Black Bear Education Trunk

Curriculum Guide

MARYLAND DEPARTMENT OF NATURAL RESOURCES

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Section 1:

Black Bear Ecology

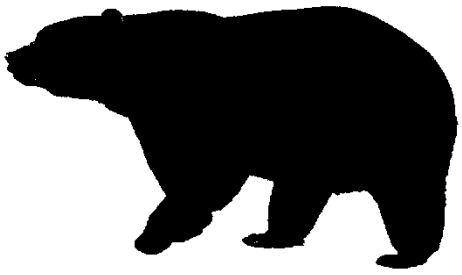
Black Bear Quick Facts

- There are 8 different species of bears worldwide. The black bear is the only species found in Maryland.
- Black bears occupy Maryland's western counties (Allegany, Frederick, Garrett, and Washington).
- There are an estimated 900,000 black bears in North America with approximately 2,000 adult bears living in Maryland.
- Adult male bears are called **boars** while females are called **sows**. Juvenile bears are called **cubs**.
- Not all black bears are black. Some black bears may be brown or cinnamon in color and/or blond. Some black bears also have white patches of hair. The vast majority of bears in Maryland are black.
- Black bears are generally solitary except for sows caring for their young.
- Adult females have an average home range of about 10 square miles, while adult males can cover 25 square miles or more. Young bears striking out on their own can travel 150-200 miles as they search for a territory of their own. A male's home range may overlap with several female home ranges.
- Black bears are **omnivores**. Adults eat acorns and other nuts, leaves, buds, seeds, fruits, **carrion**, and insects.
- Black bears may spend up to 20 hours per day feeding before going into hibernation. During this time, they can eat up to 20,000 calories per day!
- During hibernation, bears do not eat, drink, urinate, or defecate. They can drop their heart rate to 8-21 beats per minute and can reduce blood flow by 45% or more.
- Black bears breed in June and July in Maryland. Females have **delayed implantation** which means the embryo will not implant in the uterus after fertilization. The implantation does not occur until November in black bears.
- Once bred, a sow may give birth to 1-5 cubs. The cubs are typically born in January while the sow is hibernating.
- Newborn cubs weigh between ½ to 1 pound.
- A wild black bear's average lifespan is about 20 years but individual bears have been documented living more than 30 years.
- Bears can be aged by counting the number of rings in the cross section of a tooth root.

Black Bear Taxonomy

Taxonomy is the science of identification, naming and classification of living organisms. Taxonomy uses a hierarchal structure that classifies organisms from very broad categories to very specific categories. In terms of scientific classification, the broadest categories are Kingdoms while the most specific ones are Species and Subspecies. The following information details the taxonomic classification of the black bear.

Kingdom-Animalia
Phylum-Chordata
Class- Mammalia
Order- Carnivora
Family- Ursidae
Subfamily- Ursinae
Genus- *Ursus*
Species-*americanus*



Over 270 species make up the Order **Carnivora**. Carnivores are found throughout the world, and despite their name, they have a diverse diet. Most members of Carnivora have an enlarged 4th upper premolar and 1st lower molar which form the **carnassials**. The carnassials are designed for shearing flesh and tendons.

The earliest known bear species lived about 30-34 million years ago. These early ancestors were small and raccoon-like in appearance. Fossil evidence suggests that they lived in North America, but it is unclear whether or not they also inhabited Eurasia. Around 15-20 million years ago, the members of today's bear lineages diverged from their early ancestors.

From those ancient species, 8 species of bears exist today. Common characteristics among bears today include large bodies with stocky legs, long snouts, shaggy hair, **plantigrade** paws with 5 non-retractable claws (see adaptation section), and short tails. The Family **Ursidae** is divided into several sub-families with the giant panda and spectacled bear being placed in their own distinct sub-family. Black bears belong to the sub-family Ursinae which includes the sloth bear, sun bear, brown bear, Asiatic black bear, American black bear, and polar bear.

There are 4 species in the Genus ***Ursus***, the American black bear, brown bear, polar bear, and Asiatic black bear. The American black bear is the most abundant and widespread of them all.

Black Bear Fact Sheet *(Ursus americanus)*

Description & Range:

Black bears are stocky animals with short, thick legs and glossy black or brownish coats. Occasionally, black bears can also be cinnamon or blond in color and can contain patches of white. Black bears are the smallest North American bears, ranging from 5-6 feet long from muzzle to tail. A black bear's tail is short- averaging 3-5 inches in length. Males and females are generally similar in appearance, but males often are a little larger. In general, **sows** (females) weigh from 150-300 pounds while **boars** (males) can weigh from 300 to 600 pounds or more.

Historically, black bears were found throughout much of North America. However, their habitat is now limited to forested areas in 40 states and Canada.

In Maryland, black bears are located primarily in Garrett, Allegany, Washington, and Fredrick counties. Populations are highest in Garrett and Allegany counties, with bear numbers rising in the remaining areas. Each year, a handful of dispersing bears seem to travel through Maryland's more suburban areas in Baltimore, Carroll, Harford, Howard, and Montgomery counties in search of new territory. These bears don't stay in Maryland's suburban areas long, choosing instead to move on to more suitable habitats in western Maryland, Pennsylvania, Virginia, and West Virginia where there is already an established bear population.

By Jim Martin - Own work, Public Domain,
https://commons.wikimedia.org/w/index.php?curid=7816500

Habitat:
Black bears are forest dwellers and can usually be found in mixed deciduous and conifer forests. Black bears prefer areas with thick understories that contain abundant food resources such as acorns, nuts, berries, and seeds.

Diet:
Bears are opportunistic feeders, which mean they will eat whatever is accessible. Largely vegetarian, common foods include berries, cherries, other fruits, acorns, beechnuts, hickory nuts, insects, roots, grasses, reptiles, amphibians, and carrion. Acorns remain the single most important natural food for bears in Maryland. As the opportunity arises, bears will also eat garbage, agricultural crops, and bird food. Bears feed heavily during the fall months in order to increase fat reserves for the upcoming winter.

Reproduction:
Black bears typically breed at 3 years of age. During June and July, boars will travel long distances to mate with a sow. Generally, the fertilized egg will not implant until November (aka **delayed implantation**). If the female does not gain enough weight before hibernation, then her body may reabsorb the eggs.

Cubs are born in January with closed eyes and fine, down-like fur. The cubs typically weigh between ½ and 1 lb. Sows give birth to 1-5 cubs which remain with the sow for approximately 18 months. After a year and a half, the family unit will break up, the yearling cubs will find their own territory to inhabit, and the sow will seek a mate to start the process over again.

