Frequently Asked Questions

Black Bear Problems and Control

BLACK BEAR PROBLEMS AND CONTROL IN NORTH AMERICA

WHY DO I NEED TO UNDERSTAND BEAR BEHAVIOR? WHAT DOES BEAR BEHAVIOR HAVE TO DO WITH "NUISANCE BEAR" PROBLEMS?

Bears are adaptable, curious, capable of rapid learning, have excellent long-term memories and exhibit a wide degree of behavioral "plasticity" (i.e., ability to adapt their behavior to changing circumstances). These behavioral characteristics are integral to understanding and managing many problem bear situations. Vocalizations, gestures, and mock charges are typical expressions of frustration, conflict, and stress. Food-seeking bears are conflicted between the desire to approach and that to flee ("fight or flight"). Their drive to attain food is strong but frustrated by their close approach to people. When the latter stimulus becomes too great, the bears flee or exhibit aggressive behavior.

They also have the ability to learn from a single experience. In Yosemite, once bears had fed on campers' food, the animals were more neutral towards people and demonstrated less fear than would be expected. This suggests that bears are more easily deterred when first offending than after repeated depredations.

Bears can become habituated to people and also conditioned to human foods. "Habituation" implies tolerance of the close proximity of people once the animal perceives no consequence as a result. "Food Conditioning" occurs when the animal then makes an association between humans and food. While not all habituated bears will become food-conditioned, the potential exists, especially in parks, campgrounds, and suburban areas. Conflicts may then arise which are detrimental to both people and bears. "Aversive conditioning" may be helpful in some nuisance situations when coupled with knowledge of bear behavior.

Some writers have alleged that bears react to humans as if they were other bears or "super bears". While this may be an oversimplification, bears clearly react to people in a unique fashion. Bears have a dominance hierarchy in their relationship to each other, and perhaps they recognize–or can be taught to recognize– people as dominant. Others have alleged that bears are "unpredictable"— a faulty assumption. Bears are not unpredictable, rather people have not yet learned to interpret all their behaviors and to react to them in an fashion that the bears understand.

References: Bacon 1972, Burghardt and Burghardt 1972, Fair and Rogers 1990, Gilbert 1989, Hastings et al. 1986, Hastings et al. 1989, Herrero 1972, Herrero 1978, Herrero 2002, Keay and Webb 1989, Kilham and Gray 2002, McCullough 1982, Stonorov and Stokes 1972, Tate and Pelton 1983

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DO BLACK BEARS DAMAGE OR DESTROY BEEHIVES?

Early settlers introduced European honeybees to the United States and propagated them for honey and for pollination of crops. Black bears soon learned to raid these artificial hives and eat the honey and larvae. Beehive damage from bears is substantial in many areas of the United States and Canada and losses have exceeded $200,000 annually in some jurisdictions. In Arkansas, monetary losses to honey production represented about 9% of total production value but may have been inflated. Losses often include not only the honey, larvae and queen but also destruction of the supers and frames. In 1990, 72% of beekeepers surveyed in Massachusetts rated damage "substantial" or "severe" although damage was estimated at < $1000 per year. However, many beekeepers frequently used electric fences and considered them to be effective.

References: Ambrose and Sanders 1978, Clark et al. 1991, Gunson 1977, Jonker et al. 1998, Maehr 1974, Sillings et al. 1989

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WHAT CAN BE DONE TO PREVENT OR CONTROL BEAR DAMAGE TO BEEHIVES?

Electric fences have been used for many years to protect apiaries from bear damage. However, bears can easily defeat poorly installed, badly maintained, or improperly sited fences. Maintenance to keep chargers effective and fencing weed-free and properly grounded is essential. Field-tested designs and general suggestions are available from several sources, including *MassWildlife* District offices. District offices within bear range have sample electric fences which can be loaned for a 1-month period. Properly constructed and maintained fences protected hives >80% of the time in Florida and Alberta. Unfenced hives were 70% more likely to be damaged than fenced ones. Portable, lightweight fences of electrified netting are commonly used to protect a single hive or small group. These fences are easily set up around palletized hives that are moved frequently for pollination purposes. Where possible, place hives at least 50 yards from wooded cover. Non-electrified fences consisting of heavy gauge woven wire panels 8 feet high with barbed wire brackets set outward at 250° will discourage most bears but are costly.

Elevated "hive stands" or platforms have been used to keep bears away from beehives in Florida but are now rarely used due to cost and maintenance problems. In British Columbia, hive units covered with 6-inch mesh hogwire and wired to a wooden pallet were effective in protecting hives.

"Aversive conditioning" using emetic compounds has been tested as a means of repelling bears from beeyards. Emetine hydrochloride, lithium hydrochloride, and alpha-naphthyl-thio-urea are among the compounds tested. Problems with aversive agents include: (1) reconditioning may be necessary to reinforce the aversion to bait, (2) the obvious taste of some agents may prevent initial conditioning, (3) some agents may be consumed in potentially lethal doses, and (4) the effects of agents on pregnant sows and their offspring is uncertain.

In Florida, 63 nuisance bears were trapped, tagged and released at beeyards, of which only 8 (14%) caused subsequent damage.

Trapping and handling may have created an aversion to the circumstances of capture.

References: Brady and Maehr 1982, Colvin 1976, Dacy 1939, DeCalesta 1983, Gilbert and Roy 1977, Gunson 1977, Hygnstrom 1994, Johansen et al. 1976, Lord 1979, Robinson 1963, Robinson et al. 1993, Sillings et al. 1989, Wooding et al. 1988, Wooldridge 1980

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DO BLACK BEARS CAUSE DAMAGE TO AGRICULTURAL CROPS?

