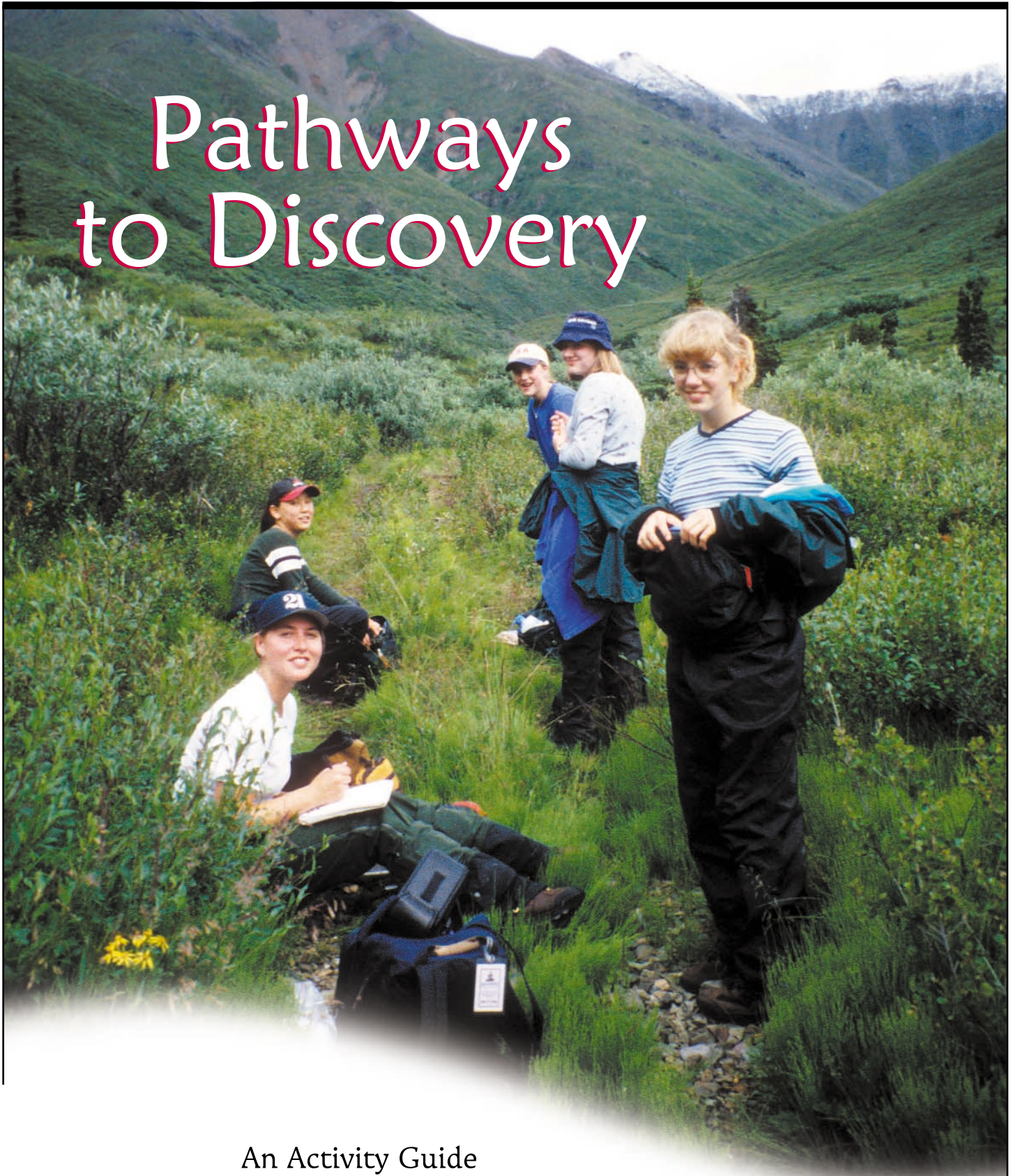


Pathways to Discovery



An Activity Guide
for Second through Fifth Grade Students

*Wrangell-St. Elias
National Park and Preserve*



*Wrangell-St. Elias
National Park and Preserve*

presents

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for Second through Fifth Grade Students

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Anchorage, Alaska



Introduction

Wrangell-St. Elias National Park & Preserve is a valuable resource for educators. We hope that this education guide will help teachers recognize and utilize this resource to its fullest benefit. Many of the students of the Copper River Basin area are subsistence users of the park; therefore, we would like to focus on the importance of research and preservation in maintaining the lifestyle that so many residents enjoy. Additionally, we hope that this introduction will lead to a life-long feeling of stewardship in the students as they explore and enjoy the Wrangell-St. Elias National Park & Preserve.

The lessons included in this guide will help introduce and encourage the students to enjoy and utilize the visitors' center, exhibit room, hiking trail through the boreal forest and the surrounding complex. Our goal is to provide usable ideas that will help further environmental education. Although the lessons were written specifically for use at the Wrangell-St. Elias National Park and Preserve Visitors' Center area, they can be easily adapted for use in other places.

The individual units encourage the development of a student's awareness and appreciation of the natural world and people's relationship and role as a part of that natural world. The units are actually a series of shorter activities that have been blended together under a specific theme with the intent that the activities will be coordinated with units in the existing school curriculum and texts. The materials are organized by grade level, but can actually be adapted for use at any grade level. The time for each activity is listed. Worksheets and other printed materials needed for activities are included.

Many activities within this guide were borrowed from other sources. The bibliography serves as a reference list for good environmental education materials and includes the sources from which the activities and lessons came. This guide does not represent our original ideas; we have tried to take the best environmental education activities and adapt them to specific lessons and objectives. We encourage you to modify what you find here to meet your specific situation and needs.

It is our pleasure to be able to share the awesome and unusual splendor of the Wrangell-St. Elias National Park and Preserve with those who live here and enjoy it daily. It is our hope that the ideals represented in these lessons will help to connect people and nature in a way that encourages greater appreciation, respect, and care. The students who participate in these lessons will become the future stewards of the Park and Preserve.



Meeting Alaska Content Standards

The Wrangell-St. Elias National Park and Preserve educational guide addresses the following Alaska Standards for Science adopted by the Alaska State Board of Education:

- SCIENCE** A. A student should understand scientific facts, concepts, principles, and theories. A student who meets the content standard should:
- 12) distinguish the patterns of similarity and differences in the living world in order to understand the diversity of life and understand the theories that describe the importance of diversity for species and ecosystems (Diversity);
 - 14) understand
 - a. the interdependence between living things and their environments;
 - b. that the living environment consists of individuals, populations, and communities; and
 - c. that a small change in a portion of an environment may affect the entire environment (Interdependence);
 - 15) use science to understand and describe the local environment (Local Knowledge).
- B. A student should possess and understand the skills of scientific inquiry. A student who meets the content standard should:
- 1) use the processes of science; these processes include observing, classifying, measuring, interpreting data, inferring, communicating, controlling variables, developing models and theories, hypothesizing, predicting, and experimenting.
 - 2) design and conduct scientific investigations using appropriate instruments;
 - 3) understand that scientific inquiry often involves different ways of thinking, curiosity, and the exploration of multiple paths.
- D. A student should be able to apply scientific knowledge and skills to make reasoned decisions about the use of science and scientific innovations. A student who meets the content standard should:
- 1) understand that scientific innovations may affect our economy, safety, environment, health, and society and that these effects may be long or short term, positive or negative, and expected or unexpected;
 - 2) recommend solutions to everyday problems by applying scientific knowledge and skills.

ENGLISH &
LANGUAGE
ARTS

- B. A student should be a competent and thoughtful reader, listener, and viewer of literature, technical materials, and a variety of other information.
A student who meets the content standard should:
- 3) relate what the student views, reads, and hears to practical purposes in the student's own life, to the world outside, and other texts and experiences.

MATHEMATICS

- C. A student should understand and be able to select and use a variety of problem-solving strategies.
A student who meets the content standard should:
- 1) use computational methods and appropriate technology as problem-solving tools;
 - 2) use problem solving to investigate and understand mathematical content;
 - 3) formulate mathematical problems that arise from everyday situations;
- E. A student should be able to apply mathematical concepts and processes to situations within and outside of school.
A student who meets the content standard should:
- 2) use mathematics in daily life; and
 - 3) use mathematics in other curriculum areas.

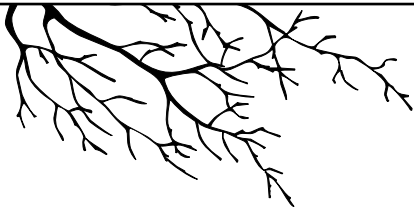
Acknowledgements

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We would like to thank the following for willingly sharing some of their lessons, plans, and graphics.

Great Smoky Mountains Institute at Tremont, Connecting People and Nature,
Great Smoky Mountain National Park, Townsend, Tennessee, 1993.

National Park Service, Our Wild Neighbors, Northwind Prepress, Anchorage, Alaska, 1999.



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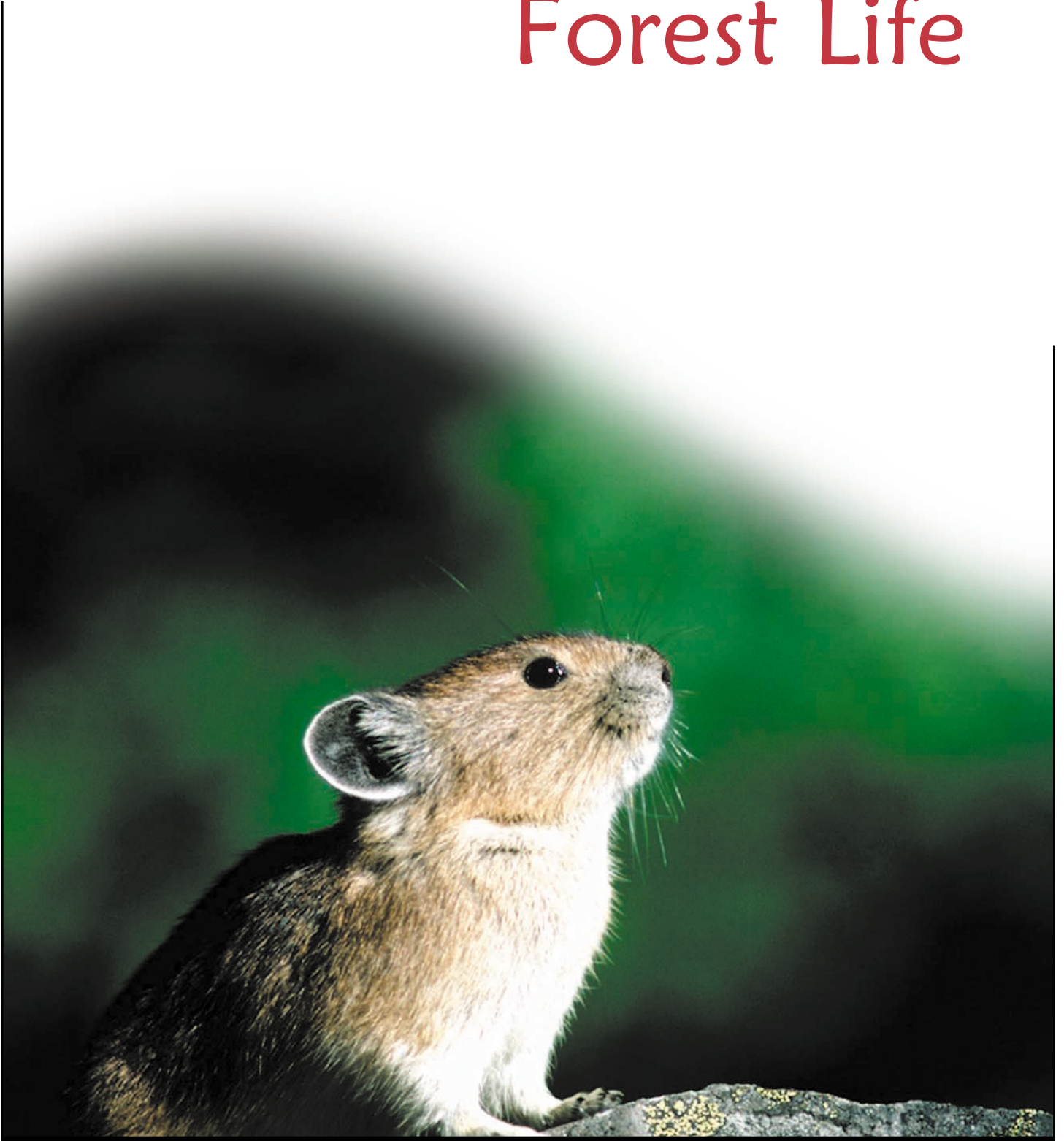
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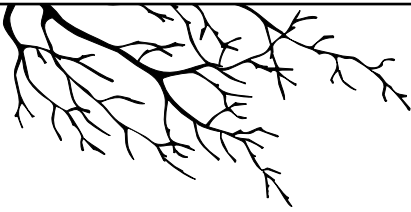
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Pathways to Discovery

Forest Life





Forest Life

TIME 3 hours

OBJECTIVES To understand how living and non-living things interact and change in the forest community.

To identify the basic survival needs shared by people and all other animals—plants, food, water, shelter, and space.

METHODS Students will work in the classroom and in the field to explore the survival needs of animals: draw pictures comparing basic needs (classroom); cut out and match animals to their environment (classroom); play an active game to recognize the importance of food, water, shelter, and space to survival and how changes in any of these can cause a change in the survival of a species; hike on the boreal forest trail and discuss what they find along the way; listen to a story and have a follow up discussion.

BACKGROUND This Unit is designed to be a follow-up to the second grade Silver Burdett Ginn Science Discovery Works textbook, Unit A, “*Interactions of Living Things*”. It can be used at any grade level.

MATERIALS Drawing paper, crayons or chalk, scissors, glue sticks, copies of Wildlife Detectives page and an Alaskan animals paste-on pictures page; clipboard, pencil and whistle, for the teacher; The Lorax by Dr. Seuss.

CONCEPTS AND SKILLS Analysis, classification, comparing similarities and differences, discussion, listing, reading, and generalization.



The Basics

TIME 20 minutes

MATERIALS Chalkboard and chalk

LEAD IN Have the students identify five basic survival needs shared by people and all other animals: plants, sunlight, water, soil and air. Students will list and organize needs of people, pets and wildlife. Tell the students that all animals (including people, pets, and wildlife) need food, water, shelter and space in which to live. These must be in the quality and quantity required by the particular animal. Because animals need food, water, shelter and space to be available in a way that is suitable to their needs, we say that these things must be available in a suitable “arrangement.”

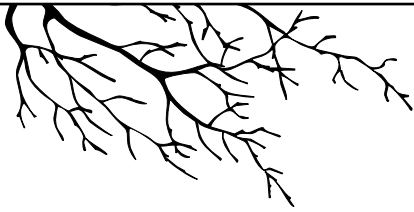
PROCEDURES Put three words on a chalkboard, so that a column of words can be listed under each: *People-Pets-Wildlife*. Ask the students, “What do people need in order to be able to live?” List the students’ ideas in a column under the word, “*People*.” Do the same for “*Pets*” and “*Wildlife*.”

After the lists are made, ask the students to look to see which ideas seem to go together into larger ideas. For example, warmth might be combined with physical comfort and both might fit within the concept of shelter. See if the students can narrow down the lists and come up with the essential survival needs for people, pets and wildlife. The most basic survival needs will be the same for each of the three groups. The lists, when reduced, could include and be limited to:

PEOPLE	PETS	WILDLIFE
food	food	food
water	water	water
shelter	shelter	shelter
space	space	space
arrangement	arrangement	arrangement
sunlight	sunlight	sunlight
soil	soil	soil
air	air	air

WRAP UP List at least four things plants and animals need for survival. How do plant needs differ from animal needs?





Habitat?

TIME 40 minutes, or two 20 minute sessions

MATERIALS Drawing paper, crayons

LEAD IN Use this activity after “The Basics” or alone if students know the basic needs already. This activity provides a little more detail than “The Basics”. Have the students:

- 1) identify their own basic needs for food, water, shelter and space in a suitable arrangement; and 2) generalize that wildlife and other animals have similar basic needs. Students draw pictures of people and animal’s homes, comparing basic needs.

PROCEDURES

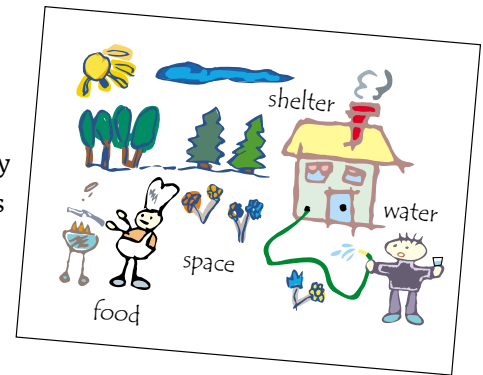
1. List the following words on a chalkboard: *food, water, shelter, and space*.
2. Read each word aloud, asking the students to repeat the words after you. (They may say the letters of the words and use the words for spelling.)
3. Food and water will be easy concepts for the students to understand. They are familiar needs for themselves each day. Shelter and space will be more difficult. Ask the students to explain what shelter and space are. Make sure the meanings of all four words are clear before you proceed.

4. Give the students drawing paper and crayons. Ask the students to draw a picture of where they find food, water, shelter and space. Ask students to label the parts of their drawings where they find their food, water, shelter and space.

Note: Food and water will not be difficult to identify. Shelter could be shown in a number of ways. Labeling a roof can show shelter. Space can be shown as the area inside and outside the house. It can include the house and yard. Space also can include the neighborhood. (Space actually includes all the areas used for survival.)

5. Once the drawings are complete, write two more words on the chalkboard: *arrangement, habitat*. Say the words aloud, asking the children to repeat them after you. (Again, these words may be used for spelling.)
6. Tell the students that when food, water, shelter and space go together in a special way, so that animals—including people—can live, we call that place a habitat. The food, water, shelter and space are in an arrangement that makes it possible for animals to live.

Optional: Ask the children if they could live in a home where the bathroom was four miles north, the kitchen was twelve miles west and the bedroom was



nine miles east. The answer, of course, is likely, “No,” since the “arrangement” is not suitable for a person. Some animals do travel great distances in their habitat, however.

7. Ask the students to write the word *habitat* in big letters at the top of their drawings. Talk with them about the meaning of habitat.
8. Give the students another piece of drawing paper. Ask them to think of an animal—any animal. Ask a few students what animal they are thinking of. Identify whether the animals they named are “wild” or “tamed.” You will probably get both, that’s great! Then ask the students to think of other animals and decide whether they are normally wild or tame. It is important to make sure the students are thinking about both wild and domesticated animals.
9. Ask the students to draw a picture of their animal in a place where it lives. Ask the students to make sure they include: food, water, shelter and space in an arrangement that they think would make it possible for the animal to survive.
10. Ask the students to talk about their drawings, pointing out the habitat components they have included.
11. Ask the students to write *habitat* in big letters on the top of this drawing too. Talk with the students about how humans and other animals need food, water, shelter, and space. The arrangement is different for each, but all have similar basic needs. When food, water, shelter, and space are arranged in a way that is suitable for an animal to survive, we call that place where these things are available “a habitat”. When the students have an understanding of “habitat,” write a few sentences defining habitat on the chalkboard. As much as possible, make use of the ideas the students suggest. For example: *Habitat is a place. It has food, water, shelter and space. These are things that animals need to live.*
12. The students may now write these sentences on the back of one of their drawings or on a piece of writing paper. They may also read the words in the sentences you have put on the board, after you. They may also write their own sentences about what habitat is, drawing pictures to go along with the words.

- WRAP UP**
1. List the essential basic needs along with non-essential needs like music, art, Nintendo, books, etc.
 2. Choose which things wildlife need to survive: food, water, shelter, space arrangement, habitat, etc.
 3. Choose which things people need to survive: food, water, shelter, space, arrangement, and habitat. Explain. Write a sentence about what people and wildlife need to survive.
 4. Tell a story. In the story, tell how a habitat meets the needs of different kinds of animals.





If You Don't See Them... Animal Evidence

There are many ways to tell if an animal lives in or travels through an area. Here are some common signs of Alaskan Animals:

NESTS Many animals build nests. Birds, waterfowl, and squirrels all raise their young in a nest. The nest may be built of moss, grass and feathers. Eagles build large nests of sticks in the highest trees along rivers and other bodies of water. Woodpeckers nest in holes in trees; swallows will nest in mud domes under the eaves of roofs.

BURROWS Many animals live underground. Fox, wolf, rodents, and beaver all build underground homes. Beavers build large dams of small trees and branches in ponds or streams.

DEPRESSIONS, TUNNELS OR TRAILS Rodents create an elaborate network of tunnels in the snow during the winter. Hare and deer create trails in the snow that are used over and over again. Moose, bear, and many other animals leave paths in the tall grass. Moose, deer, and bear bed down at night and will leave a large depression of crushed grass.

BROWSE (Young twigs, leaves, and other plant material that animals have eaten.) Moose, hare, and porcupine eat the bark of trees and shrubs, especially in the winter. During periods of deep snow the bark will be stripped high in the trees, because the moose or hare are standing on five to six feet of snow at the time. Hare will leave 45-degree angle cuts on small willows and shrubs because of their sharp incisor teeth.

MEALS OR FOOD CACHES (Hidden food to be eaten later.) Squirrels leave cone caches in their territory and hide mushrooms in the crooks of tree branches. The bones of small animals can be found at the base of trees that are homes to eagles. Bears will leave carcasses (bodies of dead animals) of moose or deer to retrieve at a later date. (Always give a bear's meal a wide berth...bears are very protective of their food!)

SCRATCH OR TEETH MARKS Moose rub on trees during their "rut" or mating season. Bears will also scratch tree trunks or other objects. Beaver leave "girdled" (removing a band of bark completely from around a tree) trees as evidence to their industry. Porcupines may chew on leather or ax handles for the salt they contain.

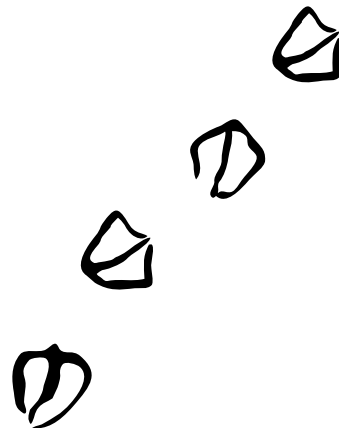
DROPPINGS Animal feces (poop), known as scat (animal droppings), are also distinctive. Hare leave small, flattened pellets of dried plant material. Goose scat resembles skinny cigars. Wolf and fox scat usually contains the bones and hair of the small animals they eat. Bear scat is larger piles of mixed vegetation and berries, with occasional fur and

bones of animals. Moose droppings change from one season to the next. In the winter, moose drop nuggets that look like sawdust; in the summer, the scat changes to a pile of more succulent vegetation.

