

I. Background Information on New Jersey's Black Bears

HISTORY

The American black bear is native to New Jersey. Prior to European settlement black bears lived in forested regions throughout the state. As European settlement progressed, forests were cleared for towns, farming and lumber. Black bears were killed indiscriminately by settlers to protect their crops and livestock. Loss of habitat and indiscriminate killing caused the black bear population to sharply decline throughout the 1800s.

In 1953, the New Jersey Fish and Game Council classified the black bear as a game animal, affording it protection from indiscriminate killing. Limited hunting was legal for black bear until 1971 when the Council, based on an assessment by Division of Fish and Wildlife (DFW) biologists, closed the hunting season.

DFW biologists began conducting research on New Jersey's black bears in 1980. Over the last 30 years, the Garden State's black bear population has been increasing and expanding its range southward and eastward from the forested areas of northwestern New Jersey. The population has grown due to increased black bear habitat as agricultural land reverted to mature forests, protection afforded by game animal status, and bears dispersing into New Jersey from increasing populations in Pennsylvania and New York. Today, black bears can be found throughout the state.

BIOLOGY AND BEHAVIOR

Habitat and General Description

Black bears are the largest land mammal in the Garden State. Their prime habitat consists of mixed hardwood forests, dense swamps and forested wetlands. They are a large-bodied, muscular animal that can run up to 35 miles per hour. New Jersey's adult male black bears, called boars, weigh on average 400 pounds. Their weight can range from 150 pounds to more than 700 pounds. Adult females, called sows, weigh on average 175 pounds. Their weight can range from 150 pounds to more than 400 pounds.

Black bears can be many different colors, ranging from brown to black. Most black bears in New Jersey are black, but there has been one documented black bear in the state that is cinnamon brown in color. About fifteen percent (15%) of New Jersey's bears also have a white chest blaze. The muzzles of black bears are typically brown.

Black bears have a remarkable sense of smell. They have been documented detecting scents at more than two miles away from a food source. Black bears also have good hearing and can see well, although they are near-

sighted. Their ability to see color helps them when foraging for foods such as berries and fruits. Black bears are strong swimmers. They are also excellent climbers who have five toes on each paw with claws that are about two inches long and curved for climbing trees. Both adults and cubs will climb trees for food and to escape disturbances. Black bears can live for more than 25 years in the wild. Signs of a black bear in the area include bear scat, paw prints and marked trees.

Diet

Black bears are omnivorous. As opportunistic feeders they will consume whatever food is available. About seventy-five percent (75%) of a black bear's diet is comprised of plants. They will naturally consume berries, fruit, nuts, insects, small mammals and carrion. When black bears emerge from their winter dens they will primarily eat newly emergent skunk cabbage, grasses, forbs, tubers, bulbs and insects. They may also feed on carrion, such as white-tailed deer carcasses.

With the onset of summer, black bears will consume more soft mast items, such as blueberries, raspberries, blackberries and wild cherries. By fall, their diet will consist mostly of hard mast items, such as acorns, beechnuts and hickory nuts. Throughout late summer and fall, black bears need to consume a minimum of 20,000 calories a day to prepare for the winter den season. The main source of unnatural foods for black bears in New Jersey is garbage.

Black bears actively forage for food in the spring after they emerge from dens and in the fall when they are actively feeding to prepare for the winter den period. Black bears are also very active throughout the summer breeding season. These are the times of year when black bear/human encounters are most common, due to bears searching for food.

The most common bear problem New Jersey's residents experience is black bears getting into their garbage. Bears are attracted to neighborhoods by garbage odors, as well as to birdseed and pet food left outdoors. On a day to day basis, black bears will spend time resting in day beds at the base of trees or in tree limbs. Black bears are clever animals and learn quickly. They can figure out how to access food sources if not properly secured.

Reproduction

Black bears in New Jersey generally begin mating at three years of age. However, reproduction by females as young as two years of age, and as old as 20 years of age, has been documented in the state.

