

Black Bear

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Figure 1. American black bear (*Ursus americanus*)

Human-Wildlife Conflicts

Quick Links

Human-Wildlife Conflicts	1
Damage Identification	3
Management Methods	4
Economics	13
Species Overview	14
Legal Status	19
Glossary & Key Words	20
Resources	21
Appendices	28

The American black bear (*Ursus americanus*, Figure 1) is a challenging species for wildlife agencies to manage due to its size, intelligence, extensive range, food habits, and adaptability, as well as societal views. In North America alone, agencies receive more than 40,000 complaints about black bear annually. Black bears are known as ‘food-driven’ animals, meaning most conflicts result from a bear’s drive to meet its nutritional needs. Not surprisingly, an overwhelming proportion of conflicts are related to their use of anthropogenic (human) food sources, such as garbage, bird food, and crops. Understanding what drives human-bear conflict is the first part of good management.

Property Damage

Property damage from bear can involve cars (Figure 2) and structures, such as homes, campers, garages, and outbuildings. Black bear can rip holes in walls, pull doors off cars, and fall through roofs in search of food. Garbage, barbecue grills, bird feeders, ornamental plants, gardens, compost piles, pet foods, and non-food items, such as soaps, detergents, citronella, 3-D archery targets, and even some plastics can attract bear. In one recent national survey, 69 percent of wildlife agencies listed improperly stored garbage as a primary cause of bear conflicts. In rural areas, bear may damage hunting tree stands and food plots.



Figure 2. Black bears in Yosemite National Park have broken into cars to get to human food sources.



Figure 3. Black bears peel back bark and girdle trees in order to feed on the soft vascular tissues.

Livestock Depredation

Livestock depredation by black bear varies regionally and may not always be reported. Cattle, sheep, horses, poultry, goats, and swine may be targeted, especially when young. Depredations tend to be chronic and concentrated in remote areas, although attacks may occur in close proximity to buildings. Attacks are usually predictable. Bear or bear sign may be observed in the area prior to an attack and bear may stalk livestock before attacking. Once a depredation occurs, it is likely to happen again. Sheep are most vulnerable on remote rangelands when bedded down or scattered. Some research has shown that cattle and swine are taken more often in the spring, while sheep are taken more often in autumn. The frequency of attacks (i.e., multiple animals injured over multiple days) tends to be related to the prey's body size— the smaller the livestock, the less time between attacks. Similarly, the size of the bear is often a determining factor in the age and size of the prey. Sick or injured bears often prey on livestock. Most depredating bears are males over the age of four.

Although bears are often blamed for killing livestock, they may not always be responsible. Bears are known to scavenge or steal carcasses killed by other predators. Furthermore, it is not uncommon for black bear to coexist for years without conflict in areas grazed by livestock. As such, every effort should be made to identify the offending animal prior to management actions.

Agriculture

Bear damage to agriculture is a widespread source of conflict. In a survey of farmers in northern states, more than half reported bear foraging and damage to corn and oats. Soybeans and wheat are less common targets, although sunflowers often sustain substantial damage. There is widespread evidence of damage to fruit-bearing trees including apples, pears, and plums. In the Pacific Northwest, bear damage to vineyards and hazel nut farms are common in late summer/fall. Damage-prone areas are generally in isolated orchards or crop fields near forests. Some research suggests that this behavior more commonly involves female bear and sub-adult male bear. Damage to apiaries, or beehives, is a special type of agricultural damage that generally occurs on a small scale.

Forestry

Black bears are known to damage trees throughout their range, but most reported damages are in the Pacific Northwest. In these areas, bear may compensate for food shortages by peeling away the bark on conifers in order to eat the soft, energy rich vascular tissues (Figure 3). This damage generally occurs from winter den emergence until other food sources are available (e.g., wild berries, grass, insects, deer fawns, elk calves). Targeted tree species include Douglas fir (*Pseudotsuga menziesii*), redwood species (*Sequoideae*), western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*) and, less commonly,

western larch (*Larix occidentalis*). Complete girdling of trees results in tree mortality while partial girdling results in degraded wood quality; both are costly to managed forests (i.e., tree farms). Black bears generally peel the bark from and feed on 10 to 45 year-old trees.

Human Health and Safety

Black bears rarely cause serious injuries to people. However, a bear that is habituated to people and conditioned to anthropogenic subsidies (i.e., garbage or other human foods or crops) is considered a risk to people, particularly if it approaches people for food. Bear may frequent trails used by hikers and can be attracted to campsites and homes by food or garbage.

Bear attacks may be defensive, predatory, or nuisance-related. While rare, predatory attacks on children have been documented and are more common than on adults over the age of 18. For information on what to do when encountering a bear, see *Appendix 2*.

In addition, car collisions kill many bear, damage vehicles, and can injure people.

Diseases transferred from bear to people are unlikely. However, bear may carry ticks that spread Lyme disease, naplasmosis (also known as human granulocytic ehrlichiosis), and Rocky Mountain spotted fever. Trichinellosis is caused by larval *Trichinella* worms and has been documented in one case of a person eating undercooked bear meat. Bears occasionally carry bovine tuberculosis, but there is no evidence that this has been transferred to livestock or people.

Damage Identification

Few animals can achieve the same level of damage or have the motivation to do so as bear. Often, people are already aware that bears live in or frequent an area by observing their tracks, scat or fur. Black bears walk flat-footed and do not have retractable claws. Therefore, their whole foot with claw imprints is visible in tracks. Bear scat

may be loose or well-formed and contain a wide variety of vegetation, including grasses, seeds, fur, bone, or fish scales. Large overturned stones and rolled or shredded logs are often indicative of bear looking for food. Bear damage may include gnawing, clawing or rubbing, and structures or trash receptacles may be overturned or show signs of brute force with large holes or evidence of crushing.

Livestock Depredation

A bear attack on livestock may be identified by parallel claw marks on the skin, which may or may not break the skin, as well as bite marks on the neck and shoulders. Canine puncture wounds caused by black bear are typically 1.4 to 2.5 inches (3.5 to 6 centimeters (cm)) apart whereas coyotes are 0.8 to 1.25 inches (2 to 3 cm) and wolves are 1.5 to 2.0 inches (4 to 5 cm). Black bear kill sites usually contain bear scat and matted vegetation as they feed on the carcass. When bears depredate young livestock they have a strong tendency to drag the carcass into forested cover to begin feeding. Depending on the size the livestock, a drag mark from the carcass may or may not be present as bears carry the carcass in their mouth. Bears often climb over net wire fences to take livestock, leaving hair fragments where they climb over fencing.

Bears and mountain lions (*Puma concolor*) also attack the top side of the neck, whereas wolves and coyotes typically attack the throat from below. Bears often eat the udders of lactating female prey whereas lions do not typically feed on the abdominal organs. Bears and lions are usually the only North American predators that partially bury their prey. A bear will often drag or partially bury a carcass to hide it and mask the smell from other predators, then move a short distance away to rest in nearby areas of dense brush or forest. Any suspected bear depredations should be approached only by trained personnel who are exercising extreme caution in case one or more bears aggressively defend the carcass.

A black bear rarely kills multiple animals at once, but such 'surplus' killings can occur, typically with poultry, sheep or swine. Surplus killing is more closely associated with brown/grizzly bear (*Ursus arctos*).

Agriculture

Black bear can cause damage to row crops, such as corn, and fruit trees. Black bears break the trunks of young trees or pull back the ends of branches to obtain fruit they cannot reach. Limbs break off and may be found hanging or near the base of the tree. Row crop damage typically results in flattened patches (up to several acres) with trails connecting patches. These feeding locations will contain bear scat. Bears prefer corn in the milk stage and usually discontinue feeding on corn during the dough stage, but may return to fields later if fields are left unharvested prior to denning. Unharvested corn that provides a food source for bears can delay denning. Bear dens in fields have damaged harvesting equipment.

Apiaries

Very few wildlife species raid apiaries, therefore bear damage is relatively easy to identify. Beehives are often scattered or broken and claw/tooth marks may be visible on hive structures; look for bits of hair on the ground and on splinted wood. Most raids occur during peak honey production.

Forestry

Most common in the Pacific Northwest and British Columbia, bear damage to trees is characterized by stripped bark with vertical canine marks on the bare trunk. Tufts of hair may also be snagged on the bark. The tree trunk is usually stripped up to about 3 to 4.5 feet (ft) off of the ground, but some bears climb and peel the trunk higher up the tree. Peeling generally occurs after bears emerge from their winter dens and coincides with conifer growth (i.e., the movement of large amounts of carbohydrates in the phloem). This period typically lasts from April through early July.

