Lessons in a Backpack

United Nations Educational, Scientific and Cultural Organization

GEORGIAN BAY BIOSPHERE MNIDOO GAMII Spirit of the Water

Movers, Sleepers, and Tough Guys

Wildlife in Winter

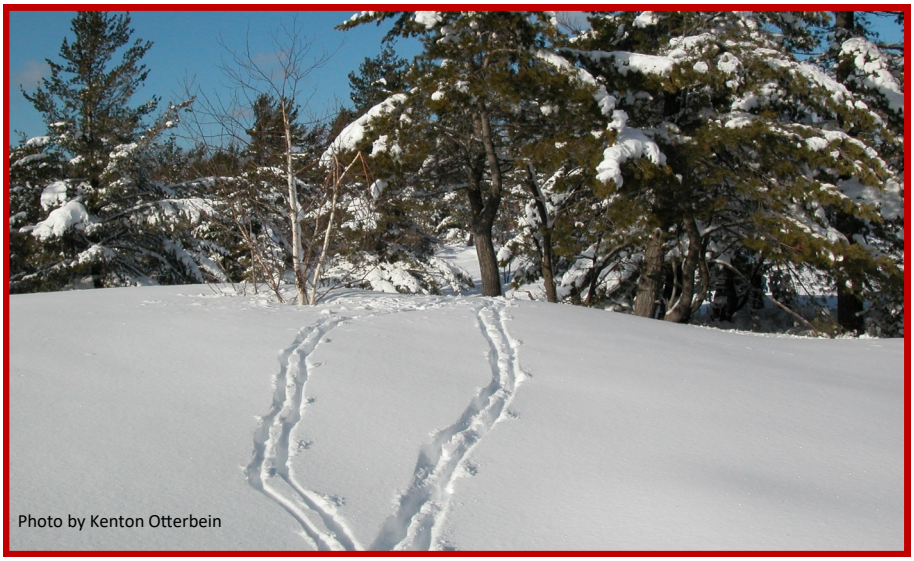

Photo by Kenton Otterbein

Description of Lesson

Through this lesson, students explore the strategies and adaptations of local wildlife for coping with our cold and snowy winter environment.

Connect with the Georgian Bay Biosphere

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GEORGIAN BAY BIOSPHERE MNIDOO GAMII Spirit of the Water

At a Glance

Grade Level: 4

Learning Environment:
Classroom
Outdoor Area (trails, tower hill, or wooded area)

Prep Time: 15 minutes

Length of Lesson: 2 hours

Key Vocabulary: migration, hibernation, torpor, subnivean

Staffing: 1 educator for 5 students

Materials:
Class set of snowshoes (available from the NNDSB Resource Centre)
Cards
Observation sheets
Pencil
Clipboards
15 film canisters
Kettle
Water
2 packages of Jell-O
Field guide: Stokes Nature in Winter by Donald Stokes

Kit available from the NNDSB Resource Centre

Groupings: Whole class, and Small groups of 2 or 3

Teaching/Learning Strategies:
Discussion, game, field trip/

Lesson Outline

TIME	ACTIVITY	LOCATION	MATERIALS
1 hr	Introduction	Indoor	
20-30 min.	Wildlife Charades	Indoor	Cards
10 min.	Intro to Snowshoeing	Outdoors	Snowshoes 1 observation sheet, pencil and clipboard per group
20-30 min.	Keep your Creature Warm	Outdoor	15 film canisters, kettle, water, 2 packages of Jell-O
15 min.	Scavenger Hunt	Indoor	Worksheets

Curriculum Expectations
Grade 4 Science

Understanding Life Systems: Habitats and Communities

Overall Expectations
2. investigate the interdependence of plants and animals within specific Habitats and Communities.

Specific Expectations
3.3 identify factors (e.g. availability of water or food, amount of light, type of weather) that affect the ability of plants and animals to survive in a specific habitat;
3.7 describe structural adaptations that allow plants and animals to survive in specific habitats (e.g., the thick stem of a cactus stores water for the plants; a duck's webbed feet allow it to move quickly and efficiently in water).

Background

The boots, snow pants, mittens, toques, jackets, and warm socks are pulled out; our thermostats are turned up; our cupboards are stocked with hot chocolate and soups; our shovels are out; and we are ready for winter! And if the cold, snowy winters of Parry Sound aren't to our liking, some of us head south to someplace like Florida, Arizona, or Texas.

The snows of winter are welcomed joyfully by those that love skiing, snowshoeing, skating, and snowmobiling. And while we might grumble and complain about the snow shoveling and ice scraping, winter isn't terribly stressful for us humans. For the wildlife that live in the area, however, winter is the most stressful time of year.

