

Animal Adaptations for Winter

A Teacher Resource Guide
Emma Brofsky

Introduction

Wintertime brings many seasonal changes to natural habitats. Temperature drops, snow covers the ground and food becomes harder to find for most animals. Winter affects animal lifestyles, making keeping warm and finding food and shelter harder. Animals must be adapted for the climate in which they live in or they will not survive throughout the season. This guide explores many kinds of **adaptations** that animals have that help them to survive in the winter. One adaptation that some animals have is to **hibernate** while other animals **migrate** to a new location for the season.

Adaptation

- What is Adaptation?
 - **Adaptation** is how animals cope with seasonal changes or food shortages to survive in the environment that they live in.
- Why do animals need to adapt?
 - Animals need to adapt in order to survive in harsh weather conditions like ice and snow and food shortages. If they don't have special characteristics, they will not survive or successfully produce offspring.
- What are some examples of adaptations animals have for the winter?
 - Bears and some other mammals can grow **thick fur coats** for warmth. They grow a layer of fat underneath their fur. Polar bears especially have **blubber** under their fur and water-repellent guard hairs.
 - A lot of animals have dense **underfur** that covers to the bottom of their feet
 - **Camouflage** is another adaptation for the winter. Arctic foxes and white-tailed jackrabbits have fur that changes from brown to white in the winter. The white coat helps them to hide in the snow.
 - Northern species of animals tend to be larger in size, meaning they have a larger **volume-to-surface area ratio** and it's easier to retain heat. Polar bears are larger than tropical bears. White-tailed deer in Michigan weigh more than those in Texas and Florida.



- **Body appendages** like ears and tails are smaller in the north as well to reduce the amount of heat that escapes from the body. Mammalian legs and snouts are shorter and stouter. Snowshoe hares have smaller ears than cottontail rabbits.



- Some mammals **change their lifestyle**. Small rodents and flying squirrels that are usually not usually colonial will share a living space or den collectively with others to conserve body heat. Muskrats and beavers will construct shelters and many animals like groundhogs, foxes, chipmunks and moles dig burrows. White-tailed deer will change their food preferences. They are

browsers and experience changes in their digestive enzymes to cope with different food sources.

- Certain fish and reptiles and amphibians produce chemicals that can **lower their freezing temperatures** a few degrees, often meaning the difference between life and death. Some of them burrow in the mud below the frostline and get oxygen from air trapped in the mud



- Aquatic mammals, such as otter and mink have thick layers of **insulating fat and specialized fur** with thick outer and thinner inner layers that trap heat.
- Ducks, geese, swans have **feathers and oil glands** that keep water away from the skin. Waterfowl are actually pretty well adapted for cold weather, the main reason for their migration is usually food shortages.

Hibernation

- What is Hibernation?
 - **Hibernation** is a special **adaptation** that some animals have to survive harsh weather conditions in the winter.
- Why do animals hibernate?
 - In addition to other adaptations for winter that animals have, hibernation is an efficient way to save energy. When food is scarce in the wintertime and animals cannot find enough food, saving energy can reduce its needs.
- How do animals hibernate?
 - There are different kinds of hibernation but generally an animal slows down its metabolism and goes “to sleep” during hibernation. It lowers its body temperature and slows down its heartbeat and breathing.
 - Before the winter, an animal prepares by eating a lot of food that it stores as fat to be used as energy in the winter. There are two kinds of fat, regular fat and special **brown fat**. Brown fat is found across the back and shoulders of

hibernating animals, close to the animal's organs (brain and liver). This special kind of fat delivers energy quickly to an animal when it is coming out of hibernation.

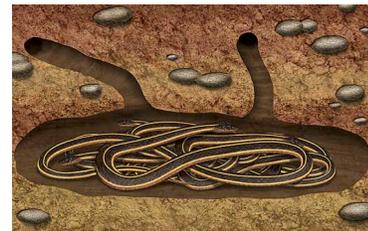
- What are some animals that hibernate?

- Woodchucks, ground squirrels and bats are **“true” hibernators**. This means that they sleep so deeply they are almost impossible to wake up. A woodchuck's heart rate goes from 80 beats a minute while active to 4 or 5 beats a minute when it is hibernating and its body temperature drops from 98 degrees Fahrenheit to 38 degrees Fahrenheit. Also their incisors, which normally grow continuously and are kept short by gnawing, stop growing while they are hibernating.
- When bats hibernate, they must find a place that stays above freezing so they gather in caves called **hibernacula**.
- “True” hibernators do wake up sometimes to nibble on food that they've stored or defecate.



