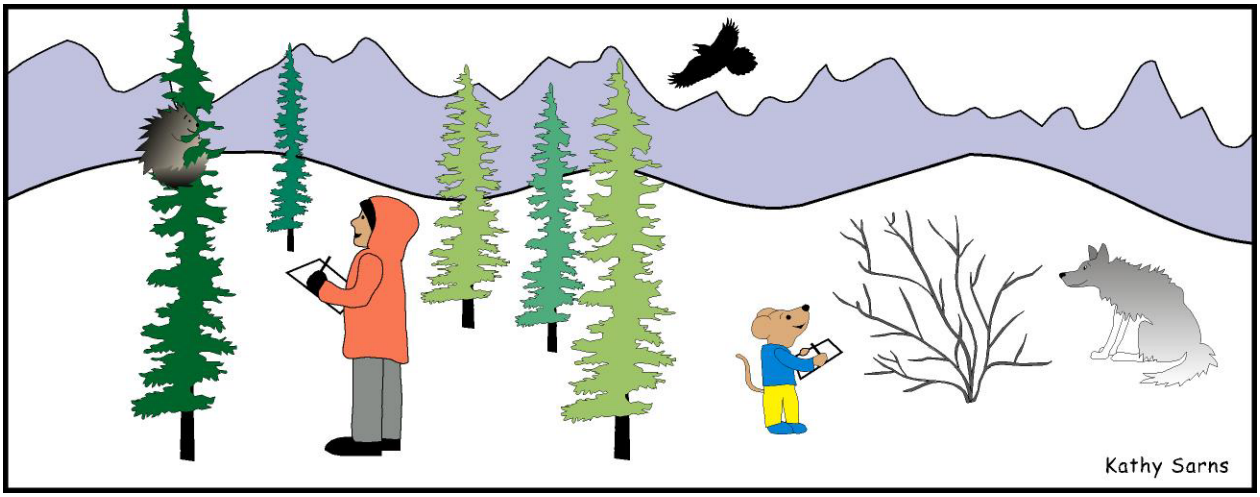
READING THE ALASKAN ENVIRONMENT



Grade Level: K-12
Alaska State Content Standards: SA15
Subject: Science
Skills: Observation
Duration: 1 class period
Group Size: individual
Setting: outdoors
Vocabulary: terminal bud, lateral bud, deciduous trees, hedging, flagging, fungus.

OBJECTIVE

Students observe a boreal forest or tundra ecosystem.

TEACHING STRATEGY

Students participate in a field trip near their school to observe the characteristics of their local ecosystem.

MATERIALS

- Reading the Alaskan Environment student worksheet
- Boreal Forest Observations
- Tundra Observations
- Don't Tear Me Apart or Crush My Home
- Clipboards or other hard surface to draw on
- Paper and pencil

ADVANCED PREPARATION

Before the field trip, look over the outdoor site available to your students. Try to find as many different features as possible. Check the area to see if there are any hazards that should be avoided. If the area you want to use is not public property, get permission prior to taking your students to the site.

PROCEDURE

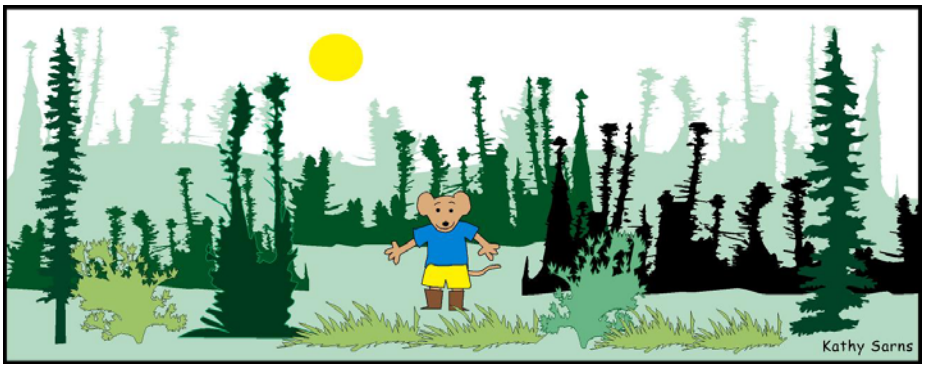
1. Explain to the students that they will be going outside to observe areas around the school that have distinct forest or tundra features. Review the Boreal Forest or Tundra Observations with students. If you live in an area that has both tundra and forest you may want to review both sheets.