With fewer daylight hours and colder temperatures, fewer food sources are available. For our wildlife, winter is the ultimate test of survival. To make it through to the next spring, wildlife have developed three different coping strategies: move out, sleep through, or tough it out.

The Movers

We don't really notice the departure of songbirds on those fall nights as hundreds of them pass overhead while we sleep. But the symphony of song in the early mornings of May and June lets us know that the songbirds are back from their winter homes, some from many thousands of kilometers away in Central America. A little later, the monarch butterflies return from their winter home in Mexico.

Unlike the songbirds, we might notice the departure of the day-time migrants - the geese, ducks, shorebirds and hawks.

Migration is the predictable movement of an animal from one location and climate to another location and climate.

While some wildlife migrate south from Parry Sound every fall, other wildlife migrate south to Parry Sound from more northerly areas. Although we may boast that our winters are cold and severe, they are nothing in comparison to what is found farther north. In years with heavy snowfall such as the winter of 1996-97, great gray owls came here from further north in search of food.

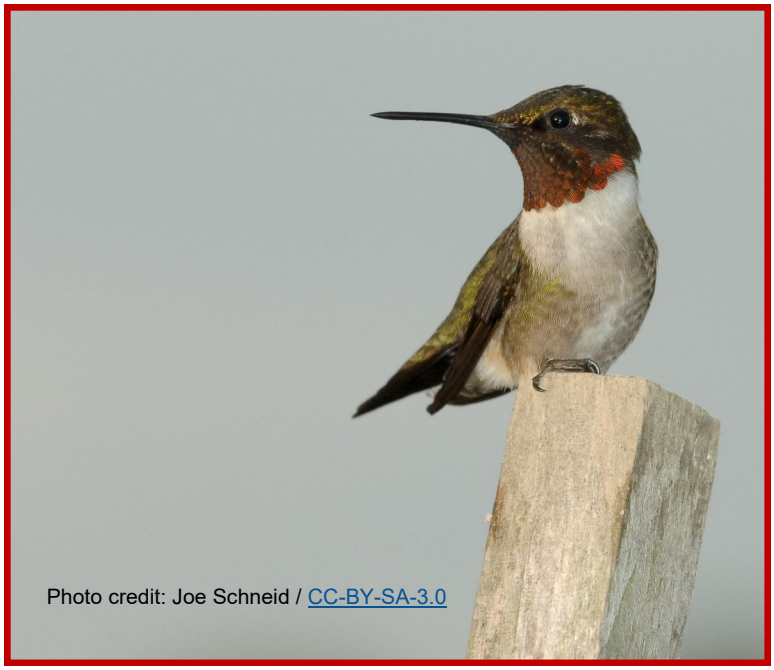

Photo credit: Joe Schneid / CC-BY-SA-3.0

Ruby-throated Hummingbird - These birds migrate south during the winter months.

The Sleepers

Mammals – Hibernation and Torpor

Sometimes we all feel like having a long winter's nap. And that is exactly what some of the warm-blooded animals in our area do: sleep much the winter through. Biologists differentiate between two different types of sleep: **hibernation** and **torpor**.

True hibernators, like chipmunks and bats, drop their body temperatures, breathing rate, and heart rates to a minimum. Their temperatures may only be a few degrees warmer than their surroundings. Hibernators will find sites that protect them from the extremes of winter weather – places like tree hollows or under fallen logs. Usually, hibernators are smaller animals that have very high metabolisms – they have to eat a lot to keep warm. This is just too much effort in the winter, so hibernation is their best option. To wake an animal from hibernation is very difficult, but if it does happen can kill the animal. The energy used to raise the animal's heart rate and temperature uses its fat reserves. Once these reserves are gone, the animal has nothing left to survive on. When an animal's temperature and heart rate drop only slightly, this is known as torpor. Most of us think of black bears as going into hibernation, but they are actually in a state of torpor. Torpor typically lasts for a shorter period of time than hibernation. Animals in torpor also wake from their sleep more quickly than those in hibernation. Other animals that enter the state of torpor are raccoons and skunks.

Did You Know?

During torpor, a black bear will lose 15%-30% of its body weight. For a 450 pound bear, that is a weight loss of about 90 pounds!

Female bears give birth during the winter, something that would not be possible for a true hibernator. Bears can easily be awaken in the winter and then drop back to sleep, or a state of torpor. Don't be fooled by a "hibernating" bear in its den!

Insects

Insects overwinter as eggs, pupae, or adults. For example, Field Crickets overwinter as eggs; Canadian Tiger Swallowtail Butterfly overwinter as a grey pupa, or chrysalis; and honeybees spend the entire winter in the hive as adults. Some of them produce their own "anti-freeze" every fall that allows them to reach temperatures of –30 degrees Celsius without freezing solid.