Bears tend to peel the healthiest trees in the healthiest stands, thus peeling may be exacerbated by forestry practices that promote growth, such as thinning and fertilization. Bark peeling is easily distinguished from deer/elk rubbing by the presence of canine marks. Bear damage may be mistaken for porcupine damage where the species overlap. Girdled trees stop photosynthesizing and their

needles turn red within one year. These “red crowns” are often used to identify bear damage. However, recent research has shown that other factors, such as root rot, also cause dead trees with red crowns. Thus, bear damage to trees may be overestimated unless verified with ground surveys.

Management Methods

Methods to manage human-bear conflicts can be grouped into two general categories: *proactive* and *reactive*. Proactive management attempts to change human behavior and prevent conflict, or keep it from recurring. Examples of proactive management include removing attractants, education and awareness, and exclusion. Conversely, reactive management attempts to change bear behavior or results in the lethal removal of the bear.

Prior to any management action, there are important factors that managers and homeowners should consider. First, many of the methods described herein are only permissible to licensed personnel, such as state and federal biologists and wildlife managers. It is up to the individual to know which strategies are legal by reviewing local laws and agency websites. Also, it is important to note that any action plan should consider the side effects of the action and include a system for monitoring efficacy (short and long-term reactions of the bear). Documenting the season, time of day, type of conflict, and any information about the bear(s) involved is important for monitoring results. Be aware that the removal of the offending bear may open up its territory to other bear and conflicts, if the cause of the conflict is not mitigated.

Aversive Conditioning

Aversive conditioning is the use of something unpleasant to stop an unwanted behavior. It could be fear-based or include the use of a painful or noxious stimuli. Aversive conditioning is most successful when combined with public education, exclusion of bear, and enforcement of regulatory ordinances. Individual bear may respond differently to aversive conditioning for reasons that are not well understood.

The following are examples of aversive conditioning strategies that rely on the capture and release or translocation of a bear. A 'soft release' allows an animal to peacefully leave an opened culvert trap or recover from tranquilization or immobilization. Research suggests that this experience alone may be unpleasant enough to stop nuisance behavior in some bear. One study in Great Smoky Mountains National Park reported that 58 to 73 percent of the bears experiencing a soft release ceased their nuisance behavior. Success was greatest for bear in the early stages of nuisance development. Those captured at night (a sign of early nuisance development) were 4 times less likely to continue nuisance behavior.

A 'hard release' uses a variety of treatments, used independently or in combination, that are more intense than a soft release. Common treatments include the following:

- Non-lethal projectiles shot at the large muscle mass on the bear's hip are one of the most successful aversion tools. Projectiles come in various forms, including bean bags, 12-gauge rubber slugs (used at ranges over 65 ft/20 meters (m) only), and rubber shot (used within 65 ft/20 m only). Proper training is required to avoid injury to the bear. In some studies, nuisance behavior stopped for up to 30 days following aversive conditioning with projectiles. In at least two studies, however, over 90 percent of bear returned to general nuisance behavior elsewhere. Far fewer abandoned it altogether. This technique is more effective for wild, non-food conditioned bear.
- Dogs are used for scaring bear or chasing them a short distance after release. Sometimes dogs remain on leashes and bark at bears as they are released. Other times, dogs chase them until a bear reaches a predetermined distance and then the dogs are called off. The most commonly used breed is the Karelian bear dog, historically used for hunting in western Siberia and known for its fearless demeanor. The use of Karelians has increased the length of time for a bear to return anywhere from 30 days to more than a year.
- Taste aversion is not widely used and is only effective in very specific and isolated cases. Bears usually learn to avoid the deterrent. The most commonly used compound is thiabendazole (TBZ). It causes vomiting. In one study, 16.5 grams of powdered TBZ was placed in a cheesecloth pouch with a dose of 165 milligrams/kilogram of a palatable attractant, such as peanut butter or honey. While effective in the short term, over time bear learned to avoid the package.
- Scare tactics involve the use of devices, such as firecrackers, motion-activated lights, propane cannons, blank rounds, and horns. In some cases, yelling and banging pots and pans can work. These methods may be effective for very short periods of time, but bears quickly habituate and may return. Increased habituation or food conditioning may result in no response at all.

Changes in Human Behavior

Many methods to prevent or resolve human-bear conflicts, require changes in human behavior.

Removing Attractants

Removing the materials that attract bear is the most effective management tool available and relies heavily on public participation. Many bears only supplement their diets with people-related foods when natural foods are unavailable. The removal of these attractants can dramatically reduce bear conflicts. Garbage cans should be placed out the morning of pickup only. Some communities still use open pit dumps that can be very attractive to bear. Every effort should be made to contain garbage behind an electric fence. Other attractants, such as pet food and birdseed, should be kept in structures inaccessible to bear and in proper containers. Bird feeders can be hung where they are inaccessible to bears, but often homeowners simply remove feeders during the spring and summer. Left over birdseed on the ground should also be removed. Fruits and vegetables should be removed as soon as they become ripe or fall to the ground. Livestock depredations can be reduced by (1) removing or relocating carcass piles away from livestock or burying, rendering, liming or

composting livestock carcasses, (2) confining livestock at night with electric fences, or (3) removing livestock from areas of high vulnerability.

In campgrounds and the backcountry, attractants (e.g., cooked and uncooked foods and garbage) should be kept away from campsites in accordance with local regulations. Keeping a clean campsite is essential. If burning is used to eliminate food waste, combustion must be complete. Burned plastic can attract bear.

Trail and Campsite Closures

Area and trail closures are especially useful for preventing human encounters with a nuisance or aggressive bear. When seasonal foods, such as berries or spawning salmon, are available and located near areas of human use, temporary closures can help prevent chance encounters and human injuries. Closing campgrounds temporarily and eliminating attractants can encourage bear to return to natural foods. Natural resource managers may want to re-route existing hiking trails and avoid creating new ones in areas where natural food sources are often available to bear. Bears are known to frequently use human trails, especially to move between food sources.

Forestry, Agriculture and Husbandry Practices

There are no proven techniques to reduce damage to trees. Research has shown that silvicultural (i.e., the growing and cultivation of trees) methods that promote tree growth of western conifers, such as thinning and fertilizing, also promote attractiveness to bear. Choices to forgo pre-commercial thinning or delay commercial thinning must be considered by foresters on a case-by-case basis. Planting of non-preferred tree species, planting at higher stand densities, and the pruning of lower branches have been recommended as techniques to reduce bear damage, but they do not comply with current operation management practices and have not been evaluated in an operational setting.

In agriculture, crop selection and rotation can reduce losses because bear do not learn to rely on a specific crop from year to year. Planting non-preferred crops in high risk locations can reduce damage. Trap and translocation may

be effective in reducing bear damage to crops in areas like Wisconsin. Electric fencing proved to be ineffective in protecting large crop areas in the Midwest. Synchronized and/or penned birthing of livestock may also reduce bear predation, but neither method is well studied.

Livestock protection dogs have been used for centuries to prevent livestock predation, and while research with bear is limited, this practice has regained popularity in recent years. The terrain, type of livestock, and number of dogs are important factors to consider when gauging effectiveness. The Akbach, Great Pyrenees, Komondor, Anatolian, and Maremma breeds have proven to be excellent at deterring predators and protecting livestock. Research suggests that greater success is achieved in open areas, such as grazing lands, and that through the long-term presence of dogs, bears may learn to avoid livestock.

Use of Terrain

Research has shown that environmental characteristics can increase the likelihood of human-bear conflicts. Forest corridors, riparian areas, and vegetation close to homes, roads, paddocks, and other human-use areas allow bear to remain relatively concealed while approaching. Studies of apiary damage show a significant correlation between bear damage and the proximity of apiaries to roads and streams, as well as forest corridors. Other studies show sheep depredations are reduced when flocks avoid known bear travel corridors, including saddleways or ridgetops connecting major drainages or natural food sources.

Wildlife Underpasses and Travel Corridors

Wildlife underpasses and travel corridors help to reduce wildlife-vehicle collisions and conflicts. Bears often avoid interstate highways, but their drive to find a mate or food, and their natural dispersal behaviors, can cause bear to cross large roads. Drainage culverts and underpasses may serve as wildlife thoroughfares and are often flanked with high fences that funnel bears toward safe routes.

Identifying natural travel corridors for bear may reduce human-bear conflicts. Corridors allow bear to avoid travelling through populated areas and provide access to

natural foods thus reducing a bear's need for human-related foods. Natural corridors typically follow drainages and wetlands, as well as ridgetops and forest fragments.