HAIR AND ANTLERS Many animals leave bits of fur on trees and other objects as they pass by an area. Moose hair is long and straight. Caribou, moose, and deer all shed their antlers at various times in the fall and winter. Moose antlers are wide and heavy. Caribou antlers are thinner and more delicate.

NOISE Many animals can be identified by the noise they make. Many birds have a very specific call. Squirrels are very vocal in defending their territory. Woodpeckers rap on wood in their quest for insects living under the bark of trees. Wolves howl to each other. Sometimes animals can be heard stomping through the underbrush or flying as they exit or enter an area.

TRACKS Most evident in snow, after a rain, and along riverbanks, tracks can tell a story about the animals in the area. A hare's back paws land in front of its front paws when it is running. Most animals will leave tracks, even if they are made by their tails or wings.





Wildlife Detectives

TIME 30 minutes

MATERIALS Scissors, glue sticks, crayons, a copy of the “*Wildlife Detectives*” page and “*Alaskan Animals*” paste-on pictures page. (These are used to match animals with the evidence they left.)

LEAD IN Students identify the evidence of specific animals. Students learn to infer actions and behavior from the evidence observed.

PROCEDURES

1. Each student is given a “*Wildlife Detectives*” page and an “*Alaskan Animals*” paste-on pictures page.
2. Have the students cut out, arrange and glue the animals near the appropriate evidence on the “*Wildlife Detectives*” page.

WRAP UP

1. Share the results with the class.
2. Discuss how there may be multiple answers (fox and wolves also use dens).

Wildlife Detectives Answers

Bald eagles build huge stick nests in the very tops of trees. Often there are the bones of small animals on the ground underneath the nest. Eagles return to their nests year after year, so the nest can become ten feet across with each year’s addition of sticks.

Ravens and **maggies** also build stick nests, but they are much smaller.

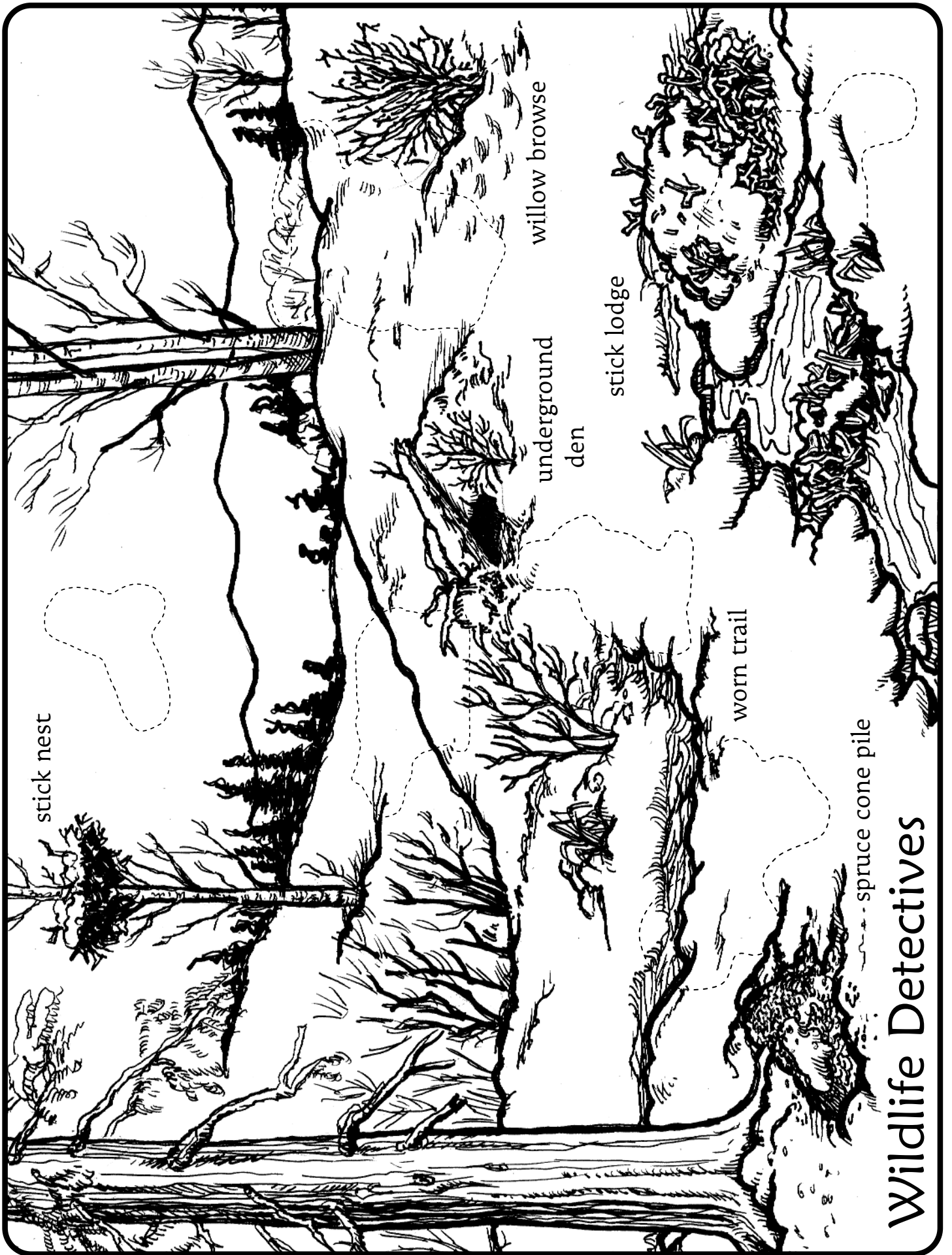
Black bear and **brown bear** burrow into natural mounds of earth, sometimes near uprooted trees or in the side of small ravines. **Fox** and **wolves** also build dens for warmth and protection.

Beaver build lodges with multiple exits for access and escape. Beaver also build dams that back up streams. These rodents need two to three feet of water all year around to transport their food and hide from predators.

Snowshoe hare create well-marked trails that they use over and over again.

Red squirrels chew into spruce cones, looking for the two seeds at the end of each scale on the cone. In the process, they create piles of spruce cone scales called middens. These piles can grow to be three feet deep and 15 to 18 feet wide.

One of the mainstays of a **moose’s** diet is willow and alder browse. In the winter, moose strip the bark of trees high above the ground, when they are standing on five or six feet of snow. Moose eat fruit trees and gardens. **Hares** and **porcupines** also browse on willows and other trees.



stick nest

spruce cone pile

worn trail

underground
den

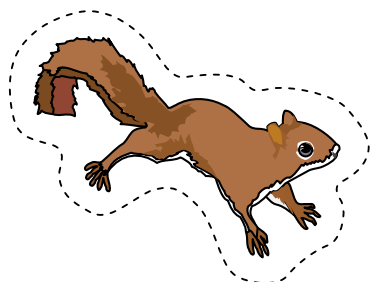
willow browse

stick lodge

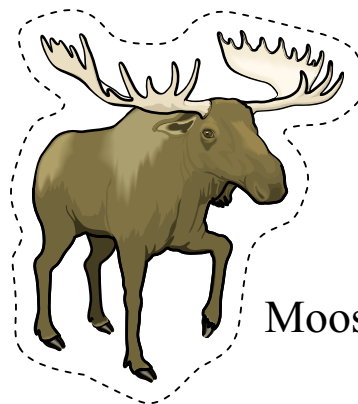
Wildlife Detectives

Wildlife Detectives

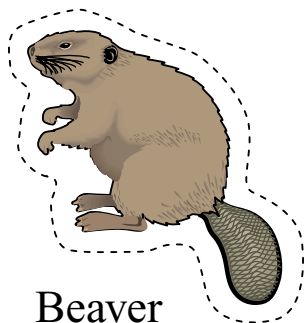
Creatures to Cut



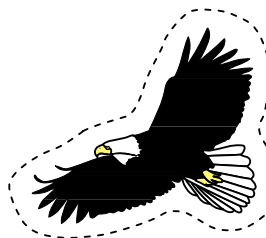
Red Squirrel



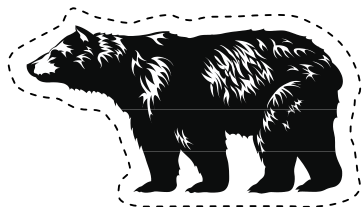
Moose



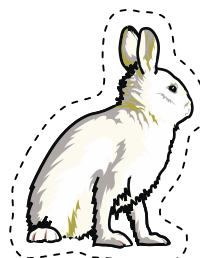
Beaver



Bald Eagle



Black Bear



Snowshoe Hare



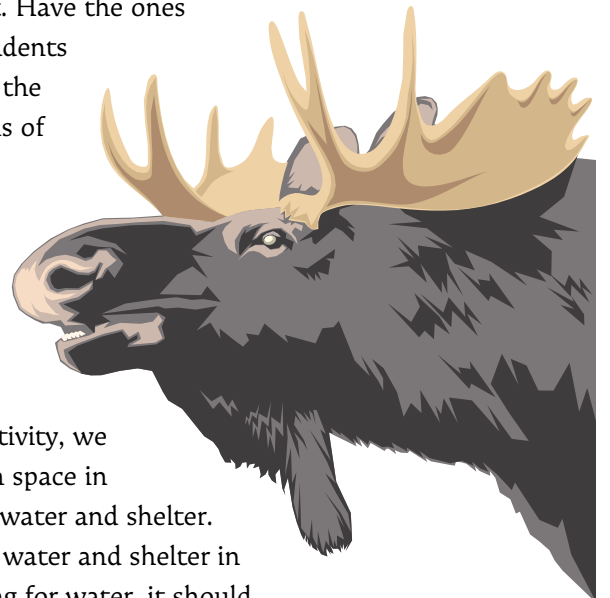
Oh Moose!

TIME 25 minutes

MATERIALS An open area, large enough for students to run, is needed for this activity. Remind the students that a community consists of all of the living members of the forest. Clipboard and pencil for the teacher or facilitator.

LEAD IN Tell the students that they are about to become “moose” or other components of habitat in a highly involving physical activity. The students will identify and describe food, water, and shelter as three essential components of habitat, describe the importance of good habitat for animals, and recognize that some fluctuations in wildlife populations are natural as ecological systems undergo constant change.

- PROCEDURES**
1. Begin by telling students that they are about to participate in an activity that emphasizes the most essential things animals need in order to survive. Review the essential components of habitat with the students: food, water, shelter, and space in a suitable arrangement. This activity emphasizes three of those habitat components—food, water and shelter—but the students should not forget the importance of the animals having sufficient space in which to live, and that all the components have to be in a suitable arrangement or the animals will die.
 2. Ask your students to count off in fours. Have all the ones go to one area; all twos, threes and fours go together to another area. Mark two parallel lines on the ground or floor ten to 20 yards apart. Have the ones line up along one line; the rest of the students line up along the other line. (A fourth of the students are at one line and three-fourths of the students are at the other line.)
 3. The ones become “moose.” All moose need good habitat in order to survive. Ask the students what the essential components of habitat are again: food, water, shelter and space in a suitable arrangement. For the purposes of this activity, we will assume that the moose have enough space in which to live. We are emphasizing food, water and shelter. The moose (the ones) need to find food, water and shelter in order to survive. When a moose is looking for water, it should clamp its hands over its mouth. When it is looking for food, it should clamp its



hands over its stomach. When it is looking for shelter, it holds its hands together over its head. A moose can choose to look for any one of its needs during each round or segment of the activity; the moose cannot, however, change what it is looking for—for example, when it sees what is available—during that round. It can change what it is looking for in the next round, if it survives.

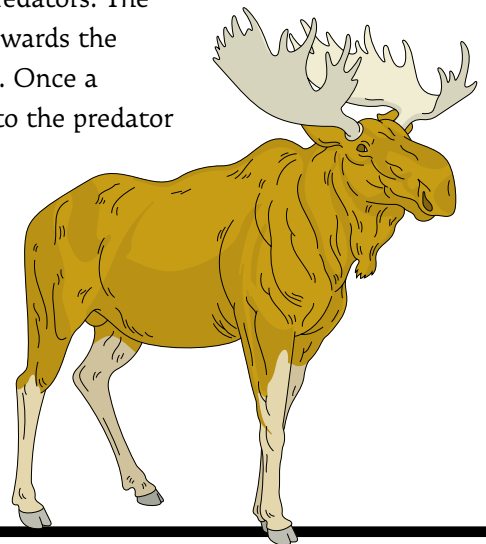
4. The twos, threes and fours are the food, water and shelter—components of habitat. Each student gets to choose at the beginning of each round which component he or she will be during that round. The students depict which component they are in the same way the moose show what they are looking for; that is, hands on stomach for food, etc.
5. The activity starts with all players lined up on their respective lines (moose on one side; habitat components on the other side) and with their backs to the students at the other line.
6. The facilitator or teacher begins the first round by asking all of the students to make their signs—each moose deciding what it is looking for, each habitat component deciding what it is. Give the students a few moments to get their hands in place—over stomachs, mouths, or over their heads. (As you look at the two lines of students, you will normally see a lot of variety—with some students water, some food, some shelter. As the activity proceeds, sometimes the students confer with each other and all make the same sign. That’s okay, although don’t encourage it. For example, all students in habitat might decide to be shelter. That could represent a drought year with no available food or water. **Note:** If students switching symbols in the middle of a round is a problem, you can avoid that by having stacks of three different tokens, or pieces of colored paper, to represent food, water and shelter at both the habitat and moose ends of the field. At the start of each round, players choose one of the symbols before turning around to face the other group.
7. When you can see that the students are ready count: “One...two...three.” At the count of three, each moose and each habitat component turn to face the opposite group, continuing to hold their signs clearly.
8. When moose see the habitat component they need, they are to run to it. Each moose must hold the sign of what it is looking for until getting to the habitat component person with the same sign. Each moose that reaches its necessary habitat component takes the “food”, “water”, or “shelter” back to the moose side of the line. This is to represent the moose’s successfully meeting its needs, and successfully reproducing as a result. Any moose that fails to find its food, water, or shelter dies and becomes part of the habitat. That is, in the next round, the moose that died is a habitat component and so is available as food, water, or shelter to the moose who are still alive. **Note:** When more than one moose reaches a

habitat component, the student who gets there first survives. Habitat components stay in place on their line until a moose needs them. If no moose needs a particular habitat component during a round, the habitat component just stays where it is in the habitat. The habitat person can, however, change which component it is from round to round.

9. You, as the facilitator or teacher, keep track of how many moose there are at the beginning of the activity, and at the end of each round you record the number of moose also. Continue the activity for approximately 10-15 rounds. Keep the pace brisk and the students will thoroughly enjoy it.
10. At the end of the rounds, gather the students together to discuss the activity. Encourage them to talk about what they experienced and saw. For example, they saw a small moose herd begin by finding more than enough of its habitat needs. The population of the moose expanded over two to three rounds of the activity until the habitat was depleted and there was not sufficient food, water and shelter for all the members of the herd. At that point, moose starved or died of thirst or lack of shelter, and they returned as part of the habitat. Such things happen in nature also. **Note:** In real life, large mammal populations might also experience higher infant mortality and lower reproductive rates as a result of overpopulation of habitat.

WRAP UP In discussion, ask the students to summarize some of the things they have learned from this activity. What do animals need to survive? What are some of the “limiting factors” that affect their survival? Are wildlife populations static, or do they tend to fluctuate, as part of an overall “balance of nature?” Is nature ever really in “balance” or are ecological systems involved in a process of constant change?

VARIATIONS After the students have played several rounds of “Oh Moose!,” introduce a predator such as a bear or wolf into the simulation. The predator starts in a designated “predator den” area off to the side. The predator has to skip or hop. This reduces the possibility of violent collisions between moose and predators. The predators can only tag moose when they are going towards the habitat and are between the habitat and moose lines. Once a moose is tagged, the predator takes the moose back to the predator den. That simulates the time it takes to eat. The “eaten” moose is now a predator. Predators that fail to tag someone die and become habitat. That is, in the next round, the predators that died join the habitat line. They will become available to surviving moose as either food, water or shelter. During each round, the teacher should keep track of the number of predators as well as the number of moose.





The Lorax

TIME 20-25 minutes

MATERIALS *The Lorax*

LEAD IN Read the book *The Lorax* by Dr. Suess. It can be read on the trail or after lunch, but is a good concluding activity to remind us all of the importance of working together, thinking ahead, and taking care of forest habitats. If the group is an active one, you may want to have them act out the story “impromptu” as you read it, making appropriate sound effects, hand and body motions—just ad-libbing!

This book can prompt a discussion on almost any subject concerning our environment. Students will discuss conservation, loss of habitat, environmental issues, population, wants and needs.

PROCEDURES After the reading of this book, open up discussion and questions. Some suggestions:

- Who was the Lorax? Did it remind you of anyone you know or have seen? Was it a good character?
- Who was the Onceler? Did it remind you of anyone you know? Was it a good character?
- How could the Lorax and the Onceler have communicated better?
- Was there anyone else involved in this situation?
- Why did the animals leave?
- How does this story relate to us? Does it remind you of anything happening around us? What can we do to help save our forests, the animals, and the communities from over development?
- Is the building of factories or farms always bad? How can we compromise?
- Do you think change in our lifestyles can influence this compromise?

WRAP UP We have studied the forest and the things that live and grow there, the habitats, communities, and the elements needed for survival—food, water, shelter and space. There is a lot that goes on in the life of our forests and the life in the forests!

Think or talk about all of the activities the students have done regarding interactions of living things. Have the students tell their favorite activity. Each student should tell something new that was learned.

Pathways to Discovery

Wildlife





Wildlife

TIME 3 hours

OBJECTIVES To develop observational skills

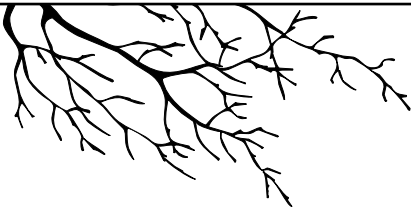
To learn to identify and appreciate some wildlife that live in the Park, their habitat requirements, and their role in Wrangell-St. Elias National Park and Preserve.

METHODS Students will explore a variety of habitats by looking for signs of wildlife; play active games in order to become familiar with the characteristics of wildlife as well as learn interactions between predators and prey; build microhabitats incorporating knowledge learned during preceding lesson activities. This unit can be taught during a one outing hike or broken up into smaller hikes and used on several days. The games and activities may also be used as solitary activities.

BACKGROUND This Unit is designed to be a follow-up to the third grade Silver Burdett Ginn Science Discovery Works textbook, Unit F, "*Roles of Living Things*". It can be used at any grade level.

MATERIALS Photos of animals, animal nametags, animal sample question sheet, food tokens or ribbons, bear game sheet, bear game food cards, and study skins.

CONCEPTS AND SKILLS Adaptation, habitat, relationships, carrying capacity, competition.



What is Wild?

TIME 10 minutes

LEAD IN Walk to an open field with the class. Explain that over the next few hours they are going to examine various aspects of wildlife existence in the Wrangell-St. Elias National Park. They are going to hike while looking for signs of wildlife, but they will also be stopping to play a number of different games and activities that will help them understand more about the wildlife around them.

PROCEDURES Ask the students the following questions:

- First of all, what is wildlife? (Wildlife can be any organism that lives in a natural, undomesticated environment, regardless of size or physical classification such as: reptiles, amphibians, mammals, insects, etc...)
- What animals might we expect to live here in Wrangell-St. Elias National Park? (Examples; moose, bear, fox, squirrel, birds, mice, beetles, ants, mosquitoes, lynx, etc...)
- Even though these animals all live in this area, they can be found in other habitats as well. What is a habitat? (Habitat is the place or type of environment where an animal gets its food, water, shelter, air, and living space.)
- The students are going to be looking for wildlife or signs of wildlife activity in several areas. Will they be more apt to see the animal or see a sign that the animal has been there?
- What signs of animals might we see? (Moose browse on willows, animal tracks, claw or scratch marks, animal scat, holes of nests in trees, etc...)

WRAP UP Ask the students if all wildlife stays wild. Ask for examples (zoos, circus). Do some domesticated animals become wild? (Yes, feral horses, goats, rabbits, etc.)



Wildlife Exploration

TIME 10 minutes

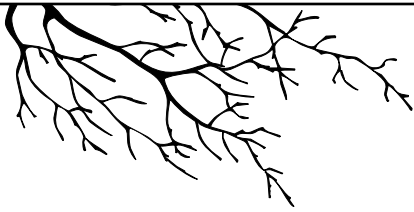
LEAD IN Tell the students that they are all now becoming detectives in search of the elusive animals of the Wrangell-St. Elias National Park and Preserve. They are really going to have to keep their eyes, ears, and noses open to observe clues of wildlife.

PROCEDURES Divide the students into pairs and have each pair find at least one sign of wildlife. Explain that one possible way of looking for signs of wildlife is to have each member of the pair specialize their observations for either the ground or above the ground. The ground-lookers examine the ground for tracks, animal diggings, burrows, matted down grass, or scat. Soft ground, snow, or sand along the trail should be examined with particular care for tracks. The other student searches in the trees and shrubs. These areas should be scoured for rubs, bear claw marks, browse lines or any signs of animals eating the bark or parts of trees (i.e., woodpecker holes, snowshoe hare rings around trees). They should look in each area visited. This activity continues throughout the hiking portion of the lesson.

Use this activity as the group moves to get to the next area and make sure each child finds one sign of wildlife. Subtle hints help sometimes. If everybody is having trouble finding signs of wildlife and the ground is dry, have the students lie in the shape of a wagon wheel on the ground with feet touching and heads fanned out in a circle to look in the tree tops for wildlife and signs of wildlife.

WRAP UP Gather the entire group together in a circle and examine or discuss all signs of wildlife found. Discuss how being in pairs might have helped the group to find animal signs that may otherwise have been overlooked. Allow each child to speak. Ask the students if people have had an impact on wildlife. How?





Mystery Critters

TIME 25 minutes

MATERIALS Alaska wildlife pictures, clothes pins, animal name tags

LEAD IN As students are hiking they should be looking for wildlife signs. Stop at a wide spot along the trail. Explain to the students that they are going to play a game of mystery in which each of them will have the name of an animal on their back. Show pictures of animals that live in the Wrangell-St. Elias National Park and Preserve and address several of the animal sample questions that follow towards each of the photos as you show them. In order to determine what their animal is, they need to ask questions of the group concerning the size, shape, habits, whether the animal is a carnivore, herbivore, or omnivore and whatever they feel might be helpful. The person they ask may only respond with “yes”, “no”, or “maybe” in each case.

PROCEDURES Begin by demonstrating the questioning procedure. Have a child pick out an animal name tag and clothespin it on the teacher’s back. The teacher will then ask the students the following questions as well as any others that seem pertinent until the animal is guessed. Explain the difference between omnivore (eats plants and meat), carnivore (eats meat), and herbivore (eats plants) when asked that sample question.

