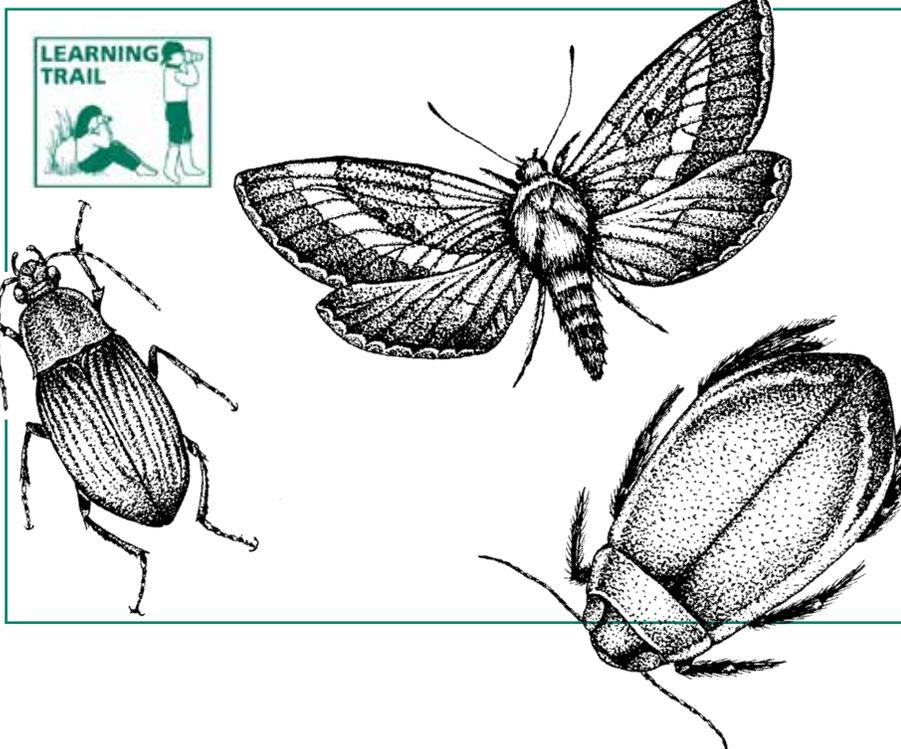


Insect Signs

1 EXTENSION

ALERT: ALASKA ECOLOGY CARDS REQUIRED



Section 2 FOREST ACTIVITIES

Grade Level: K - 12

State Standards: A A-1, L B-3

NGSS: K-LS1-1., K-ESS3-1., 2-LS4-1
3-LS4-3., 4-LS1-1, 5-LS2-1.
MS-LS2-3.

Subject: Science

Skills: Observing, comparing,
inferring, identifying

Duration: 50 minutes

Group Size: Individuals

Setting: Outdoors & indoors

Vocabulary: Cambium, consumer,
food chain, gall, habitat, larvae,
names of insects, predator, prey,
sap

Objective:

Students will identify signs of insect activity and determine the role of insects in a forest food chain.

Complementary Activities:

OUTDOOR – “Detritivores,” “Forest Ecosystem Scavenger Hunt,” “Mammal Signs,” and “Bird Signs” in this section; “Snag a Home” in Section 4, *Succession*. *INDOOR* – “Forest Food Web Game” in this section.

Materials:

Copies of “Insect Signs Chart” and “Insect Signs Science Card” (next page) for each student, hand lens, clipboards and writing paper or field note books, pencils or pens. *Alaska Ecology Cards* of forest insects.

Background:

See *INSIGHTS*, Section 2, *Forest Ecosystems*.

Procedure:

IN ADVANCE, locate a forest site with a variety of live plants (trees, shrubs, and groundcover) and dead leaves. Look for a spot that shows galls (see illustration on *Insect Signs Chart*) on plants, or a tree with bark engravings or

reddish brown sawdust at its base. Record the number and location of insect signs you find for later comparison with student notes.

1. *IN CLASS*, discuss the role of insects in the forest ecosystem. Are insects **consumers**? What do they consume? Where are they represented on a forest **food chain**?