In New England in colonial times, black bears were serious agricultural pests and were bountied as an incentive for controlling their numbers. Black bears still cause damage to agriculture, particularly corn. Corn is not only consumed but stalks are flattened, hindering mechanical harvesting. In Wisconsin, corn damage increased from 10% (of all damage claims) between 1936-1954 to 65% between 1986-1990, principally due to the increased use of short-maturity varieties of corn. Silage corn is most commonly depredated in New England. Oats and blueberries are also sometimes damaged. Watermelons, soybeans, peanuts, and other crops may be affected in southern states. Apple orchards are occasionally damaged, often by bears' breaking tree limbs while climbing. Depredations are typically linked to crop maturation and the abundance and availability of natural foods. In east-central Minnesota, 50% of respondents growing corn and oats experienced damage in 1991, with an average 11% loss. In 1990, 68% of corn producers surveyed in Massachusetts rated damage as "low" or "moderate" and most (77%) estimated damage at <$1000 per year. Bear damage has little economic impact on the total product of the damaged commodity, but individuals may suffer substantial loss.

References: Calvert et al. 1992, Cardoza 1976, Clark et al. 1991, Davenport 1953, Garshelis et al. 1999, Jonker et al. 1998, Maddrey and Pelton 1995, Spencer 1955, Stowell and Willging 1992, Vaughan et al. 1989, Warburton and Maddrey 1994, Will and Kopp 1982

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WHAT CAN BE DONE TO PREVENT OR CONTROL BEAR DAMAGE TO AGRICULTURAL CROPS?

Keep open mowed areas on all sides around cornfields and other crops damaged by bears. When possible, cut back vegetation along field margins and overgrown gullies and stream beds which may be used as pathways by bears. Single-strand electrified tape fencing may be erected around fields–or at least on the most vulnerable side–as the crop matures. Place bacon strips or similar bait on the tape to entice bears to sniff or lick it to enhance the shock. Fencing may be viewed as costly by small producers. When possible, alternate corn with other row crops to provide less food and cover. Seven-strand slanted fences have been used successfully to keep bears out of orchards.

Propane cannons were used successfully in New York and Wisconsin to repel bears from crops. However, bears may become habituated to the noise and the period of aversion may be slight. The bears may also just move to another nearby field.

Live-trapping and translocation is used to provide a temporary solution in some states; however, bears may return from substantial distances. In Wisconsin, homing time averaged 24 days, allowing time for corn to mature past the milk stage. Annual costs for translocation in Wisconsin averaged $70,000. Translocation also does not address the root cause of the problem, which may then recur.

Bear hounds may also be used to provide temporary relief. However, only 1 of 5 bears chased 8 times left its home range in Wisconsin, while in Maine pursued bears stayed within their known home range 54% of the time. Bears chased from their range usually returned within 1 day. In Massachusetts, bear hounds may be used only by permit on a case-by-case basis.
Sport hunting may occasionally be effective in reducing bear damage when the offending segment of the population can be targeted. In Massachusetts, bear hunting is popular in early September and hunters often hunt in or near corn fields, especially when natural foods are scarce. Crop damage permits are issued in some states to allow farmers to shoot offending animals. Massachusetts farmers have certain statutory rights to control problem wildlife when in accordance with M.G.L. c. 131, § 37.

References: Garshelis et al. 1999, Hygnstrom and Hauge 1989, Jonker et al. 1998, Maddrey and Pelton 1995, Massopust and Anderson 1984, McArthur 1981, Robinson et al. 1993, Stowell and Willging 1992, Warburton and Maddrey 1994, Will and Kopp 1982

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DO BLACK BEARS PREY ON DOMESTIC LIVESTOCK?

Black bears are capable of killing various livestock and poultry, including sheep, goats, swine, cattle, rabbits, turkeys, and chickens. Sheep accounted for most (90%) losses in Virginia but in Alberta cattle (mostly calves) comprised 81% of losses. Livestock depredations are comparatively uncommon in Massachusetts; 100% of livestock owners surveyed in 1990 indicated that damage was “low” or “moderate” with losses <$1000 per year.

Livestock depredations have been widely reported throughout North America, but verification of kills is often lacking. Only 1 of 8 bears within sheep allotments in Idaho and Wyoming was a known predator. In one Maine study, 57% of sheep losses were fraudulent or undetermined. Typically, only a single animal or a few are killed; however, in one western state 230 sheep were killed. Numerous losses during a single instance may involve “surplus killing” (i.e., excessive multiple kills at one time). Although one hypothesis suggests that searching behavior (but not killing behavior) may be inhibited by feeding and satiation, in most instances of surplus killing some external factor or circumstance increases prey vulnerability.
Losses often occur when livestock are allowed to range freely in rugged terrain or when livestock and bears use limited habitat concurrently and forage on similar foods. Most losses are associated with lactating females or their newborn young. Increases in depredations also often coincide with natural food failures.

Livestock killers are usually adult male bears. However, it is unlikely that males have greater vulnerability than females to bear-control techniques. Males may have greater home ranges and more wide-ranging movements than females–resulting in more encounters with livestock–or may have gender-specific behaviors differing from those of females. While it is conceivable that individual bears can have behavioral traits which predispose them to predation, evidence is lacking in the absence of marked animals, intensive field studies, and an adequate sample size.

References: Alt et al. 1977, Davenport 1953, Garshelis 1989, Horstman and Gunson 1982, Jonker et al. 1998, Jorgensen et al. 1978, Jorgensen 1983, Kruuk 1972, Linnell et al. 1999, Piekielek and Burton 1975, Rogers 1976, Spencer 1955

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WHAT CAN BE DONE TO PREVENT DEPREDATIONS ON LIVESTOCK BY BEARS?

