis							
Arkansas	—[b]	62	1	55	—[b]	252	6	46
Arizona	4,701	240	11	43	4,290	227	8	46
California	11,048[c]	1,331[c]	7[c]	36[c]	18,495	1,724	6	41
Colorado	5,724	581	7	34	14,237	811	8	40
Florida	313	49	5	29	No season			
Georgia	—[b]	86	4	48	9,924	284	13	54
Idaho	14,467	1,201	5	34	[d]	1,880	8	34
Maine	—[b]	2,579	14	46	13,130	3,779	16	45
Massachusetts	1,277	33	5	53	2,355	94	4	45
Michigan	4,370[e]	1,016[e]	12[e]	39[e]	7,208	1,902	10	42
Minnesota	5,400	1,666	13	42	16,067	4,151	17	44
Montana	11,048	1,331	7	36	18,495	1,724	6	41
New Hampshire	7,274[e]	215[d]	7[d]	39[d]	16,885	492	10	43
New Mexico	3,382	325	7	40	6,573	384	7	35
New York	—[b]	754	15	44	—[b]	852	14	41
North Carolina	—[b]	566	8	38	—[b]	1,463	14	40
Oregon	17,407	928	4		35,829	1,056	4	31
Pennsylvania	92,041	1,978	24	51	105,146	2,626	18	51
South Carolina	501	7	3	40	834	27	4	44
Tennessee	4,361	73	7	36	4,781	149	9	38
Utah	501	70	8	32	216	67	2	37
Vermont	—[b]	328	13	42	—[b]	476	14	42
Virginia	—[b]	589	20	37	16,063	930	17	34
Washington	12,220	1,443	7	36	32,858	1,228	4	33
West Virginia	6,792	384	10	41	21,243	1,190	9	37
Wisconsin	1,804	980	12	41	6,098	2,981	25	47
Wyoming	3,720	211	4	36	2,117	247	5	33

[a]Percent of bears harvested of the estimated population.
[b]No separate bear license.
[c]3-yr average is for 1987, 1988, 1990.
[d]No surveys conducted.
[e]3-yr average is for 1990, 1991, 1992.

Carolina, Oregon, and Vermont all adopted policies to not relocate bears, but these jurisdictions may relocate transient bears in urban or suburban settings. California, New Jersey and Virginia practiced on-site treatment of problem bears, employing aversive conditioning during release.

Regulations governing the feeding of bears

By 2001, 2 jurisdictions in Canada (British Columbia, Yukon) and 12 in the US (Alaska, Arkansas, California, Colorado, Maryland, Montana, New Mexico, New York, South Carolina, Virginia, Washington, West Virginia) banned in-

Table 6. Change in black bear population estimates and harvest data in the United States and Canada between the late 1980s and the early 21st century.

	3 yr average (1987–1989)					3 yr average (1999–2001)				
Jurisdiction	Population	Bear hunters	Harvest	Harvest level	Female (%)	Population	Bear hunters	Harvest	Harvest level	Female (%)
United States[a]	155,950	193,571	12,812	9	40	227,150	313,727	21,080	9	40
Change (%)						46	62	65		
Canada[b]	405,500	99,007	19,759	5	29	434,500	59,387	20,184	5	26
Change (%)						7	−40	2		

[a]Arizona, California, Colorado, Maine, Michigan, Minnesota, Montana, New Hampshire, New Mexico, Oregon, Pennsylvania, South Carolina, Tennessee, Utah, Washington, West Virginia, Wisconsin, Wyoming.
[b]Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, Québec, Saskatchewan, Yukon.

tentional or inadvertent feeding of wildlife in a manner that could contribute to the habituation and food-conditioning of a bear. By 2004, 2 additional Canadian provinces (Alberta, Manitoba) and 4 more US jurisdictions (Florida, Kentucky, New Jersey, Pennsylvania) introduced anti-feeding regulations. In 2001, 10 jurisdictions (British Columbia, California, New Jersey, Michigan, Minnesota, New Hampshire, North Carolina, Oregon, Washington, Wisconsin) had formalized systems to document human–bear conflict which included a database to enter and retrieve data.