Boreal Forest Observations

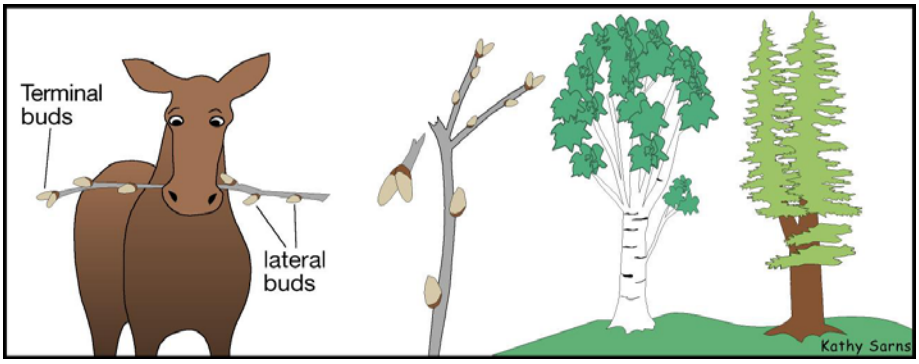
A walk through a forest can tell you about the history and characteristics of the area. Species and condition of the vegetation can give clues to the areas living and non-living components and to what events have taken place in the past. Look for some of the following features in your forest.

In the boreal forest, if you see white spruce and large aspen trees, you know you have a dry area.

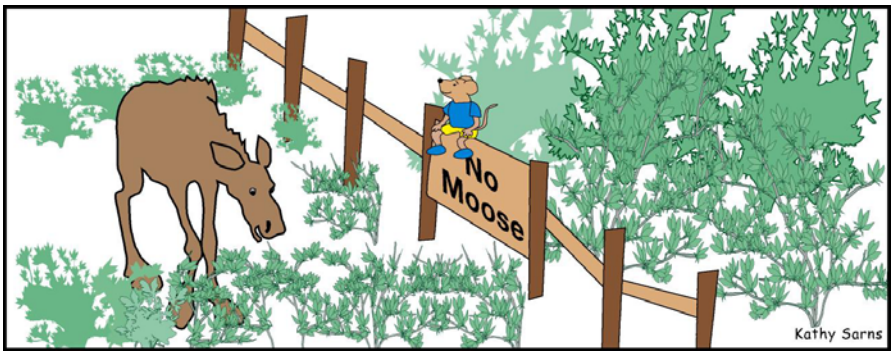
Scrawny black spruce and members of the willow family designate wet or swampy areas.



The shape of a tree can tell you about certain events in its life. When the **terminal bud** (top) is damaged or broken off, the **lateral buds** (sides) take over growth. This results in trees or bushes that may look like this. What events might have caused this?



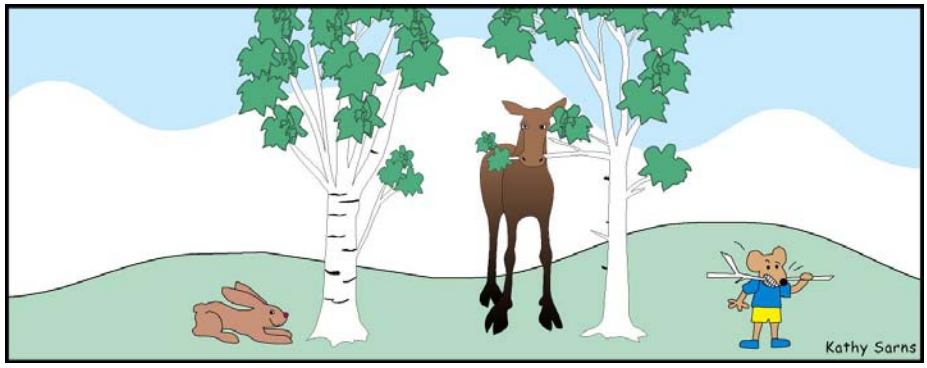
If several trees in an area show these characteristics, it may indicate that insects, over browsing, wind or avalanches have affected that area. When many of the willow and **deciduous trees** (trees that lose all their leaves in the fall) in the area show **hedging** (trees or shrubs that are bushy and cropped at about the same height), it shows that animals like moose are feeding heavily in this area.