Contraception

None are available.

Diversionsary Feeding

Diversionsary, or supplemental, feeding uses an alternate food source, such as sugar-rich pelleted foods, beef fat, and fruit, to lure bear away from other resources. Feed is generally provided for a limited period to protect other resources. This should not be confused with baiting, which is feeding wild bear to attract them to a hunting site and is legal in several states. Although, one may argue that the effects between diversionsary feeding and baiting are not discernable. Feeding bear is illegal in many states, so managers should be aware of all local, state, and federal statutes before putting food for bear in the field.

Diversionsary feeding has been used for decades in Washington State to reduce damage to western conifers. This program occurs primarily west of the Cascade Mountain crest to the Pacific Ocean, where Douglas-fir is the dominant commercially grown tree. Pelleted feed is provided to bear early in the growing season (April through June) prior to the availability of soft mast, such as buds, seeds, and fruits. The pellets contain molasses, a mixture of meat and bone meal, sugar beet, sugar cane, salt, magnesium sulfate, anise feed aroma, and swine vitamins and minerals. Other attractants, such as beaver carcasses, have been used initially to help bear find the pellets. Research has suggested the bear feeding program is cost effective in western Washington, although critics argue that feeding leads to illegal hunting or that bears "double-dip" (i.e., eat pelleted food and peel trees). Concerns have been raised that diversionsary feeding may increase a bear population above its natural carrying capacity and lead to more conflict behavior, although this has not been scientifically tested

Diversionsary feeding in campgrounds and residential areas has received less attention for fear it may create nuisance bears and jeopardize human health and safety. A multi-year study in Minnesota suggested that diversionsary feeding lead to a significant reduction in nuisance activity and a greater tolerance of bear by residents. A study in Utah found that bear visited provisioned feed sites during their normal feeding patterns (crepuscular and nocturnal periods) 76 percent of the time, and bear did not visit the sites more quickly or more frequently through time.

Diversionsary feeding is often considered a last option due to the possible ill-effects of increased disease transmission, increased loss of resources, and concerns for human safety. Managers should fully weight the pros and cons before initiating a diversionsary bear feeding program. Additionally, managers should include a monitoring component to evaluate efficacy.

Exclusion

Preventing bear access to attractants is an important part of managing human-bear conflicts and includes the use of bear-resistant containers, fencing, and other methods.

Bear-resistant containers range from small 'bear cans' for backpacking to trashcans for curbside refuse pickup (Figure 4) and full-size dumpsters for public use. All include



Figure 4 . Bear-proof trashcan with locking mechanism.

features to resist brute force and impact, prevent access (i.e., locking mechanisms), and reduce odors. The failure of these containers to prevent bear access is almost always due to improper use and closure.

Electric fencing to exclude bears is commonly used around apiaries (Figure 5), night pens for livestock, and remote campsites. Fences may be permanent or temporary. Small, portable units are commercially available and use non-rechargeable batteries or solar power. When properly maintained and installed, electric fences are nearly 100 percent successful in preventing bear access to apiaries.

Permanent electric fencing should use wood posts equipped with insulators, while temporary electric fencing may use plastic, fiber or fiberglass step-in posts. Posts should be at least 3 to 3.5 ft high. Ideally, 2 to 3, 6-ft long ground rods of galvanized steel or copper should be driven into the ground within 20 ft of the fence controller. The number of ground rods required depends on the soil texture and moisture content. Clamp a 10 to 14 gauge, 20,000 volt insulated ground wire onto the ground rod with a screw-tight clamp that ‘bites’ into both the rod and wire. Attach the ground wire to the controller’s negative side. For the ‘hot’ wire, use either single-strand 10 to 14 gauge or 0.5 inch poly-wire. Single-strand wire requires joint clamps, while poly-wire may be tied using a simple square knot. Choose a starting point and clamp a wire to each properly-spaced insulator, connecting them to the corresponding insulator on each post around the protected area. Vertical strand spacing should be 8 to 12 inches apart. After completely enclosing the area with wire, attach an insulated ‘gate’ handle with a proper knot or clamp on each strand to allow human access to the area. Beginning at the bottom strand, tie or clamp a lead-out wire (10 to 14 gauge, 20,000 volts) and attach to each strand above it in turn, then connect the trailing end to the positive terminal of the controller. Typically, 3,500 to 5,000 volts are sufficient to deter bear.

It is usually best to store the energizer and battery within the fence to prevent bear damage. Proper maintenance includes the removal of vegetation from around the wires, ensuring the proper ground, and maintaining the proper

voltage. Consult your local management agency for their recommendations, if non-target wildlife may be affected.

The following electric fencing materials are recommended for use in bear damage management:

- Wire: 3 strands of 0.5 inch (1.3 cm) polytape; 20,000 volt double insulated wire for connecting the energizer and ground
- Posts: 3.2 ft (1 m) fiberglass step-in posts, and 6 ft x 1.5 inches (1.8 m x 0.04 m) corner posts
- Energizer: 0.25 joule with 12 volt marine battery
- Ground: 4 to 6 ft x 0.5 inches (1.2 to 1.8 m x 1.3 cm) copper grounding rod

Metal flashing around trees has been suggested by some to protect fruit trees, hunters’ tree stands, bird feeders, and elevated platforms for apiaries. However, individuals should use caution when using this method. Bear can easily tear down flashing. If used, position it approximately 8 ft up the tree trunk in a way that it does not damage the tree.

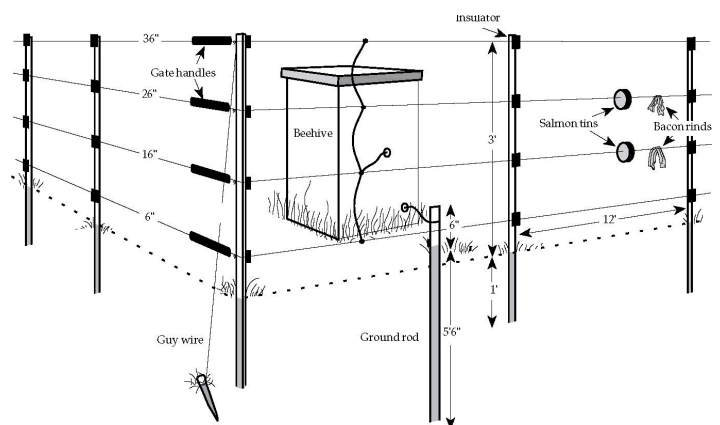


Figure 5. Diagram of electrical fencing around an apiary.

Exclusion may also include hanging attractants from a tree or pole, however bears must not be able to access them by climbing or reaching.

Hunting/Shooting

Black bear hunting is common in many parts of the species' range, and regulations are set by state and provincial authorities. It is one method used as part of an integrated damage management approach for reducing human-bear conflicts; and there is no evidence that hunting alone reduces human-bear conflict. Decreases in the amount of public land for hunting and increases in conflicts in suburban areas limit the use of hunting as a tool to reduce conflicts. Furthermore, large male bears often are the primary targets of hunting, but bear of all ages engage in conflict behavior. Some conflicts do not coincide with hunting seasons, making it difficult to target problem bear. It is the responsibility of the wildlife management agency to determine sustainable bear harvest levels.

The use of lethal control outside of hunting seasons may be necessary to reduce human-bear conflicts. This is usually accomplished by wildlife management agencies or others under their authority or through the issuance of depredation permits. Efforts to target an individual bear often follow a 2- or 3-strike rule where nonlethal tools are used before lethal control. In some states, especially those with robust bear populations, lethal control is the preferred alternative after bears have broken into homes, eaten livestock, routinely crossed electric fences or injured a person regardless of its previous behavior. The use of hunting dogs, camera traps, or stakeouts can be effective in targeting the specific bear.

It is legal in some areas to kill a black bear if it threatens life or property. Check local regulations for more information and whether carcasses must be surrendered to local wildlife authorities.

If firearms are carried as a defense against bears, larger caliber rifles and handguns or 12-gauge shotguns with slugs are essential. Fatally wounding a bear does not guarantee that an attack will be deterred prior to its death. Black bear can travel up to 44 ft/second (30 mph).

Extreme precision, timing, and control of the firearm are vital and usually require considerable practice.