Mating season runs between late May and August and peaks in June and July. Both male and female black bears will mate with multiple partners to ensure reproductive success. After mating, sows undergo a process called "delayed implantation." The fertilized egg divides at the cellular level until it becomes a ball of cells called a blastocyst. The blastocyst remains free-

floating in the bear's uterus and does not implant in the uterine lining until November, about six months after fertilization occurs.

It appears that sows must be in overall good health and in a region with available food sources for the fertilized egg to implant and not be aborted. The fertilized egg will only implant in sows who have obtained adequate body weight and a large enough fat reserve to ensure that she can carry cubs to term and provide milk for them throughout the winter den period.

Cubs are born in January and weigh on average between 8 and 16 ounces at birth. They are born blind and covered with fine hair. Cubs' eyes open between 25 and 30 days. New Jersey's sows produce an average litter size of 3 cubs. Litters with as few as one cub and as many as six cubs have been documented in the state. A sow is very aware of the cubs' presence in the den and ensures that they stay close to her body for warmth. The cubs nurse and develop quickly on the sow's milk, which is high in fat and protein.

By March, cubs weigh about five pounds. Cubs and sows emerge from dens in April. In New Jersey, seventy percent (70%) of cubs survive their first year. Cubs remain with their mother for up to 18 months. Consequently, female black bears generally breed every other year.

Throughout the year and a half cubs spend with their mother they are taught basic skills, such as how to find food and avoid danger. By one year of age, at which time cubs are called yearlings, they weigh about 80 pounds. When yearlings are 16 to 18 months old the sow breaks up the family unit by aggressively chasing off the yearlings so that she can breed again. Yearlings are then left to fend for themselves and search for their own home range. Female yearlings are often permitted to share portions of their mother's home range, while males must travel further to establish their home range.

Winter Dormancy

Black bears are not true hibernators and may be active all year long. During the winter, black bears enter a state of winter dormancy called torpor. While in the state of torpor their heart rate and respiratory rate slow and their body temperature slightly drops, but not as much as in true hibernators (such as woodchucks).

Black bears typically do not urinate or defecate while in torpor. The small amount of urine that is produced is reabsorbed by their kidneys. They live off of their body fat, which is metabolized to produce the calories and water that they need to survive. They generally lose between eighteen percent (18%) and twenty percent (20%) of their body fat while in their dens and they are able to maintain their bone and muscle mass. While in torpor black bears are capable of being easily awakened if disturbed and they may leave their dens on mild winter days in search of food.

Black bears begin entering their winter dens in the fall to avoid periods of food shortage and severe weather. Impregnated females typically enter dens first, during the last week in October. Males may not enter dens until December. Den sites generally include ground nests, excavation sites, brush piles, hollow trees, rock cavities and sometimes beneath houses and other buildings. The den sites are typically small in size to retain body heat and ensure that black bears stay well insulated.

Behavior and Interactions

Black bears are generally solitary animals, with the exception of sows with cubs. Adult bears may also be seen together during breeding season. They tend to be crepuscular animals, meaning they are most active shortly before sunrise and again after sunset. However, they can be active during the day and may be active throughout the night. They will adjust their routines when it affords them the opportunity to take advantage of human-derived food sources, such as human garbage left out overnight or food scraps at a campground.

The size of a black bears home range varies depending on the abundance of natural foods. Bears may move further in times of less food like early spring. Yearling females may share the territory of the adult sow, but male yearlings must travel a greater distance to find a home range that is not already occupied by a dominant adult male.

Female black bears have smaller home ranges than males. In portions of New Jersey with the highest black bear density, a sow's home range may be less than 2 square miles. The adult males cover a much larger home range, which may overlap several female home ranges.

Black bears are typically not aggressive animals and tend to be wary of people. They do, however, engage in posturing to intimidate other animals, including black bears, and people when establishing dominance or when they feel threatened.