2. Using the information on the *Alaska Ecology Cards* of forest insects, review some of the traits, **habitats**, **prey**, and **predators** before going to the forest site.

3. Discuss and compare student findings. Where do the found insects fit in the food chain? Students can use the *Alaska Ecology Cards* to illustrate information and enhance the discussion.

4. Pose the following questions: Will you find more or less insect signs at other seasons of the year. Why? How does this affect decomposition in the forest?

5. If they have studied other ecosystems (tundra, rainforests, wetlands, etc.), students compare what they found



in their local forest to the work and abundance of insects elsewhere.

EXTENSION:

Research forest insects and create a display. Students use the *Alaska Ecology Cards* or other “Curriculum Connections” resources (*following*) to find out more about their forest insects. They use this information along with sketches of the insect signs they found to make posters or a display of forest wildlife.

Curriculum Connections:

(See appendix for full citations)

Books:

Insects: A Guide to Familiar American Insects (Cottam)

Insects and Diseases of Alaskan Forests (Holsten)

National Audubon Society Field Guide to North American Insects and Spiders (Milne)

Website:

<https://www.gi.alaska.edu/AlaskaScienceForum/>

Teacher Resources:

(See appendix)

SCIENCE CARD

Insect Signs

Insects are some of the most important **consumers** in forest ecosystems. The “Insect Signs Chart” shows some of the evidence insects leave behind. How many of these signs can you find in this area?

1. Write the heading “Insect Signs” on a page in your field notebook. Record the number of different types of insect signs you find in this area.

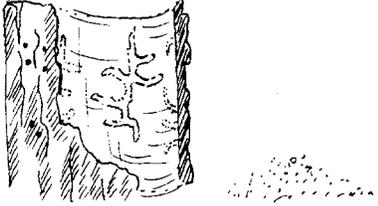
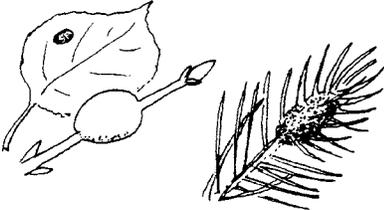
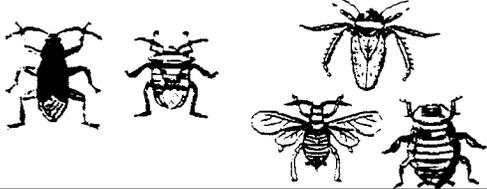
2. List each type of insect for which you find evidence. Draw a sketch to remind you what its sign looked like. Your sketch or its label should include the leaf or type of wood where you found the sign – the insect’s **habitat**.

3. Where do the insects whose evidence you found fit in the food chain? Would another kind of forest have different insects? Record your answers in your notebook.