By Mark Betram - U.S. Fish and Wildlife Service, Public Domain, https://commons.wikimedia.org/w/index.php?curid=290455

Sounds:
Black bears communicate with sounds, body language, and scent marking. Typical black bear sounds include grunts and tongue clicks when relaxed. Cubs also make a humming sound similar to a purr when nursing. When unsettled, black bears may make a huffing or woofing noise and clack their teeth as a warning sign. When threatened, a black bear may also make a bluff charge.

Behavior:
Black bears tend to be most active near dusk and dawn but may be active at any time of the day or night. Right before denning, black bears can actively forage for up to 20 hours per day! Generally, black bears are solitary and spend their days foraging for food.

Prior to denning, black bears will consume up to 20,000 calories per day and will increase their mass by 30-35%. Black bears are not true hibernators, but they do slow down their heart rate and breathing while denning. Typically, Maryland black bears enter the den in mid to late November through December, pending on the weather and food availability. They typically remain in the den until March or April. Brush piles are the most common type of den site found in Maryland. However, black bears will den under large boulders, within simple depressions, in tree cavities, or even under porches and other human dwellings. Some bears may even choose not to hibernate as long as they are in good physical condition and have an adequate food source to see them through the winter.

Management:
Black bears are managed as a game species in Maryland. The main goals of black bear management in Maryland are to 1) ensure that healthy black bear populations are maintained statewide, 2) conserve habitat for black bears, 3) promote human safety and address conflicts between humans and bears, 4) manage bears in a professional and humane manner, and 5) provide funding mechanisms for future management. More information about black bear management can be found on our black bear page here.

Black Bear Predator-Prey Relationships

Predators are animals that eat other animals (**prey**). Most predator-prey relationships have evolved over thousands of years. Some predators are specialists and have a limited set of prey species. For example, mountain lions are specialist predators that mainly feed on white-tailed deer. Other predators are generalists and will consume whatever is available. Black bears are both predators and prey.

Black bears are opportunistic feeders and will eat whatever is readily available. The majority of their diet consists of vegetation, but they will also consume a fair amount of meat as well. Black bears will eat almost anything, such as grubs from a bumblebee nest, bird eggs, ants, termites, voles, fawns, and carrion. Occasionally, black bears will also prey on small livestock.

When young, black bear predators include foxes, coyotes, dogs, bobcats, and other bears. Adult black bears do not have natural predators except for humans.

Black Bear Adaptations

Adaptations are traits that help organisms survive and reproduce in their ecological niche or habitat. Adaptations occur over many years and can be physical, behavioral or physiological.

A **physical (anatomical) adaptation** is one that entails a physical feature like the shape or color of an animal. Camouflage is an excellent example of a physical adaptation. Other example of physical adaptations include the well-developed carnassial teeth on mustelids (weasels) that help them shear flesh or the clear eyelids that beavers have to be able to see underwater.

Photo by: Robert Barber/Painet Inc.

Long-tailed weasels have well-developed carnassials

Behavioral adaptations are adaptations that have been learned or inherited. Language, swarming by bees or other colony insects, and use of tools are all examples of behavioral adaptations.

Physiological adaptations permit the organism to perform special functions. An example of this would be the production of venom by timber rattlesnakes. Another physiological adaptation is the process of **estivation** or when some animals enter a state of inactivity during prolonged periods of drought or high temperatures.

The following pages list some adaptations that black bears possess.

Physical Adaptation: Black Bear Eyes

Black bears have limited color vision and have eyes on the front of their skull. This adaptation allows the bear to have binocular vision. Prey species like white-tailed deer tend to have eyes on the sides of their skull while predators typically have eyes situated in the front of their skulls. This binocular vision allows predators to see and judge depth in order to pursue and track prey. In contrast, most prey species have poor depth perception.

"*Eyes in the front, the animal hunts. Eyes on the side, the animal hides.*"

One of the reasons for black bears having color vision is to aid in the search of berries for food. While their vision is relatively good, black bears are near-sighted which helps them find food close to the ground. Young black bears are born with blue eyes that eventually turn brown.

Black bears have good night vision, in part due to a light-detecting membrane in their eye known as the **tapetum lucidum**. This membrane is well-developed in most nocturnal animals and causes "eye shine" when light is shined on them.

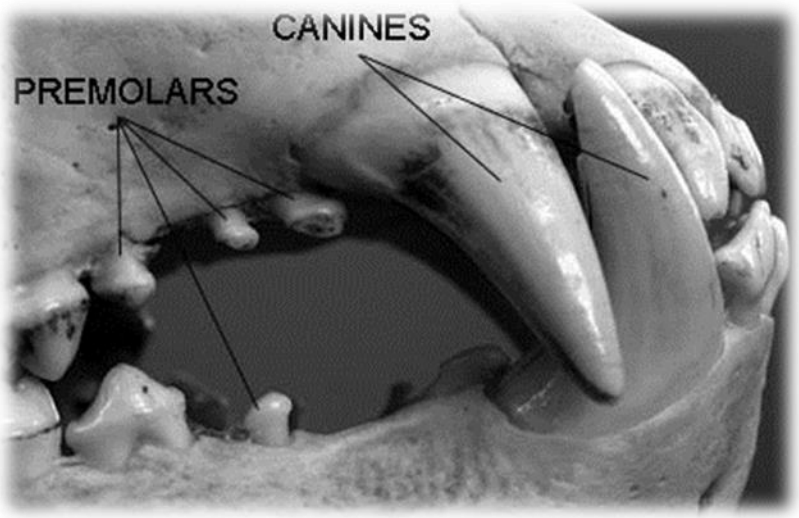
Photo by: Hans Stieglitz

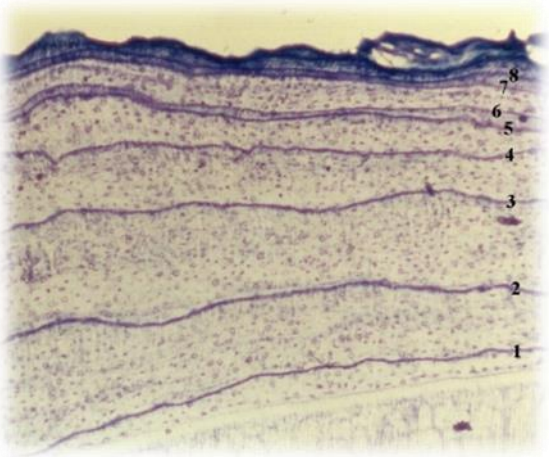
Physical Adaptation: Black Bear Teeth

Black bears have 42 teeth that include incisors, canines, premolars, and molars. By 2.5 years, black bears will have a full set of adult teeth. The small incisors in the front of their mouth are designed for nipping off fresh plant material like grasses. On either side of their incisors are large canines designed for ripping and tearing flesh. Black bears have reduced 1st, 2nd, and 3rd premolars which creates a space (**diastema**) on either side of their mouth that allows them to strip leaves off of plants grabbed sideways in their mouth. Finally, their broad, flat molars are designed for crushing and grinding plant material.