Public Awareness and Education

Public awareness is one of the most important and least expensive tools for managing bear conflicts and should be used in conjunction with other management methods. Depending on the conflict, individuals and agencies have several public relations tools to choose from. For short-term conflict mitigation, postings at trailheads, visitor centers, and farm stores can help educate backcountry visitors and homeowners. For ongoing initiatives, agencies and community members can create websites, hold community forums, bear fairs, and workshops. Nongovernmental organizations such as "Be Bear Aware", "Bear Wise", "Get Bear Smart" and others provide local help and are excellent online resources. In backcountry areas, agency staff can provide fliers and interpretation on bear behavior and safety measures. If resources permit, a hotline to report conflicts can help track trends in conflict behavior and reduce agency response time. The use of television, radio, and print media has helped reduce human-bear conflicts. Studies show that more successful media campaigns use graphic content (i.e., bears being shot or hit by cars) and simple messages, such as "A fed bear is a dead bear" or "Garbage kills bears."

Public opinions about bears vary widely and successful managers tailor their messages to their audience. Successful messaging campaigns involve an interactive and interdisciplinary approach. Include the public, biologists, pest control operators, and wildlife managers to define the objectives of the project and design a strategy. The most important messages for the public are (1) the removal or containment of attractants, and (2) the use of bear-resistant containers (see *Exclusion*). Local ordinances that mandate garbage and attractant control must be enforced with effective law enforcement and fines for violations. Positive changes can be made if warnings are enforced with fines. The public should be made aware of existing or changing regulations concerning attractants and the products available for that purpose.

Rehabilitation

Rehabilitation in captivity is almost always reserved for bear less than 1 year old. Highly food-conditioned bears are unlikely to be rehabilitated. Survival after release back into the wild may increase if human contact is minimized during the rehabilitation period.

Sample sizes of studies that have evaluated the release of rehabilitated cubs are small and results are varied. Minimum apparent survival of 11 rehabilitated orphan cubs at 180 days post-release was 77 percent in the Smoky Mountains of Tennessee. In New Hampshire, 10 rehabilitated orphan cubs were released in the springs of 2011 and 2012. Six of 7 bears survived the hunting season in 2011 and were not associated with known cases of nuisance behavior. Conversely, 3 bears released in 2012 were presumably in conflict situations and did not survive through the hunting season. In Utah, 6 rehabilitated orphan cubs were released in November and December of 2014, closer to winter denning. One bear shed its tracking collar. Of the remaining 5 bears, 3 showed fidelity to the release site following den emergence, while 2 resettled 27 to 29 miles (44 to 46 kilometers (km)) away. Unfortunately, there are no known long-term studies of the fates and habitat use of rehabilitated orphan black bear. Nevertheless, there is enough evidence to suggest that the practice is a better alternative than euthanasia if 1) adequate rehabilitation facilities are available, 2) human presence is minimized, and 3) suitable release sites are utilized.

Repellents

One bear repellent or 'bear spray' is commercially available. Its active ingredient is found in chili peppers of the genus *Capsicum*. The repellent is compressed into a spray canister that, when released by a trigger mechanism, sprays powder about 30 ft (9 m). It is often recommended that recreationalists traveling in bear country carry bear spray. In fact, some areas require it. Carriers should become familiar with the device and how to use it, as well as what to do if they encounter a bear. Practice canisters that do not contain the active ingredient are available from several manufacturers. There is some evidence that bears

are attracted to areas where bear spray has been used. It is always wise to read posted signs and check with park rangers and staff before using popular trails. Also, be aware of state regulations regarding bear spray and check airline regulations before planning to fly with bear spray as it may be prohibited.

Translocation

Translocation is the capture and movement of an animal from one location to another location outside of its home range. It has been used for decades to help reduce human-bear conflicts. Translocation success varies geographically and may be associated with several factors. Some research suggests that the success of translocations may be related to a combination of time of year (including mating season), release location, age, sex, health, and family status, among other factors (see *Appendix 3*).

Successful translocations have occurred with bears of all ages except dependent cubs. Age groups and long translocation distances play a big role in success, although food and range availability at the release site are also thought to be important factors. A review of bear relocations in 9 States and 2 Canadian Provinces, suggested that adult bears must be translocated more than 40 miles (64 km) to assure less than a 50 percent return, while shorter translocation distances may prevent returns from sub-adults.

Bears have the ability to orient homeward without the use of familiar landmarks. This is commonly referred to as "homing," and it is a key component in using translocation as a management tool. Homing distances of greater than 248 miles (400 km) have been recorded, but younger bear may not travel as far and are less likely to return to their area of capture. In some cases, bears have hibernated in the new location and then returned home the following year.

In a public survey in Wisconsin, 73 percent of respondents supported translocation to address black bear nuisance and crop damage issues. Results from a Wisconsin mark-recapture study using genetic analysis

suggested only 4 percent of 520 relocated bears were recaptured in corn fields during the study; and that 71 percent of repeat offenders returned to within 6 miles (10 km) of their original capture sites. This study, however, did not account for survival rates. In a Florida study, repeat offender rates were greater—nearly half of translocated bear engaged in a nuisance event at least once post-release and 34 percent engaged in nuisance events more than once. Apparent annual survival rates for translocated male and female bear (75 and 80 percent, respectively) in the Florida study did not differ and were comparable to resident, non-offending male bear in the area. In south-central Colorado, apparent annual survival rates were 50 percent for adult bear and 28 percent for sub-adults. The probability of a bear dying due to repeat conflict was slightly lower than that of non-conflict mortalities (e.g., hunter harvest, poaching, vehicle strike, etc.).

In general, managers should base translocation decisions on the condition and characteristics of the bear, identification and access to an appropriate release site with adequate distance from the capture site, potential effects of the translocation on resident bears at the release site, and other available management options.

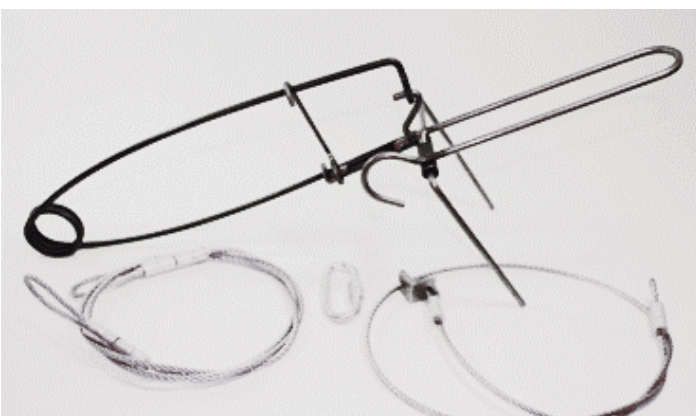


Figure 6. An Aldrich snare includes a spring-loaded thrower that casts a looped cable upward above the wrist of the bear.

Trapping

Trapping to harvest bear is rarely used and is no longer legal in most states. However, it is widely used by wildlife managers to collect biological information, translocate, or aversively condition bear. The most common trapping methods include foot snares and culvert traps, both of which require the use of bait. Effective bear baits include those with strong aromas, such as canned fish and meats, pet food, and bacon. Sugary foods, such as fruit, molasses, doughnuts, and pastries are also effective. Bait should not contain chocolate which is toxic to bears.

The Aldrich snare (Figure 6), is the most common and proven foot snare for bear. It is considered very safe for bear and properly trained trappers. It includes a spring-loaded thrower that casts a looped cable upward above the wrist of the bear. Snares and springs can be purchased commercially. Large diameter cables are less likely to break or cause injury to bear, but may throw too slowly to catch bear. A small diameter cable throws faster, but increases the chances of injury to the bear's foot or leg. Injuries can be reduced by adding cable stops which prevent a snare from closing past a predetermined diameter. However, cable stops may decrease the snare's effectiveness.

The use or set of the Aldrich foot snare has changed over the years. The original standard set was placed above the ground approximately 5 inches by forked sticks. Later, it became common to dig a 5-inch hole, slightly smaller than the loop of the snare, and placing the snare around the hole. Around 1968, the pipe snare set became common where the snare was placed in a 4- to 6-inch diameter pipe or can. All of these techniques or slight modifications are still used today. Some variations use buckets for bear to reach into instead of stepping onto the trigger. There are also new styles of foot snares based off of the Aldrich design. In all cases, the snare must be safely secured to a large living tree or a drag heavy enough that the bear cannot leave the site.