Perspective on black bear management

Trends in populations

Management agencies have taken conservative approaches to managing black bears during what can be termed the population restoration phase of the latter half of the 20th century. This was due, in large part, to early research that portrayed the species as having one of the lowest rates of reproduction of any land mammal in North America (Jonkel and Cowan 1971), being among the slowest reproducing terrestrial mammals in the world (Bunnell and Tait 1981), and vulnerable to overharvest (Bunnell and Tait 1980). More recently, research has indicated that some bear populations in the east and midwest are more productive than earlier reported, with most females having their first litters at 3 years old (some at 2 years) and a mean litter size for adult females approaching 3 cubs (Alt 1989, McLaughlin 1998, McDonald and Fuller 2001). Recruitment rates of around 1 cub per year, assuming 25–30% mortality (Bunnell and Tait 1985), are comparable to many hunted ungulate populations. Although most ungulates become reproductively mature at 1–2 years of age, their reproductive potential rarely extends past 15 years (V. Geist, University of Calgary, Calgary, Alberta, Canada, personal communication, 2006); black bears can successfully reproduce into their mid-twenties (Alt 1989, McLaughlin 1998, H. Hristienko unpublished data). For Manitoba, that means that >11,600 cubs are born each year if the black bear population has 25,000 animals, a female:male sex ratio of 55:45 (Pastuck 2001), 33% of females are available to breed in any year (Alt 1982), and an average litter size of 2.56 (Hristienko et al. 2004). Using an annual mortality rate of 18–47% for cubs (Kolenosky 1990) results in an estimated 6,160–9,530 yearlings searching for a home range each year.

Pooled population estimates for North American black bear populations suggest a growth rate of 2% per year (Garshelis and Hristienko 2006) since the late 1980s. Decker et al. (1981) suggested that high bear populations will inevitably lead to human–bear conflicts because of the bear's attraction to human food sources, implying an association between the population densities of humans and bears. Because we are unlikely to be able to control the density and distribution of people, we are left with controlling the density and distribution of bears to reduce conflict between the two. That leads us to question: How do agencies manage black bear populations to sustain their abundance and distribution while maintaining them at levels that safeguard human welfare and property (wildlife acceptance capacity) in a cost-effective manner? By how agencies manage we mean not just philosophically in terms of how many bears there should be, but also mechanistically in terms of the practices employed to reach those goals.

Black bear management

Black bears are a long-lived species that occupy the top of the food chain and are capable of rapidly altering their behavior to adjust to environmental change (Ayers et al. 1986, Stirling and Derocher 1990). There is no evidence to show that black bear populations in settled areas of North America self-regulate or that bears dispersing beyond the periphery of their current range would fare poorly (Garshelis 1994). In fact, suburban woodland areas are becoming sanctuaries for bears, primarily because they provide food in the absence of significant perceived risks (to bears). A Nevada study attributed many traits of urban-interface bears to the availability of human foods, including the 70–90% smaller home ranges, 30% greater body mass, higher reproductive success, and later denning and slightly earlier emergence than wildland bears (Beckmann and Berger 2003*a,b*). Similarly, in New Hampshire and New Jersey, female bears occupying human residential areas had smaller home ranges than reported for bears in nearby less developed areas (Ellingwood 2003, MacKenzie 2003).

Animal-rights activists want no human interference through hunting, trapping, or problem animal destruction, so bears can 'naturally' seek their own population levels (R. Carmichael, Chair of Animal

Use Committee, International Association of Fish and Wildlife Agencies [IAFWA], Winnipeg, Manitoba, Canada, personal communication, 2004). Both provincial and state wildlife management agencies and most animal-care organizations attempt to manage animal populations but use different means to achieve the same ends. Agencies manage free-ranging populations and attempt to provide human use within habitat limits (at or below biological carrying capacity), whereas animal-care organizations manage captive individuals based on the availability of space in shelters and homes (that is, at or below carrying capacity). In either case, when carrying capacity is exceeded, animals are removed by hunters or by a veterinarian or caregiver. Even with subsidized spaying and neutering programs, many pets are euthanized each year. The CBS News program *48 Hours* reported that in the US, 5 million domestic dogs and cats were deliberately killed in 2001.

If left unchecked, black bears can be a limiting factor to other species—moose (*Alces alces*) in Alaska (Osborne et al. 1991) and woodland caribou (*Rangifer tarandus caribou*) in Newfoundland (Mahoney et al. 1990). In the case of black bears living closely with people, bears can present the same type of nuisance situations as raccoons (*Procyon lotor*), foxes (*Vulpes* spp.), or uncontrolled pets (McLaughlin and Beck 1996). We believe public tolerance for these nuisances will erode and bear populations eventually will have to be controlled. This may be by hunters, by citizens (either legally or illegally), or by government agencies at public expense.

Lethal control

Hunting programs are usually structured to suit the demographics, geography, and local traditions of jurisdictions. The hunting methods permitted largely depend on hunter numbers, access, terrain, effectiveness, humaneness, public safety, and local culture, concurrent with species population dynamics (distribution, density, behavior, reproduction, recruitment, longevity, and natural mortality), all filtered through the lens of politics.

