Survivor: Minnesota Winter

In a Nutshell

Students will explore a variety of techniques Minnesota animals use to cope with harsh winter conditions. Students will participate in an outdoor hike to search for signs of these winter survival techniques.

Grade K - 1
Season Winter
Location Visitor Center

Learning Objectives

After participating in this activity, students will be able to:

- Explain that Minnesota wildlife deal with winter conditions differently.
- Name the three main winter survival strategies of wildlife: **Hibernate**, **Migrate**, and **Deal with the Cold**.
- Give at least one reason why some wildlife can **Deal with the Cold** Minnesota winters: their food is available all year, they have a body covering that keeps them warm, and/or they are adapted for traveling in the snow.

Literature Connections

Dear Rebecca, Winter is Here by Jean Craighead George (AD540L)
Animals in Winter Henrietta Bancroft and Richard Van Gelder
What do Animals Do In Winter? by Melvin and Gelda Berger
The Animal's Winter Sleep by Lynda Graham-Barber
Someone Walks By by Polly Carlson-Voiles
Welcome, Brown Bird by Mary Lyn Ray
Luck by Jean Craighead George
Sunshine Makes the Seasons by Franklyn Branley (AD510L)
The Reasons for Seasons by Gail Gibbons (AD620L)

Pre-Activities

Prior to the activity, encourage students to bring in a variety of animal pictures. Students will discuss possible techniques animals use to survive winter conditions. Based on the discussion, students will organize the pictures into one of four categories: hibernate, migrate, lay eggs (then die), or adapt to the cold. Students will glue the pictures to poster board to display in the classroom.

On-site Activities

Students will discuss various techniques animals use to survive a winter in Minnesota. Students will hike in search of signs that refuge wildlife hibernate, migrate or deal with the cold in order to survive winter conditions. Weather permitting, students will use snowshoes for the hike. ***There must be at least 6 inches of snow in order to use snowshoes for the hike.***

Classroom Connection

Research a Refuge Animal

Ask students to research how an animal found in Minnesota Valley National Wildlife Refuge is able to survive winter conditions. What does their animal eat? How does it stay warm during the winter? Ask students to illustrate the report.

Create A Simple Nature Calendar

Introduce students to the science of phenology: the observation of nature's patterns and rhythms. Through a Phenology calendar students can monitor and record changes in nature. They might choose to record the animal signs they notice each week or changes in the weather. Teachers can create a class list of events, organized by the season, for students to observe. For example:

- **Winter:** The date ice first appears on the edges of nearby lakes. The last day students notice it is comfortable to wear shorts and sandals. The first snowflake big enough for a student to catch on his/her tongue. The first goldfinch students see dressed in the dull yellow and black feathers of their winter plumage.
- **Spring:** The first sighting of returning robins, monarchs, hummingbirds and orioles. The first hibernating turtles and groundhogs again basking in the warm, spring sunshine. The day ice no longer appears on nearby lakes. The first chorus of frog calls

heard. The date the first brood of goslings is seen paddling behind mom.

- **Summer:** The date goldenrod and aster flowers begin blooming on the prairie. The first day the grasshoppers, katydids, and crickets begin calling to each other.
- **Fall:** The day the first flock of geese are noticed flying overhead. The first day maple leaves begin to change color. The date the last leaf falls off of a nearby maple tree.

Students may choose to record their observations with drawings, words, or a combination of both. For more ideas and examples on keeping a phenology calendar, download the Young Naturalists article *Nature's Calendar* from the DNR website at www.dnr.state.mn.us/young_naturalists/phenology

Teacher Resources

Nature's Calendar, Conservation Volunteer Magazine
Teacher's guide www.dnr.state.mn.us/young_naturalists/phenology
Minnesota Nature Notes by Jim Gilbert

Survivor: Minnesota Winter
Pre-Activity

Materials

- Assortment of wildlife pictures for students to categorize into groups: hibernators, migrators, and animals that deal with the cold (in the event student contribution is limited)
- Wildlife artifacts that represent migrators, hibernators, and animals that deal with the cold (antlers, rabbit pelt, turtle shell, snake skin, monarch puppet, artificial flowers, etc.)
- Migration, Hibernation, and Animals that Deal with the Cold posters
- 3 pieces blank white poster board (one for each category)
- Sharpie marker or pre-printed title strips glued to poster board (Migration, Hibernation, Animals that Deal with the Cold)
- Earth ball to represent the earth
- Globe or ball (larger than earth) to represent the sun
- Glue sticks

Introduction

Lead students in a discussion of the natural history of winter. How does the weather change? How do plants respond to winter weather changes? What happens to bodies of water? How does the length of day and night change?