Reptiles and Amphibians

Reptiles and amphibians are cold-blooded or ectothermic, which means that unlike us humans, they rely on their surroundings for warmth. When the cold weather comes, they are unable to maintain their body temperatures and must go into sheltered areas to prevent being completely frozen.

Our Massasauga Rattlesnakes generally hibernate individually in sphagnum moss pockets that have high moisture content. The moss and the snow cover above keeps the water from freezing and keeps the snakes at a temperature warm enough for them to survive.

Many frogs – spring peepers, chorus frogs, gray treefrogs, and wood frogs spend much of the winter in a frozen state - as frogsicles! In some, their bodies undergo chemical changes which prevents their tissues from freezing or they tolerate certain levels of ice between cells. Good snow cover is essential to survival, as they overwinter under leaf litter on the forest floor. These frogs thaw out in the spring, which is why we hear them sing so early in the season as the evenings warm.

Toughing It Out

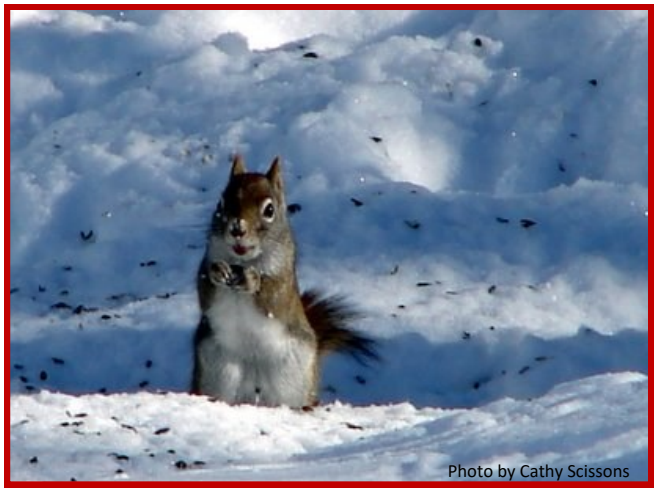
Photo by Cathy Scissons

For those that do tough out and stay active during the winter months here in Parry Sound, the survival rate is often slim. The key to surviving to next spring is making every bite of food count by managing the amount of energy used.

Putting On Extra Clothes

Just like we put on extra clothing to go outside, many animals put on more layers - of fat and fur. Trappers know that the best pelts are the ones found in winter.

Some animals, like the long- and short-tailed weasels, change their fur colour to a winter white to blend in with the winter surroundings, thus putting on their heavier winter coats and protecting themselves from predators.

Keeping Warm Under the Blanket of Snow

Just as we might cuddle up under a blanket, for some small rodents, like voles and woodland mice, a winter with heavy snow helps them to survive. Snow is a great insulator, keeping the cold out and the warmth in the space between the forest floor and the snow cover, known as the subnivean space. The temperature here hovers around minus 1 degree Celsius. In fact, a soil surface under snow can be 15 degrees Celsius warmer than without snow covering.

In addition to warmth, the snow provides the small rodents with a ready supply of food and protection from predators. Green leaves, stems, and berries are all foods that weren't available to them before because of the difficulty of getting to them without protective covering.

Ruffed grouse also use the snow for its insulating factor on extremely cold days. Many a winter enthusiast on skis or snowshoes has been caught off-guard as a ruffed grouse explodes from its "snow-roost," a hole under the snow used to keep warm until the severe weather passes.

Changing Diet

The white-tailed deer lives off greens during the summer months and buds and twigs during the fall and winter – basically what is available during the season. To be able to do so their digestive enzymes change from season to season to allow them to process the food.

White tailed deer will herd up in stands of Eastern Hemlock or Cedar Swamps, where the heavily-needled branches keep the snow from becoming too thick for them to walk through and find food. These areas known as "deer yards," also are significantly warmer than the surrounding areas.

Finding Shelter

For some of us that prefer to be indoors most of the winter, the outdoors may appear to be uniformly cold and uncomfortable. However, there are many microclimates where the exposure to cold, snow and wind is significantly lower. Logs, caves, holes, dead trees, spruce and cedar stands, under snow, and human structures all provide critical shelter from winter extremes.

Teaching and Learning

Part A. Introduction

Discuss: *What does the word "winter" bring to mind?* (Write answers on board.)

Compare and Contrast Human vs. Wildlife. Ask students: *What are the winters like in our area? What are the ways in which we humans get ready for winter? Clothing? In our homes? Food? What are the ways animals get ready for winter? (Elicit responses: migrate, hibernate, find shelter.) Clothing? Homes? Food?*

Part B. Wildlife Charades

Divide class into two groups. Explain basic rules of charades and that the cards could be from any of the three categories: "Movers," "Sleepers," or "Tough Guys." Debrief game by asking what they learned about the strategies local wildlife use to cope with our winters.