- Bears are not “true” hibernators because they are easily awakened from their winter slumber. Skunks, raccoons and opossums also have this type of hibernation. They do enter a stage of **“torpor”** with reduced body temperature and slowed breathing but wake up to forage food between winter snows.

- Some cold-blooded snakes, turtles and frogs also hibernate. They must protect themselves from the cold because they cannot warm themselves up. Frogs and turtles bury themselves in mud while some snakes gather underground to hibernate in sheltered places like rotted out logs.



- Some insects like ladybugs also undergo a form of hibernation. They enter a state of inactivity in the winter and their growth, development and activities are temporarily suspended, while maintaining just enough metabolic activity to stay alive. This state is called **diapause**.

Migration

- What is migration?

- **Migration** is an **adaptation** where due to a lack of food or shelter, an animal or group of animals can travel a long distance to a new location in order to improve the quality of their habitat.

- Why do animals migrate?

- In the winter, the ground is covered by snow and a lot of food sources for birds, deer and other animals are not as readily available
- The cold temperatures and snow and ice are also hard to live in, often their homes are destroyed or they cannot find adequate shelter.

- How do animals migrate?

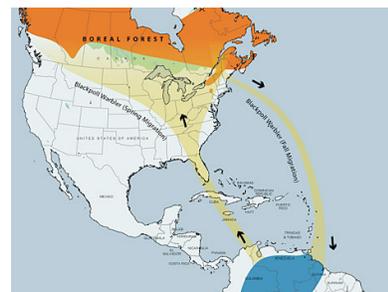
- In addition to changes in weather and scarcity of food, many migratory animals have internal signals that tell them when to get ready to migrate. If they waited until it was really cold and there was no food then they wouldn't survive.
- Many animals use wind and water currents to guide them to their final destination; others use surrounding landscapes like coastlines, mountain ranges and river valleys. Migratory animals use their **biological clock** and the sun and stars as a compass. Animals that migrate during the day can use the sun while those that travel at night to avoid predators can use the stars.

- Bird Migration

- North American birds migrate to a variety of wintering grounds even including Central and South America or the Caribbean. About two-thirds of New York birds are migratory including the American Robin, Blackbird, Bluebird, Grey Catbird, Wood Thrush, Cedar Waxwing, most Warblers and Swallows.
- The Arctic Tern and Wilson's storm-Petrel migrate the furthest, travelling as much as 11,000 miles each way annually
- Birds need access to shelter and food and favorable weather conditions on their migration journey. There is great variation in the distance and length of time some birds will fly before they stop to rest and find food. Some songbirds like warblers migrate around 30 miles per day at the start and closer to 200 miles per day in later stages of migration.



- The Blackpoll Warbler migrates from the United States to South America and Puerto Rico, travelling about 3,000 kilometers (1,864 miles) over open ocean. They can spend over three days



flying without stopping. The American Golden Plover travels over 2,000 miles from Canada to the West Indies without stopping.

- Students can get involved in helping with bird migration by keeping a garden or

putting out bird feeders and being involved in **citizen science** through bird watching a recording. They can participate in data-collection activities with Cornell's Lab of Ornithology that help scientists determine trends and figure out proper management for birds.

- Other Animal Migration

- Northeast deer migrate generally in a southern direction where it is warmer but mostly they travel where there is available food and shelter.
- Monarch Butterflies travel south to Mexico in the fall and spend the winter there until they migrate north in the spring. The monarchs lay eggs in the southern United States as they travel north and then die. When those children develop they continue the journey north. Monarchs only live 2-6 weeks in the summer but each female lays hundreds of eggs and the life cycle continues.



Teacher Resources

Scholastic Teachers

<http://www.scholastic.com/teachers/lesson-plan/animals-winter-scavenger-hunt>

- Animals in Winter Scavenger Hunt

The Deep Sleep, ThinkQuest Educational Website

<http://library.thinkquest.org/TQ0312800/hibernate.htm>

- A summary of the ways in which animals hibernate.

Mrs. Jones Room

<http://mrsjonesroom.com/themes/hibernation.html>

- Collection of links, games, activities, songs and poems about hibernation

Cornell Lab of Ornithology

<http://www.birds.cornell.edu/Page.aspx?pid=1478>

- Learn all about birds and participate in citizen science projects

World on the Move: Great Animal Migrations

<http://www.bbc.co.uk/radio4/worldonthemove/>

- Shows interactive migratory routes of various animals.

Journey North: A Global Study of Wildlife Migration and Seasonal Change

<http://www.learner.org/jnorth/>

- Allows wildlife observers to track migrations of monarchs, whooping cranes, hummingbirds, first signs of spring and other natural occurrences.

Brain POP

<http://www.brainpop.com/educators/home/>

- Great website with many educational videos, lesson plans and activities about science and other topics