Unlike snares, culvert traps (Figure 7) must be set on flat ground that is accessible by vehicle. They consist of a large diameter pipe (similar to those used in the construction of



Figure 7. Culvert traps are commonly used to trap black bear.

culverts under roads) usually mounted on a trailer with wheels. Bait or lure is often attached to a spring-loaded wire on the closed end of the trap. When the bear takes the bait and pulls on the wire, a door on the opposite, open end of the trap closes. Culvert traps should be placed in areas with sufficient cover so they are hidden from curious observers. If the culvert trap is unstable or too high off the ground, back the trap into holes dug for the trap's tires and place logs under the trap for balance. Keep the door runners free of debris. As with snares, there are many modifications for culvert traps.

While trapping is commonly used in wildlife research and management, it does present risks to bear resulting from injury and stress. Individuals new to trapping bear should consult with trap manufacturers and experienced bear trappers before attempting sets of their own. As such, it is important to minimize the amount of time an animal is in a trap. Trapping is a very stressful experience for an adult bear and/or its trapped or separated cubs. Cubs can also be hurt by the trap's cables or doors, particularly if they are the drop-down ('guillotine'-style) doors. Newer culvert trap door designs are available that are safer for cubs.

The experience of being trapped is extremely uncomfortable for any animal, and some studies have shown that the trap and release process itself is sufficient to reduce nuisance behavior in some bears. If bears are

trapped repeatedly, they may become trap-shy or trap-happy. These bears either learn to avoid traps or are willing to endure the trap to obtain the bait, respectively. Both conditions can negatively affect trapping results. It is important for managers to mark trapping areas with signage to prevent human injury and they may want to consider other methods of informing the public in areas with a greater human presence. Consult your local officials for available equipment and best practices.

Chemical Immobilization

Immobilizing a bear is only permissible by trained professionals and requires appropriate state and federal permits. Resources and training are available and required in most locations. The following are some important considerations:

- The use of immobilization drugs on bear close to or within harvest seasons may be illegal due to the risk of hunters killing and eating recently immobilized bear. Consult state and local laws.
- During immobilization, obtain biological information and mark the bear for future research, such as with ear tags, PIT tags, tattoos, etc.
- Allow for sufficient time to monitor a recovering bear. There have been cases of recovering bear drowning, falling or colliding with vehicles.
- The safest, most commonly used pharmaceuticals for immobilization are Telazol (tiletamine and zolazepam), a combination of Ketamine/Xylazine, or 'BAM' (butorphanol/azaperone/medetomidine). Consult local, state or federal experts.

Toxicants

None are available.

Economics

The economic impacts of black bear can manifest as losses (i.e., livestock predation, property and agriculture damage, bear parts trafficking) or gains (i.e., ecotourism, hunting). Costs associated with black bear damage vary widely and are not well documented.

Livestock Predation

In Colorado and Utah, about 2,000 sheep and lambs are lost to bear predation every year. Another study in northern Alberta reported 541 bear damage claims on 1,246 livestock over a period of 5 years. This is low since some losses were not reported and some claims were denied for lack of evidence (absence of a carcass). Losses were only 0.2, 0.11, and 0.02 percent of available cattle, sheep, and swine, respectively. In 1990, bear damages to U.S. sheep and lambs totaled \$450,000; in Oregon, this resulted in a loss of \$17,800 and 400 animals. In 1999, Alberta, Canada reported an annual loss of \$555,000 in sheep and lambs due to bear predation.

Apiaries contribute hundreds of millions of dollars every year to the U.S. economy. In some areas, half of the apiaries are raided by bear every year. While total damage estimates are not available, isolated incidents usually cost less than \$1,000 and suffer only one incident per year. Florida has reported apiary losses of \$100,000 annually since the late 1990s, and one older study in the Peace River section of Alberta (circa 1990) reported annual damages of approximately \$200,000.

In parts of northern Wisconsin where corn and oat production overlaps black bear ranges, bear damage to crops ranged from approximately \$100,000 to \$375,000 per year (2010-2017) to crops enrolled in the Wildlife Damage Abatement and Claims Program (WDACP). During the same timeframe, 249 to 296 farmers enrolled in the WDACP for crop damage protection from bear. In 2017, 14,500 acres of corn in Wisconsin—valued at more than \$8.3 million—was enrolled for protection from bear damage in the WDACP. In 2018, 115 WDACP enrollees were given electric fencing materials to protect more than 800 apiaries—valued at \$2.8 million—from bear damage.

Property Damage

Black bear damages to personal property may be the most difficult to calculate. The best records are from Yosemite National Park, where black bears have been implicated in over \$3.7 million in cumulative damages since the 1990s. In one 1998 report, bear damaged more than \$650,000 of visitor property in the park (an all-time high). This figure is likely greater than that of other locations of equal size, however, due to the concentrations of reliably available foods and the abilities of bear to learn how to obtain them. Each year, over 3.5 million people visit the valley in Yosemite, which is an area of only 7 miles² (18 km²). After implementation of an intensive visitor awareness and food-control program, annual damage claims dropped from over \$288,000 to an average of about \$107,000.

Among the most expensive damages to property is forced entry into motor vehicles and collisions on roadways. While most collisions only involve vehicle damage, bodily injury can also occur. The Federal Highway Administration recently reported that yearly damages from all wildlife collisions averaged \$2,451 for vehicles only and \$6,126 for accidents with human injuries. When peripheral damages are considered in the total (such as towing and the value of the animal), damage costs can rise to between \$8,000 and \$30,000 per collision. Overall, bears represent a relatively small portion of vehicle collisions.

Forestry

The economic impact of black bear to tree farms managed with intensive silvicultural operations in the Pacific Northwest varies. A recent study showed that bear damage at a landscape scale in northwest Oregon was 0.35 percent of net present value. However, the same study revealed that damage at the stand level ranged from 4 to 46 percent of net present value. The complete loss of a tree is not guaranteed after bear damage, but loss of the basal log (first 16 ft) is common. Complete girdling of the tree results in the tree's death within a year and a total loss. Models suggest that removing damaged wood by bears is more economical than leaving it in the harvest unit. In a research study in Oregon and Washington, models suggested that there was still economic value in trees damaged, but not killed, by bear, and that it was

more economical to salvage them rather than leave them in the harvest unit. This however, could change with location and market demands.

Tourism and Hunting

Despite the damages done by black bears, their presence is perceived as an indicator of good forest health. While the monetary value of a single wild animal is difficult to quantify, black bears bring in millions of dollars to state and federal agencies from both ecotourism and hunting. These activities support species conservation and management initiatives, as well as provide employment and peripheral income from equipment sales, lodging, and food services. One Michigan study reported over \$3.4 and \$2.6 million in annual revenue from the sale of bear hunting licenses and bear-viewing, respectively. Alaska is potentially the most visited state for bear viewing, adding hundreds of millions of dollars per year to local economies. While many more prefer to view grizzly bear to black bear, the latter remains one of the top attractions for the state.

Damage Compensation Programs

Damage compensation attempts to mitigate human-bear conflicts by paying restitution for losses attributed to bear. For example, a 2001 Colorado study revealed that 55 percent of the annual wildlife damage claims in the state were caused by bear resulting in about \$250,000 in restitution payments.

Compensation usually begins with an investigation of damages after an incident, but some programs require enrollment in a program prior to any compensation. Enrollment may require participants to allow regulated hunting on their land or damage mitigation strategies, such as trapping and translocation. Reimbursement funding is limited, however, and it does not eliminate the cause of the problem. Damage reimbursement may also reduce the incentive for claimants to proactively reduce bear damages. Some members of the public have been unhappy with the returns from such programs, insisting that they were not fully compensated for the value lost.

Proactive Management

The use of proactive management and public education programs help reduce bear damage and may be more cost-effective over the long term. Although prices for electric fences (\$1.50 to \$3.00 per ft) and bear-proof trashcans (\$50.00 to \$400.00), may seem expensive, recurring bear damages are often more costly. Furthermore, human safety is an important consideration even though the risks of bear attacks and human injury are low. The prevention of nuisance bear behavior and damages helps to foster a sense of security with the public and enables the coexistence of bear and people.

Lastly, proactive management reduces the need for costly wildlife damage management equipment, equipment maintenance, and additional work hours. Encouraging the use of bear-proof trashcans or the removal of dog food and birdseed around homes prevents bear nuisance behavior and the subsequent need for more costly management, such as translocation. One translocation attempt requires the purchase of a culvert trap and may require tracking collars and receivers, pharmaceuticals, and drug-delivery equipment. Extensive work hours are needed to drive to and prepare the trap site, evaluate the release site, transport the animal, perform equipment maintenance, and monitor the animal. Often, these efforts must be repeated multiple times.