Animal Sample Questions

- Am I a mammal? A bird? An insect?
- Am I bigger than a hare? Smaller than a fox?
- Do I have four legs? Two legs? Six legs? Eight legs?
- Do I have a tail? Is it longer than a rabbit’s?
- Am I brown? White? Black? Am I more than one color?
- Am I an omnivore? Carnivore? Herbivore?

Encourage the students to make up more questions of their own.

After you have guessed your animal, pin an animal name tag on the back of one student at a time. Allow the student to stand up and turn slowly around so all students see his animal tag. Have the students in the group answer the questions asked by this student—yes, no, maybe answers only! Take turns until all students have discovered their animal.

Ask the students the following questions:

- What have we learned about the animals of the Wrangell-St. Elias National Park and Preserve?
- Can you name the herbivores? (Examples: hare, moose, squirrel, mouse, beaver)
- Who are the carnivores? (Examples: owl, eagle, lynx, fox, wolf)
- Who are the omnivores? (Examples: black bear, grizzly bear, bat, coyote, man)



Predator-Prey

TIME 30 minutes

MATERIALS Food tokens or pieces of survey ribbon

LEAD IN Look for signs of wildlife along the trail. Have the group focus exploration on signs of predator/prey relations. Stop in an open flat area with as few obstructions as possible. Have the students sit in a circle. Review with them the definition of *habitat* (a place where an animal lives).

- What is needed in this habitat? (food, water, shelter, and space)
- What might be needed in a habitat for a hare? (grasses and plants for food, trees and burrows for shelter, a stream for water, and enough space for the hare to find all of these)
- What else might be in a hare's habitat? Think of something the hare might not want to be there. (a predator)
- What interactions take place between animals living in the same or similar habitats?

We are going to play a game to further look at the relationship between predators—animals which eat other animals—and their prey—the animals which are eaten.

PROCEDURES Have all the students go out and collect ten small rocks, acorns, pinecones, or other objects to use as food tokens. Place the tokens in the circle. This is where the prey will get its food. The students are now ready to play a game in which both predators and prey try to gather food and survive.

- Divide the group so that three-fourths of the students are the prey species and one-fourth are the predator species. Count off by fours. The number ones, twos and threes are prey; the number fours are predators.
- The predators will be the wolf. They must capture three prey animals to survive.
- The prey will be snowshoe hare. The prey must collect five food tokens to survive.
 - Designate one area as the safe zone, or have the prey pick their own: a tree or root, to represent the safety of home.



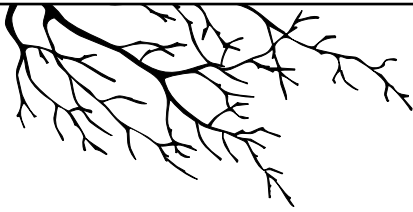
- The prey are to line up along the safe zone. When the game is being played, the prey are safe when they are behind this safe line. When the prey are out on the game field, they can also be safe if they remain completely frozen.

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- The prey must collect five tokens to survive, but they can only collect one at a time. Each token must be brought back to the safe zone before another is collected.
 - The wolves can succeed in capturing prey by tagging a moving hare. If caught, the hare must accompany the wolf to its den. A wolf cannot catch another hare until the first is left at the den.
 - Play continues until all hares have either been caught or have collected five tokens.

WRAP UP Ask the students how it felt to be a predator or a prey. Ask them if it was easier to be the predator or the prey. (This question usually spurs mixed feelings and rarely leads to a group agreement.)

- Ask the students what they learned about wildlife from this activity. (Predators and prey both have to work at survival.)
- Ask students how predation (animals eating other animals) is important. (It keeps populations in check.)
- Play another round, but this time become overloaded with predators. Discuss the consequences of too many predators. In nature, what would the wolves have to do if they wanted to survive? (move away, change food source, etc.)
- Play a round with too many hares and not enough food for them. Try playing without any predators. What happens now? (habitat deterioration) Are predators necessary then?





Bear Carrying Capacity Game

TIME 30 Minutes

MATERIALS Food cards

LEAD IN Hike along the trail looking for animal signs and habitats. Explain that there are limitations on the numbers of any species in a given area, such as the Wrangell-St. Elias National Park and Preserve. This is known as the area's carrying capacity. These limitations are often closely related to the amount of food available. In this game students will be bears competing for limited food resources.

PROCEDURES Scatter the food cards over a 50 X 50 foot area. Have students go to a place they designate as their den. Do not tell the students what the color, initials, and numbers on the cards represent just yet.

- Tell them only that the pieces of paper are different kinds of bear food. Since bears are omnivores (like people), they like a wide assortment of foods, so they should gather different colors to represent the variety of food.
- Have students collect cards keeping in mind that bears don't run after their food and they must take it back to their den one piece at a time. No bear can steal food from another bear's den. When all the food has been collected the students should bring their cards and sit in a circle.
- Ask students about how it felt to be competing for their food. Explain that the numbers on each card represent the amount of energy available from that food source in a given area of bear habitat:
 - Green cards are grasses and plant leaves
 - Maroon cards are berries and other fruit
 - Orange cards are hard mast (acorns)
 - Red cards are animal matter
 - Yellow cards are insects
- Have each student add up the points on his or her own cards and explain that it takes 80 pounds per ten-day period to keep a bear alive. If a student does not have 80 pounds of food, what happens to him? (They would either starve, migrate out of the area, or kill and take over another bear's territory.)
- Discuss the idea that a given bear habitat can only support a limited number of bears. How many bears in this activity could have survived? The number of bears an area can support is called that area's carrying capacity. The teacher will help the students calculate the carrying capacity by dividing the total number of points obtained by the group collectively by 80 (the number of pounds to keep a bear

alive for 10 days). Apply the carrying capacity idea to other animals. (For example, if the carrying capacity in an area for moose is 50, what happens if there are 75 moose?)

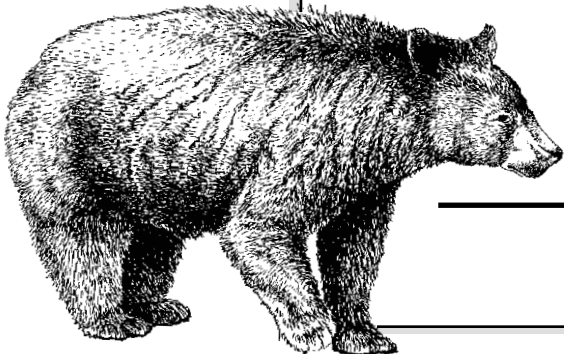
- Play the game again, but explain to the group that not all bears are equally prepared to survive. Designate some students as having had cubs. These students will have to collect 120 pounds of food to feed themselves and their cubs. Blindfold a student. This bear tried to eat a lynx and was scratched in the eyes. He is now blind. Designate others as old, crippled, injured. Another variation includes having the students “bear walk” on hands and feet to obtain their food.
- Discuss the results of this round.

WRAP UP Ask the students:

- What are different activities animals undertake in order to meet needs of shelter, food, water, space? What is the carrying capacity of an area for a certain species?
- Do they think most species, not just bears, have a carrying capacity in a specific habitat?
- If people destroy forests, build roads, or otherwise disturb the natural checks and balances in nature, will an area be able to provide all the resources for the community of animals that live there, enabling each to reach its carrying capacity in that area? Why or why not?
- Does the earth has a carrying capacity for people?

Bear Carrying Capacity FOOD CHART

KIND	POUNDS	% DIET
Tubers (orange)	20	25
Berries (maroon)	20	25
Plants (green)	20	25
Insects (yellow)	12	15
Meat (red)	8	10
In 10 Days	80	100





Study Skins

TIME 30 minutes

MATERIALS A variety of animal skins

LEAD IN Hike to the Visitors' Center or a central activity center. Tell the students that they have had the opportunity to experience being animals, as well as looking for signs of wildlife activity around them. Explain that since it's not always possible to see the wildlife, they are going to participate in an activity in which they will learn more about animals through the use of study skins. Use bear, fox, lynx, beaver, wolf, hare, and marten skins which are available at the visitors' center.

PROCEDURES Seat the students in a circle and blindfold each student. Explain that each student will be handed an animal and, with blindfolds on, they will have to study their animal. They may need to share their skin with a partner.

- Explain that all of the things we have talked about earlier in the lesson will be important. They don't need to know what their animal is, but they will need to determine what adaptations it has and where it might live.
- Tell the students that once they put on their blindfolds, no one can speak unless asked to do so. Pass out the blindfolds and have the students put them on.
- Now bring out the study skins and give one to each student. Emphasize the importance of handling the animals with care so that future groups will have study skins to use. These study skins are VERY FRAGILE.
- After everyone has a study skin, go around the group (still with blindfolds on) and ask each student to describe their animal's adaptations (tail, claws, size, fur, etc...) and tell where they think it might live.
- After every student has had a turn have them remove their blindfolds. Identify the animal and tell the group what it is.

WRAP UP Ask the students if they noticed any adaptations by touching the animal that they might not have noticed otherwise. How did they feel about actually touching the animal rather than just talking about it?



Model Habitats

TIME 30 minutes

MATERIALS Animal tags, drawing paper, pencils, crayons, territory size information

LEAD IN This is a back in the classroom activity. The students will draw a microhabitat for a particular animal and determine by research how large an animal's territory must be. Information on territory size must be included so the student can write on the drawing how large an area it represents. Tell the students they've seen some of the adaptations of animals and examples of possible interactions between animals. They need to put this knowledge all together and build some habitats. What the students are going to do now is imagine that they are an animal. They can be any animal that might live in the Wrangell-St. Elias National Park and Preserve including one from any previous activity. You may elect to use the animal tags used in the Mystery Critter activity.

- Explain to them that they are going to construct a micro-habitat for their animal. Remind them that a habitat must contain all of the basic living requirements for their animal.
- Ask the students what the basic living requirements are (water, food source, shelter, and enough space). Emphasize that what they are building is a habitat, not just a home, and all the basic living requirements are often not close to the den or nest. The place where the moose sleeps is not the only part of his habitat because he may need to get water and browse quite far from where he sleeps. Summer and winter requirements may also be different.

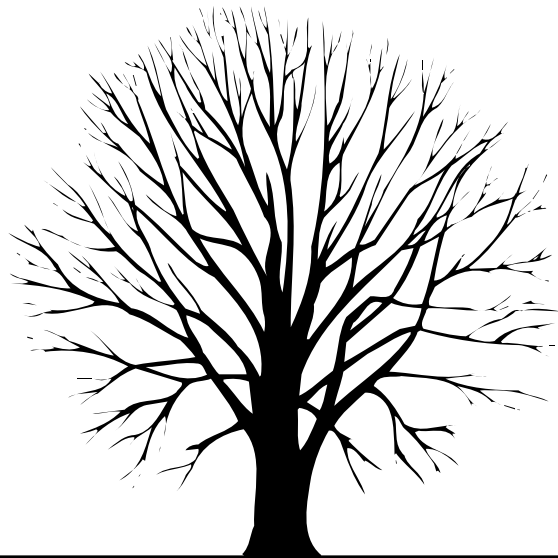
PROCEDURES Have each student select an animal tag. Limit the students to one drawing page and just let their imaginations go wild. They can draw any kind of forest litter like pine needles, pine cones, sticks, leaves, etc. to represent their animal's shelter, water and food. Help each student estimate how much space their animal might need to survive for a year. This is the animal's territory and many species protect their territory from others of their kind. A wolf's territory may be more than 25 square miles, while a squirrel may only need a quarter acre. There are 640 acres in a square mile.

- Give the students 10-15 minutes (or more time if they are really into it) to work on their habitats.

WRAP UP Once everyone has had sufficient time to construct their habitat, gather the group together to share the habitats allowing each person to describe it to the rest of the group. Ask the students to explain their reasoning for each part of their model and the

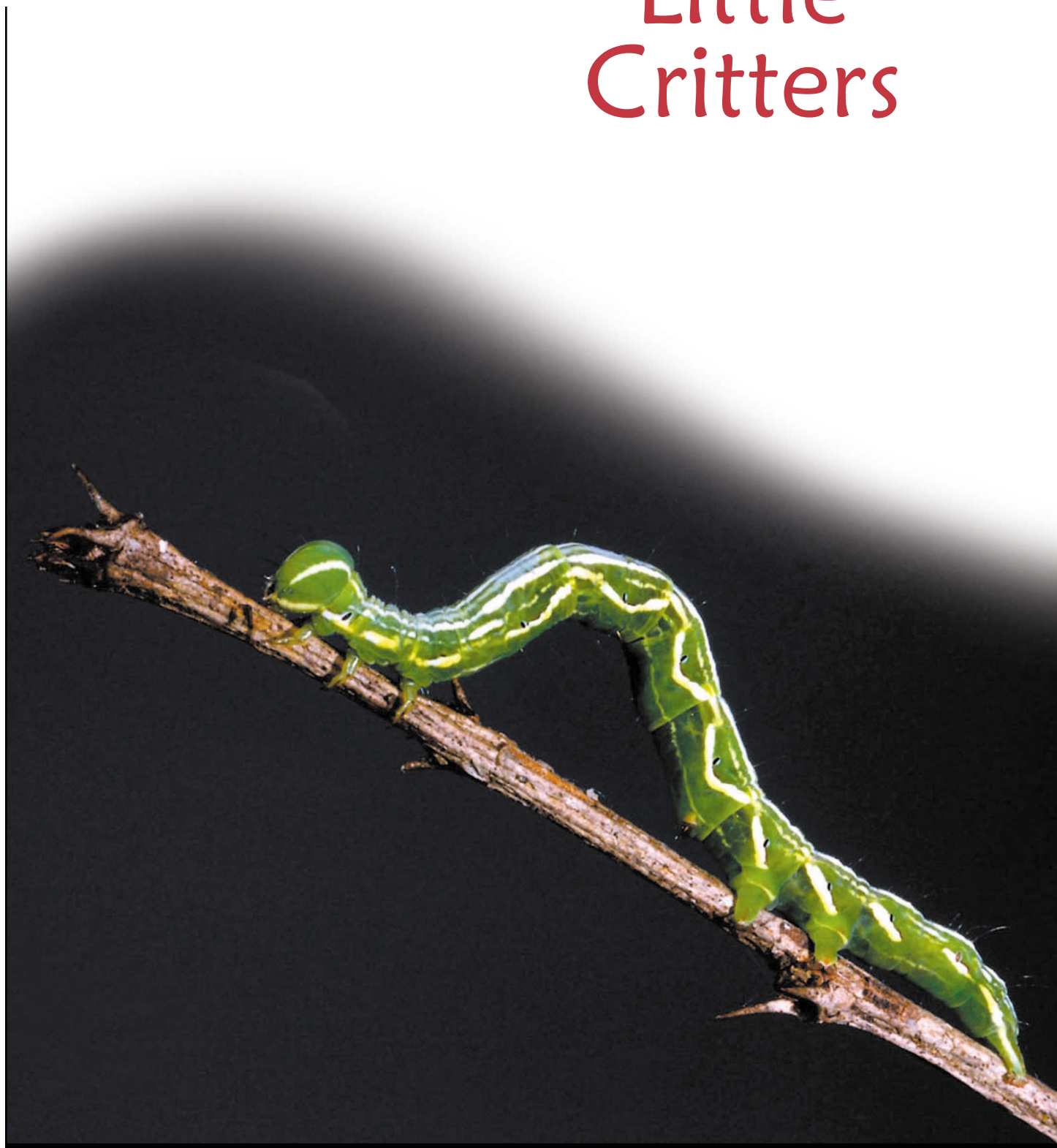
territory needed by their animals. Are there any special requirements that the animal needs for winter or summer?

- After all the habitats have been seen, tell the students that a logging company will be cutting down trees in the area. What impact will this have on their animals?
- So that people can get to the trees to log, new roads will be built through your area. Will this have any impact?
- Because of the new roads there will be more hunters in your area. Will this have any impact?
- For wildlife, habitat loss is the single most important issue today. Most species become threatened or extinct because of damage to their habitat. Is this happening in the Wrangell-St. Elias National Park and Preserve now?
- How can each of us help save wildlife habitat?



Pathways to Discovery

Little Critters





Little Critters

TIME 3 hours

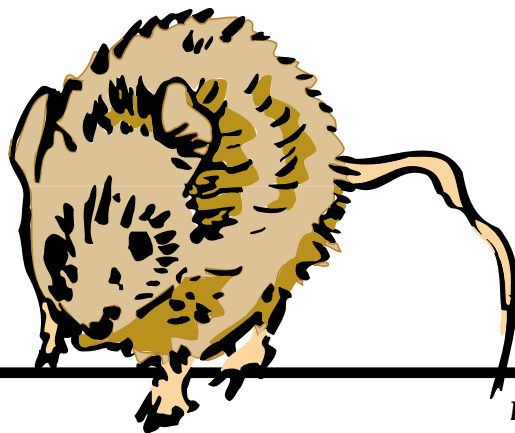
OBJECTIVES Using discovery and observation, students will better understand the role of little creatures as they relate to their habitat and other living things. Students will become more comfortable with these little creatures. An understanding and awareness of the diversity found among the little creatures of Wrangell-St. Elias National Park and Preserve will be gained.

METHODS Students become Nature Detectives or Sleuths to explore a field, a forest, and a wetland habitat. They will observe and collect information about small animals, their behaviors, habitats in which they live, and how they use their senses to survive. The lessons in this unit may be used as a one day activity or used independently on different days visiting different areas. The wetland area at the visitors' center is a large puddle, so the wetland activities might be done at Moose Creek or any suitable pond.

BACKGROUND This Unit is designed to be a follow up to the fourth grade Silver Burdett Ginn Science Discovery Workbook, Unit C, "Animals". It can be used with any grade level.

MATERIALS Case study sheets, pencils, journals or clipboards with extra paper, field guides, hand lenses, collecting jars, bug boxes, pairs of film containers with cotton balls soaked in scents, blindfolds, statements sheet and fact sheet.

CONCEPTS AND SKILLS Habitat, observation, adaptations, interdependence, niche.





Nature Sleuths

TIME 5-10 minutes

MATERIALS Nature Sleuth Code of Ethics

LEAD IN Gather the group and walk together to the boreal forest trail where you will be introducing the day's adventure.

PROCEDURES Tell the students that they will be exploring three different habitats: a field, a forest, and a wetland in search of little creatures that live in these areas.

- Ask the group for a definition of the word “habitat.” (An area in which an animal is able to fulfill its water, food, shelter or cover, and space needs for survival.)
- Ask the students to give you some examples of little creatures that they might expect to find during the day's exploration. Creatures such as: insects, spiders, small mammals, and birds. (Moths, beetles, butterflies, dragonflies, squirrels, mice, voles, rabbits, spruce hens, snowbuntings, woodpeckers, grosbeaks...)
- Ask what types of evidence they might find that would suggest that these animals were in the area at one time. (Scat, chewed-on plants, holes in trees or in the ground, insect trails in plants or on the ground, nests, animal trails.)
- Tell the group that during the habitat exploration they will be observing and handling most little creatures that they find so that they will be able to determine the creature's habitat, food needs, water needs, cover needs, and survival needs. They must, however, explore safely for the benefit of themselves and the little creatures. Tell the students that there are a few precautions that they must be aware of which will be explained upon arrival at the first activity area (the field).
- All of the information that is gathered will be put together so that the group will begin to understand why the creatures are here in this habitat, on this planet, and what they might do for the rest of the planet.
- Explain to the students that in order for them to look for these little creatures effectively, they all must use their imaginations and change from ordinary school students into “Nature Sleuths!”

WRAP UP Explain that you are going to read the following CODE OF ETHICS and that they should repeat what you say when you pause.

NATURE SLEUTH CODE OF ETHICS

I (state your name) **do solemnly promise** (pause) **that for the next three hours** (pause) **I will search for and find** (pause) **as many little creatures as I possibly can.** (pause) **I promise to catch and handle these creatures** (pause) **with the utmost care** (pause) **so as to not hurt the little critters.** (pause) **I promise to use such skills as** (pause) **a good ear, to help me hear sounds I might not normally hear,** (pause) **a sharp sense of smell** (pause) **which will help me smell the smells there are to smell.** (pause) **And I will use my eagle-like vision to the fullest.**



Creature Meeting

TIME 15-20 minutes

MATERIALS Journals or notebooks, pencils

LEAD IN Tell the students that in order to be good sleuths, they must develop excellent skills of observation.

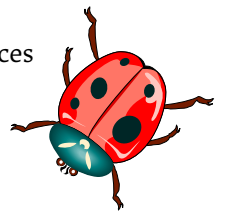
PROCEDURES Tell the students that soon they'll be spreading out to search for some little creatures and this will be their first challenge.

- Tell them that they are to find one little creature and closely follow its movements for five to ten minutes.
- During this time they are to take careful notes about their observations, including:
 1. What it looks like.
 2. How it moves.
 3. Where it goes; how it gets there (running across logs, crawling along a fallen twig, stumbling over rocks, etc.)
 4. What it meets and its reaction to the meeting.

RULES:

Do not harm the little creature! If the little critters crawls under a rock or a leaf to hide, take note of it—then **CAREFULLY AND GENTLY** lift the object away and continue observations. Remind them to replace the object when they are finished observing.

- Stress that the students should take good notes.
- Encourage students to be good observers, set reasonable boundaries, and send them out. Most likely some students will need help finding their little creatures. Help them, but encourage them to look by suggesting good places (i.e. under rocks and logs, on tree trunks, in piles of leaves, etc.)



WRAP UP Gather the students back together.

- Ask them to tell you about their little creatures.
- Instruct them to imagine that they were their little creature. What would it feel like?
- Have students write about their little creature's journey from its point of view using their notes and memory as guidelines. Where was it going? Why? What did it see? What was it "thinking"?
- Take time to share.



Moving On

TIME 5-15 minutes

MATERIALS None

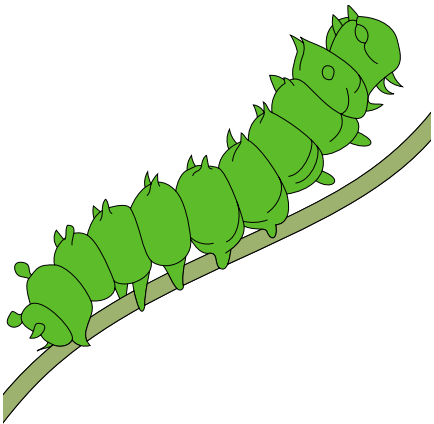
LEAD IN Explain to the sleuths that they are going to walk to the first area of study—the field. On the way to the field habitat:

- Have them look for evidence of little creatures at **EYE LEVEL** while they walk.
Note: This method of looking for something will be used and modified in subsequent lessons while walking to the forest and the pond.

PROCEDURES Nature trail to field:

- Ask the sleuths to look for evidence of living creatures at Eye Level on the way to the field.
- If they find something, encourage them to stop the group and share it. (Some examples are: birds, nests, insects, insect homes, plants, etc.)