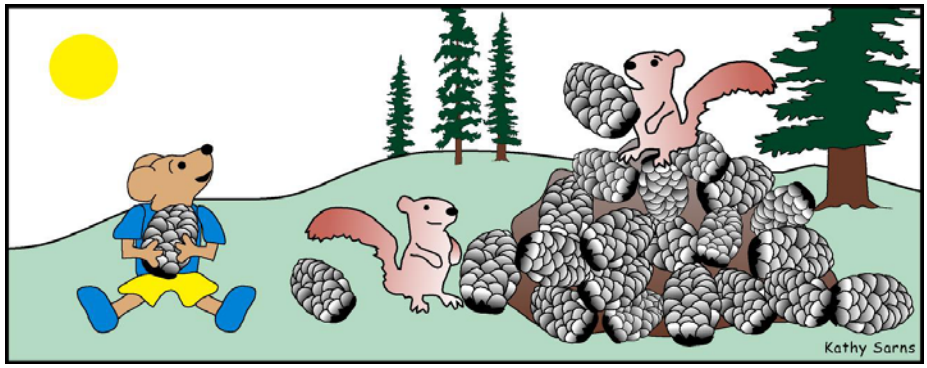
Flagging is caused by having the terminal buds on one side of the tree damaged by wind or avalanches. If you find this condition you should be leery of setting up camp.

Look closely for sap lines, small holes and sawdust piles on trees. These are signs of insect infestation. When an insect infestation is severe, trees may die. Examples of entire forests affected by insects can be seen on the Kenai Peninsula.

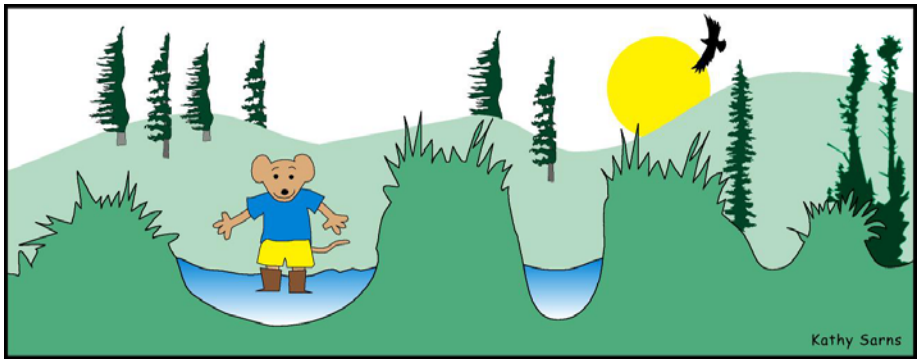
Trees or shrubs with the bark chewed off or broken branches indicate that animals may have used them for food. The height of the damage will help you determine what animal ate it and the time of year when it occurred. You will want to look around these areas for tracks or scat.



Look for caches of cones or piles of cone scales. These indicate that squirrels or other animals have been feeding. Listen carefully for the call of these animals.



Look for evidence of non-living components such as permafrost (displayed by frost heaves, non-draining water, or pingos,) exposure of the slope (south facing or north facing,) composition of the soil or direction of prevailing winds.



2. Before heading outdoors, review the "Don't Tear Me Apart or Crush My Home" guidelines for investigating an environment.