Black bears also can be aged using their teeth. Bears have rings on the roots of their teeth for each year of growth- similar to tree rings! The outer part of the root, called **cementum**, adds a new layer each year. The new layer has two parts: a narrow dark line that forms during hibernation and a light area that forms during the growing season. During the years that sows raise cubs, the sows will have narrow spaces between their root rings (see picture below).

Bears are one of the few wild animals that can develop tooth decay. Black bears can get cavities due to a diet rich in sugars. The decay and loss of teeth can lead to poor health, starvation, and/or death.





Black bear teeth (left) and tooth cross section of 8 yr old sow that had cubs at 5 and 7yrs of age Photos by: Michigan DNR

Physical Adaptation: Black Bear Feet

Black bears have large, flat feet with thick footpads designed for walking long distances. Black bear's long, curved claws allow the bears to easily climb trees and rip into rotting logs to find food. Males also will use their strong claws to mark trees.

The black bear's flat foot structure is designed to have the bear walk by placing their entire foot on the ground with each step. This foot type is known as **plantigrade.** Plantigrade feet are adapted to help with balance and to allow organisms to stand upright. In contrast, dogs and cats are digitigrade meaning that they walk on their toes with their heels raised.

By vhhammer - CC BY-SA 2.0, https://commons.wikimedia.org/w/index.php?curid=11323277

Physical Adaptation: Black Bear Tongue

Black bears have a long, sticky, agile tongue. Their tongue can reach into ant colonies, similar to an anteater tongue. In addition, black bears can use their tongue to sort preferred food like acorns in their mouth.

Physical/Physiological Adaptation: Black Bear Sense of Smell

By far, a black bear's greatest sense is their sense of smell. A black bear's sense of smell is 7 times the capacity of a bloodhound! The nasal mucous membrane in a bear's nose is almost 100 times larger than a human's nasal membrane.

In addition to large noses and nasal membranes, black bears also have a **Jacobson's organ**, also known as a **vomeronasal organ**. This organ is located in the roof of their mouth and is comprised of sensitive nerve endings that help a bear detect airborne scents. To use this structure, a bear has to lift its snout, open its mouth, and then lap air while inhaling. Many animals like snakes, lizards, and select mammals also possess this organ.

Photo by: Eugene Beckes, Creative Commons

Physiological Adaptation: Black Bear Hibernation

Hibernation is a physiological adaptation. **Hibernation**, by definition, is the state of inactivity and lowered metabolism in an organism. Black bears are not true hibernators like ground hogs. Unlike true hibernators, bears do not exhibit a significant drop in their body temperature and remain somewhat alert during this time.

Before hibernation, bears will consume up to 20,000 calories per day and will drink several gallons of water (**hyperphagia**). The large amounts of water are necessary to quickly rid the body of waste. Bears can release up to 4 gallons of urine per day during this time of year! Right before they go into their dens, a black bear will rest up to 22 hours per day.

In November and December, most black bears in Maryland will go into hibernation. Timing is usually dependent upon weather and food availability. Bears use dens for hibernation. Dens may be burrows, caves, hollowed trees, or simply nests on the ground. The most common den site found in Maryland is a brush pile. Bears may gather leaves, grass, and twigs to make insulated beds to curl up upon, leaving only their well furred backs exposed to the cold. Bears will sleep alone, except for a sow with her cubs or her year old cubs (**yearlings**).

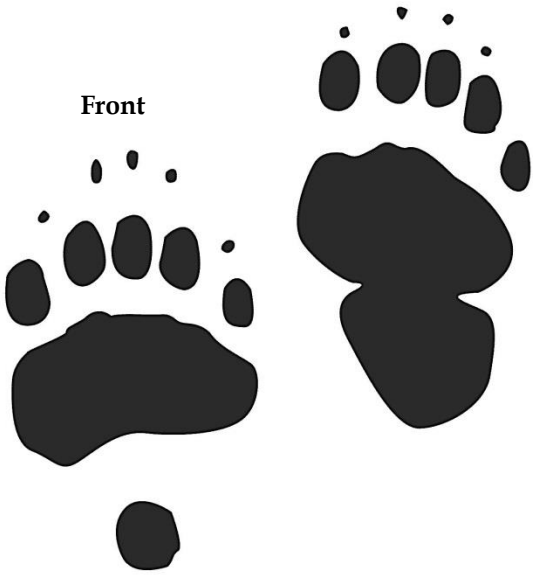
Black bears will hibernate with their face tucked into their chest to prevent heat loss. During this time, black bears will not eat, drink, urinate, or defecate. Nitrogen waste will be biochemically recycled back to proteins. This process helps prevent black bears from significant muscle loss. As their body processes waste, a fecal plug will form from intestinal secretions, cells, hair, and other indigestible materials. The bear's heart rate will drop to 8-21 beats per minute while blood flow to extremities like their legs can be reduced by up to 45%.

Cubs typically are born in mid-late January. Newborn cubs are essentially helpless, so females will provide care in the den. The newborn cubs do not hibernate, rather they spend their time feeding and sleeping as the weeks progress. By the end of February, cubs are 4 to 6 weeks old and usually weigh 2-3 pounds.

Newborn black bear cubs by USFWS

Black Bear Tracks, Scat, and Sign

Black bears leave behind lots of sign as they travel through the woods.



One easy way to tell if black bears have been in the area is to look for tracks. The black bear's flat foot structure is designed to have the bear walk by placing their entire foot on the ground with each step. This foot type is known as **plantigrade.**

Front Foot:

- 5 toes w/ large claws
- Smaller than rear foot
- Heel pad often does not register
- 2.1 – 5.3 in (5.5 – 13.5 cm) long
- 2.1 – 5.6 in (5.3 – 14.2 cm) wide

Hind Foot:

- 5 toes w/ large claws
- Heel pad often does not fully register
- 2.8 – 8 in (7.6 – 20.4 cm) long.
- 2.5 – 6.9 in (6.3 – 17.5 cm) wide

Scat, aka poop, is another way to tell if black bears have been in an area. The size and shape of the scat depends a lot on the diet of the bear. Usually, the scat is tubular in appearance and contains remnants of berries, nuts, hair, seeds, and more. Generally, the size averages 1-1/2 inches to 2-1/4 inches in diameter.

Other sign include claw marks on trees or den sites.