Black bears exhibit a number of expressions and actions in an attempt to intimidate. When agitated, a black bear may pop its jaws, utter a series of huffs or swat the ground. They will sometimes bluff charge an intruder when cornered, threatened or attempting to steal food. Sows will vocalize to cubs when sensing danger and both adults and cubs will run away and climb trees to escape disturbances. Black bears stand on their hind legs to obtain a better view of objects and also to assist with detecting scents.

Problems between black bears and people can occur when black bears learn to associate people with food. Habituation to human food sources may cause a black bear to become bold and lose its fear of people.

RESEARCH AND MANAGEMENT

The Division of Fish and Wildlife is responsible for protecting and managing New Jersey's wildlife. In fulfillment of this responsibility, the agency is studying and managing a growing black bear resource while minimizing interactions with people.

The Division of Fish and Wildlife's overall integrated bear management strategy includes public education, black bear research and monitoring, trapping and aversive conditioning, and euthanizing bears that pose a public safety threat.

Research

In 1980, Division personnel began conducting intensive research on New Jersey's black bear population. In 2001, the Division's Black Bear Project Team was created to intensify black bear management efforts. After more than 30 years of research, Division personnel have handled approximately 3,500 individual bears. The Division has been conducting bear studies in the Kittatinny Ridge (Western) and Bearfort Mountain (Eastern) Regions. The Eastern Region comprises an area of approximately 350 square miles and the Western Region approximately 230 square miles. In 2007, the research study area expanded to include Bear Management Zone 4, which is west of I-287, south of I-80 and north of I-78. The entire research study area now encompasses 1,201 square miles.

The Division's Black Bear Project uses three primary methods of research. These include research trapping and tagging, reproduction and recruitment work and radio telemetry studies. The data is collectively used to determine scientific population estimates, bear densities, breeding age and productivity, along with mortality and longevity of New Jersey's black bears. The Division also partners with a number of cooperative research institutions such as East Stroudsburg University, Rutgers University and Montclair State University.

During research trapping and tagging, black bear project personnel capture and handle black bears in order to collect biological information and to estimate the population size in the research study area using mark-recapture methods. Research trapping for population monitoring takes place twice a year, in the fall and spring. The black bear project team works for nineteen consecutive days, trapping and collecting data on the animals.

Research trapping techniques include using Aldrich foot snares and culvert traps to capture black bears. Both types of traps commonly used by wildlife biologists and researchers employ humane methods of capture. Foot snares and culvert traps are baited with bacon, molasses and sweet scents to attract bears. Aldrich foot snares consist of a cable attached to a stout tree. When the bear places its front paw inside of the looped cable, a spring mechanism is triggered and the cable wraps around the bear's paw. The bear maintains the ability to move 360 degrees around the tree and can even climb the tree

to a certain extent. Culvert traps are barrel shaped traps that contain a bait bag. When the bear enters the culvert trap, a mechanism is triggered when they pull on the bait bag and the culvert door closes. Traps are baited and checked daily by Division personnel.

When caught, black bears are chemically immobilized with darts containing an anesthetic and analgesic solution. Once sedated, bears that have never been caught before receive metal ear tags which display an identification number. The identification number is also tattooed onto the inside upper lip of the animal. Additional biological information is collected on all trapped bears. Measurements are taken on parts of the bear to determine growth rates and productivity in sows. Measurements include head circumference, head length, body length, girth, paw and leg measurements and teat length on sows. The bears are also weighed using a scale with a pulley system. A tissue sample is collected from the ear for DNA analysis (such as paternity studies) and blood samples are collected to look for diseases, such as West Nile Virus and Toxoplasmosis. The pre-molar tooth is extracted to determine the bear's age. Once cross-sectioned and stained, rings, called annuli, are visible and can be counted like a tree ring to determine age.

When biologists obtain a dead black bear, such as one killed in a vehicle collision, they may collect additional biological information from the bear when conducting a necropsy. Biologists may look at the stomach contents for food studies, the diaphragm to look for diseases like Trichinosis and reproductive tracts to determine the number of litters a sow may have produced.