In addition to generating revenue to support wildlife conservation programs, provincial and state wildlife agencies view hunting as "a safe, legal, responsible use of the wildlife resource and a legitimate and effective means to control over-abundant game species in a cost-effective manner" (Wolgast et al. 2005:19). Hunting has been embraced by agencies as a core element of what is termed the North American model of wildlife conservation (Prukop and Regan 2005). A well-managed harvest system achieves a sustained yield and places a positive value on black bears in terms of economic, social and biological benefits. The alternative to a goal-driven hunting program is often a reactive, individual-based approach to dealing with nuisance bears (McDonald 2003). Hunted populations seem to be more wary of humans (McCullough 1982, Herrero 1985, Swenson 1999) than unhunted populations.

Provincial and state human demographics appear to have a greater effect on hunting seasons than biological factors. We identified an east and south versus a west and north division, and urban jurisdictions tend to have more restrictive hunting regimes than jurisdictions with largely rural populaces (Fig. 1). Estimated bear number increases were greater (87%) in the 14 jurisdictions that had resident populations but did not permit hunting than in jurisdictions that did permit hunting: 51% in the 21 jurisdictions that had only a fall-season and 6% in the 17 jurisdictions that had both spring and fall seasons (Fig. 2). We recognize that the estimates provided by managers were not always based on precise methodology and thus do not reflect absolute population trends (Garshelis and Hristienko 2006), and that some of the increases may have been by design. However, these estimates serve a management purpose and are necessary for adjusting bear harvests according to a perceived population trend.

Pennsylvania, Virginia, and Wisconsin all reported increasing bear populations and subsequent conflicts even though harvest rates in recent years were >20%. Previously, losses to hunting of 8% (Kolenosky and Strathearn 1987) and 14.2% (Miller 1990) were thought to be excessive for Ontario and North America, respectively.

Western and northern populations, where food is less abundant and hard mast often absent, certainly may need to be managed more conservatively than eastern populations. However, to reduce the high levels of human–bear conflict in many jurisdictions, harvest objectives to reduce or stabilize bear populations will need to be increased. This will require wildlife management agencies to change their philosophy *vis a vis* black bears from restoration to management (McDonald 2003). Even if these higher harvest objectives are significantly exceeded in a year, few bear populations should be at any serious risk. Through harvest monitoring and knowledge of population dynamics, agencies should be able to

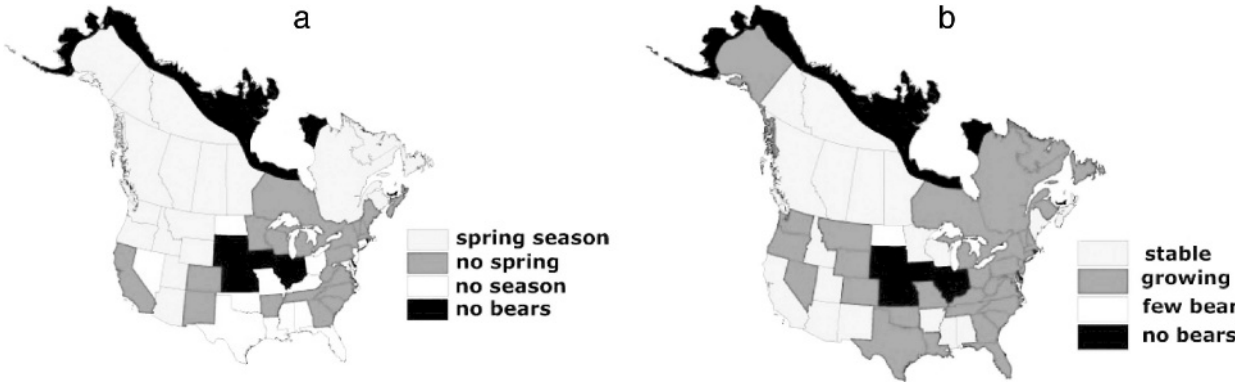

Fig. 1. (a) Hunting season strategies across North America and the associated trend in human–black bear conflicts, 2001. (b) Range of black bear population estimates and growth in North America within associated management strategies, 2001.

respond quickly by reducing harvest objectives as has been demonstrated in some states (New Hampshire; M. Ellingwood, New Hampshire Department of Fish and Game, Concord, New Hampshire, USA, personal communication, 2006).