Avoid pasturing livestock in remote areas, areas with heavy wooded cover close by, or areas with wooded gullies or other pathways which bears may use to approach the livestock. When possible, pen the livestock in or near barns at night, especially pregnant females or those with small young. Avoid field birthing, if possible, or clean up birthing areas to remove afterbirths which may attract predators. Attentiveness by shepherds and improved herding techniques are the greatest positive factors in alleviating losses. In operations where the livestock are constantly herded, kept in open areas, or confined at night, predators must develop specialized behaviors to successfully prey on the livestock. Electric fencing may be used to protect the pens of small animals, such as domestic rabbits.

Do not leave carcasses of dead animals exposed in fields, pastures, or nearby areas. Bury carcasses deeply or incinerate or render them. Do not place supplemental foods nearby as a lure or distraction. This will attract or habituate bears and will be counterproductive. Store livestock feed in secure containers or sturdy structures which are inaccessible to bears.
Bright lights, loud music, noisemakers, and frightening devices have a limited effectiveness but may deter curious individual bears that are not focused on predation. If used, the locations of such devices should be changed frequently to avoid bears becoming accustomed to them.

Guard dogs are often effective in alleviating losses. In 1 study, 75% of 20 encounters between black (n=17) and grizzly (n=3) bears resulted in bears being chased off without either preying on sheep or being shot by the shepherd. In another survey, 89% of 70 producers considered guard dogs an economic asset. Several breeds have been tested, including Akbash, Komondor, and Great Pyrenees. Successful guard dogs are aggressive towards predators, attentive towards herd animals, and trustworthy. Guard dogs should be reared with sheep to create a bond between the dog and the sheep. Dogs are costly and may not be appropriate for small operations. Llamas and donkeys are useful in guarding sheep against coyotes, but may be afraid of bears.

In some instances, farmers or landowners may destroy the offending bear. When possible, contact your local *MassWildlife* District office for advice prior to such action and report the killing of the bear to the Environmental Police or *MassWildlife* immediately thereafter.

References: Andelt 1999, Andelt 2001, Coppinger et al. 1983, Green et al. 1984, Green 1989, Green and Woodruff 1989, Hygnstrom 1994, Linnell et al. 1999, Jorgensen et al. 1978, Jorgensen 1983, Robinson et al. 1993, Will 1980

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ARE BLACK BEARS A NUISANCE IN PARKS AND CAMPGROUNDS?

Black bears have been perceived as nuisances in some National Parks at least since the 1890s. Throughout North America, human-associated foods continue to attract black bears to parks and campgrounds. In Great Smoky Mountains National Park, there were 107 personal injuries and 715 incidents of property damage between 1964-1976. In Yellowstone, property damage incidents averaged 262 between 1960-67 but averaged 5 between 1983-1993 after implementation of a bear management plan. Nuisance complaints at New York state campgrounds averaged 37 between 1975-79 but < 27 annually after 1980.

Deliberate and inadvertent feeding by humans may lead to conflicts and property damage, as well as alterations in bear behavior, foraging habits, reproductive rate, physical size, distribution, and numbers. The intense recreational activities in many parks and campgrounds threatens bears due to those human activities which promote habituation and a conditioned response to human foods, potentially leading to a lethal response.

References: Ayres et al. 1986, Baptiste et al. 1979, Gilbert 1989, Gunther 1994, Hastings et al. 1989, Herrero 2002, Keay and Webb 1989, Merrill 1978, O'Pezio et al. 1983b, Rogers et al. 1976, Schullery 1986, Singer and Bratton 1980, Tate and Pelton 1983

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WHAT CAN BE DONE TO PREVENT NUISANCE BEAR SITUATIONS IN PARKS AND CAMPGROUNDS?

Key components of park and campground bear management programs include: (1) removal of artificial food sources, (2) regulatory actions, (3) information and education, (4) control of problem bears, and (5) research and monitoring.
Cultural and sanitary measures may include closing of open garbage pits (landfills or open dumps have been phased out in Massachusetts); installation of bear-proof dumpsters or trash containers; proper food storage using elevated poles, wires, food hoists, or individual bear-proof containers; sanitation and cleanup of picnic grills and outdoor fireplaces; and prohibitions on feeding or deliberately attracting bears. Taste-aversion conditioning has been tried experimentally. It may be effective in some situations to reduce nuisance activity when combined with the reduction of human-associated food sources. It may be difficult and expensive to restrict bear access to human foods, but also essential if bear and humans are to coexist.

Regulations, guidelines, or use agreements should address “do’s and don’ts” applicable to bear management. All park and campground users should be informed of such regulations and appropriate penalties imposed for violations.
Information and education programs are essential. Users must not only be informed of area regulations but must know why they are needed and what the consequences of violations may be, not only to the users but to the bears. Posters, brochures, videos, and personal contact may all be important, depending on the area’s size, ownership, and geographical location.

Ideally, bears should be discouraged before they become a problem. Depending on circumstances, persistent problem bears may be harassed, relocated, or destroyed by governmental officials or authorized persons. Harassment or “aversive conditioning” techniques may vary in effectiveness depending on methodology and the degree to which the bear is habituated or food-conditioned. Noisemakers, and frightening devices have a limited effectiveness but may deter curious individual bears that are not focused on human foods. Sirens, boat horns, Critter Gitter® strobe/siren units, high-pressure water guns, Scarecrow® water spraying repellers, and similar devices may be effective on bears that are not strongly conditioned to human foods. Some aversive devices, such as pyrotechnics, less-than-lethal projectiles, and pepper spray are restricted or prohibited in Massachusetts and should not be used by unauthorized persons.

Shepherding dogs may be highly effective, where available. Relocation has often been used in the past, but may be ineffective in small states. In New Hampshire, most relocated bears began homing immediately upon release and 61% were known to be dead within 11 months.