4. If you find the insects themselves, draw a picture of them in your notebook to help you identify them later.



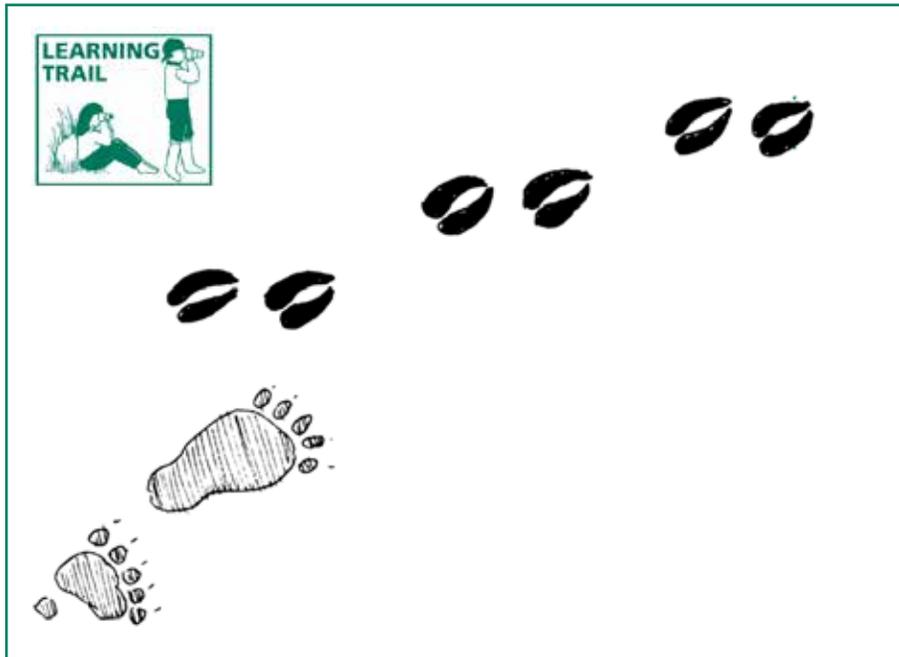
Insect Signs Chart

FEEDING METHOD	SIGNS	EXAMPLES OF INSECTS THAT LEAVE THESE SIGNS
Leaf-chewing Insects		 <p data-bbox="789 573 1430 604">Larvae of moths, butterflies, sawflies, and beetles</p>
Leaf-mining Insects		 <p data-bbox="789 835 1377 867">Tiny larvae of moths, beetles, flies, and wasps</p>
Leaf-rollers and Tent Caterpillars		 <p data-bbox="789 1083 1000 1115">Larvae of moths</p>
Cambium-eating Insects		 <p data-bbox="789 1329 1446 1360">Larvae of bark beetles, a few moths, and some flies</p>
Gall-making Insects		 <p data-bbox="789 1577 1382 1640">Wasps, flies, sawflies, gall-making aphids, and spruce aphid</p>
Sap-sucking Insects		 <p data-bbox="789 1881 959 1913">Adult Insects</p>



Mammal Signs

1 EXTENSION *ALERT: ALASKA ECOLOGY CARDS OPTIONAL*



Section 2 FOREST ACTIVITIES

Grade Level: 5-12

NGSS Standards: 5-ESS3-1,
MS-LS2-1, MS-LS2-2.

Subjects: Science, language arts

Skills: Observing, identifying,
inferring, comparing,
descriptive writing

Duration: 50 minutes

Group Size: Individuals

Setting: Outdoors

Vocabulary: Animal names,
carnivore, consumer, food chain,
habitat, herbivore, predator, prey

Objective:

Students will use a variety of signs to identify the presence of specific mammals and determine their diet.

Complementary Activities:

OUTDOOR— “Forest Ecosystem Scavenger Hunt,” “Insect Signs,” and “Bird Signs” in this section. “Track Casting” in Section 3, *Forest Learning Trail*. “Snag a Home” in Section 4, *Succession*. *INDOOR* — “Forest Food Web Game” in this section.

Materials:

Copies of “Mammal Signs Chart” (following) and “Mammal Signs Science Card” for each student, clipboards and writing paper or field note books, pencils or pens. *OPTIONAL:* *Animal Tracks of Alaska* and *Alaska Ecology Cards*.

Background:

See *INSIGHTS, Section 2, Forest Ecosystems*.

Procedure:

IN ADVANCE, locate several forest sites where you find evidence of two or more mammals. Good choices may be near open water, sites with snow, and areas with a variety of shelter. Record the number of signs you find on the instruction card below as an incentive for students. Make a separate record of the mammal signs at these sites for later comparison with student notes.

If desired, you can have students make a plaster track prints of what they find. See “Track Casting” in Section 3, *Forest Learning Trail*.

1. *IN CLASS*, brainstorm what kind of mammals live in a forest. Discuss what these animals obtain from a forest (*food, shelter, water, space* — **habitat**) and why forest habitat is important for their survival. Review **predator** and **prey** relationships.

2. Tell the students they will go in search of forest mammals. Students may not see specific animals, but they could find animal signs such as droppings, browse marks, or tracks.



3. Give each student the “Mammal Signs Science Card” and the “Mammal Signs Chart.”

Classroom Follow-Up:

1. Students discuss and compare their findings. Based on what they found, where do their animals fit in a forest **food chain** and forest **food web**?