Glossary

Adaptation- traits that help an organism survive

Boar- male black bear

Carnassial- the large upper premolar and lower molar teeth of a carnivore, adapted for shearing flesh

Carnivora- a diverse order that includes over 270 species of placental mammals

Carrion- the decaying flesh of dead animals

Cementum- outer part of tooth root

Cub- juvenile black bear

Delayed implantation- a reproductive strategy where the embryo (blastocyst) does not immediately implant in the uterus, but is maintained in a state of dormancy

Diastema- a space or gap between two teeth

Estivation- when animals enter a state of inactivity during prolonged periods of drought or high temperatures

Hibernation- a state of inactivity and metabolic depression

Home range- the area in which an animal lives and travels

Hyperphagia- abnormally increased appetite for food

Jacobson's organ- an olfactory sense organ primarily used to detect pheromones and other scents (aka vomeronasal organ)

Omnivore- An animal or organism that feeds on both animal and plant matter

Plantigrade- (of a mammal) walking on the soles of the feet, like a human or a bear

Predator- an animal that eats another animal

Prey- an animal hunted or seized for food, especially by a carnivorous animal

Sow- female black bear

Tapetum lucidum- layer of reflective tissue in the eye of many vertebrates

Taxonomy- the science of identification, naming and classification of living organisms

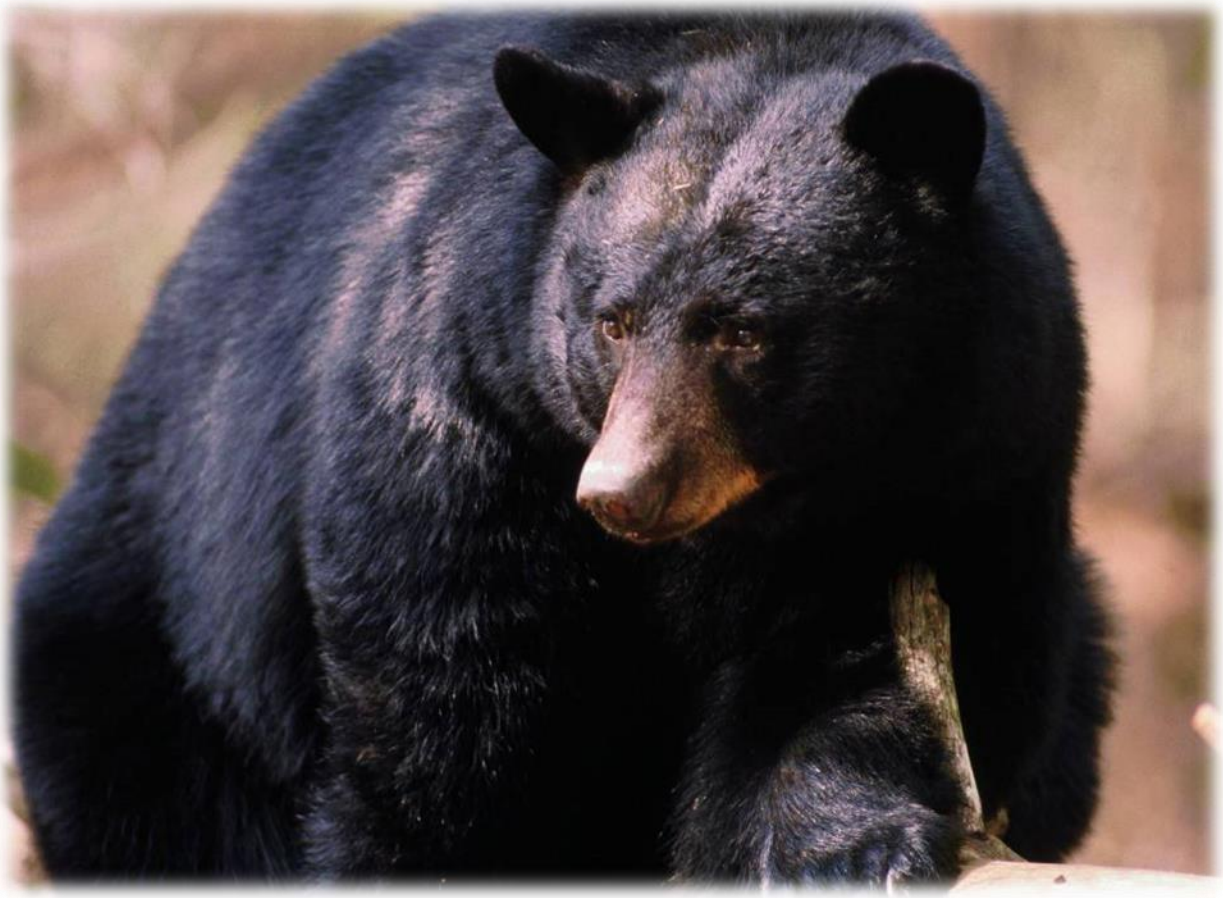
Ursidae- bear family which contains 8 extant species

***Ursus*-** genus in the family Ursidae (bears) that includes the widely distributed brown bears, the polar bear, and black bears

Vomeronasal organ- see Jacobson's organ

Yearling- an animal that is between one and two years old

Section 2:



Maryland Black Bear Management

Black Bear Management Timeline

- **Pre 1600s –** Black bear were abundant and distributed statewide due to excellent habitat. Native Americans coexisted with black bears and regarded them differently based on tribal beliefs.
- **1600s – 1700s –** Colonists began to harvest timber and expand agricultural land degrading habitat. Additionally, bear were regarded as vermin.
- **Mid 1700s – Early 1900s –** A bounty was established in Somerset and Worcester counties encouraging people to kill bears. Indiscriminate killing coupled with habitat loss devastated the black bear population.
- **1900s**- Black bears restricted to western Maryland.
- **After 1953**- Black bear hunting season closed.
- **Mid** 1**960s –** Black bears are only found in the remote mountainous areas of Allegany and Garrett counties.
- **1972 –** Black bear status was changed from a "forest game" animal to being listed on the state's "endangered species" list.
- **1980 –** Increased sightings and bear damage complaints lead to removal from "endangered species" and listed as "nongame species of special concern."
- **1985 –** Black bear status changed to "forest game" species, although hunting season remained closed.
- **1991 –** Maryland Department of Natural Resources (MD DNR) conducts an intensive mark-recapture study to estimate the size of Garrett County's bear population. Point estimated results showed 79 bears.
- **2000 –**Point estimated results from another intensive mark-recapture study showed 227 adult and subadult bears west of Cumberland.
- **2004 –** MD DNR conducts first black bear hunting season in 51 years.
- **2005 –** Following another intensive mark-recapture study, black bear population estimate is around 326 adult and subadult black bears west of Cumberland.
- **2011 –**701 adult and subadult bears are estimated west of Cumberland with another mark-recapture study. Results reveal that the annual bear hunting season has allowed the population to continue to grow.
- **2011 – Present –** Annual black bear hunting season continues with the goal to slow the growth of Maryland's black bear population. In 2016, more than 2,000 adult and subadult black bears are estimated to live in western Maryland (Allegany, Frederick, Garrett, and Washington counties).