Research and monitoring–even in small areas–is important to understand the effectiveness of the area’s bear management program and changes in human attitudes and behavior, as well as changes in bear numbers, distribution, and behavior.

References: Baptiste et al. 1979, Barden et al. 1995, Dalle-Molle et al. 1986, Garner and Vaughan 1989, Gillin et al. 1997, Hunt 2000, Keay and Webb 1989, Minnesota Department of Natural Resources 2002, O’Pezio et al. 1983b, Singer and McCullough 1982, Ternent and Garshelis 1999, Vachowski 1994

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ARE BLACK BEARS A NUISANCE IN RESIDENTIAL OR SUBURBAN AREAS?

Over the past few decades, residential and suburban bear complaints have dramatically increased, surpassing traditional commodity-based complaints in many areas and not restricted to a single geographical locale. These problems may relate to rapid increases in numbers of both bears and humans, combined with habitat fragmentation by structures, highways, and agriculture. Periodic changes in weather patterns and natural food availability may also force shifts in bear movements and feeding patterns, resulting in closer contact between bears and humans. In Massachusetts, residential complaints increased 6800% between 1973-2001, while in northern Nevada nuisance bears increased 7000% between 1995-2002 (Las Vegas *Sun*, June 22, 2002). Similar trends are evident elsewhere.

Typical residential complaints include destruction of bird feeders, consumption of pet foods, raiding and damaging of trash containers and dumpsters, digging in compost piles, breaking into sheds and outdoor structures, damaging grease-stained grills and barbecues, and begging food from backyard picnickers. As bears become habituated to people and conditioned to human foods, the animals become bolder. Bird feeders in the back yard lead the animal to pet foods on the porch, which then lead to forced home entries and the destruction of the offending bear. Human injuries may also occur.

References: Barden et al. 1995, Fimbel et al. 1991, Landriault et al. 2000, McCarthy and Seavoy 1994, Peine 2001

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WHAT CAN BE DONE TO PREVENT NUISANCE BEARS AROUND RESIDENCES AND IN SUBURBAN AREAS?

Common solutions include many of the same actions that should be taken with bears at campgrounds and parks. Most importantly, people should remove or secure food sources that may attract or tempt bears.

Take down bird feeders by April 1 (earlier if bears are active) and don't put them back up until December 1. Feeders may be hung from a wire at least 8 feet from the ground, but even if the feeders are inaccessible or "bear proofed", bears may be attracted by spilled seed. Birds do not need supplemental food in spring and summer and will not suffer from the lack of artificial feeding. Use other means, such as flower beds, dusting sites, bird baths, and nesting boxes to attract birds for your enjoyment.

If feeding pets outside, be sure that all pet food is consumed at a single feeding. Don't leave pet food or dirty food dishes outside overnight. Bears will be attracted to pet foods stored in trash cans or sheds. Be sure that bears cannot tip over and open food containers or break into sheds. Food odors may attract bears even if they can't gain access.

Store all garbage in closed containers in a secure garage or inside location. Small bags of garbage may also be frozen and placed in the trash immediately before pickup. Do not leave trash cans unattended overnight. Wash and rinse cans regularly since bears may be attracted by odors. Double-bagging trash and placing ammonia, bleach, or camphor in the cans may reduce food odors but is not a guarantee that bears will avoid the trash.

Clean greasy barbecues and picnic grills with an ammonia-based cleanser after using them. Grills may be covered with aluminum foil prior to use to minimize soiling of the grill surface. Dispose of used foil in a secure container. Gas grills should be operated on high setting after cooking to burn off food residues. Do not leave food scraps, spilled grease, or dirty picnic utensils at your picnic area. Scrub and cleanse picnic tables and benches.

Do not place meat scraps, fruit or vegetable remains, or sweet materials in your compost pile or bin. Bears (and other wildlife) may be attracted to these items.

Do not leave soiled diapers or diaper pails outside. Bears will be attracted to and feed upon the fruit and vegetable residue in the diapers.

Be sure that your home is secured against wildlife, especially during warm weather. Do not leave home with the screen door locked and the inside door open. Bears can and will break through the screening to get at food items in your kitchen. In at least 1 instance in Massachusetts, bears gained entry by pushing an air conditioner into the house and entering through the hole. Turn off kitchen exhaust fans when not in use and clean grease from the grill and vent screen regularly.
If your local businesses, neighborhood community or residential development uses dumpsters, you may want to discuss waste management with your waste disposal contractor and civic action group. Important parts of a community waste management program include: (1) a plan to separate food and wastes from bears and other wildlife, (2) a local bylaw or ordinance, (3) a plan to finance waste disposal costs, (4) an educational program for residents, and (5) a responsive contractor.

Some states have laws which allows the state fish and wildlife agency to enact rules and regulations to prohibit people from feeding or deliberately attracting bears or other wildlife. There is no such law in Massachusetts and *MassWildlife* cannot prohibit people from feeding wild animals in most circumstances. However, cities and towns may be able to do so under the authority of their local Board of Health, if a public health issue is involved.

Be prepared *before* bears come to your residence or your local area. Once the animals have fed on human food, they will be more difficult to repel or frighten. Mild aggression by people is useful in asserting dominance over timid bears when they first appear. Do not approach a bear closely. If the bear huffs or blows, pops its jaws, or hits the ground, the animal is warning you that you are too close to it and you should back away. If the bear does not yield or flee, promptly move to your vehicle or a building. Notify *MassWildlife* District offices or Environmental Police of an aggressive or non-yielding bear.