3. Take students to your designated area. Give students time for the observations outlined in field notebook page.

4. Back in the classroom, compare observations. Ask the following:

    a) What was the most interesting thing you observed?
    b) Did you see something today that you have never noticed before?
    c) What do you think you saw that made this boreal forest or tundra environment unique from one another and other ecosystems?

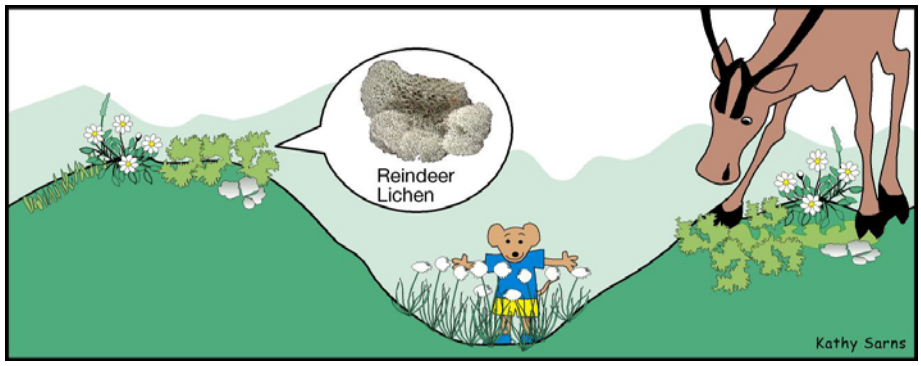
EVALUATION

Divide the class into partners and trade field notebook pages. Students choose an observation from their partner's book and discuss how it is unique to the boreal forest or tundra ecosystem. Students compare and critique one another.

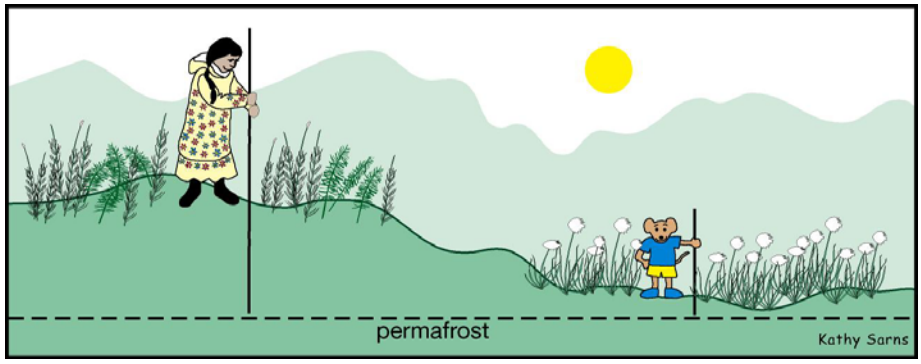
Tundra Observations

A walk through the tundra can tell you about the history of characteristics of the area. Species and condition of the vegetation can give clues to the areas living and non-living components and to what events have taken place in the past.

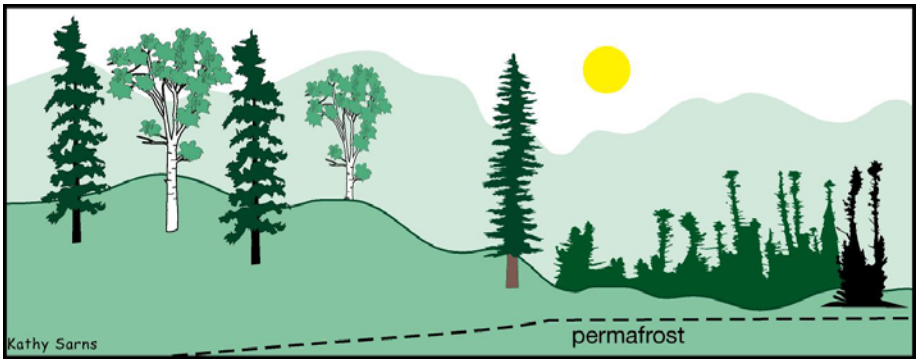
One of the interesting things about tundra is that areas can be dry, wet, or both. Wet tundra supports mosses and sedges. Dry tundra has dry as and reindeer lichens. In some areas the dry plants will grow on top of hummocks and the wet plants in the low areas between.