Black Bear Management History

Pre-colonial

More than 3 million years ago, the ancestors of today's black bear crossed the Land Bridge from Asia. Around 500,000 years ago, the modern species of black bear became part of the landscape. Historically, black bears inhabited much of the North American continent, barring Mexico and some western states.

Native Americans coexisted with black bears, and each tribe would regard black bears in different manners.

Colonial

The quality of Maryland's forests was degraded as early settlers cleared the forests to harvest timber and expand agricultural land during the 1600s and 1700s. As a result, the quality of bear habitat was also greatly degraded. In addition, settlers considered bears to be a threat and treated them as vermin. In fact, in the mid-1700s, a bounty was established in Somerset and Worcester counties encouraging people to kill bears. Bears were indiscriminately killed throughout the 1800s and into the early 1900s. This indiscriminate killing combined with large-scale habitat loss through uncontrolled timber cutting and a lack of conservation laws eliminated black bears and other forest wildlife species from many parts of the state.

The peak of deforestation and agricultural activity across most of New England occurred from 1830 to 1880. Across much of New England, 60 to 80 percent of the land was cleared for pasture, tillage, orchards and buildings. Settlers also changed the habitat and landscape across Maryland and the eastern U.S. through large scale timber cutting. By: http://harvardforest.fas.harvard.edu/

Early 1900s-1970s

By the early 1900s, the loss of habitat had restricted black bears to the western portion of the state. After the 1953, the black bear hunting season was closed in Maryland. By the mid 1960s, the black bear population was nearly extirpated and was restricted to the more remote areas of Garrett and Allegany counties. In 1972, the status of the black bear was changed from that of a forest game species to being listed on the state endangered species list.

Modern

Throughout the mid-1970s and 1980s, the Maryland Department of Natural Resources, Wildlife and Heritage Service (WHS) noted an increase in bear sightings and bear damage complaints. As a result, the black bear was removed from the state endangered species list in 1980 and was listed as a nongame species of special concern. In 1985, the status of the black bear was once again changed from a nongame species back to a forest game species. Hunting seasons remained closed.

In 1991, the Wildlife and Heritage Service (WHS) conducted an intensive mark-recapture study in an effort to estimate the size of Garrett County's bear population. In conducting the study, WHS trapped bears on public lands in Garrett County. Upon examining the capture and recapture rates of trapped bears, WHS estimated that Garrett County supported between 0 and 167 black bears, with a point estimate of 79 bears (12.0 bears per 100 mi^2).

In 1996, the Maryland General Assembly authorized the Black Bear Conservation Stamp program. The stamp generates funds that are used to compensate farmers who have reported damage to agricultural crops caused by black bears.

In 2000, the Wildlife and Heritage Service once again undertook the large task of estimating the size of Maryland's black bear population.

2015 Black Bear Stamp by Steve Oliver

Advances in DNA analysis technology gave WHS' wildlife managers a more efficient means of sampling the bear population and providing reliable results. Hair snares, consisting of a baited area surrounded by barbed wire, were distributed throughout Garrett and western Allegany counties on both public and private lands during the summer of 2000. The black bear population in 2000 in western Maryland (from Cumberland to the West Virginia line) was estimated to be between 166 and 337 animals, with a point estimate of 227 adult and sub-adult bears (27.3 bears per 100 mi^2).

A black bear by a hair snare trap. The inside of the trap is baited with food, so bears crawl under the wire to get to the bait, leaving behind hair samples which can be analyzed using DNR technology. By MD DNR

Additional population estimates were conducted in 2005 and 2011. In 2005, an estimated population of 326 adult and subadult bears were recorded. In 2011, 701 adult and subadult bears were estimated in Garrett and Allegany counties.

Black Bear Management Today

Approximately 2,000 adult bears roam across our four western-most counties (Allegany, Frederick, Garrett, and Washington). Between 2011-2015, black bears have caused a yearly average of 500 nuisance calls and $17,000 in agricultural damages. In addition, around 60 bears are killed each year by vehicle strikes.

After decades of research and population monitoring, the decision was made to once again hunt black bears in western Maryland. On October 25th 2004, the Maryland Department of Natural Resources (MD DNR) reopened Maryland's black bear season after 51 years. The hunt was conducted in Garrett County and western Allegany County (from Cumberland west). The goal of the hunt was to slow the growth of western Maryland's growing black bear population.

In the early days of Maryland's new black bear hunt, permits were issued and strict harvest quotas were followed (Table 1). MD DNR established a harvest quota targeting an approximate 8 to 12% harvest mortality. This quota was based on the objective of achieving 20 to 25% overall mortality (seasonal +non-seasonal mortality). In 2004, 200 black bear hunting permits were awarded, and 20 black bears were checked in on the opening day of the hunting season. In 2005, hunters harvested 40 bears in 4 days. This total was achieved despite an early-season snowstorm and long-term power outages across most of the hunt area.

In 2006, MD DNR expanded the hunt area to include all of Garrett and Allegany counties and increased the number of permits awarded to 220. In 2006, hunters harvested 41 bears in 2 days. Hunters harvested 51 bears in 4 days in 2007 and 56 bears in 4 days in 2008. From 2008-2013, the number of permittees and harvest totals increased several times.

In 2014, MD DNR eliminated the quota system that had been used to manage black bear harvest since 2004. Instead, a 4 day hunting season was established with 450 bear hunting permits issued. Despite poor weather conditions, 69 bears were harvested. The black bear population has continued to increase in size and range. In 2016, the black bear hunting zone was expanded to include Frederick and Washington counties.

Table 1. Bear Hunt Statistics: 2004-2015

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
# of Permittees	200	200	220	220	220	240	260	260	340	380	450	500
# of Applications Received	2,272	2,192	2,402	2,804	3,302	3,608	3,850	3,915	4,027	3,504	3,631	4,307
# of Bears Harvested	20	40	41	51	56	68	67	65	92	94	69	95
Hunter Success Rate	5.5%	11%	9%	11%	12%	12%	12%	12%	13%	13%	6.5%	8%

Maryland wildlife biologists conduct annual reproduction surveys by visiting dens of sows with radio collars. During the surveys, biologists tranquilize the sow and collect data on the sex, weight, and health of cubs. In 2015, the first 5-cub den was documented in Maryland. The cubs are marked with ear tags and pit tags (an electronic tag implanted under the skin that can be identified with a special reader). These unique ID numbers assist with future identification of bears in the event they are captured or otherwise handled again. Other surrounding states participate in similar research, and it is not unusual for a black bear tagged in another state to end up in Maryland. For example, in 2008 a black bear tagged in New Jersey ended up on the eastern shore of Maryland- over 100 miles away!