Banging of pots and pans, loud music, and bright lights may have a limited effect when bears initially appear but will probably be ineffective once bears are habituated to people and conditioned to human foods. Super Soaker® water guns, Scarecrow® water spraying repellers, boat horns, or Critter Gitter® strobe/siren units may also be effective against some bears. *Do not* use ammonia or any substance other than water in water guns. Noisemakers may be inappropriate in residential areas. Certain aversive devices including pyrotechnics, less-than-lethal projectiles, and pepper spray are restricted or prohibited in Massachusetts and should not be used by untrained or unauthorized persons.

Some communities, especially in the west, have instituted formal programs of "aversive conditioning" to teach bears to avoid humans and human foods. Components of these programs may require a prompt response by trained personnel using devices or methods not typically available to the homeowner and may be costly. Some measures may not be lawful in Massachusetts. If communities are located close together, aversive action by one town may merely drive the bears to another. Public education and community involvement is essential.

Karelian bear dogs, Blackmouth curs, and other breeds have been used in some states to chase nuisance bears from residences, as

well as campgrounds. Dogs may be costly to train and maintain. They may not be practical in heavily developed areas where either bears or dogs may be struck by vehicles on roadways.

References: Barden et al. 1995, Davidson et al. 2003, Hastings et al. 1989, Holmshaw 1994, Landriault et al. 2000, McCarthy and Seavoy 1994, Minnesota Department of Natural Resources 2002, Peine 2001

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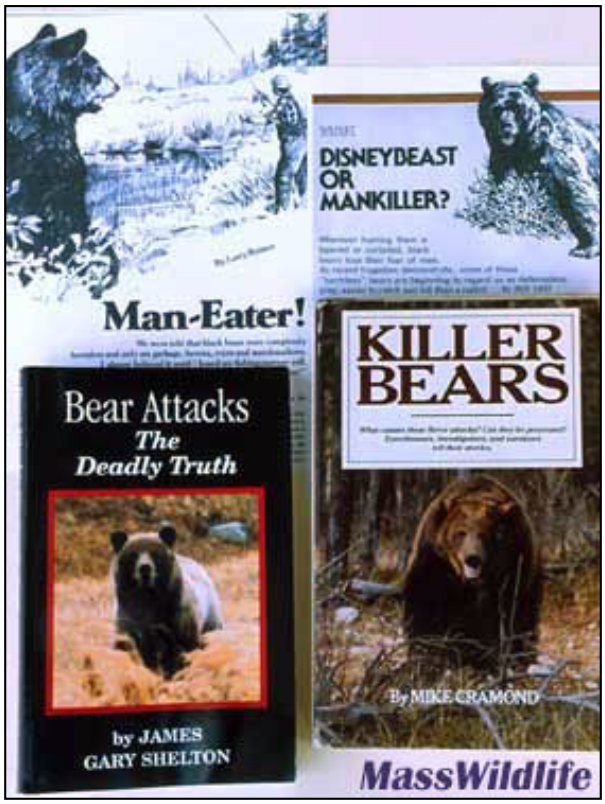
ARE BLACK BEARS DANGEROUS TO PEOPLE?



Black bear "attacks" on humans are both defensive and offensive. Defensive attacks are fairly common, especially in parks, campgrounds, and similar situations where humans and black bears are brought into close contact and bears are habituated or conditioned to humans and human foods. Injuries, typically minor scratches, occur when people crowd, pet, or hand-feed bears and intrude on the animal's personal space. However, defensive attacks are much less frequent than suggested by the animal's aggressive displays. In 1 Yosemite study, <6% of 992 human-bear interactions involved aggression, none of which resulted in physical contact. Similarly, <6% of 624 aggressive acts by "panhandling" bears in the Great Smoky Mountains resulted in contact. Such incidents diminish when area managers remove artificial food sources and educate the public about bear behavior.

In a Yosemite study, fear was the human behavior most likely to elicit an aggressive response by black bears, followed by neutrality and a close approach. However, human aggression was least likely to stimulate aggression, suggesting that meek behavior may actually increase the chance of bear aggression. In the Great Smoky Mountains, people crowding bears accounted for 40% of aggressive acts, or 64% including situations where crowding was 1 of 2 precipitating causes. In such situations, aggressive responses by black bears included vocalizations, 2 or 4-footed stances accompanied by swatting gestures, charging a person(-s), or snapping, biting, or forcing persons to the ground.

Offensive or "predatory" or "predaceous" attacks on humans by black bears do occur but are very rare. During the period 1900-2003, there have been 52 human fatalities from black bears, more than 80% of which were predatory in nature. Of these, 5 have occurred in Alaska, 11 in the lower 48 USA, and the remainder in Canada. Non-fatal predatory attacks are more frequent but still rare. The trend of bear-inflicted injuries–at least in Canada–has grown along with the human population. Predatory attacks have typically been in remote or rural areas, probably where bears have little or no experience with people, and almost always have involved male bears. Persons most at risk have been those hiking, fishing, berry picking or working in remote areas. In British Columbia between1960-1997, 77% of black bear attacks involved such persons. Recently, there is some indication that predatory attacks are increasing in more settled areas, although data are yet sparse. Wounded bears and sows protecting young are a small component of the serious injuries or fatalities from black bears.

Overall, black bears are extraordinarily tolerant of humans, even under substantial provocation. In Yellowstone National Park, injuries from black bears averaged 2.7 per million visitors between 1970-1979 and from 1980-1994, 0.5 per million. Roadside injuries decreased due to vigorous public education and the removal of food-conditioned bears. In New York State (1960-80), only 3 minor bear-related injuries occurred during 77 million recreation days.

References: Fair and Rogers 1990, Gunther and Hoekstra 1998, Hastings et al. 1986, Herrero and Fleck 1990, Herrero and Higgins 1995, Herrero and Higgins 1999, Herrero 2002, McCullough 1982, Middaugh 1987, Tate and Pelton 1983

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WHAT SHOULD I DO IF I AM ATTACKED BY A BLACK BEAR?