2. Ask if they think they might find more or less mammal sign at other seasons of the year. Why?

3. Where might they go to find signs of mammals on the chart that were not found during class? What does that habitat offer that the class forest does not offer?

EXTENSION:

Research forest mammals and create a display. Students use the *Alaska Ecology Cards* or other “Curriculum Connections” resources (below) to find out more about their forest mammals. They use this information along with sketches of tracks and signs to make posters or a display of forest wildlife.

Curriculum Connections:

(See appendix for full citations)

Books:

Alaska Mammals (Smith)

Alaska Wildlife Notebook Series (ADF&G)

Animal Tracks of Alaska (Sheldon)

Animal Tracks of Alaska (Stall)

Mammals of Alaska (Alaska Geographic)

Teacher Resources:

(See appendix)

SCIENCE CARD

Mammal Signs

1. Write “Forest Mammals” at the top of a page in your field notebook. Record the number of mammals whose evidence you find in this area.

2. List mammals whose evidence you find along the left side of your page.

3. Write what you think they eat based on the signs you find on the right side of the page. Decide whether they are **herbivores** or **carnivores**.

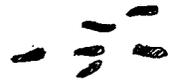
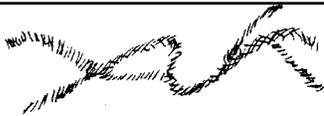
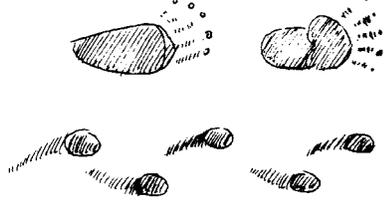
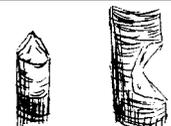
4. Write a short description of the signs next to each animal’s name. Try to compare each sign to something

familiar. Make a rhyme, or a humorous statement in order to help you remember which sign is evidence of which animal. (*For example: Deer droppings look like big chocolate chips. Hare-browsed willows are sharp. Ow!*)

5. If you find signs of other mammals while walking to or from this site, make notes of your findings on the page. The “Mammal Signs Chart” shows evidence of mammals that you might find in this forest. There are signs of at least ____ kinds of mammals in this area. Can you find these signs and identify them?

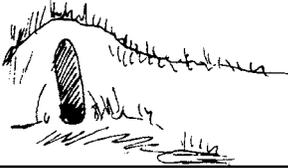
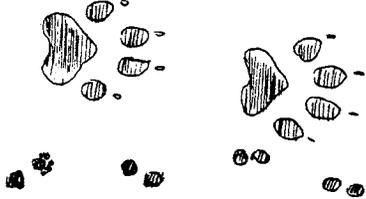
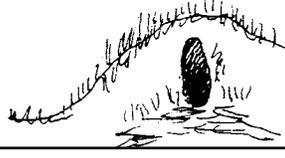
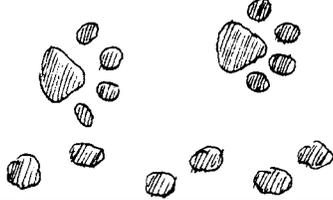
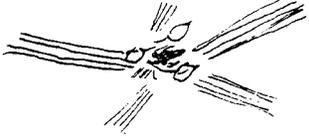
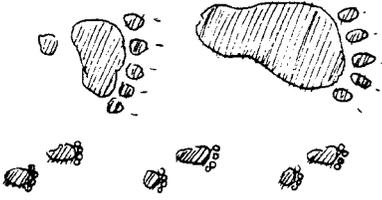
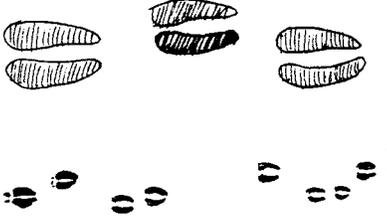
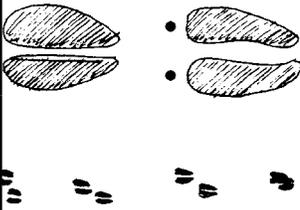


