

BOREAL FOREST SUCCESSION



Grade Level: 5-8

Alaska State Content Standards: SA12, SA14, SA15

Subject: Science

Skills: Classification, Observation, Comparison, Description

Duration: 1 class period

Group Size: 2

Setting: outdoors

Vocabulary: succession, successional stage, herb stage, shrub stage, young forest stage, mature forest stage, maturing aging forest stage, habitat, minerals, vegetation mosaic

OBJECTIVE

Students describe the progressive successional stages of a boreal forest.

- large sheets of white paper (for mural) for each student
- colored construction paper

TEACHING STRATEGY

Students will observe and record different stages of forest succession around their school grounds and create mural.

TEACHER BACKGROUND

The forest is always changing! Plants are growing, using the nutrients in the soil, and dying. Animals are feeding in the forest, leaving their waste, growing, and dying. Even the smallest organisms in the soil, bacteria, are very important. Bacteria break down dead organisms, putting nutrients back into the soil for plants to use.

MATERIALS

- "Succession of the Boreal Forest After Fire" 1 per student
- 3-4 sheets of plain paper per student
- pencils, crayons, markers, etc.



Succession is the natural, orderly change in plant and animal communities that occurs over time. If left undisturbed, an open field may become an "aging" forest in 150-300 years. However soil conditions, climate, permafrost, topography, and natural and unnatural forces may affect the pattern of succession.

Weather, fire, flood, insects, and human activity can disrupt the forest, altering the pattern of succession. The "Succession of the Boreal Forest After Fire" handout will give you a detailed description of each stage. Although many disturbances may impact forest succession, fire is the only one that returns important nutrients to the soil.

The boreal forest provides many animals with their basic needs--food, water, shelter, and space. During the process of forest succession, an area may become more suited for some wildlife species and less suited for others.

In the **"Herb Stage,"** (contains seed plants whose stems wither away to the ground each winter) insects and small rodents feed on the grasses, herbaceous plants, and seeds. Songbirds, such as flycatchers and warblers, feed on insects. Sparrows

and grosbeaks feed on seeds, birds of prey (hawks, owls) feed on rodents (mice, voles), and game birds (ptarmigan, grouse) feed on seeds and buds. As the diversity of plants increases so does the variety of wildlife species.

Plants continue to flourish in the **"Shrub Stage."** Shrubs (usually low woody plants with several permanent stems instead of a single trunk), herbs, and fallen trees provide abundant nesting cover for songbirds, rodents, game birds, and snowshoe hares. These animals attract predators such as foxes, weasels, marten, and lynx. Moose feed on shrubs and sapling trees. These animals, in turn, attract large predators like wolves.

As the forest progresses into the **"Young Forest Stage,"** the quantity and diversity of shrubs and herbaceous plants decreases. With less variety in food available, the number of wildlife species decreases. Songbirds and birds of prey nest in the trees of a young forest. Beavers use young trees to build their lodges and feed on the tender branches.

In the **"Mature Forest Stage"** hardwood trees begin to die, opening the canopy for the growth of spruce. Shrubs return

and make more food and cover available to songbirds, game birds, and rodents.

In the "**Climax Forest Stage**," dead trees called snags provide homes for woodpeckers and other cavity-nesting birds. Porcupines, squirrels, spruce grouse, and several songbird species are typical of old stands of spruce trees.

ADVANCED PREPARATION

Choose several sites on the school grounds that will illustrate forest succession.

PROCEDURE

1. Have students make blank field notebooks by folding 3-4 sheets of paper in half and stapling them together.
2. Prepare students for a field trip by giving them copies of the "Succession of the Boreal Forest After Fire" handout. Review on the board the stages of boreal forest succession and the major plant groups in each stage. Have them add this handout to their field notebooks.
3. At each different successional site, have students determine the major plant groups. Have students list, illustrate, or take pictures of what they see for their field notebooks. Ask students to guess, based on their observations, what stage of succession they see. Remember that successional stages may not be readily apparent and that stages may blend together. You may not find all successional stages near your school.

4. Back in the classroom, give the students time to review their field notebooks and add any finishing touches.
5. Ask students to share their findings and their conclusions. Ask them the following questions:
 - a) How many different successional stages did you observe? What stages were they and why do you think so?
 - b) Was it hard to determine what stage the forest was in?
 - c) Based on the stages seen, what do you think happened to cause the succession? What clues do you have? How could you find out if you are correct?
 - d) What was the most interesting thing you observed?

EVALUATION

1. Using the notes and observations from the field trip, have students describe the stages of succession they observed.
2. Divide the class into small groups. On a large sheet of white paper have each group make a mural about local boreal forest succession using construction paper and other materials. Encourage students to be creative and suggest illustrating how fire impacts the forest and those animals living there.








3. Have each group present their mural to the class explaining the types of plants and animals found in each stage of succession. Comparisons should also be made between the field experience and the mural creation.

REFERENCES

Used with permission from the "Wildfire and Wildlife" pamphlet, Alaska Department of Fish and Game, Fairbanks.

Succession of the Boreal Forest After Fire

Student Handout

 <p>Kathy Sarns</p>				
<p>Herb Stage (0-5 years) Fire has burned the forest, returning minerals to the soil in the form of ash. Herbs (wildflowers, grasses, sedges) may grow from seeds and sprout from roots. Mosses and lichens may revegetate as well. In addition, seeds from outside the area may be brought in by wind or animals. Shrub seedlings often sprout from unburned roots, and many trees sprout from stumps. If the fire occurred in a mature or over-mature forest, dead trees called snags may still be standing.</p>	<p>Shrub Stage (6-25 years) Shrub and tree seedlings grow larger and begin shading the grasses and other small plants. Shrubs and tree seedlings offer good cover for many animals such as birds, mice, and snowshoe hares. Foods for wildlife, including berries, seeds, buds, and leaves are plentiful. Tree snags that have fallen are decaying.</p>	<p>Young Forest Stage (26-50 years) Sapling trees such as birch, aspen, and poplar (all hardwoods) have grown too tall for their leaves to be eaten by most animals. The forest canopy has become more dense, shading the forest floor. Only shrubs, herbs, and mosses that are shade-tolerant can grow under low light conditions found in this stage. Spruce begin growing among the hardwoods; however, their growth is slow. Most tree snags have fallen.</p>	<p>Mature Forest Stage (51-150 years) Mature hardwood trees become less abundant as some die, opening the canopy for spruce to grow taller. Hardwood saplings, tall shrubs, herbs, mosses, and lichens also grow in the canopy openings.</p>	<p>Climax Forest Stage (150-300 years) The canopy is more open. The forest is mostly spruce trees. Hardwoods, tall shrubs, herbs, mosses, and lichens grow in the openings. There are dying and dead trees still standing which provide food and cover for some animals.</p> <p>Boreal forest succession depends on soil, climate, water, and the presence or absence of permafrost. For example, in cold climates where there is permafrost and little rainfall or snow, succession may not progress beyond the shrub stage. Only dwarf trees and shrubs can grow in such environments.</p>