

# Animal Adaptations for Succession

**ALERT: ALASKA ECOLOGY CARDS REQUIRED**

## Section 4 FOREST ACTIVITIES



**Grade Level:** 3 - 8

**State Standards:** Geo E-5

NGSS: 3-LS4-3, 3-LS4-4, 4-LS1-1

MS-LS1-5, MS-LS2-1, MS-LS2-2,

MS-LS2-4, MS-ESS2-2,

HS-ESS2-7

**Subjects:** Science, art, language arts

**Skills:** Comparing, differentiating, analyzing, reasoning, reading, writing

**Duration:** 2 or 3 50-minute sessions

**Group Size:** Whole class

**Setting:** Indoors

**Vocabulary:** Adaptation, cambium, conifer, deciduous, ground cover, habitat, predator, shrub, snag, succession, successional stage

### Objective:

Students will match wildlife species to the forest successional stage where they are most likely to be found.

### Teaching Strategy:

Students draw a mural of plant successional stages and list the appropriate wildlife beneath each stage.

### Complementary Activities:

*OUTDOOR/INDOOR:* “Flipbook Succession” and “Snag a Home,” both in this section.

### Materials:

*Alaska Ecology Cards*; copies of succession charts (from *INSIGHTS*, Section 4, *Succession*); butcher paper; ruler or yard stick; pencils; crayons, markers or paints; tape or paste. Copies of forest-organism list (following page). Worksheets: “Who Lives Where?” and “Where’s Home?” (following pages).

### Background:

See *INSIGHTS*, Section 4, *Succession*.

### Procedure:

1. Divide the class into several groups, if desirable, or have everyone work on one large mural.
2. Students draw a line dividing the butcher paper into an upper and lower section. Use the top portion to draw plants of the successional stages in your area (from charts in *INSIGHTS*, Section 4). The drawing should fill all the space above the line. Label the stages. Leave the bottom portion for the following steps.
3. Referring to the lists below, students use the *Alaska Ecology Cards* that feature species from either the **boreal forest** or Pacific **coastal rainforest** to find clues to where the animals will be found.
4. Students start drawing a line where an animal would first appear and continue the line under each successional stage that the animal can use (see illustration). Label the line with the animal’s name.
5. Students draw or paste pictures of the animals on the line with its name and/or in the mural scene at the appropriate stage(s).



6. Discuss with students what effects disturbance of a forest by fire, timber harvest, or insect outbreak might have on wildlife. *(They should conclude that the effects depend on the animal and the successional stage of the forest after each event. Disturbances benefit some wildlife species while decreasing the numbers of others.)*

Evaluation:

1. Students answer the worksheets: “Who Lives Where?” and “Where’s Home?”

2. Students write a short report comparing and contrasting the animals and their adaptations in the early pioneer and climax stages of succession. Students should note any similarities and detail the differences among the animals’ adaptations.

### Curriculum Connections:

(See appendix for full citations)

#### Books:

*A Dead Log* (Green)

*Alaska Wildlife Notebook Series* (ADF&G)

*Dead Log Alive* (Kittinger)

*How the Forest Grew* (Jasperson)

*Log’s Life* (Pfeffer)

#### Media:

*Old Growth Forest: an Ecosystem* (Video) (National Geographic)