Opponents of bear hunting argue that hunting is not effective at reducing human–bear conflicts because of the low probability that hunters will kill the bears that actually cause problems, and that hunters preferentially target large males. By removing 1–5-year-old bears, the age group responsible for >70% of all reported nuisance conflict (Garshelis 1989, Shull 1994, Landriault 1998, Brown and Hamr 1999) and which are represented in the same proportion in most populations and harvests (Shull 1994, H. Hristienko unpublished data), managers are being proactive in addressing the density and distribution aspect of the human–bear conflict issue.

Because variability in bear complaints is related to so many factors, it is difficult to arrive at a specific cause-and-effect relationship to explain large swings in nuisance activity from one year to the next. That said, New Jersey reduced bear complaints by 42% in 2004, the year after its first bear hunt in 33 years (Wolgast et al. 2005). With fewer bears, it is natural to assume that there would be fewer human–bear interactions resulting in fewer complaints. Although some nuisance bears are killed during a regulated hunting season, thereby eliminating further problems, many nuisance bears are relatively invulnerable to hunters because of access and firearm restrictions in and around communities. We believe hunter access will soon be (if it is not already) one of the

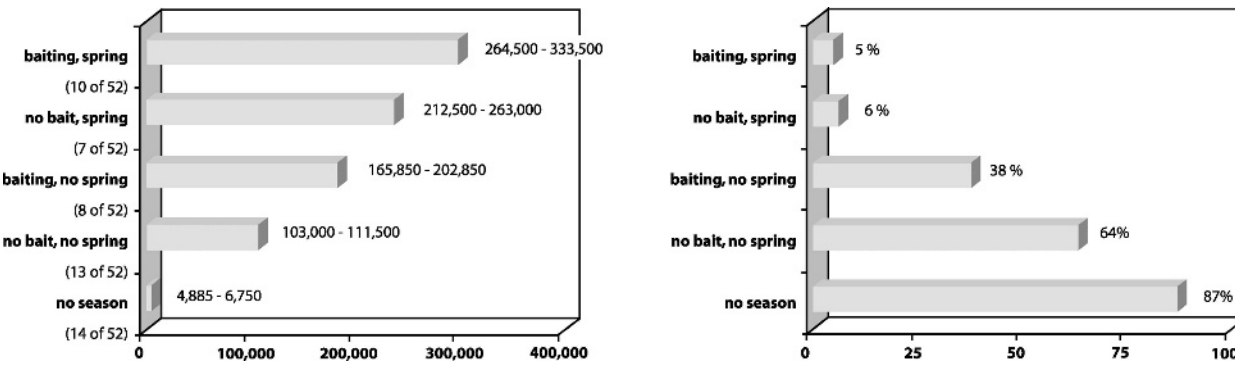

Fig. 2. Range of black bear population estimates and growth in North America within associated management strategies, 2001.

largest obstacles to resolving the most controversial bear population management situations, as it is for white-tailed deer (*Odocoileus virginianus*) management.

Opponents of bear hunting further condemn the practice on ethical grounds and claim it is unnecessary to manage populations. Animal-rights activists, frustrated in most broad attempts to curtail hunting through legislative, judicial, and agency regulatory routes, have adopted a strategy—often using the ballot initiative where available—of challenging elements of hunting that research has identified as most offensive to or least understood by non-hunters, that is, claiming that hunters only seek a trophy, that it is unsafe, that baiting is unsporting, that the use of dogs is cruel, that spring hunting is unfair, or that shooting mothers orphans their cubs. (Pacelle 1998).

Bear hunting methods

Baiting. It is important to distinguish between using attractants to lure bears in hunting situations and the deliberate or inadvertent luring of bears in nuisance situations. Baiting for the purpose of hunting typically occurs in forested habitat, removed from direct interaction with humans, and bears in these situations tend to be secretive and wary whereas bears that interact with humans in suburban settings can become habituated and food-conditioned as they learn to associate humans and food without negative consequences. Habituated bears may become increasingly brazen to the point of being aggressive when they learn humans can be intimidated, as has been demonstrated with coyotes (*Canis latrans*) and mountain lions (*Felis concolor*) (Timm et al. 2004). Swenson (1999) concluded that if bears are to maintain their wariness of humans, human-derived foods must not be available to them.

Opponents of baiting argue that it epitomizes unfair chase, it causes littering problems, promotes the transmission of disease, conditions bears to become nuisances, and increases bear vulnerability to hunters. Proponents of baiting argue that it enhances the safety of hunters and non-hunters (particularly where elevated stands are used), is appropriate for settings where visibility is limited and spot and stalk hunting is impractical, helps maintain consistency in the number of bears harvested annually, distributes hunting pressure rather than leaving large tracts of difficult (from a hunting perspective) habitats unhunted and optimal habitat overhunted, can target the male segment of the population, can increase selectivity against females accompanied by cubs, improves the opportunity for a humane kill, can increase harvests where chronic depredation or other human–bear conflict is common, and provides opportunities for hunters to experience and photograph all types of wildlife. All these points must be considered by agencies when developing an effective harvest strategy to meet management objectives.