Using the earth ball to represent the earth, and another slightly larger ball to represent the sun; demonstrate how and why we experience seasons.

The Reasons for the Seasons

First Grade Explanation

The earth spins in space two ways. One way creates the day and night cycle and the other is the reason for the seasonal cycle. Ask students to share their ideas about either cycle.

- Demonstrate these cycles using the earth ball. Show students the location of Minnesota on the ball. Ask a student volunteer to stand next to you and to hold the sun poster. Turn the earth ball so that Minnesota faces the sun. Explain to students that this represents daytime. Spin the ball so that Minnesota faces toward outer space. Explain to students that this represents nighttime. Explain to students when it is nighttime in Minnesota it is day time on the other side of the world. Ask students how long it takes the earth to make one complete turn? (Students should answer 24 hours.)

- Orbiting around the sun is the second way the earth spins in space. Demonstrate the slight tilt of the earth as it rotates through a 24 hour period. To better explain the seasonal cycle, use the earth ball to first illustrate the axis (an imaginary line that passes through the northern most part (the North Pole) and the southern most part (the South Pole) of earth and the equator. Next drawn an imaginary with your finger to divide the northern hemisphere from the southern hemisphere. Explain to students that this imaginary line is called the equator.

- Slowly walk around the sun, keeping the earth tilted. Show how the position of the hemispheres in relation to the sun change as the earth orbits the sun. This tilt in combination with the orbit is what creates the seasons. When the northern hemisphere, where Minnesota is located, is directed toward the sun we experience summer. At the same time the southern hemisphere is tilted away from the sun and is experiencing winter. Move the ball through an entire orbit cycle to test if students can interpret Minnesota seasons. At this point, add the 24-hour cycle into the demonstration at the same time. How long does it take the earth to make one complete orbit around the sun? (12 months or 1 complete year).

How do animals respond to all of these seasonal changes? It depends on the animal, the preferred food of the animal, and the animal's preferred habitat. Introduce to students the terms **Hibernate, Migrate** and **Deal with the Cold**.

Creating Classroom Posters

Carefully preview the pictures students collected or pictures you provided. Remove any pictures that may confuse students. For example: remove pictures of animals not commonly found in Minnesota and pictures of animals shown in a winter landscape that are typically thought to migrate or hibernate in Minnesota.

Discuss each option for dealing with winter and display the appropriate poster. Ask students to identify some of the animals they see on the poster. Ask students why the animals they chose hibernate, migrate or deal with the cold depending on the poster. Ask students to think about the following questions:

1. Can this animal find what it needs to eat during the winter season?
2. Can this animal move around in an icy, frozen habitat?
3. Does this animal have a body covering (such as fur or feathers) to help keep it warm during the cold winter?

Discussion Points

Hibernators: There are several different types of hibernation. Some animals that hibernate have warm fur, a thick layer of fat, and sometimes a way to store food deep underground for a mid-winter meal. These types of hibernators spend much of the winter sleeping, occasionally waking up to urinate, eat, and drink. Other types of hibernators might lack fur and a thick layer of body fat to stay warm. As they "sleep" their body temperature drops drastically making them appear to be frozen and dead. Loud noises, movement and touch do not wake them up.

Migrators: This group of animals typically has a warm body covering; however, it is unable to obtain food in a frozen climate or has no method to store food. Most migrators have wings and can travel to other areas in the world where food can be found. Exception: If a bird is able to find food, despite the cold weather, it will not migrate and its feathers will keep it warm. Example: robins, mallards, Canada geese.

Deal with the Cold: This group of animals is able to find the food needed to survive all year long, has a body covering that keeps it warm, and is able to move around its habitat. These animals do not need to stash food or leave (migrate) to find the food necessary to survive.

Note: Are All Winter Sleepers "Hibernating"?