During research trapping, sows may be fitted with radio-collars and monitored by radio telemetry to gather information on reproduction, survival, mortality, home range size and habitat use. Throughout the year, Black Bear Project personnel track collared sows on foot using a hand-held antenna with a radio-receiver. The receiver detects the radio-frequency from a transmitter on the collar, which is emitted as a pulsed signal. The exact location of the animal is then determined by homing towards the signal or by using triangulations to calculate the location.

In the spring of 2008, the Division began to track sows using satellite collar transmitters. This allows biologists to evaluate the effectiveness of aversive conditioning by studying the movements of collared nuisance bears. The satellite collars send information through satellites to a ground-based computer tracking system in order to accurately determine the animal's location.

During January, February and March, staff from the Black Bear Unit conduct den research to document reproduction and recruitment into the population. Personnel track bears to various den sites using radio-telemetry. Boars and sows in dens are chemically immobilized and biological information is collected. Sows are also checked for cubs of the year. In March, when cubs of

the year are large enough in size, they are tagged with metal ear clips, weighed and measured.

Management Measures

In addition to the Division of Fish and Wildlife's black bear research and monitoring and public education campaign, personnel implement wildlife control measures to manage nuisance black bears. The Bear Response Unit staff are biologists and technicians trained in wildlife management techniques. They are available to provide advice to callers with minor bear problems and technical assistance to homeowners, beekeepers and agriculturists with serious damage problems.

The Bear Response Unit personnel, who are certified in firearms use and chemical immobilization, also actively trap and aversively condition bears responsible for recurring nuisance incidents. A 2009 study of aversively conditioned bears ([study abstract](#) - pdf, 10kb; [full study](#) - pdf, 7.6mb) found that all of them returned to an urban setting within 17 days after release. Three of the five conditioned bears were observed in dumpsters or entering a dumpster. Based on these findings, the aversive conditioning protocol at best is beneficial in keeping bears temporarily away from the location where they were conditioned. However, it does not eliminate nuisance behavior in black bears. Personnel will euthanize bears that show unyielding or aggressive behavior and pose a threat to public safety, or that do not respond to the conditioning process. Division personnel have trained nearly 1,000 police officers and park rangers in bear response.

In November 2000, the Division of Fish and Wildlife began implementing the current Black Bear Rating and Response Criteria (BBRRC). The BBRRC is the operating policy for response to bears that are a threat to human safety, agricultural crops, property or are a nuisance (Adapted from Black Bear Policy Committee 2005). The BBRRC defines three categories of black bear behavior and dictates how the New Jersey Department of Environmental Protection and local law enforcement should respond.

Black Bear Category Rating Criteria	
Category I	Bears which are a threat to public safety and property.
Category II	Nuisance bears which are not a threat to public safety or property.
Category III	Bears exhibit normal behavior and are not a nuisance or threat to public safety.

The following tables describe the different responses taken by the Division of Fish and Wildlife based on a bear's category classification:

Category I Black Bears		
Description	Examples	Division Response
Black bears exhibiting behavior that is an immediate threat to human safety, those causing agricultural damage to farmland or property damage over \$500.	Human attacks, home entries, attempted home entries, tent entries, agricultural crop damage and killing or injuring livestock or pets.	These bears are euthanized as soon as possible to protect the public or eliminate further damage to agricultural crops or property.
Category II Black Bears		
Description	Examples	Division Response
Nuisance black bears which are not a threat to life or property.	Habitual visits to garbage containers, dumpsters or birdfeeders and property damage less than \$500.	These bears are aversively conditioned using rubber buckshot, pyrotechnic charges and bear dogs (black mouth curs) so that they receive a negative experience associated with the nuisance location and people. If trapped, nuisance bears are released on site and aversively conditioned.
Category III Black Bears		
Description	Examples	Division Response
Black bears exhibiting normal behavior and not creating a threat to the safety of the public or being a nuisance. In general, these are animals observed and reported to the DFW's Bear Response Unit by the public or local authorities. Such animals may be considered by the	Dispersing animals that wander into densely populated areas, black bears passing through rural and suburban neighborhoods and black bears observed by hunters, hikers, campers and others using facilities in black bear habitat. Category III bears may occasionally use birdfeeders and trash containers as	The Black Bear Response Unit offers assistance in the form of technical advice on bear-proofing surroundings to callers reporting Category III encounters. No attempt is made to capture a Category III bear unless it is confined in a fenced area or treed in an urban area during daylight and any further