Part C. Introduction to Snowshoeing

Explain how to put on the snowshoes. Demonstrate with a shoe in a snowshoe so all can see. Make sure to emphasize the importance of tightening the bindings, or students will be constantly walking out of the snowshoes. Students will participate in the rest of the lesson in snowshoes. Ask if anyone can think of an animal that has its own snowshoes. (Snowshoe hare have developed large feet for staying on top of the snow and ruffed grouse grow combs on the sides of their toes for walking in snow.) In fact, two common types of snowshoes, the beavertail and the bear paw, where developed by native groups who watched how these animals adapted to get around in snow. Snowshoes basically distribute the wearer's weight over a greater area making it so the wearer doesn't sink as far into the snow. Remind students to keep their feet a little wider apart than they would regularly and to follow their leader. As a group, have each person take a turn as the leader so that no one person gets too tired out.

Part D. Keep Your Creature Warm

The objective of this activity is for students to theorize and conduct an experiment to see what the best natural resources are for keeping wildlife warm through the winter.

Procedure: In a kettle, boil water. Pour water into a glass measuring, add a package of Jell-O, and stir vigorously until dissolved. While waiting for the Jell-O to dissolve, discuss the importance of finding shelter for the winter survival of wildlife. Discuss the different locations of shelter available (snow, logs, caves, dead trees, etc.) and the different insulating materials (moss, dead leaves, snow, etc.).

When the Jell-O has dissolved, fill one container halfway for each pair of students. This container is a "pretend" animal that the students must find a shelter outdoors to keep it warm enough and alive over winter - in this case, keep from hardening into Jell-O. Explain that the students should keep the canisters warm until given a chance to shelter it (i.e. in a pocket, close to body). Give students 10-15 minutes to shelter their "animals." Proceed with next activity, and come back to them later.

Part E. Scavenger Hunt

In winter, animals that do tough it out leave behind many signs. Explain that the students are Winter Wildlife Detectives responsible for discovering why everything seems so quiet out in the woods. Handout one observation sheet for each group. Have adult or teacher record group observations.

Part F. Keep Your Creature Warm (cont.):

Have students gather up their "animals." If they can pour out their animal as liquid, it survived. If it is Jell-O, it has died.

Discuss: *Which "animals" survived? Which didn't? What seems to have been the best materials and locations the animals warm?*

Part G. Scavenger Hunt (cont.)

Take up results and return to class.

Photo by Glenda Clayton

Ruffed Grouse - Hiding away from the cold in its "snow-roost."

Extension Activities

Assessment Activity

Learning Log

On approximately one page, have students write their reflections to the following questions:

What did I do in class today?
What did I find interesting?
What questions to I have about what I learned?
What was the point of today's lesson?
What connections did I make with previous lessons?

Additional Resources

Monkman, Drew. *Nature's Year in the Kawarthas: A Guide to the Unfolding Seasons.* 2002.

Ontario Nature Magazine - Nature Notes at onnaturemagazine.com/nature-notes. Relevant to this lesson: On with the Snow, Ice on the Pond, and Winter Adaptations.

Step Outside: Your Guide to Nature's Events. A compilation of seasonal happenings that can be used to bring nature into the classroom found at r4r.ca/en/step-outside/nature-guides.

Winter Wildlife Scavenger Hunt

As a group of winter wildlife detectives, use your keen senses of sight, smell, and hearing to uncover the secret lives of animals around us!

1. Find the tracks of four different animals.	
2. Find five different food sources and guess what might eat them.	
3. Find three signs that animals have eaten.	
4. Find homes or shelters for five different animals.	
5. Find evidence of insects (egg, pupae/ chrysalis or adult form).	
6. Stop, look and listen. What other signs of animal activity do you notice?	

Winter Wildlife Scavenger Hunt

Teacher Copy

1. Find the tracks of four different animals.	Common tracks: deer, dog, squirrel, rabbit
2. Find five different food sources and guess what might eat them.	Examples: twigs, seeds, cones, buds, bark
3. Find three signs that animals have eaten.	Examples: browsed twigs, broken seeds on the ground, animal kill signs (fur, bones, etc.)
4. Find homes or shelters for five different animals.	Examples: dens, lodges, burrows
5. Find evidence of insects (egg, pupae/ chrysalis or adult form).	Examples: carvings in wood (bark beetles), galls on plants (goldenrod, oak, spruce), active winter insects (springtails, stoneflies), wasp nests, web nests in trees (eastern tent caterpillar
6. Stop, look and listen. What other signs of animal activity do you notice?	