Attacks or threatened "bluff" attacks in campgrounds, along roadsides, or similar developed areas usually occur because people are too close to the bear, or because the bear wants the person's food items. Backing away while keeping an eye on the bear usually addresses the animal's concern about your proximity to it. If the bear is persistent in its attempts to get your food, it is best to comply. Report the bear's behavior to officials. There have been no known black bear attacks in Massachusetts since the early 1800s.

The standard response to serious bear attacks is to "play dead with grizzlies and fight back with black bears". More specifically, it is probably appropriate to play dead if the attack is defensive (e.g., defense of cubs) and fight back if the attack is predatory. Context, circumstances, bear behavior, and geographical locale are indicators which may indicate the nature of the attack. Risk of bear attack can be diminished by individual responsibility and the communication and utilization of knowledge about bear behavior and natural history.

Predatory black bears seldom give explicit signs of aggression and intent. The bear typically approaches during the daytime, sometimes slowly circling the person, and then rushing in for the attack. Predatory attacks usually continue until the bear is deterred, the person escapes, or the bear gains its prey. If the bear is not deterred by noise or throwing of objects and escape is impossible, your only option may be to fight back with any available means. Adults as well as young children have successfully fought back and deterred potentially lethal bear attacks.

For more detailed information and guidance, consult the book *"Bear Attacks: their causes and avoidance"* (Rev. ed., 2002) by Stephen Herrero. The video *"Staying Safe in Bear Country"* produced by the Magic Lantern Group is also useful.

References: Fair and Rogers 1990, Herrero and Higgins 1999, Herrero 2002

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IS IT DANGEROUS TO GET BETWEEN A FEMALE BLACK BEAR AND HER CUBS?

Black bears undoubtedly evolved as a forest animal and are anatomically and behaviorally adapted to forests. These adaptations convey survival advantage in response to threats of predation on the young. Tree-climbing ability is apparent in cubs when they first emerge from the den and they will quickly climb when a threat appears. The sow need only wait nearby and return after the threat passes, thus protecting both herself and her young without direct confrontation. Grizzlies, however, which use grasslands, plains and other open habitats, aggressively defend their young. The common admonition "don't get between a bear and its cubs" fails to recognize the behavioral differences between black bears and grizzlies. Black bear sows are extraordinarily tolerant–although uncomfortable–of people who approach their cubs. A Michigan biologist reported that only 4 sows chased away researchers during live-trapping and handling of >300 bears. Nevertheless, people should not deliberately intrude upon a female with cubs, unless necessary, to avoid stressing or harassing the animals. Cubs should not be captured and "saved" unless they are

too young to survive alone and the female is known to be dead (e.g., a road kill situation).

Tolerance may be diminished somewhat in parks or developed areas where bears have become habituated and food-conditioned. In the Great Smoky Mountains National Park, breeding sows were less likely to be nuisances than were males, but were involved in more personal injuries. Serious attacks or fatalities occur rarely. One stimulus may be when the person climbs a tree to "escape". Since tree-climbing is the cubs' defense mechanism, the sight and sound of humans climbing may precipitate a response by the sow. One such fatality occurred in a Michigan park when an aggressive female with 4 cubs mauled a man in a tree, causing him to fall to his death. Another fatality happened in Alberta when a berry-picker was chased for over ½ mile and killed by a sow with 2 cubs.

References: Herrero 1972, Herrero 1978, Herrero 2002, Singer and Bratton 1980, Smith 1995, Tough and Butt 1993

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WILL A BLACK BEAR ATTACK IF I RUN AWAY FROM IT?

Black bears can run surprisingly fast. Unless the person is very close to a vehicle or sturdy structure, and the bear is far away, it can easily catch the person if it wants to. While most bears are tolerant, food-conditioned bears may be aggressive and chase people who intrude on the animal's personal space, or to get people to drop or throw food items. Consequently, it is unwise to run from a black bear. In a Yosemite study, running was 1 of 2 human behaviors most likely to precipitate an aggressive response by black bears. Running probably caused people to take their eyes off the bear, thus rendering them vulnerable. In Yellowstone, 61% of hikers injured by either black or grizzly bears had reacted either by running or climbing a tree. In Jasper National Park, Alberta, a black bear chased and killed a 7-year-old girl who attempted to flee to her cabin.

References: Gunther and Hoekstra 1998, Hastings et al. 1986, Hastings et al. 1989, Herrero 2002

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IF A WOMAN IS MENSTRUATING, DOES THAT INCREASE HER RISK OF BEAR ATTACK?

In August 1967 in Glacier National Park, 2 young women were killed by 2 different grizzly bears on the same night. One of the women was wearing cosmetics and was menstruating and using external pads. Some writers speculated that menstrual odors triggered the attack and bear-safety brochures now often warn women not to hike or camp in bear country during menstruation. While also unlikely that 2 bears would attack on the same night without a common environmental event, the most important factor was probably the habituation of both bears to people and human-associated foods. A subsequent fatal attack at Glacier in 1976 involved a grizzly which entered a tent, dragging out and killing a young woman. The woman was not menstruating or using cosmetics and the camp was sanitary. Two young male bears with a history of harassing campers were killed nearby a few hours later. In Yellowstone, 19 people were injured by bears between 1980-1994. Five victims were women; no evidence linked menstruation to any attack.

In a Manitoba study, captive and free-ranging polar bears reacted strongly to seal tissues and used tampons but other non-food items and non-menstrual blood produced little or no response. However, in Minnesota, 26 free-ranging researcher-habituated black bears were exposed to used tampons from 26 women. Twenty of the bears were also exposed to 4 menstruating women. Regardless of sex, age, reproductive status, or time of year, no bear showed appreciable interest in menstrual odors, either from tampons or the women. Attacks on menstruating women by black bears may occur under some conditions, but have not been demonstrated. The use of tampons, rather than external pads, may be a reasonable precaution when camping or hiking in bear country.