Hibernation is a tricky concept. Over the years, biologists have redefined the term and revised the list of wildlife considered to be true hibernators. Today, animals that "sleep" through the winter may be true hibernators or simply entering a state of temporary sleep called torpor. Biologists look at biological changes that take place within an animal's body to determine whether or not it truly hibernates.

True Hibernation

True hibernators may appear at first glance to be dead. Their body temperature lowers. Their heart beat slows down. Some become stiff and hard as if they are frozen. Loud noises, movement and touch do not immediately "wake" them up. Animals that are true hibernators include many Minnesota reptiles and amphibians: snakes, lizards, frogs, toads and some turtles. Some Minnesota mammals considered true hibernators are ground squirrels, groundhogs, and chipmunks.

Torpor

Torpor is a state of deep, temporary sleep with alert stages for eating, drinking and going to the bathroom. Animals that spend parts of the winter in torpor might wake up and move around on a warm winter day, if disturbed, or if especially hungry. Animals that spend much of their winter in torpor are skunks, raccoons and badgers. Many birds that are active during a Minnesota winter day may spend the coldest, nighttime hours in a state of torpor.

Pass out one picture to each student. Ask each student to decide whether the picture they hold is an animal that hibernates, migrates, or stays and deals with the cold. Instruct students to find the poster in the back of the classroom labeled with the correct header (migrate, hibernate, deal with the cold) for their animals. Instruct them to glue their animal picture to the correct poster. Station an adult next to each poster if possible to observe and advise students to avoid mistakes.

Wrap-Up

Discuss with students the importance for dressing for the upcoming winter fieldtrip to the Refuge. If there is sufficient snow, students will hike through the Refuge using snowshoes. Remind students that snow boots are required for snowshoes to fit properly.

On-Site Activities

Materials

- Migration, Hibernation, and Animals that Deal with the Cold posters
- Minnesota Wildlife Mystery Boxes that include items such as: turtle shells, snake skins, deer antlers, assortment of feathers, pelts, skulls, scat replicas, puppets, laminated wildlife pictures, and examples of wildlife foods.
    - Hibernators: beaver, turtle, snake
    - Migrators: mallard, hummingbird, monarch butterfly
    - Animals that Deal with the Cold: rabbit, woodpecker, fox
- PowerPoint presentation
- One pair of snowshoes per student plus one pair per adult volunteer and teacher (depending on weather conditions).

Introduction

How people cope with the cold

Ask students to share what they do, eat or wear during the winter that is different from summer. For example:

- How do you dress differently? (from sandals to boots, t-shirts to coats, adding mittens and hats)
- What food do you eat when it its cold, that you may not eat when the weather is warm? (hot cocoa, soup, oatmeal)
- How do you move around or play in the winter that is different from summer? (examples: ski/snowboard instead of riding bikes, snowshoeing instead of hiking, sledding and ice skating instead of rollerblading)

How Wildlife Deals with Winter

While people are able to "adapt" to changes in weather, animals either are or are not designed for the cold. Review the 3 main ways Minnesota wildlife deal with winter conditions that were introduced to the class during the pre-activity: hibernate, migrate, and deal with the cold.

Minnesota Wildlife Mystery Boxes

Introduce students to the challenges animals face in the winter. Divide students into teams equal to the number of Minnesota Wildlife Mystery Boxes available. Make sure there is at least one adult leader (teacher, chaperone, refuge volunteers or staff) to work with each team. Explain to students that

each kit contains pictures and clues to help students determine what the animal eats, how the animal stays warm, and the animal's preferred habitat and shelter. Provide each team with enough time to explore the items in their kit to determine the answers to the following three questions:

- How does this animal stay warm?
- What type of food does this animal eat?
- Can this animal move around its habitat all winter?

Each Minnesota Wildlife Mystery Box comes with a description of the items in the box to assist the adults lead student discussion to determine whether the animal represented in the kit migrates, hibernates, or deals with the cold. If possible, ask students to rotate through more than one kit.

Allow 20 minutes at the end of the activity, before the outside hike, to facilitate a class wrap-up. Use the power point and script to lead student teams, in the order that wildlife is presented on the screen, through their discoveries. Encourage them to use the artifacts in their kits to illustrate their conclusions. Give each team an opportunity to answer: Does this animal migrate, hibernate or deal with the cold? Ask the entire class if they agree with the team's conclusion before moving on.