Species Overview

Identification

The American black bear (*Ursus americanus*, Order Carnivora, Family Ursidae) shares the genus with the Asiatic black bear (*Ursus thibetanus*) and the two other North American bear species: the brown/grizzly bear (*Ursus arctos*) and the polar bear (*Ursus maritimus*). It is likely that the American black bear diverged from a common ancestor with the Asiatic species about 5 million years ago. Subsequent divergence on the North American continent gave rise to the ancestors of polar and brown

bears roughly 3 million years ago. The American black bear is divided into 16 subspecies that occupy many habitats and regions across the continent.

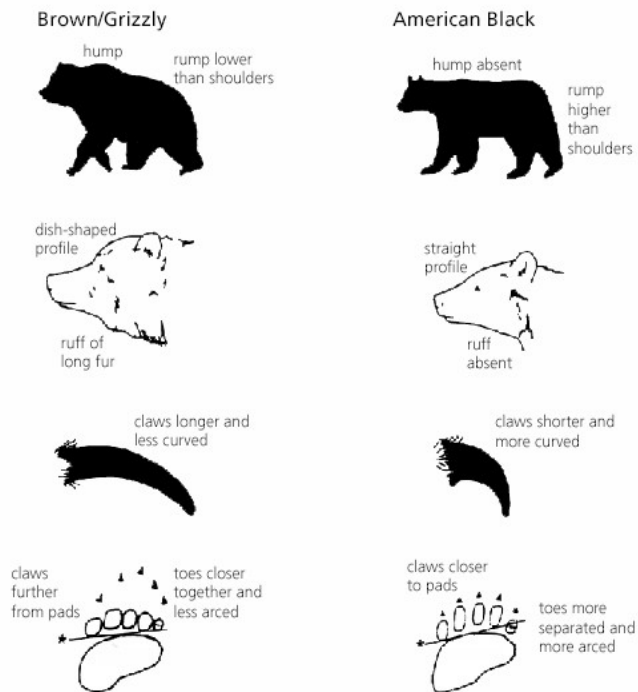
Physical Description

The black bear is the smallest of the North American bears. It is a large, stocky mammal about 5 ft in length and standing about 3 ft at the shoulder. Males and females differ in size and weight. Males typically weigh between 200 to 500 pounds (lbs) and females weigh between 100 to 300 lbs. A black bear's size and weight depends upon the type and abundance of food it eats, its social status, and the time of year. Some bears captured in the fall season have weighed more than 800 lbs. Conversely, bears may lose up to 30 percent of their body weight

during winter hibernation and may appear thin or lanky in the spring and early summer.

Black bears walk flat-footed (plantigrade), have five forward facing toes and short, curved, non-retractable claws ideal for climbing. The tracks of their front feet are distinguished from their back feet by their rear pads. The rear pad of the front foot (heel) does not leave an imprint. They have relatively short, rounded ears, small eyes, and an inconspicuous tail.

The name 'black bear' is somewhat of a misnomer, since their fur may range from shades of brown, blonde, white, or even 'blue'. Such color types (phases) tend to be regionally concentrated. For instance, black-phase bears are usually found on the east coast and in northern boreal forests, whereas brown-phase and cinnamon-phase bears are more common in the west, southwest, and the boundary waters of northern Minnesota and southern Ontario, Canada. White-phase (non-albino) and blue-phase bears are found on the coast of British Columbia, Canada, and parts of Alaska. Whether black, white, or somewhere in between, the coat is usually a solid color. The snout may be brown and some bears display a white patch on their chest.



* A line drawn under the big toe across the top of the pad runs through the top half of the little toe on black bear tracks and through or below the bottom half of the little toe on brown/grizzly tracks.

Figure 8. Side-by-side comparison of brown/grizzly and black bear characteristics.

Distinguishing Between Species

Within the contiguous United States, black bear range overlaps with that of brown/grizzly bear in parts of Wyoming, Montana, Idaho, and Washington. In western Canada and Alaska, range overlap is extensive except in the northernmost latitudes where trees are absent. Overlap with polar bear is extremely limited and only occurs in the northernmost parts of the black bear's range in Alaska and Canada. In addition to differences in ranges, some anatomical features can help distinguish between black and brown/grizzly bear (Figure 8).

- The shoulder hump is a characteristic usually attributed to the brown bear, but may be exaggerated or diminished in either species.
- Overall size; adult brown bears are typically 1.5 to 2 times larger than black bears.

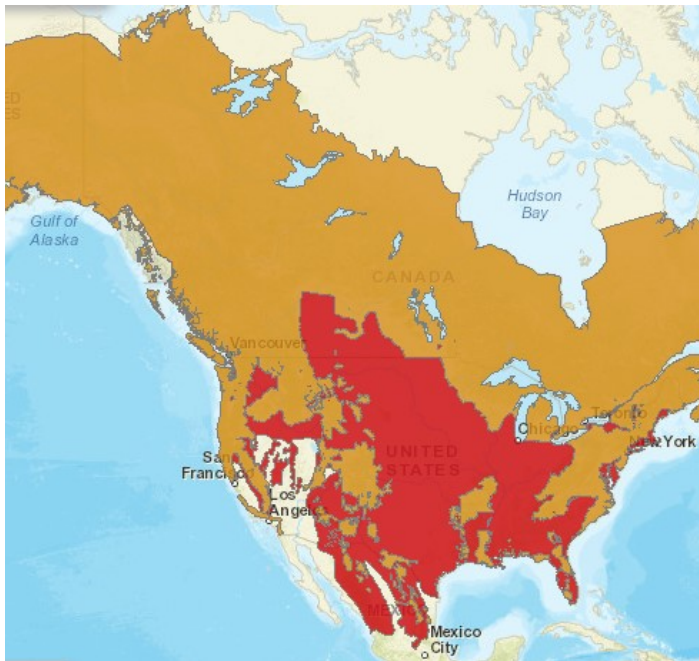


Figure 9 . Black bear range across North America highlighted in orange. Black bears are extirpated in the red areas.

- When viewed in profile (from the side), the ridge of the black bear's nose from eyes to nostrils is straight to slightly humped (convex). The nose of the brown bear may also be straight, but more often has a dished, concave shape.
- The height of the rump on the black bear is generally higher than its shoulders, whereas that of the grizzly bear tends to be lower than its shoulder hump.
- Coat color is very deceiving, especially where ranges overlap. It is generally advisable to rely on other features. Investigators may look for shades of brown on the muzzle or white on the chest. Phenotypes follow regional patterns, so local knowledge may be valuable. Furthermore, the fur of the brown bear in some parts of its range may appear 'grizzled' (dusted with blonde or gray on the back).
- When available, footprints are helpful in distinguishing between the species. Claw length, instep and foot shape are different. A brown/grizzly bear's front claws

may appear as fingers, about 1.5 to 4 inches (4 to 10 cm) long, while those of the black bear are more curved and leave a pointed imprint. Black bear claws are about 1.1 to 2 inches (3 to 5 cm) long. Note, the tracks of a brown/grizzly bear whose claws are worn down from digging are easily mistaken for those of a black bear. Also note the differences in the toe arc.

Habitat and Range

Black bears are primarily associated with forested habitats, however they are highly adaptable and have reestablished populations in at least 40 U.S. states in a wide variety of habitats. Their range continues to expand and now includes parts of at least 5 states where they have been locally extirpated for decades (Figure 9). Black bears have been found as far south as Mexico and the southern tip of Florida, and in the north to central Alaska and northern Canada. Populations can be found on both the Atlantic and Pacific coasts in virtually every state, and all provinces and territories of Canada except Prince Edward Island. They occupy the dry forests and deserts of the American west and southwest, temperate forests of the east, subtropical zones and swamps of the deep south and boreal forests of the north.

Home range size varies with age, sex, and environmental factors, including the time of year, habitat productivity, population density, and topography. In poorer habitats where food is scarce, bears may have larger home ranges, whereas the opposite is true in richer habitats. Typically, males have home ranges about two-thirds larger than those of females. One study reported home ranges of 31 miles² (81 km²) and 10 miles² (27 km²), respectively. Range overlap is very common, and male home ranges may overlap those of several females. Habitat use is based on a tradeoff between desirable habitat features and avoiding conflicts with other bear. Adult males tend to usurp the most desirable habitats. Younger males and females with cubs that try to avoid adult males may be found closer to human habitations.

Movements outside of normal home ranges (not to be confused with dispersal) have been well-recognized among bear populations and may follow seasonal food availability. While migrations may be a response to local food

shortages, studies show that many migrations occur during late-season hyperphagia when bears are in search of large amounts of food. Migrants have been observed traveling up to 31 miles (80 km) to large groves of oak and hazel trees, often following the trails of other bear.