Mammal Signs Chart

ANIMAL	TRACKS	DROPPINGS	OTHER SIGNS
Shrew			
Vole, Mouse, or Lemming			 Tunnels under the snow or, after the snow melts, small piles of grasses lying in patterns like tunnels.
Squirrel			 Middens or large piles of cones, cone scales, and cone cobs. Also, mushrooms hanging in trees.
Snowshoe Hare			 Willows, birch, rose, aspen, or other plants with stems neatly clipped.
Porcupine			 Large strips or patches of bark missing from a tree trunk.
Beaver			 Tree stumps or branches with gnawing marks; lodges or dams of sticks and branches.
River Otter			 Strong odor; trampled grasses and plants, dens under tree roots, and sledding trails on small slopes.



Mammal Signs Chart

ANIMAL	TRACKS	DROPPINGS	OTHER SIGNS
Marten			
Fox or Coyote			
			Dens
Wolf			
			Dens
Lynx			
			Scraping around droppings
Bear			
			Grasses and sedges that have been grazed or clipped off. Skunk cabbage that is torn or dug up.
Deer			
			Huckleberry or other shrubs with stems that appear to have been chewed off.
Moose			
			Birch, aspen, willow, or other plants with stems roughly browsed (not neatly clipped).



Bird Signs

2 EXTENSIONS ALERT: ALASKA ECOLOGY CARDS OPTIONAL



Bird landing and walking in snow

Section 2 FOREST ACTIVITIES

Grade Level: 5 - 12

NGSS: 5-ESS3-1., MS-LS2-1.
MS-LS2-2.

Subject: Science

Skills: Observing, identifying,
inferring

Duration: 50 minutes

Group Size: Individuals

Setting: Outdoors

Vocabulary: Bird names, food
chain, food web, habitat

Objective:

Students will recognize bird signs and identify the species and behavior of any birds in the area.

Complementary Activities:

OUTDOOR – “Forest Ecosystem Scavenger Hunt,” “Mammal Signs,” and “Insect Signs” in this section; “Snag a Home” in Section 4, *Succession*. **INDOOR** – “Forest Food Web Game” in this section.

Background:

See **INSIGHTS**, Section 2, *Forest Ecosystems*.

Materials:

“Bird Signs Chart” and “Bird Signs Science Card” for each student, clipboards and writing paper or field note books, pencils or pens.

OPTIONAL: Field guides to animal tracks and birds, binoculars, and *Alaska Ecology Cards*.

Procedure:

IN ADVANCE, locate several forest sites where you can find evidence of several birds. Good choices may be near open water, sites with snow, and areas with a variety of

shelter. *It is okay to salt the area you choose with a feather or raptor casting.* Record the number and kinds of bird signs you find for later comparison with student observations and notes. Fill in the number of signs on the “Bird Signs Science Card.”

1. **IN CLASS**, brainstorm what kind of birds live in a forest. Discuss what these wildlife obtain from a forest (*food, shelter, water, space* — **habitat**) and why forest habitat is important for their survival. Review the concept of **food chains**. Where are birds on the forest food chain?

2. Tell the students they will go in search of forest birds. Students may not see specific birds, but they could hear birds or find bird signs such as feathers, nests, whitewash (droppings), or tracks.

3. Give each student the “Bird Signs Science Card” and the “Bird Signs Chart.”

Classroom Follow-Up:

1. Students discuss and compare their findings. Based on what they found, what do their birds need in the forest ecosystem? Where do they fit in the forest **food web**?



2. Ask if they think they might find more or less bird sign at other seasons of the year. Why?

3. Where might they go to find the birds or their signs illustrated on the Chart that were not found during class? What does that habitat offer that the class forest does not offer?

EXTENSIONS:

A. **Research forest birds and create a display.** Students use the *Alaska Ecology Cards* or other “Curriculum Connections” resources (*following*) to find out more about their forest birds. They use this information along with sketches of tracks or signs to make posters or a display of forest wildlife.