WRAP UP When the group arrives at the habitat study area, gather them together in a circle and review some of the things they found along the way.





Field Exploration

TIME 20-30 Minutes

MATERIALS Field guides, resource sheets, bug boxes, jars, notebooks, pencils. **Note:** The following activity area outline is to be used for all three habitats: field, forest, wetland.

LEAD IN Once you arrive at the habitat study area, carry out the exploration as follows.

PROCEDURES Tell the sleuths that they are now in the field habitat.

- Ask them to look around and tell what characterizes a field.
- Ask them for examples of little creatures that might inhabit that particular habitat.
Field: Insects (ants, butterflies, moths, flies) spiders, mice, birds.
- Set comfortable boundaries within the habitat area that will provide the sleuths with individual exploring room.
- Show them the field guides and other resource sheets available to the whole group for ID purposes.
- Let them go to work in the habitat! The students may CAREFULLY collect smaller critters (ants, beetles, insects,...) in the bug boxes. Other creatures like butterflies, mice, moths...can probably be collected in the jars. However, one of the best ways to learn about little creatures is to observe them in their habitat doing what they do.
- During the exploration go from group to group answering questions and reinforcing excitement and curiosity about what they are doing.
- When sleuths have explored and found a little creature about which they are very excited, give them a “case study sheet”.
- Once the students have explored and completed a case study on at least one creature, gather the group together with their little critters and case study sheets.

WRAP UP Pass all the creatures around so that everyone can look at each one.

- Ask several detectives to explain one or more of their creature case studies to the rest of the group using the case study sheets as a format.
- Ask each sleuth how they think these creatures affect, or what relationship they have to their environment, the Park, and people. (i.e. Are they harmful? Are they helpful? Are they important to us? To others? Why?)
- As a group put all of the creatures into several groups according to their individual similarities and differences. Have each sleuth write the group of his or her creature on their case study sheet.
- Tell the sleuths to carefully return their creatures to where they were found.
Found alive, return alive!

CASE STUDY SHEET

Name given to creature _____

Where was it found? (Habitat) _____

Description:

Number of eyes: _____

Number of legs: _____

Number of body parts (sections): _____

Special characteristics or behaviors: _____

Sleuths present when found: _____

Date: _____

CASE STUDY SHEET

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Description:

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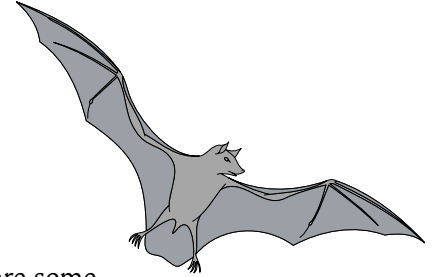
Date: _____



Bat and Moth

TIME 15-20 Minutes

MATERIALS Blindfold



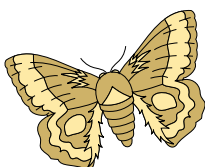
LEAD IN Explain the following to the students:

Not all little creatures can be found during the day. What are some little creatures that are active at night? (bats, moths and other insects, some mice and other rodents). How does a bat find its food? (Through the use of sonar. The bat sends out a high pitched sound as it flies. If those sound waves hit something—a moth or some kind of obstacle—they bounce back to the bat. Through this use of sonar, a little bat can catch and eat up to 3,000 insects in one night).

PROCEDURES Gather the group in a circle with students an arm's length apart from each other.

- Choose one student to be the bat, and a different student to be the moth.
- Explain that the bat, who will be blindfolded to simulate darkness (bats are not blind, in fact their eyesight is quite good), will try to catch the moth using “sonar”. To do this the bat and moth will both be inside the circle. Neither the bat nor the moth can leave the circle of students during the game.
- On the teacher’s signal the game begins. The bat calls out “BAT!” to which the moth must immediately reply “MOTH”. Both bat and moth may walk inside the circle, but neither may run. The bat calls out as often as needed, and walks in the direction of the moth’s response. This is done until the bat catches the moth. When this happens, allow other students to play the parts.
- If a bat is having trouble catching the moth, stop the game. Decrease the size of the circle. What does this signify? (Loss of habitat) Resume play.
- After playing the game a few times, try some variations using one bat and several moths, or one moth and several bats.

WRAP UP Discuss the niche that bats have in the ecosystem. (A niche is the “job” of an animal or plant.) Suppose that we decide to kill all of the bats in the area. What effects might that have on us? (We might have a huge problem with mosquitoes and other insects.) What effects might that have on other plants and animals? (Different plants might be killed or injured by the increased number of insects. This in turn would affect the animals that use these plants as food or shelter.)





Forest Exploration

TIME 20-30 Minutes

MATERIALS Field guides, resource sheets, bug boxes, jars, notebooks, pencils

LEAD IN Explain to the sleuths that they are going to walk to a forest habitat. On the way to the forest habitat:

- Have them look for evidence of little creatures **ABOVE THEIR HEADS** as they walk along. (Some examples are: birds, squirrels, squirrel nests, bird nests, homes in trees, etc.)
- Upon arrival at the habitat study area, gather the group together and share some of the things they found along the way.

PROCEDURES Tell the sleuths that they are now in the forest habitat.

- Ask them what makes a forest different from a field? (Trees, temperature, amount of light, moisture, etc.)
- Ask the detectives to give examples of little creatures that might inhabit that particular habitat. (Forest: spiders, mice, squirrels, insects, birds, etc.)

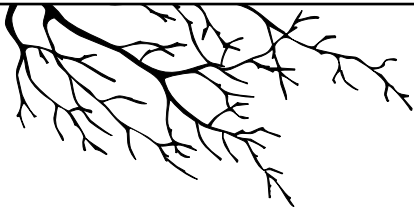
Follow the same exploration procedures as with the field exploration.

- Set comfortable boundaries within the habitat area that will provide the sleuths with individual exploring room.
- Show them the field guides and other resource sheets available to the whole group for ID purposes.
- Let them go to work in the habitat! The students may **CAREFULLY** collect smaller critters (ants, beetles, insects,...) in the bug boxes. Other creatures like butterflies, mice, moths... can probably be collected in the jars. However, some of the best learning to be done about little creatures is to observe them in their habitat doing what they do best.
- During the exploration go from group to group answering questions and reinforcing excitement and curiosity about what they are doing.
- When sleuths have explored and found a little creature that they are very excited about, give them a case study sheet .
- Once the students have explored and completed a case study on at least one creature, gather the group together with their little critters and case study sheets.

WRAP UP Pass all the creatures around so that everyone can look at each one.

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- Ask several detectives to explain one or more of their creature case studies to the rest of the group using the case study sheets as a format.
 - Ask each sleuth how they think these creatures affect, or what relationship they have to their environment, the Park, and people. (i.e. Are they harmful? Are they helpful? Are they important to us? To others? Why?)
 - As a group, put all of the creatures into several groups according to their individual similarities and differences. Have each sleuth write the group of his or her creature on their case study sheet.
 - Tell the sleuths to carefully return their creatures to where they were found.
Found alive, return alive!





“Scent” sations!

TIME 10-15 Minutes

MATERIALS Pairs of small closed containers with scents on cotton balls (cinnamon, peppermint, lilac, etc.), blindfolds

LEAD IN Stop in an area that is fairly large and flat. Ask the students, “How do animals find one another in the forest?” (Mostly through the sense of smell.) Many animals have glands located on their legs or their lower body. These glands produce odors which are left on the ground. These odors help one animal track another. Tell the students that they are going to take part in an activity that shows how they can find a partner using their sense of smell.

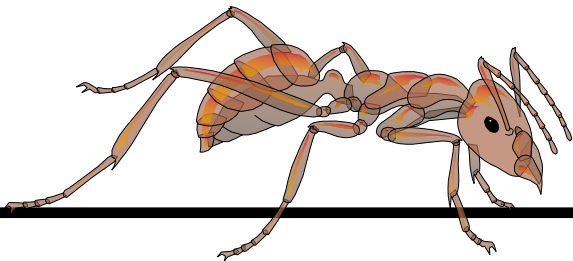
PROCEDURES Ask the students if they’ve ever seen a line of ants walking along the ground. If an ant leaves the colony after the line has departed, how does it find the line of ants? (By the scent the ants leave behind). Where does this scent come from? (A gland on the ant’s abdomen). As the ants walk, they occasionally drag their abdomen on the ground, thus releasing the odor. Other animals release a chemical, called a pheromone, into the air to attract their mate.

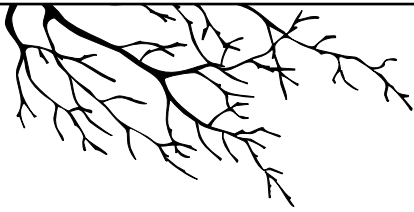
- Have the students form a circle. Take out the film containers. Inside each one is some cotton that has been soaked in some scent (peppermint, cinnamon, lilac, etc.) Choose up to half the group to go inside the circle. The other half forms the boundary. First, as an example, blindfold one student and let that student smell the odor in the container. Have six unblindfolded students open their containers and see if the one with the blindfold can find that matching scent.
- Next blindfold half the insiders and give each a film container. These will identify their partners through their sense of smell. Give the other insiders a duplicate scent container. These will be found by their scent.
- The unblindfolded students position themselves in one place. The blindfolded students try to find who has the same scent. When successful, the pair joins the outer circle.
- When all partners have been found, pass the film containers around and try to identify the scents.

Note: Because of a human’s relatively poor sense of smell (when compared to other animals), it may be difficult for students to identify the scents that are being passed around. Use this as an example of the fantastic sense of smell that most animals have. Humans are also subject to suffer from olfactory fatigue, a condition where the nose

stops detecting the odor even though it is still present. This is helpful when the odor is unpleasant.

WRAP UP Ask the students: Would we be able to track an ant without seeing it? How about a prey species, such as a hare or moose? (Probably not, our sense of smell isn't sensitive enough.) Was it difficult to identify the scent? Why or why not? What are some other ways little creatures might be able to recognize prospective mates or other members of their kind? (sound, light)





Wetlands Exploration

TIME 20-30 Minutes

MATERIALS Field guides, resource sheets, bug boxes, jars, notebooks, pencils

LEAD IN Explain to the sleuths that we will now walk to a wetlands habitat.

Forest habitat to wetlands:

- Have the students look for evidence of little creatures **BELOW EYE LEVEL—TO THE GROUND**. (Some examples are insects on plants, insect homes in plants, chewed plants, holes in the ground, ant hills, living animals, scat droppings, etc.)
Note: In wetlands sleuths may explore the pond if weather permits. Explain the importance of safety—being careful on slippery rocks—**NO RUNNING!**—move slowly. Remind them to replace rocks after they've looked under them.
- When you arrive at the habitat study area, gather the group together in a circle and share some of the things they found along the way.

PROCEDURES Tell the sleuths that they are now in the wetlands habitat.

- How is it different from the other habitats they have explored?
- Ask them to give examples of little creatures that might inhabit that particular habitat.

Wetlands: insects, spiders, birds, small mammals, etc.

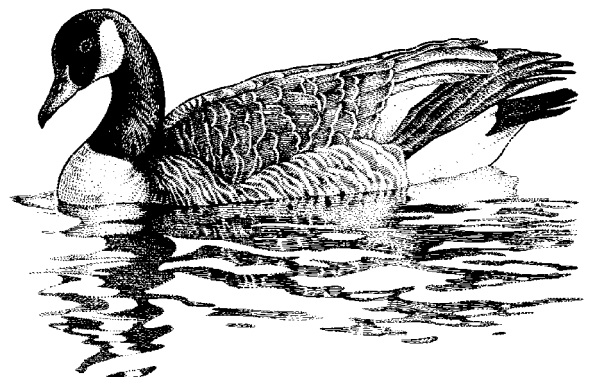
Follow the same exploration procedures as with the previous explorations. If the wetlands area is dried up or frozen, search for evidence of what might have lived there.

- Set comfortable boundaries within the habitat area that will provide the sleuths with individual exploring room.
- Show them the field guides and other resource sheets available to the whole group for ID purposes.
- Let them go to work in the habitat! The students may **CAREFULLY** collect smaller critters (ants, beetles, insects,...) in the bug boxes. Other creatures like butterflies, mice, moths... can probably be collected in the jars. However, some of the best learning to be done about little creatures is to observe them in their habitat doing what they do best.
- During the exploration go from group to group answering questions and reinforcing excitement and curiosity about what they are doing.
- When sleuths have explored and found a little creature that they are very excited about, give them a case study sheet .

-
- Once the students have explored and completed a case study on at least one creature, gather the group together with their little critters and case study sheets.

WRAP UP Pass all the creatures around so that everyone can look at each one.

- Ask several detectives to explain one or more of their creature case studies to the rest of the group using the case study sheets as a format.
- Ask each sleuth how they think these creatures affect, or what relationship they have to their environment, the Park, and people. (i.e. Are they harmful? Are they helpful? Are they important to us? To others? Why?)
- As a group put all of the creatures into several groups according to their individual similarities and differences. Have each sleuth write the group of his or her creature on their case study sheet.
- Tell the sleuths to carefully return their creatures to where they were found.
Found alive, return alive!





Habitat Conclusion

TIME 5-10 Minutes

MATERIALS None

LEAD IN Tell the sleuths that they will now put all the information from each of the three habitats together to see what they have discovered.

PROCEDURES Review all three habitats, the little creatures found, their groups, and their relationship to each other, people and the planet.

- Areas to cover during Habitat Conclusion should include the following:
 1. Animal's group.
 2. Animal's relationship to the world.
 3. What it eats.
 4. What eats it.
 5. Whether the animal was easy to find in its habitat or not, and why protective coloration/camouflage helps it to blend into its surroundings, thus protecting it from predators or to hide from its prey.
 6. Things that this animal might do to survive: behaviors for survival such as building a home, flying, migrating, hibernating, etc.

WRAP UP Explain to the sleuths that as they walk, they must look at all three levels: EYE LEVEL, ABOVE THEIR HEADS, and BELOW EYE LEVEL, in search of little creatures.

- Once at the destination, gather students together in a circle and share discoveries.

Web of Life



TIME 15-20 Minutes

MATERIALS Ball of yarn

LEAD IN Find a flat open area and have the students sit in a circle (in uncomfortable weather go inside or do this activity upon return to school).

- Restate that they've seen and learned a lot about little creatures and ask: How do little creatures fit into the whole of nature? What is their niche? Do they help or hinder growth in the forest? The field? The wetlands? Are they really needed? (If a student has something he/she desperately wants to say, let him/her speak, but try to let the activity itself answer the questions.)
- Explain to the students that this activity may provide the answers.

PROCEDURES Ask the students: What is the primary source of energy for our planet? (The Sun) Accept answers until someone gets the right one then give that student the ball of yarn. Have that student wrap the end of the yarn once around his/her wrist.

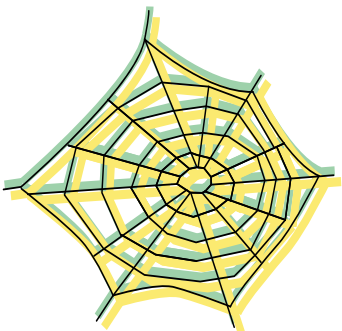
- Ask the students: What is something that derives its energy directly from the Sun? (Plants) Again, accept responses—if a student answers, “plant”, have the “sun” gently pass the ball of yarn to the “plant”. Then, have the “plant” decide what kind of plant—no need to get too specific, but fern, grass, pine tree, algae, etc. works better than “plant.”

Have the now specific “plant” wrap the yarn once around his/her wrist forming a sort of bridge between the “sun” and the specific “plant”. You will want the bridge to be fairly taut (easy on those wrists though.)

- Ask the students: What might get its food or energy from the specific “plant”? (Birds, hares, bees, aphids, etc...) Again, have the ball of yarn passed on the next feasible answer.
- Repeat this until everyone is connected.
- After the last person gets the yarn, ask, “Now, what was it that got all this energy flow in motion?” (Sun) Return the ball of yarn to the “Sun”. The web is complete.

A Few Tips to Help It Work:

- Try to supervise the activity so that the ball of yarn is being passed across the circle as often as possible—this helps bring out the web idea.
- This is a lesson on little creatures, so encourage the students to be little creatures



as often as possible (at least a third of your circle should be little creatures.)
Also, include a human.

- Don't get discouraged. There are NO dead ends. Remember, things die and scavengers, fungi, and bacteria are there to gain energy from the dead critters and plants.
- Have fun!

Ask the students: Now that we've formed this web of life, can anyone think of any animal or plant represented in the web that we'd be better off without? Take any responses. If no one speaks up, choose one of the less likable critters (preferably a little creature such as mosquito, gnat, mouse, etc.) and ask the students if any of them would be happier if that critter weren't around.

- To demonstrate the effect, have the students close their eyes. Have the student that is representing the undesirable critter give a slight tug with his wrist. Instruct the other students to tug back if they feel a tug on their wrist.
- After a few seconds, ask the student: Who felt a tug? (Everyone should have.) What does that tell you? (Even the smallest, most insignificant creatures are important to the well being of life on Earth—EVERYTHING IS CONNECTED!) Does that include little creatures? (Yes, of course.) Does that include us? (Yes) You mean WE NEED little creatures? (Yes)
- As a way of releasing the web, ask the students what would happen if our primary source of energy (sun) were to disappear? (Most students will guess right—everything would die.)
- To demonstrate, have the “Sun” drop the ball of yarn, and unwrap the yarn from his wrist and let it fall. Instruct the other students that if they lose the bridge that connects them to any other component, they should also unwrap their wrist and let the yarn fall. (Everyone should drop the yarn.)
- Ask them, What happened? (We all died.) What does that mean? (We all need the Sun and all the other critters to successfully survive on this planet.)

WRAP UP Ask the students if anyone has learned to like little creatures any better than they did before today.

- Restate that little creatures are a vital part of life on Earth and fascinating to study. Encourage the students to continue learning about little creatures. They'll be amazed at what they find.
- Have a volunteer help wrap up the all of yarn.
- Congratulate them on their excellent sleuthing work.

What is an Insect?

Some animals are very big and some are very small. But there is one type of animal that is often very, very small. In fact, this animal is sometimes so tiny that you hardly notice it—until it lands on your arm or bites your leg! Do you know this animal's name? ■ Yes, we call some of these animals bugs—water bugs, bedbugs, stink bugs. But scientists call these bugs insects!

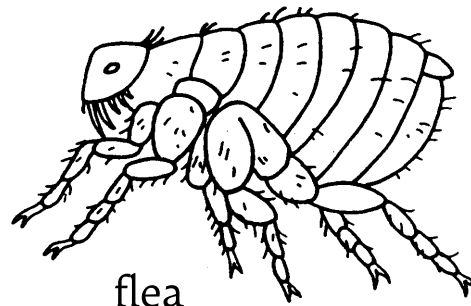
All insects have six legs. Some insects have two wings and others have four wings. All insects have two feelers on top of their head. These feelers are also called antennae (an-ten-i). an insect uses its antennae to feel things, to smell things, and sometimes even to hear things. Insects also have tiny hairs all over their bodies to help them feel. Insects are different than people because they have no bones inside their bodies. Instead, they have a tough skin on the outside to protect them, and underneath that skin is an even tougher shell that is like armor.

People breath through two little holes in their nose called nostrils, but insects breathe through small tubes on the bottoms of their bellies! How do you think it would feel to

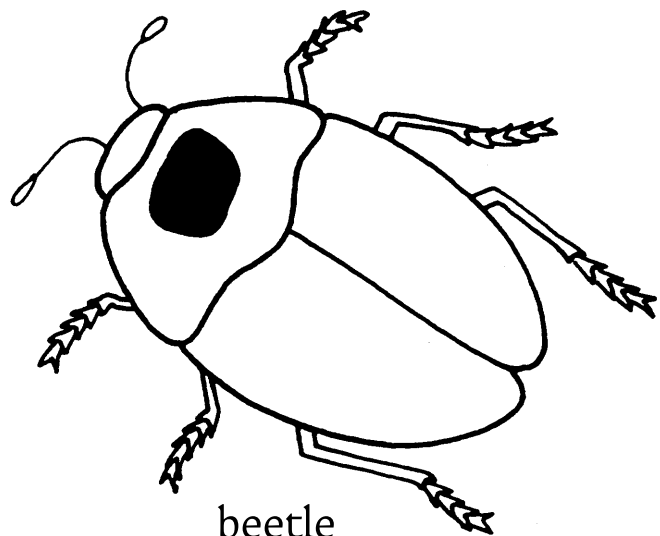
breathe through your belly button? ■ Try it. Can you do it? ■ Of course not! Only insects can. Most insects have two large eyes, but a few insects have even more than two. However, insects can't see very well at all.

There are nearly one million types of insects, and they are all different. Some, like fleas, are as tiny as freckles; and others, like walking sticks, are as long as your whole finger!

Big or small, fast or slow—all insects are part of nature's plan and can help people in many ways. Aren't we lucky to be able to share the earth with such interesting animals?