<p>caller to be a danger or a nuisance because the caller has not had the experience of interacting with bears.</p>	<p>supplemental food sources in the course of their activities. Until a Category III black bear returns to a particular site and repeats utilization of these food sources, it is not considered to be a nuisance or problem animal (Category II).</p>	<p>movement will result in a threat to safety of the public or the animal due to potential vehicle collision.</p>
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Although the Division of Fish and Wildlife and the New Jersey Fish and Game Council are committed to advancing the science of non-lethal population control measures for black bears, at this time there is no EPA or FDA approved contraceptive drug or sterilization drug available for bears.

II. Classroom Curriculum Activity Supplements

A. The attached NJ Black Bear Range Maps (Figures 1-4) can be used with the following activities in the curriculum:

- Finding Bear Country "Where's the Bear"
- Black Bear History "Shaping the Land"
- Bear Behavior "Tracking a Bear"

B. The attached Black Bear Habitat Map (Figure 5) can be used with the Home Sweet Home "Investigating Habitats" activity. For a detailed description of bear habitat analysis for New Jersey's Bear Management Zones, refer to the NJ Division of Fish and Wildlife's Comprehensive Black Bear Management Policy, which can be viewed at the following link:

<http://www.njfishandwildlife.com/bearpolicy10.htm>

C. The following bear den data can be used with the Home Sweet Home "Bear Beds" activity.

ADDENDUM TO "A SAMPLING OF DEN DATA"

Northwestern New Jersey

Source: NJDEP Division of Fish and Wildlife's Black Bear Project

During den study checks in the winter of 2011, Division staff identified the dens of 21 radio-collared, adult female black bears. Bears denned in brush piles (28.5%), excavations (23.8%), rock cavities (14.3%), manmade structures (14.3%), open nests (9.5%) and tree dens (9.5%). In 2011, no black bears were found denned under rootballs (0%).



D. The following comparative bear data can be used with The Three Bears “How Do You Bear Up?”

Weight Range for Adults in New Jersey	Weight Range for Adults in Montana*
Female: 150-400 lbs	Female: 120-180 lbs
Male: 150-800 lbs	Male: 180-400 lbs

Reproduction in New Jersey	Reproduction in Montana*
Females often first breed at 3 years of age. Reproduction by females as young as 2 years of age, and as old as 20 years of age, has been documented in the state.	Females often first breed at 2 1/2 or 3 1/2 years of age; in very poor habitat, may not breed until 6 1/2
Number of young averages 3 cubs per litter. Litters with as few as 1 cub and as many as 6 cubs have been documented.	Number of young averages 1.5 to 1.8 cubs/litter.

* *Black Bear — Ursus americanus. Montana Field Guide. Montana Natural Heritage Program and Montana Fish, Wildlife and Parks. Retrieved on December 16, 2011, from http://FieldGuide.mt.gov/detail_AMAJB01010.aspx*

E. The following bear data can be used with the Bear Behavior “How Many Bears?” activity.

Year	Population Estimate for prime bear areas of northern NJ (N of Rt. I-80 & W of Rt. I-287)
2001	1777
2005	2397
2009	3438

For a detailed description of bear population monitoring in New Jersey, refer to the NJ Division of Fish and Wildlife’s Comprehensive Black Bear Management Policy, which can be viewed at the following link:

<http://www.njfishandwildlife.com/bearpolicy10.htm>