Animal-rights activists argue that baiting bears is antithetical to hunting, while others oppose baiting on the grounds that they believe the practice preconditions bears to foods associated with humans. Paquet (1991:2) conceded that for the Riding Mountain area of Manitoba there was "no evidence that bears exposed to baits become problems in campgrounds, agricultural areas, or residential developments." McLaughlin, in a 1996 *Outdoor Life* article, demonstrated that in Maine, where baiting typically accounts for about 75% of the harvest (Vashon and Cross 2005), bears were not conditioned to become nuisances. D. Garshelis (Minnesota Department of Natural Resources, Grand Rapids, Minnesota, USA, personal communication, 2003) has not seen evidence from capture studies in Minnesota to implicate baited bears in nuisance activities; to the contrary, nuisance bears are not the ones that have been captured repeatedly. Both Garshelis and H. Reynolds (Alaska Department of Fish and Game, Anchorage, Alaska, USA, personal communication, 2003) theorized that if baiting and nuisance behavior are linked—that is, baiting spurs bears to become nuisances, but baiting also attracts nuisance-prone bears—then, in a heavily hunted population, baiting may remove more nuisance animals than it creates.

G. Vautour (Ontario outfitter, Massey, Ontario, Canada, personal communication, 2003) speculated that prior to the cancellation of the spring bait hunt in Ontario, 2,000 registered tourist outfitters each put out a minimum of 4,500 kg (10,000 pounds) of bait in addition to what was placed by resident hunters. The removal of >9 million kg (20 million pounds) of food, at a time of the year when it is difficult for bears to find energy-rich foods, forced bears to seek food elsewhere. He speculated that baiting stations in the spring served as intercept feeding sites (where food is placed to lure animals away from other areas) delaying dispersal until natural foods are available. In central Ontario, all

incidents of nuisance behavior by bears that were trapped and collared at bait sites began after hunters suspended baiting activities in spring, supporting the theory that baited bears depended on bait as a spring food (Landriault 1998).

During 1995–98, prior to the 1999 cessation of the spring bait hunt in Ontario, a few resource offices received a total of 2,600 nuisance bear complaints. During 1999–2002, post cancellation, these same offices received 12,426 calls (T. Quinney, Ontario Federation of Anglers and Hunters, Peterborough, Ontario, Canada, personal communication, 2005). For Manitoba, the figures for the same periods were 5,850 (average = 1,463; range = 739–2,295) and 5,838 (average = 1,459, range = 1,102–1,809). For the same periods, the numbers of bears harvested were 26,886 and 18,920 in Ontario, and 6,424 and 6,899 in Manitoba. Responding to mounting pressure to protect its citizens from nuisance bears, Ontario invested $10 million (Canadian) during the 2 years after introducing a comprehensive nuisance bear management strategy in 2004 to reverse the trend of increasing human–bear conflicts.

We believe that baiting can be used to achieve harvest objectives in and around developed areas, perhaps even using feed mixtures specifically formulated for bears to reduce the association of people and anthropogenic foods. In our opinion, hunting from elevated stands over bait may be the most effective and safest way to hunt bears in developed areas because baiting can be used to attract bears to areas outside restriction zones or onto the land of willing landowners. Hunters are forced to take short distance shots at stationary targets with all shots from the elevated stands being directed into the ground, and bait sites can be marked to alert non-hunters to their presence (McDonald 2003).

Spring hunting. A key question regarding the ability of hunting to manage human–bear conflict is how will the season of hunt (spring versus fall) affect the number of human–bear conflicts if a given number of bears are to be killed by hunters to limit population growth? By reducing the density of bears in the spring, agencies are being proactive in addressing the density and distribution of bears before the peak problem bear season, which in Manitoba is mid-July–early September (H. Hristienko unpublished data). In years when there is an abundance of natural foods in the fall, hunting success can be reduced (Noyce and Garshelis 1997). In Minnesota, which allows baiting, hunting success ranged from 26% (in 1994) to 43% (in 1995) from 1984 to 1995. In 2002, a year in which the fall food index was deemed high, hunting success was 14% (Garshelis 2005). Additionally, whatever population reduction gains are achieved in a fall-only season will be offset by the assimilation of dispersing yearlings the following summer.