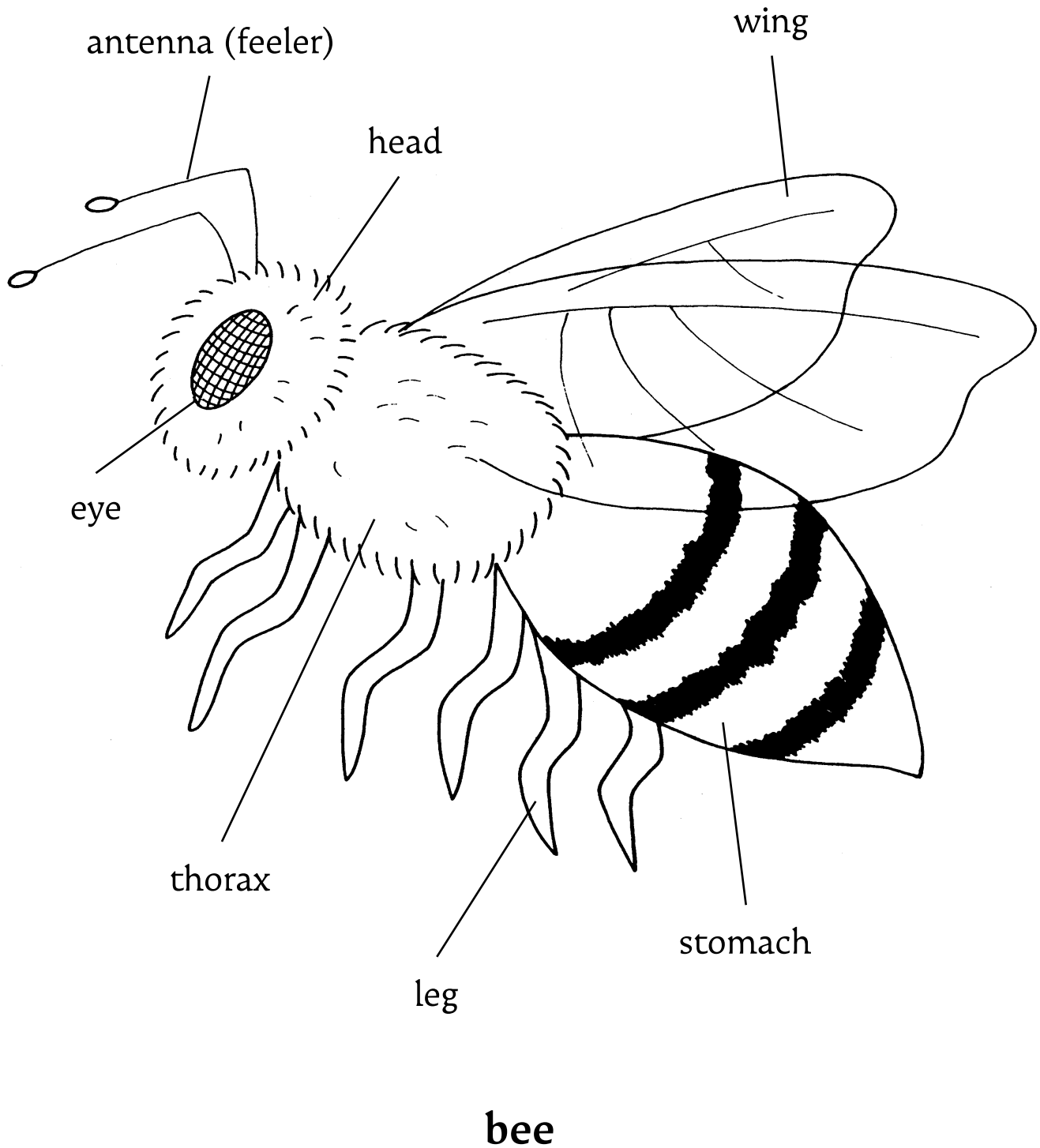


flea

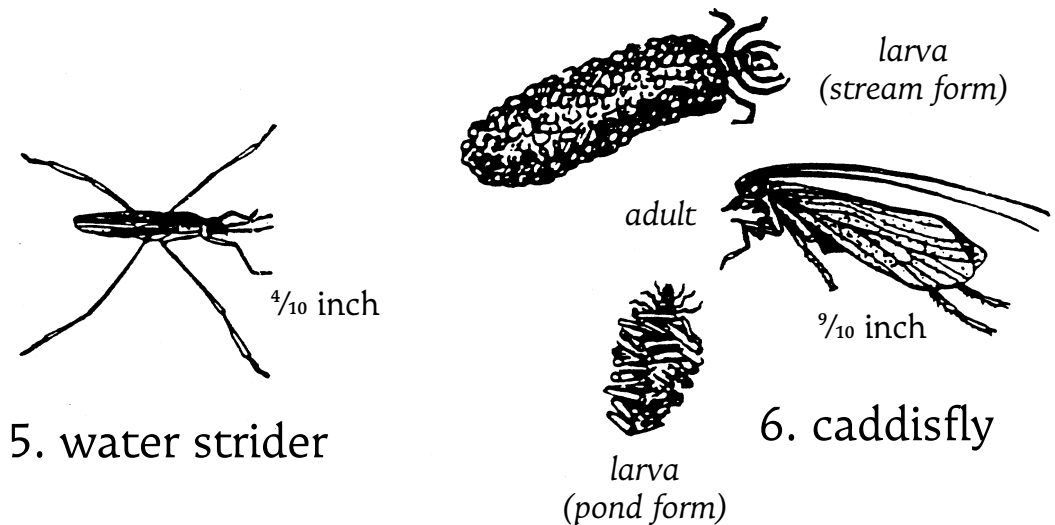
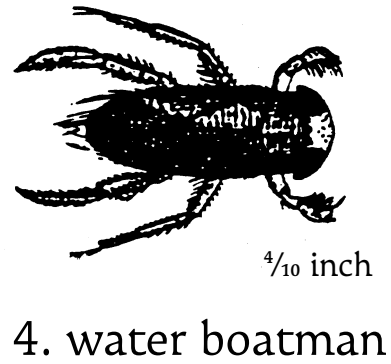
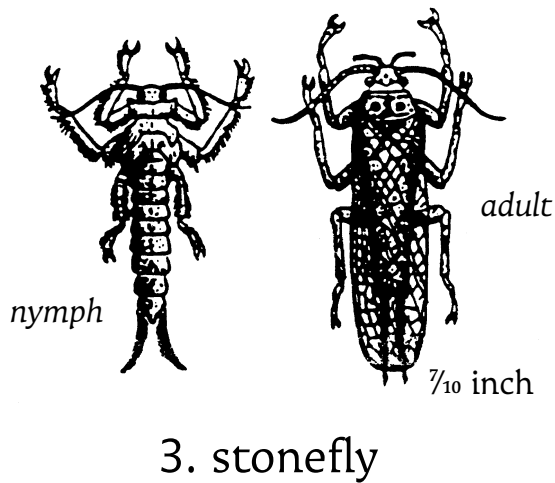
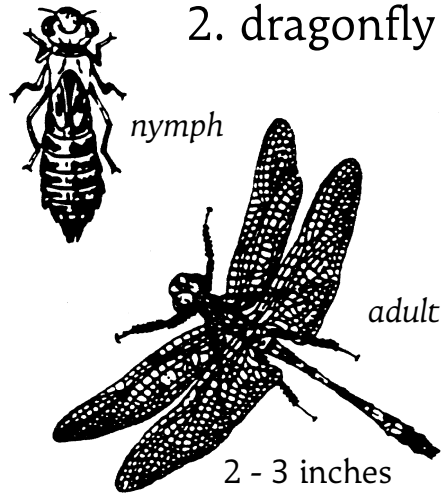
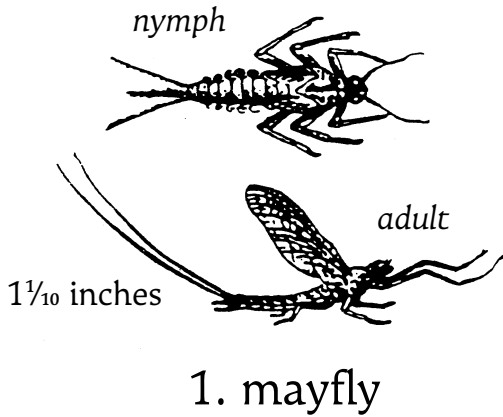


beetle

Anatomy of an Insect



Aquatic Insects

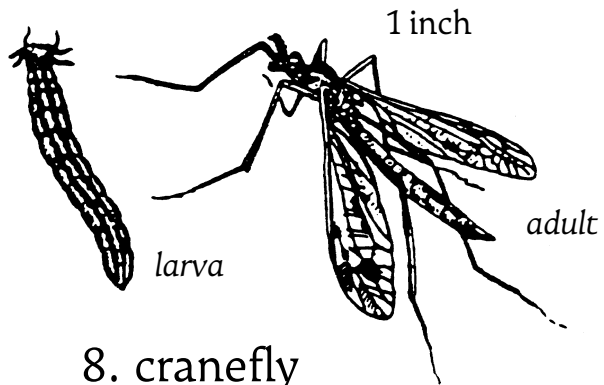


Aquatic Insects



$\frac{6}{10}$ inch

7. whirligig beetle

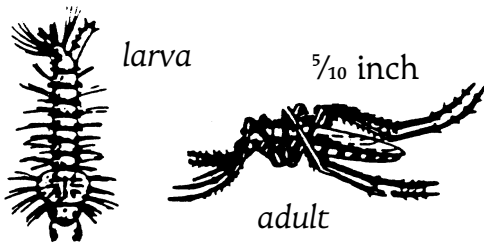


1 inch

larva

adult

8. cranefly

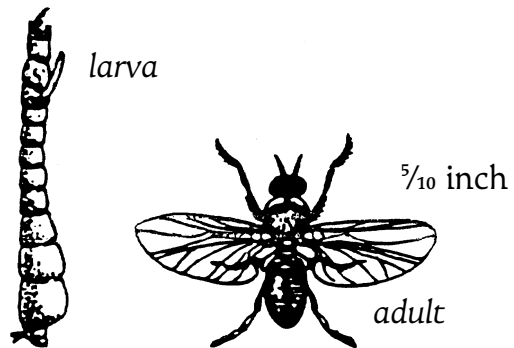


larva

$\frac{5}{10}$ inch

adult

9. mosquito

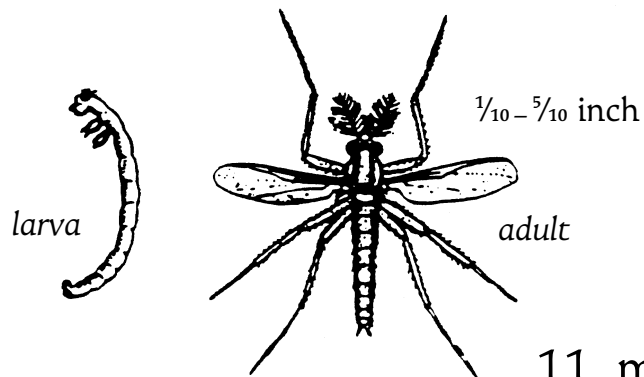


larva

$\frac{5}{10}$ inch

adult

10. blackfly



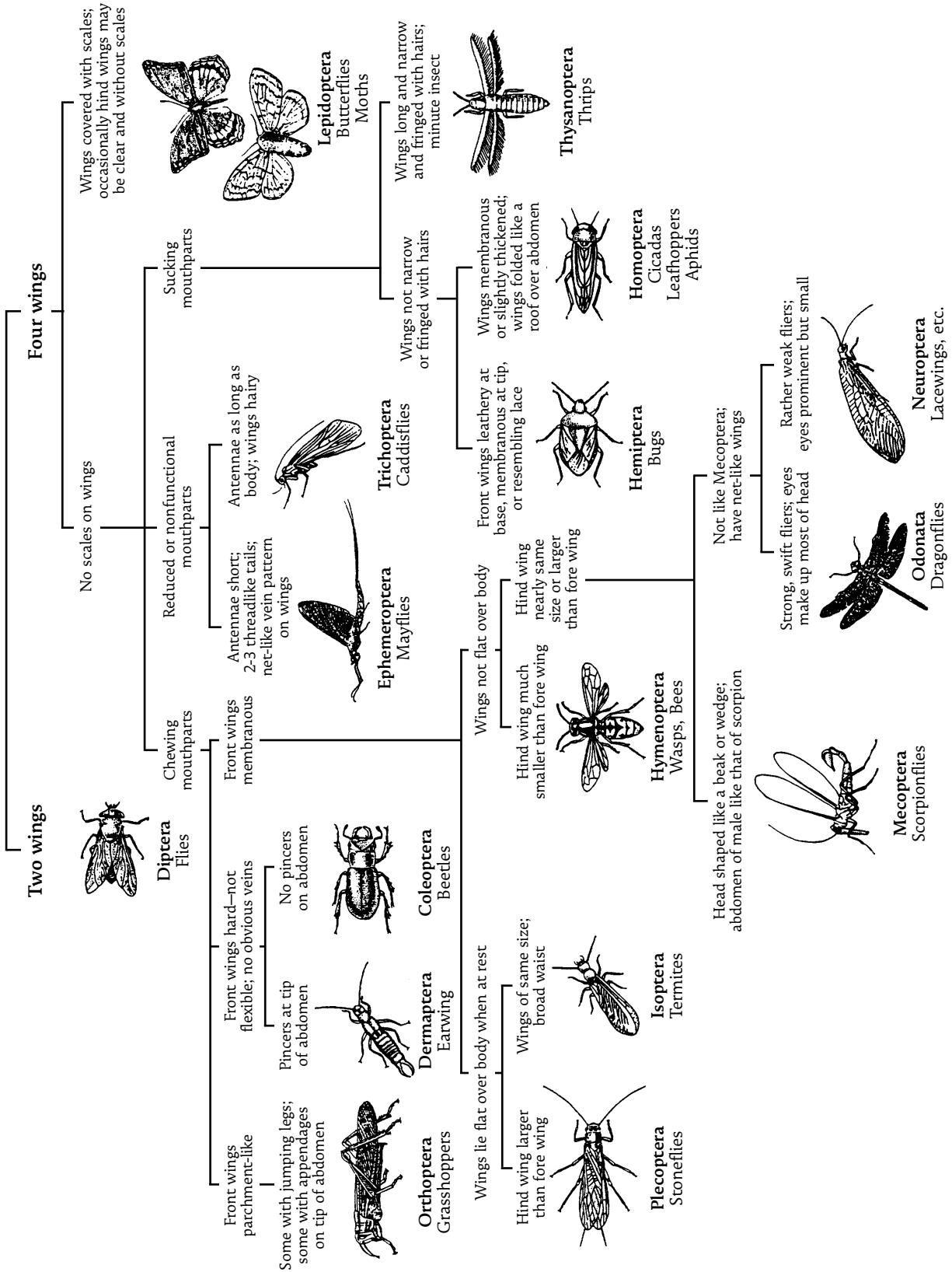
larva

$\frac{1}{10}$ - $\frac{5}{10}$ inch

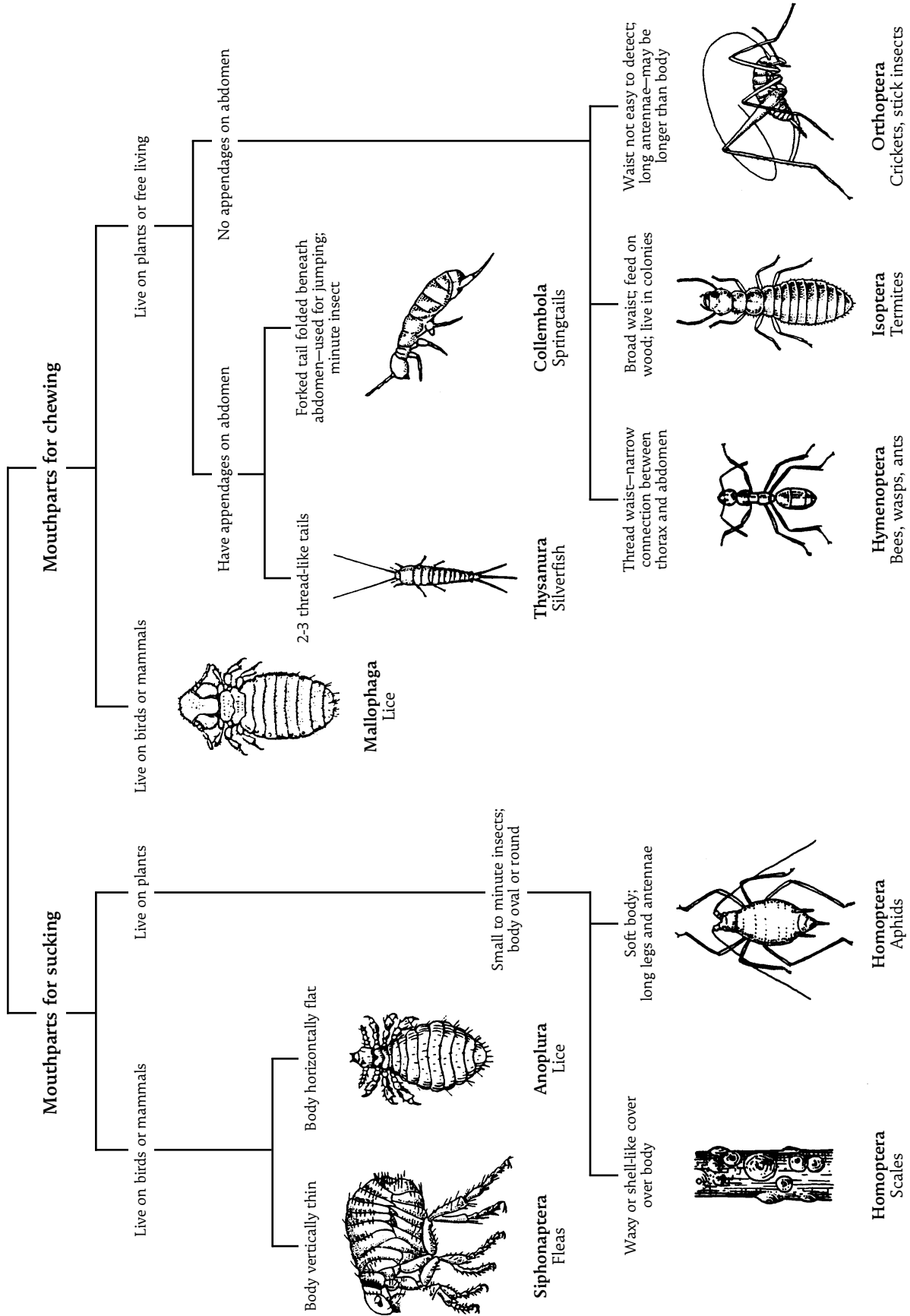
adult

11. midge

A Key to Winged Insect Orders



A Key to Wingless Insect Orders



Pathways to Discovery

Tree-mendous





Tree–mendous

TIME 3 hours

OBJECTIVES To familiarize students with the structure, function and importance of trees.
To develop identification skills.

METHODS Students will examine trees closely; they will “build” a tree to learn parts and functions. They will use a key to identify trees, play an active game to learn about growth needs and participate in a creative writing activity. This unit can be taught during one hike or broken up into smaller hikes and used on several days. The games and activities may also be used independently.

BACKGROUND This Unit is designed to be a follow-up to the fifth grade Silver Burdett Ginn Science Discovery Works textbook, Unit A, “Plants”. It can be used at any grade level or at any time.

MATERIALS Characteristics cards, riddle cards, blindfolds, tree key, tree needs game cards, tree adoption certificates, pencils, string (optional—for Record Trees activity)

CONCEPTS AND SKILLS Observation, cooperation, sensory awareness, problem solving.



Getting to Know a Tree

TIME 10 minutes

MATERIALS Characteristic cards

LEAD IN Start the introduction when you reach the beginning of the trail you are using for this lesson.

- Sit down in a circle before going into the woods.
- Explain to the students that during this lesson as they are walking along the trail, they will be asked to be very observant, to think, and to really let their imaginations go wild sometimes.
- Ask the students for some ideas about why trees are important. How do we use trees?
- Ask students if they have ever experienced a situation where they have been at a place where they didn't know anyone (i.e. moved to a new area, new class, etc.) How did they feel?
- Explain that for most people, walking into the forest is like entering a crowd of unknown people. During this lesson the students will be introduced to some of the members of this interesting community.

PROCEDURES Explain that just as people have characteristics that help us recognize individuals in a crowd, so do trees.

- Ask them for examples of characteristics trees have that could help us identify them.
- As they mention specific qualities, hold up the card that has that characteristic and read the description on the back concerning that attribute.
- Go over the characteristics that they fail to mention

The following Characteristic Cards should be included: BARK, LEAVES, SHAPE & SIZE, FLOWERS & FRUITS OR SEEDS, ROOTS, LOCATION, TWIGS, EVERGREEN OR DECIDUOUS.

WRAP UP Tell the students that as they begin to walk into the forest they should keep these characteristics in mind and begin to notice how the trees are different.

Characteristic Cards

Bark

The bark may be smooth or rough; it also may have special patterns or be a certain color. It may look different on various parts of the tree.

Leaves

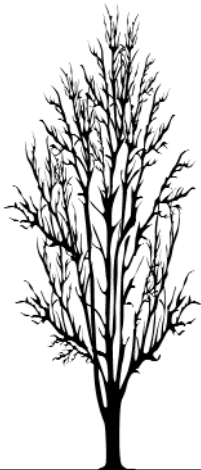
When they are on the tree, leaves tell us a great deal. Their shape is important, but so is their size, color, and number of leaflets. Sometimes what looks like a single leaf is just part of a large compound leaf. The way that they are arranged on the twigs (opposite versus alternate) is also important.

Shape & Size

Trees are shaped differently, just like people. Some kinds are crooked while others are straight. Some only grow small while others can grow very tall.

Flowers, Fruits & Seeds

Most trees have flowers of some kind, even though they may be very small. When the flower matures, it becomes a fruit that contains seeds. Often flowers, fruits or seeds are present on a tree.



Roots

Roots act as anchors for the tree. They transport water and nutrients to the leaves. During the winter, they store the tree's food. Some grow along the ground surface while other penetrate deep into the earth.

Location

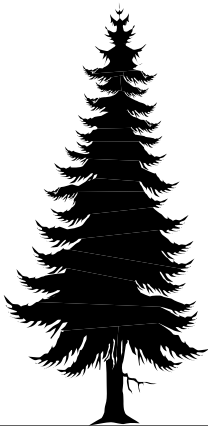
Some trees like warm, dry places, while others like cool, wet places. Some are found near water and others are found in open fields. In the mountains, different trees are found at different heights or elevations.

Twigs

The twigs of the tree are helpful in the winter. They have buds that are different shapes and they have scars from where the leaves were attached that can show us how the leaves were arranged. The twigs may also be colored.

Evergreen or Deciduous

Some trees lose their leaves in the fall. Others that have tough, leathery or waxy leaves will keep theirs year-round. This can help us identify many plants.





Tree Parts Riddles

TIME 20 Minutes

MATERIALS Riddle cards

LEAD IN After walking into the forest for a short distance, ask the group to look around them at the different trees that make up that community.

- Explain that in addition to knowing the different characteristics of trees, they should also think about what those characteristics do for the tree.
- Tell them that they will be playing a riddle game to get them thinking in this way.

PROCEDURES Select a student who would like to read the first riddle to the group (the Tree Riddler).

- Explain that each riddle contains several clues about a specific characteristic and its purpose.
- As the clues are read, the other students should find an individual tree to stand beside.
- When a student thinks he/she knows what characteristic is being described, it should be pointed to on the tree but do not call it out.
- The Riddler should pause after each clue, but by the time the last clue is reached, all the students should have it figured out.
- The Riddler then shouts, "AND WHAT AM I TALKIN' ABOUT?!"
- The group responds by shouting the answer (i.e. "ROOTS!!!!").

WRAP UP After all the riddles have been read or before the students become restless, gather the group together.

Ask the students to briefly share what things they have learned about trees that they didn't know before.

Riddle Cards

1. I am an unopened package.
2. I am often covered with scales.
3. I will someday be a leaf or a flower.
4. I am on the tree year-round.
5. I am found on the tree's twigs.

What am I talkin' about?
Buds

1. You'll only find me at certain times of the year.
2. I can be very large or very small.
3. I start out as something else.
4. I am eaten by many animals, including humans.
5. I can help to grow more trees.

What am I talkin' about?
Fruit or Seeds

1. I am not fond of heights.
2. I am not often visible.
3. I have "hair".
4. I help keep the tree standing.
5. I am very thirsty.

What am I talkin' about?
Roots

1. I am young but important.
2. You can tell a lot by looking at my scales.
3. I am on the tree all year.
4. I am where the buds and leaves hang out.
5. I grow from the ends of the branches.