### Teacher Resources:

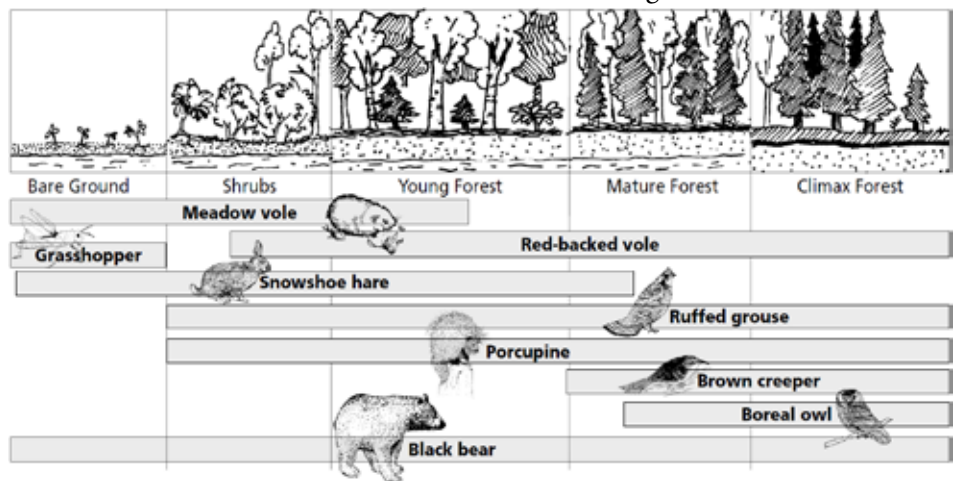
(See appendix)

### BOREAL FOREST

Sunlight  
Air  
Water  
Rocks and soil  
White spruce tree  
Red squirrel  
Goshawk  
Carrion beetle  
Bacteria  
Gilled mushroom  
Bark beetle  
Hairy woodpecker  
Sharp-shinned hawk  
Birch tree  
Moth  
Chickadee  
Truffle  
Bacteria  
Springtail  
Flying squirrel  
Low-bush cranberry  
Vole  
Great horned owl  
Weasel  
Polypore or shelf fungi  
Protozoans  
Lichen  
Moose  
Grouse  
Hare  
Lynx  
Algae

### COASTAL FOREST

Sunlight  
Air  
Water  
Rocks and soil  
Sitka spruce  
Red squirrel  
Goshawk  
Carrion beetle  
Bacteria  
Gilled mushroom  
Bark beetle  
Red-breasted sapsucker  
Sharp-shinned hawk  
Hemlock tree  
Sawfly wasp  
Chickadee  
Truffle  
Bacteria  
Springtail  
Flying squirrel  
Trailing raspberry  
Moth  
White-footed deer mouse  
Marten  
Polypore or shelf fungi  
Protozoans  
Lichen  
Deer  
Grouse  
Crossbill  
Wolf  
Algae




Dead trees are valuable in the forest. Standing dead trees called snags are soft enough to be drilled by woodpeckers. Birds adapted for cavity-nesting such as boreal owls appreciate these homes in the sky.




# Who Lives Where?

Which successional stage of the **boreal forest** is home for each of these animals? Compare the animal's needs to the description of secondary succession to figure this out. Fill in the number(s) of the successional stage(s) in which you think each animal could survive best.




**A** \_\_\_\_\_

Flying squirrels eat fungi, berries, and seeds. They need standing live or dead trees to glide between. They escape predators by hiding among the branches of live trees. They need holes in snags to nest and rest.




**E** \_\_\_\_\_

Moose eat the branches and leaves of birch, aspen, and willow. They cannot reach the branches of old trees, so they need saplings and tall shrubs.




**B** \_\_\_\_\_

Voles eat seeds, berries, and fungi. They need many fallen logs, shrubs, and small plants to hide under.




**F** \_\_\_\_\_

Boreal chickadees eat seeds and insects that feed on conifers. For nesting, chickadees dig holes in large snags. They hide from predators in the branches of conifers.




**C** \_\_\_\_\_

Crossbills eat only the seeds of conifers and the insects that live in the tops of conifers. They also nest in conifer trees.




**G** \_\_\_\_\_

Ruffed grouse live in broadleaf forests. They feed mainly on the buds of birch and aspen trees. They often rest in conifer trees, but they nest on the ground under shrubs.



**D** \_\_\_\_\_

Three-toed woodpeckers feed on insects that bore into the bark of dead and dying spruce trees. They need large snags to dig holes for nesting and resting places.