Mortality

Black bears live up to 30 years of age, but the average is considerably less depending on the habitat and their level of contact with humans. In one study, suburban bear rarely lived past 10 years of age. Sources of mortality include starvation, conflicts with other bears, predation by other carnivores (as cubs), vehicle collisions, hunting, and nuisance kills.

Population Status

Black bear populations in the contiguous United States are estimated at more than 300,000 with an additional 100,000 to 200,000 in Alaska.

Social Behavior and Communication

Despite their solitary lives, bears communicate with each other using vocalizations, body language, and scent markings. Visual and auditory acuity is similar to that of people, but their sense of smell is many times stronger. It has been suggested that forest-dwelling species, such as the black bear, vocalize more than other species that occupy open habitats. This may explain why black bears have larger ears than brown/grizzly bears.

Vocalizations by black bears are relatively simple. Most are related to stress or disputes, although cubs often vocalize to draw the attention of their mother or to voice contentment. Common vocalizations among black bears include the following:

- **Huffing:** A sound made by rapid exhalation, usually in clusters of 2 to 3. This is usually a demonstration of a bear's discomfort or surprise.
- **Blowing:** A loud, powerful, singular version of huffing like blowing out a candle. It may be slow and controlled or a rapid exhalation. Usually understood as

frustration or an aggressive or defensive sound and may accompany physical demonstrations. This may be used in conjunction with jaw popping.

- **Jaw popping or popping:** A sound made by smacking the lips as the mouth opens after striking the top and bottom teeth/jaws together. This is a combined visual and auditory display. This is usually motivated by nervousness or defensiveness and may also serve to relieve stress.
- **Moaning and Pulse Moaning:** Aggressive or stress sounds used primarily in disputes with other bears over space or food.
- **Bawling:** This vocalization is made by bear cubs to prompt the mother's care when frightened, separated from her, or when hungry.
- **Purring:** A sound of contentment by cubs often uttered when suckling from the mother.

Chemical communication by bear is an area of ongoing research. Chemical scents left after tree marking and through urine streams communicate the sex and reproductive status of individuals. New research is showing that scent communication also occurs through glands in the feet of brown bear. It has been suggested that bear can also identify time elapsed since the scent was deposited, which would be important for maintaining spatial separation between bears with overlapping territories. Bears may also learn what other bears are eating and identify sources of food based on scat.

A bear's initial response to other bear and people is generally wariness and avoidance. Given the opportunity, most bears will leave. When bears do not leave, they may communicate to people in the same way they would another bear. Clues to the bear's mood and intentions can be learned from the position of its head, ears, mouth, and eyes. A good rule of thumb is that the more visible the canines (i.e., their head is up and mouth open), the greater the intensity of a confrontation. Be careful in assessing this behavior though, since bears may elevate the head to see or smell better, whether they are standing on all four feet or upright on their hind legs. The following descriptions can

help individuals distinguish between curious or food-driven approaches and defensive and offensive attacks.

When a bear chooses to approach another individual, it may do so either tentatively, confidently, or stealthily. These approaches have very different meanings. During a curious or tentative approach, bear will not usually walk directly toward one another. They may stop often, take a meandering (indirect) path, turn away, move the head and eyes to one side, and fake interest in meaningless objects by smelling or tasting them, such as twigs. The ears will be up and attentive. A bear that desires to avoid contact, but for some reason cannot or is unwilling to leave will often avert its eyes away or glance briefly at the person or bear. It may yawn to relieve stress, position the head down, and pull the ears slightly back. This is a defensive posture often accompanied by salivating, head swaying, and stress vocalizations. If a bear is used to obtaining food from people, its approach to someone may be more confident. This can be identified by lack of hesitation, a more 'purposeful' gait, and a more direct route. The ears may be up and attentive or pinned toward the back to intimidate the other individual. Stealthy approaches are almost always identified as predatory behavior. Bear may circle quietly from dense brush and remain concealed; the position of the head is down, ears pinned, with unwavering eye contact. The approach may be slow and from behind the intended victim.

If a bear is surprised, it usually flees the area. However, a surprised bear may also become defensive. In addition to the vocalizations described previously, bear may swat the ground or attack nearby brush or logs. A frustrated black bear may also perform 'bluff' charges to intimidate a person or another bear. The bear may appear to run toward a target with harmful intentions, but will stop short or veer away prior to making physical contact. If a black bear bluff charges, the chances of it attacking during a subsequent charge are very low. Conversely, black bear that do make physical contact typically do so on the first charge. In these rare cases, bears are simply trying to remove a threat. Any injuries to victims are usually minor. Defensive situations include surprising a bear at close distances, mothers defending cubs, or a bear perceiving a threat to food or space.

By contrast, a predatory attack is not designed to scare, but catch and kill. The bear will usually remain quiet and concealed to ambush or stalk the victim. Predatory attacks are extremely rare, but often fatal. In a report of all known attacks over many decades, only 6 percent of aggressive acts resulted in physical contact with a person. Predatory attacks by black bear caused only 20 fatalities over 80 years. Most occurred in daylight on victims under the age of 18. Hundreds of benign encounters occur every year.

Reproduction

Black bears usually reach sexual maturity between the ages of 3 and 5. However, some have been observed reproducing as early as 2 or as late as 8 years of age. Maturity is directly related to the productivity of their environment, with richer habitats permitting reproduction at younger ages.

Mating usually occurs over a period of about 6 to 8 weeks in May, June, or July when females come into estrous. During courtship, pairs often seek remote areas to reduce competition and may remain together for hours or weeks. Both females and males are promiscuous and a litter may have multiple fathers. Males have been known to kill or chase off existing cubs to encourage the sow to enter estrous. After fertilization, the egg remains dormant until fall, at such time it will implant in the uterus, if the female has obtained adequate fat reserves to survive through



Figure 10 . Black bear den in New Hampshire.

hibernation. While rare, sows with offspring from successive litters have been observed.

One to five (2.5 average) cubs are born in a den in January or early February after a 2-month gestation period. Weighing less than a pound at birth, cubs develop rapidly and emerge from the den as early as mid-March weighing 5 to 8 lbs. Young bears remain with their mothers for 18 months, at which time they may be forced to disperse by their mother or her potential mate. Sows have been known to reunite with their yearlings for a time after mating. From the time a yearling leaves its mother to when it reaches sexual maturity the bear is known as a 'sub-adult' (usually between ages 2 to 5).

Cub survival is around 50 percent, but may be as low as 33 percent. Starvation is the leading cause of mortality in cubs and may be more severe in urban environments. Young males in their second summer will usually disperse from their mother's range and seek their own territory. Females usually adopt ranges adjacent to or overlapping their mother's range. Territorial disputes and other factors, including nuisance behavior, contribute to the deaths of sub-adult males.

Food Habits

Black bears are opportunistic and adaptable feeders that eat many kinds of food. Most of their diet is vegetation, including grasses, tree phloem, leaves, fruit, nuts and seeds. Prey, such as fish, ungulates, and smaller mammals, are a small part of their diet, but may be eaten in varying quantities when available. Black bears also eat carrion and scavenge from other carnivores. The calves of herbivores, such as deer and moose, can be an important food source. Bears have also learned to eat high-calorie foods that are unintentionally provided to them by people. Birdseed, pet food, garbage, and even some non-edible products, such as engine oil and plastics, are attractive to bears.

Bears have evolved to adapt to changing amounts and varieties of foods throughout the year. They depend heavily on plant species that produce soft mast (blackberries, blueberries, cherries, etc.) and hard mast (acorns, hickory

nuts, beechnuts, hazelnuts, etc.). In most regions, however, these foods do not become available until mid to late-summer and their abundance varies widely from year to year. This forces bears to compensate with other foods. Mast is particularly important in late summer and fall, when bears maximize their intake of calories to boost fat reserves for hibernation.

Hibernation

Hibernation, or winter denning, is thought to occur more in response to low food availability than temperature. In more temperate climates like the southern U.S., only pregnant sows den. Where food is available year-round, males and non-pregnant females may not den at all. In northern climates, denning may occur as early as October and last until April or early May.

During hibernation, several physiological changes take place. Heart rate and breathing slow considerably, but core temperature only drops by a few degrees. As such, hibernating bears can be easily aroused and should not be disturbed. Bear will not eat, drink or defecate while in the den. During warm periods, bears have been known to emerge and forage for available foods.