What am I talkin' about?
Twigs

1. I'm dead on the outside, but alive on the inside.
2. I come in many colors.
3. Protection is my job.
4. Some would say I am the tree's skin.
5. Dogs also have this.

What am I talkin' about?
Bark

1. The tree needs me and I need the tree.
2. I am a factory.
3. I help feed the tree, both when I am alive, and when I am dead.
4. My job is photosynthesis.
5. Check me out in the fall!

What am I talkin' about?
Leaves



Build a Tree

TIME 20 minutes

LEAD IN Hike to a place where trees abound but pick a fairly open spot, with all the students on one edge of the area. Explain that each person will be a part of a tree and together they will “Build a Tree”!

PROCEDURES Choose about two people to be the heartwood (also called xylem). They come to the center of the area and stand back to back. Ask what the heartwood is and its function. (It is the dead inner part of a tree that lends support.) The heartwood children are to stand tall and strong and come up with a noise to depict their function and practice it together.

- Next, ask for volunteers to be roots. Have these two or three people lie on the ground with their feet up against the heartwood. Ask their function. (To absorb water and nutrients up the tree from the roots like thousands of tiny straws.) Have them develop their sound to depict their function and practice it once. Repeat the heartwood’s sound too.
- Now have more students form a combination cambium/phloem ring around the sapwood. Ask the purpose of the cambium (a ring of growth cells that adds new xylem and phloem thereby expanding the tree’s girth) and the phloem (a layer of conducting cells outside the cambium which transports food from the leaves to the rest of the tree cells). Have these students create a noise as well. Repeat all the sounds.
- Next comes the outer protective layer—the bark. These students join hands and encircle the whole tree. Ask what the bark’s function is (protection). From what might it be protecting the tree (fire, insects, pocket knives, etc.)? Have them decide on a noise as well.
- Now that your tree is constructed, let it “live”. Have each component do its job (make their noise). Pretend to be a bug trying to attack the tree and the bark has to fend you off. Or tell them that it is winter and ask who does their job now? Disband the tree by pretending lightning has hit it and shattered it to pieces.

WRAP UP Quiz the students by having each section shout out the tree part you are thinking about. Who protected you? (Bark!) Who absorbed water from the soil? (Roots!), etc.



Tree Meeting

TIME 20 Minutes

MATERIALS Blindfolds

LEAD IN After hiking a ways, find an area with a variety of trees, not too much underbrush and where the terrain is not steep or treacherous. Explain that the students will be getting to know a tree by using all of their senses—except sight!

- PROCEDURES**
- Demonstrate the following procedure with one student in order to stress the importance of careful leading techniques and to explain the activity.
 - Be sure to point out hazards.
 - Have the “sighted” person from each pair blindfold his/her partner.
 - Have the sighted person lead the blindfolded partner safely to any tree within the teacher’s sight.
 - Sighted person helps the blindfolded person explore the tree by suggesting the following:
 - Rub your cheek against the bark.
 - Is the tree dead or alive?
 - Can you put your arms around the tree?
 - Is the tree older than you?
 - Are there plants or animals living on the tree?
 - Can you reach the lowest branch of the tree?
 - What is on the ground below the tree?
 - What does the tree smell like?
 - What animals could or could not climb the tree?
 - From the texture of the bark, leaves, etc., give this tree a name.
 - Etc.
 - When the blindfolded partner has finished exploring, he/she is led back to where they began.
 - Remove the partner’s blindfold and have him/her find the tree explored.
 - Let the students switch roles so everyone has a chance to Meet a Tree.

WRAP UP After the blindfolds are taken off, ask if everyone found his/her tree. Was it difficult? How did you recognize it? Are all trees different?



Boots Keys

TIME 20 minutes

MATERIALS Chalkboard and chalk or large flip chart and markers

LEAD IN If you were out on a hike and saw something that interested you, but did not know what it was, how would it be identified? How would you find out what a particular fern, tree, rock, mushroom or flower was called in order to find out more about it? (Look in a book called a field guide). Let's look at how these work by making one.

PROCEDURES Have the group sit down in a circle.

Tell them: a field guide is like a puzzle with lots of clues. These puzzles are called "keys". The clues help us work through a puzzle (the key) until the name of the item is known; then we can find out more about it. Finding out the name of the object from a good field guide is like trying to find your way around an area with good signs. Every time you get to a road junction, you must read the signs and decide where to go next. If you take a wrong turn, it's not a big deal, but you may have to backtrack in order to get to the right place.

- Let's make a key in order to better understand how they work.
- Ask each student to contribute one boot or shoe. (You could use writing instruments such as pens and pencils if the weather is cold.) Assemble all of these items in the center of the circle.
- Have someone write down the key as it is devised.
- Start by selecting the most obvious differences to separate the items into two groups. (i.e. boots vs. shoes; pencils vs. pens). Remember, which categories we choose are up to us since we are making the key. Scientists use their own judgement in deciding which categories to use, but the goal is to make up a simple and easy to use key.
- Label these groups 1A and 1B. For example, 1A—it's a boot. 1B—It's a sneaker. (There should be two "mutually exclusive" categories.)
- Have the students pick out other characteristics (color, shape, size, etc.) of group 1A which can be used to further subdivide the group. This will be labeled 2A and 2B. (Example, 2A—It's brown. 2B—It's not brown.)
- Continue this process until all of group 1A and all of group 1B is separated to the individual items. Each division should tell the key reader what the next step is to be or what the item is. For example, 1A—It's a boot, Go to 2. 2A—It's brown, the boot is Tom's.

-
- Once the key is completed, you'll want to test it out.
 - Have a student select an item and take it through the key to find out how easy (or difficult) it is to use their key. They will then return the item to the owner and it will be that person's turn to key out an item.
 - Continue around the group until everyone has used this simple key effectively.
 - If they are able to name the item correctly, they are ready to go on. If not, they need to find out where the problem is.

WRAP UP Ask the students how or why the key they have made might be easier to use than one in a field guide. (There are fewer items to identify, they are familiar with the items and know which one belongs to each person in the group.)





Identifying Trees with a Key

TIME 35 Minutes

MATERIALS Tree Keys

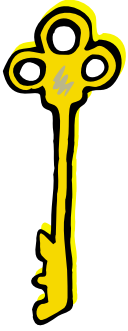
LEAD IN Go to an area where there are a variety of trees.

- Tell the students that now they are going to learn how to use a simple “KEY” which is like a puzzle that, when followed correctly, can “unlock” the identity of an individual tree.
- Pass out the tree keys. (If there are no leaves on the trees make sure you are using the winter key.)
- Explain to the students that the key is set up as a series of paired statements that the user must read and decide which one is the most true for the individual tree they are trying to identify. At the end of the truest statement should be a number indicating where to go next in the key. If they follow the key carefully, they should be led to the name of the specific tree.
- Use a tree as an example and go through the key with input from the group. Do this until most of them understand how the key works.

PROCEDURES Tell the students that they will now work in pairs to see how many trees they can identify. Each pair should properly identify at least two trees. (You can see which pairs can identify the most trees in a certain period of time, or challenge the group to find examples of ten different trees within the key.)

- Allow the students to go to work, coming to you with questions or their answers.

WRAP UP Gather the group together and ask if they are now able to recognize more characteristics in trees than they did before. Tell them that there are keys for animals, plants, and all kinds of things and that it can be fun learning to identify the individuals within a community.



Tree Key

1. A.) If the tree is an evergreen, go to 2.
B.) If the tree is not an evergreen, go to 4.
2. A.) If the twigs have short reddish hairs, go to 3A.
B.) If the twigs are hairless, go to 3B.
3. A.) If the needles are blue green on all sides; cones are egg-shaped, nearly round, less than an inch, it is a black spruce (*Picea mariana*)
B.) If the needles are sharply pointed with white lines on all sides; cones look like cylinders, it is white spruce (*Picea glauca*)
4. A.) If leaf is twice as long as it is wide, edges are finely toothed or without teeth, it is a willow (*Salix*)
B.) If leaves are less than twice as long as wide, finely or coarsely toothed; leafstalks are mostly more than 1/2 inch long, go to 5.
5. A.) If leaf edges are finely toothed with curved or rounded teeth, go to 6.
B.) If leaf edges are coarsely toothed with sharp-pointed teeth of two sizes, go to 7.
6. A.) If leaf blades are nearly round and less than 2 inches long with flat leaf stalks, it is a quaking aspen (*Populus tremuloides*).
B.) If leaf blades are longer than wide with round leaf stalks, leaves pale green underneath, it is balsam poplar (*Populus balsamifera*).
7. A.) If leaf edges are not lobed and the white, papery bark usually peeling off, it is paper birch (*Betula papyrifera*).
B.) If leaf margins are finely toothed, the gray bark smooth with horizontal lines (lenticels), with dark brown cones in groups, it is an alder (*Alnus crispa*).

Winter Tree Key

1. A.) If the tree is an evergreen, go to 2.
B.) If the tree is not an evergreen, go to 4.
2. A.) If the twigs have short reddish hairs, go to 3A.
B.) If the twigs are hairless, go to 3B.
3. A.) If the needles are blue green on all sides; cones are egg-shaped, nearly round, less than an inch, it is a black spruce (*Picea mariana*)
B.) If the needles are sharply pointed with white lines on all sides; cones look like cylinders, it is white spruce (*Picea glauca*)
4. A.) If the winter buds are covered by a single scale, and the leaf scars and twigs are arranged singly, it is a willow (*Salix*)
B.) If there are winter buds with two or more scales exposed, go to 5.
5. A.) If winter buds are resinous or sticky, shiny brown, long and pointed, with lowest bud scale centered over leaf scale, go to 6.
B.) If winter buds are not resinous or sticky, and lowest bud scale is at side of bud, go to 7.
6. A.) If winter buds are an inch or less in length, slightly or not resinous, it is quaking aspen (*Populus tremuloides*).
B.) If winter buds are 3/8 to 1 inch long and very resinous, it is balsam poplar (*Populus balsamifera*).
7. A.) If winter buds are mostly stalked, and the bark usually gray with old, hard blackish cones usually present, it is alder (*Alnus crispa*).
B.) If winter buds are not stalked, the fruits not cone like, and the bark papery white, usually peeling off, it is paper birch (*Betula papyrifera*).





Record Trees

TIME 10 minutes

MATERIALS Tape measure, paper and pencil

LEAD IN Now that the students are familiar with the methods of measuring trees, extend their observational skills with the following activity. Challenge the students to be looking for trees that are the “Granddaddies” of the forest. These trees will have the greatest circumference—the measurement around the tree.

PROCEDURES Show the students a tape measure and explain that, if during the lesson someone sees a tree that they think might be a “granddaddy,” the group can go and measure it. The group should identify the tree, measure its circumference at chest height, and list its location.

WRAP UP Did the students observe any “granddaddy” trees? Why are there not very many? Do they think there will be more? Why or why not?





Tree Needs

TIME 20 minutes

MATERIALS Colored cards or chips to represent the following: green—carbon dioxide, yellow—sun, blue—water, brown—minerals from soil.

LEAD IN Walk down the trail in search of a fairly large open area. Explain to the students that now that they have learned to recognize some of the individual trees, they will be exploring what it feels like to be a tree.

PROCEDURES Position students in a straight line on one side of the playing field. That line will be their base. When students are lined up, explain that you are Mother (or Father) Nature and that each one of them is a seedling (a young tree).

- Ask students what trees (or plants, in general) need to survive (water, minerals from the soil, sunlight, and carbon dioxide). Show them the cards representing these items. As Mother Nature, you have scattered the items needed for their survival on the ground. Ask what happens to a tree if it doesn't receive one of these four items (it dies).
- Explain that each tree needs only one card of each item to survive. After you say, "GO," they may go and pick up cards. When they have one of each card they should return to home base.
- When everyone has returned, ask students who survived (got one of each card). This is their first year's growth.
- Before playing another round, ask students to look at the availability of necessary items (number of cards left). Discuss what they think will happen during another year (many trees will die because of lack of necessities).
- Play another round. Again ask how many survived. Those who did not survive should step forward. Ask students what happens to trees when they die (fall down, decay, turn back to soil). The nutrients of a dead tree are returned to the soil, so those "trees" that die should scatter their cards in the playing area. (Dead trees can be "replanted" or just sit out until the end of the game.)
- If they are replanted, ask the students what trees would have the advantage, the young ones or the older ones? (Older ones, because they have deeper roots, and are taller.) To demonstrate this, allow the "older trees" to take one or two steps forward.
- Play another round and see how many survive. After one or two rounds of replanting, have the "dead trees" sit out until just a few are left.

WRAP UP Gather the group together. Ask students, what do trees need to survive? Do all trees get everything they need? Which trees have the advantage for survival? How does this help the forest?



Zoom

TIME 20 minutes

MATERIALS Journals or notebooks, pencil

LEAD IN During this activity, students will be involved in a series of activities which use their senses and can help them to be more aware of our environment.

PROCEDURES Ask students to look around and find an object (i.e. boulder, tree) approximately 100' away from them. (It can be on or off the trail.) Have them write observations about that object in their notebooks.

- Tell students to walk halfway to their object and again write observations.
- Continue hiking until the object is reached. Write observations.
- Have students make a poem about their object using some of their observations.

WRAP UP Explain that perception plays an important role in expression. Using their objects as examples, discuss how their perceptions differed between viewing the objects distantly and viewing them up close. How did they describe their objects? Take a few moments to share some of the poems.





Adopt-A-Tree

TIME 30 Minutes

MATERIALS Certificates, tree keys, tape measure, pencil

LEAD IN Tell students to select a tree that is appealing or attractive to them because they will be adopting this tree and calling it their own for this activity. Explain to the students that they should be open-minded when adopting their tree and try to be aware of every aspect and detail of their encounter.

PROCEDURES Walk along the trail until you reach a place large enough for the group to easily get off the trail and spread out into the forest.

- Set boundaries for the students, allowing them some space, but also keeping them in sight.
- Ask the children to go to the tree they wish to adopt. (Ask that students not share trees.) Tell the students to fill out their tree adoption certificate. Give the students sufficient time to allow them to complete their worksheet. (Approximately 15 minutes.)
- After they have finished, gather them together in a circle.

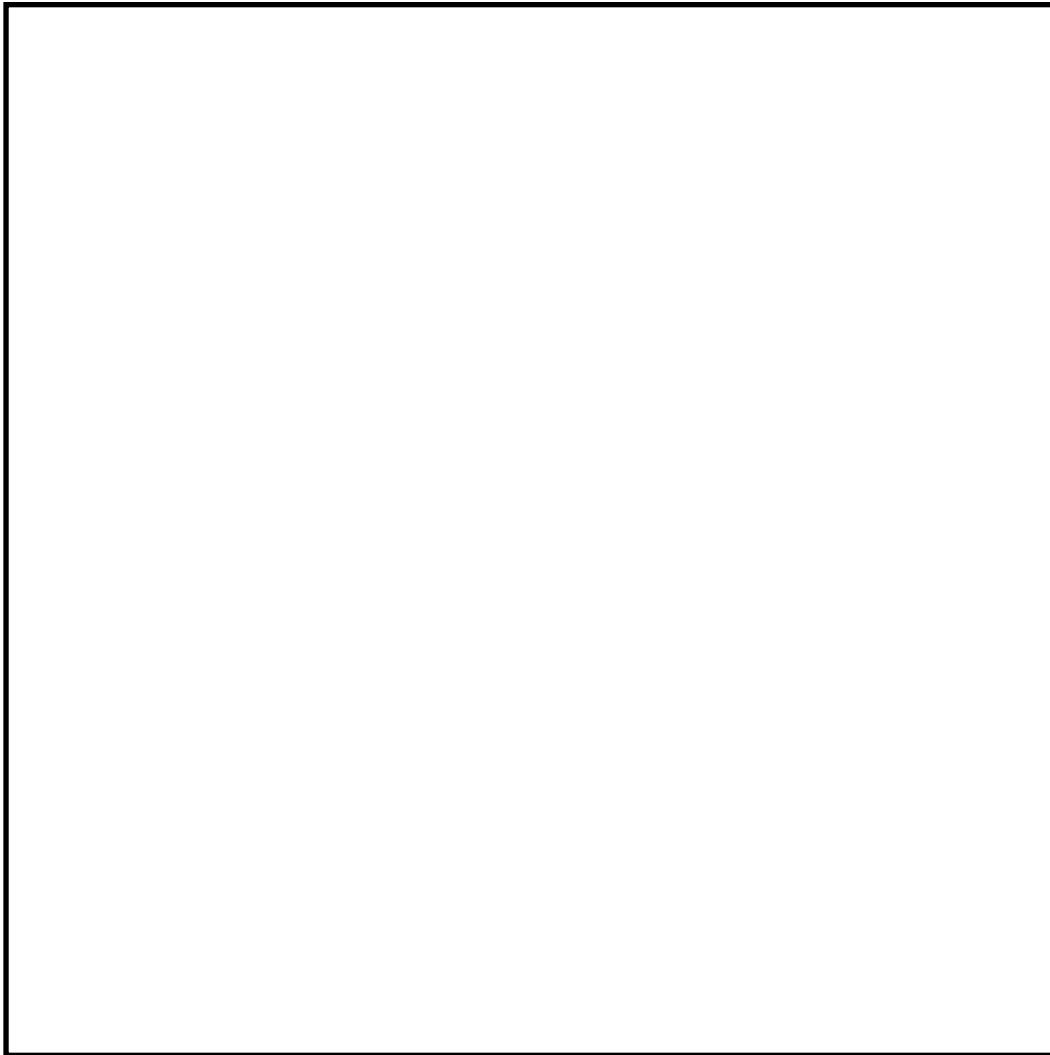
WRAP UP Have each student tell the group why their tree is different, and show the bark or leaf rubbing or tree sketch they made on the tree adoption certificate.

- Ask the group of students the following questions: Why did you choose the tree you did? Was your tree similar to any other trees that were adopted?
- Do the next activity here in the same spot or walk along the trail until another suitable spot is found.

WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE

hereby certifies that

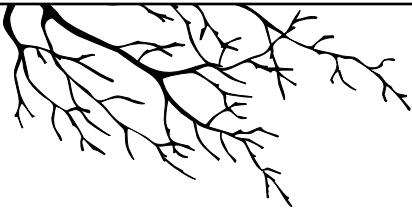
has officially adopted this tree
on the ____ day of _____, 20__



Bark rubbing, leaf print, or tree drawing

Type of tree _____ Approximate height _____ Circumference _____

Reason for Adoption _____



Muir's Trees and Writing Activity

TIME 30 minutes

MATERIALS Journal or paper and pencil

LEAD IN Explain to students that throughout time many people have gone to the woods for retreat and to be inspired. Trees have provided inspiration for many people. What is it that makes trees impress and inspire us so? Ask them if they know who John Muir was.

PROCEDURES Read the following story about how John Muir gained his inspirations:

John Muir: Nature's Visionary

"I have not yet in all my wanderings found a single person so free as myself," he confided to a friend. Of all American naturalists, Muir was the wildest; he was also the most active, the most self-reliant, and the most persuasive, probably because his knowledge came from nature, not simply from books. In the endless pursuit of wisdom, John Muir rejected creature comforts, preferring instead to live on "essences and crumbs." His beard and hair grew shaggy; his clothes became equally scruffy. But Muir's rough-hewn exterior and free-form life-style never prevented him from succeeding. He lived his own life, following the direction of his heart for good or ill—and yet he still brought lasting changes to the world.

Whether camping among the sequoias or scaling an unclimbed peak, Muir went alone, continually exposing himself to what others might consider unthinkable dangers: avalanches, bears, frostbite, isolation, fierce storms. But to Muir, such dangers were merely grand opportunities to explore the mysterious natural world that served him as both laboratory and temple. When a winter storm descended on the Yuba River valley of northern California, he "lost no time in pushing out into the woods to enjoy it." Nature's raw power fascinated him with scenes of "pine six feet in diameter bending like grasses." Falling trees crashed about him. "The air was mottled with pine tassels and bright green plume, that went flashing past in the sun-light like birds pursued." But that was not enough; the wild-spirited Muir needed to immerse himself in the storm's very heart "and get my ear close to the music"—and so he climbed a hundred-foot Douglas fir tree, its wind-bullied top "rocking and swirling in wild delight." Here he spent much

of the afternoon, captivated by “so noble an excitement of motion.” Yet Muir’s senses tuned in to the wonder as well as to the terror. From his lofty perch he sorted out faint fragrances borne on raging gusts. “Winds are advertisements of all they touch,” he noted, his nose telling him that “this wind came first from the sea, rubbing against its fresh, salty waves, then filtered through the redwoods, threading rich ferny gulches, and spreading itself in broad rolling currents over many a flower-decorated ridge of the coast mountains, then...into these piney woods with the varied perfume gathered by the way.” Such sensitivity of feeling and thought deepened throughout Muir’s life, reflecting a delightfully child-like wonderment, not only in storms but in anything wild. A single flower, a bumblebee, a foamy waterfall all were to him great marvels, each a tiny but indispensable part of nature’s grand harmony. And so he never tired of climbing the next ridge—or of campaigning for its preservation. In his day, many people considered the wilds valuable only for their own gain. John Muir began to open their eyes. “The clearest way into the Universe is through a forest wilderness,” he would preach. “Climb the mountains and get their good tidings. Nature’s peace will flow into you as sunshine flows in trees. The winds will blow their own freshness into you, and the storms their energy, while cares will drop off like autumn leaves.”

—From *John Muir’s Wild America* by Tom Melham
Published by: The National Geographic Society, 1976

WRAP UP

After reading the story, give students a sheet of paper and ask them to find a comfortable spot near a friendly-looking tree (possibly the tree that they have adopted) or do this back in class. Ask them to write a story, a poem or just some of their thoughts about trees. If they are having trouble, give them one of these starting ideas to finish: Trees are important because... If I were a tree I would tell the world... I wish I were a tree because... A tree is like a...

Gather the group back together and encourage students to share what they have written about trees. Ask them if they think our planet is caring for its trees like it should. How could we do better at caring for our trees and forests?



Tree Riddles

1. What tree always sighs and languishes?
2. What tree is made of stone?
3. What tree is pulled from the water with a hook?
4. What tree is particularly useful in snow and rain?
5. What is the straightest tree that grows?
6. What tree is older than most other trees?
7. What tree do ladies wear around their necks?
8. What tree runs over the meadows and pastures?
9. What tree is often found in people's mouths?
10. What tree does everyone carry in their hand?
11. What tree is the neatest tree that grows?
12. What tree is found after a fire?
13. What tree wages a war on crops?
14. What tree is an awful grouch?
15. What tree grows nearest the sea?
16. What tree always has a partner?
17. What tree grieves more than any other?
18. What tree is often found in bottles?
19. What tree is worn in the orient?
20. What tree describes a pretty girl?
21. What tree is used in kissing?