References: Cushing 1983, Gunther and Hoekstra 1998, Herrero 2002, Olsen 1969, Rogers et al. 1991

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SHOULD I CARRY PEPPER SPRAY TO DEFEND MYSELF AGAINST BEARS?

Oleoresin capsicum ("pepper spray") has been used since the 1960s as a sublethal inflammatory agent for law enforcement, personal defense and as a dog repellent. The active ingredient–capsaicin–is derived from cayenne pepper plants and mixed with oil or another carrier agent for dispersal as an aerosol. Early field tests on 5 dump and campground bears in Michigan and Minnesota repelled the bears without aggressive response. In another study, 86% of nuisance bears sprayed were repelled but returned to feed shortly thereafter. In an analysis of 66 North American records, 94% of close encounters with aggressive grizzly bears resulted in cessation of the behavior exhibited prior to spraying. In 100% of encounters with curious or garbage-seeking grizzlies, pepper spray appeared to stop the behavior. Similarly, in 4 of 4 encounters with aggressive black bears pepper spray appeared to stop the bear's behavior, but did not cause it to leave the scene. In most (73%) of situations with curious black bears, spray appeared to stop the behavior, but in 62% of situations where the bear received a substantial dose the animal did not leave, or left and returned. Pepper spray may be useful in a variety of field circumstances but variable responses by bears do occur. Spray should be directed into the bear's face at close range (<20 ft) so that the particles contact the animal's mucous membranes. Spray should be directed as a cloud rather than a stream so that noise and visual effects act as an additional deterrent.

Pepper spray, Mace® and similar less-than-lethal chemical agents are restricted under Massachusetts law and a person must have a Firearms Identification Card to purchase, possess and carry such items. Based on past events, it is unlikely that persons in Massachusetts should routinely carry pepper spray as a bear defense. Pepper spray should not be used in strong winds, rain, very cold weather, or in dense vegetation. Pepper spray should not be sprayed on the ground, tents, or vegetation as a deterrent. In field studies in Alaska, brown bears were strongly attracted to spray residue and rubbed and rolled in it.

References: Herrero and Higgins 1998, Rogers 1984, Smith 1998

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SHOULD I CARRY A FIREARM TO DEFEND MYSELF AGAINST BEARS?

In Massachusetts, a person should not routinely need to carry a firearm to defend against bear attack. Persons must have either a Firearms Identification Card or a License to Carry Firearms to purchase, possess, and carry firearms and ammunition.

Outside Massachusetts, contact the local fish and wildlife agency or other responsible authority to ascertain their recommendations. Firearms may be useful in remote areas for rare instances of predatory attack or close chance encounter with a sow grizzly and cubs. Unless the shot is accurately directed, the bear may be wounded and continue its attack. Some people have shot the victim, rather than the bear, in the intensity of the moment. Firearms may also cause some people to act bolder than normal and be less intent on their surroundings. The Northwest Territories' *"Safety in Bear Country"* manual and the videos *"Staying Safe in Bear Country"* and *"Working in Bear Country"* are useful.

Rifles of .30-06 caliber and larger or 12-gauge shotguns with rifled slugs are effective on black bears. More powerful rifles such as the .458 Winchester Magnum are sometimes recommended for protection against grizzly/brown bears but are not suitable for all shooters.

References: Clarkson 1989, Herrero 2002, Meehan and Thilenius 1983

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WHAT IS "AVERSIVE CONDITIONING" AND WILL IT SOLVE NUISANCE BEAR PROBLEMS?

"Aversive conditioning" is a learning process in which "punishment" or some unpleasant stimulus is used to cause the subject to associate negative feelings with an undesirable behavior and thereby to reduce the frequency or intensity of that behavior. Noisemakers, water guns, or bright lights may sometimes be used to discourage curious or non-habituated bears from people's backyards (see FAQs above). Bad-tasting substances may also be used to "teach" bears not to consume honey or human edibles.

More elaborate aversive conditioning programs are being used in several states and provinces. These programs may be costly, long-term, and require trained personnel with appropriate legal authorizations. Trained dogs may also be used to harass nuisance bears. Some aversive techniques may be impractical in some locales. Bears that are strongly food-conditioned may be difficult to deter. An appropriate legal framework, intensive public education, and stakeholder involvement are integral to the success of such programs.

In Juneau, Alaska, increased bear activity in response to poor sanitation led to high numbers of food-conditioned bears, with >300 complaints and 14 bears killed in 1987. Researchers used shotgun-fired rubber slugs and buckshot to deter nuisance bears, of which 43% abandoned the site. However, 93% remained in the general area and continued their nuisance activities. Economics, public safety, and wildlife concerns subsequently drove revisions in the city's waste-disposal ordinance, which–combined with intensive public education efforts–eventually reduced bear complaints.

The mountain resort community of Mammoth Lakes, California, nestled within the Sierra National Forest, began experiencing substantial nuisance bear activity in the 1990s. Bears foraged for garbage, invaded houses, and disrupted visitor activities. Beginning in 1996, city officials changed local ordinances and instituted educational programs. In addition, a widely publicized aversive conditioning program was put in place. Police and trained consultants capture, immobilize, mark, and release residential bears, or act in a bold and dominant manner and harass the animals with rubber projectiles, bean-bag rounds, pepper spray, pyrotechnics, shrill audio devices, and other aversive techniques. This conditioning is designed to drive the bears out of urban areas to the adjacent heavily-forested mountains.