B. **Set up a winter bird feeding station visible from the classroom.** If a wooded area is near your classroom window, depending on grade level, students set up a winter bird feeding station after researching the best devices, food, and location through their local Alaska Fish and Game office, Audubon Chapter, or “Curriculum Connections” (*below*).

Students keep a class chart of the kinds of birds that come to their feeding station, how often they are seen, and note their behaviors. Before the school year ends, students calculate the results and discuss the seasonal changes in bird visits.

Curriculum Connections:

(See appendix for full citations)

Books:

Alaska Wildlife Notebook Series (ADF&G)

Guide to the Birds of Alaska (Armstrong)

The National Audubon Society North American Birdfeeder Handbook (Burton)

Teacher Resources:

(See appendix)

SCIENCE CARD

Bird Signs

You have heard of mammal tracks. Did you know birds leave signs too? Open your eyes and look carefully, you will be able to find ____ bird signs that are in this area.

1. Write “Forest Birds” at the top of a page in your notebook.

2. Record the number of birds whose evidence you find at this site. Then list them by name along the left side of the page.

3. Listen and look carefully, for these birds may still be nearby. Have one person in your group repeatedly make a shhh, shhh, shhh sound. Sometimes birds will move or call when they hear this sound.

4. If you see birds, watch them. Can you identify them using the guide book? Watch and record their behavior.

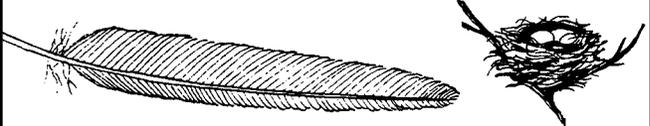
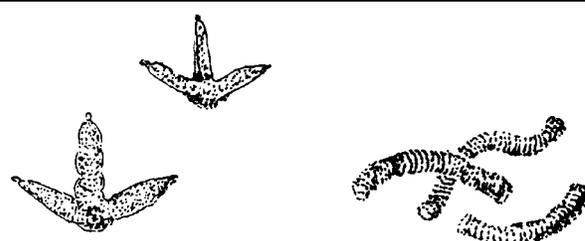
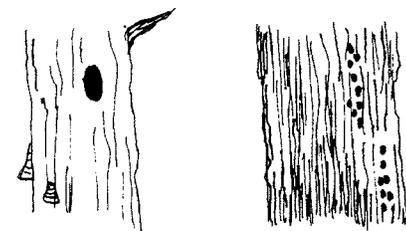
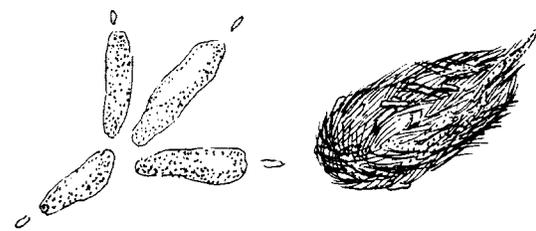
What trees do they like most? Are they eating? Gathering sticks? Record what you see in sketches or words.

5. If you found signs of grouse or woodpeckers, look for these groups in a field guide to birds. Based on the season and the habitat you are in, can you figure out which kind of grouse or woodpeckers might be in this area? List the species you think are most likely to have made the signs.

6. If you find signs of other birds enroute to the site, make notes of your findings in your notebook.



Bird Signs Chart

BIRD	SIGNS	
Signs Left by Many Birds		Feathers, sticks or grass nests
Grouse		Grouse make 3-toed tracks on solid snow or wet soil, but in deep soft snow they make a trail that looks like a ditch in the snow. Their droppings seem dry and are shaped like fat worms. Listen for their hooting or low drumming calls.
Woodpeckers		Listen for tapping or drumming sounds. Look on live and dead trees for small or large holes that look like something drilled into the bark of the tree. Also look for flakes of bark around the base of trees.
Raven		Droppings and tracks around a dead animal. Hoarse croaking sounds.
Hawks and Owls		Hawks and owls regurgitate pellets of fur, feathers, and other indigestible bits of the prey. These pellets are cleaned of all meat, so that they smell and feel clean.
Songbirds		Listen for twittering, chirping, or other calls and songs.