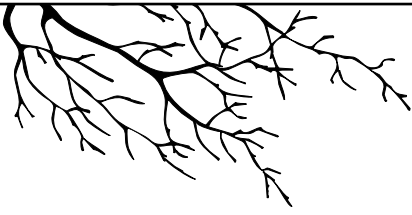
1. pine, 2. lime, 3. bass, 4. rubber, 5. plum, 6. elder, 7. fir, 8. yew,
9. gum, 10. palm, 11. spruce, 12. ash, 13. locust, 14. crab, 15. beech, 16. pear,
17. weeping willow, 18. cork, 19. sandal, 20. peach, 21. tulip



Pathways to Discovery

The Boreal Forest in Winter





The Boreal Forest in Winter

TIME 3 hours

OBJECTIVES Students will gain an appreciation for and understanding of the winter season and the adaptations that plants and animals must make in order to survive this most challenging Alaskan season.

METHODS Students will participate in sensory awareness activities and games in order to more fully experience and understand the forest in winter.

BACKGROUND This lesson is designed to show that the forest is still a living place, even in winter. Many think that with colder weather there is nothing to see and no beauty to appreciate. By close inspection of the many small parts of the forest, the big picture can be seen through different eyes and the wonder of Wrangell-St. Elias National Park and Preserve is revealed.

MATERIALS Globe, Tracks and Traces chart, Twig Clues chart, Winter Whereabouts Role Cards, MASH cards (animal role play), warm clothes for winter hiking, paper and pencil.

**CONCEPTS
AND SKILLS** Sensory awareness, observation.



People in Winter

TIME 20 Minutes

MATERIALS Globe

LEAD IN Tell the students that today they will be exploring the Park in her winter coat. Ask them what they think of when winter is mentioned. Is everything dead and dreary? Is there anything to see? Look at what causes seasonal changes. Then go out and explore these questions further.

- By using a globe the teacher can demonstrate to the students how the earth tilts as it rotates around the sun. When the Northern Hemisphere tilts away from the sun it is winter and when it tilts towards the sun it is summer. This also explains why the United States has winter while Australia has summer. Closer to the equator there is less seasonal change.

PROCEDURES Ask the students to identify some ways in which people prepare for the winter. What are some adaptations that people make in order to survive winter? (i.e. put on weight, insulate your house, wear more clothing, migrate).

- Be sure to make the distinction between physiological adaptations and behavioral adaptations. Ask the students do these adaptations produce heat? (Generally no, heat for the body is produced from the energy given by foods. Most adaptations hold in heat, but do not produce it.)
- Ask the students: Does anyone know what the following phrase means? “When your feet are cold, put on a hat!” (Our brains receive the most blood and oxygen in our body, so by putting on a hat we keep our head warmer and in turn our feet feel warmer.)

WRAP UP Explain that the group will be going outside on a hike and that being warm-blooded, we need to remain warm so we have to put on our adaptations (coats, hats, gloves, boots, etc.)





Tuning Into Winter

TIME 10-15 Minutes

MATERIALS None

LEAD IN Tell the students that they will be asked a few questions as they walk or ski to the trail. (These questions help the students “tune in” to winter and set the tone for upcoming activities.)

- Explain that winter is mostly a quiet time for nature, so in order to “tune in” to nature all students need to be quiet as they walk.

PROCEDURES Written below is a series of questions and statements you may ask the students during the hike to the trail.

- Look around. What are some things to see or feel today that cannot be seen or felt during the summer?
- Look around. Is winter everywhere? What are some clues? (snow, cold, cold wind, leaves off trees, creek is frozen)
- What colors are there in winter? (red berries, green evergreens, yellow grasses, white snow, gray birds, blue sky)
- Stop! With eyes closed, listen to the sounds of winter. What can be heard? (wind, birds calling, leaves rustling, creek flowing)

WRAP UP Now create a circle with the group and have each student share this thought: What does winter mean?

- Explain to the group that winter means many different things to different people. It is also true that feelings and understanding of winter will vary with location. People who go through the long winters of Alaska feel differently than people who live in the shorter winters of California.
- Now explain that just as people adapt to the winter around them, nature also adapts to the winter season.
- Explain that they are now going to look at how one part of nature adapts to the winter season.



Trees in Winter

TIME 15 Minutes

MATERIALS None

LEAD IN Ask the group, “Animals can move around or seek shelter to adapt to winter, but can trees move south or put on a coat?”

- Now ask the group, “If trees can’t move, how do they adapt to winter?” (Broad-leaf or deciduous trees become dormant and evergreens slow down their growth and keep most of their needle-like leaves.)
- Now ask, “With the trees as they are today, how could we identify a tree?” (Bark, buds, shape, location, branching—opposite or alternate.)

In the next part of these tree activities, the group is going to participate in a sensory awareness exercise with a tree. The teacher’s role will be to guide them through it by asking questions and leading discussion.

PROCEDURES First, find a large open area beside the trail.

- Next have each student select a tree that is within close hearing distance. (They will need to hear the questions so be sure to have them remain fairly close.)
- Once each has located their tree, remind them that the leader will be talking and they need to listen. Ask them to remain quiet and listen to directions.
- Now read each of the following statements, one at a time, and pause for a minute or two between each statement so students will be able to complete that task. (Students do not need to respond to the questions. Have them save their comments for after this exercise.)
 1. Look at the selected tree. What is its shape or silhouette? Is it round on top, flat, or have angles? Each tree has its own shape or silhouette, and winter is the best time to notice it.
 2. Hug your tree. How is it shaped? Does it feel round, odd shaped, or bent? Is the tree young, middle aged, or old?
 3. Touch the tree. How does the bark on the tree feel when touched? Is it rough, bumpy, or smooth? Each kind of tree has a different kind of bark and it is a good clue to identify a tree in winter.
 4. Smell the tree. What does it smell like? Smell the ground below the tree. Does it smell different?

WRAP UP Quietly gather everyone in a circle and have them share thoughts about their trees. Ask the students questions like: What was learned about the tree? How did it feel? Was there anything unique observed about the selected tree?



Twig Detectives

TIME 10 minutes

MATERIALS Twig Clue Chart

LEAD IN Tell the students that they will now be looking closer at one special part of the tree—the twig.

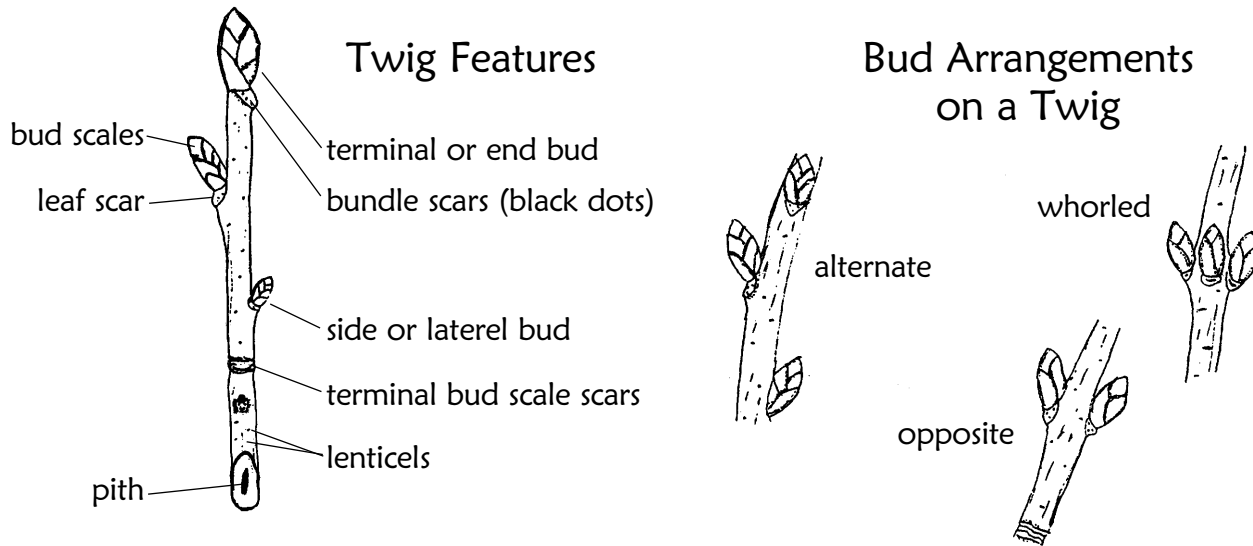
PROCEDURES Gather students together and point out the parts of the twig and its role with the tree. (The twig chart provided with this lesson will supply the necessary information for twig investigation. Advise students to be careful not to harm this live tree.)

- Use the Twig Clue chart and identify a tree with the group. **Note:** A Twig Key kit can be found in the unit box which may be obtained from Wrangell-St. Elias National Park and Preserve.

WRAP UP Gather students in a group and ask the following questions:

- What value are twigs to the tree? (They are the new growth for the tree because they hold the leaf and flower buds for the upcoming spring.)
- What are some adaptations trees make for the winter? (Broad-leaf trees become dormant and evergreens keep leaves and slow down growth.)
- How are trees valuable during the winter? (They provide cover and seeds for wildlife and they block wind around our homes.)
- When looking at these trees were there any signs of wildlife? What would be some signs of wildlife around trees? (Holes in trees, chewed nutshells, shredded bark, chewed twigs.)

Twig Clue Chart



A twig is a woody stem found at the end of tree branches. A twig is made up of:

Terminal or end buds are found at the end of the twig. One per twig. Usually point straight up and are larger than the side or lateral buds. Some tree species do not produce a true terminal bud so one of the side buds acts as a terminal bud.

Side or lateral buds are smaller than the terminal bud. These buds will produce smaller branches than the terminal bud.

Leaf scars found directly below the bud is the scar left by the leaf from the previous summer. This scar varies greatly in size and in shape.

Bundle scars are found on the surface of leaf scars. These small dots are actually sealed ends of tiny tubes that were open during the tree's active growing season. During the growing season sap passed through these tubes from the twigs to the leaves and then the leaf made food flow back to the growing parts of the tree.

Lenticels are cork-filled pores found on the bark of the twigs permit the green, living inner bark to breathe.

Bud scales are the coverings surrounding the bud that protect the bud from cold and from drying out. These coverings may be a second layer or several layers overlapping.

Terminal bud scale scars are the scars left when the bud scales from last year's terminal bud fell off. The bud scale scars encircle the twig. From the tip of the twig to the first bud scale scar is one year's growth. From the tip back to the second scar is two years' growth, and so on.

Pith is the soft, spongelike substance in the center of the twig. The color and shape of this pith when the twig is sliced crosswise is helpful for identification purposes with some species.



Winter Whereabouts

TIME 15 minutes

MATERIALS Winter Whereabouts Role Cards

Note: This role-play activity will involve students acting out animals and what each animal does to survive winter based on the MASH concept. This activity may be used in addition to the MASH card game or used as a separate activity. If both of these activities are used it may be helpful to walk on the trail for a few minutes with the students. This will allow the group time to stretch and warm up.

LEAD IN Tell the students that they will now have a chance to see what it is like to be a wild animal in the winter as they act out their behavior. These are animals not discussed yet so they will have to be observant to be able to guess what they are. They too live here in the Wrangell-St. Elias National Park and Preserve. Please keep the MASH methods in mind during this activity.

PROCEDURES First divide the students into groups of three or four depending on the number of students in the group.

- Now let each subgroup obtain a role-play card with their assignment on it. Ask the students to spend a few minutes studying the card and thinking of how they can act out or role-play this animal and its method of winter survival.
- After five minutes or so, gather the group back together in a semicircle. Explain to the students that as each group is demonstrating their animal and its strategy for surviving the winter, there is to be no talking.
- Have one group at a time stand in front of the main group and act out their animal and method of survival.

Once each small group has completed their role-play, ask the main group to guess which animal and method of survival the subgroup was portraying. Be ready to assist by helping to answer questions if needed. Continue these role-plays until each subgroup has completed their role-play.

WRAP UP State to the group: We have now seen that winter causes a lot of changes in people, trees, and wildlife.

Ask the students: Why are these changes made? (To ensure their survival.)

Now ask the group: How could we find the animals who are active today in this winter world? (Tracks, homes, food scraps, etc.)

Winter Whereabouts Role Cards

You have become a herd of caribou. You survive by eating lichen, grasses, sedges, mosses, and leaves of willow and birch. You require cool, windblown sites or snowfield in summer to escape insect harassment. In the winter, you migrate to find food and escape predators.

You have become a warren of snowshoe hare. You require a forest mosaic that includes early successional stages where branches of willows, birch, and aspen are found at heights you can reach. You survive by eating twigs of birch, willow and aspen. Demonstrate how you eat and how aware you must be of predators such as lynx, fox, great-horned owls, red fox, and coyote.

You have become a group of mice. You stay active all winter, constantly searching for seed and food. Demonstrate for the group who you are and what you do in winter.

You are a gaggle of geese. You don't like the winter cold and your food is running out, so you are going to head south. Geese, like you, migrate in a V-shaped pattern. Show everyone what you do in the winter.

You are a parliament of owls. Owls survive winter by hunting for rabbits and mice. You are active the entire winter. Demonstrate your talents so they may guess who you are and how you survive the winter.

You are a colony of bats. Your species of bat survives winter by hibernating in caves. Demonstrate to the group what you have become and how winter affects you.

You are a swarm of honey bees. You survive winter by gathering yourselves in a ball and moving your bodies to produce heat. You also eat your honey to give you energy. Demonstrate what you have become and how you survive.

You are a skulk of foxes. Being a fox you are quick and sly. You are a good hunter and you spend the winter staying active. Show who you are, but remember to be sly.

You are a descent of woodpeckers. Being a woodpecker, you stay active all winter in search of bugs in and on trees. Demonstrate your skills so the group can guess who you are and what you do to survive in the winter.



Tracks & Traces Detective Hike

TIME 30-40 Minutes

MATERIALS Tracks and Traces Clue List

Note: In this activity students will become detectives in search of clues that prove some animals do remain active in winter. “If You Don’t See Them...Animal Evidence”, located on pages 6-7, could be used to help answer questions along the trail.

LEAD IN Tell the students that they are now to become detectives in search of clues. Their task is to find clues that prove some animals do remain active during the winter.

Ask the group:

- What are some possibilities for clues they could find as they walk this trail? (Homes, food scraps, droppings, tracks.)
- Where do they suppose they could find these clues? (High in trees, beside a tree, next to a fallen log, beside a rock, and all around.)

PROCEDURES Explain to the group that they are going on a hike where they will become detectives in search of clues about winter wildlife. The guidelines written below will aid the winter detectives in their search for clues.

Detectives are:

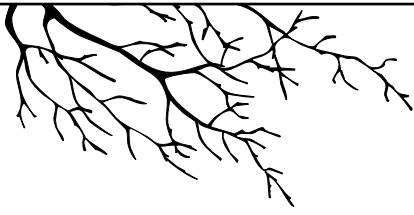
1. usually quiet so they can listen to the world around them for clues,
 2. careful with evidence, so they always return things to where they were found,
 3. quiet, if any animals are spotted so that they do not disturb the animal.
- Visit some soft snow along the trail to look for tracks.
 - Ask students why they should look for tracks in these places.
 - If someone in the group spots a clue or a piece of evidence that animals are around, share these questions with the group: What is it? Who was here? Who lives here? Where was it going? What might it have been doing?
 - Have a volunteer keep a written list of the signs of wildlife that found on the hike—include what it was (track, scat, etc.), where it was (beside tree, middle of trail) and maybe a possible note or two on what the animal may have been doing or where it might have been going. What evidence the groups find will depend upon the observation skills of the group, so keep everyone looking for clues of wildlife.
 - If the group has done well at being winter detectives and time allows, expand investigation into other habitats, like beside a stream or pond or in a field. Compare notes on what was found, where it was found, and any similarities or differences of clues between these different habitats.

WRAP UP Gather the group in a circle and ask them to share some thoughts about what they found on their detective hike.

Ask the group the following: With the evidence found on the hike, what animal evidence was seen?

- If this same trail is walked in summer, would more or less evidence of animals be seen? Why or why not? (More animals are busy in summer with gathering food, raising young, and building shelter.)





Animals in the Boreal Forest

TIME 30-45 minutes

MATERIALS Whistle for emergency use, clipboard with a teacher check list of “*If You Don’t See Them... Animal Evidence*”, pencil

LEAD IN Tell the students this activity will be done as they hike along the “Boreal Forest and Valdez Trails” near the Wrangell-St. Elias National Park and Preserve Visitors’ Center. Prepare the students by explaining the following: We know some things about interactions in the forest. There are more things out here than just plants. What else makes up the forest community? (animals, such as squirrels, rabbits, insects, shrews, and owls) Tell the students they will need to be good, quiet observers for the next activity.

PROCEDURES Ask the students what kinds of animals are in the forest around them. Will they see any of them? What evidence can they look for that will tell them an animal has been there? (i.e. a hole that something might use for a home, tracks, scat, scratches on trees, chewed leaves of nuts, trails, etc.)

- Tell the students to walk quietly along the trail while looking for animals or animal signs.
- After walking for a while, stop and recount what signs they might have seen. If they haven’t seen any signs, talk about some possible reasons why:
 1. Many animals are asleep during the day, especially mammals.
 2. Winter is a hibernating time for some animals.
 3. Animals try to camouflage themselves for protection—they don’t want to be found.
 4. We are too noisy.
- Since we know that animals are here, in what ways do animals depend on the forest community?
 1. They find something to eat there (food and water).
 2. They live there (shelter, air, and space).
 3. They raise their families there.
- Since the animals depend upon many things in the forest community, what do they contribute?
 1. They are food for other predators.
 2. Some insects provide pollination for the continuation of the forest.

-
3. Each animal is a “population control” for the plant or animal it eats.
 4. When animals die, their bodies give back nutrients into the earth, and become soil again.
 5. Some organisms help larger things decompose and turn back to soil.
 6. Many animals help disperse plant seeds.

(Any answer given is right, so try to tie them in with some of the ideas above.)

- Continue along the trail discussing life in the forest and pointing out the various panels depicting the sites along the way.

WRAP UP Reiterate the definition of habitat. Does the definition given agree with what we’ve talked about so far?

Discuss the various markers and sites along the trail and how they relate to habitat.



Migration Headache

TIME 30-40 minutes

MATERIALS None

LEAD IN A field is a good place for this activity. To the casual observer, migration may seem like an easy and safe way of dealing with winter. In reality, migration is a costly and often treacherous endeavor. In addition to tremendous energy requirements, most migratory animals must find food along the way, find places to rest, avoid predation, and find a suitable habitat in the new area upon arrival.

PROCEDURES Tell the students that in this game they are ducks who have to migrate back and forth from their northern and southern habitats in order to survive. Designate three safe zones in both the northern and southern range. A safe zone is a place where the ducks cannot be hunted and can rest after their long journey. Safe zones must be so labeled by the teacher and can take the form of a tree or boulder or any other natural feature that the ducks can hold on to.

- Though most of the students will be ducks, two volunteers will be needed to be predators. (Have one a human hunter and the other a natural predator.)
- When the teacher gives the call, the ducks must leave their northern grounds for the south and avoid the predators who will be trying to tag the ducks as they run by. If a duck successfully reaches one of the southern safe zones without being tagged, allow the duck to rest for a few seconds. If a duck is tagged by a predator, it is out of the game.
- While the surviving ducks are resting, inform them that while they have been enjoying the sunny south, one of the northern safe zones has been converted into a highway and thus is no longer a safe zone. When they are ready, tell them that the longer days of spring are here and they must head back to their now diminished northern safe zones (expect fewer ducks to survive because of habitat destruction.)
- Again, while the ducks are resting in their northern safe zones, tell the surviving ducks that one of their southern safe zones has now been converted into a shopping mall and is no longer a safe zone.
- Repeat the sequence until only one of the southern and northern habitats remain. The predators will quickly figure out that the ducks will all be headed for the same place and may congregated near the last safe zone. The ducks may complain that this is unfair, but explain to them that predators will gather in an area if a large source of food exists.

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- In order to add more stress for the ducks, recruit one of the already deceased ducks to act as an oil spill to run around and tag more ducks. By the same token, however, if a duck successfully makes two round trips without being tagged, the duck is allowed to reproduce by bringing one of the dead ducks back into the game.

WRAP UP

After playing for a while the duck population should have dramatically declined. Gather the students together in order to discuss the game. First ask how the ducks felt having to move all the time. Then ask them if migration is an easy or safe way of handling the winter. In addition to the natural stresses of constantly moving, man-made disturbances are making it more difficult for migratory animals to successfully complete their annual journeys.

- Here in the park many animals, such as sheep and caribou, migrate from higher elevations to lower elevations, or summer grounds to winter grounds.
- Discuss ways in which we can work together to protect migratory animals and their habitats (energy conservation, establishment of preserves, regulate predators, etc.)





MASH Riddles

TIME 15-20 minutes

MATERIALS MASH Cards

Note: This game is a flash card game in which the group will look at various animals and discuss their abilities to adapt and survive winter. Each picture will contain a picture of an animal on the front and a teacher clue on the back. Each of the cards will be an example of one of the four methods of survival used by animals in the winter. The four methods of survival are illustrated by the MASH concept. (Migrator, active, storer, and hibernator.) These methods of survival involve adaptations in the animals' bodies and/or their daily lifestyles.

LEAD IN Explain that trees and other plants are not the only creatures that must adapt to winter in the forest. Animals have the same task. Were the signs of wildlife found on and around the trees fresh sign or old? How is this known? What animals made each of those signs? Where are those animals now? What are two factors that limit animals in the winter? (Food, warmth, water, shelter, etc.)

- Introduce the MASH concept. Tell them that each of the letters represents a way for wildlife to survive the cold season. See if the students can figure what MASH stands for.
- Ask the students what each of the four parts of the MASH concept mean in relationship to the winter environment (i.e. What does it mean to migrate? What does it mean to store food? What does it mean to hibernate for winter?) Different animals deal with winter in a variety of ways.
- Tell the students that they will be shown a series of pictures with animals of the Wrangell-St. Elias National Park and Preserve.
- Next explain that when shown each of these cards, the group should tell which way the pictured animal survives winter. (MASH concept) Then together share what is know about that animal.

PROCEDURES First, show the students a picture of one of the animals. Now ask them questions like these:

- What is this animal? (Give clues, if needed.)
- Where might you find this animal in winter?
- Will this animal be able to survive winter in this area? Why or why not? (If needed, ask questions about what foods they eat and if these foods are found around here in winter. Also ask if this animal is cold-blooded or warm-blooded and how that

would affect winter survival. Cold-blooded animals are generally slow and sluggish below 40 degrees.)