Opponents of spring hunts contend that hundreds of cubs are orphaned (Kerr 1999) and starve when their mothers are killed (Animal Alliance of Canada 1999). All jurisdictions that have spring hunting seasons prohibit the killing of cubs or females accompanied by cubs of the year during those hunts. Manitoba demonstrated that <8% of harvested females (representing 2% of the total annual harvest) showed evidence of placental scars from the year of harvest (indicating that the female had given birth to cubs that year). Although some orphaning does occur, the number is negligible (<2%) compared to cub mortality from natural causes (Hristienko et al. 2004). In Ontario, 40% of cubs orphaned after 24 May survived until hibernation (G. Kolenosky and S. Strathearn, 1987, Survival and movements of orphan and non-orphan black bear cubs in east-central Ontario, Ontario Ministry of Natural Resources, Maple, Ontario, Canada) as did 40% of cubs orphaned after 18 June in Virginia (M. Vaughan, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA, unpublished data, 2002).

Spring seasons can have less effect on bear population dynamics than seasons in the fall primarily because the spring harvest is largely composed of males (Jolicoeur 1997; Hristienko et al. 2004; H. Reynolds, personal communication, 2003). For this reason, Utah reinstated a statewide spring bear season in 2006 after a 14-year closure (C. McLaughlin, Utah Division of Wildlife Resources, Salt Lake City, Utah, USA, personal communication, 2006).

In addition to reducing the density and distribution of black bears before the peak of the problem bear season, hunters in a regulated spring bait hunt can take advantage of sparse vegetation that increases the detectability of cubs and can select against nursing females because they tend to be less mobile and avoid areas of disturbance. Further, spring hunts support a rural economy and the tourism industry at a time of the year when few other opportunities are available and offers hunters the opportunity to take bears when their coats are prime and when the animals are leaner and their meat more palatable than in the fall (Hristienko et. al. 2004).

Use of dogs. Early settlers used dogs to find and bring bears to bay, and hunting with dogs made bears more timid (Alexander 1890). Today, several arguments have been put forward to oppose the continued use of trained dogs to hunt black bears. First, it is claimed that the use of dogs provides an unfair advantage for hunters and causes psychological and physical trauma to bears not ultimately killed. Techniques such as the use of radiocollars on dogs and relaying of dogs (i.e., rotating fresh dogs on to the track of a bear already being pursued by dogs) are cited as support for the unsporting claim. Second, dogs in pursuit of a bear do not respect property lines, thus trespass becomes an issue. Third, pursuing hounds may harass non-target wildlife species and sometimes catch and injure bears on the ground, particularly cubs. And finally, the dogs themselves are subject to injury from the chased bear.

Although dogs provide an advantage to the hunters, as evidenced by comparing success rates of hunters using dogs and still hunters, using dogs does not guarantee that a bear will be located, tracked, and ultimately killed. Many variables figure into the ultimate success of a hunt behind dogs, including the age of the track, weather conditions, terrain, and the condition of the dogs. Individual bears behave differently when pursued by dogs. Some are clearly agitated even when treed, but others are able to maintain comfortable distances between themselves and the dogs, periodically stopping to determine if the dogs are closing on them. Some treed bears apparently feel secure, even relaxed, and may even sleep, while dogs are baying at the bottom of the tree (Auger and Black 1995:149). Thus, it is difficult to determine just how much psychological trauma bears endure from being pursued by dogs. Pursuit during hot weather can certainly lead to physical stress on bears and dogs alike; however, most hunting seasons occur when hot weather is atypical. Bear–dog encounters on the ground can result in physical harm, usually to the dogs.

Using radiocollars on dogs allows hunters to locate lost dogs when a chase has ended and to stay in contact with the dogs when they are out of hearing range. This contact can allow hunters to determine if dogs are getting close to roads or other human activity (or vast roadless areas where contact with the dogs may be difficult to maintain) and intercept them if necessary (Elowe 1990). Use of radiocollars also helps avoid trespass or at least to resolve the issue more directly by allowing the hunter to know where the dogs are and demonstrate to a landowner or enforcement official the ability to retrieve them. Hunting with hounds, like baiting, allows hunters to be selective when deciding whether to kill a bear because typically there is time to assess the sex and relative size of a treed bear. Further, treed bears provide relatively stationary targets allowing for good shot placement.

Non-lethal control. Human–bear conflict can be greatly reduced through non-lethal measures such as bear-proof waste management systems; electric fencing around dumps, bee hives, crops and gardens; modifying placement or configuration of field crops; and using aversive conditioning to train first-time offenders to keep away; these all reduce bear access to food and other attractants. Unfortunately, once a bear becomes habituated to humans, the removal of attractants may not change behavior (McCullough 1982).