**H** \_\_\_\_\_

Red foxes eat voles and can only live in places where many voles live. Foxes dig dens under fallen logs, or into the ground under trees or shrubs.



**1. Regrowth Herb Stage:** Fire releases many stored nutrients. Plants and fungi begin growing soon after the fire. There are standing dead and dying **snags** of spruce and broadleaf trees. Few have fallen to the ground.

**2. Regrowth Shrub Thicket:** Within 3 to 15 years, the site is covered by tall shrubs and saplings (willow, aspen, birch). A variety of non-woody plants (herbs) are growing. Dead trees lie on the ground, but many large snags remain.

**3. Young Forest:** In 30 to 50 years, birch, aspen, and willows have grown into young trees. Slow-growing spruce are still small. Few snags remain. Fewer shrubs and ground cover plants grow in this stage than in other successional stages.


**4. Mature Forest:** In 75 to 100 years, the spruce are taller than the broadleaves. The forest is more open because many broadleaves have died. A few broadleaf snags have nest holes in them. Fungi and seed- and berry-producing shrubs and herbs grow here.

**5. Old-Growth Forest:** By 150 to 200 years, mainly spruce remain. The forest is fairly open and contains many large, dead spruce and broadleaf trees with holes. The forest floor is covered by fallen logs, and mosses, and berry plants.




# Where's Home?

Which successional stage of **coastal rainforest** is home to each of these animals? Compare the animal's needs to the descriptions of secondary succession to find the answer. Fill in the number(s) of the successional stage(s) in which you think each animal could best survive.




Flying squirrels eat fungi, berries, and seeds. They need standing live or dead trees to glide between. They escape **predators** by hiding among branches of live trees. They need holes in trees for dens.

**A** \_\_\_




Sitka black-tailed deer eat a variety of **ground cover** plants, lichens, and the twigs of **shrubs** such as huckleberry. They need areas without deep snow to find food and escape predators in winter.

**E** \_\_\_




Porcupines eat the **cambium** layer of live hemlock and spruce trees, along with the branches and leaves of shrubs and ground cover plants. Their quills protect them from most predators.

**B** \_\_\_




Chestnut-backed chickadees eat seeds and insects that feed on conifers. To make nests, they dig holes in large snags. They hide from predators in the branches of conifers.

**F** \_\_\_




Crossbills eat only the seeds of **conifers** and the insects that live in the tops of conifers. They also nest in conifer trees.

**C** \_\_\_




Dark-eyed juncos eat insects and the seeds of ground cover plants and insects. They nest on the ground under logs, branches, or shrubs.

**G** \_\_\_



Red-breasted sapsuckers feed on insects that bore into the bark of dead and dying spruce trees. They need snags to dig the holes for nesting and resting places.

**D** \_\_\_



Bald eagles eat fish and dead animals. They build huge stick nests in large, old conifers and **deciduous** trees (cottonwoods and poplars).

**H** \_\_\_



**1. Regrowth Stage:** Many plants begin growing soon after timber harvest. Within 3-5 years, the site is covered by tall shrubs and saplings (alder, huckleberry, spruce, hemlock). Their shade forces out many sun-loving ground cover plants. Branches, stumps, and logs cover the ground, making travel through here difficult. A few standing dead trees (**snags**) remain. In hard winters, 6-8 feet of snow may cover the ground.



**2. Second-Growth Forest:** Within 15-30 years, the site is thickly covered by hemlock and Sitka spruce. These conifers shade the forest floor so very few shrubs or ground cover plants can grow. No large snags remain. The conifer branches catch the snow, keeping ground snowcover light even in severe winters.



**3. Old-Growth Forest:** By 250-600 years, very large trees as well as young seedlings and saplings grow here. Openings in the canopy allow sunlight to reach the forest floor, so a variety of shrubs and ground cover plants can grow. There are many large snags, hollow trees, and fallen logs. Branches of the large trees prevent snow from covering shrubs and ground cover plants even in severe winters.