Dens may be constructed high above the ground in hollow trees, underneath fallen logs or snags, dug into the earth, and in crawl spaces or basements under homes (Figure 10). Usually a new den is constructed every year, but bears may reuse their dens or those abandoned by other bears. Many bears den within their home range, however male bears have been documented denning up to 89 miles (144 km) outside their normal range.

Legal Status

Black bears are protected by state and federal laws in all states where they occur. Many states have developed management plans and provide opportunities for seasonal harvest. A few subpopulations may be considered locally threatened due to population levels or environmental pressures, therefore these states may not provide hunting seasons.

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 Figure 2. Photo by National Park Service, Yosemite National Park
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 Figure 6. Photo by Scott Hygnstrom, University of Wisconsin-Stevens Point
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Glossary

- Apiary:** A place where bees are kept; a collection of beehives.
- Girdling:** A cut through the bark all the way around a tree or branch which disrupts the flow of fluids through the tree.
- Hyperphagia:** The need to eat continuously.
- Mast:** The edible vegetative or reproductive part (i.e., acorns or other nuts) produced by woody plants.
- Phloem:** The vascular tissue in plants that is a conduit for sugars and other metabolic products downward from the leaves.

Keywords

Agriculture, American black bear, Damage, Forestry, Human Safety, Hunting, Livestock, Management, Relocation, Trapping, *Ursus americanus*

Disclaimer

Wildlife can threaten the health and safety of you and others in the area. Use of damage prevention and control methods also may pose risks to humans, pets, livestock, other non-target animals, and the environment. Be aware of the risks and take steps to reduce or eliminate those risks.

Some methods mentioned in this document may not be legal, permitted, or appropriate in your area. Read and follow all pesticide label recommendations and local requirements. Check with personnel from your state wildlife agency and local officials to determine if methods are acceptable and allowed.

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Appendix 1

Damage Management for Black Bear

Type of Control	Available Management Options
Aversive Conditioning	<ul style="list-style-type: none"> • Non-lethal projectiles • Dogs • Taste aversion • Scare devices (firecrackers, propane cannons, horns, etc.)
Changes in Human Behavior	<ul style="list-style-type: none"> • Remove attractants • Close trails and campsites • Modify forestry, agriculture and husbandry practices • Build wildlife underpasses and travel corridors
Diversionsary Feeding	Lure bears away from valuable resources with alternative food sources, such as sugar-rich pellets, beef fat, and fruit
Exclusion	<ul style="list-style-type: none"> • Bear-resistant containers • Electric fencing • Metal flashing
Hunting/Shooting	Large caliber rifles and handguns or 12-gauge shotguns; Allowed with proper federal and state permits
Public Awareness and Education	<ul style="list-style-type: none"> • Post warnings at trail heads • Websites • Community forums • Campaigns (Be Bear Aware, Bear Wise, Get Bear Smart, etc.)
Repellents	Bear spray with capsicum
Translocation	Most successful with non-food conditioned young bears (< 4 years old) moved greater than 75 miles (120 km) from capture site
Trapping	<ul style="list-style-type: none"> • Aldrich foot snares • Culvert traps

Appendix 2

Reacting to a Bear Encounter

It is important to be prepared for bear encounters. In most cases, a non-habituated, non-food conditioned black bear will avoid people whenever possible. Injuries to people by black bears are very rare, and over 90 percent are minor. Crowding or invading a bear's space is usually a factor in an attack, therefore, some bear experts recommend people keep a minimum distance of 225 ft/69 m when possible. Except in rare cases, even a surprise encounter with a mother and cubs usually results in black bear running away. Many sows will send their cubs up a tree while she herself retreats or climbs up behind them. This is a good time for you to leave. As a rule, a surprise encounter should be taken very seriously. If you live in an area inhabited by both black and brown/grizzly bear, learn to distinguish between the species because they respond very differently to threats. Separate information is available for encounters with brown/grizzly bear. When in areas with both species, always assume the bear you are seeing is a brown/grizzly until you know otherwise. Neither species is likely to attack anyone in a tight group of at least 3 to 4 people. However, if people are spread out from one another, they are often treated as though each was alone. Bear spray should always be carried and within reach.

Preparation is key. Consider what you would do if you meet a bear and talk about this with your group, family, or neighbors. Bear can run at 44 ft/second (30 mph), so it is best to make your presence known in bear country to avoid a surprise encounter at close range. Your reaction distance may be short in dense woods, on windy days, or near running water. To alert bears to your presence, sing or talk while breaking sticks or making other natural sounds in the woods. When camping, do not camp if bear scat, other bear signs, or a bear's natural foods are present. Use designated campsites unless there is evidence of bears. Cook away from and downwind of your tent, do not sleep in clothes that you have cooked in, and do not keep food in your tent. Store food and trash in bear-proof containers or put it where bear cannot get to it (i.e, hanging attractants from a tree or pole not accessible to bear).

Most of the time a black bear will leave after an encounter. Unless the bear is a known nuisance, it should be allowed to leave voluntarily. Preventing a bear's escape may result in human injury, and bears that have chosen to leave should never be pursued. Surprised bear may do 'bluff' charges or swat at the ground with their paws. In this case, stand your ground, speak firmly, and slowly wave your hands to identify yourself as human and to help encourage the bear to leave. You should be aware that bear might make similar demonstrations to ask you to leave; these are covered in the section on *Social Behavior and Communication*. Direct, initiation of confrontation of a bear is never advisable, so people should demonstrate a willingness to leave the bear alone. Move off the trail or side-step slowly away from the bear so you can watch where you are going; backing up can cause you to fall.

Bear may occasionally walk towards people despite attempts to frighten or deter them away. This can happen for a variety of reasons. In the case of a food-conditioned bear, it may have learned that approaching or threatening people results in a food reward. Whenever possible, never reward an approaching bear with food. One popular strategy is to drop another object, such as a camera or water bottle, that will distract them. Bears that are rummaging through personal goods may be chased off by charging, shouting, and throwing objects near them. Note that this is NOT a strategy to be used with brown/grizzly bear. Curious approaches are most common with young 'teenage' bear. This, too, should be discouraged. Stand your ground, yell, and stomp your feet to encourage the bear to leave. Bear may attempt to follow people out of curiosity or, in rare cases, because they consider them as prey. Bear spray is an effective deterrent. If a black bear makes physical contact with you, fight back! Always report incidents to local authorities.

Appendix 3

Factors Affecting Black Bear Translocation

Factor	Description
Release Location	Prior to relocation, an evaluation of the release area and its resources can help with successful translocations. Additionally, agencies should consider the health of the animal since candidates will exert a great deal of energy returning home, locating new sources of food, or defending themselves.
Distance	This is a major factor influencing the success of translocation. Multiple studies suggest that distances greater than 37 miles (60 km) provide the best chance for success, but success has been observed at shorter distances (26 miles/42 km). It has been further suggested that distances greater than 40 miles (64 km) are necessary to ensure a 50 percent non-return rate and that distances over 75 miles (120 km) are best.
Age	Independent bears (not dependent on the mother) under 4 years of age are the best candidates for translocation. Some reports state that only 18 percent within this age group return to nuisance behavior, and even less return to the site of capture. Older bears are less likely to adopt new home ranges after translocation, but are more likely to survive. Adult males are poor translocation candidates during the mating season, and adult females are generally less successful than males. Adult bears, regardless of whether they are successfully translocated, may be more likely to resume nuisance behavior than younger bears; however, one study reported that only 39 percent continued nuisance behavior.
Sex	Young males naturally disperse from their natal home range and are better candidates for translocation than females, especially at young ages. Females do not usually disperse and may be poor candidates due to their tendency to return to their natal territory. Studies suggest that some young males may already be in the act of dispersal (i.e. searching for home ranges) when they are captured for nuisance behavior.
Family Status	One study showed that mother bears with cubs were successfully translocated during the winter denning season. There is no reported difference in homing response between independent females versus females with cubs at other times of the year. However, cub mortality can be quite high in the first year, and translocating a mother with cubs might further jeopardize survival of the cubs if their mother attempts to return home.
Season	Translocation success is low for male bear during the breeding season. Conflicting studies have shown that late-season translocations may be more successful than translocations during other times of the year, but that some bear return to capture sites in the spring after hibernating at their release sites. Females with cubs have been successfully translocated during winter denning.
Physical Barriers	Some studies suggest that topographical features, such as mountain ranges or large rivers, may play a role in translocation success. One study indicated river width may prevent some bear from returning to capture sites. A 1-mile (1,600 m) wide river was a barrier to some bear while a 656-ft (200 m) wide river was not.