When a bear becomes a nuisance, which for many may simply mean its presence, the public often demands action. Reactive programs, such as trap-and-transport of problem bears, do not necessarily resolve the problem because relocated bears take with them the habits they learned, and if the food incentives remain at the original site, other bears will be enticed into the same behavior, especially offspring of habituated family groups. Removing the bear without addressing the attractant (McArthur 1981) perpetuates the cycle. Finding unoccupied areas where bears can be released without being a nuisance is difficult given that the recommended distance a bear needs to be relocated is about 60 km (straight line distance) to achieve an 80% likelihood of it not returning (Alt et al. 1977, Rogers 1986, Shull 1994, Landriault 1998). It is too early to say whether aversive conditioning trains bears to stay away from human food sources. Because methods, definitions, application, evaluation, and definition of success vary, research is now being conducted to assess the availability, effectiveness, and feasibility of non-lethal means to alleviate nuisance situations, and if effective, to develop standards.

Opponents of lethal control argue that fertility control is a viable alternative. Problems with this option for black bears include the lack of approved chemical or biological sterilants for free-ranging bears, and lengthy and costly program implementation because bears would need to be handled or remotely injected to receive treatment, Further,

treated nuisance bears would likely continue to be nuisances, and dispersing bears would probably be unaffected (US Department of Agriculture et al. 2002). The National Park Service (2006) rejected the use of contraception alone to control non-native deer (*Axis axis, Dama dama*) in Point Reyes National Seashore, California. Their preference is to use lethal removal with long-acting contraceptives. Even in combination, their population modeling predicted it will take 15 years to achieve target population levels and will require considerable investment. Fraker et al. (2006) concluded that for New Jersey, fertility control would be difficult, expensive, and almost certain to fail.

Human–bear conflict. Black bears have adapted to thrive in landscapes with human activity for a variety of reasons (Ternent et al. 2001). What may once have been prime bear habitat, with seasonally abundant natural foods, may now be replaced with a higher quality and more dependable year-round food supply—garbage, bird feed, fruit trees, gardens, beehives, compost, and pet food. During late summer and autumn, depending on latitude, bears enter hyperphagia, a stage when fat reserves are accumulated for hibernation through increased food intake, from 8,000 kcal/day to 15,000 to 20,000 (Nelson et al. 1983). Because a bear's feeding strategy is to obtain the most calories with the least amount of effort, it seems logical that a bear would readily adapt to finding and consuming anthropogenic foods rather than foraging extensively for lower-reward natural foods, especially when there is little risk involved in acquiring them. To achieve 20,000 kcal a day, a bear would need to consume 36 kg (80 pounds) of fruit or 3 kg (6.6 pounds) of nuts, which equates to 8½ cheese pizzas, or 25 hamburgers, or 3.5 kg (7.7 pounds) of sunflower seeds.

Will (1980) reported that at that time, most states handled <50 complaints/year, citing human carelessness, ignorance, and fear at the root of most problems. Those causes still apply today as do the following 4 concerns he identified with respect to human–bear conflict: it requires significant time and resources from understaffed wildlife units, which takes away resources for other programs and activities, it lessens the stature and value of the black bear, it degrades the credibility of wildlife agencies when, in the public's view, inappropriate actions are taken, and destroying nuisance animals is a contradiction in the conservation of wildlife.

Peine (2001) reported that in most cases it took 10 to 25 years for communities to formulate policies concerning nuisance bears, often being triggered by human tragedy. He specified the unwillingness by people to modify their behavior (i.e., not my problem) and the costs associated with such programs as reasons for the lengthy process.

In the absence of population control measures in and around communities within bear-occupied habitat, negative interactions between humans and bears are expected to rise unless human behavior is changed. To achieve the most effective and long-lasting solution in preventing conflict with bears, residents and visitors will need to accept responsibility for making their properties and communities less inviting to bears, rather than responding to a bear that has already gained access to human-sourced foods or adapted to their availability. By eliminating and securing all scent (such as bird feed) and visual (such as bird feeders) attractants, conflict can be reduced significantly in years of normal natural food, reducing risk to the public (with respect to personal safety and property) and bears and lowering costs to all levels of government for problem bear control. In years when natural foods are scarce, however, significant human–bear conflict should be anticipated. Governments can mitigate these conflicts to some extent by providing counsel and limited partnered-funding opportunities, but the impetus for long-lasting change and durable solutions must originate in the affected communities.