Maryland's black bear biologist, Harry Spiker, attaches an ear tag to a cub in western Maryland

Even with the black bear hunt, Maryland's black bear population continues to steadily increase. During the spring, it is not unusual for young black bears to travel long distances to find suitable habitat. Occasionally, these young black bears will travel to places such as Baltimore, Howard, Montgomery, and Cecil counties. In 2016, a black bear was fatally hit by a vehicle as far south as the southern tip of St. Mary's county. As the population grows, Maryland's wildlife managers will work to sustain our black bear populations while mitigating potential conflicts with the public.

Section 3:

Black Bear Lesson Plans

What Bear Goes Where?- Project WILD, pg 30

This activity is copyrighted and is only found within the trunk guide.

Animals in Winter

Grade Level: K-3
Subjects: Science, Expressive Arts, Environmental Education, Language Arts
Skills: analysis, application, observation

Objectives:
Students will learn about hibernation, migration, and adaptations.

Methods:
Students will read about animals in winter, sort animals by what they do in winter and then will research and draw an animal in its winter habitat.

Materials:
- Animals in Winter by Henrietta Bancroft (in trunk)
- Craft materials for winter animal pictures
- Sorting cards (in trunk & on CD)

Background:
In winter, the weather gets colder and the days get shorter. Animals deal with these changes in different manners. Some animals like Baltimore orioles migrate, or travel to other locations. Other animals like little brown bats hibernate, or go through a deep sleep. Some animals like gray squirrels adapt to the cold by changing their daily activity patterns and layering on fat to insulate their bodies. In this activity, students will learn about hibernation, migration, and adaptation.

Procedures:
1. Ask students how they deal with cold weather. How do they stay warm? Do they spend more time outside or more time inside? Why?
2. Ask students how wild animals deal with cold weather. Where do animals go in the winter? Write down their ideas on the board.
3. Write 'hibernation', 'migration', and 'adaptation' on the board. Ask students what they think each term means. After discussion, provide definitions.
4. Read "Animals in Winter" by Henrietta Bancroft (found in trunk). Discuss what the students learned with the story.
5. Hand out sorting cards (several sets in trunk; copies are also on resource CD). Have students sort animals based on where they go/ what they do in the winter. Go over the student's choices with them.

6. Now that students know more about animals in the winter, have students select an animal from a provided list or on their own. Have students research what the animal does in winter and create a picture of it in its winter habitat.
7. Have students present their findings to the class.

Extensions:

1. Black bears hibernate in Maryland. Have students research what adaptations allow black bears to hibernate. Where do black bears hibernate?
2. Have students observe winter wildlife in their schoolyard or their backyards. What animals can they find in the winter? What behaviors are the animals displaying? Are they foraging? Are they trying to stay warm?
3. Begin activity with a blubber bag demonstration to get students thinking about adaptations for the cold. (Blubber bag instructions are found in Section 4).

Evaluation:

1. Ask students to explain the differences between migration and hibernation. Have students name one local animal that migrates and one local animal that hibernates.

Eat Like a Bear

Grade Level: K-3
Subjects: Environmental Education, Language Arts
Skills: analysis, observation

Objectives:
Students will learn about foods that bears eat.

Methods:
Students will listen to a story about what bears eat and will create collages with bear food items.

Materials:
- Eat Like a Bear by April Pulley Sayre (in trunk)
- Pictures of food from magazines, newspapers, etc
- Colored strips of paper (optional)

Background:
Bears are opportunistic feeders, which mean they will eat whatever is accessible. Brown bears (aka grizzly bears) are more carnivorous than black bears. Largely vegetarian, black bears commonly eat cherries, other fruits, acorns, beechnuts, hickory nuts, insects, roots, grasses, reptiles, amphibians, and carrion. Acorns remain the single most important natural food for bears in Maryland. As the opportunity arises, black bears will also eat garbage, agricultural crops, and bird food. Bears feed heavily during the fall months in order to increase fat reserves for the upcoming winter. In this activity, students will learn about common foods that bears eat.

Procedures:
8. Ask students what foods they like to eat and why. Why do they eat food at all?
9. Ask students what foods they think bears eat. List their responses on the board.
10. Read the book "Eat Like a Bear" by April Pulley Sayre (in trunk). You can encourage students to dramatically act out sections as you read the book (like sniffing the air to find food or "chewing", etc). You may also need to define certain terms for the students.
11. After reading the book, ask the following discussion questions:
    a. What foods did the bear eat? Compare to the list students generated before going over the book. What was the same? What was different?

b. What would happen if the bear did not spend so much time looking for food? Why was it important for the bear to eat from April through November?
c. Would you like to be a bear? Why or why not?

12. Tell students this book is about a brown bear, a relative of black bears that are found in Maryland. Brown bears eat more meat than our local black bears. List some of the additional foods that black bears eat.

13. Go through the lists of bear foods and ask students what they would eat. Ask them to explain why they would not eat certain foods.

14. Provide students with old magazines, newspapers, and other items that may have pictures of food. Have them make a collage of foods black bears will eat. As an alternative, provide strips of colored paper and have students create food collages, similar to the illustrations in the book. Have students present their collages to the class.

Extension:

1. Ask students what are verbs. Verbs are 'action' words. Write the words 'hunting', 'foraging', 'eating', and 'hibernating' on the board and create a column for each. Define these terms for students. Read through the story a second time and have students identify verbs associated with each word. An example is posted below:

Hunting	Foraging	Eating	Hibernating
Chase	Dig	Eat	Prepare
Bounding	Find	Clip	Gather
Race	Paw	Snip	Follow
Bashes	Claw	Gnaw	Settle
Thrashes	Pull	Chomp	Cuddle
Follow	Tear	Rake	Curl
Wade	Scratch	Nibble	

2. Pair activity with the early childhood extensions from the How Many Bears Can Live in the Forest activity in this section.

Evaluation:

1. Have students list foods that black bears eat and compare those foods to their diets.

Bearly Born- Project WILD

Tracks- Project WILD, pg 30

How Many Bears Can Live in the Forest?

These activities are copyrighted and are only found within the trunk guide.

Sleepy Bear

Adapted, with permission, from the New Mexico Black Bear education guide http://www.wildlife.state.nm.us/download/education/conservation/discover-curriculum/Black-Bear-of-NM-Educator-Guide.pdf

Grade Level: 4-12
Subjects: Biology, Ecology, Math
Skills: Analysis, Inference, Comparison

Objectives:
Students will be able to 1) define hibernation and qualify it for bears, 2) equate hibernation with survival, and 3) list the characteristics and results of hibernation.