Animal Clue Hike

Still in teams, allow students 45 minutes to hike through refuge habitats in search of wildlife signs including: nests, dens, feeding, sounds, smells, and tracks. Ask students to determine whether a clue suggests an animal is coping with the cold, hibernating, or has migrated. Ask the adult leader to record student observations on the data sheet as they explore with their group.

Wrap-up Management Connection

Back in the classroom pass out the student journal pages. Ask the adult team leaders to help the students in their team review what they discovered and record their observations under the categories Hibernation Clues, Migrations Clues, Animals Dealing with the Cold Clues. When the teams are finished, wrap up the lessons with a whole class discussion of what students observed during their hike. List their observations on the white board under the same categories.

Finish up the lesson with an explanation of the term **phenology:** the seasonal patterns and rhythms of nature. Explain to the students that when observations, like the ones they made today, are compared from year to year biologists are more likely to notice unusual changes in otherwise predictable cycles. Sometimes, these changes signal a problem that scientists have to address in order to protect a plant or animal species.

Biologists are not the only ones who can help to collect valuable phenology data. Many citizen science programs are now available for anyone interested in learning how to collect and report phenology. Let students know that their teachers can help them log onto websites like Nature's Notebook (the program Minnesota Valley National Wildlife Refuge uses), Feeder Watch (specific to winter birds), and many others to learn more and get involved.

Additional Background Information

More About……Animals that Hibernate

Hibernators are unable to find the food they need to survive during winter or they are cold-blooded and simply unable to maintain warmth. To adjust, their bodies have been designed to sleep through most of the winter.
For example:

- A woodchuck eats mainly green, leafy vegetation, small grains, and garden plants. It spends most of the summer gorging on these foods to gain a thick layer of fat. During hibernation, the woodchuck is able to reduce its metabolism and utilize the stored fat for up to 6 months.
- Without a thick coat of fur or the ability to regulate body temperature, Minnesota reptiles and amphibians hibernate through the winter. Some reptiles and amphibians, like turtles and frogs, bury into the mud at the bottom of ponds. Forest amphibians, like the spring peeper and the American toad, bury into the forest soil. Some reptiles, like the common garter snake, hibernate in large groups in underground dens dug by other animals.

More About……Animals that Migrate

Some Minnesota animals must migrate to find the food they need during winter. Perhaps they can't access the food they need for survival or the food is not available during the winter months.
For example:

- Ducks, geese, and loons are unable to reach the food they need when lakes, ponds and wetlands freeze. Ducks eat aquatic plants floating on the water's surface, plants rooted in the shallows and aquatic invertebrates. Geese eat the young shoots of plants growing along wetland edges and banks. Loons dive under the water to hunt and spear fish.
- The American robin is unable to find the earthworms and other insect larvae found in the upper layers of the soil, once frost has set in. Hummingbirds and monarch butterflies, both nectar feeders, are unable to find flowering plants during the winter months. Bluebirds and adult dragonflies rely on flying insects for food which they are unable to find during winter.

More About……Animals that Deal with the Cold

Minnesota animals that stay here and are active through the winter are designed to deal with the cold. Generally, these animals have warm winter coats and eat food that is available all winter.

For example:

- Thick winter coats: Each hair in a deer's winter coat is hollow like a straw. The air that fills each hair is heated by the animal's body, acting like an electric blanket warming the animal despite winter's coldest temperatures.
- White winter coats: As winter weather approaches, animals like ermine, snowshoe hare and arctic fox begin to grow in a white winter coat. The light colored fur of the arctic fox, snowshoe hare and ermine help these mammals blend in with their snowy white surroundings. This camouflage helps them hide from predators. The feathers of the snowy owl are also mostly all white. Why would white feathers in the winter help the snowy owl? The white feathers provide better camouflage for sneaking up on its prey.
- Thick feathers: Birds able to find food all-year, including winter, (such as woodpeckers, chickadees, cardinals, jays, crows and finches) have an insulating layer of feathers to keep them warm. The largest, most stiff feathers, flight feathers, are used for flying. The second largest feathers, contour feathers, cover and protect the body. The smallest, most fluffy feathers, down feathers, can be compared to wearing long underwear. The fluffy design of down feathers traps heat next to the bird's body.