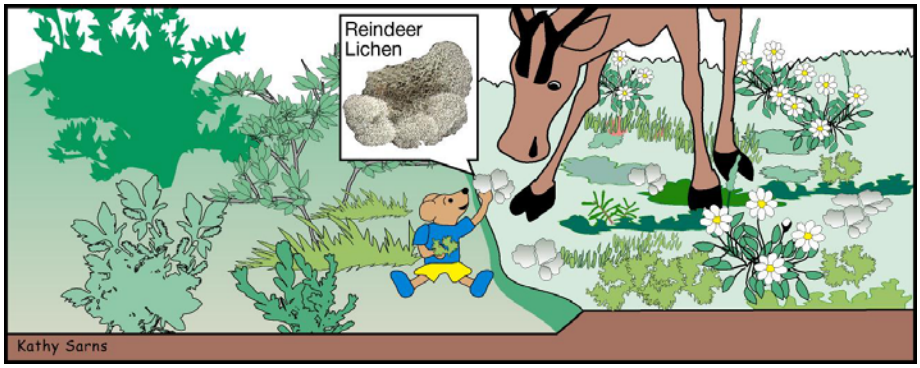
Horsetail plants (Equisetum) have deeper roots than most tundra plants. If horsetail is present, permafrost is not very close to the surface. You can use a probe to find the permafrost layer. Push the probe straight down through the tundra. Depending on the time of year, permafrost may be a few inches or a few feet below the surface.



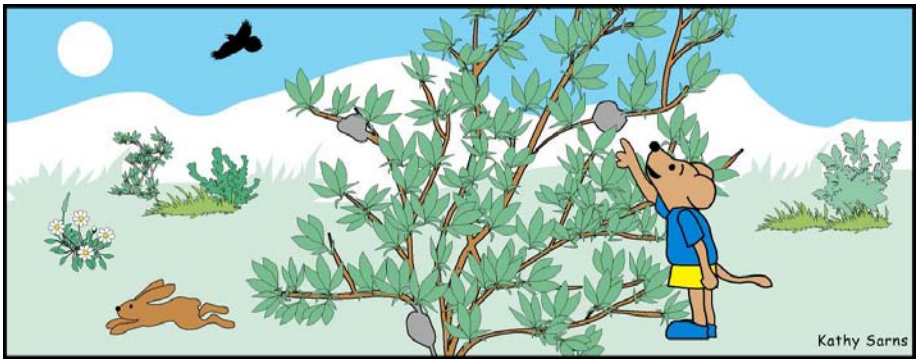
If trees are present on the landscape, look for permafrost under the black spruce. There will be no permafrost under big healthy aspen or white spruce.



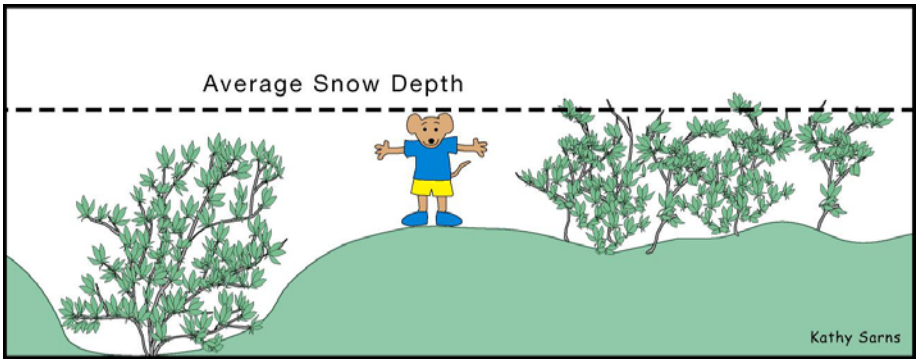
Moss and lichen grow slowly; a thick mat of either plant indicates that the area has been undisturbed for a long time. This thick mat makes it hard for other plant seeds to grow. Tundra plants reproduce vegetatively, meaning thy re-sprout from roots. After a mat is removed by fire, and the mineral soil is exposed, plants seeds can sprout more easily. Any disturbed ground will have different tundra plants than in an area of no disturbance.