Aversive conditioning programs have the potential to be an effective tool for combating nuisance bear situations, when coupled with stakeholder involvement. However, programs vary in methodology, personnel, support, and longevity. The effectiveness may also vary and is not always measured or discerned. Further research is needed to develop, implement, and standardize the components of an effective aversive bear-conditioning program. Some questions include: (1) what conditioning measures, if any, are effective in deterring nuisance bears and under what situations? (2) are aversive techniques effective on strongly food-conditioned bears? (3) how long does deterrence last without reinforcement? (4) does conditioning deter bears from the offending behavior, or only from particular foods, sites, or people? (5) what situations are conducive to aversive conditioning, is conditioning cost-effective, and can the appropriate personnel be trained and are they able and willing to participate after training? (6) when is

conditioning deemed to be inappropriate or ineffective and in what circumstances are bears to be either left alone or destroyed? (7) how is “success” measured?

References: Clark et al. 2002, McCarthy and Seavoy 1994, Peine 2001

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WILL HUNTING SOLVE NUISANCE BEAR PROBLEMS?

If recreational hunting is to play a role in alleviating or controlling nuisance bear situations, such hunting must either: (1) reduce the bear population to levels where damage is eliminated or reduced to acceptable levels, (2) target specific bears or groups of bears involved in damage, or (3) function as an aversive conditioning technique to “teach” bears to cease offensive behavior.

Hunting is often considered to be a management tool, rather than solely a recreational pursuit. Hunting is often the cheapest method, license fees support the managing agency’s activities, and fees and associated expenses place a value on the hunted animal, while damage-control kills devalue it. Hunting is rarely the only management option available but can be a useful component of an overall program, in addition to the cultural and social values inherent in recreational hunting.
If hunting is necessary as a bear management tool, then we must necessarily: (1) understand the impact of hunting on bear behavior and population dynamics, (2) effectively regulate bear seasons to adjust harvest levels and sex and age composition, and (3) identify and target the desired population component. Our ability to address these aspects is often limited.

Clearly, there are historical examples where black bear numbers have been significantly reduced by overhunting–even without bounties or predator-control agents–particularly in localized areas. In general, modeling suggests that a black bear population can sustain a maximum harvest of 14 to 16%. If the management objective is to exceed such harvest level and reduce “overpopulation”, then the managing agency must have the ability to accrue sufficient numbers of hunters; manipulate season length, timing, and bag limits; and implement those hunting techniques which will be effective in harvesting sufficient numbers of bears. In areas with high bear populations, localized hunting may create a sink effect, perpetuating the nuisance activity which stimulated the hunting process. Conversely, unhunted areas may be a source for bears which move into adjacent huntable regions. In 1997, 81 bears were killed in Sevier County, Tennessee, most within the city limits of Gatlinburg which supported a large number of food-conditioned bears. Hunting is probably a poor means to teach bears to avoid people or nuisance behavior. Speculation persists that bears in heavily hunted areas are more “wary” than those where hunting is absent, perhaps by selectively removing bold bears while those predisposed to avoid people survive, or when bears are shot at but missed. These hypotheses cannot be rigorously tested due to subjective impressions, unquantified statements, and short-term observations. Behavioral changes resulting from food-conditioning may have greater influence on “wariness” than does hunting. Others have suggested that bears respond to human behaviors and avoid hunters because of the hunters’ audacious or domineering demeanor. Bears may also exhibit a conditioned response to audible cues, such as the click of a firearm’s safety. While bears can undoubtedly learn and respond to human behaviors and sounds, these learned responses may simply cause bears to avoid certain people or locations, but not terminate offending behavior elsewhere.

Sport hunting is a valid recreational pursuit with deep roots in human culture. Hunting can also play a distinct role in wildlife management when goals and objectives are clearly defined and attainable, knowledge of the animal’s population dynamics is available, and methodology is sufficient to the task. Stakeholder understanding and support is essential in order to avoid socio-political challenges to management actions.

References: Beck et al. 1995, Decker et al. 2002, Geist 2003, Gilbert 1989, Herrero 2002, McCullough 1982, Peine 2001, Swenson 1999

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WHAT ROLE DOES EDUCATION PLAY IN BLACK BEAR MANAGEMENT AND DAMAGE CONTROL?

Education is often described as integral to the understanding, management, and resolution of human-black bear impacts. However, “education” is not mere entertainment nor the satisfying of curiosity or impulse. To be effective, education must be a process which advances individual knowledge and so causes the individuals to inculcate the teachings into their own behaviors. The most crisply-presented and technically accurate presentations–as well as those most visually attractive–do little for bears unless the knowledge so presented is utilized by listeners who are later confronted with issues of bear conservation and management.

Science can determine those practices and actions which affect bears and their habitats, but all stakeholders must be conjoined in the decision-making process which implements those practices and actions. “Cultural carrying capacity” (CCC) is that number of animals which can compatibly co-exist with a given human population. Science can provide population estimates and densities but only stakeholders can determine tolerance levels and co-existence. Local areas may have equal numbers of bears and bear problems, but different levels of CCC. Wildlife professionals must meld both the ecological and human facets of wildlife management. A focus on those socially defined effects of events or interactions which warrant management, which are then integrated with a structured decision-making process, is relevant to wildlife management in the 21st century. Wildlife–perhaps especially bears–and people are inextricably intertwined and without that synthesis we are less than human.

References: Beck et al. 1995, Davidson et al. 1994, Decker et al. 2002, Ellingwood and Spignesi 1987, Ellingwood 1999, Garner and Vaughan 1989, Herrero 2002, Keay and Webb 1989, O’Pezio et al. 1983b, Riley et al. 2002, Riley et al. 2003, Robinson 1992, Shepard 1996, Struzik 1989, Warburton and Maddrey 1994

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Questions? Comments? Contact: ***MassWildlife*** at Mass.Wildlife@state.ma.us

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