Methods:
Students will measure their own heart rate, breath rate, and temperature before and after an active simulation and will compare results to a bear's conservation of energy when it hibernates.

Materials:
- Clock or timer
- Small food items (plastic food, colored paper strips, poker chips, etc)
- Paper bags
- Thermometers
- Data sheets
- Stereo or other device to play music

Background:
Hibernation is a physiological adaptation. **Hibernation**, by definition, is the state of inactivity and lowered metabolism in an organism. Black bears are not true hibernators like ground hogs. Unlike true hibernators, bears do not exhibit a significant drop in their body temperature and remain somewhat alert during this time.

Before hibernation, bears will consume up to 20,000 calories per day and will drink several gallons of water (**hyperphagia**). The large amounts of water are necessary to quickly rid the body of waste. Bears can release up to 4 gallons of urine per day during this time of year! Right before they go into their dens, a black bear will rest up to 22 hours per day.

Black bears will hibernate with their face tucked into their chest to prevent heat loss. During this time, black bears will not eat, drink, urinate, or defecate. Nitrogen waste will be biochemically recycled back to proteins. This process helps prevent black bears from significant muscle loss. As their body processes waste, a fecal plug will form from intestinal secretions, cells, hair, and other indigestible materials. The bear's heart rate will drop to 8-21 beats per minute while blood flow to extremities like their legs can be reduced by up to 45%.

During this activity, students will compare their resting heart rate, breath rate, and temperature to their active heart rate, breath rate, and temperature.

Procedures:

1. Hide "food" items around the classroom or in a playing field before students arrive.
2. Ask students what they know about hibernation. What's the difference between hibernation and migration? Why do some animals hibernate? What local animals hibernate? Write a list of hibernators on the board.
3. Relax the students by playing soothing music and leading them in deep breathing exercises.
4. Show students how to take their heart rate- by placing their index and middle finger on the side of their neck below the jaw on the carotid artery- and then have them count the rate for 20 seconds. Tell them to multiply that number by three and record it on their data sheet.
5. Show students how to take their breath rate (by holding their hand in front of their faces), and then have them count the rate for 1 minute and record it on their data sheet.
6. Next, have students take their temperature with a thermometer or simply tough their forehead and record "hot", "cool", or "warm". Have students record this information on their data sheet.
7. Hand each student a paper bag and tell them that it represents their "stomach".
8. After everything is recorded, have the students get up and run in place for one minute to warm up for the simulation. You may want to play fast paced music to help them with this process.
9. Tell students that they are hungry bears and that "food" is hidden in the room or around the playing field. Show them an example of what to look for. Explain to students that they will only have 2-4 minutes to forage. Once they find "food", then they can pick it up one piece at a time and add it to their "stomach".
10. Remind students that bears are generally solitary and do not help each other find food. Then, allow the students to forage. You may want to continue to play fast paced music.

11. Stop the students after a desired time, and have them immediately count their heart rate and record the information. Have them also record information on their breath rate and temperature.
12. Have students compare their heart rate, breath rate, and temperature before and after they searched for food. What happened and why? Discuss the meaning of the differences and help lead them to the idea that less energy (food) is needed when they are resting compared to when they are searching for food. Have students compare the amount of "food" they gathered compared to their peers. Did the students who gathered the most food have larger changes in heart and breath rates? Why or why not? Are there any differences in the heart and breath rate changes in relation to size or gender? Why or why not?
13. Return to the list of animals that hibernate. Go over information relating to black bear hibernation. Share the fact that black bears have their heart rate drop to 8-21 beats per minute during hibernation. Have students compare that to their own initial heart rate. How do they compare to a bear? Do they think their sleeping heart rate will be higher or lower? Why or why not?
14. As a wrap-up, have students discuss why animals hibernate. Ask students what might happen to the animals if they did not hibernate.

Extensions:

1. Have students research information on local animals that hibernate. What is the animal's normal resting heart rate versus their hibernation heart rate? Have students research other physiologic changes that happen during hibernation and either write a report or present their findings to the class.

Where Were You When…

Adapted, with permission, from the New Mexico Black Bear education guide http://www.wildlife.state.nm.us/download/education/conservation/discover-curriculum/Black-Bear-of-NM-Educator-Guide.pdf

Grade Level: 7-12
Subjects: Ecology, Math
Skills: Analysis, Mapping, Comparison

Objectives:
Students will be able to 1) define and contrast home range and territory, 2) list or identify at least 5 factors affecting human and bear activity within their home range.

Methods:
Students will plot their own home range and primary activity area then compare it to the home range of a black bear.

Materials:

- Computers & access to a mapping program like Google Earth

Background:
A **home range** is an area of land where animals live which is not actively defended, and animals of the same species move around freely. Home ranges are also usually much larger than a territory. Because bears have to eat so much, they need a large home range to search for food. Bears also tend to be solitary to minimize competition for food.

In areas where food supplies are limited, black bear home ranges tend to be larger and have looser boundaries. Using a technique called radio telemetry, researchers are able to document where black bears travel. Often female home ranges will include the ranges of several females. However, male black bear ranges rarely overlap.

Adult females have an average home range of about 10 square miles, while adult males can cover 25 square miles or more. Young bears striking out on their own can travel 150-200 miles as they search for a territory of their own. This movement by young bears is called dispersing. Each year, a handful of dispersing bears seem to travel through Maryland's more suburban areas in Baltimore, Carroll, Harford, Howard, and Montgomery counties in search of new territory. These bears don't stay in Maryland's suburban areas long, choosing instead to move on to more suitable habitats in western Maryland, Pennsylvania, Virginia, and West Virginia where there is already an established bear population.

Procedure:

1. Ask students what the difference is between a home range and a territory. Encourage them to explain their answers. Provide definitions after some discussion. Ask students if we also have home ranges and territories.
2. Have students write down a list of places they visit on a typical weekday like a Tuesday or Wednesday. For each place, have students determine if the location is visited for shelter, food, water, etc.
3. Allow students to go to computers and open a mapping program like Google Earth. Encourage students to map out the locations they listed for their weekday excursions. Once completed, have students connect the outermost points of their travels. This area forms their home range. Ask students to calculate the area of their home range in square miles.
4. Ask students to identify areas within their home range that make up their territory. This would be an area that they have "ownership" over like an apartment or a house. Ask students to calculate the area of their territory in square miles.
5. Have students compare the sizes of their home ranges and territories. What are some things that they notice? Who has the largest home range? Who has the smallest home range?
6. Go over home range information for black bears. How do the students' home ranges compare to black bears? Are they larger or smaller? What may be the reason for the size differences?
7. Ask students if their home range changes by the season. Why or why not? Do they think the home range for black bears will also change?
8. Ask students why scientists would care about home ranges for wild animals like black bears. Why would a wildlife manager want to study home range patterns for local bears?
9. Review material students learned about home ranges and territories.