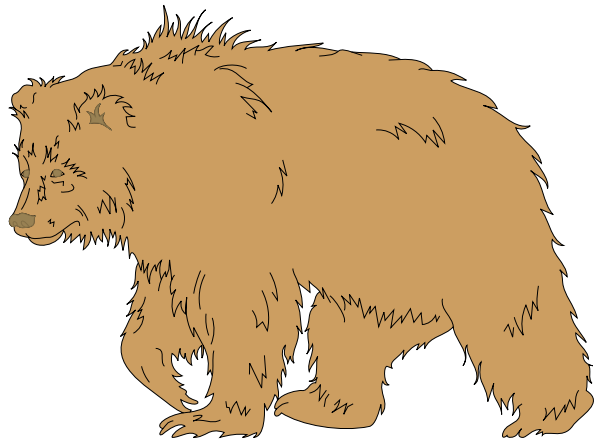
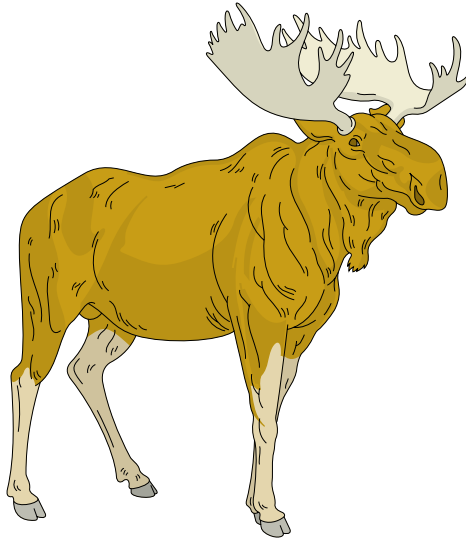
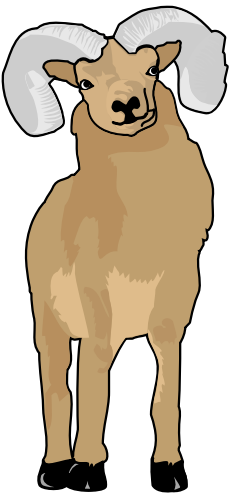
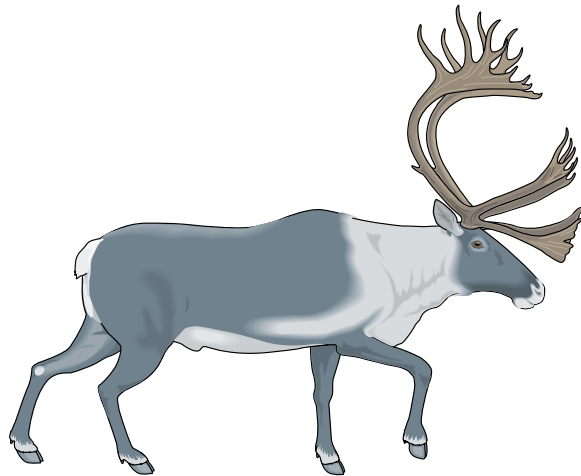
- What adaptations does this animal have to survive winter?
- If this animal cannot survive winter here, where will it find shelter and be able to survive?

(The number of animal cards you use will depend on the amount of time you have available and the interest of the group.)

WRAP UP Ask the students what MASH stands for. Can they name one animal for each method of survival?

- What are some advantages and disadvantages to each method?
- Ask them what happens to a true hibernator. (Their body metabolism drops drastically.)
- Explain that the MASH methods are generalizations. There are exceptions to every rule. When the weather is warm, some animals come out of their dens to look for food. The bear often does this as it goes into a dormant state and is not a true hibernator.

MASH Game Cards



Caribou

Caribou eat a variety of plants, mostly willows, birch, and grasses, switching to lichens in the winter. They continually migrate to different areas for food. They are eaten by wolves, bears, wolverine, and people. They live in lowland and alpine tundra and the northern forests of Alaska. Both males and females have antlers that they shed each year.

MIGRATOR

Moose

The moose is the largest member of the deer family. Moose thrive in forests and river thickets. Only bulls have antlers for use in courtship displays. They eat willow, birch, aspen, pond weeds, and grasses. They are eaten by wolves and bears. Moose only migrate a few to 60 miles. Deep snow can lead to malnutrition of hundreds of moose. Many moose are killed by automobiles and trains.

ACTIVE

Dall Sheep

Dall Sheep live on open alpine ridges and meadows. Male sheep have large curly horns; female sheep have smaller, only slightly curved horns. Dall sheep eat grasses and sedges. In the winter, sheep may eat willow, lichen, and moss. Most sheep populations will visit mineral licks in the spring. They are eaten by wolves, wolverines, bears, coyotes and eagles.

ACTIVE

Porcupine

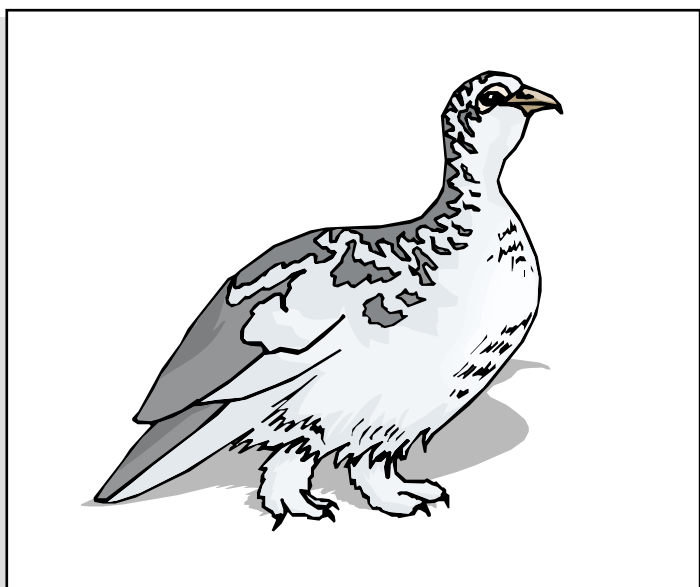
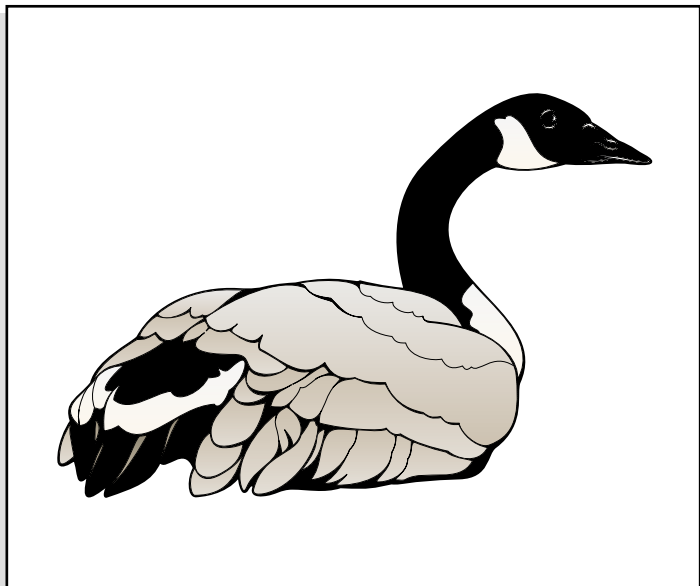
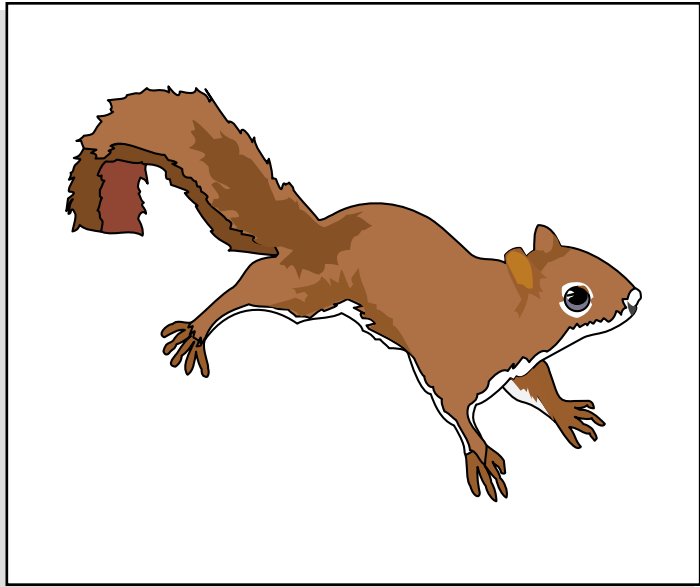
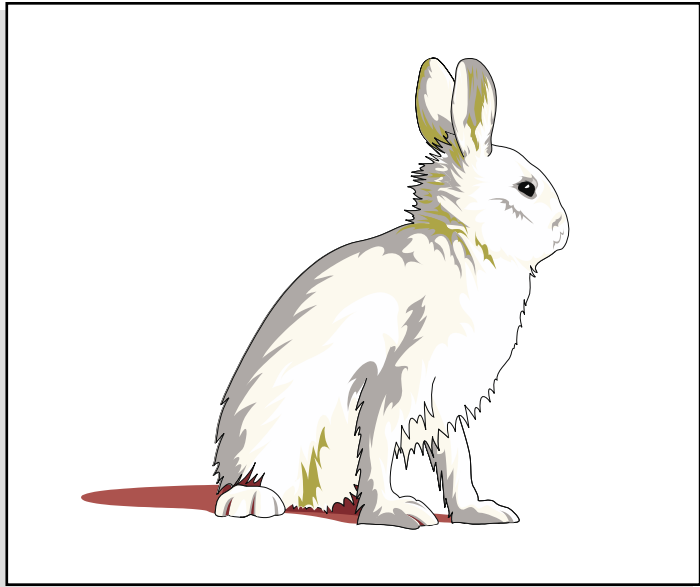
The porcupine is the second largest rodent in Alaska. It is entirely covered with barbed quills (except for its belly, footpads, and nose). Porcupine have poor eyesight, but a keen sense of smell. They eat the inner bark of spruce, hemlock, and birch. In the spring they eat a variety of buds and leaves. They have a taste for salt from perspiration left on ax handles, canoe paddles, or leather. They also eat antlers and bones of dead animals to obtain calcium and phosphorus. Porcupines are a favorite meal for wolves, coyotes, lynx, and wolverines. Native Alaskans use porcupine quills for decoration and jewelry.

ACTIVE

Brown Bear

Brown bear live throughout Alaska except for the far western islands of the Aleutian Chain. They have a dish-shaped face and a hump on their back above the shoulder. Bears are born in a winter den, without hair and weighing less than a pound. Young bears stay with their mothers for three to five years. Brown bear eat many types of food including salmon, berries, grasses, roots, and cow parsnip. Bears will also eat moose and caribou as well as dead meat. Bears are dormant during the winter. Seventy percent of all North American brown bears live in Alaska.

HIBERNATOR



Red Squirrel

Red Squirrel can be found in spruce forests over most of Alaska. Much of the squirrel's summer is spent cutting and storing green spruce cones. A single cache may be three feet deep and 15-18 feet wide. They also store mushrooms on tree branches. They eat seeds, berries, insects, and eggs. They are eaten by hawks, owls, marten, and housecats. They will nest in multiple sites, in a hole in a tree or in a mass of twigs, leaves, and lichen. A red squirrels territory is about an acre. They remain active all year and help scatter seeds to other areas.

STORER

Snowshoe Hare

The snowshoe hare is found in forests, swamps, and brush throughout interior and southcentral Alaska and are an important part of the food web. They differ from rabbits in that they are born with fur and with eyes open, not hairless and blind. Their coat turns white in the winter and their hind feet are well-furred like snowshoes. They eat grasses, buds, twigs, and leaves in the summer and spruce twigs and needles, birch and willow bark in the winter. They are eaten by owls, lynx, fox, and coyote. They do not live underground, but use natural shelters under bushes and branches. Hare populations follow high and low cycles.

ACTIVE

Lesser Canada Goose

Lesser Canada Geese are the most common geese in Alaska. They nest in coastal wetlands, coastal tundra, and river valleys. They mate for life and are flightless for about a month each summer while they molt. Predators include fox, gulls, wolves, bears, wolverine, eagle raven and man. Geese eat grasses, berries, and grains.

MIGRATOR

Black Bear

Black bear live in the forested areas of Alaska. Black bears all have brown pointed muzzles. They eat moose calves, plans, salmon, berries, and dead meat. Sometimes a bear will even eat another bear. Black bear go into dormancy (not hibernation) in the winter, waking up periodically to hunt for food. Bears have been known to break into cabins and garbage cans.

HIBERNATOR

Red Fox

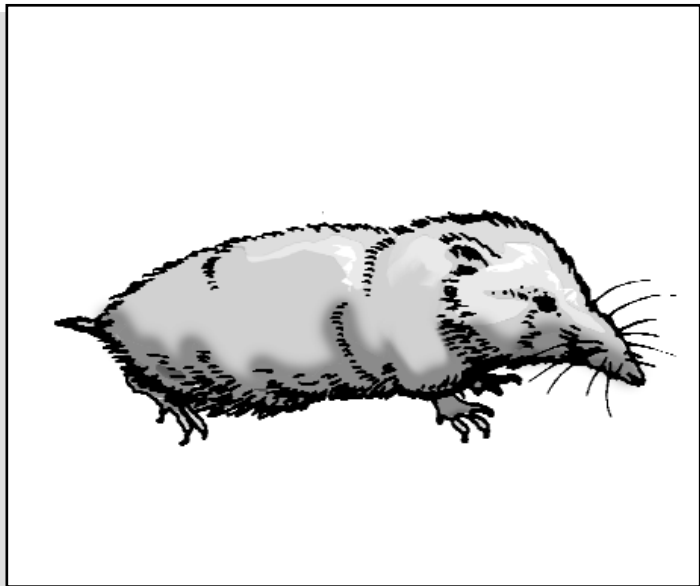
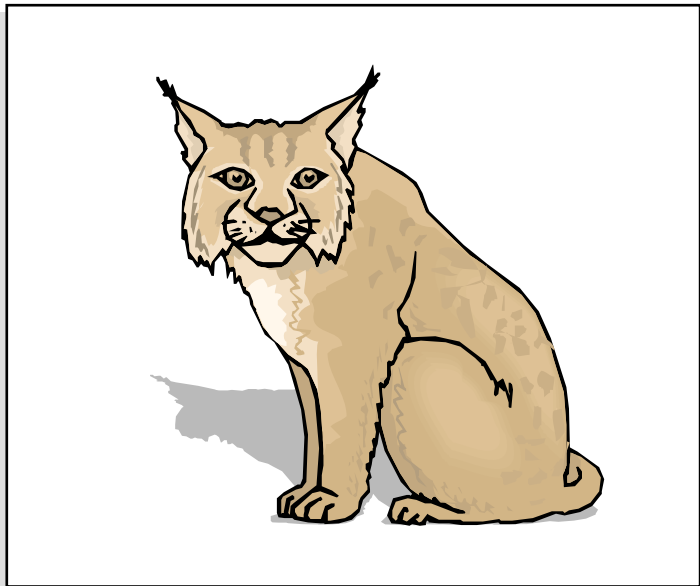
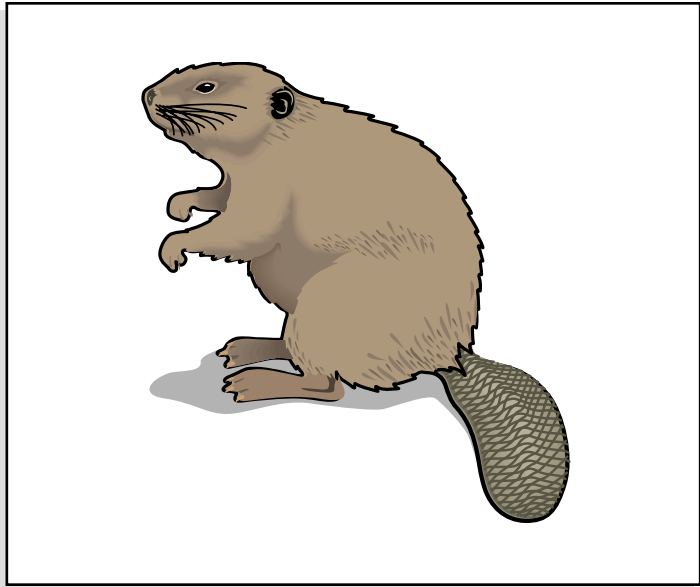
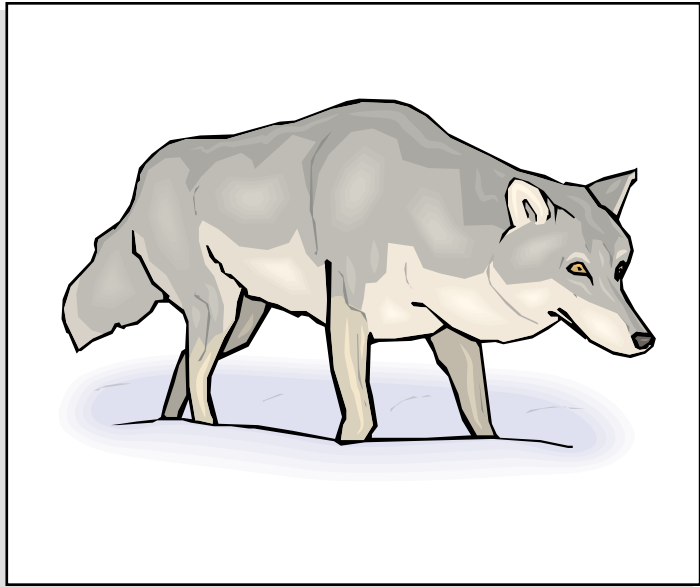
The red fox is found throughout Alaska. They are related to wolves, both being members of the dog family. They always have a white tip on their tail, but can range in color from red to silver to black. Like wolves, fox build dens in which to have their kits. Fox eat rodents, hares, squirrels, birds, eggs, insects, plants, and dead meat. They cache (or store) their food for later use. Fox predators include wolves, coyotes, lynx, wolverine, and eagles.

STORER

Ptarmigan

The willow ptarmigan is Alaska's state bird. Their wings are white all year, but their whole body turns white in the winter. Their feet are covered in feathers for insulation. They live in alpine and dry lowland tundra and migrate from one feeding place to the other in the winter. They can be seen gathering in flocks of several thousand, returning to their breeding grounds in the spring. They eat the buds and twigs of willow and other shrubs, seeds, berries, and some insects. They are eaten by fox, lynx, golden eagles, and humans.

MIGRATOR



Beaver

The beaver is North America's largest rodent. It is found in forested areas all over the state. It has large webbed feet and a broad, flat tail used for swimming and balance when cutting down trees. Beaver slap their tails on the surface of the water as a warning signal to other beaver. Beaver have ear and nose valves that close when the animal is under water. Beaver require two to three feet of water all year round for transporting food and hiding from predators. To ensure this level of water, beaver sometimes construct dams. Beaver lodges and dens are used as food caches. They are a single room with multiple exits for food access and escape. Beaver eat bark, aquatic plants, roots and grasses. Beaver are eaten by wolves, lynx, wolverine, bears, and man.

STORER

Wolf

The wolf lives in over 85% of Alaska in a wide variety of habitats. They range in color from black to almost white. They are highly social animals, living in packs with an alpha male and an alpha female. Wolves build dens in the side of hills and have four to seven pups. The range of a pack can be 200 to 600 square miles. Wolves eat moose, caribou, Dall sheep, mountain goats, beaver, hares, rodents, and sometimes fish and birds. They are occasionally eaten by other wolves. Wolves are an important variable in keeping animal populations in check.

ACTIVE

Marten

The marten is a small furbearing animal with sharp teeth, short legs, yellow to brown fur and a long tail. They live in coniferous forests and require a high population of voles nearby to eat. They also eat meadow jumping mice, berries, small birds, bird eggs, squirrels and dead animals. They are eaten by coyotes, red fox, lynx, eagles, and great horned owls. They use squirrel middens (piles of spruce cone scraps left by squirrels) for winter den sites.

ACTIVE

Meadow Jumping Mouse

The meadow jumping mouse is small with a very long tail, large hind feet, small ears and large front teeth for gnawing. They live in forest edges and damp meadows. They need den sites beneath brush, logs or stumps and well-drained sites to dig their winter burrows. They eat seeds, insects and fruit. They are eaten by weasels, marten, hawk owls and foxes. The meadow jumping mouse hibernates in winter.

HIBERNATOR

Shrew

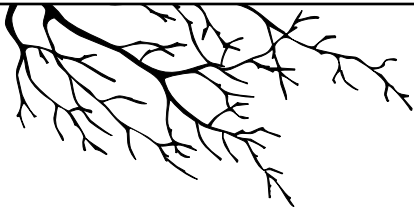
Shrews are very small mammals with a long, pointed nose, short legs, and soft, dense fur. Alaskan species have a long tail. They live in forests, shrublands, wetlands and tundra, preferring moist habitats. Shrews eat springtails, beetles, fly larvae, centipedes, mites, worms, spiders and round worms. They also eat the eggs and young of small ground nesting birds, young voles, and carrion. They are eaten by weasels, owls, kestrels, jaegers and shrikes. The shrew's metabolism is so rapid that an individual shrew may eat its own weight in meat every three hours!

ACTIVE

Lynx

Lynxes are small- to medium-sized mammals with large feet, short tails and sharp teeth. They are in the cat family. They require a mosaic of old conifer and early successional stage forest where prey is abundant. Lynx eat snowshoe hare almost exclusively; when hare populations are low, lynx may also eat small mammals, birds and rarely moose or caribou. Young lynx may be eaten by great horned owls or wolverines. The lynx is the only cat native to Alaska.

ACTIVE



Create Your Own Winter

TIME 25-30 minutes

MATERIALS Lead in:

LEAD IN Explain to students that through a short creative writing exercise they are going to create an image of winter.

PROCEDURES Have the students take a small sheet of paper and tear it into ten slips of approximately equal size. On each slip they are to write one word (they should write a different word on each slip) that is in some way associated with winter. Emphasize that this is a creative exercise and students should try to think of unusual words.

- After all of the students are finished writing their words, have them fold the slips and put them in a pile. From this large pile of words, each student will draw out ten slips, preferably not the same ones that they wrote. With these ten new words they are to write two or three sentences in which all of the words are used. The topic of their sentences would involve some aspect of the winter season.
- Have the students then read to the rest of the group what they have written. Understand that due to the abstract source of their words, their writings may sound strange, but they will be interesting and will provide some unique images of the winter season.

WRAP UP End the lesson by discussing the complexity of the winter season, that it is more than just cold and dark. In fact, winter is a challenging time for people and for plants and animals, and that the forest in winter is a beautiful and interesting place to explore as long as you dress appropriately and prepare for it.



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The following items can be borrowed from the Wrangell-St. Elias National Park and Preserve Visitors' Center:

- Slesnick, Irwin, Owl Pellet Kit, 1990.
- Alaska Public Lands Information Center, Bird Adaptations Kit.

Wrangell-St. Elias National Park and Preserve has developed boxes with supplies for each unit. These boxes can be obtained by contacting the interpretive staff at (907) 822-5234.