Models for reducing conflict with bears can be found in Canmore, Alberta, and Juneau, Alaska, as well as at several national parks in Canada and the USA. Their successes resulted from investment in animal-resistant waste management systems and enforcement of garbage and anti-feeding ordinances. Civic governments and their residents acknowledged and accepted shared responsibility for the problem and had the will to find and implement the necessary measures to reduce conflict.

Management implications

Population management through conservative hunting seasons and regulations has not kept pace with the reproductive ability of the American black bear. We believe treating the symptoms of human–bear conflict will meet with limited success in

reducing those conflicts if bear populations are concurrently allowed to increase.

We can no longer explain away problem bear issues as being directly related to the abundance of natural foods (Poulin et al. 2003)—the more natural food, the fewer problems. Though it is safe to say that there will be fewer human–bear conflicts in years of abundant natural food, these bumper crops do not occur frequently—nor do crop failures. Records from Manitoba indicate that during 1995–2006, there were 2 years of abundance, 2 years of poor production, and 8 average years (H. Hristienko unpublished data). If the density of bears is above an average year's carrying capacity, then one would expect the trend in problem occurrences to be above the long-term average as bears travel in search for food or to remain stable to lower if the population is at or below carrying capacity. In Arkansas, Shull (1994) found that reproduction and recruitment better explained fluctuations in levels of human–bear conflict than did variation in food production and availability. For years in which recruitment of 2-year olds is atypically large, this influx could be the result of synchronized reproduction brought on by food failure (McLaughlin et al. 1994, Poulin et al. 2003) or it could be a function of a reduction in the age of first reproduction (from 5 to 4) due to a high food index in the year of reproduction or an increase in average litter size coupled with low mortality. If the former applies, one should expect a reduced cohort following the year of food failure. If not, the latter seems more plausible.

We should also no longer assume that female black bears need to be protected because they have such low reproductive capacity. Garshelis (1994:9) stated "increased mortality of dispersing sub-adult males would not be sufficient to regulate population size (true density-dependence), unless there were also repercussions for females." By reducing the non-reproducing segment of the female component of a population (females without cubs), recruitment potential would be moderated. In some jurisdictions, harvests comprised of 40% females ($\leq$20% being adults; Poulin et al. 2003) and harvest rates $>$20% appear to be sustainable. Managers will need to educate the public, including hunters, about the usefulness of female harvests to control bear populations before the killing of females without cubs in the spring or with cubs in the fall is accepted. As this continues to be true in the case of white-tailed deer management, this will be an ongoing campaign.

Groups opposed to hunting or to the lethal removal of bears often advance their position through emotional appeal and unsubstantiated, sensationalized, or flawed claims (Ugalde 1991). The reporting of such claims in the press and governments' varied responses (or lack of response) to them can lend credence to these claims and do a disservice to the greater public who have consistently identified a desire to be informed with empirical information (Campbell et al. 2001). Managing authorities should investigate all claims of non-lethal population control that are backed by peer-reviewed data and refute unsubstantiated claims.

Wildlife management authorities will continue to determine population targets at a large scale, but communities need to become involved in determining the levels of bear presence and types of conflict they are willing to tolerate. A considerable challenge for government is achieving local agreement and support for a management strategy that attempts to achieve a tolerance target. This is not a simple matter, given the complex variables involved, including often diametrically opposed public opinion (e.g. on non-lethal versus lethal measures, leave them alone versus not in my backyard), costs, safety concerns, and access and firearm restrictions.

A bear population management regime based on public hunting and guided by science should enable a jurisdiction to achieve its objectives of minimizing human–bear conflict while maintaining costs at manageable levels. However, if an informed public deems the significantly higher costs associated with maintaining bear populations at high levels justifiable, is willing to cover those costs from sources other than hunting license revenues, is willing to tolerate increased numbers of encounters in coexistence with bears, and does not burden wildlife agencies with liabilities associated with injuries or damage caused by an abundance of black bears, then those agencies may be required to maintain programs that attempt to manage conflict in the absence of bear population control. In situations where hunters simply are not able to kill enough bears to meet population goals, then capturing and destroying problem bears may be justifiable if adjoining bear populations are already managed near biological carrying capacity.

Human–bear conflict, real or perceived, will occur wherever humans and bears occupy the same space, at any bear density. The management of black bears

in the 21st century will require a 2-fold approach: an integrated management regime that uses public hunting to regulate the density and distribution of bears and removes individual nuisance bears, along with an aggressive education and political program that informs the public about what can be done to deter bears from associating people and dwellings with food, implements bear-proofing measures, and enacts and enforces bear-proof garbage storage and anti-feeding regulations.

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