Extension:
Have students research home range and territory sizes for selected wildlife. Have students write a report or present findings to class.

Section 4:

Additional Activities

Black Bear Crossword

Across

1. To keep bears out of your yard, you should make sure your _____ cans are clean and secure.
4. A female bear is called a _____.
7. During winter months, bears _____
8. Black bears eat animal material and plant material. That makes them ____.
11. A bear has a long, sticky tongue that helps it eat ants. This is known as a ___.

Down

2. One important food for black bears are ____ which come from oak trees.
3. Black bears live in the _____.
5. A black bear has ___ toes on each foot.
6. Food, water, shelter, and space make up an animal's _____
9. A male bear is called a _____.
10. In the winter, black bears spend their time in a(n) ___.

Black Bear Crossword Answers

Across

1. To keep bears out of your yard, you should make sure your garbage cans are clean and secure.
4. A female bear is called a sow.
7. During winter months, bears hibernate.
8. Black bears eat animal material and plant material. That makes them omnivores.
11. A bear has a long, sticky tongue that helps it eat ants. This is known as a(n) adaptation.

Down

2. One important food for black bears are acorns which come from oak trees.
3. Black bears live in the forest.
5. A black bear has five toes on each foot.
6. Food, water, shelter, and space make up an animal's habitat.
9. A male bear is called a boar.
10. In the winter, black bears spend their time in a den.

Black Bear Cub Double Puzzle

Unscramble the words below, and copy the letters in the numbered cells to other cells with the same number.

CABLK

BRAE
7

CBSU

GOWR
1

RYVE
5

KYILUCQ.

TYHE

TAE

TRMEOH'S '
2 6

MIKL,

SNUT,

SEBRERI,
4

NAD
3

STCIESN.
8

1 2 3 4 5 6 7 8

Created by [Puzzlemaker](#) at DiscoveryEducation.com

Black Bear Cub Double Puzzle Answers

Unscramble the words below, and copy the letters in the numbered cells to other cells with the same number.

CABLK B l a c k

BRAE B e a r
7

CBSU c u b s

GOWR g r o w
1

RYVE v e r y
5

KYILUCQ. q u i c k l y .

TYHE t h e y

TAE e a t

TRMEOH'S m o t h e r s '
2 6

MIKL, m i l k ,

SNUT, n u t s ,

SEBRERI, b e r r i e s ,
4

NAD a n d
3

STCIESN. i n s e c t s .
8

o m n i v o r e
1 2 3 4 5 6 7 8

Created by [Puzzlemaker](#) at DiscoveryEducation.com

Black Bear Menu Word Search

S S R Y H L Q I T H U E Z Y A
X E C J R J N J P A R G M B R
O V S K S S L H X A A A K B S
Y B H S E W D N E L S B Y E N
Z S L C A F W V A C P B V C S
U P T U I R F A D G B A S C W
P S K K E Q G G W W E C N Z J
H O N E Y B B B N L R K R R R
N F L G Q P E I O W R N O W D
N O I R R A C R N F I U C J D
G E H D J R N P R R E K A E C
C X V K J G O C W I S S H Y V
I O J Y M P X H S M E C O O C
S T R A W B E R R I E S T L U
B I L N U O P N H Y Y J F E O

Can you find and circle the names of the black bear's favorite foods?

- ACORNS
- BLUEBERRIES
- CARRION
- CORN
- GRASSES
- HONEY
- INSECTS
- LEAVES
- RASPBERRIES
- SKUNK CABBAGE
- STRAWBERRIES

Black Bear Menu Word Search

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- LEAVES
- RASPBERRIES
- SKUNK CABBAGE
- STRAWBERRIES

Blubber Bag

Some animals survive cold temperatures by using a thick layer of insulating fat. Have students test out a fat substitute on a small scale!

Materials:

- 3 plastic zipper-lock bags; (quart-sized is good)
- Duct tape
- Shortening (like Crisco)
- Ice
- Water

Procedure:

1. Take a plastic bag (like a quart sized bag) and fill it with several heaping spoonfuls of shortening.
2. Put hand inside a second plastic bag of the same size as the first and push it into the shortening-filled zipper lock bag.
3. Spread the shortening around the zipper lock bags until the inner bag is mostly covered.
4. Fold the top of the inner zipper lock bag over the top of the outer zipper lock bag, keeping the shortening between the two. Duct tape the fold in place so that the shortening does not come out of the bag.
5. Fill your container with a mixture of ice and water.
6. Ask students how animals deal with cold weather. Where do they go? Do some stay? If they stay, then how do they survive freezing temperatures? Talk to students about adaptations like fat (blubber), fur, etc.
7. Show students the container with ice and water and the blubber bag. Ask students if they think their hands will be cold in the blubber bag? Why or why not?
8. Have students place their hand in the water using the blubber bag. Can they feel the cold water? What is the function of the blubber?
9. Have the same student place their hand in the 3rd bag and then in the water. Can they feel the cold water now? (*optional*- just have them place their hand directly into the water without a bag). Ask if they lived in an arctic environment would they rather have the blubber bag or no bag? Why or why not? Ask students what kinds of animals might have blubber or lots of fat?
10. As an extension, try other 'insulating agents'. How well does sand insulate? Cotton balls? Rice? Have students create and test hypotheses!

Sing-Along: Bear is Sleeping

Bear is sleeping, bear is sleeping
In his den, in his den
Wonder when he'll wake up, wonder when he'll wake up
In the spring! In the spring!

Time to wake up, time to wake up
Sleepy bear, sleepy bear
It is spring time, it is spring time
Wake up now! Wake up now!

Sing-Along: Bear Went Over the Mountain

Sing about foods that bears eat. This song can be supplemented with the Lunch for a Bear cards found in the trunk and on the resource CD.

The bear went over the mountain,
The bear went over the mountain,
The bear went over the mountain,
To see what he could eat.

And what do you think he ate?
And what do you think he ate?

He ate plants* on the mountain,
He ate plants* on the mountain,
He ate plants* on the mountain,
As much as he could eat!

Replace 'plants' with other food items such as insects, meat, fruits, and nuts.

Black Bear Mask by Zoo New England

Note: also can be printed from Resource CD

Make a Black Bear Den!

Create a model of a black bear den using a paper bag and your student's creativity! Grab a paper bag, make some black bear cutouts, and have students create the rest using craft materials, leaves, sticks, rocks, and more. Shoeboxes can also be used in place of bags.