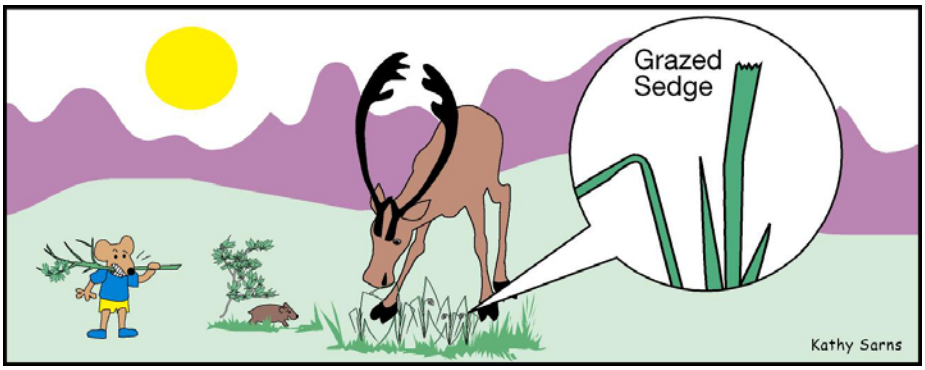
Galls, or knots of wood caused by insects, can often be found on willow. Rusts on shrubs that are damaged by disease in the tundra can also be seen.



On the tundra, average annual snow depth can be estimated by the shrub height. Tundra shrubs do not send branches out higher than the snow cover as the wind and snow rips them off or kills the plant altogether. Usually there are taller shrubs in gullies along creeks and behind bluffs where they are protected from the winter.



Grazing sign on sedges and shrubs may be seen. Caribou and lemmings usually graze the plants for the base, so often evidence can only be seen when looking up close.



"DON'T TEAR ME APART OR CRUSH MY HOME"
GUIDELINES FOR INVESTIGATING AN ENVIRONMENT

"Yikes! Watch Out! You almost stepped on my home! **Ouch!** You just crunched me with your big foot!"

If plants and animals could talk, this is what they might say to someone who is carelessly tromping through their home. It is important to be aware of your actions when going out to explore wildlife habitat. Here are several guidelines to follow so that minimal damage will be done to the environment as a result of your visit.

1. When visiting private property or public lands, it is your responsibility to know the rules and to follow them. Be sure to get permission from the owner before you visit private land.

2. Stay on the trail whenever possible. If it is necessary to go off the trail, try to avoid stepping on plants and well-camouflaged ground nests.

3. Do not eat any plants or fruits (berries) before asking your teacher or an adult who can positively identify that it is edible.

4. When collecting samples for the classroom, take as few samples as possible and share them.

   Remember that whatever you take cannot be enjoyed by others who visit the area after you. If many people use the area, collecting should be discouraged, and in many instances collecting may not be permitted at all.

5. When taking a sample, take from the ground before taking from the plant. If you do take from the plant, take only a leaf or a small branch from the side of the plant, not from the top. Some plants have compound leaves, so get a whole leaf and not just a leaflet for identification.

6. Carefully remove the branch or leaf to avoid tearing the bark or damaging the remaining plant.

7. Take bark from dead trees only.

8. Do not take any live eggs for classroom samples; however, broken eggshells are OK.

9. When collecting samples, carry the samples carefully so they will be good specimens when you return to the classroom.

10. If collecting a whole plant, loosen the soil around the plant and roots with a digging tool, so roots can be easily removed. Try to collect the entire root or at least a representative portion. Fill in the hole with loose soil to protect plants nearby.

11. If you are interested in viewing wildlife, you must be very quiet and move slowly so you won't frighten the wildlife away before you get a chance to see it!

12. A safe distance should always be kept from any animal for your protection and theirs.